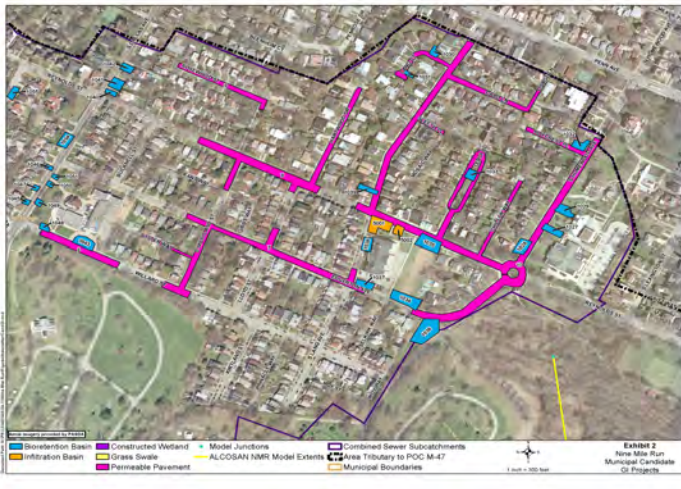


3 Rivers Wet Weather Evaluation of the Feasibility of Green Infrastructure Implementation



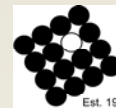
Nine Mile Run Sewershed
Girty's Run Sewershed
McNeilly Run Sewershed

SITUATE IN:
City of Pittsburgh,
Borough of West View, and
Borough of Millvale
Allegheny County

Draft February 20, 2013
Final May 15, 2013

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WADETRIM



**3 Rivers Wet Weather Evaluation of the Feasibility of
Green Infrastructure Implementation
for the Nine Mile Run, Girty’s Run and McNeilly Run Sewersheds
in Allegheny County, PA
Final May 15, 2013**

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LIST OF ABBREVIATIONS/ACRONYMS

3RWW	3 Rivers Wet Weather
ACHD	Allegheny County Health Department
ACO	Administrative Consent Order
ALCOSAN	Allegheny County Sanitary Authority
BMP	Best Management Practices
CSO	Combined Sewer Overflow
DEM	Digital Elevation Model
DEP	Pennsylvania Department of Environmental Protection
DOJ	Department of Justice
EPA	Environmental Protection Agency
FSWG	Feasibility Study Working Group
ft	Feet
GI	Green Infrastructure
GIS	Geographic Information Systems
gpd	gallons per day
H&H	Hydraulic and Hydrologic
HRU	Hydrologic Response Unit
I/I	Infiltration and Inflow
LF	Linear Feet
LTCP	Long Term Control Plan
MG	Million Gallons
mgd	Million Gallons Per Day
NLCD	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System
NRCS SSURGO	Natural Resources Conservation Service Soil Survey Geographic Database
O&M	Operation and Maintenance
PaDEP	Pennsylvania Department of Environmental Protection
POC	Point of Connection
SUSTAIN	System for Urban Stormwater Treatment and Analysis INtegration
SWMM	Storm Water Management Model
TMDL	Total Maximum Daily Load
USGS NED	United States Geological Survey National Elevation Dataset
USGS NHD	United States Geological Survey National Hydrography Dataset
WWP	Wet Weather Plan

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Introduction

In recent years, incorporating Green Infrastructure (GI) into Combined Sewer Long Term Control Plans (LTCPs) and Wet Weather Plans (WWPs) has not only become more common place but has also, in certain instances, become a Plan element required by regulatory agencies. However, unlike more traditional grey infrastructure solutions consisting of combined sewer separation, upsized conveyance, storage tanks and treatment, an engineering assessment methodology has not yet been established to evaluate green infrastructure on an area-wide (e.g. sewershed, drainage basin, or municipal) basis at a planning level.

The goal of this project, which was funded by a grant from the R. K. Mellon Foundation, was to develop an engineering assessment approach and present a planning level technical/cost-effectiveness based methodology that could be used by municipalities to evaluate the potential for incorporating site specific green infrastructure methods and projects into their feasibility studies. The engineering methodology described herein is founded on science, technical information and data developed by and available from various public/governmental sources. The analysis was performed utilizing:

- U S Environmental Protection Agency's (EPA) System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN), best management practices (BMP) siting tool module to identify locations of potential GI BMP features within a given sewershed and
- 3 Rivers Wet Weather's (3RWW) RainWays tool to analyze sizing, and flow reduction effectiveness and implementation cost elements.

The assessment presented herein describes a planning level evaluation of prospective GI projects for consideration of implementation on a municipal and/or commercial/institutional level. As with any planning level analysis, more detailed site and sewershed specific analysis is

required before definitive conclusions can be reached regarding either the viability or cost-effectiveness of any potential GI projects identified herein.

Grey vs. Green Overview

It is specifically noted that this project addressed only one facet of the three that comprise a comprehensive source flow reduction alternative to typical grey infrastructure solutions. The remaining two facets, separation of combined sewers where green is not recommended as a tributary source flow alternative, and source flow reduction in separate sewers, should also be addressed as part of a comprehensive evaluation. A discussion of all three facets should be included in any comparative analysis of grey vs. green.

Approach

The combined sewer areas of three pilot sewersheds were analyzed to develop the process for evaluating sites for potential GI projects. The Nine Mile Run Sewershed (785 acres), Girty's Run Sewershed subdivided into Millvale (277 acres) and West View (542 acres), and McNeilly Run Sewershed (285 acres) were the pilot areas 3RWW identified as having potential to be beneficially impacted by GI projects based upon their relative sizes, extent of combined sewers, previous analysis and number of overflow structures.

An overview diagram presenting the approach and technical process is presented as Attachment A. This analysis begins with widely available GIS data and ends with identification of specific suggestions for GI BMP projects, cost estimates, and estimates of annual volumetric flow reduction. As shown on Attachment A, the evaluation was prepared for varying "areas of interest." Elements of the analyses were completed for the entire ALCOSAN service area, elements were completed for combined sewer systems at the SWMM sub-catchment level, and other elements were completed (summarized) at the ALCOSAN Point of Connection (POC) level.

The following sections describe in more detail the various steps of the process shown on Attachment A.

Area of Interest: ALCOSAN Service Area - EPA SUSTAIN Analysis / BMP GIS Features

The initial elements of the analysis are accomplished with EPA’s SUSTAIN program Framework Manager, an ArcGIS methodology utilized to identify potential sites for BMPs within a given geographic area based on eight specific design criteria such as slope, drainage area, soil conditions, groundwater depth, and isolation distances to roads, streams and buildings. Utilizing the BMP siting module of SUSTAIN the first step was the identification of locations of “BMP GIS Features” which are simply GIS polygons that depict locations and areas where all identified site suitability criteria applicable to implementation of a specific GI BMP appear to be met. Table 1 presents a listing of the parameters and data sources utilized to perform the SUSTAIN siting criteria analysis:

Table 1		
GIS Data	Type	Source
Soils	vector	NRCS SSURGO
GW Depth	vector	NRCS SSURGO
Land Owner	vector	Landbase Systems Parcels
Roads	vector	Landbase Systems Surface Cover Enhanced by PM Team Urban Land Use (vector) layer
Streams	vector	USGS NHD
Urban Land Use	vector	Landbase Systems Surface Cover Enhanced by 2008 Allegheny County Building Footprints
DEM 10-m resolution	raster	USGS NED
Impervious	raster	Surface Cover at 30-m resolution enhanced by Urban Land Use (vector) for better resolution of 10 ft.
Land Use	raster	ALCOSAN Parcels with NLCD 2006 used to fill gaps

SUSTAIN was developed to evaluate 14 specific GI BMPs including variations of trenches, ponds, infiltration basins/gardens, permeable/porous pavement, etc. For the purposes of this

project, these 14 BMPs were reduced to six broader categories of BMP's (See Table 2 below, yellow highlighted BMPs preserved) more appropriate to an area-wide assessment.

Cisterns and rain barrels were excluded from the SUSTAIN analysis because these BMPs can be placed at most properties located within the sewershed without regard to soils, slope, perviousness, etc. Likewise, Green Roofs were segregated for analysis outside of SUSTAIN. Dry ponds and sand filters were eliminated completely from the analysis because they are not considered appropriate technologies for Combined Sewer source reduction.

Out of the box, SUSTAIN defines eight generic "default" siting criteria values for each BMP. These "default" criteria values are understood to be widely applicable throughout the country. However, for the Allegheny County evaluation, initial SUSTAIN runs utilizing the default criteria values produced findings that did not agree with actual local site conditions. To correct for this finding, an analysis was undertaken directed at refining the eight criteria values to be more representative of conditions in Southwestern Pennsylvania. Using knowledge of local conditions and engineering judgment, the PM Team developed local criteria that were provided to the Westmoreland Conservation District engineer for review and comment. Table 2 below presents the Allegheny County specific SUSTAIN BMP screening criteria utilized to establish the BMP GIS Features map. Figures A-1, B-1, C-1 and D-1, (Appendices A, B, C, and D) present the resultant BMP GIS Features for each of the pilot sewersheds.

Table 2

No.	BMP	Drainage Area (acre)	Drainage Slope (%)	Impervious (%)	Hydrological Soil Group	Water Table Depth (ft)	Road Buffer (ft)	Stream Buffer (ft)	Building Buffer (ft)
1	Bioretention	< 2	< 5%	> 0%	A-D	> 2	>5	>25	>15
2	Cistern	-	-	-	-	-	-	-	< 30
3	Constructed Wetland / Wet Pond	> 25	< 15%	-	B-D	> 2	>25	> 100	>100
4	Dry Pond	> 10	< 15%	> 0%	A-D	> 4	-	> 100	-
5	Grassed Swale / Bioswale	< 5	< 4%	-	A-D	> 2	< 100	-	>15
6	Green Roof	-	-	-	-	-	-	-	-
7	Infiltration Basin / Trench	< 10	< 15%	-	A-B	> 4	>25	> 100	>25
8	Infiltration Trench	< 5	< 15%	> 0%	A-B	> 4	-	> 100	-
9	Porous Pavement (Concrete/Asphalt) / Permeable Interlocking Paver	< 3	< 5%	> 0%	A-D	> 2	-	>100	-
10	Rain Barrel	-	-	-	-	-	-	-	< 30
11	Sand Filter (non-surface)	< 2	< 10%	> 0%	A-D	> 2	-	> 100	-
12	Sand Filter (surface)	< 10	< 10%	> 0%	A-D	> 2	-	> 100	-
13	Vegetated Filter Strip / Grass Buffer	-	< 10%	-	A-D	> 2	< 100	-	>50
14	Wet Pond	> 25	< 15%	> 0%	A-D	> 4	-	> 100	-

Area of Interest: ALCOSAN Combined Service Area - Development of Concept Projects

As shown on the process diagram (Attachment A), once the BMP GIS Features have been identified within the combined sewer areas, the process proceeds to development of concept projects. Three categories of projects/features were ultimately identified:

- Concept Municipal GI Projects
- Concept Commercial/Institutional GI Projects, and
- Residential BMP Features.

Identification of Concept Municipal GI Projects

Following mapping of GIS features, a series of steps are utilized to organize and screen the diverse/disperse GIS features to identify Concept Municipal GI Projects. Generally this process includes:

- Consolidate BMP GIS Features into BMP Features.
- Group BMP Features by SWMM Model sub-catchment.
- Apply the screening criteria to identify projects that would likely be municipally owned, operated and maintained. This process consists primarily of evaluating location and access to potential projects. Generally the features/projects must be within the municipal right-of-way or on vacant, accessible land that could be purchased by the municipality.
- Apply Feasibility Filtering Criteria
 - Avoid/exclude areas with existing tree cover.
 - Identify BMP features that can be used to capture stormwater prior to entering combined sewer system. (i.e. not “end-of-pipe” projects).
 - Identify and select “stand-alone” BMPs: Permeable Pavement, Bioretention, and in areas outside of dense residential neighborhoods, Infiltration Basins and Constructed Wetlands.

- Other BMPs such as Grass Swales and Vegetated Filter Strips were looked at only if they could be used in conjunction (conveyance purposes) with a “Stand-Alone” BMP.

This process yielded two sets of features: “Municipal BMP Features” consisting of BMP features that were at least conceptually feasible to be owned, operated, and maintained by a municipal entity, or “Residual Non-Municipal BMP Features”. As shown on Attachment A, this latter category of features was further segregated into Commercial/Institutional or Residential features for processing. The “Commercial/Institutional BMP Features” defined GI features on large private sites; and the “Residential BMP Features” defined residual BMP features that were not incorporated into either of the other categories but that offer potential for neighborhood projects such as rain garden installations by individuals or community groups.

- Merge the “BMP features” into “candidate projects”. Once the Municipal and Commercial/Institutional BMP Features were identified and consolidated in an area, engineers merged the features into larger potential street/neighborhood level BMP projects that were defined as “candidate projects”. Figures A-2.1 and A-2.2, B-2, C-2 and D-2 (Appendices A, B, C, and D) present the resultant Concept Municipal GI Projects by SWMM Model sub-catchment for each of the pilot sewersheds.

RainWays Municipal Tool Analysis

The resultant Concept Municipal GI Projects were then accumulated and analyzed via GIS procedures and 3RWW’s web based RainWays tool on a sub-catchment wide basis to:

- Identify and quantify the surface drainage areas and runoff characteristics (HRU, pervious/impervious) tributary to the individual GI projects,
- Size the Concept Municipal GI Project for each BMP type; based on design sizing criteria,

- Evaluate effectiveness in reducing runoff, and
- Develop capital and operating cost estimates associated with specific BMPs including Present Worth Values calculated assuming a 20 year term at 1% interest.

Underlying this process are the following simplifying assumptions:

- 1) In cases of overlapping drainage area between permeable pavement and un-improved surface infiltration BMPs, the area of overlap was assigned to the un-improved surface infiltration BMP,
- 2) All Concept Municipal GI Projects for each BMP type were analyzed and costs were developed assuming an underdrain that outlets to the combined sewer system,
- 3) Capture values assume that 100% of the runoff from the individual drainage area of each BMP site is directed to the BMP site, all catch basins / inlets in tributary drainage area are closed off, and all roof leaders in tributary drainage areas are disconnected from the combined sewers and re-directed to the BMP,
- 4) Additional costs to convey flow to or from the Concept Municipal GI Projects to a point of discharge were not included in the analysis, and
- 5) Estimates of percent reduction and frequency of overflow in RainWays Regulator Reports are indicative findings based on a simple modification of the ALCOSAN 1st generation H&H models, obtained in 2011, that relate modification of initial abstraction to overflow volumes and frequency; actual SWMM H&H GI modeling is recommended.

Tabulations presented on Figures A-2.1 and A-2.2, B-2, C-2 and D-2 (located in Appendices A through D, respectively) present the drainage areas tributary to each Concept Municipal GI Project for each of the pilot sewersheds.

For each of the pilot sewersheds, tables (A 1.1 – 1.16, B 1.1- 1.6, C 1.1 – 1.16 and D 1.1 -1.7) are provided in the appendices of this document that contain the output analysis from this process. As noted on the referenced tables, the Concept Municipal GI Projects were sized to capture the first inch of runoff for the drainage areas tributary to the individual GI Projects. The upper section of each table presents the effective design size (area) of each Concept Municipal

GI Project by BMP type as well as the drainage area tributary to each. (This information is discussed by pilot sewershed below.)

Residual Non-Municipal BMP Features

In addition to the Candidate Municipal GI Projects, the screening process also defined Residual Non-Municipal BMP Features, which were subsequently separated into Commercial/Institutional BMP Features and Residential BMP Features.

The Commercial / Institutional BMP Features were subjected to a similar process as the Municipal BMP Features, whereby additional screening criteria were applied to identify Concept Commercial/Institutional GI Projects for analysis in 3RWW's web based RainWays tool on a sub-catchment basis. These additional criteria consisted of identifying large parking lots suitable for permeable pavement; and buildings with a "footprint" exceeding 5,000 sq.ft.; and a flat roof for application of green roofs. Figures A-3, B-3, C-3 and D-3 (located in Appendices A through D) present the Concept Commercial/Institutional GI Projects for each of the pilot sewersheds. These Concept Commercial/Institutional GI Projects were then analyzed in 3RWW's web based RainWays tool on an individual basis utilizing the same criteria above for the Concept Municipal GI Projects. For each of the pilot sewersheds, tables are provided in the appendices of this document that contain the output analysis from this process.

The remaining BMP Features that did not fit into the categories described above are identified as Residential BMP Features, which were subsequently screened for unimproved surface infiltration type BMPs. Figures A-4, B-4, C-4 and D-4 (located in Appendices A through D) for each of the pilot sewersheds present the remaining Residential Infiltration Features.

Summary of Findings and Project Deliverables

The following sections provide a summary of the analysis performed and results for the three pilot sewersheds: Nine Mile Run Sewershed, Girty's Run Sewershed subdivided into Millvale and West View, and McNeilly Run Sewershed.

Nine Mile Run Sewershed

The Nine Mile Run Sewershed is located within the ALCOSAN Upper Monongahela Planning Basin and is tributary to ALCOSAN Point-of-Connection (POC) M-47. The sewershed is a mixed sewershed, meaning it consists of both separate sanitary sewers and combined sewers. The separate sanitary sewers are located within the Boroughs of Churchill, Edgewood, Swissvale and Wilkesburg, the Municipality of Penn Hills and a portion of the City of Pittsburgh. The combined sewers are located within the City of Pittsburgh. As previously stated, this study was limited to the combined sewer areas, which in the M-47 sewershed consisted of 785 acres of mixed use, predominantly moderate density residential development, park/open space, with some commercial/institutional areas.

Nine Mile Run Sewershed - BMP GIS Features

The SUSTAIN BMP siting tool analysis resulted in identification of a total of 6,323 BMP GIS Features covering 228 acres, which consisted of the following:

- Permeable Pavement: 1,390 features comprising 50.5 acres
- Bioretention: 1,911 features comprising 59.6 acres
- Infiltration Basins/Trenches: 524 features comprising 23.1 acres
- Vegetated Filter Strips: 761 features comprising 47.1 acres
- Grass Swales: 1,701 features comprising 46.6 acres, and
- Constructed Wetlands: 36 features comprising 1.1 acres.

Locations of all identified BMP GIS features are presented on Figure A-1 of Appendix A.

Nine Mile Run Sewershed - Concept Municipal GI Projects

Based on the GI BMP features, concept Municipal GI Projects were identified in 16 out of 17 ALCOSAN combined system SWMM model sub-catchments within the Nine Mile Run

Sewershed. Table A-1.1 through A-1.16 of Appendix A presents a summary of the results of the Concept Municipal GI Projects analysis by SWMM model sub-catchment.

Tables A-2.1 through A-2.16 of Appendix A summarizes the RainWays input data (HRU, drainage area etc.) by type of Concept Municipal GI Project by sub-catchment. The location of this tabulated information is also presented graphically on Figures A-2.1 and A-2.2 of Appendix A. Individual RainWays output for each sub-catchment is presented in Appendix A, while Table A-3 of Appendix A presents a summary of the overall effectiveness for the entire Nine Mile Run sewershed.

In summary, as shown on Table A-3, out of a total 785 acres of combined sewershed area, 321 Concept Municipal GI Projects were identified that could potentially control the runoff from approximately 161 acres, yielding an estimated 21% effective annual runoff reduction, about 51 MG annual volume based on capture of the first inch of runoff for the typical year precipitation pattern, at a capital cost of \$3.38 million.

Nine Mile Run Sewershed - Concept Commercial/Institutional GI Projects

Concept Commercial/Institutional GI Projects were identified in 6 out of 17 ALCOSAN combined system SWMM model sub-catchments within the Nine Mile Run Sewershed. Tables A-4.1 through A-4.2 and Tables A-5.1 through A-5.3 of Appendix A present a summary of the Concept Commercial/Institutional GI Projects for each regulator for permeable pavement and green roofs, respectively. The Concept Commercial/Institutional GI Projects along with tributary drainage area for permeable pavement is presented graphically on Figure A-3 of Appendix A.

Regulator based RainWays output for Concept Commercial/Institutional GI Projects for permeable pavement is presented in Appendix A while Table A-6 and A-7 of Appendix A presents a summary of the overall effectiveness for the entire Nine Mile Run sewershed for permeable pavement and green roofs, respectively.

In summary, as shown on Tables A-6 and A-7, out of a total available 785 acres of combined sewershed area, 32 Concept Commercial/Institutional GI Green Roof and Permeable Pavement Projects were identified that could potentially control the runoff from approximately 15 acres, yielding an estimated 3.87% effective annual runoff reduction, about 9.2 MG annual volume based on capture of the first inch of runoff for the typical year precipitation pattern, at a capital cost of \$5.35 million.

Nine Mile Run Sewershed - Residential BMP Features

Figure A-4 of Appendix A presents the Residential BMP Features. No further analysis was performed for these.

Girty's Run Sewershed – West View

The Girty's Run Sewershed – West View is located within the ALCOSAN Lower Ohio/Girty's Run Planning Basin and is tributary to ALCOSAN POC A-67. The West View portion of the Girty's Run sewershed consists of a total of 542 acres, of which, 460 acres are a combined sewer system serving mixed use, predominantly moderate density residential development, park/open space, with some commercial/institutional area.

Girty's Run Sewershed – West View - BMP GIS Features

The SUSTAIN BMP siting tool analysis resulted in identification of a total of 1,331 BMP GIS Features covering 31.2 acres, which consisted of the following:

- Permeable Pavement: 211 features comprising 7.3 acres
- Bioretention Basins: 400 features comprising 8.9 acres
- Infiltration Basins/Trenches: 141 features comprising 3.8 acres
- Vegetated Filter Strips: 239 features comprising 5.5 acres
- Grass Swales: 338 features comprising 5.8 acres, and
- Constructed Wetlands: 2 features comprising 0.004 acres

Locations of all identified BMP GIS features are presented on Figure B-1 of Appendix B.

Girty's Run Sewershed – West View - Concept Municipal GI Projects

Concept Municipal GI Projects were identified in 6 out of 7 ALCOSAN combined system SWMM model sub-catchments within the West View portion of the Girty's Run Sewershed. Table B-1 of Appendix B presents a summary of the Concept Municipal GI Projects for each SWMM model sub-catchment.

Tables B-2.1 through B-2.6 of Appendix B summarize the RainWays input data (HRU, drainage area etc.) by type of Concept Municipal GI Project by sub-catchment. The locations of this tabulated information are also presented graphically on Figure B-2 of Appendix B. Individual RainWays output for each sub-catchment is presented in Appendix B, while Table B-3 of Appendix B presents a summary of the overall effectiveness for the West View portion of the Girty's Run Sewershed.

In summary, as presented on Table B-3, out of a total 460 acres of combined sewershed area, 120 Concept Municipal GI Projects were identified that could potentially control the runoff from approximately 48 acres, yielding an estimated 8.5% effective annual runoff reduction, about 13.4 MG annual volume based on capture of the first inch of runoff for the typical year precipitation pattern, at a capital cost of \$0.95 million.

Girty's Run Sewershed – West View - Concept Commercial/Institutional GI Projects

Concept Commercial/Institutional GI Projects were identified in 3 out of 7 ALCOSAN combined system SWMM model sub-catchments within the West View portion of the Girty's Run Sewershed. Tables B-4.1 through B-4.2 and Tables B-5.1 through B-5.3 of Appendix B present a summary of the Concept Commercial/Institutional GI Projects for each regulator for permeable pavement and green roofs, respectively. The Concept Commercial/Institutional GI Projects along

with tributary drainage area for permeable pavement are presented graphically on Figure B-3 of Appendix B.

Regulator based RainWays output for each Concept Commercial/Institutional GI Projects for permeable pavement is presented in Appendix B while Table B-6 and B-7 of Appendix B presents a summary of the overall effectiveness for the entire West View portion of the Girty's Run Sewershed for permeable pavement and green roofs, respectively.

In summary, as shown on Tables B-6 and B-7, out of a total 460 acres of combined sewershed area, 28 Concept Commercial/Institutional GI Green Roof and Permeable Pavement Projects were identified that could potentially control the runoff from approximately 8 acres, yielding an estimated 2.23% effective annual runoff reduction, about 3.5 MG annual volume based on capture of the first inch of runoff for the typical year precipitation pattern, at a capital cost of \$2.45 million.

Girty's Run Sewershed – West View - Residential BMP Features

Figure B-4 of Appendix B presents the Residential BMP Features. No further analysis was performed for these.

Girty's Run Sewershed – Millvale

The Girty's Run Sewershed – Millvale is located within the ALCOSAN Upper Allegheny Planning Basin and is tributary to ALCOSAN POC A-67. The Millvale portion of the Girty's Run sewershed consists of a total of 277 acres consisting of a combined sewer system serving mixed use, predominantly high density residential commercial/institutional area.

Girty's Run Sewershed – Millvale - BMP GIS Features

The SUSTAIN BMP siting tool analysis resulted in identification of a total of 1,076 BMP GIS Features covering approximately 26 acres, which consisted of the following:

- Permeable Pavement: 259 features comprising 12.8 acres
- Bioretention Basins: 322 features comprising 5.4 acres
- Infiltration Basins/Trenches: 10 features comprising 0.8 acres
- Vegetated Filter Strips: 120 features comprising 2.0 acres
- Grass Swales: 364 features comprising 4.96 acres, and
- Constructed Wetlands: 1 feature comprising 0.01 acres.

Locations of all identified BMP GIS features are presented on Figure C-1 of Appendix C.

Girty's Run Sewershed – Millvale - Concept Municipal GI Projects

Concept Municipal GI Projects were identified in 16 out of 22 ALCOSAN combined system SWMM model sub-catchments within the Millvale portion of the Girty's Run Sewershed. Tables C-1.1 through C-1.16 of Appendix C present a summary of the Concept Municipal GI Projects for each SWMM model sub-catchment.

Tables C-2.1 through C-2.16 of Appendix C summarize the RainWays (HRU, drainage area etc.) input data by type of concept Municipal GI Project by sub-catchment. This information is also presented graphically on Figure C-2 of Appendix C. Individual RainWays output for each sub-catchment is presented in Appendix C, while Table C-3 presents a summary of the overall effectiveness for the Millvale portion of the Girty's Run sewershed.

In summary, as presented on Table C-3, out of an available 277 acres of combined sewershed area, 56 Concept Municipal GI Projects were identified that could potentially control the runoff from approximately 35 acres, yielding an estimated 12.6% effective annual runoff reduction, about 11.5 MG annual volume based on capture of the first inch of runoff for the typical year precipitation pattern, at a capital cost of \$0.75 million.

Girty's Run Sewershed – Millvale - Concept Commercial/Institutional GI Projects

Concept Commercial/Institutional GI Projects were identified in 14 out of 22 ALCOSAN combined system SWMM model sub-catchments within the Millvale portion of the Girty's Run Sewershed. Tables C-4 and Table C-5 of Appendix C present a summary of the Concept Commercial/Institutional GI Projects for each regulator for permeable pavement and green roofs, respectively. The Concept Commercial/Institutional GI Projects along with tributary drainage area for permeable pavement is presented graphically on Figure C-3 of Appendix C.

Regulator based RainWays output for each Concept Commercial/Institutional GI Project for permeable pavement is presented in Appendix C, while Table C-6 and C-7 of Appendix C present a summary of the overall effectiveness for the entire Millvale portion of the Girty's Run Sewershed for permeable pavement and green roofs, respectively.

In summary, as presented on Tables C-6 and C-7, out of an available 277 acres of combined sewershed area, 49 Concept Commercial/Institutional GI Green Roof and Permeable Pavement Projects were identified that could potentially control the runoff from approximately 11.54 acres, yielding an estimated 9.4% effective annual runoff reduction, about 8.6 MG annual volume based on capture of the first inch of runoff for the typical year precipitation pattern, at a capital cost of \$7.30 million.

Girty's Run Sewershed – Millvale - Residential BMP Features

Figure C-4 of Appendix C presents the Residential BMP Features. No further analysis was performed for these.

McNeilly Run Sewershed

The McNeilly Run Sewershed is located within the ALCOSAN Saw Mill Run Planning Basin and is tributary to ALCOSAN POC S-15. The sewershed is a mixed sewershed meaning it consists of both separate sanitary sewers and combined sewers. The separate sanitary sewers are

located within the Borough of Dormont, Township of Baldwin and the Municipality of Mt. Lebanon. The combined sewers are located within the City of Pittsburgh. As previously stated, this study was limited to the combined sewer areas, which in the S-15 sewershed consisted of 285 acres serving land use predominately moderate density residential development.

McNeilly Run Sewershed - BMP GIS Features

The SUSTAIN BMP siting tool analysis resulted in identification of a total of 1,127 BMP GIS Features covering 18.76 acres, which consisted of the following:

- Permeable Pavement: 408 features comprising 8.5 acres
- Bioretention Basins: 325 features comprising 3.7 acres
- Infiltration Basins/Trenches: 10 features comprising 0.6 acres
- Vegetated Filter Strips: 99 features comprising 2.5 acres
- Grass Swales: 285 features comprising 3.5 acres, and
- Constructed Wetlands: 0 features.

Locations of all identified BMP GIS features are presented on Figure D-1 of Appendix D.

McNeilly Run Sewershed - Concept Municipal GI Projects

Concept Municipal GI Projects were identified in 7 out of 7 ALCOSAN combined system SWMM model sub-catchments within the McNeilly Run Sewershed. Table D-1 of Appendix D presents a summary of the Concept Municipal GI Projects for each SWMM model sub-catchment.

Tables D-2 of Appendix D summarizes the RainWays input data (HRU, drainage area etc.) by type of concept Municipal GI Project by sub-catchment. This information is also presented graphically on Figure D-2 of Appendix D. Individual RainWays output for each sub-catchment is presented in Appendix D while Table D-3 of Appendix D presents a summary of the overall effectiveness for the entire McNeilly Run sewershed.

In summary, as presented on Table D-3, out of a total available 285 acres of combined sewershed area, 91 Concept Municipal GI Projects were identified that could potentially control the runoff from approximately 61 acres, yielding an estimated 20.3% effective annual runoff reduction, about 20.8 MG annual volume based on capture of the first inch of runoff for the typical year precipitation pattern, at a capital cost of \$1.43 million.

McNeilly Run Sewershed - Concept Commercial/Institutional GI Projects

Concept Commercial/Institutional GI Projects were identified in 4 out of 7 ALCOSAN combined system SWMM model sub-catchments within the McNeilly Run Sewershed. Tables D-4 and D-5 of Appendix D present a summary of the Concept Commercial/Institutional GI Projects for each regulator for permeable pavement and green roofs, respectively. The Concept Commercial/Institutional GI Projects along with the tributary drainage area for permeable pavement is presented graphically on Figure D-3 of Appendix D.

Regulator based RainWays output for each Concept Commercial/Institutional GI Project for permeable pavement is presented in Appendix D while Table D-6 and D-7 of Appendix D present a summary of the overall effectiveness for the entire McNeilly Run sewershed for permeable pavement and green roofs, respectively.

In summary, as presented on Tables D-6 and D-7, out of a total 285 acres of combined sewershed area, 16 Concept Commercial/Institutional GI Green Roof and Permeable Pavement Projects were identified that could potentially control the runoff from approximately 3.47 acres, yielding an estimated 2.6 % effective annual runoff reduction, about 2.71 MG annual volume based on capture of the first inch of runoff for the typical year precipitation pattern, at a capital cost of \$1.96 million.

McNeilly Run Sewershed - Residential BMP Features

Figure D-4 of Appendix D presents the Residential BMP Features. No further analysis was performed for these.

Conclusion

It has been shown that even with steep slopes, poorly draining soils, and dense development characteristic of much of the study area, municipal engineers will be able to use the process developed under this project to identify a significant number of locations meeting the sound engineering placement criteria for Green Infrastructure. Local engineering knowledge is essential in determining whether locations identified can be efficiently developed into projects that address the region's source flow reduction needs.

The cost effectiveness comparison between green and grey solutions remains to be completed. As noted in the introduction, the GI analysis is but one aspect of this comparison. In addition to the GI analysis, a complete evaluation requires analysis of separation of combined sewers where green is not recommended as a tributary source flow alternative, and source flow reduction in separate sewers. Although it is anticipated that the cost effectiveness will vary due to site-specific factors that cannot be generalized, the initial estimates of annual volume reduction and associated capital costs, particularly of the Concept Municipal GI Projects, appears encouraging. The extent of the capacity deficiency, the available land and the neighborhood acceptance will all be part of the decision making.

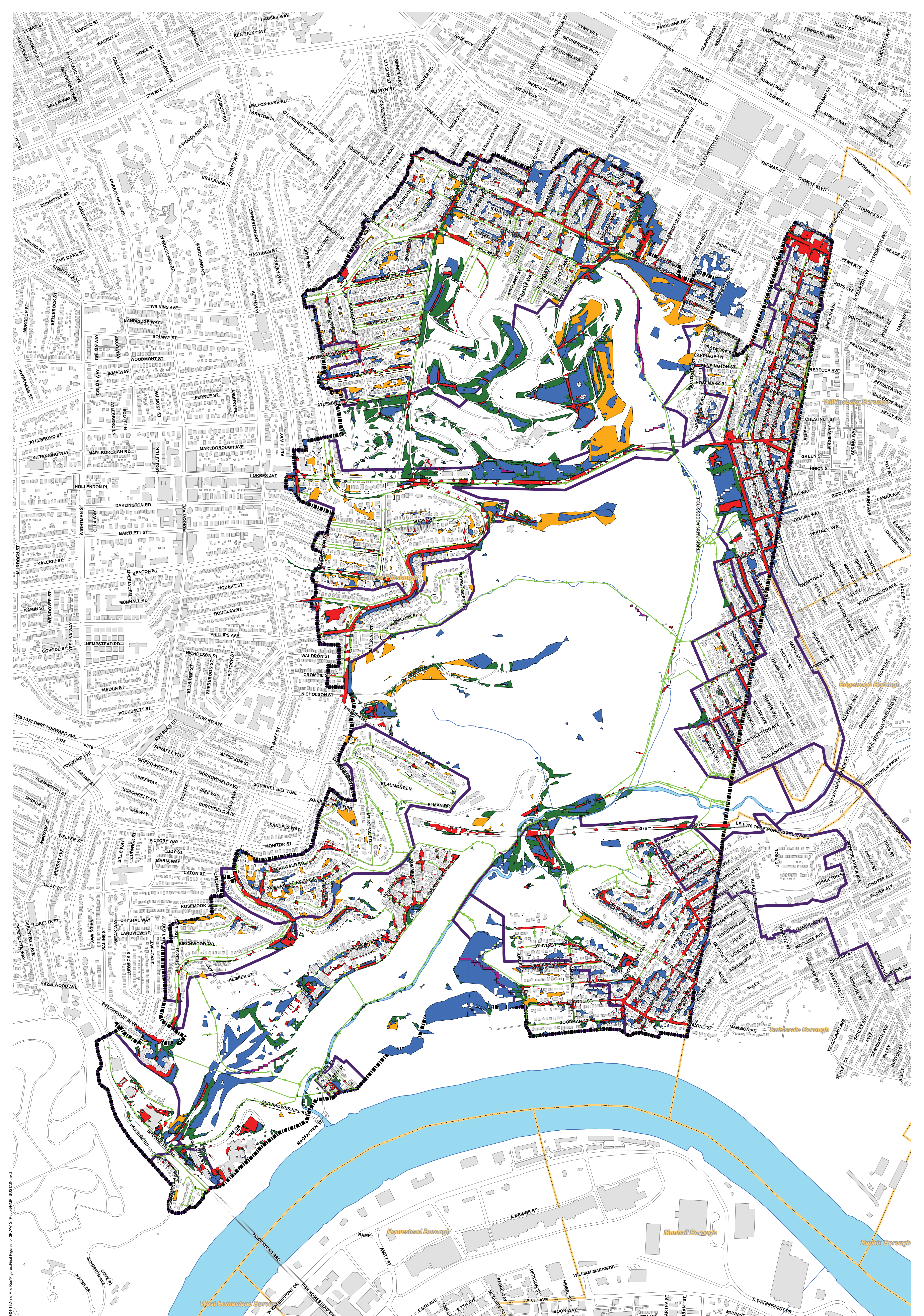
There is much remaining to be done, even with these pilot sewersheds. The details of where the GI projects drain, the assessment of water quality impacts, the SWMM modeling of GI peak flow impacts on the planned grey facilities, the local will to implement GI, and any incentivization to be offered for the implementation of GI, all remain to be answered. The long term responsibility and funding for maintenance is critical in these applications and is also as yet unanswered.

As part of the project process, the results have been reviewed with municipal representatives and engineers from each of the pilot sewersheds and combined sewer municipalities. If judged by the response from those groups, the project was extremely successful. The representatives unanimously expressed satisfaction with the process and have embraced the results. One of the goals of the project was to have the GI information included in the July 2013 feasibility studies of the subject municipalities. Girty's Run Joint Sewer Authority (GRJSA), West View Borough, and the Pittsburgh Water and Sewer Authority (PWSA) have all indicated an intention to include the results in their feasibility studies.

As part of the feasibility study process, GRJSA has indicated that they are using the project information to determine if GI can replace the planned grey infrastructure to address deficiencies with several small CSOs. PWSA has used the project results to do SWMM evaluations of the Nine Mile Run and McNeilly Run sewersheds to determine if GI solutions will result in a cost savings. PWSA has requested that the analysis be extended into other sewersheds where they have facilities.

APPENDIX A

APPENDIX A
FIGURES



Permeable Pavement	Vegetated Filter Strips	Sewerlines	Combined Sewer Subcatchments
Bioretention Basins	Grass Swales	Edge of Pavement	Area Tributary to POC M-47
Infiltration Basins / Trench	Constructed Wetlands	Building Footprint	Municipal Boundaries

0 250 500 1,000 1,500
1 Inch = 500 Feet

3 Rivers
Wet Weather
Improving our region's water quality

Baker

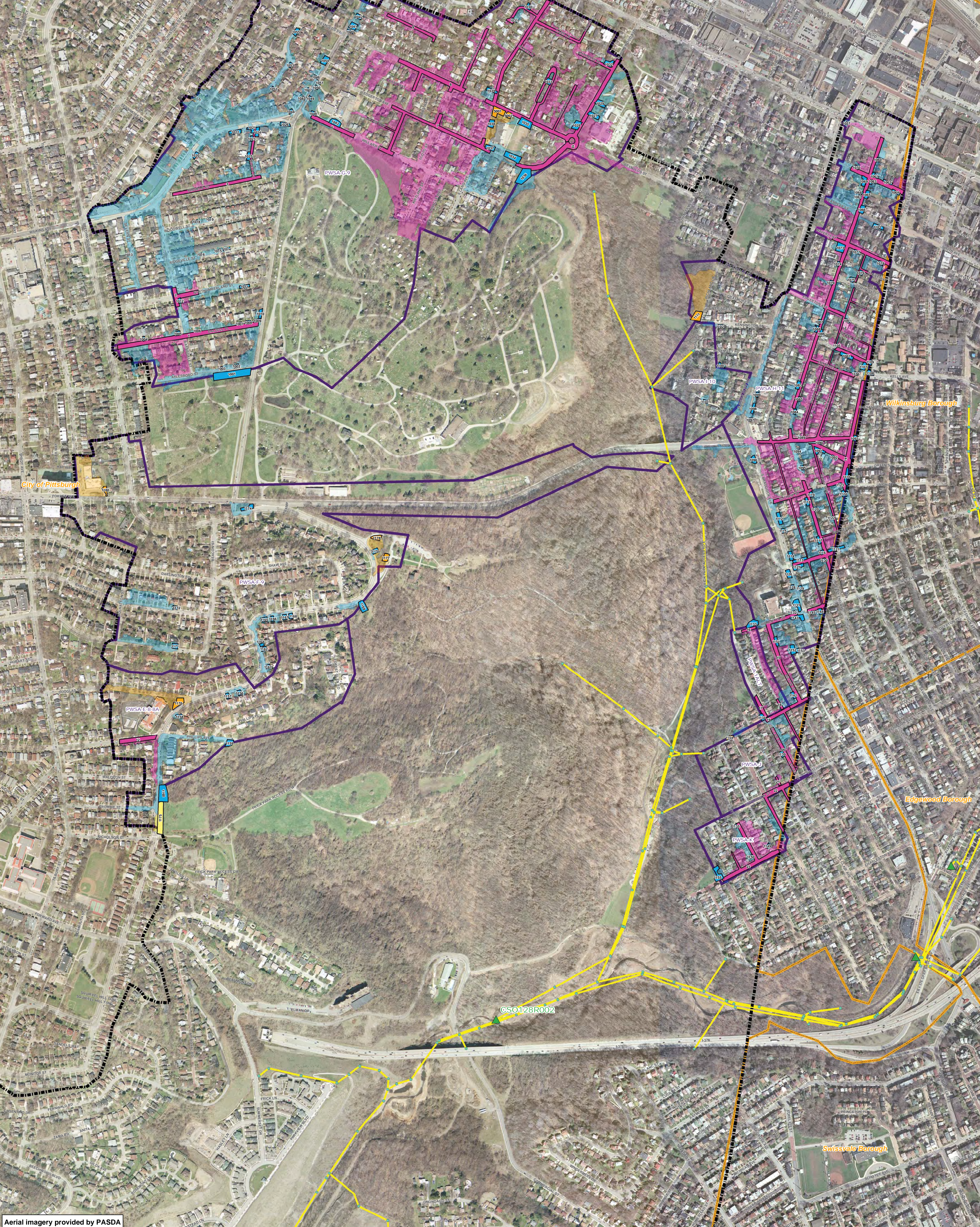
WADETRIM

Figure A-1
Nine Mile Run
BMP GIS Features

Document Path: N:\PROJECTS\2014\13\Nine Mile Run\GIS\BMP GIS Features for SRWV GI Report\MR_BMP GIS Features.mxd
 Date: 11/15/2014 10:54:13 AM
 User: BUSTAN

Candidate GI Project Area Utilization Summary			
BMP Type	Total GI Project Area Available	GI Project Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area	
	(acres)	(acres)	%
Permeable Pavement	18.51	2.62	14%
Bioretention	6.91	1.04	15%
Infiltration Basins	0.65	0.07	11%
Grass Swales	0.28	0.00	0%
Constructed Wetlands	0.00	0.00	0%

- The Candidate GI Project areas shown reflect potential project locations.
 - RainWays evaluations reporting cost and effectiveness relate to only a portion of the area shown (as presented in the above table).
 - Overlapping drainage areas have been assigned to non-permeable pavement BMPs.



Aerial imagery provided by PASDA

Bioretention Basin	Bioretention Drainage Area	Outfalls
Infiltration Basin	Infiltration Basin Drainage Area	Model Junctions
Constructed Wetland	Constructed Wetland Drainage Area	ALCOSAN NMR Modeled Pipe Network Extent
Grass Swale	Grass Swale Drainage Area	Combined Area Tributary to POC M-47
Permeable Pavement	Permeable Pavement Drainage Area	Combined Sewer Subcatchments
		Municipal Boundaries

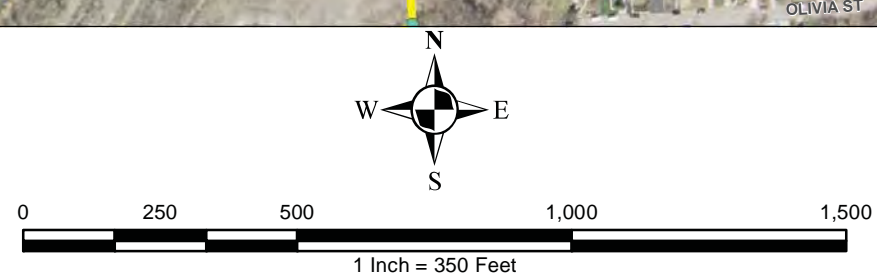
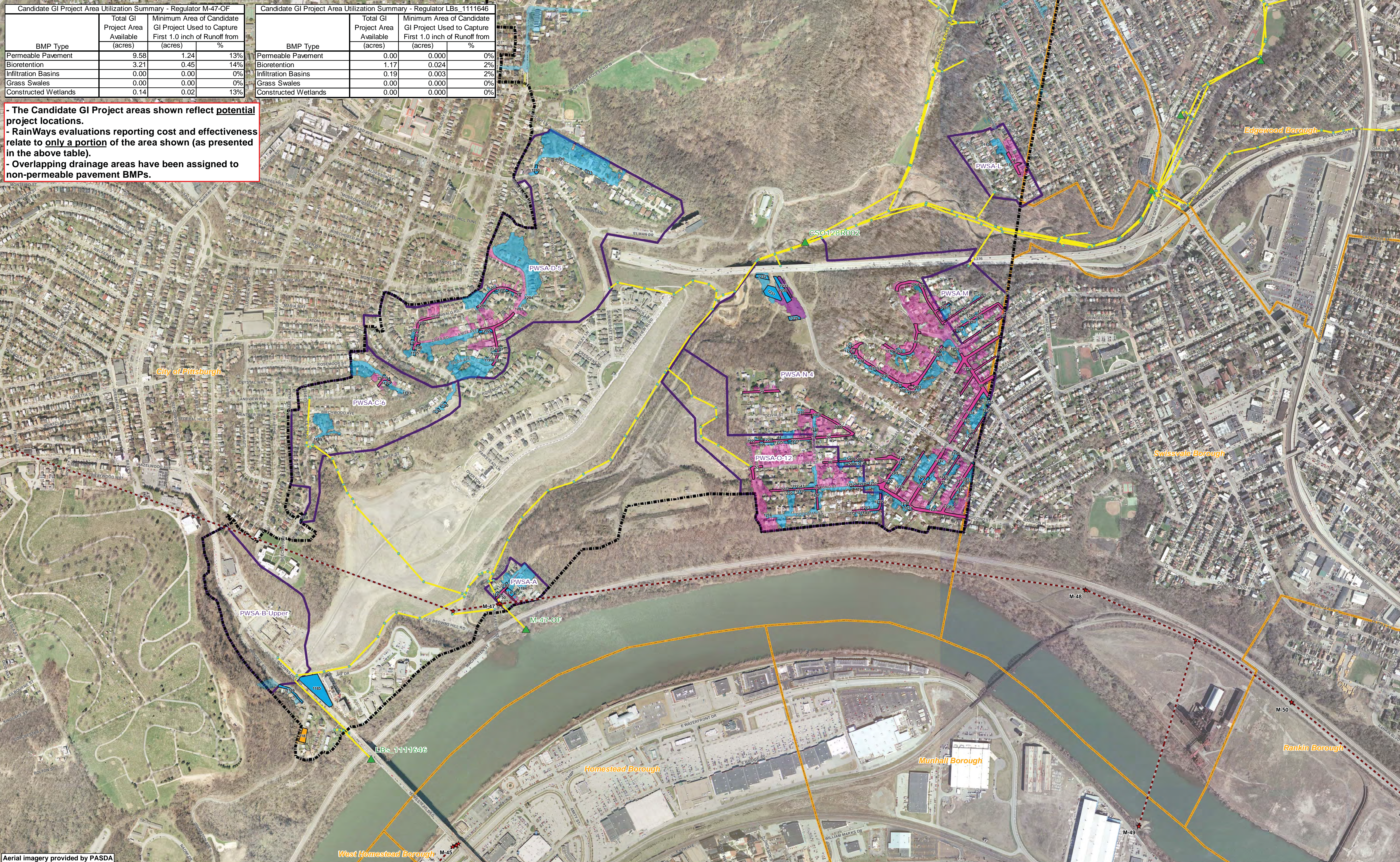


	Figure A-2.1 Nine Mile Run Concept Municipal GI Projects	

BMP Type	Minimum Area of Candidate GI Project Used to Capture First 1.0 inch of Runoff from		
	Total GI Project Area Available (acres)	(acres)	%
Permeable Pavement	9.58	1.24	13%
Bioretention	3.21	0.45	14%
Infiltration Basins	0.00	0.00	0%
Grass Swales	0.00	0.00	0%
Constructed Wetlands	0.14	0.02	13%

BMP Type	Minimum Area of Candidate GI Project Used to Capture First 1.0 inch of Runoff from		
	Total GI Project Area Available (acres)	(acres)	%
Permeable Pavement	0.00	0.000	0%
Bioretention	1.17	0.024	2%
Infiltration Basins	0.19	0.003	2%
Grass Swales	0.00	0.000	0%
Constructed Wetlands	0.00	0.000	0%

- The Candidate GI Project areas shown reflect potential project locations.
 - RainWays evaluations reporting cost and effectiveness relate to only a portion of the area shown (as presented in the above table).
 - Overlapping drainage areas have been assigned to non-permeable pavement BMPs.



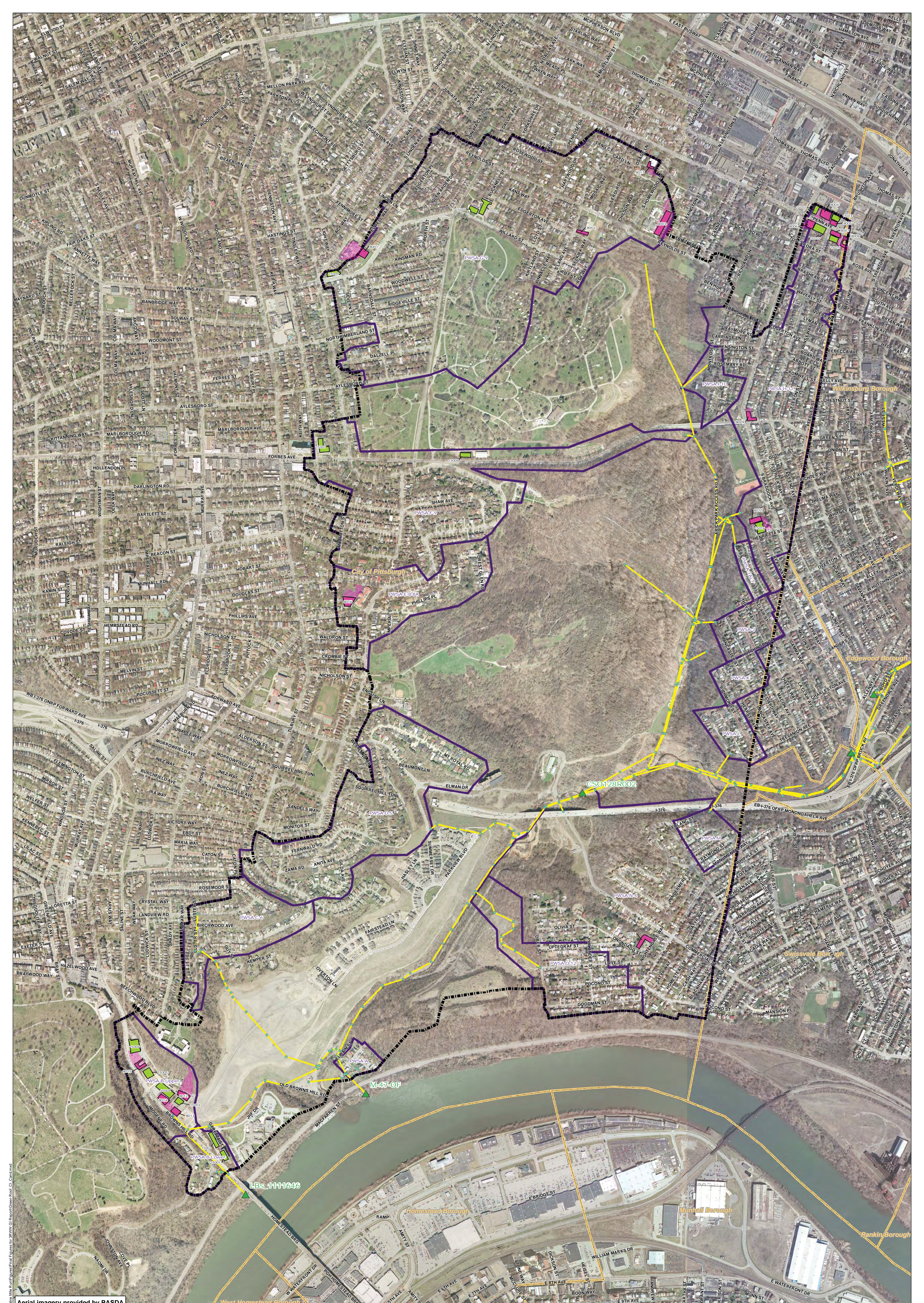
Aerial imagery provided by PASDA

Bioretention Basin	Bioretention Drainage Area	Outfalls	Combined Area Tributary to POC M-47
Infiltration Basin	Infiltration Basin Drainage Area	Model Junctions	Combined Sewer Subcatchments
Constructed Wetland	Constructed Wetland Drainage Area	ALCOSAN NMR Modeled Pipe Network Extent	Municipal Boundaries
Grass Swale	Grass Swale Drainage Area		
Permeable Pavement	Permeable Pavement Drainage Area		

0 200 400 800 1,200
 1 Inch = 400 Feet

3 Rivers Wet Weather
 Baker
 Landbase Systems
 WADETRIM

Figure A-2.2
 Nine Mile Run
 Concept Municipal GI Projects



Aerial imagery provided by PASDA

- Green Roof Candidate Projects
- Permeable Pavement Candidate GI Projects
- Permeable Pavement Candidate GI Project Drainage Areas
- Outfalls
- Model Junctions
- ALCOSAN NMR Modeled Pipe Network Extent
- Combined Sewer Subcatchments
- Combined Area Tributary to POC M-47
- Municipal Boundaries

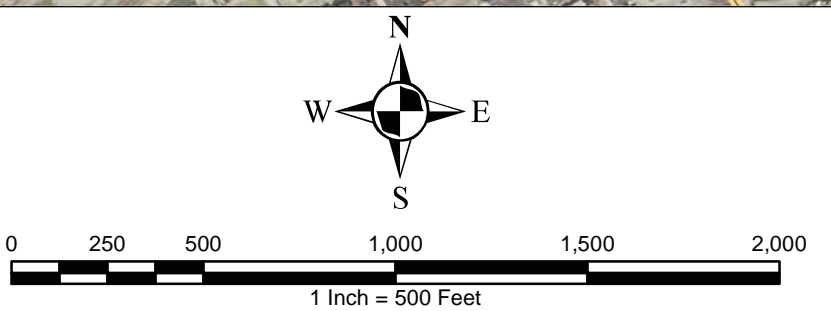
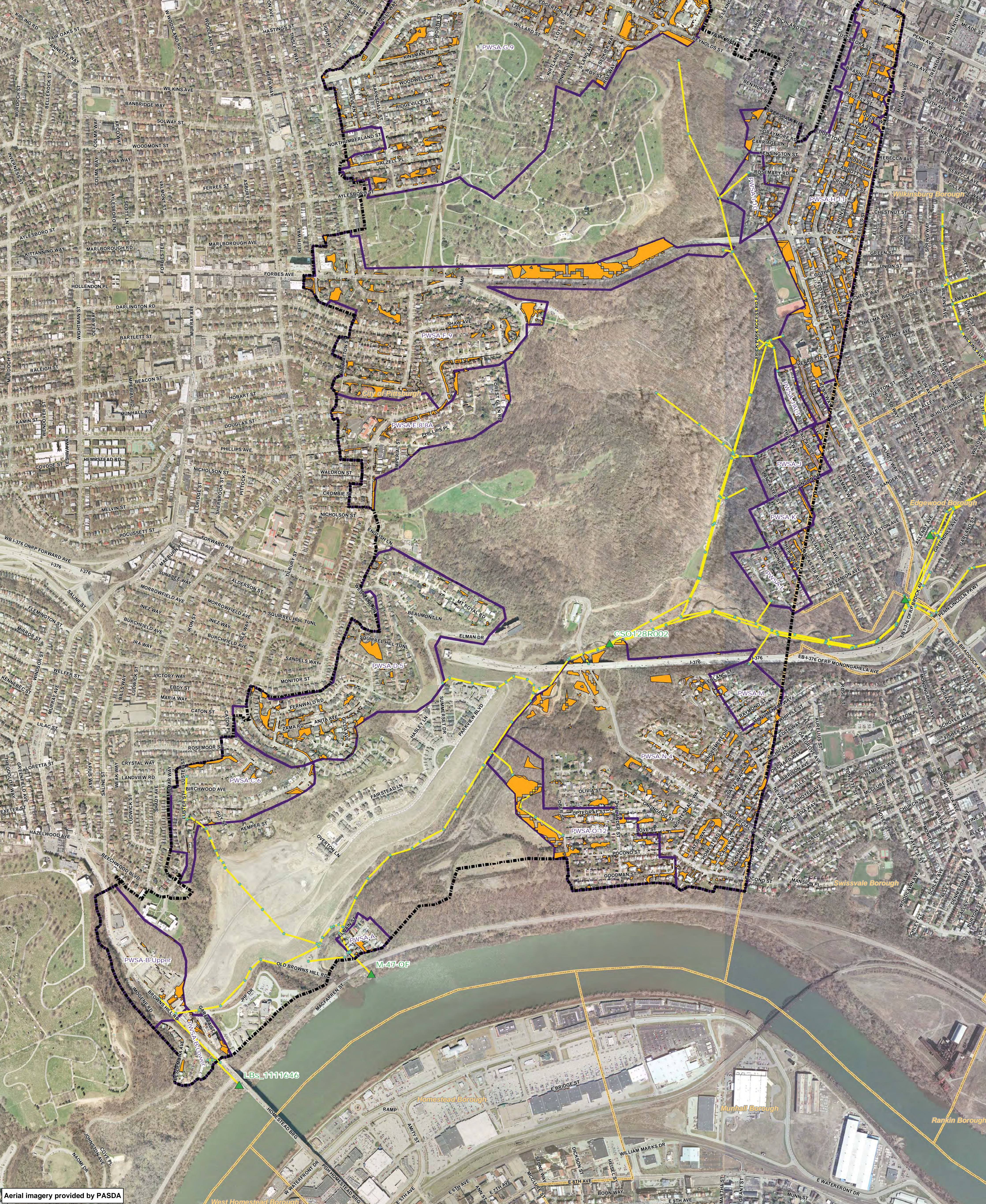


Figure A-3
Nine Mile Run
 Concept Commercial / Institutional GI Projects

Subcatchment	Non-municipal BMP Feature Areas (sq. ft.)	Non-municipal BMP Feature Areas (acres)
PWSA-1ALT	8,201.6	0.17
PWSA-A	12,022.5	0.26
PWSA-B-Lower	27,357.9	0.62
PWSA-B-Upper	33,198.2	0.76
PWSA-C-6	52,690.0	1.21
PWSA-D-5	194,029.5	4.45
PWSA-E-8	73,221.1	1.68
PWSA-F-9	550,434.8	12.64
PWSA-G-9	883,368.0	20.28
PWSA-H-11	491,830.3	11.29
PWSA-I-10	31,101.6	0.71
PWSA-J	28,193.5	0.65
PWSA-K	15,609.4	0.36
PWSA-L	5,113.0	0.12
PWSA-M	17,219.2	0.40
PWSA-N	466,945.3	10.72
PWSA-O	226,053.1	5.19
	3,116,589.0	71.51



Aerial imagery provided by PASDA

- Infiltration Type BMP
- Combined Sewer Subcatchments
- Combined Area Tributary to POC M-47
- Municipal Boundaries
- ALCOSAN NMR Modeled Pipe Network Extent
- Outfalls
- Model Junctions

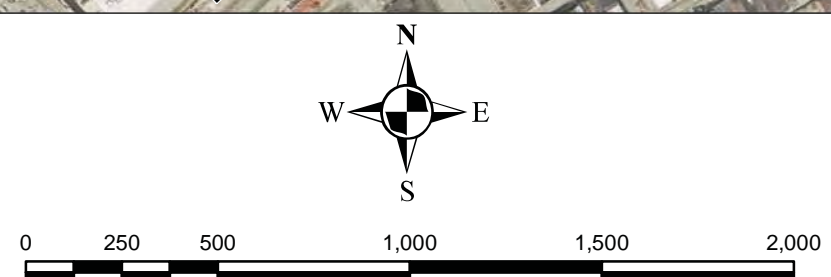


Figure A-4
 Nine Mile Run
 Residential BMP Features

APPENDIX A
TABLES 1.1
THROUGH 1.16

Table A-1.1
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-1ALT
Subcatchment Size	3.96 acres
Total Annual Subcatchment Runoff (RainWays)	1.49 MG
Drainage Area Tributary to Municipal GI Projects	0.664 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.024	0	0	0	0	0	0.02
Number of Candidate GI Projects	3	0	0	0	0	0	3
Annual Combined Sewer Area Runoff Captured (MG)*	0.19	0	0	0	0	0	0.19
Combined Sewer Area Runoff Capture (%)	12.94%	0.00%	0.00%	0.00%	0.00%	0.00%	12.94%
Opinion of Probable Cost***							
Construction Cost	\$12,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$12,000
O/M Cost (20 years)	\$1,000						\$1,000
Present Worth Cost**	\$13,000						\$13,000
Present Worth Cost per Drainage Area Treated (acres)	\$20,000						\$20,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.2
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment PWSA-A
Subcatchment Size 4.12 acres
Total Annual Subcatchment Runoff (RainWays) 1.22 MG
Drainage Area Tributary to Municipal GI Projects 1.44 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.02	0.01	0	0	0	0	0.03
Number of Candidate GI Projects	1	4	0	0	0	0	5
Annual Combined Sewer Area Runoff Captured (MG)*	0.09	0.18	0	0	0	0	0.27
Combined Sewer Area Runoff Capture (%)	7.8%	14.5%	0.0%	0.0%	0.0%	0.0%	22.3%
Opinion of Probable Cost***							
Construction Cost	\$11,000	\$14,000	\$ -	\$ -	\$ -	\$ -	\$25,000
O/M Cost (20 years)	\$1,000	\$1,000					\$2,000
Present Worth Cost**	\$12,000	\$15,000					\$27,000
Present Worth Cost per Drainage Area Treated (acres)	\$47,000	\$15,000					\$19,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.3
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-B-Lower
Subcatchment Size	10.34 acres
Total Annual Subcatchment Runoff (RainWays)	3.19 MG
Drainage Area Tributary to Municipal GI Projects	1.54 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0	0.024	0.003	0	0	0	0.027
Number of Candidate GI Projects	0	2	1	0	0	0	3
Annual Combined Sewer Area Runoff Captured (MG)*	0	0.30	0.05	0	0	0	0.35
Combined Sewer Area Runoff Capture (%)	0.0%	9.4%	1.4%	0.0%	0.0%	0.0%	10.8%
Opinion of Probable Cost***							
Construction Cost	\$ -	\$ 24,000	\$ 2,000	\$ -	\$ -	\$ -	\$ 26,000
O/M Cost (20 years)		\$ 2,000	\$ 1,000				\$ 3,000
Present Worth Cost**		\$ 26,000	\$ 3,000				\$ 29,000
Present Worth Cost per Drainage Area Treated (acres)		\$ 21,000	\$ 12,000				\$ 19,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.4
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-C-6
Subcatchment Size	30.86 acres
Total Annual Subcatchment Runoff (RainWays)	8.83 MG
Drainage Area Tributary to Municipal GI Projects	2.21 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.01	0.04	0	0	0	0	0.05
Number of Candidate GI Projects	1	7	0	0	0	0	8
Annual Combined Sewer Area Runoff Captured (MG)*	0.27	1.52	0	0	0	0	1.79
Combined Sewer Area Runoff Capture (%)	1.0%	5.6%	0.0%	0.0%	0.0%	0.0%	6.6%
Opinion of Probable Cost***							
Construction Cost	\$6,000	\$ 39,000	\$ -	\$ -	\$ -	\$ -	\$45,000
O/M Cost (20 years)	\$1,000	\$ 3,000					\$4,000
Present Worth Cost**	\$7,000	\$ 41,000					\$48,000
Present Worth Cost per Drainage Area Treated (acres)	\$24,000	\$ 22,000					\$22,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.5
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-D-5
Subcatchment Size	75.48 acres
Total Annual Subcatchment Runoff (RainWays)	20.06 MG
Drainage Area Tributary to Municipal GI Projects	14.32 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.17	0.19	0.00	0.00	0.00	0.00	0.36
Number of Candidate GI Projects	3	18	0	0	0	0	21
Annual Combined Sewer Area Runoff Captured (MG)*	1.36	2.32	0.00	0.00	0.00	0.00	3.68
Combined Sewer Area Runoff Capture (%)	6.8%	11.6%	0.0%	0.0%	0.0%	0.0%	18.3%
Opinion of Probable Cost***							
Construction Cost	\$114,000	\$ 180,000	\$ -	\$ -	\$ -	\$ -	\$294,000
O/M Cost (20 years)	\$4,000	\$ 10,000					\$14,000
Present Worth Cost**	\$117,000	\$ 189,000					\$306,000
Present Worth Cost per Drainage Area Treated (acres)	\$31,000	\$ 19,000					\$22,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.6
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary
February 19, 2013

Subcatchment	PWSA-E-8-8A
Subcatchment Size	37.36 acres
Total Annual Subcatchment Runoff (RainWays)	11.82 MG
Drainage Area Tributary to Municipal GI Projects	3.58 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales****	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.04	0.067	0.026	0	0	0	0.13
Number of Candidate GI Projects	1	5	1	1	0	0	8
Annual Combined Sewer Area Runoff Captured (MG)*	0.32	0.83	0.45	0	0	0	1.60
Combined Sewer Area Runoff Capture (%)	2.7%	7.0%	3.8%	0.0%	0.0%	0.0%	13.6%
Opinion of Probable Cost***							
Construction Cost	\$20,000	\$ 65,000	\$ 16,000	\$ -	\$ -	\$ -	\$101,000
O/M Cost (20 years)	\$1,000	\$ 4,000	\$ 1,000				\$6,000
Present Worth Cost**	\$21,000	\$ 69,000	\$ 17,000				\$107,000
Present Worth Cost per Drainage Area Treated (acres)	\$49,000	\$ 32,000	\$ 19,000				\$30,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

****Capture values for these Candidate GI Projects were negligible in this subcatchment.

Table A-1.7
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-F-9
Subcatchment Size	93.77 acres
Total Annual Subcatchment Runoff (RainWays)	28.20 MG
Drainage Area Tributary to Municipal GI Projects	4.51 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.06	0.04	0.00	0.00	0.00	0.10
Number of Candidate GI Projects	0	14	3	0	0	0	17
Annual Combined Sewer Area Runoff Captured (MG)*	0	0.79	0.67	0	0	0	1.45
Combined Sewer Area Runoff Capture (%)	0.0%	2.8%	2.4%	0.0%	0.0%	0.0%	5.2%
Opinion of Probable Cost***							
Construction Cost	\$ -	\$ 61,000	\$ 23,000	\$ -	\$ -	\$ -	\$ 84,000
O/M Cost (20 years)		\$ 4,000	\$ 1,000				\$ 5,000
Present Worth Cost**		\$ 64,000	\$ 24,000				\$ 88,000
Present Worth Cost per Drainage Area Treated (acres)		\$ 23,000	\$ 15,000				\$ 20,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.8
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **PWSA-G-9**
Subcatchment Size 212.01 acres
Total Annual Subcatchment Runoff (RainWays) 65.89 MG
Drainage Area Tributary to Municipal GI Projects 60.91 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	1.57	0.56	0.01	0.00	0.00	0.00	2.14
Number of Candidate GI Projects	8	55	2	0	0	0	65
Annual Combined Sewer Area Runoff Captured (MG)*	12.35	7.09	0.23	0.00	0.00	0.00	19.67
Combined Sewer Area Runoff Capture (%)	18.8%	10.8%	0.4%	0.0%	0.0%	0.0%	29.9%
Opinion of Probable Cost***							
Construction Cost	\$ 745,000	\$ 533,000	\$ 8,000	\$ -	\$ -	\$ -	\$ 1,286,000
O/M Cost (20 years)	\$ 28,000	\$ 30,000	\$ 1,000				\$ 59,000
Present Worth Cost**	\$ 770,000	\$ 560,000	\$ 9,000				\$ 1,339,000
Present Worth Cost per Drainage Area Treated (acres)	\$23,000	\$ 22,000	\$ 17,000				\$ 22,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.9
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-H-11
Subcatchment Size	85.95 acres
Total Annual Subcatchment Runoff (RainWays)	33.85 MG
Drainage Area Tributary to Municipal GI Projects	26.81 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.82	0.32	0.00	0.00	0.00	0.00	1.14
Number of Candidate GI Projects	2	73	1	0	0	0	76
Annual Combined Sewer Area Runoff Captured (MG)*	6.42	3.99	0.07	0	0	0	10.48
Combined Sewer Area Runoff Capture (%)	19.0%	11.8%	0.2%	0.0%	0.0%	0.0%	31.0%
Opinion of Probable Cost***							
Construction Cost	\$387,000	\$ 308,000	\$ 3,000	\$ -	\$ -	\$ -	\$698,000
O/M Cost (20 years)	\$15,000	\$ 17,000	\$ 1,000				\$33,000
Present Worth Cost**	\$400,000	\$ 324,000	\$ 4,000				\$728,000
Present Worth Cost per Drainage Area Treated (acres)	\$32,000	\$ 26,000	\$ 4,000				\$28,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.10
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-I-10
Subcatchment Size	9.39 acres
Total Annual Subcatchment Runoff (RainWays)	1.97 MG
Drainage Area Tributary to Municipal GI Projects	0.47 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Number of Candidate GI Projects	0	2			0	0	2
Annual Combined Sewer Area Runoff Captured (MG)*	0	0.09			0	0	0.09
Combined Sewer Area Runoff Capture (%)	0.0%	4.8%	0.0%	0.0%	0.0%	0.0%	4.8%
Opinion of Probable Cost***							
Construction Cost	\$ -	\$ 7,000	\$ -	\$ -	\$ -	\$ -	\$7,000
O/M Cost (20 years)		\$ 1,000					\$1,000
Present Worth Cost**		\$ 8,000					\$8,000
Present Worth Cost per Drainage Area Treated (acres)		\$ 18,000					\$18,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.11
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-J
Subcatchment Size	10.63 acres
Total Annual Subcatchment Runoff (RainWays)	3.67 MG
Drainage Area Tributary to Municipal GI Projects	0.87 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.05	0.01	0.00	0.00	0.00	0.00	0.06
Number of Candidate GI Projects	3	2	1		0	0	6
Annual Combined Sewer Area Runoff Captured (MG)*	0.39	0.17	0.02		0	0	0.58
Combined Sewer Area Runoff Capture (%)	10.6%	4.6%	0.6%		0.0%	0.0%	15.9%
Opinion of Probable Cost***							
Construction Cost	\$24,000	\$ 14,000	\$ 1,000	\$ -	\$ -	\$ -	\$39,000
O/M Cost (20 years)	\$1,000	\$ 1,000	\$ 1,000				\$3,000
Present Worth Cost**	\$25,000	\$ 15,000	\$ 2,000				\$42,000
Present Worth Cost per Drainage Area Treated (acres)	\$96,000	\$ 28,000	\$ 38,000				\$49,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.12
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-K
Subcatchment Size	7.49 acres
Total Annual Subcatchment Runoff (RainWays)	2.90 MG
Drainage Area Tributary to Municipal GI Projects	2.19 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.12	0.01	0.00	0.00	0.00	0.00	0.13
Number of Candidate GI Projects	2	5	0	0	0	0	7
Annual Combined Sewer Area Runoff Captured (MG)*	0.92	0.11	0	0	0	0	1.04
Combined Sewer Area Runoff Capture (%)	31.8%	3.8%	0.0%	0.0%	0.0%	0.0%	35.7%
Opinion of Probable Cost***							
Construction Cost	\$56,000	\$ 9,000	\$ -	\$ -	\$ -	\$ -	\$65,000
O/M Cost (20 years)	\$3,000	\$ 1,000					\$4,000
Present Worth Cost**	\$58,000	\$ 10,000					\$68,000
Present Worth Cost per Drainage Area Treated (acres)	\$39,000	\$ 15,000					\$32,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.13
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-L
Subcatchment Size	9.24 acres
Total Annual Subcatchment Runoff (RainWays)	3.11 MG
Drainage Area Tributary to Municipal GI Projects	1.15 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.04	0.005	0	0	0	0	0.04
Number of Candidate GI Projects	1	2	0	0	0	0	3
Annual Combined Sewer Area Runoff Captured (MG)*	0.28	0.06	0	0	0	0	0.34
Combined Sewer Area Runoff Capture (%)	9.0%	2.0%	0.0%	0.0%	0.0%	0.0%	11.0%
Opinion of Probable Cost***							
Construction Cost	\$19,000	\$ 5,000	\$ -	\$ -	\$ -	\$ -	\$24,000
O/M Cost (20 years)	\$1,000	\$ 1,000					\$2,000
Present Worth Cost**	\$20,000	\$ 6,000					\$26,000
Present Worth Cost per Drainage Area Treated (acres)	\$25,000	\$ 18,000					\$23,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.14
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-M
Subcatchment Size	9.49 acres
Total Annual Subcatchment Runoff (RainWays)	2.89 MG
Drainage Area Tributary to Municipal GI Projects	1.56 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.04	0.02	0.00	0.00	0.00	0.00	0.07
Number of Candidate GI Projects	4	8	0	0	0	0	12
Annual Combined Sewer Area Runoff Captured (MG)*	0.25	0.29	0	0	0	0	0.54
Combined Sewer Area Runoff Capture (%)	8.8%	9.9%	0.0%	0.0%	0.0%	0.0%	18.8%
Opinion of Probable Cost***							
Construction Cost	\$22,000	\$ 23,000	\$ -	\$ -	\$ -	\$ -	\$45,000
O/M Cost (20 years)	\$1,000	\$ 2,000					\$3,000
Present Worth Cost**	\$23,000	\$ 25,000					\$48,000
Present Worth Cost per Drainage Area Treated (acres)	\$35,000	\$ 28,000					\$31,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.15
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-N
Subcatchment Size	130.66 acres
Total Annual Subcatchment Runoff (RainWays)	32.50 MG
Drainage Area Tributary to Municipal GI Projects	23.10 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.73	0.12	0.00	0.00	0.00	0.02	0.87
Number of Candidate GI Projects	11	49	0	0	0	1	61
Annual Combined Sewer Area Runoff Captured (MG)*	5.76	1.45	0	0	0	0.28	7.49
Combined Sewer Area Runoff Capture (%)	17.7%	4.5%	0.0%	0.0%	0.0%	0.9%	23.0%
Opinion of Probable Cost***							
Construction Cost	\$347,000	\$ 113,000	\$ -	\$ -	\$ -	\$ 2,000	\$462,000
O/M Cost (20 years)	\$13,000	\$ 7,000				\$ -	\$20,000
Present Worth Cost**	\$359,000	\$ 119,000				\$ 2,000	\$480,000
Present Worth Cost per Drainage Area Treated (acres)	\$25,000	\$ 17,000				\$ 2,000	\$21,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-1.16
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	PWSA-O
Subcatchment Size	34.93 acres
Total Annual Subcatchment Runoff (RainWays)	7.66 MG
Drainage Area Tributary to Municipal GI Projects	9.23 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.22	0.062	0	0	0	0	0.28
Number of Candidate GI Projects	6	18	0	0	0	0	24
Annual Combined Sewer Area Runoff Captured (MG)*	1.75	0.77	0	0	0	0	2.52
Combined Sewer Area Runoff Capture (%)	22.9%	10.1%	0.0%	0.0%	0.0%	0.0%	33.0%
Opinion of Probable Cost***							
Construction Cost	\$106,000	\$ 60,000	\$ -	\$ -	\$ -	\$ -	\$166,000
O/M Cost (20 years)	\$4,000	\$ 4,000					\$8,000
Present Worth Cost**	\$110,000	\$ 63,000					\$173,000
Present Worth Cost per Drainage Area Treated (acres)	\$17,000	\$ 24,000					\$19,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

**APPENDIX A
TABLES 2.1
THROUGH 2.16**

Table A-2.1
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **PWSA-1ALT**
Subcatchment Size 3.96 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	0.624	0.064	10.3%
Impervious-High	0	0.000	0.0%
Impervious-Mod	0.38	0.038	10.1%
Impervious-Low	0.577	0.117	20.3%
Pervious-High-D		0.000	0.0%
Pervious-High-C		0.000	0.0%
Pervious-High-B		0.000	0.0%
Pervious-Mod-D	0.112	0.000	0.0%
Pervious-Mod-C	0.615	0.019	3.0%
Pervious-Mod-B		0.000	0.0%
Pervious-Low-D	1.205	0.403	33.4%
Pervious-Low-C	0.156	0.023	14.9%
Pervious-Low-B	0.275	0.000	0.0%
Totals	3.944	0.664	

Table A-2.2
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

PWSA-A
4.12 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	0.507	0.120	23.7%	0.000	0.0%
Impervious-High	0.013	0.007	56.1%	0.006	43.1%
Impervious-Mod	0.241	0.050	20.9%	0.079	32.9%
Impervious-Low	0.419	0.024	5.8%	0.174	41.5%
Pervious-High-D	0.264	0.082	31.1%	0.001	0.4%
Pervious-High-C	0.464	0.170	36.7%	0.000	0.0%
Pervious-High-B	0	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.754	0.332	44.1%	0.007	1.0%
Pervious-Mod-C	0.487	0.046	9.4%	0.000	0.0%
Pervious-Mod-B	0	0.000	0.0%	0.000	0.0%
Pervious-Low-D	0.958	0.179	18.6%	0.160	16.7%
Pervious-Low-C	0.013	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0	0.000	0.0%	0.000	0.0%
Totals	4.12	1.011		0.427	

Table A-2.3
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **PWSA-B-Lower**
Subcatchment Size 10.34 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Infiltration Basin	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	0.985	0.018	1.8%	0.000	0.0%
Impervious-High	0.594	0.076	12.7%	0.000	0.0%
Impervious-Mod	1.271	0.257	20.2%	0.052	4.1%
Impervious-Low	0.554	0.068	12.3%	0.000	0.0%
Pervious-High-D	0	0.000	0.0%	0.000	0.0%
Pervious-High-C	1.573	0.020	1.2%	0.000	0.0%
Pervious-High-B	0.767	0.073	9.6%	0.209	27.3%
Pervious-Mod-D	0.1	0.100	99.8%	0.000	0.0%
Pervious-Mod-C	0.846	0.122	14.5%	0.000	0.0%
Pervious-Mod-B	1.862	0.047	2.5%	0.000	0.0%
Pervious-Low-D	1.113	0.342	30.7%	0.000	0.0%
Pervious-Low-C	0.674	0.152	22.5%	0.000	0.0%
Pervious-Low-B	0	0.000	0.0%	0.000	0.0%
Totals	10.339	1.274		0.262	

Table A-2.4
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

PWSA-C-6
30.86 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	3.837	0.148	3.9%	0.122	3.2%
Impervious-High	1.183	0.011	0.9%	0.019	1.6%
Impervious-Mod	2.768	0.264	9.5%	0.147	5.3%
Impervious-Low	1.181	0.269	22.8%	0.180	15.2%
Pervious-High-D	4.652	0.003	0.1%	0.000	0.0%
Pervious-High-C	0.073	0.000	0.0%	0.000	0.0%
Pervious-High-B	3.674	0.022	0.6%	0.025	0.7%
Pervious-Mod-D	3.199	0.286	8.9%	0.000	0.0%
Pervious-Mod-C	0	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	7.575	0.465	6.1%	0.186	2.5%
Pervious-Low-D	0.016	0.003	19.0%	0.000	0.0%
Pervious-Low-C	0	0.000	0.0%	0.000	0.0%
Pervious-Low-B	2.705	0.437	16.1%	0.451	16.7%
Totals	30.863	1.909		1.130	

Table A-2.5
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

PWSA-D-5
75.48 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	10.022	1.361	13.6%	0.594	5.9%
Impervious-High	0.773	0.000	0.0%	0.000	0.0%
Impervious-Mod	5.129	0.760	14.8%	0.471	9.2%
Impervious-Low	4.59	1.170	25.5%	1.924	41.9%
Pervious-High-D	3.205	0.000	0.0%	0.000	0.0%
Pervious-High-C	5.782	0.000	0.0%	0.000	0.0%
Pervious-High-B	4.456	0.291	6.5%	0.000	0.0%
Pervious-Mod-D	3.233	0.000	0.0%	0.001	0.0%
Pervious-Mod-C	2.635	0.215	8.2%	0.000	0.0%
Pervious-Mod-B	20.845	3.783	18.1%	0.851	4.1%
Pervious-Low-D	0.276	0.000	0.0%	0.000	0.0%
Pervious-Low-C	0.554	0.089	16.1%	0.000	0.0%
Pervious-Low-B	13.997	2.781	19.9%	2.662	19.0%
Totals	75.497	10.450		6.503	

**Table A-2.6
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment**

February 19, 2013

Subcatchment PWSA-E-8-8A
Subcatchment Size 37.36 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Infiltration Basin		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	5.887	0.185	3.1%	0.001	0.0%	0.000	0.0%
Impervious-High	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Impervious-Mod	2.603	0.148	5.7%	0.357	13.7%	0.000	0.0%
Impervious-Low	4.510	0.956	21.2%	0.195	4.3%	0.476	10.6%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-High-B	1.879	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	0.885	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	14.670	0.061	0.4%	0.092	0.6%	0.000	0.0%
Pervious-Low-D	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Low-C	0.445	0.176	39.6%	0.000	0.0%	0.000	0.0%
Pervious-Low-B	6.476	0.682	10.5%	0.297	4.6%	0.141	2.2%
Totals	37.355	2.208		0.942		0.618	

Table A-2.7
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

PWSA-F-9
93.77 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Infiltration Basin	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	11.407	0.240	2.1%	0.375	3.3%
Impervious-High	0.079	0.000	0.0%	0.000	0.0%
Impervious-Mod	6.868	0.129	1.9%	0.025	0.4%
Impervious-Low	11.276	0.834	7.4%	0.413	3.7%
Pervious-High-D	0.444	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.893	0.000	0.0%	0.000	0.0%
Pervious-High-B	1.869	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	1.601	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	5.384	0.016	0.3%	0.020	0.4%
Pervious-Mod-B	22.06	0.430	1.9%	0.216	1.0%
Pervious-Low-D	5.739	0.000	0.0%	0.000	0.0%
Pervious-Low-C	2.795	0.041	1.5%	0.004	0.2%
Pervious-Low-B	23.36	1.179	5.0%	0.584	2.5%
Totals	93.775	2.870		1.637	

Table A-2.8
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **PWSA-G-9**
Subcatchment Size 212.01 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Infiltration Basin		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	32.660	3.145	9.6%	0.002	0.0%	4.361	13.4%
Impervious-High	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Impervious-Mod	5.315	1.071	20.2%	0.000	0.0%	1.419	26.7%
Impervious-Low	29.993	5.784	19.3%	0.202	0.7%	9.593	32.0%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	2.626	0.580	22.1%	0.000	0.0%	0.785	29.9%
Pervious-Mod-C	17.933	0.269	1.5%	0.000	0.0%	2.389	13.3%
Pervious-Mod-B	11.521	3.586	31.1%	0.000	0.0%	1.830	15.9%
Pervious-Low-D	10.920	0.793	7.3%	0.000	0.0%	2.336	21.4%
Pervious-Low-C	25.344	0.493	1.9%	0.000	0.0%	1.500	5.9%
Pervious-Low-B	75.700	9.955	13.2%	0.334	0.4%	12.456	16.5%
Totals	212.012	25.676		0.539		36.669	

Table A-2.9
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **PWSA-H-11**
Subcatchment Size 85.95 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Infiltration Basin		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	16.378	1.831	11.2%	0.000	0.0%	3.257	19.9%
Impervious-High	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Impervious-Mod	2.141	0.427	19.9%	0.019	0.9%	0.355	16.6%
Impervious-Low	17.971	3.540	19.7%	0.014	0.1%	9.410	52.4%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.519	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.890	0.239	26.9%	0.000	0.0%	0.180	20.2%
Pervious-Mod-C	1.858	0.000	0.0%	0.459	24.7%	0.000	0.0%
Pervious-Mod-B	5.405	0.230	4.2%	0.261	4.8%	0.152	2.8%
Pervious-Low-D	34.996	6.474	18.5%	0.000	0.0%	10.526	30.1%
Pervious-Low-C	1.202	0.064	5.3%	0.215	17.9%	0.000	0.0%
Pervious-Low-B	4.588	0.068	1.5%	0.175	3.8%	0.001	0.0%
Totals	85.948	12.872		1.144		23.880	

Table A-2.10
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **PWSA-I-10**
Subcatchment Size 9.39 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	1.075	0.079	7.3%
Impervious-High	0.114	0.000	0.0%
Impervious-Mod	0.219	0.000	0.0%
Impervious-Low	0.457	0.048	10.6%
Pervious-High-D	0.000	0.000	0.0%
Pervious-High-C	1.203	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%
Pervious-Mod-D	0.000	0.000	0.0%
Pervious-Mod-C	2.627	0.000	0.0%
Pervious-Mod-B	0.601	0.000	0.0%
Pervious-Low-D	0.000	0.000	0.0%
Pervious-Low-C	1.693	0.161	9.5%
Pervious-Low-B	1.399	0.181	13.0%
Totals	9.388	0.469	

**Table A-2.11
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment**

February 19, 2013

Subcatchment
Subcatchment Size

PWSA-J
10.63 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Infiltration Basin		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	1.737	0.067	3.9%	0.000	0.0%	0.081	4.7%
Impervious-High	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Impervious-Mod	0.504	0.000	0.0%	0.032	6.4%	0.000	0.0%
Impervious-Low	1.630	0.175	10.7%	0.000	0.0%	0.455	27.9%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.017	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	1.768	0.000	0.0%	0.003	0.2%	0.000	0.0%
Pervious-Mod-B	0.750	0.000	0.0%	0.018	2.4%	0.000	0.0%
Pervious-Low-D	2.760	0.311	11.3%	0.000	0.0%	0.421	15.3%
Pervious-Low-C	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Low-B	1.469	0.002	0.1%	0.000	0.0%	0.000	0.0%
Totals	10.635	0.555		0.053		0.958	

Table A-2.12
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

PWSA-K
7.49 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	1.063	0.015	1.4%	0.248	23.4%
Impervious-High	0.000	0.000	0.0%	0.000	0.0%
Impervious-Mod	0.339	0.000	0.0%	0.000	0.0%
Impervious-Low	1.712	0.123	7.2%	0.984	57.5%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.027	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	0.505	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	0.293	0.000	0.0%	0.000	0.0%
Pervious-Low-D	2.914	0.529	18.2%	0.875	30.0%
Pervious-Low-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0.637	0.027	4.3%	0.043	6.8%
Totals	7.490	0.694		2.150	

Table A-2.13
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

PWSA-L
9.24 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	1.552	0.067	4.3%	0.270	17.4%
Impervious-High	0.094	0.000	0.0%	0.000	0.0%
Impervious-Mod	0.820	0.000	0.0%	0.000	0.0%
Impervious-Low	0.755	0.017	2.2%	0.274	36.2%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.735	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.869	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	1.795	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	2.102	0.267	12.7%	0.570	27.1%
Pervious-Low-C	0.514	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	9.236	0.350		1.114	

Table A-2.14
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

PWSA-M
9.49 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	1.484	0.141	9.5%	0.153	10.3%
Impervious-High	0.126	0.000	0.0%	0.000	0.0%
Impervious-Mod	0.208	0.000	0.0%	0.003	1.6%
Impervious-Low	0.913	0.274	30.0%	0.544	59.5%
Pervious-High-D	2.274	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.910	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	3.571	0.481	13.5%	0.593	16.6%
Pervious-Low-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	9.486	0.896		1.293	

Table A-2.15
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

PWSA-N
130.66 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Constructed Wetland		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	11.574	0.609	5.3%	0.000	0.0%	2.270	19.6%
Impervious-High	0.614	0.045	7.3%	0.000	0.0%	0.156	25.5%
Impervious-Mod	2.824	0.018	0.7%	0.025	0.9%	0.124	4.4%
Impervious-Low	15.337	1.194	7.8%	0.447	2.9%	7.289	47.5%
Pervious-High-D	6.203	0.012	0.2%	0.000	0.0%	0.089	1.4%
Pervious-High-C	12.166	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.699	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	13.530	0.087	0.6%	0.127	0.9%	0.260	1.9%
Pervious-Mod-C	12.486	0.010	0.1%	0.000	0.0%	0.010	0.1%
Pervious-Mod-B	3.415	0.000	0.0%	0.000	0.0%	0.000	0.0%
Pervious-Low-D	45.919	5.029	11.0%	0.709	1.5%	11.937	26.0%
Pervious-Low-C	3.703	0.050	1.3%	0.000	0.0%	0.210	5.7%
Pervious-Low-B	0.721	0.000	0.0%	0.000	0.0%	0.000	0.0%
Totals	129.191	7.054		1.309		22.343	

Table A-2.16
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

PWSA-O
34.93 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	3.353	0.282	8.4%	0.915	27.3%
Impervious-High	0.000	0.000	0.0%	0.000	0.0%
Impervious-Mod	0.908	0.083	9.1%	0.508	56.0%
Impervious-Low	2.598	0.758	29.2%	1.575	60.6%
Pervious-High-D	0.569	0.000	0.0%	0.000	0.0%
Pervious-High-C	1.966	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	4.383	0.215	4.9%	0.697	15.9%
Pervious-Mod-C	3.765	0.000	0.0%	0.040	1.1%
Pervious-Mod-B	2.573	0.000	0.0%	1.107	43.0%
Pervious-Low-D	11.356	1.361	12.0%	2.516	22.2%
Pervious-Low-C	1.516	0.000	0.0%	0.025	1.6%
Pervious-Low-B	1.726	0.000	0.0%	0.822	47.6%
Totals	34.713	2.699		8.205	

APPENDIX A
TABLE 3

Table A-3
3RWW GI Project
Concept Municipal GI Project Evaluation Summary
Nine Mile Run
February 19, 2013

Total Combined Sewer Area 785.08 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 237.25 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales***	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	3.86	1.51	0.09	0.00	0.00	0.02	5.47
Number of Candidate GI Projects	46	264	9	1	0	1	321
Portion of Drainage Area Tributary to Concept GI Projects (acres)	77.50	77.74	4.58	0.00	0.00	1.31	161.12
Annual Combined Sewer Area Runoff Captured (MG)*	30.19	18.93	1.49	0.00	0.00	0.28	50.88
Combined Sewer Area Runoff Capture (%)	12.7%	8.0%	0.6%	0.0%	0.0%	0.1%	21.4%
Opinion of Probable Cost****							
Construction Cost	\$ 1,869,000	\$ 1,455,000	\$ 53,000	\$ -	\$ -	\$ 2,000	\$ 3,379,000
O/M Cost (20 years)	\$ 74,000	\$ 88,000	\$ 6,000	\$ -	\$ -	\$ -	\$ 168,000
Present Worth Cost**	\$ 1,935,000	\$ 1,534,000	\$ 59,000	\$ -	\$ -	\$ 2,000	\$ 3,530,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 25,000	\$ 20,000	\$ 13,000	\$ -	\$ -	\$ 2,000	\$ 22,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***Capture values for these Candidate GI Projects were negligible in this subcatchment.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX A
TABLES 4.1 & 4.2

Table A-4.1
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary - Regulator CSO128R002
Nine Mile Run
February 19, 2013

Total Combined Sewer Area 456.21 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 149.78 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement		
	PWSA-G	PWSA-H	Totals
Subcatchment			
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.12	0.21	0.32
Number of Candidate GI Projects	4	7	11
Portion of Drainage Area Tributary to Concept GI Projects (acres)	2.36	2.92	5.28
Annual Combined Sewer Area Runoff Captured (MG)*	0.93	1.62	2.54
Combined Sewer Area Runoff Capture (%)***	1.41%	4.78%	1.70%
Opinion of Probable Cost****			
Construction Cost	\$56,000	\$98,000	\$154,000
O/M Cost (20 years)	\$3,000	\$4,000	\$7,000
Present Worth Cost**	\$58,000	\$102,000	\$160,000
Present Worth Cost per Drainage Area Treated (acres)	\$25,000	\$35,000	\$31,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-4.2
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary - Regulator M-47-OF
Nine Mile Run
February 19, 2013

Total Combined Sewer Area 318.53 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 84.29 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement		
	PWSA-B-Upper	PWSA-N	Totals
Subcatchment			
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.30	0.02	0.32
Number of Candidate GI Projects	4	1	5
Portion of Drainage Area Tributary to Concept GI Projects (acres)	4.32	0.35	4.67
Annual Combined Sewer Area Runoff Captured (MG)*	2.34	0.16	2.51
Combined Sewer Area Runoff Capture (%)***	29.16%	0.50%	2.97%
Opinion of Probable Cost****			
Construction Cost	\$142,000	\$10,000	\$152,000
O/M Cost (20 years)	\$6,000	\$1,000	\$7,000
Present Worth Cost**	\$147,000	\$11,000	\$158,000
Present Worth Cost per Drainage Area Treated (acres)	\$35,000	\$32,000	\$34,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX A
TABLES 5.1
THROUGH 5.3

Table A-5.1
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary - Regulator CSO128R002
Nine Mile Run
February 19, 2013

Total Combined Sewer Area 456.21 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 149.78 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*			
	PWSA-F	PWSA-G	PWSA-H	Totals
Subcatchment				
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.53	0.69	1.09	2.31
Number of Candidate GI Projects	2	3	5	10
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.53	0.69	1.09	2.31
Annual Combined Sewer Area Runoff Captured (MG)**	0.45	0.58	0.92	1.95
Combined Sewer Area Runoff Capture (%)***	1.59%	0.88%	2.71%	1.30%
Opinion of Probable Cost****				
Construction Cost	\$548,000	\$709,000	\$1,120,000	\$2,377,000
O/M Cost (20 years)	\$10,000	\$13,000	\$19,000	\$42,000
Present Worth Cost****	\$557,000	\$720,000	\$1,138,000	\$2,415,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,046,000	\$1,045,000	\$1,045,000	\$1,046,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-5.2
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary - Regulator LBs_1111646
Nine Mile Run
February 19, 2013

Total Combined Sewer Area 10.34 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 3.19 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	PWSA-B-Lower	Totals
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.42	0.42
Number of Candidate GI Projects	2	2
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.42	0.42
Annual Combined Sewer Area Runoff Captured (MG)**	0.35	0.35
Combined Sewer Area Runoff Capture (%)***	11.12%	11.12%
Opinion of Probable Cost*****		
Construction Cost	\$433,000	\$433,000
O/M Cost (20 years)	\$8,000	\$8,000
Present Worth Cost****	\$440,000	\$440,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,047,000	\$1,047,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table A-5.3
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary - Regulator M-47-OF
Nine Mile Run
February 19, 2013

Total Combined Sewer Area
 Total Annual Combined Sewer Area Runoff (RainWays)

318.53 acres
 84.29 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	PWSA-B-Upper	Totals
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	2.17	2.17
Number of Candidate GI Projects	4	4
Portion of Drainage Area Tributary to Concept GI Projects (acres)	2.17	2.17
Annual Combined Sewer Area Runoff Captured (MG)**	1.83	1.83
Combined Sewer Area Runoff Capture (%)***	22.76%	2.17%
Opinion of Probable Cost*****		
Construction Cost	\$2,231,000	\$2,231,000
O/M Cost (20 years)	\$38,000	\$38,000
Present Worth Cost****	\$2,266,000	\$2,266,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,045,000	\$1,045,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX A
TABLE 6

Table A-6
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary
Nine Mile Run
February 19, 2013

Total Combined Sewer Area 785.08 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 237.25 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement			
	CSO128R002	LBS_1111646	M-47-OF	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.32	0.00	0.32	0.64
Number of Candidate GI Projects	11	0	5	16
Portion of Drainage Area Tributary to Concept GI Projects (acres)	5.28	0.00	4.67	9.94
Annual Combined Sewer Area Runoff Captured (MG)*	2.54	0.00	2.51	5.05
Combined Sewer Area Runoff Capture (%)***	1.70%	0.00%	2.97%	2.13%
Opinion of Probable Cost****				
Construction Cost	\$154,000	\$0	\$152,000	\$306,000
O/M Cost (20 years)	\$7,000	\$0	\$7,000	\$14,000
Present Worth Cost**	\$160,000	\$0	\$158,000	\$318,000
Present Worth Cost per Drainage Area Treated (acres)	\$31,000	\$0	\$34,000	\$32,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each regulator. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the entire sewershed.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX A
TABLE 7

Table A-7
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Project Summary
Nine Mile Run
February 19, 2013

Total Combined Sewer Area 785.08 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 237.25 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roofs*			
	CSO128R002	LBs_1111646	M-47-OF	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	2.31	0.42	2.17	4.90
Number of Candidate GI Projects	10	2	4	16
Portion of Drainage Area Tributary to Concept GI Projects (acres)	2.31	0.42	2.17	4.90
Annual Combined Sewer Area Runoff Captured (MG)**	1.95	0.35	1.83	4.13
Combined Sewer Area Runoff Capture (%)***	1.30%	11.12%	22.76%	1.74%
Opinion of Probable Cost*****				
Construction Cost	\$2,377,000	\$433,000	\$2,231,000	\$5,041,000
O/M Cost (20 years)	\$42,000	\$8,000	\$38,000	\$88,000
Present Worth Cost****	\$2,415,000	\$440,000	\$2,266,000	\$5,121,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,046,000	\$1,047,000	\$1,045,000	\$1,045,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each regulator. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the entire sewershed.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

**APPENDIX A
RAINWAYS
OUTPUT**

**APPENDIX A
RAINWAYS
OUTPUT
INFILTRATION
BMPs**

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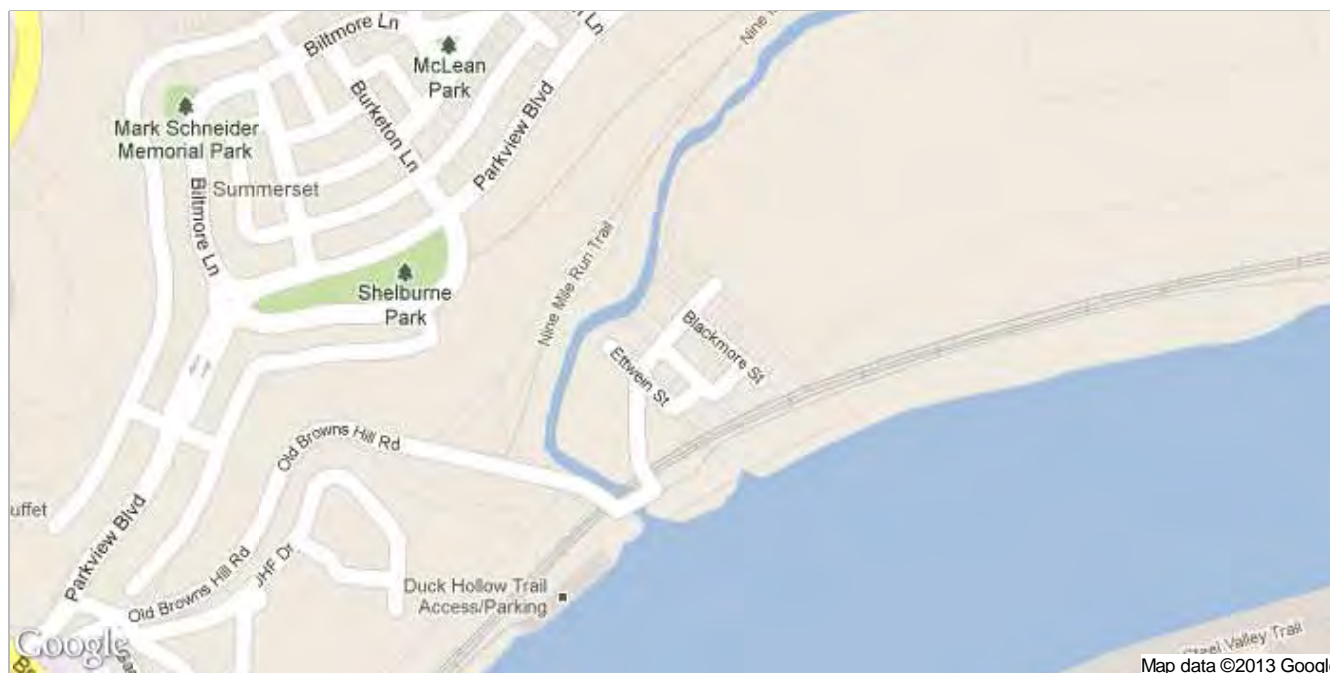
NMR_PWSA-A_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 4.12 acres

Total project cost: \$14,000

Priority area ranking: Medium-Medium (5.34/10)

Design depth: 1 inches

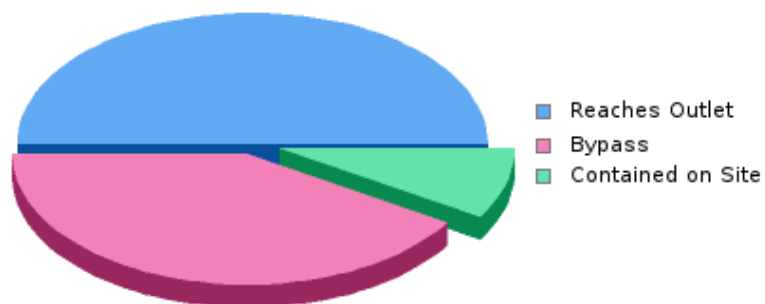
Total impervious area: 1.2 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344750)

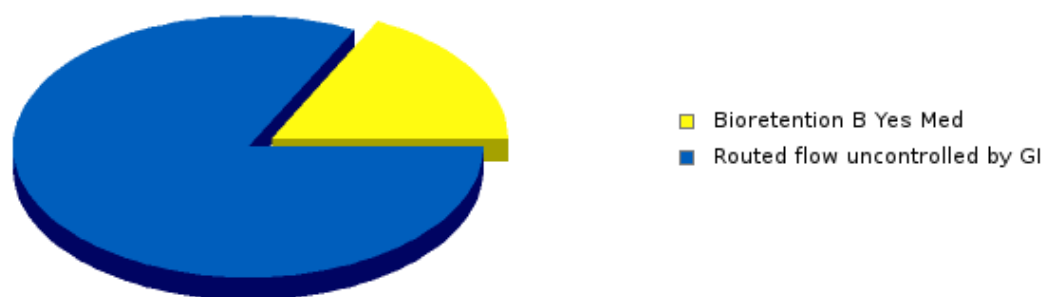
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	3.73 acre-ft
Total Reduction	15 %
Total Runoff Captured	0.56 acre-ft
Total Outlets	3.17 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)		
	Green Infrastructure Capacity			7,656 gallons (0.3 acre-in) 0.014 acres		
LBs_1344750	Building	0.507	1.31	24% flow		
	Impervious-High	0.013	0.03	56% flow		
	Impervious-Mod	0.241	0.62	21% flow		
	Impervious-Low	0.419	1.06	6% flow		
	Pervious-High-D	0.264	0.09	31% flow		
	Pervious-High-C	0.464	0.09	37% flow		
	Pervious-Mod-D	0.754	0.22	44% flow		
	Pervious-Mod-C	0.487	0.08	9% flow		
	Pervious-Low-D	0.958	0.23	19% flow		
	Pervious-Low-C	0.013	0	0% flow		
		Design Depth			1 inches	
		Percent BMP Effectiveness			14.96%	
	BMP Runoff Reduction			0.56 acre-ft		

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344750	Bioretention B Yes Med	\$13,700	\$800	20	\$14,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344750	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1344750

Bioretention B Yes Med Effluent: 0.2 acre-ft

NMR_PWSA-B-Lower_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 10.34 acres

Total project cost: \$26,000

Priority area ranking: Medium-Medium (5.21/10)

Design depth: 1 inches

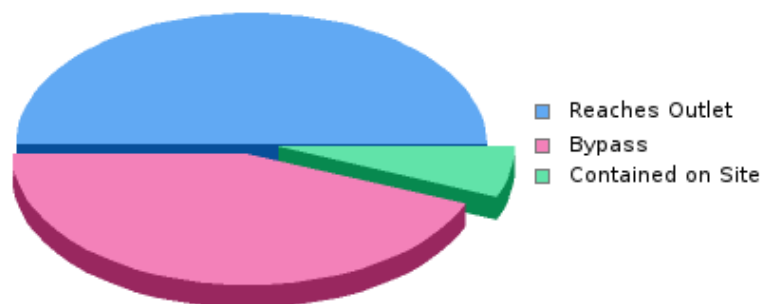
Total impervious area: 3.4 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344793)

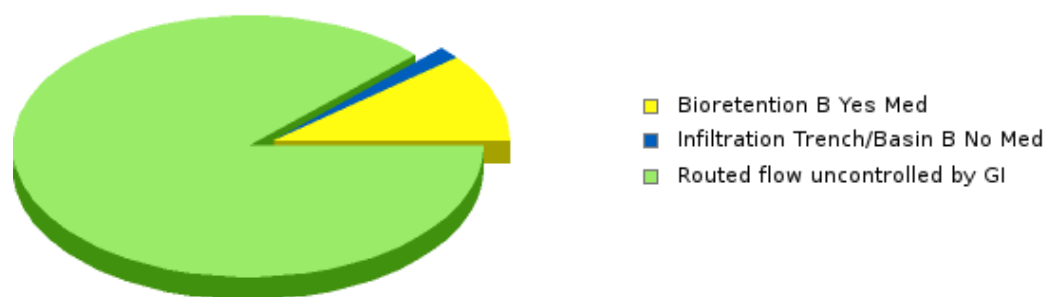
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	9.78 acre-ft
Total Reduction	11.1 %
Total Runoff Captured	1.08 acre-ft
Total Outlets	8.7 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	Infiltration Trench/Basin B No Med (2)	
	Green Infrastructure Capacity			12,948 gallons (0.5 acre-in) 0.024 acres	1,556 gallons (0.1 acre-in) 0.003 acres	
	Building	0.985	2.54	2% flow	0% flow	
	Impervious-High	0.594	1.55	13% flow	0% flow	
	Impervious-Mod	1.271	3.28	20% flow	4% flow	
	Impervious-Low	0.554	1.4	12% flow	0% flow	
	Pervious-High-C	1.573	0.3	1% flow	0% flow	
	Pervious-High-B	0.767	0.07	10% flow	27% flow	
LBs_1344793	Pervious-Mod-D	0.1	0.03	100% flow	0% flow	
	Pervious-Mod-C	0.846	0.14	15% flow	0% flow	
	Pervious-Mod-B	1.862	0.13	3% flow	0% flow	
	Pervious-Low-D	1.113	0.26	31% flow	0% flow	
	Pervious-Low-C	0.674	0.09	23% flow	0% flow	
	Design Depth			1 inches	1 inches	
	Percent BMP Effectiveness			9.64%	1.42%	
	BMP Runoff Reduction			0.94 acre-ft	0.14 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
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LBs_1344793	Bioretention B Yes Med	\$23,100	\$1,300	20	\$24,400
	Infiltration Trench/Basin B No Med	\$1,500	\$100	20	\$1,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344793	Bioretention B Yes Med	\$22.01	\$0.06	20
	Infiltration Trench/Basin B No Med	\$13.44	\$0.02	20

Project BMP Routing

Outlets

LBs_1344793

Bioretention B Yes Med Effluent: 0.3 acre-ft

Infiltration Trench/Basin B No Med Effluent: 0 acre-ft

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NMR_PWSA-C-6_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 30.86 acres

Total project cost: \$40,000

Priority area ranking: Medium-Medium (5.35/10)

Design depth: 1 inches

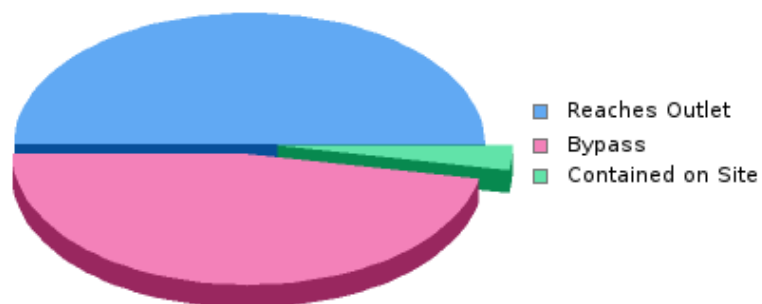
Total impervious area: 9 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344686)

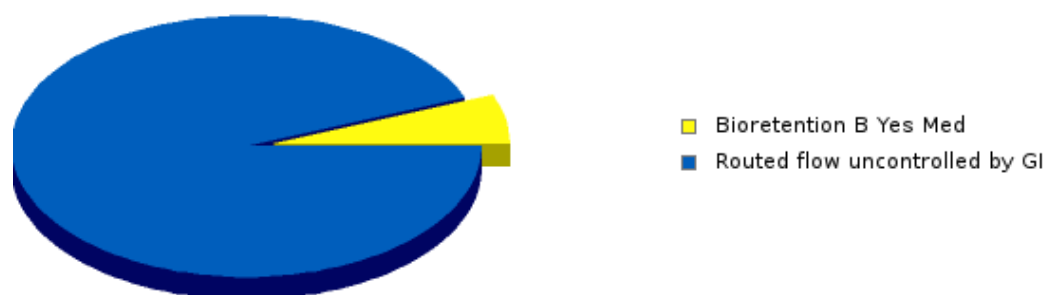
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	27.09 acre-ft
Total Reduction	5.8 %
Total Runoff Captured	1.56 acre-ft
Total Outlets	25.53 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			21,400 gallons (0.8 acre-in) 0.04 acres	
	Building	3.837	9.91	4% flow	
	Impervious-High	1.183	3.08	1% flow	
	Impervious-Mod	2.768	7.15	10% flow	
	Impervious-Low	1.181	2.99	23% flow	
	Pervious-High-D	4.652	1.52	0% flow	
	Pervious-High-C	0.073	0.01	0% flow	
LBs_1344686	Pervious-High-B	3.674	0.32	1% flow	
	Pervious-Mod-D	3.199	0.94	9% flow	
	Pervious-Mod-B	7.575	0.53	6% flow	
	Pervious-Low-D	0.016	0	19% flow	
	Pervious-Low-B	2.705	0.64	16% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			5.75%	
	BMP Runoff Reduction			1.56 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344686	Bioretention B Yes Med	\$38,200	\$2,100	20	\$40,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1344686	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBS_1344686

Bioretention B Yes Med Effluent: 0.5 acre-ft

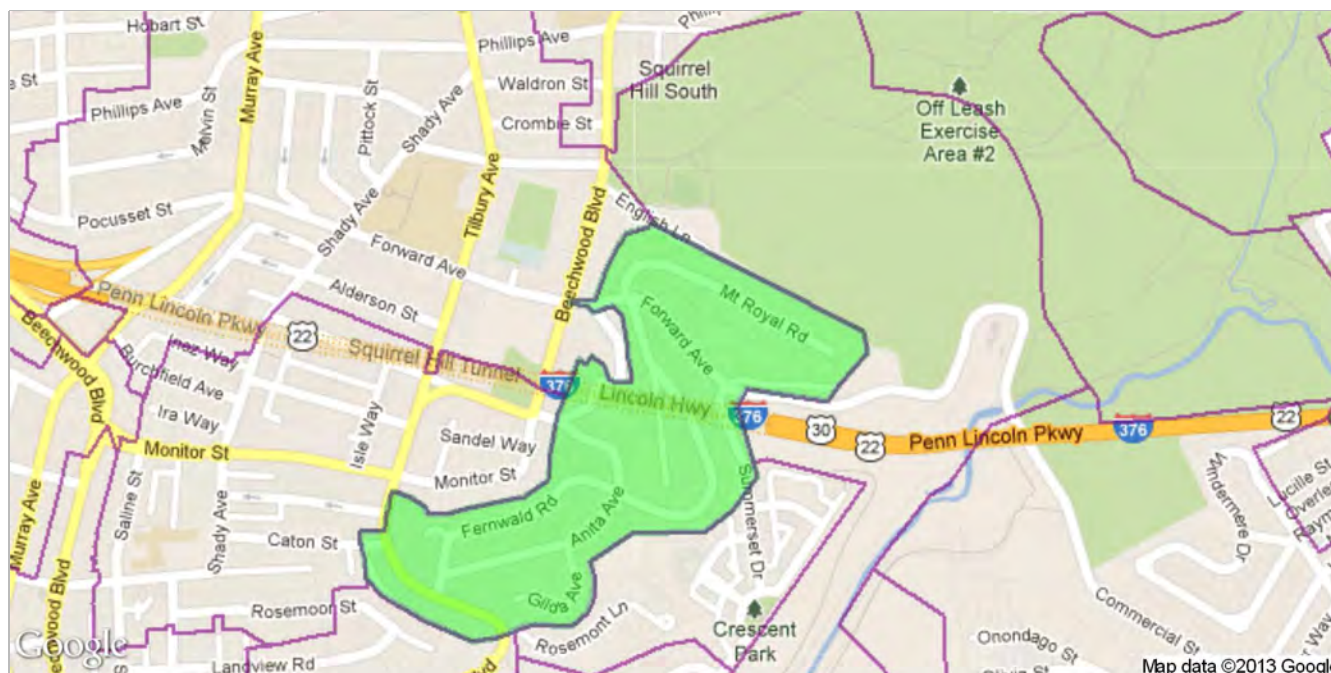
NMR_PWSA-D-5_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 75.48 acres

Total project cost: \$189,000

Priority area ranking: Medium-Medium (5.47/10)

Design depth: 1 inches

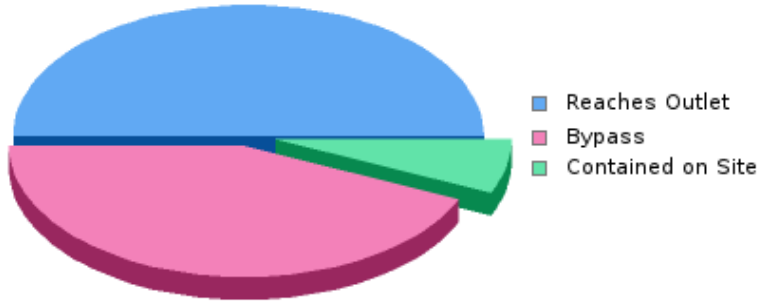
Total impervious area: 20.5 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344623)

Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution








Total Runoff pre-BMP	61.56 acre-ft
Total Reduction	11.9 %
Total Runoff Captured	7.31 acre-ft
Total Outlets	54.24 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)
	Green Infrastructure Capacity			100,414 gallons (3.7 acre-in) 0.187 acres
LBs_1344623	Building	10.022	25.87	14% flow
	Impervious-High	0.773	2.01	0% flow
	Impervious-Mod	5.129	13.24	15% flow
	Impervious-Low	4.59	11.62	26% flow
	Pervious-High-D	3.205	1.05	0% flow
	Pervious-High-C	5.782	1.09	0% flow

Pervious-High-B	4.456	0.39	7% flow	
Pervious-Mod-D	3.233	0.95	0% flow	
Pervious-Mod-C	2.635	0.43	8% flow	
Pervious-Mod-B	20.845	1.46	18% flow	
Pervious-Low-D	0.276	0.07	0% flow	
Pervious-Low-C	0.554	0.07	16% flow	
Pervious-Low-B	13.977	3.31	20% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			11.88%	
BMP Runoff Reduction			7.31 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344623	Bioretention B Yes Med	\$179,000	\$9,800	20	\$188,800

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344623	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1344623

Bioretention B Yes Med Effluent: 2.3 acre-ft

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NMR_PWSA-E-8-8A_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 37.36 acres

Total project cost: \$83,000

Priority area ranking: Medium-Medium (5.51/10)

Design depth: 1 inches

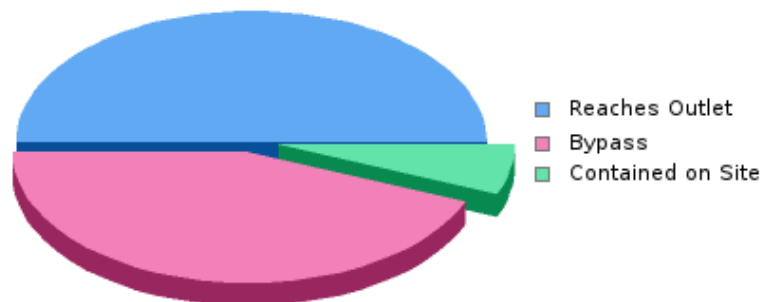
Total impervious area: 13 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344528)

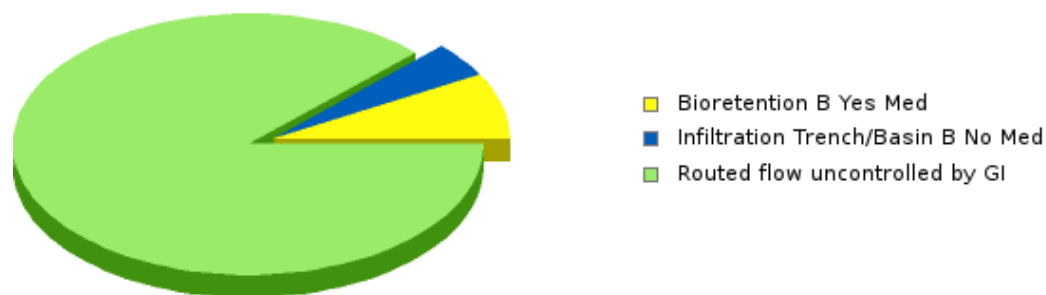
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	36.26 acre-ft
Total Reduction	11 %
Total Runoff Captured	4 acre-ft
Total Outlets	32.26 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	Infiltration Trench/Basin B No Med (2)	
	Green Infrastructure Capacity			35,965 gallons (1.3 acre-in) 0.067 acres	15,483 gallons (0.6 acre-in) 0.026 acres	
	Building	5.887	15.2	3% flow	0% flow	
	Impervious-Mod	2.603	6.72	6% flow	14% flow	
	Impervious-Low	4.51	11.42	21% flow	4% flow	
	Pervious-High-B	1.879	0.16	0% flow	0% flow	
LBs_1344528	Pervious-Mod-C	0.885	0.15	0% flow	0% flow	
	Pervious-Mod-B	14.67	1.03	0% flow	1% flow	
	Pervious-Low-C	0.445	0.06	40% flow	0% flow	
	Pervious-Low-B	6.476	1.53	11% flow	5% flow	
	Design Depth			1 inches	1 inches	
	Percent BMP Effectiveness			7.22%	3.81%	
	BMP Runoff Reduction			2.62 acre-ft	1.38 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
	Bioretention B Yes Med	\$64,100	\$3,500	20	\$67,600
LBs_1344528	Infiltration Trench/Basin B No Med	\$15,000	\$500	20	\$15,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344528	Bioretention B Yes Med	\$22.01	\$0.06	20
	Infiltration Trench/Basin B No Med	\$13.44	\$0.02	20

Project BMP Routing

Outlets

LBs_1344528

Bioretention B Yes Med Effluent: 0.8 acre-ft

Infiltration Trench/Basin B No Med Effluent: 0.1 acre-ft

NMR_PWSA-F-9_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 93.77 acres

Total project cost: \$87,000

Priority area ranking: Medium-Medium (5.46/10)

Design depth: 1 inches

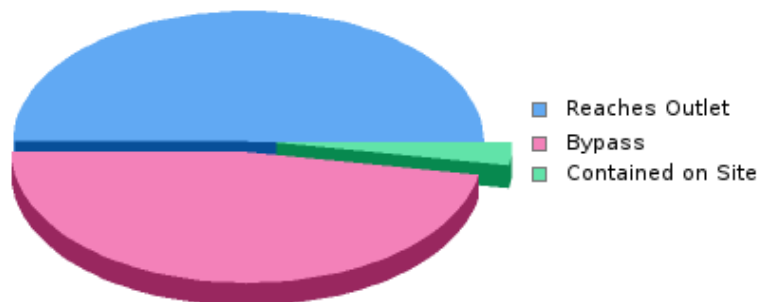
Total impervious area: 29.6 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344488)

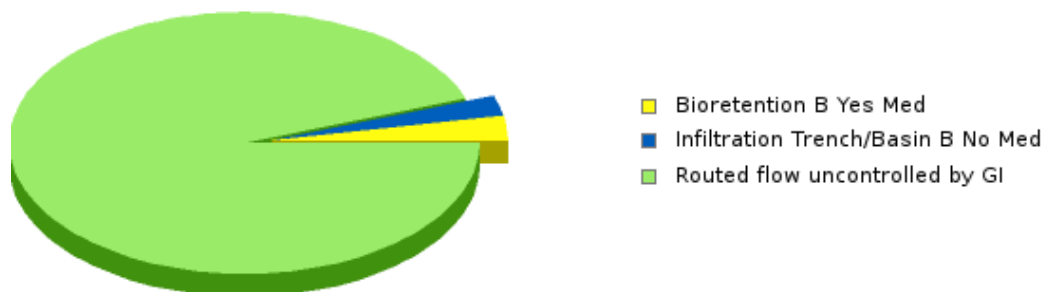
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution
















Relative GI Reduction of Runoff



Total Runoff pre-BMP	86.55 acre-ft
Total Reduction	5.2 %
Total Runoff Captured	4.53 acre-ft
Total Outlets	82.02 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	Infiltration Trench/Basin B No Med (2)	
	Green Infrastructure Capacity			33,965 gallons (1.3 acre-in) 0.063 acres	23,017 gallons (0.8 acre-in) 0.038 acres	
	Building	11.407	29.45	2% flow	3% flow	
	Impervious-High	0.079	0.21	0% flow	0% flow	
	Impervious-Mod	6.868	17.73	2% flow	0% flow	
	Impervious-Low	11.276	28.55	7% flow	4% flow	
	Pervious-High-D	0.444	0.15	0% flow	0% flow	
	Pervious-High-C	0.893	0.17	0% flow	0% flow	
	Pervious-High-B	1.869	0.16	0% flow	0% flow	
LBs_1344488	Pervious-Mod-D	1.601	0.47	0% flow	0% flow	
	Pervious-Mod-C	5.384	0.88	0% flow	0% flow	
	Pervious-Mod-B	22.06	1.54	2% flow	1% flow	
	Pervious-Low-D	5.739	1.36	0% flow	0% flow	
	Pervious-Low-C	2.795	0.35	2% flow	0% flow	
	Pervious-Low-B	23.36	5.53	5% flow	3% flow	
	Design Depth			1 inches	1 inches	
	Percent BMP Effectiveness			2.86%	2.38%	
	BMP Runoff Reduction			2.47 acre-ft	2.06 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344488	Bioretention B Yes Med	\$60,600	\$3,300	20	\$63,900
	Infiltration Trench/Basin B No Med	\$22,400	\$800	20	\$23,200

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344488	Bioretention B Yes Med	\$22.01	\$0.06	20
	Infiltration Trench/Basin B No Med	\$13.44	\$0.02	20

Project BMP Routing

Outlets

LBs_1344488

Bioretention B Yes Med Effluent: 0.8 acre-ft

Infiltration Trench/Basin B No Med Effluent: 0.2 acre-ft

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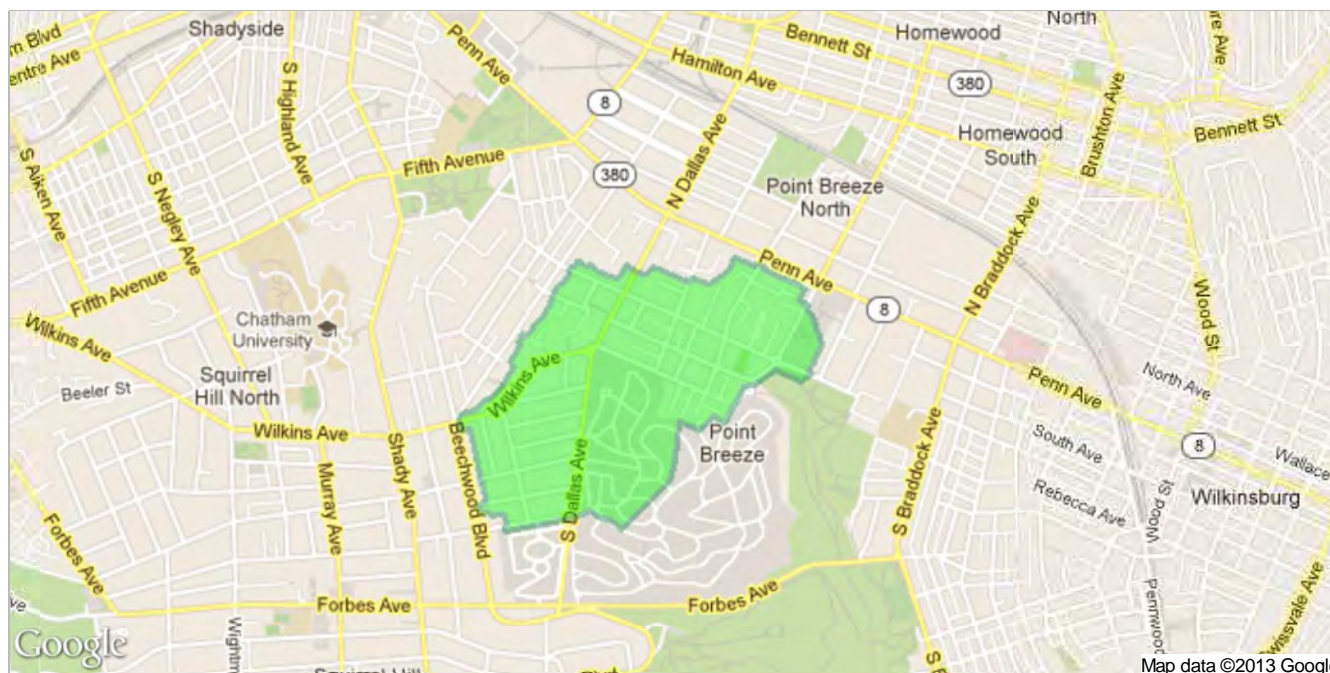
NMR_PWSA-G_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 212.01 acres

Total project cost: \$570,000

Priority area ranking: Medium-Medium (5.55/10)

Design depth: 1 inches

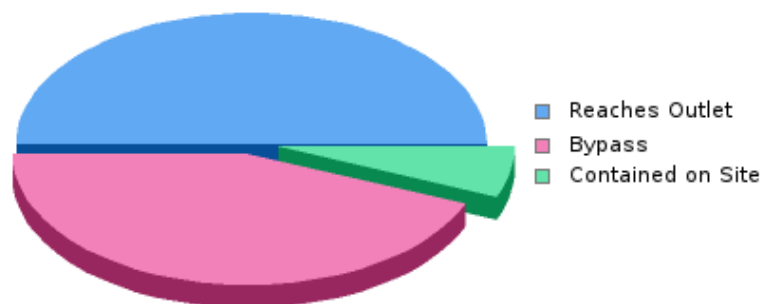
Total impervious area: 68 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344348)

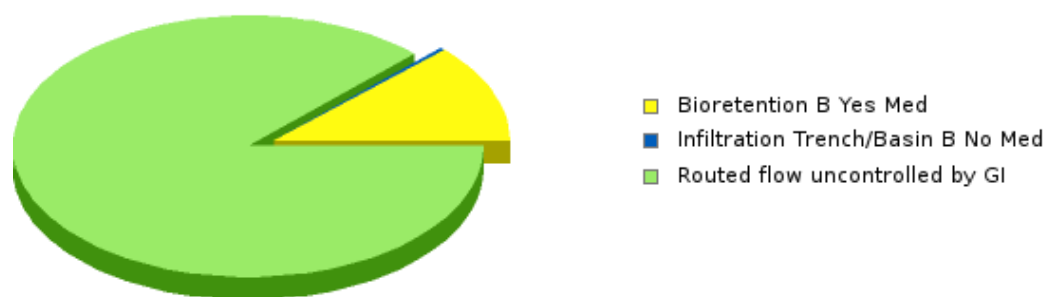
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	202.2 acre-ft
Total Reduction	11.1 %
Total Runoff Captured	22.46 acre-ft
Total Outlets	179.74 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	Infiltration Trench/Basin B No Med (2)	
	Green Infrastructure Capacity			298,583 gallons (11 acre-in) 0.555 acres	7,920 gallons (0.3 acre-in) 0.013 acres	
	Building	32.66	84.32	10% flow	0% flow	
	Impervious-Mod	5.315	13.72	20% flow	0% flow	
	Impervious-Low	29.993	75.93	19% flow	1% flow	
	Pervious-Mod-D	2.626	0.77	22% flow	0% flow	
	Pervious-Mod-C	17.933	2.94	1% flow	0% flow	
LBs_1344348	Pervious-Mod-B	11.521	0.81	31% flow	0% flow	
	Pervious-Low-D	10.92	2.58	7% flow	0% flow	
	Pervious-Low-C	25.344	3.21	2% flow	0% flow	
	Pervious-Low-B	75.7	17.92	13% flow	0% flow	
	Design Depth			1 inches	1 inches	
	Percent BMP Effectiveness			10.76%	0.35%	
	BMP Runoff Reduction			21.75 acre-ft	0.71 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
	Bioretention B Yes Med	\$532,400	\$29,300	20	\$561,700
LBs_1344348	Infiltration Trench/Basin B No Med	\$7,700	\$300	20	\$8,000

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
	Bioretention B Yes Med	\$22.01	\$0.06	20
LBs_1344348	Infiltration Trench/Basin B No Med	\$13.44	\$0.02	20

Project BMP Routing

Outlets

LBs_1344348

Bioretention B Yes Med Effluent: 6.9 acre-ft

Infiltration Trench/Basin B No Med Effluent: 0.1 acre-ft

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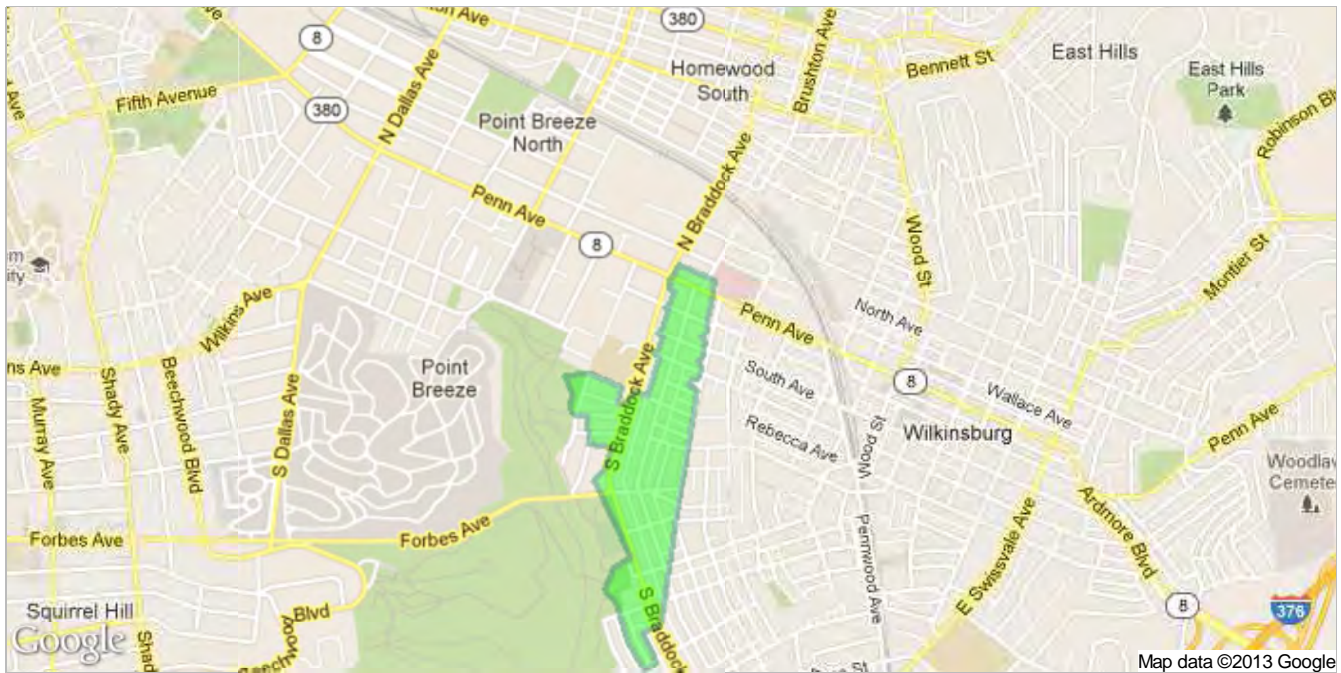
NMR_PWSA-H-11_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 85.95 acres

Total project cost: \$327,000

Priority area ranking: Medium-Medium (5.46/10)

Design depth: 1 inches

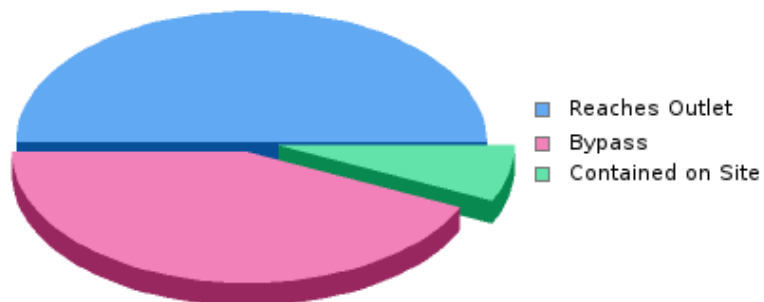
Total impervious area: 36.5 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344378)

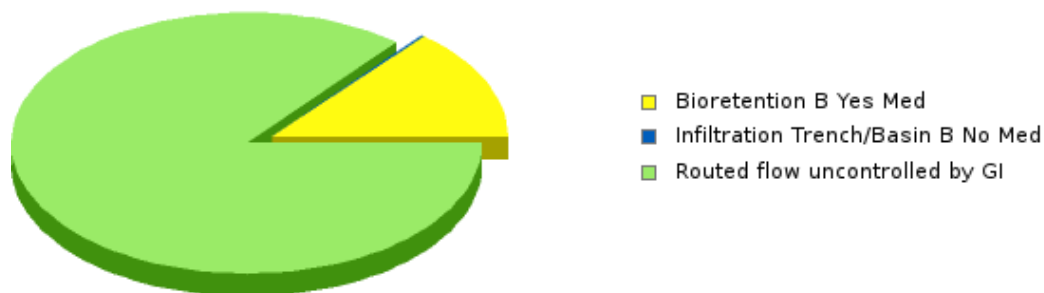
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	103.87 acre-ft
Total Reduction	12.3 %
Total Runoff Captured	12.78 acre-ft
Total Outlets	91.09 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	Infiltration Trench/Basin B No Med (2)	
	Green Infrastructure Capacity			172,566 gallons (6.4 acre-in) 0.321 acres	2,308 gallons (0.1 acre-in) 0.004 acres	
	Building	16.378	42.28	11% flow	0% flow	
	Impervious-Mod	2.141	5.53	20% flow	1% flow	
	Impervious-Low	17.971	45.5	20% flow	0% flow	
	Pervious-High-C	0.519	0.1	0% flow	0% flow	
	Pervious-Mod-D	0.89	0.26	27% flow	0% flow	
LBs_1344378	Pervious-Mod-C	1.858	0.31	0% flow	25% flow	
	Pervious-Mod-B	5.405	0.38	4% flow	5% flow	
	Pervious-Low-D	34.996	8.28	19% flow	0% flow	
	Pervious-Low-C	1.202	0.15	5% flow	18% flow	
	Pervious-Low-B	4.588	1.09	2% flow	4% flow	
	Design Depth			1 inches	1 inches	
	Percent BMP Effectiveness			12.1%	0.2%	
	BMP Runoff Reduction			12.57 acre-ft	0.21 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344378	Bioretention B Yes Med	\$307,700	\$16,900	20	\$324,600

Infiltration Trench/Basin B No Med	\$2,200	\$100	20	\$2,300
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Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
	Bioretention B Yes Med	\$22.01	\$0.06	20
LBs_1344378	Infiltration Trench/Basin B No Med	\$13.44	\$0.02	20

Project BMP Routing

Outlets

LBs_1344378

Bioretention B Yes Med Effluent: 4 acre-ft

Infiltration Trench/Basin B No Med Effluent: 0 acre-ft

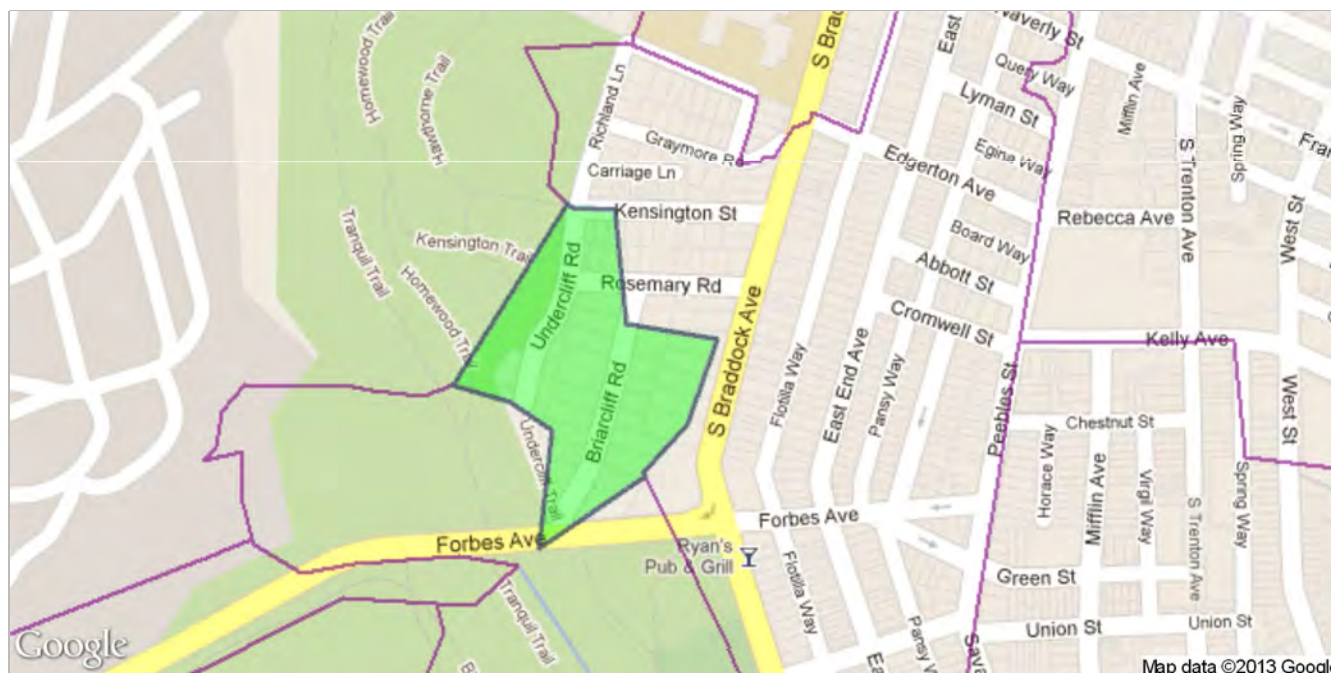
NMR_PWSA-I-10_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 9.39 acres

Total project cost: \$8,000

Priority area ranking: Medium-Medium (5.49/10)

Design depth: 1 inches

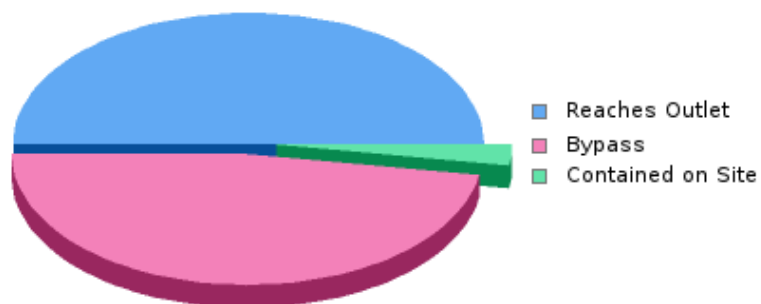
Total impervious area: 1.9 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344450)

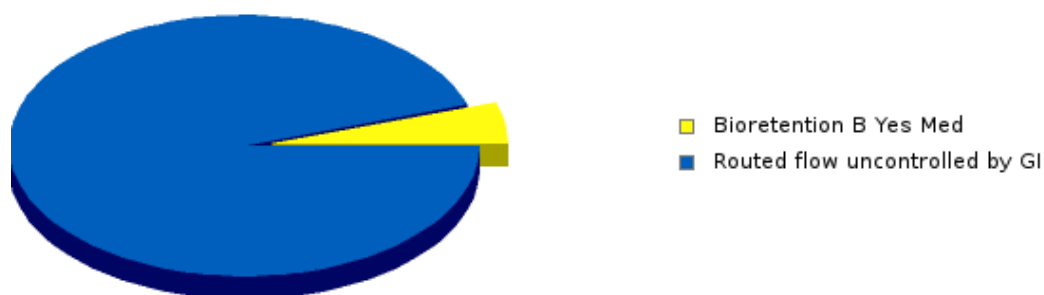
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	6.04 acre-ft
Total Reduction	4.9 %
Total Runoff Captured	0.29 acre-ft
Total Outlets	5.75 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			4,026 gallons (0.1 acre-in) 0.007 acres	
	Building	1.075	2.78	7% flow	
	Impervious-High	0.114	0.3	0% flow	
	Impervious-Mod	0.219	0.57	0% flow	
	Impervious-Low	0.457	1.16	11% flow	
	Pervious-High-C	1.203	0.23	0% flow	
LBs_1344450	Pervious-Mod-C	2.627	0.43	0% flow	
	Pervious-Mod-B	0.601	0.04	0% flow	
	Pervious-Low-C	1.693	0.21	10% flow	
	Pervious-Low-B	1.399	0.33	13% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			4.86%	
	BMP Runoff Reduction			0.29 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344450	Bioretention B Yes Med	\$7,200	\$400	20	\$7,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344450	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1344450

Bioretention B Yes Med Effluent: 0.1 acre-ft

NMR_PWSA-J_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 10.63 acres

Total project cost: \$15,000

Priority area ranking: Medium-Medium (5.41/10)

Design depth: 1 inches

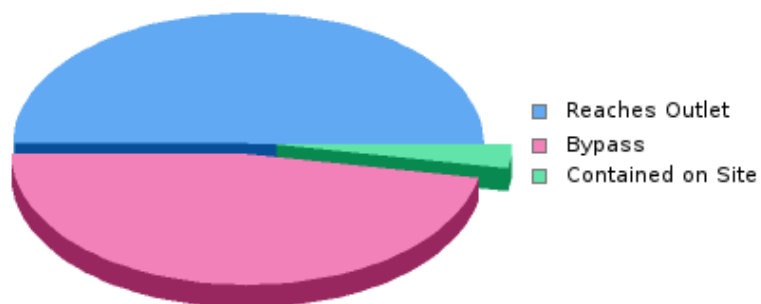
Total impervious area: 3.9 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344560)

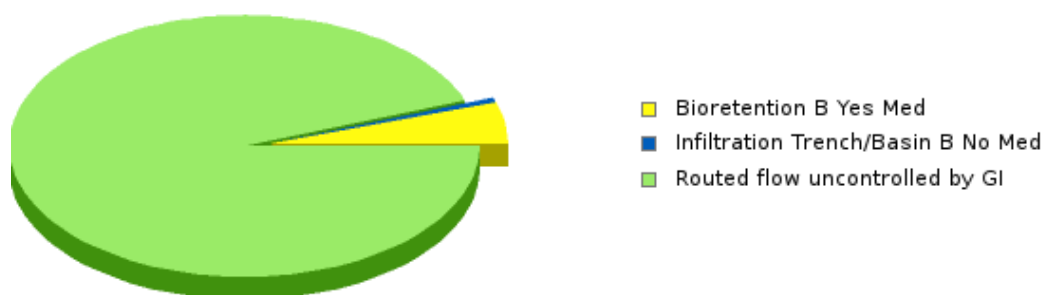
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	11.26 acre-ft
Total Reduction	5.4 %
Total Runoff Captured	0.61 acre-ft
Total Outlets	10.65 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	Infiltration Trench/Basin B No Med (2)	
	Green Infrastructure Capacity			7,355 gallons (0.3 acre-in) 0.014 acres	825 gallons (0 acre-in) 0.001 acres	
	Building	1.737	4.48	4% flow	0% flow	
	Impervious-Mod	0.504	1.3	0% flow	6% flow	
	Impervious-Low	1.63	4.13	11% flow	0% flow	
	Pervious-High-C	0.017	0	0% flow	0% flow	
LBs_1344560	Pervious-Mod-C	1.768	0.29	0% flow	0% flow	
	Pervious-Mod-B	0.75	0.05	0% flow	2% flow	
	Pervious-Low-D	2.76	0.65	11% flow	0% flow	
	Pervious-Low-B	1.469	0.35	0% flow	0% flow	
	Design Depth			1 inches	1 inches	
	Percent BMP Effectiveness			4.76%	0.65%	
	BMP Runoff Reduction			0.54 acre-ft	0.07 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
	Bioretention B Yes Med	\$13,100	\$700	20	\$13,800
LBs_1344560	Infiltration Trench/Basin B No Med	\$800	<\$100	20	\$800

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344560	Bioretention B Yes Med	\$22.01	\$0.06	20
	Infiltration Trench/Basin B No Med	\$13.44	\$0.02	20

Project BMP Routing

Outlets

LBs_1344560

Bioretention B Yes Med Effluent: 0.2 acre-ft

Infiltration Trench/Basin B No Med Effluent: 0 acre-ft

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NMR_PWSA-K_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 7.49 acres

Total project cost: \$9,000

Priority area ranking: Medium-Medium (5.39/10)

Design depth: 1 inches

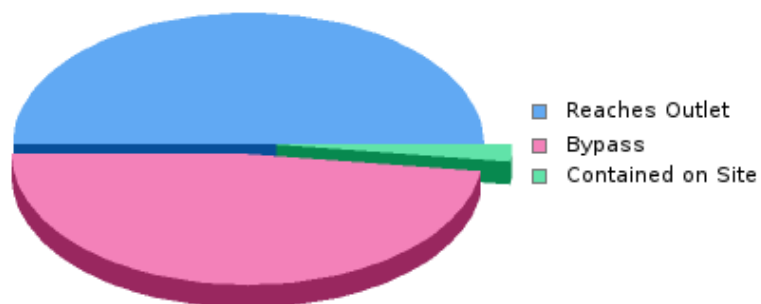
Total impervious area: 3.1 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344589)

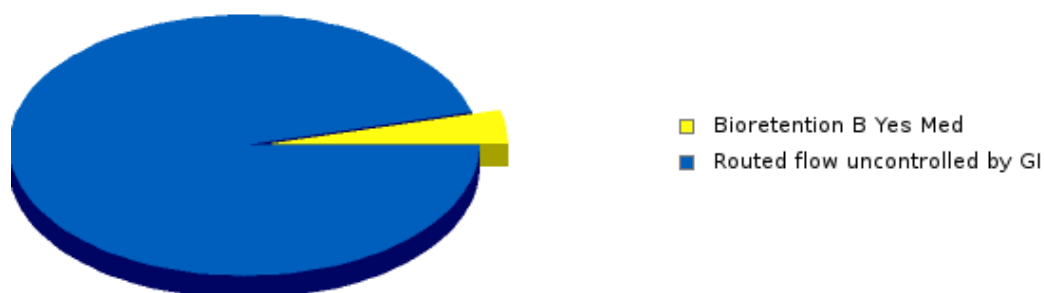
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution








Relative GI Reduction of Runoff



Total Runoff pre-BMP	8.91 acre-ft
Total Reduction	3.9 %
Total Runoff Captured	0.35 acre-ft
Total Outlets	8.56 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			4,809 gallons (0.2 acre-in) 0.009 acres	
LBs_1344589	Building	1.063	2.74	1% flow	
	Impervious-Mod	0.339	0.88	0% flow	
	Impervious-Low	1.712	4.33	7% flow	
	Pervious-Mod-D	0.027	0.01	0% flow	
	Pervious-Mod-C	0.505	0.08	0% flow	
	Pervious-Mod-B	0.293	0.02	0% flow	
	Pervious-Low-D	2.914	0.69	18% flow	
	Pervious-Low-B	0.637	0.15	4% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			3.93%	
	BMP Runoff Reduction			0.35 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344589	Bioretention B Yes Med	\$8,600	\$500	20	\$9,100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1344589	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBS_1344589

Bioretention B Yes Med Effluent: 0.1 acre-ft

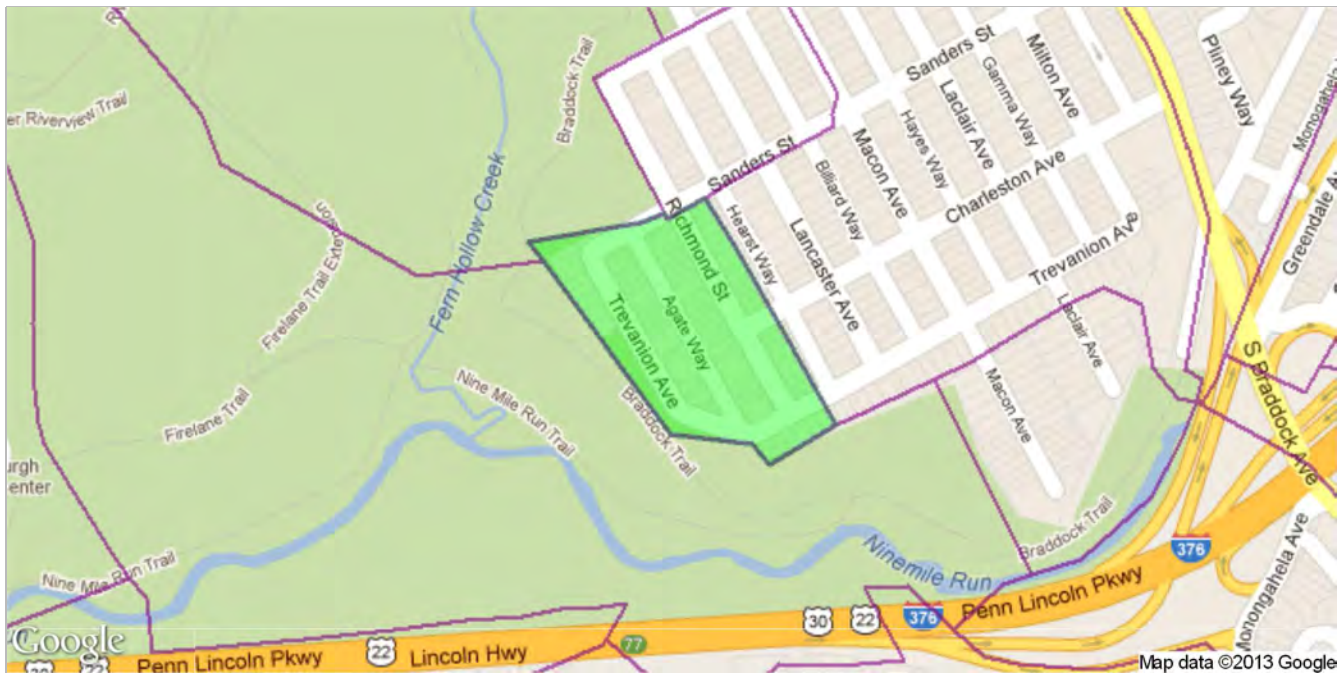
NMR_PWSA-L_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 9.24 acres

Total project cost: \$5,000

Priority area ranking: Medium-Medium (5.41/10)

Design depth: 1 inches

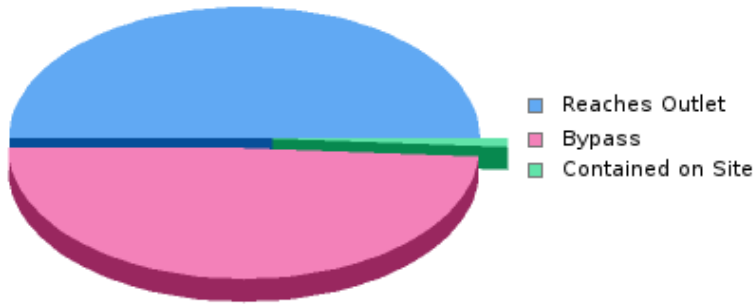
Total impervious area: 3.2 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344620)

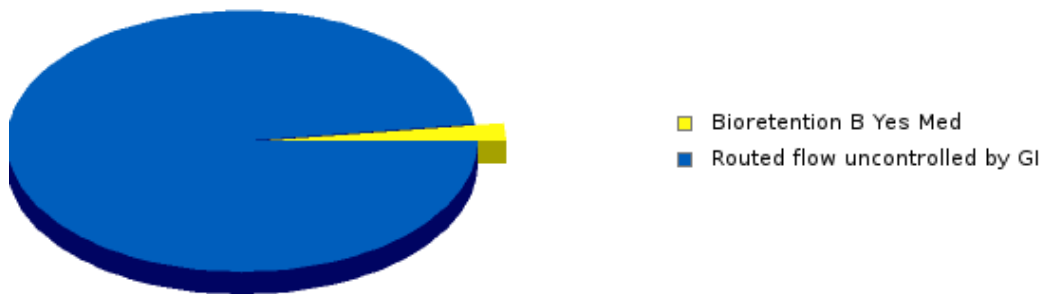
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	9.53 acre-ft
Total Reduction	2.1 %
Total Runoff Captured	0.2 acre-ft
Total Outlets	9.33 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			2,745 gallons (0.1 acre-in) 0.005 acres	
	Building	1.552	4.01	4% flow	
	Impervious-High	0.094	0.24	0% flow	
	Impervious-Mod	0.82	2.12	0% flow	
	Impervious-Low	0.755	1.91	2% flow	
	Pervious-High-C	0.735	0.14	0% flow	
LBs_1344620	Pervious-Mod-D	0.869	0.25	0% flow	
	Pervious-Mod-C	1.795	0.29	0% flow	
	Pervious-Low-D	2.102	0.5	13% flow	
	Pervious-Low-C	0.514	0.07	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			2.1%	
	BMP Runoff Reduction			0.2 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344620	Bioretention B Yes Med	\$4,900	\$300	20	\$5,200

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344620	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1344620

Bioretention B Yes Med Effluent: 0.1 acre-ft

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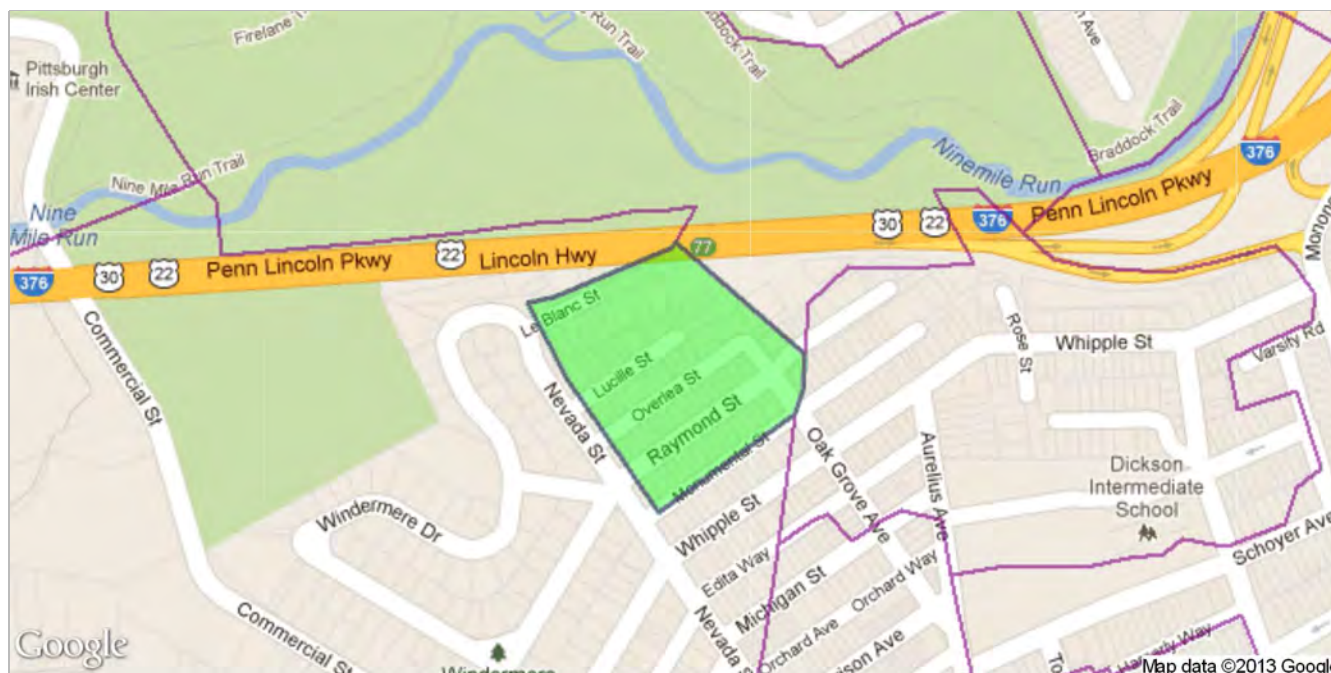
NMR_PWSA-M_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 9.49 acres

Total project cost: \$23,000

Priority area ranking: Medium-Medium (5.46/10)

Design depth: 1 inches

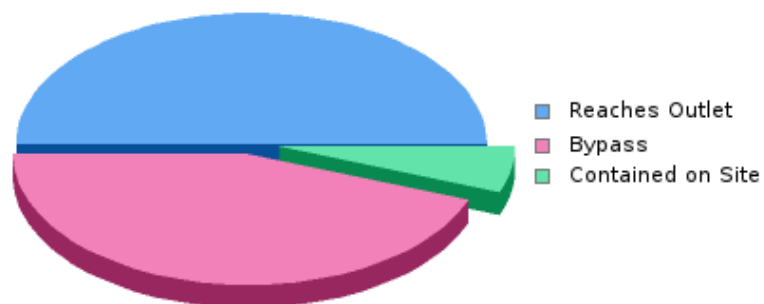
Total impervious area: 2.7 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344661)

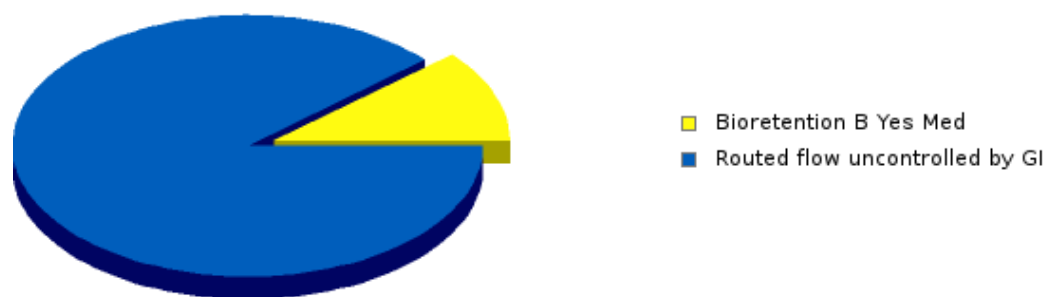
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	8.86 acre-ft
Total Reduction	10.2 %
Total Runoff Captured	0.91 acre-ft
Total Outlets	7.96 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			12,463 gallons (0.5 acre-in) 0.023 acres	
LBs_1344661	Building	1.484	3.83	10% flow	
	Impervious-High	0.126	0.33	0% flow	
	Impervious-Mod	0.208	0.54	0% flow	
	Impervious-Low	0.913	2.31	30% flow	
	Pervious-High-D	2.274	0.74	0% flow	
	Pervious-Mod-D	0.91	0.27	0% flow	
	Pervious-Low-D	3.571	0.85	14% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			10.24%	
	BMP Runoff Reduction			0.91 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344661	Bioretention B Yes Med	\$22,200	\$1,200	20	\$23,400

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344661	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1344661

Bioretention B Yes Med Effluent: 0.3 acre-ft

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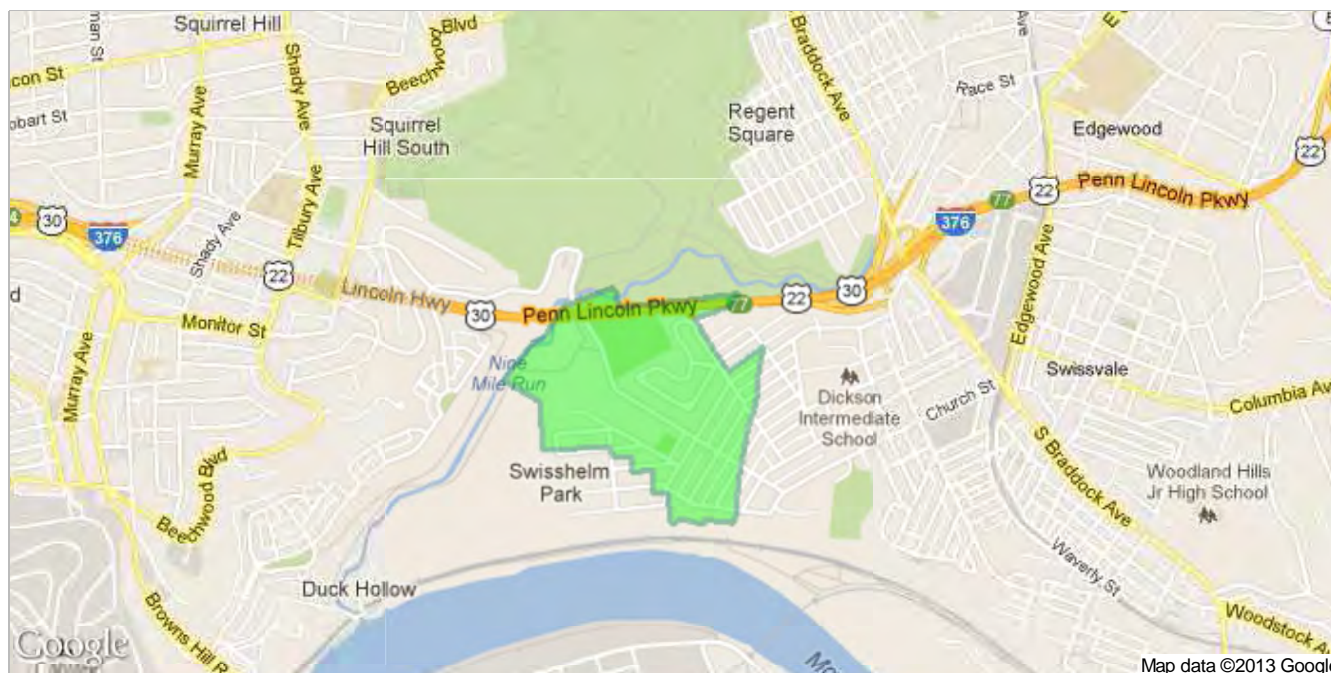
NMR_PWSA-N_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 130.66 acres

Total project cost: \$120,000

Priority area ranking: Medium-High (5.66/10)

Design depth: 1 inches

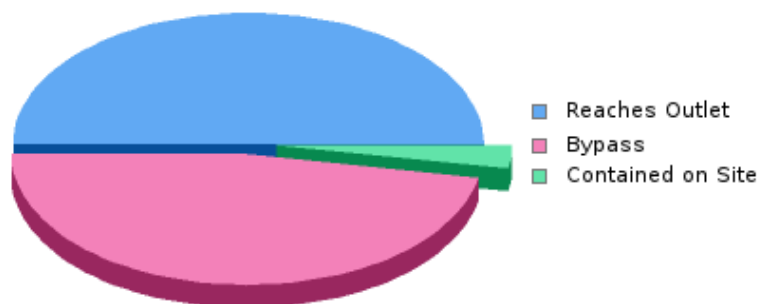
Total impervious area: 30.3 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344652)

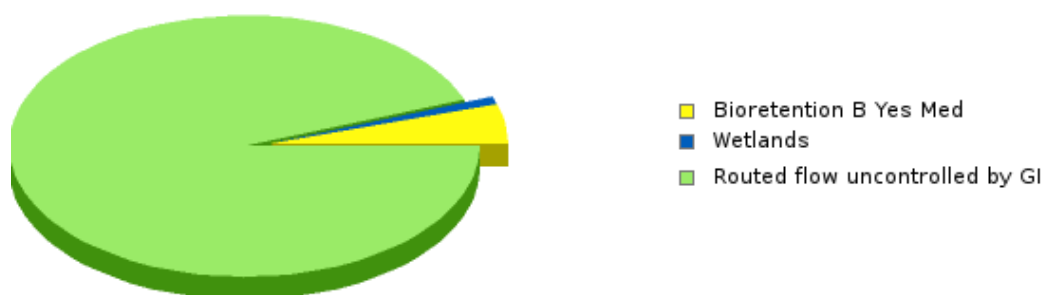
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution

















Relative GI Reduction of Runoff



Total Runoff pre-BMP	99.74 acre-ft
Total Reduction	5.5 %
Total Runoff Captured	5.46 acre-ft
Total Outlets	94.29 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	Wetlands (2)	
	Green Infrastructure Capacity			62,842 gallons (2.3 acre-in) 0.117 acres	15,590 gallons (0.6 acre-in) 0.019 acres	
	Water	1.472	0	0% flow	0% flow	
	Building	11.574	29.88	5% flow	0% flow	
	Impervious-High	0.614	1.6	7% flow	0% flow	
	Impervious-Mod	2.824	7.29	1% flow	1% flow	
	Impervious-Low	15.337	38.83	8% flow	3% flow	
	Pervious-High-D	6.203	2.03	0% flow	0% flow	
	Pervious-High-C	12.166	2.3	0% flow	0% flow	
LBs_1344652	Pervious-High-B	0.699	0.06	0% flow	0% flow	
	Pervious-Mod-D	13.53	3.96	1% flow	1% flow	
	Pervious-Mod-C	12.486	2.05	0% flow	0% flow	
	Pervious-Mod-B	3.415	0.24	0% flow	0% flow	
	Pervious-Low-D	45.919	10.87	11% flow	2% flow	
	Pervious-Low-C	3.703	0.47	1% flow	0% flow	
	Pervious-Low-B	0.721	0.17	0% flow	0% flow	
	Design Depth			1 inches	1 inches	
	Percent BMP Effectiveness			4.59%	0.88%	

BMP Runoff Reduction	4.58 acre-ft	0.88 acre-ft
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Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344652	Bioretention B Yes Med	\$112,100	\$6,200	20	\$118,300
	Wetlands	\$1,600	\$100	20	\$1,700

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344652	Bioretention B Yes Med	\$22.01	\$0.06	20
	Wetlands	\$1.93	\$0	20

Project BMP Routing

Outlets

LBs_1344652

Bioretention B Yes Med Effluent: 1.4 acre-ft

Wetlands Effluent: 0.6 acre-ft

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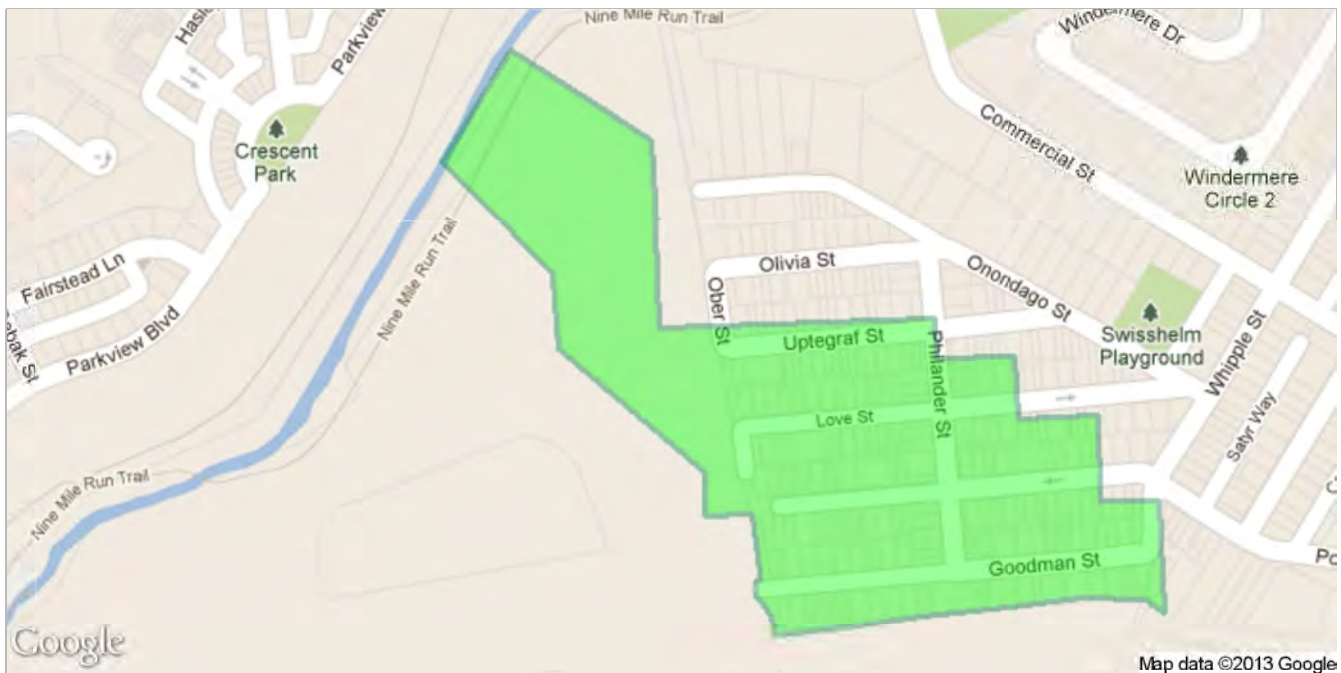
NMR_PWSA-O_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 34.93 acres

Total project cost: \$63,000

Priority area ranking: Medium-High (5.74/10)

Design depth: 1 inches

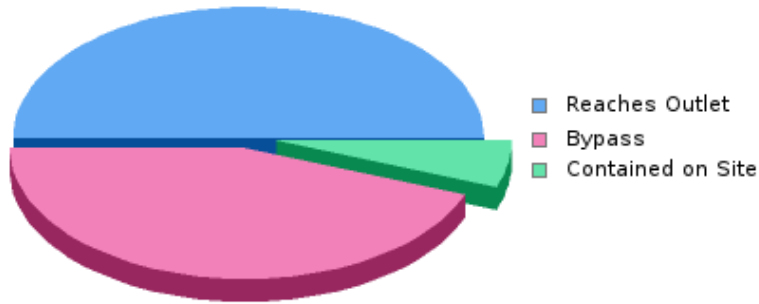
Total impervious area: 6.9 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344688)

Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution















Relative GI Reduction of Runoff



Total Runoff pre-BMP	23.5 acre-ft
Total Reduction	10.3 %
Total Runoff Captured	2.43 acre-ft
Total Outlets	21.07 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			33,352 gallons (1.2 acre-in) 0.062 acres	
	Water	0.217	0	0% flow	
	Building	3.353	8.66	8% flow	
	Impervious-Mod	0.908	2.34	9% flow	
	Impervious-Low	2.598	6.58	29% flow	
	Pervious-High-D	0.569	0.19	0% flow	
	Pervious-High-C	1.966	0.37	0% flow	
LBs_1344688	Pervious-Mod-D	4.383	1.28	5% flow	
	Pervious-Mod-C	3.765	0.62	0% flow	
	Pervious-Mod-B	2.573	0.18	0% flow	
	Pervious-Low-D	11.356	2.69	12% flow	
	Pervious-Low-C	1.516	0.19	0% flow	
	Pervious-Low-B	1.726	0.41	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			10.34%	
	BMP Runoff Reduction			2.43 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green	Construction	O&M Costs (total,	Lifespan	Total
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	Infrastructure BMP	Cost	present value)	(years)	Cost
LBS_1344688	Bioretention B Yes Med	\$59,500	\$3,300	20	\$62,800

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1344688	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBS_1344688

Bioretention B Yes Med Effluent: 0.8 acre-ft

**APPENDIX A
RAINWAYS
OUTPUT
PERMEABLE
PAVEMENT**

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NMR_PWSA-1ALT_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 3.96 acres

Total project cost: \$12,000

Priority area ranking: Medium-Medium (5.34/10)

Design depth: 1 inches

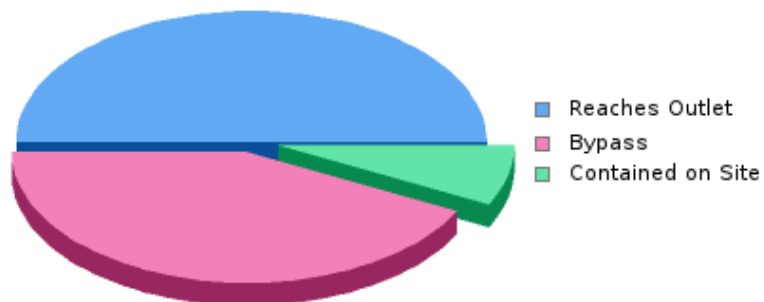
Total impervious area: 1.6 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344529)

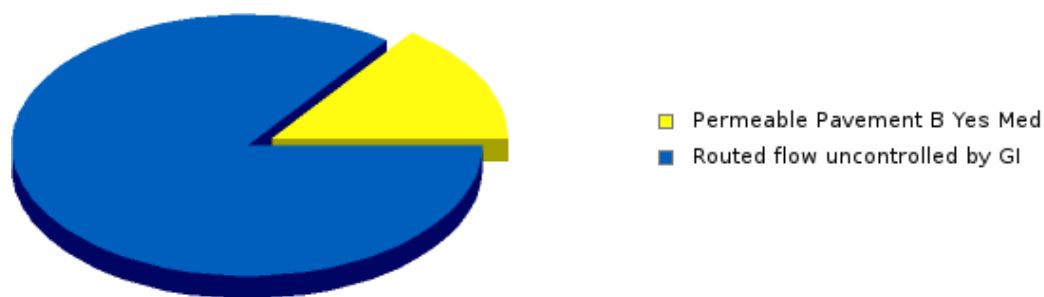
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	4.56 acre-ft
Total Reduction	12.9 %
Total Runoff Captured	0.59 acre-ft
Total Outlets	3.97 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			6,795 gallons (0.3 acre-in) 0.024 acres	
LBs_1344529	Building	0.624	1.61	10% flow	
	Impervious-Mod	0.38	0.98	10% flow	
	Impervious-Low	0.577	1.46	20% flow	
	Pervious-Mod-D	0.112	0.03	0% flow	
	Pervious-Mod-C	0.615	0.1	3% flow	
	Pervious-Low-D	1.205	0.29	33% flow	
	Pervious-Low-C	0.156	0.02	15% flow	
	Pervious-Low-B	0.275	0.07	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			12.94%	
	BMP Runoff Reduction			0.59 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344529	Permeable Pavement B Yes Med	\$11,600	\$300	20	\$11,900

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be

called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type. Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344529	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344529

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

NMR_PWSA-A_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 4.12 acres

Total project cost: \$13,000

Priority area ranking: Medium-Medium (5.34/10)

Design depth: 1 inches

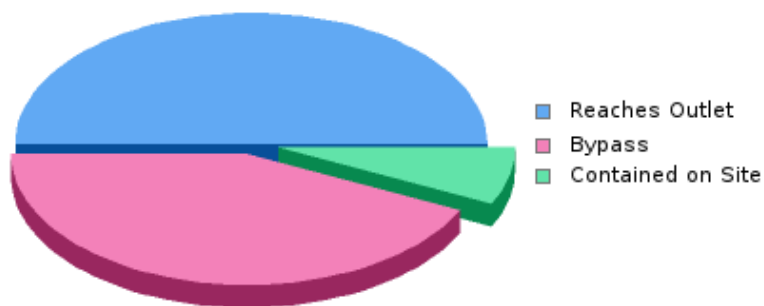
Total impervious area: 1.2 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344750)

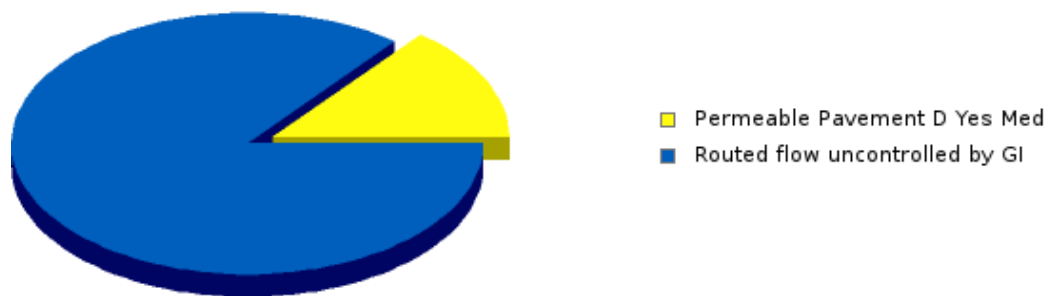
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff













Total Runoff pre-BMP	3.73 acre-ft
Total Reduction	12.5 %
Total Runoff Captured	0.47 acre-ft
Total Outlets	3.26 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement D Yes Med (1)
LBs_1344750	Green Infrastructure Capacity			7,255 gallons (0.3 acre-in) 0.026 acres

Building	0.507	1.31	0% flow	
Impervious-High	0.013	0.03	43% flow	
Impervious-Mod	0.241	0.62	33% flow	
Impervious-Low	0.419	1.06	41% flow	
Pervious-High-D	0.264	0.09	0% flow	
Pervious-High-C	0.464	0.09	0% flow	
Pervious-Mod-D	0.754	0.22	1% flow	
Pervious-Mod-C	0.487	0.08	0% flow	
Pervious-Low-D	0.958	0.23	17% flow	
Pervious-Low-C	0.013	0	0% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			12.49%	
BMP Runoff Reduction			0.47 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344750	Permeable Pavement D Yes Med	\$12,300	\$400	20	\$12,700

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1344750	Permeable Pavement D Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344750

Permeable Pavement D Yes Med Effluent: 0.2 acre-ft

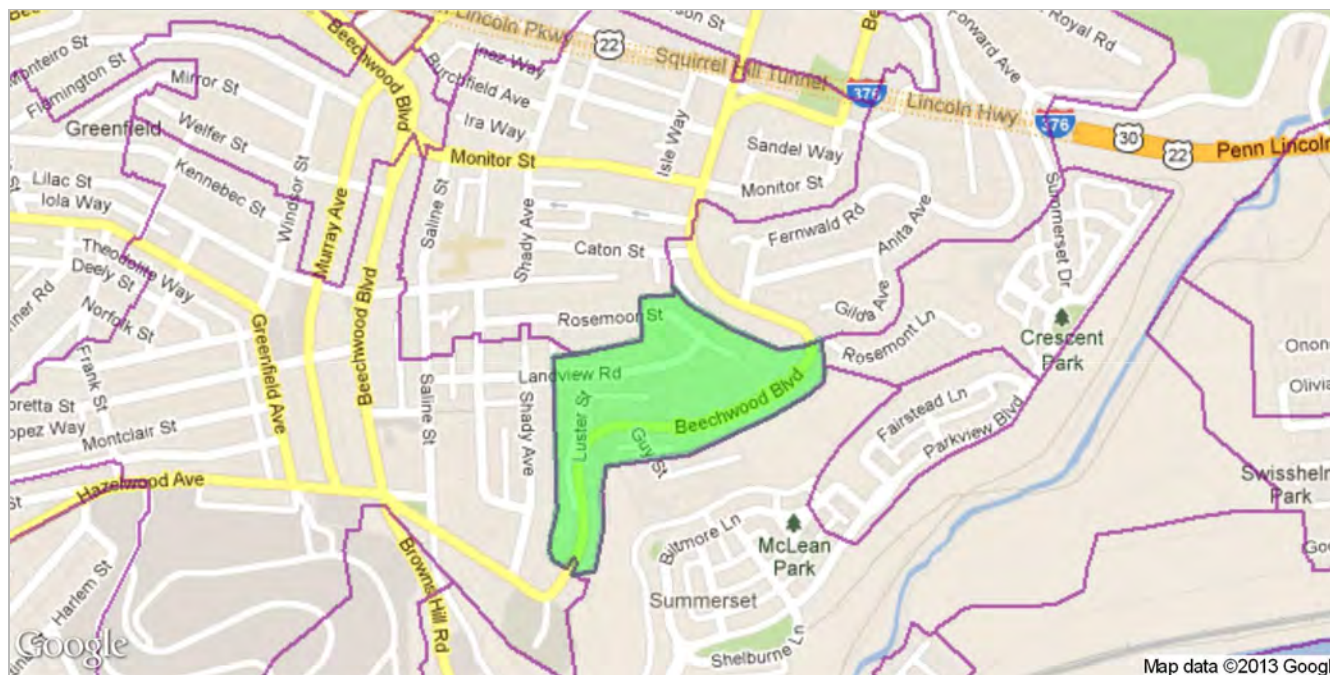
NMR_PWSA-C-6_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 30.86 acres

Total project cost: \$23,000

Priority area ranking: Medium-Medium (5.35/10)

Design depth: 1 inches

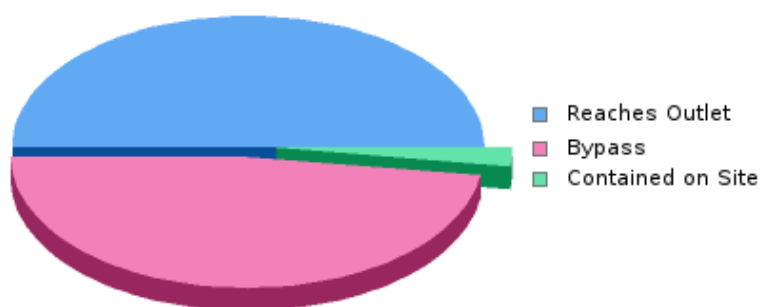
Total impervious area: 9 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344686)

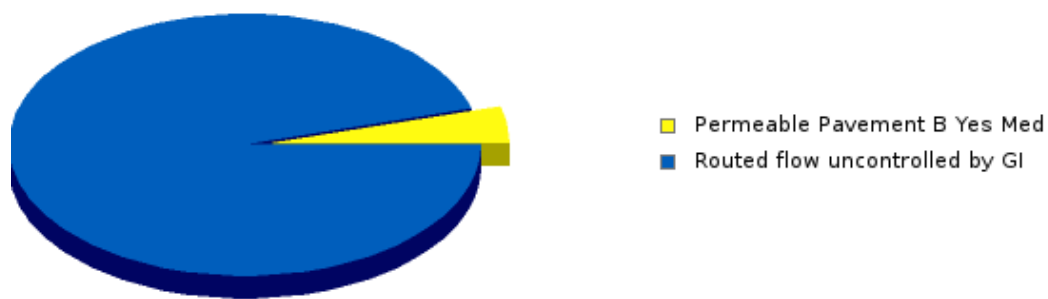
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	27.09 acre-ft
Total Reduction	4.3 %
Total Runoff Captured	1.16 acre-ft
Total Outlets	25.92 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1344686	Green Infrastructure Capacity			13,426 gallons (0.5 acre-in) 0.048 acres

Building	3.837	9.91	3% flow	
Impervious-High	1.183	3.08	2% flow	
Impervious-Mod	2.768	7.15	5% flow	
Impervious-Low	1.181	2.99	15% flow	
Pervious-High-D	4.652	1.52	0% flow	
Pervious-High-C	0.073	0.01	0% flow	
Pervious-High-B	3.674	0.32	1% flow	
Pervious-Mod-D	3.199	0.94	0% flow	
Pervious-Mod-B	7.575	0.53	2% flow	
Pervious-Low-D	0.016	0	0% flow	
Pervious-Low-B	2.705	0.64	17% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			4.3%	
BMP Runoff Reduction			1.16 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344686	Permeable Pavement B Yes Med	\$22,800	\$700	20	\$23,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1344686	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344686

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

NMR_PWSA-D-5_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 75.48 acres

Total project cost: \$152,000

Priority area ranking: Medium-Medium (5.47/10)

Design depth: 1 inches

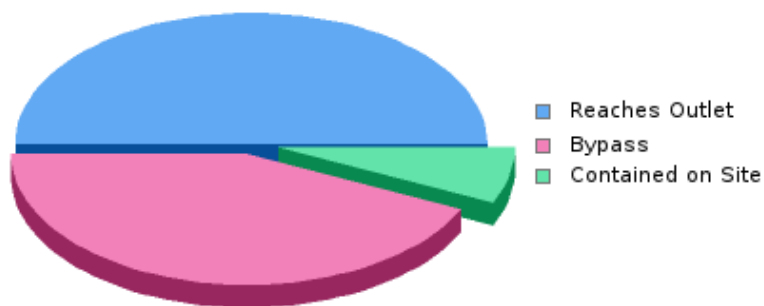
Total impervious area: 20.5 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344623)

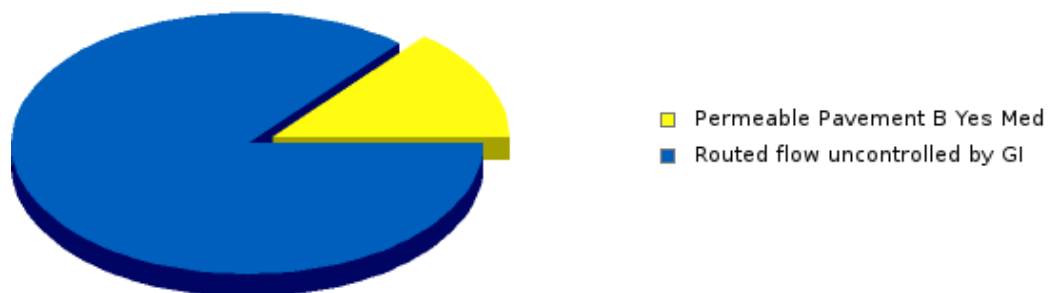
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff









Total Runoff pre-BMP	61.56 acre-ft
Total Reduction	12.2 %
Total Runoff Captured	7.52 acre-ft
Total Outlets	54.04 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1344623	Green Infrastructure Capacity			86,694 gallons (3.2 acre-in) 0.311 acres

Building	10.022	25.87	6% flow	
Impervious-High	0.773	2.01	0% flow	
Impervious-Mod	5.129	13.24	9% flow	
Impervious-Low	4.59	11.62	42% flow	
Pervious-High-D	3.205	1.05	0% flow	
Pervious-High-C	5.782	1.09	0% flow	
Pervious-High-B	4.456	0.39	0% flow	
Pervious-Mod-D	3.233	0.95	0% flow	
Pervious-Mod-C	2.635	0.43	0% flow	
Pervious-Mod-B	20.845	1.46	4% flow	
Pervious-Low-D	0.276	0.07	0% flow	
Pervious-Low-C	0.554	0.07	0% flow	
Pervious-Low-B	13.977	3.31	19% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			12.22%	
BMP Runoff Reduction			7.52 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344623	Permeable Pavement B Yes Med	\$147,400	\$4,200	20	\$151,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the

infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1344623	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344623

Permeable Pavement B Yes Med Effluent: 0.8 acre-ft

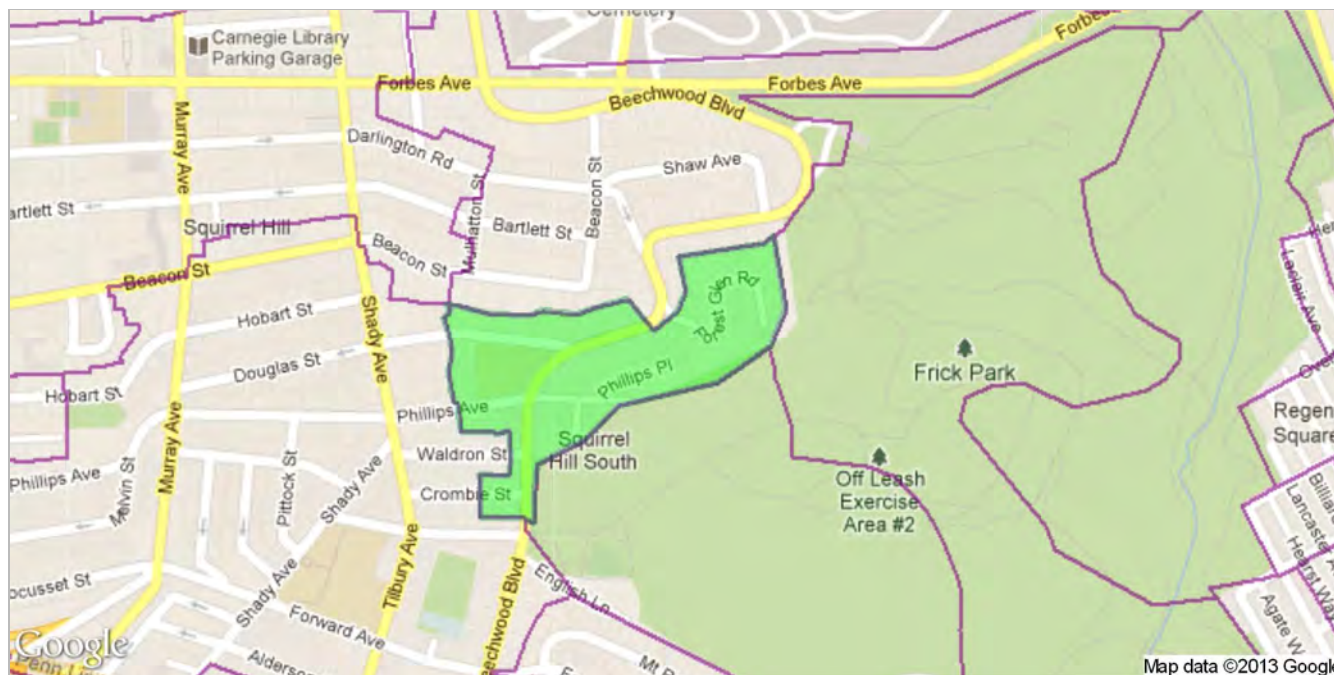
NMR_PWSA-E-8-8A_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 37.36 acres

Total project cost: \$23,000

Priority area ranking: Medium-Medium (5.51/10)

Design depth: 1 inches

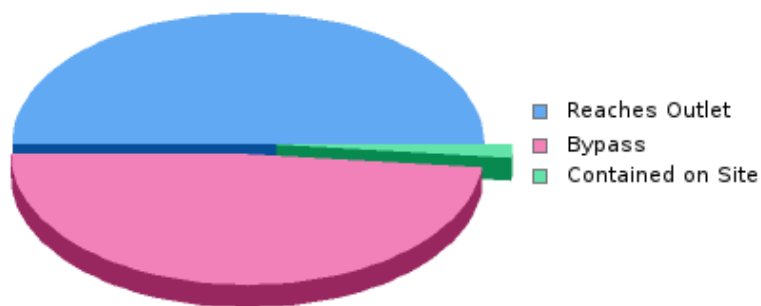
Total impervious area: 13 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344528)

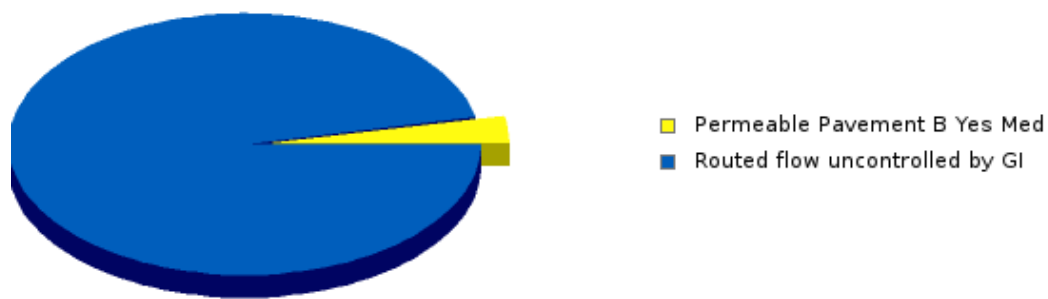
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff











Total Runoff pre-BMP	36.26 acre-ft
Total Reduction	3.2 %
Total Runoff Captured	1.16 acre-ft
Total Outlets	35.1 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1344528	Green Infrastructure Capacity			13,420 gallons (0.5 acre-in) 0.048 acres

Building	5.887	15.2	0% flow	
Impervious-Mod	2.603	6.72	0% flow	
Impervious-Low	4.51	11.42	11% flow	
Pervious-High-B	1.879	0.16	0% flow	
Pervious-Mod-C	0.885	0.15	0% flow	
Pervious-Mod-B	14.67	1.03	0% flow	
Pervious-Low-C	0.445	0.06	0% flow	
Pervious-Low-B	6.476	1.53	2% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			3.21%	
BMP Runoff Reduction			1.16 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344528	Permeable Pavement B Yes Med	\$22,800	\$700	20	\$23,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1344528	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344528

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

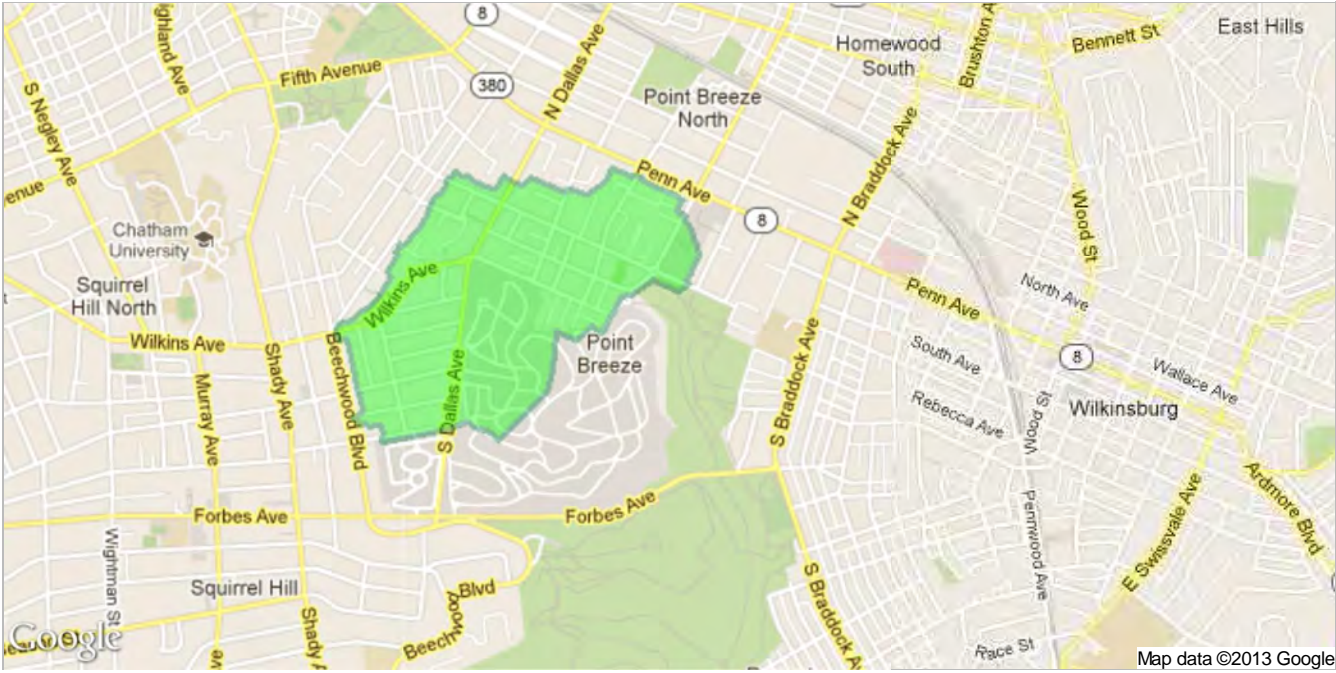
NMR_PWSA-G_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 212.01 acres

Total project cost: \$790,000

Priority area ranking: Medium-Medium (5.55/10)

Design depth: 1 inches

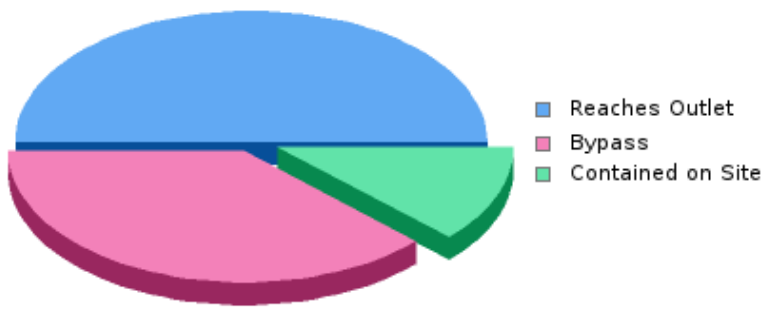
Total impervious area: 68 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344348)

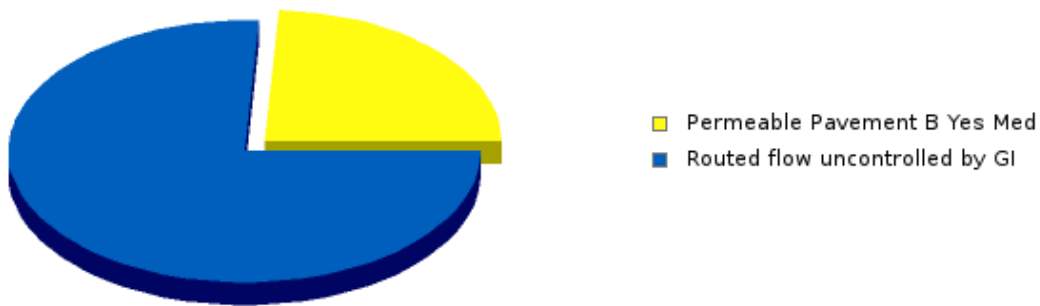
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	202.2 acre-ft
Total Reduction	19.4 %
Total Runoff Captured	39.19 acre-ft
Total Outlets	163.01 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1344348	Green Infrastructure Capacity			451,732 gallons (16.6 acre-in) 1.621 acres

Building	32.66	84.32	13% flow	
Impervious-Mod	5.315	13.72	27% flow	
Impervious-Low	29.993	75.93	32% flow	
Pervious-Mod-D	2.626	0.77	30% flow	
Pervious-Mod-C	17.933	2.94	13% flow	
Pervious-Mod-B	11.521	0.81	16% flow	
Pervious-Low-D	10.92	2.58	21% flow	
Pervious-Low-C	25.344	3.21	6% flow	
Pervious-Low-B	75.7	17.92	16% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			19.38%	
BMP Runoff Reduction			39.19 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344348	Permeable Pavement B Yes Med	\$768,300	\$21,900	20	\$790,200

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1344348	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344348

Permeable Pavement B Yes Med Effluent: 4.1 acre-ft

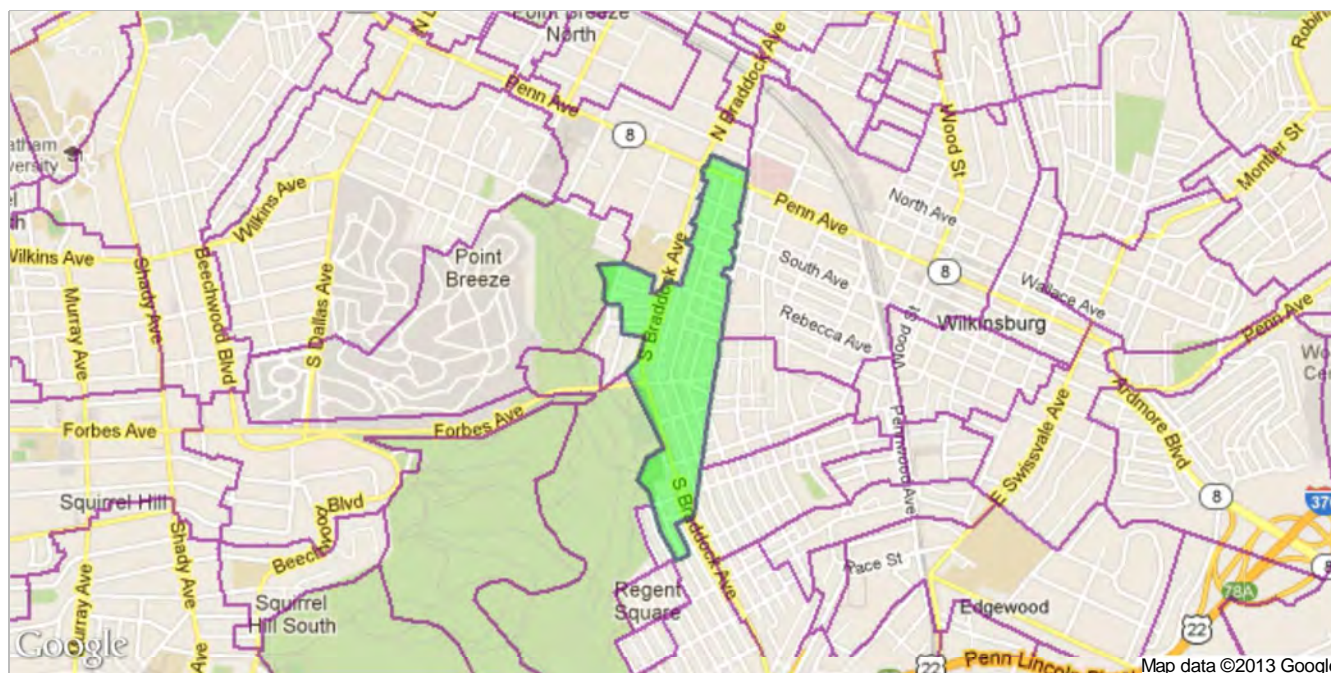
NMR_PWSA-H-11_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 85.95 acres

Total project cost: \$650,000

Priority area ranking: Medium-Medium (5.46/10)

Design depth: 1 inches

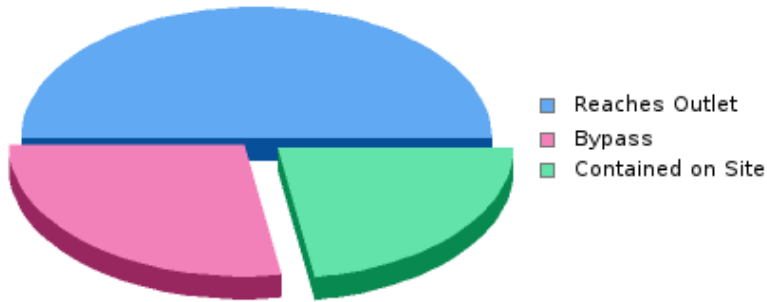
Total impervious area: 36.5 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344378)

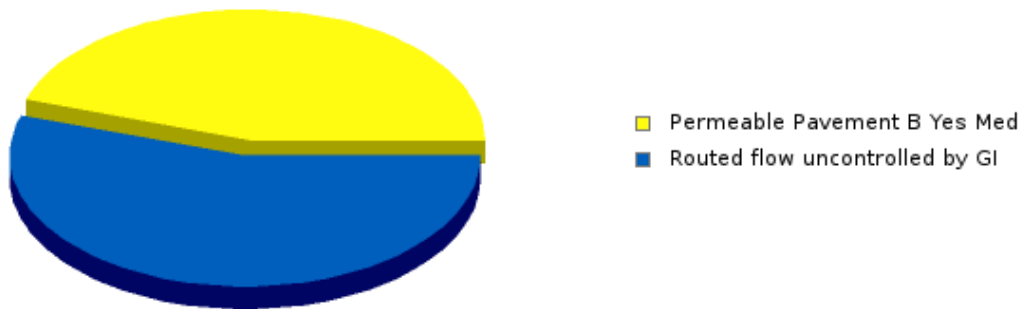
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	103.87 acre-ft
Total Reduction	31 %
Total Runoff Captured	32.22 acre-ft
Total Outlets	71.65 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			371,355 gallons (13.7 acre-in) 1.333 acres	
	Building	16.378	42.28	20% flow	
	Impervious-Mod	2.141	5.53	17% flow	
	Impervious-Low	17.971	45.5	52% flow	
	Pervious-High-C	0.519	0.1	0% flow	
	Pervious-Mod-D	0.89	0.26	20% flow	
LBs_1344378	Pervious-Mod-C	1.858	0.31	0% flow	
	Pervious-Mod-B	5.405	0.38	3% flow	
	Pervious-Low-D	34.996	8.28	30% flow	
	Pervious-Low-C	1.202	0.15	0% flow	
	Pervious-Low-B	4.588	1.09	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			31.02%	
	BMP Runoff Reduction			32.22 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344378	Permeable Pavement B Yes Med	\$631,600	\$18,000	20	\$649,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344378	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344378

Permeable Pavement B Yes Med Effluent: 3.4 acre-ft

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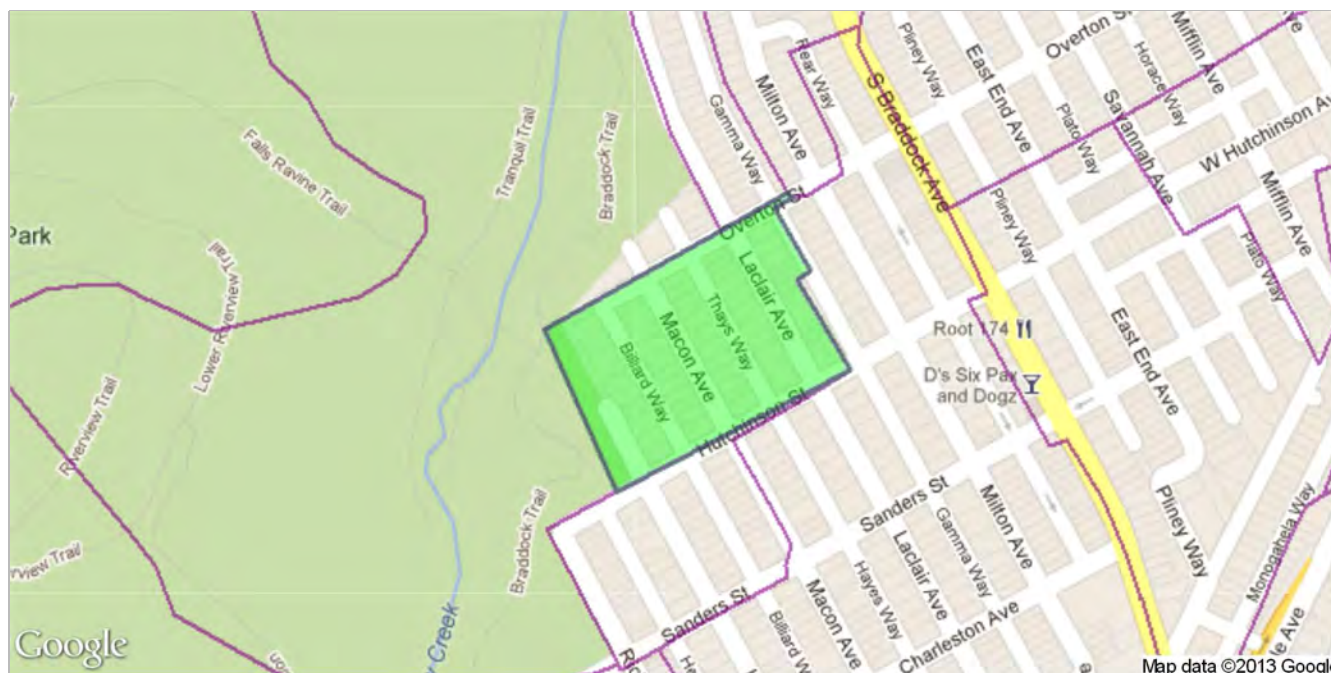
NMR_PWSA-J_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 10.63 acres

Total project cost: \$27,000

Priority area ranking: Medium-Medium (5.41/10)

Design depth: 1 inches

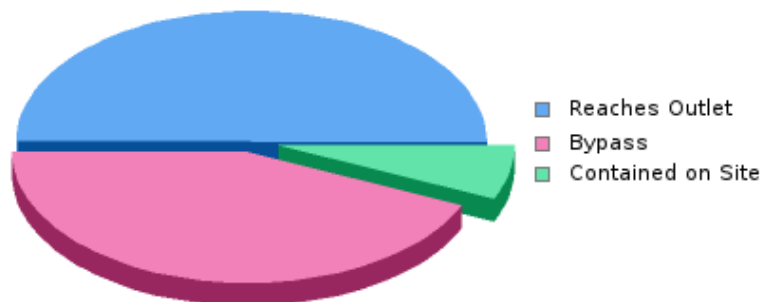
Total impervious area: 3.9 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344560)

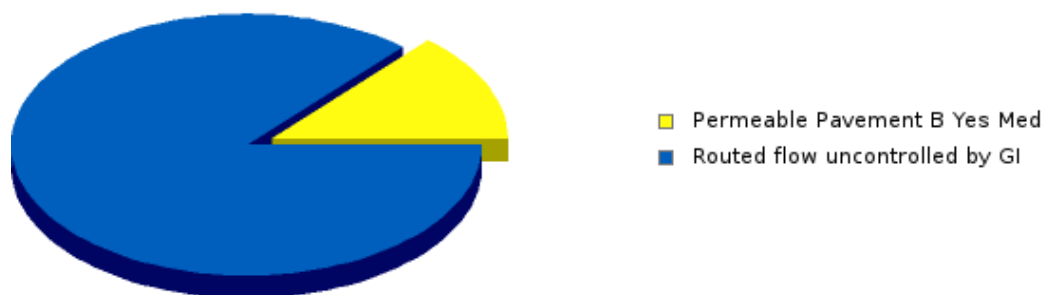
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	11.26 acre-ft
Total Reduction	11.9 %
Total Runoff Captured	1.34 acre-ft
Total Outlets	9.92 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			15,413 gallons (0.6 acre-in) 0.055 acres	
	Building	1.737	4.48	5% flow	
	Impervious-Mod	0.504	1.3	0% flow	
	Impervious-Low	1.63	4.13	28% flow	
	Pervious-High-C	0.017	0	0% flow	
LBs_1344560	Pervious-Mod-C	1.768	0.29	0% flow	
	Pervious-Mod-B	0.75	0.05	0% flow	
	Pervious-Low-D	2.76	0.65	15% flow	
	Pervious-Low-B	1.469	0.35	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			11.88%	
	BMP Runoff Reduction			1.34 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344560	Permeable Pavement B Yes Med	\$26,200	\$700	20	\$26,900

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be

called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type. Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344560	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344560

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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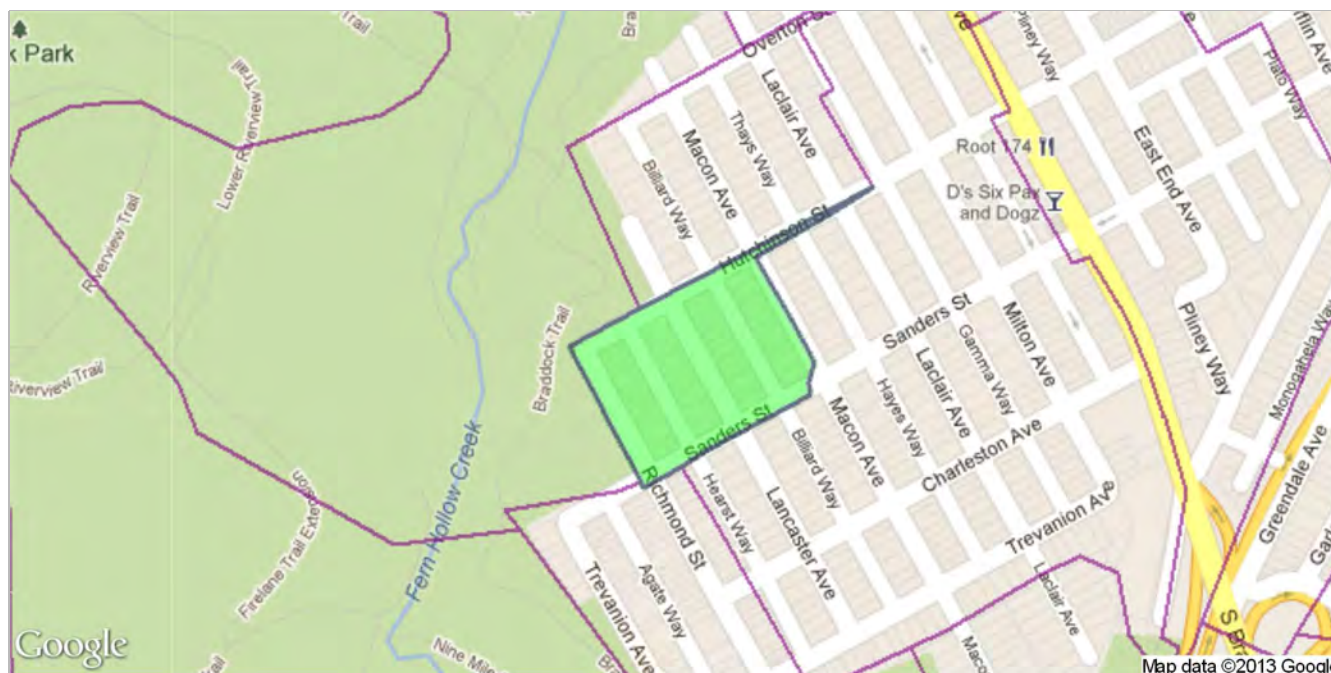
NMR_PWSA-K_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 7.49 acres

Total project cost: \$61,000

Priority area ranking: Medium-Medium (5.39/10)

Design depth: 1 inches

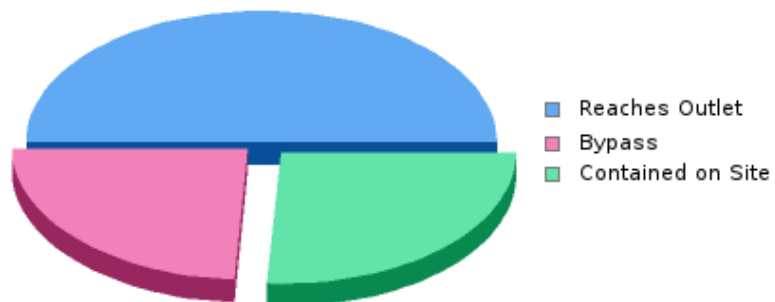
Total impervious area: 3.1 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344589)

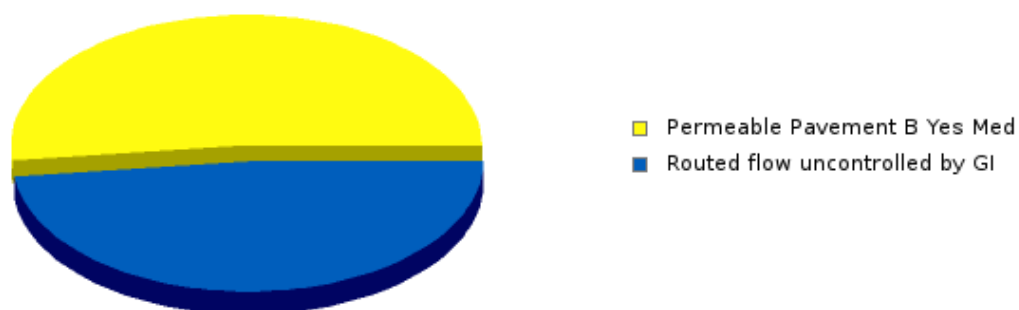
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	8.91 acre-ft
Total Reduction	34.2 %
Total Runoff Captured	3.04 acre-ft
Total Outlets	5.86 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			35,073 gallons (1.3 acre-in) 0.126 acres	
LBs_1344589	Building	1.063	2.74	23% flow	
	Impervious-Mod	0.339	0.88	0% flow	
	Impervious-Low	1.712	4.33	58% flow	
	Pervious-Mod-D	0.027	0.01	0% flow	
	Pervious-Mod-C	0.505	0.08	0% flow	
	Pervious-Mod-B	0.293	0.02	0% flow	
	Pervious-Low-D	2.914	0.69	30% flow	
	Pervious-Low-B	0.637	0.15	7% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			34.17%	
	BMP Runoff Reduction			3.04 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344589	Permeable Pavement B Yes Med	\$59,700	\$1,700	20	\$61,400

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be

called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type. Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344589	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344589

Permeable Pavement B Yes Med Effluent: 0.3 acre-ft

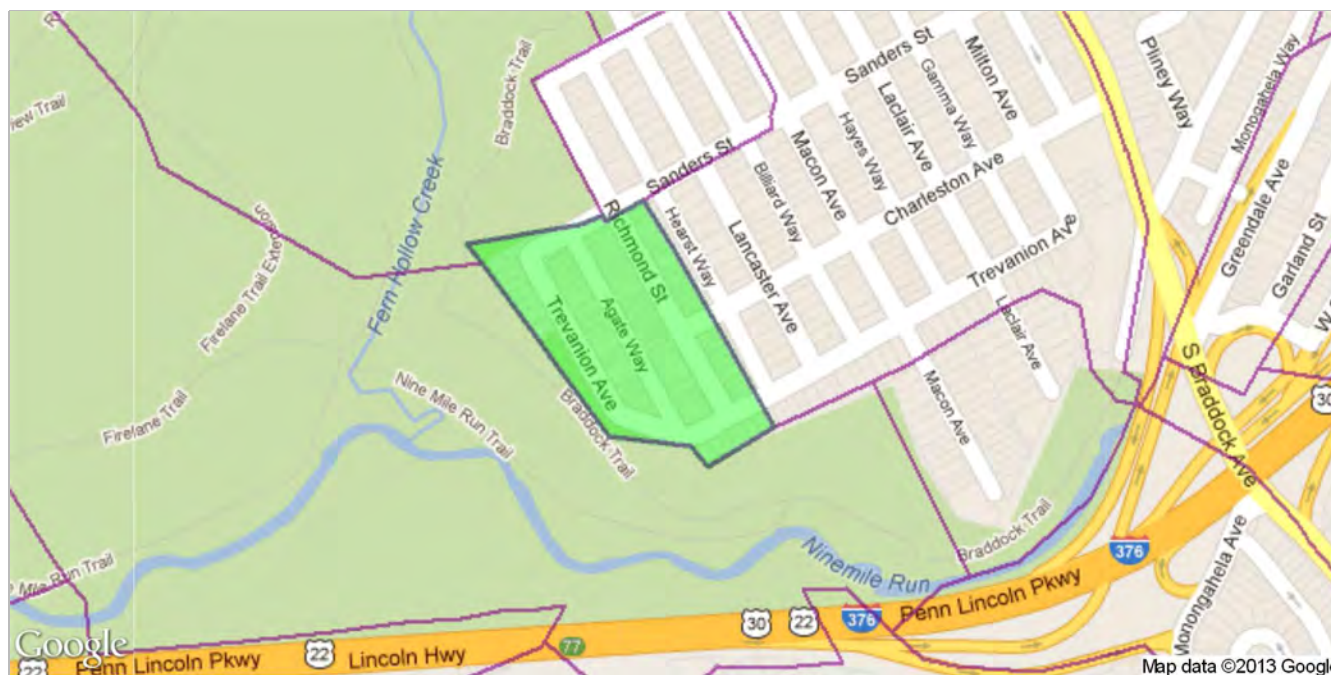
NMR_PWSA-L_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 9.24 acres

Total project cost: \$27,000

Priority area ranking: Medium-Medium (5.41/10)

Design depth: 1 inches

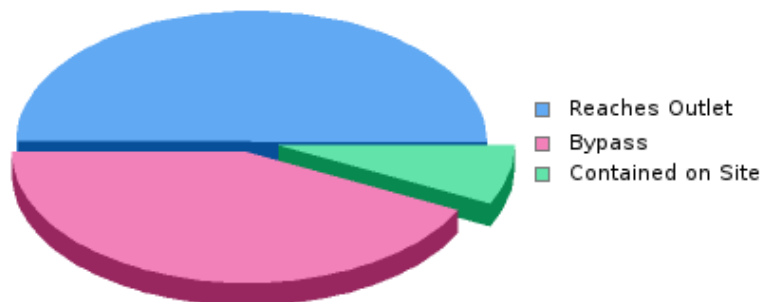
Total impervious area: 3.2 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344620)

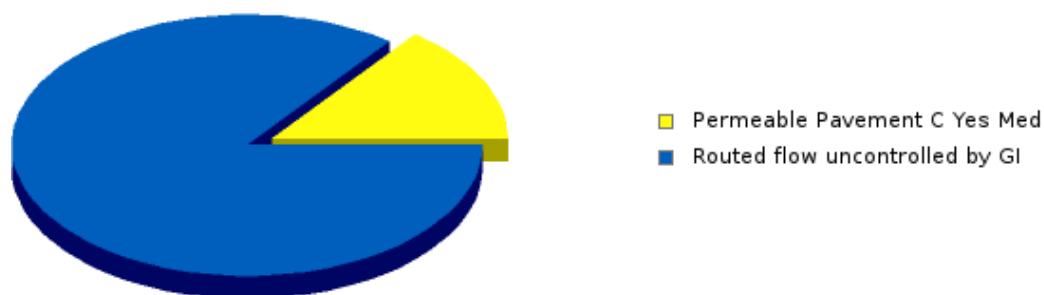
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	9.53 acre-ft
Total Reduction	12.8 %
Total Runoff Captured	1.22 acre-ft
Total Outlets	8.31 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement C Yes Med (1)	
	Green Infrastructure Capacity			15,683 gallons (0.6 acre-in) 0.056 acres	
	Building	1.552	4.01	17% flow	
	Impervious-High	0.094	0.24	0% flow	
	Impervious-Mod	0.82	2.12	0% flow	
	Impervious-Low	0.755	1.91	36% flow	
	Pervious-High-C	0.735	0.14	0% flow	
LBs_1344620	Pervious-Mod-D	0.869	0.25	0% flow	
	Pervious-Mod-C	1.795	0.29	0% flow	
	Pervious-Low-D	2.102	0.5	27% flow	
	Pervious-Low-C	0.514	0.07	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			12.76%	
	BMP Runoff Reduction			1.22 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344620	Permeable Pavement C Yes Med	\$26,700	\$800	20	\$27,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration

rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1344620	Permeable Pavement C Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1344620

Permeable Pavement C Yes Med Effluent: 0.3 acre-ft

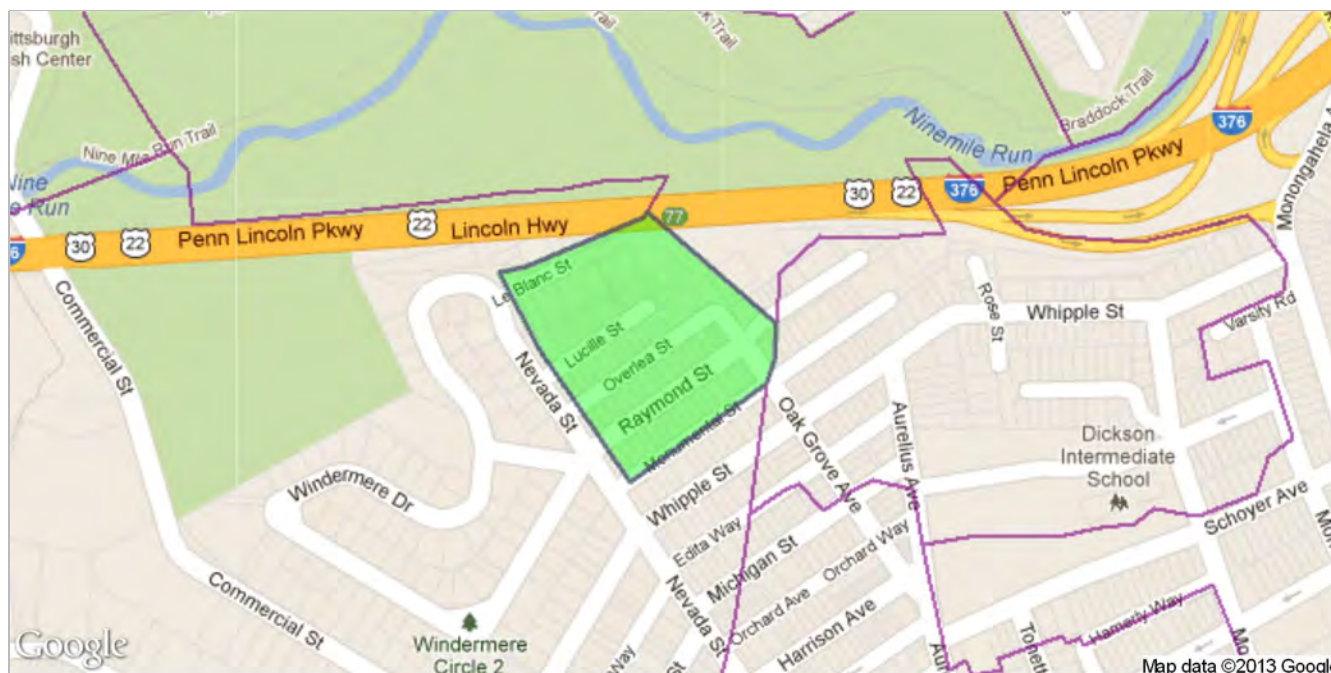
NMR_PWSA-M_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 9.49 acres

Total project cost: \$35,000

Priority area ranking: Medium-Medium (5.46/10)

Design depth: 1 inches

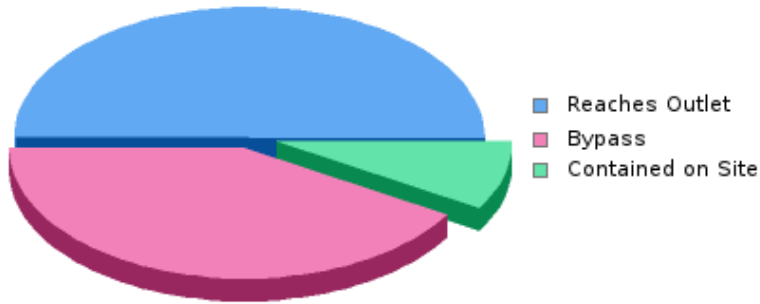
Total impervious area: 2.7 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344661)

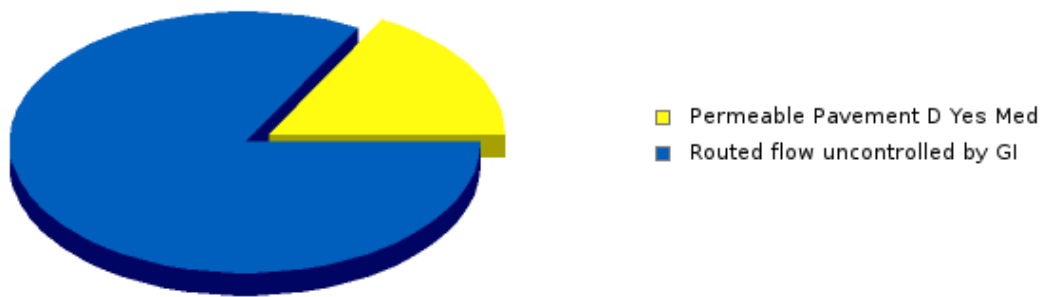
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	8.86 acre-ft
Total Reduction	14.5 %
Total Runoff Captured	1.29 acre-ft
Total Outlets	7.58 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement D Yes Med (1)	
	Green Infrastructure Capacity			20,072 gallons (0.7 acre-in) 0.072 acres	
	Building	1.484	3.83	10% flow	
	Impervious-High	0.126	0.33	0% flow	
	Impervious-Mod	0.208	0.54	2% flow	
	Impervious-Low	0.913	2.31	60% flow	
LBs_1344661	Pervious-High-D	2.274	0.74	0% flow	
	Pervious-Mod-D	0.91	0.27	0% flow	
	Pervious-Low-D	3.571	0.85	17% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			14.53%	
	BMP Runoff Reduction			1.29 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344661	Permeable Pavement D Yes Med	\$34,100	\$1,000	20	\$35,100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344661	Permeable Pavement D Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344661

Permeable Pavement D Yes Med Effluent: 0.6 acre-ft

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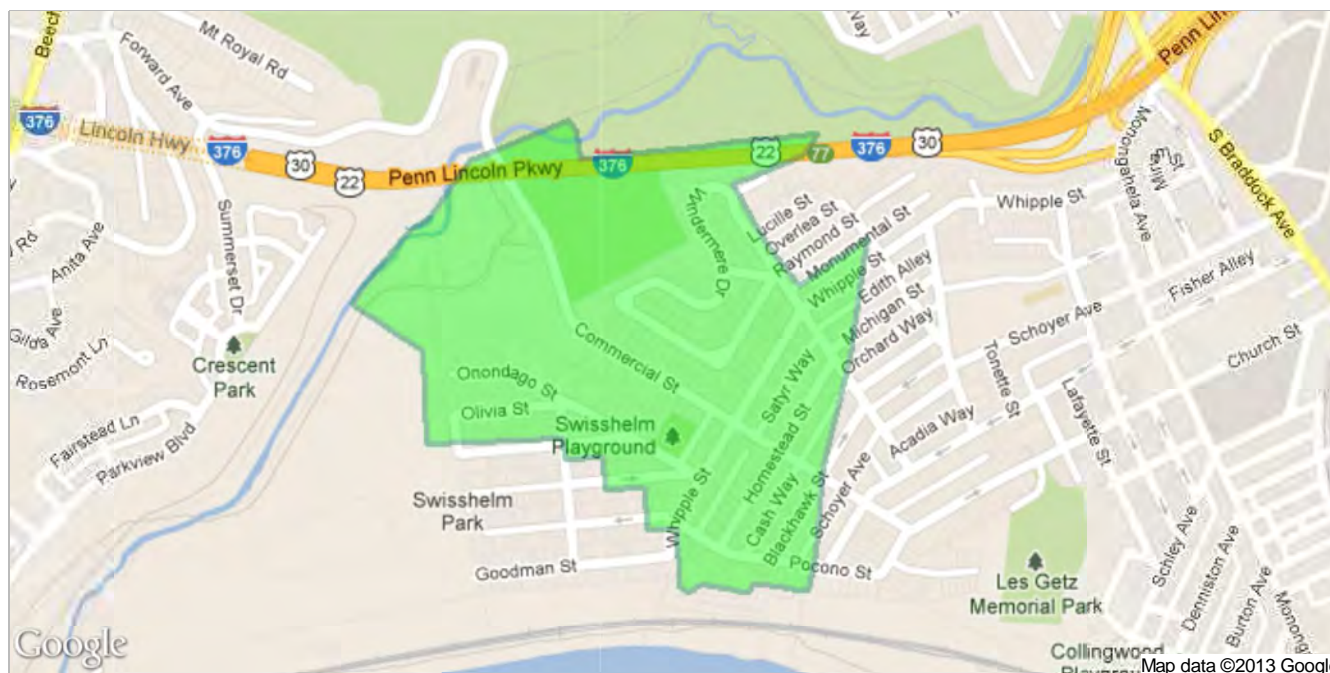
NMR_PWSA-N_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 130.66 acres

Total project cost: \$516,000

Priority area ranking: Medium-High (5.66/10)

Design depth: 1 inches

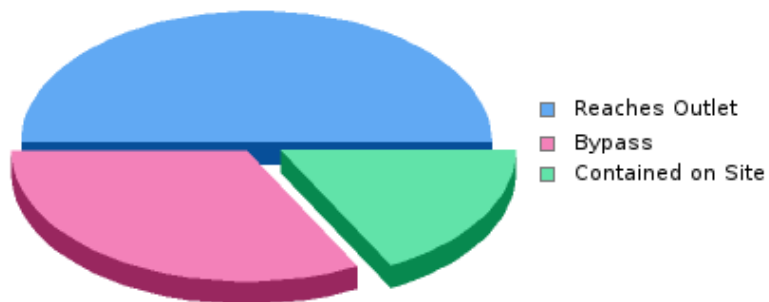
Total impervious area: 30.3 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344652)

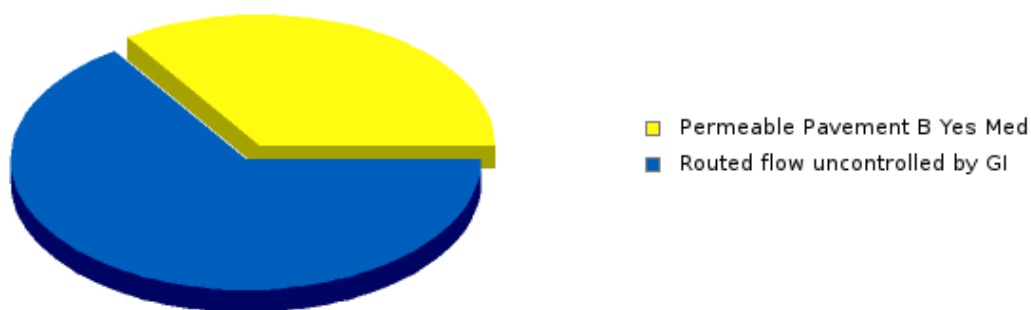
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution







Relative GI Reduction of Runoff



Total Runoff pre-BMP	99.74 acre-ft
Total Reduction	25.7 %
Total Runoff Captured	25.58 acre-ft
Total Outlets	74.16 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			294,914 gallons (10.9 acre-in) 1.059 acres	
	Water	1.472	0	0% flow	
	Building	11.574	29.88	20% flow	
	Impervious-High	0.614	1.6	26% flow	
	Impervious-Mod	2.824	7.29	4% flow	
	Impervious-Low	15.337	38.83	48% flow	
	Pervious-High-D	6.203	2.03	1% flow	
	Pervious-High-C	12.166	2.3	0% flow	
LBs_1344652	Pervious-High-B	0.699	0.06	0% flow	
	Pervious-Mod-D	13.53	3.96	2% flow	
	Pervious-Mod-C	12.486	2.05	0% flow	
	Pervious-Mod-B	3.415	0.24	0% flow	
	Pervious-Low-D	45.919	10.87	26% flow	
	Pervious-Low-C	3.703	0.47	6% flow	
	Pervious-Low-B	0.721	0.17	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			25.65%	
	BMP Runoff Reduction			25.58 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344652	Permeable Pavement B Yes Med	\$501,600	\$14,300	20	\$515,900

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344652	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344652

Permeable Pavement B Yes Med Effluent: 2.7 acre-ft

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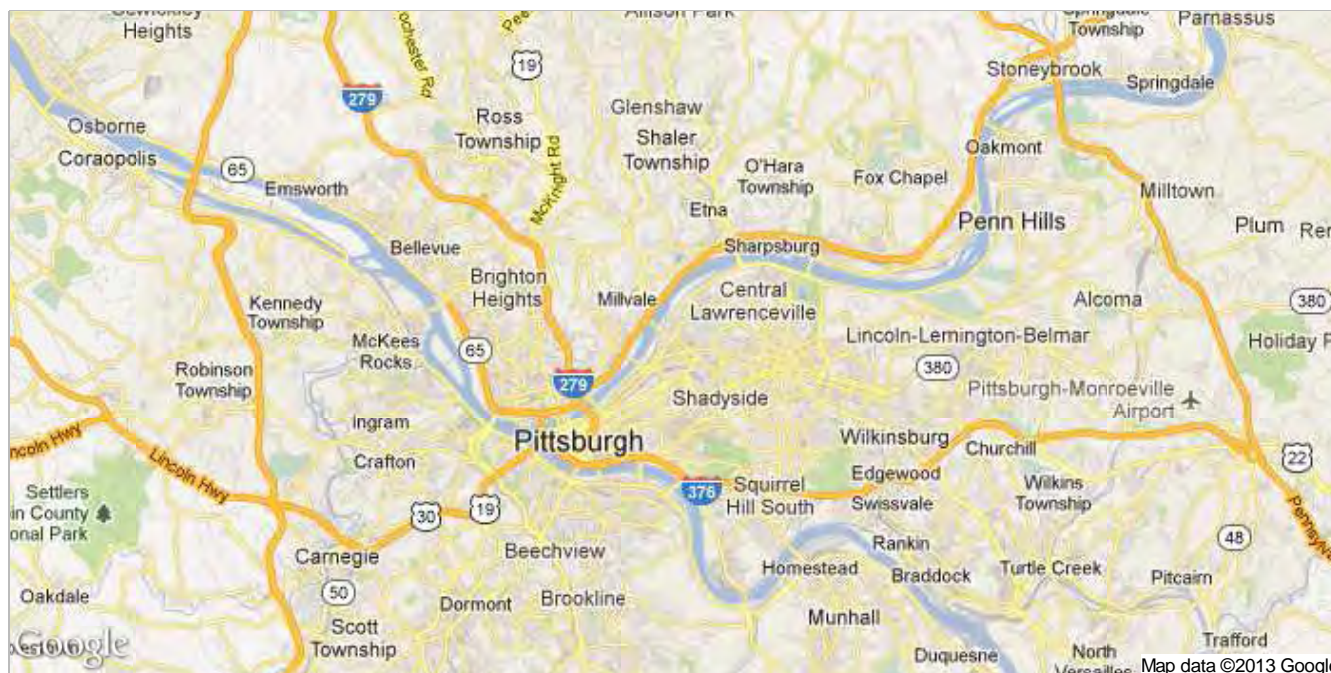
NMR_PWSA-O_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 34.93 acres

Total project cost: \$160,000

Priority area ranking: Medium-High (5.74/10)

Design depth: 1 inches

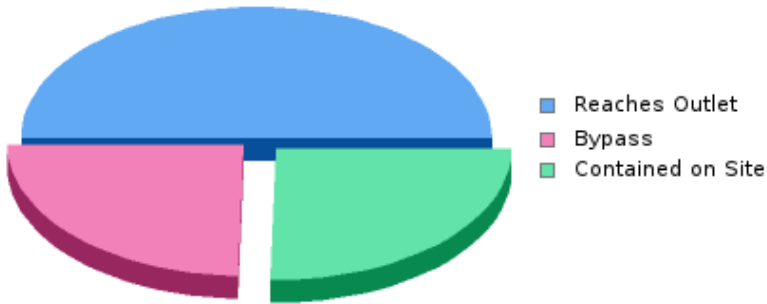
Total impervious area: 6.9 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344688)

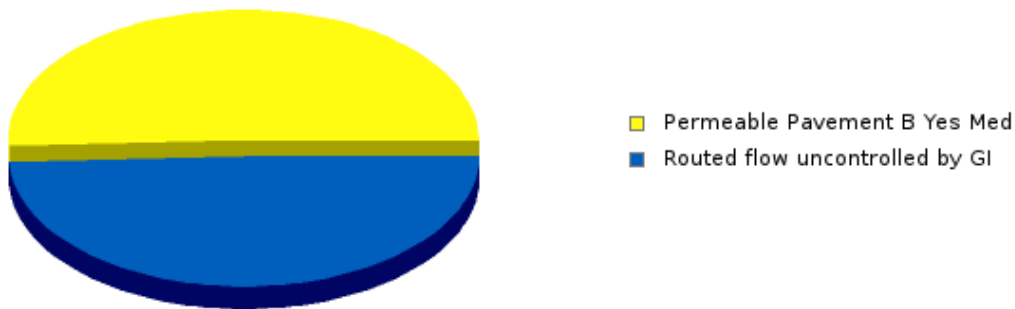
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	23.5 acre-ft
Total Reduction	33.7 %
Total Runoff Captured	7.91 acre-ft
Total Outlets	15.59 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			91,184 gallons (3.4 acre-in) 0.327 acres	
	Water	0.217	0	0% flow	
	Building	3.353	8.66	27% flow	
	Impervious-Mod	0.908	2.34	56% flow	
	Impervious-Low	2.598	6.58	61% flow	
	Pervious-High-D	0.569	0.19	0% flow	
	Pervious-High-C	1.966	0.37	0% flow	
LBs_1344688	Pervious-Mod-D	4.383	1.28	16% flow	
	Pervious-Mod-C	3.765	0.62	1% flow	
	Pervious-Mod-B	2.573	0.18	43% flow	
	Pervious-Low-D	11.356	2.69	22% flow	
	Pervious-Low-C	1.516	0.19	2% flow	
	Pervious-Low-B	1.726	0.41	48% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			33.66%	
	BMP Runoff Reduction			7.91 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
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LBs_1344688	Permeable Pavement B Yes Med	\$155,100	\$4,400	20	\$159,500
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Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344688	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344688

Permeable Pavement B Yes Med Effluent: 0.8 acre-ft

**APPENDIX A
RAINWAYS
OUTPUT
COMMERCIAL-
INSTITUTIONAL**

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NMR_Commercial_1

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-G-9

Project Setting



Site Characteristics

Project size: 0.08 acres

Total project cost: \$4,000

Priority area ranking: Medium-Medium (5.43/10)

Design depth: 1 inches

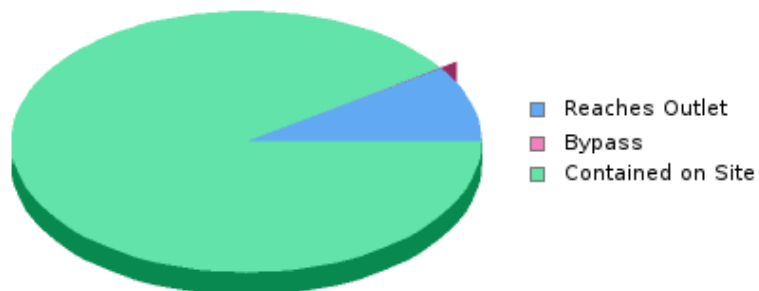
Total impervious area: 0.1 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344348)

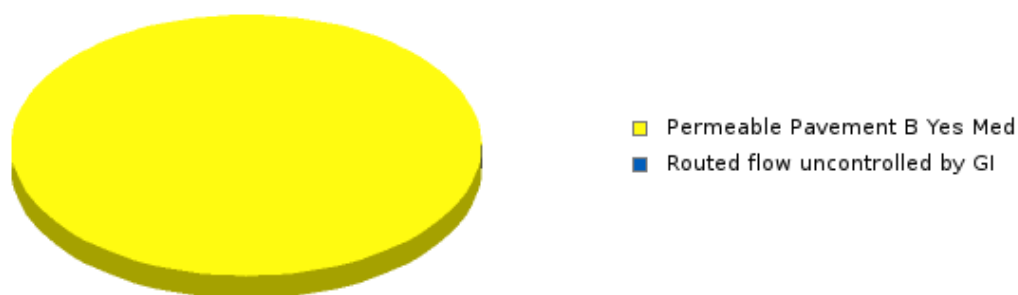
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution





Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.2 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.18 acre-ft
Total Outlets	0.02 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			2,080 gallons (0.1 acre-in) 0.007 acres	
	Impervious-Low	0.064	0.16	100% flow	
LBs_1344348	Pervious-Low-B	0.158	0.04	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.18 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344348	Permeable Pavement B Yes Med	\$3,500	\$100	20	\$3,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
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LBS_1344348	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
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Project BMP Routing

Outlets

LBS_1344348

Permeable Pavement B Yes Med Effluent: 0 acre-ft

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NMR_Commercial_2

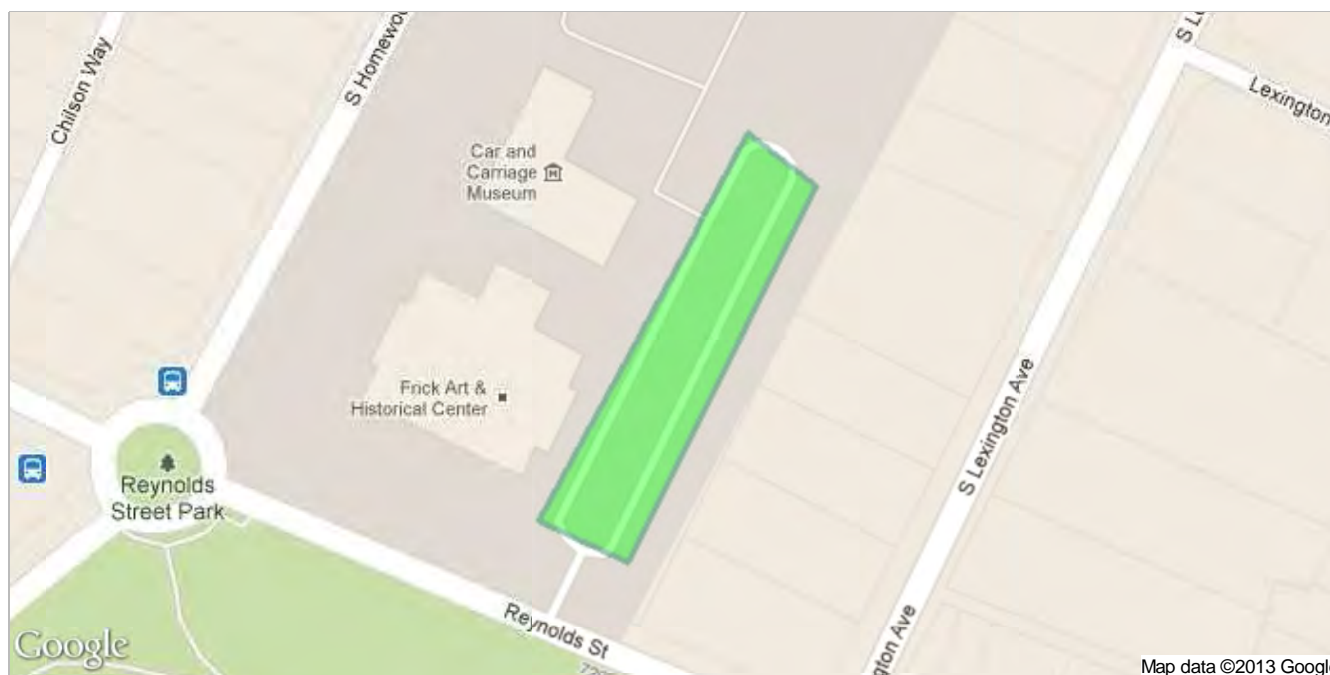
Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-G-9

Project Setting



Site Characteristics

Project size: 0.56 acres

Total project cost: \$33,000

Priority area ranking: Medium-Medium (5.28/10)

Design depth: 1 inches

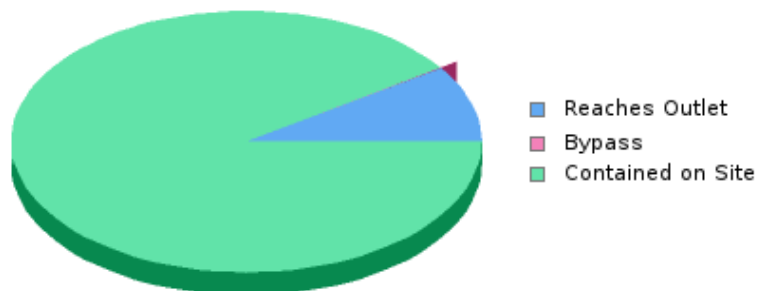
Total impervious area: 0.6 acres

POC(s)/Regulator(s): A-42-00 (LBs_1344320); M-47-00 (LBs_1344348)

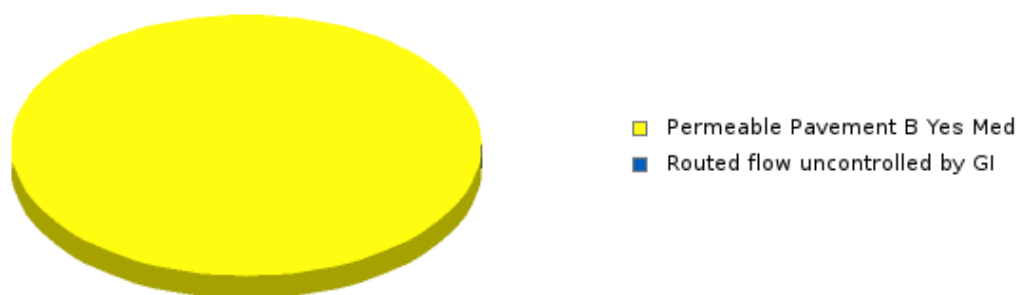
Municipalities: N/APittsburgh

Overall Green Infrastructure Performance

Runoff Distribution





Relative GI Reduction of Runoff



Total Runoff pre-BMP	1.81 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	1.64 acre-ft
Total Outlets	0.17 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			506 gallons (0 acre-in) 0.002 acres	
LBs_1344320	Pervious-Low-B	0.205	0.05	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.04 acre-ft	
	Green Infrastructure Capacity			18,374 gallons (0.7 acre-in) 0.066 acres	
LBs_1344348	Building	0.011	0.03	100% flow	
	Impervious-Low	0.623	1.58	100% flow	
	Pervious-Low-B	0.659	0.16	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			1.59 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344320	Permeable Pavement B Yes Med	\$900	<\$100	20	\$900
LBs_1344348	Permeable Pavement B Yes Med	\$31,300	\$900	20	\$32,200

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be

called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type. Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344320	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
LBs_1344348	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344320

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1344348

Permeable Pavement B Yes Med Effluent: 0.2 acre-ft

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NMR_Commercial_3

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-G-9

Project Setting



Site Characteristics

Project size: 0.07 acres

Total project cost: \$3,000

Priority area ranking: Medium-High (5.7/10)

Design depth: 1 inches

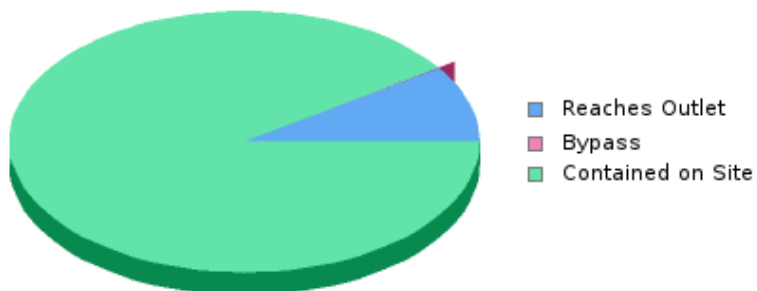
Total impervious area: 0.1 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344348)

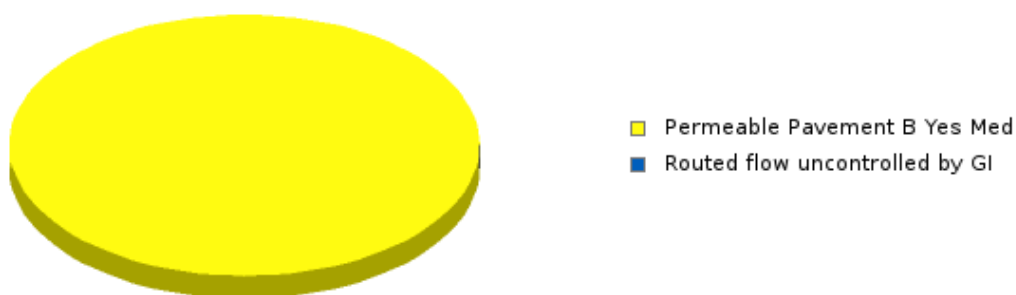
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.17 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.16 acre-ft
Total Outlets	0.02 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
	Green Infrastructure Capacity			1,822 gallons (0.1 acre-in) 0.007 acres
	Impervious-Low	0.069	0.17	100% flow
LBs_1344348	Design Depth			1 inches
	Percent BMP Effectiveness			90.49%
	BMP Runoff Reduction			0.16 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344348	Permeable Pavement B Yes Med	\$3,100	\$100	20	\$3,200

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344348	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1344348

Permeable Pavement B Yes Med Effluent: 0 acre-ft

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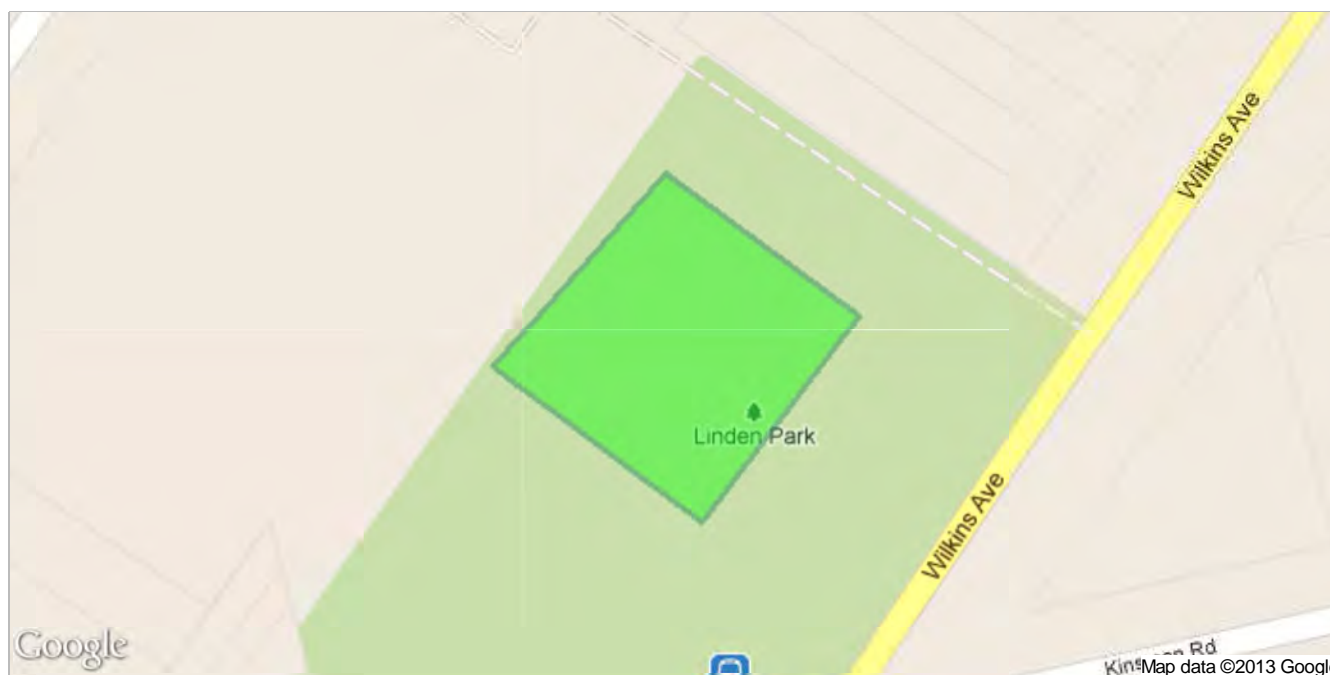
Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-G-9

Project Setting



Site Characteristics

Project size: 0.23 acres

Total project cost: \$18,000

Priority area ranking: Medium-High (5.92/10)

Design depth: 1 inches

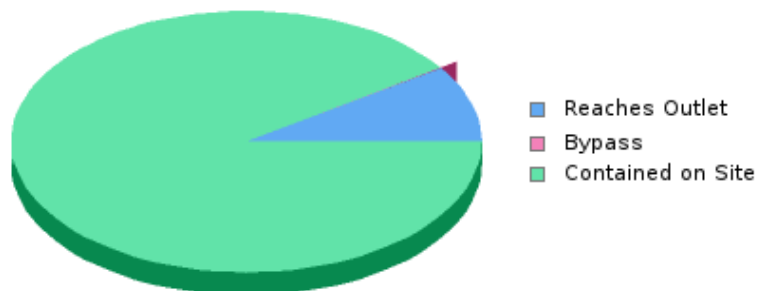
Total impervious area: 0.4 acres

POC(s)/Regulator(s): A-42-00 (LBs_1344174); M-47-00 (LBs_1344348)

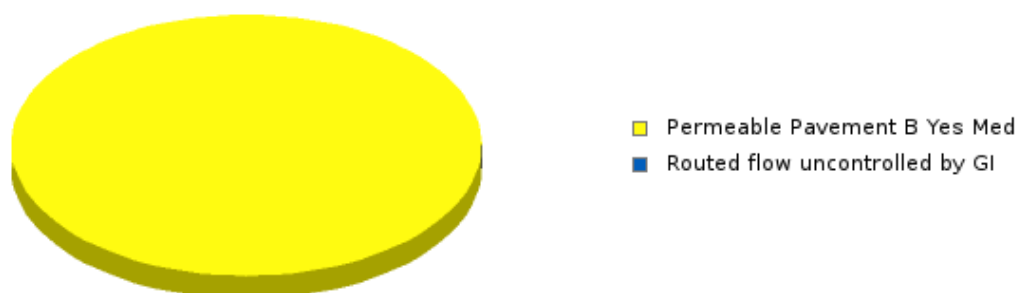
Municipalities: N/APittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.97 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.87 acre-ft
Total Outlets	0.09 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)		
LBs_1344174	Green Infrastructure Capacity			3,156 gallons (0.1 acre-in) 0.011 acres		
	Building	0.038	0.1	100% flow		
	Impervious-Mod	0.063	0.16	100% flow		
	Pervious-Mod-D	0.118	0.03	100% flow		
	Pervious-Mod-B	0.01	0	100% flow		
	Pervious-Low-D	0.028	0.01	100% flow		
	Design Depth			1 inches		
	Percent BMP Effectiveness			90.49%		
	BMP Runoff Reduction			0.27 acre-ft		
LBs_1344348	Green Infrastructure Capacity			6,915 gallons (0.3 acre-in) 0.025 acres		
	Impervious-Mod	0.254	0.66	100% flow		
	Pervious-Mod-D	0.013	0	100% flow		
	Pervious-Mod-B	0.049	0	100% flow		
	Design Depth			1 inches		
	Percent BMP Effectiveness			90.49%		
	BMP Runoff Reduction			0.6 acre-ft		

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
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LBs_1344174	Permeable Pavement B Yes Med	\$5,400	\$200	20	\$5,600
LBs_1344348	Permeable Pavement B Yes Med	\$11,800	\$300	20	\$12,100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344174	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
LBs_1344348	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344174

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1344348

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-G-9

Project Setting



Site Characteristics

Project size: 0.3 acres

Total project cost: \$15,000

Priority area ranking: Medium-Medium (4.89/10)

Design depth: 1 inches

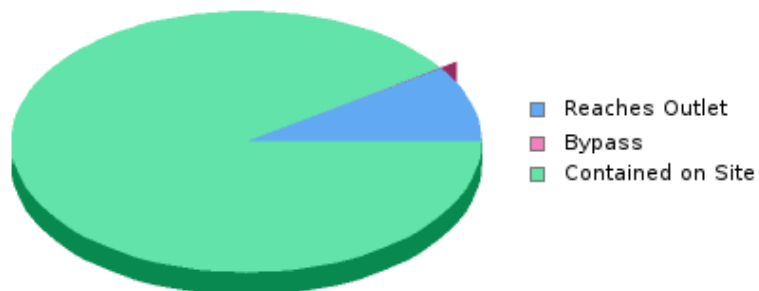
Total impervious area: 0.3 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344378)

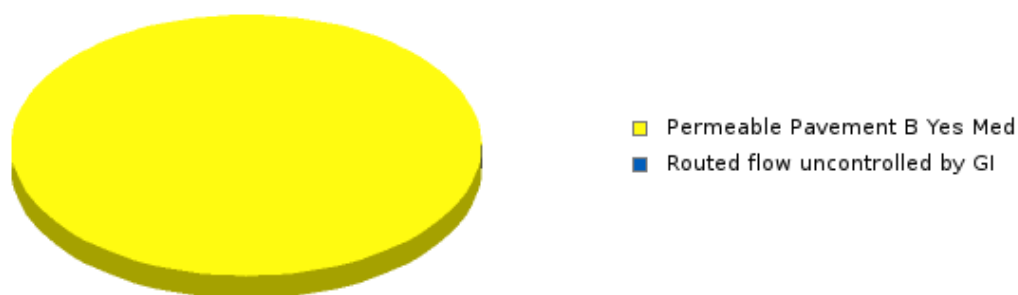
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.81 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.73 acre-ft
Total Outlets	0.08 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
	Green Infrastructure Capacity			8,452 gallons (0.3 acre-in) 0.03 acres
	Impervious-Low	0.304	0.77	100% flow
LBs_1344378	Pervious-Low-D	0.172	0.04	100% flow
	Design Depth			1 inches
	Percent BMP Effectiveness			90.49%
	BMP Runoff Reduction			0.73 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344378	Permeable Pavement B Yes Med	\$14,400	\$400	20	\$14,800

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
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LBs_1344378	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
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Project BMP Routing

Outlets

LBs_1344378

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-H-11

Project Setting



Site Characteristics

Project size: 0.13 acres

Total project cost: \$10,000

Priority area ranking: Medium-Medium (5.21/10)

Design depth: 1 inches

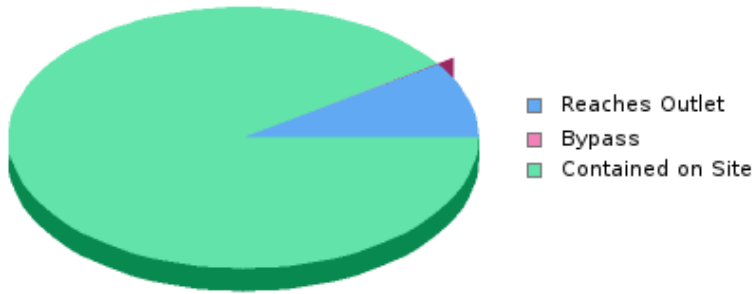
Total impervious area: 0.2 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344378)

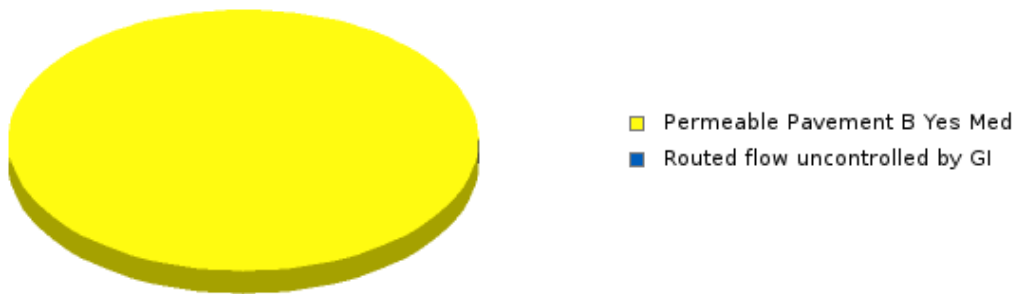
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution






Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.57 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.52 acre-ft
Total Outlets	0.05 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			5,991 gallons (0.2 acre-in) 0.022 acres	
LBs_1344378	Building	0.032	0.08	100% flow	
	Impervious-Low	0.192	0.49	100% flow	
	Pervious-Low-D	0.024	0.01	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.52 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344378	Permeable Pavement B Yes Med	\$10,200	\$300	20	\$10,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure	Construction Cost	O&M Costs (\$/year)	Lifespan
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	BMP	(\$/sqft)	/sqft)	(years)
LBS_1344378	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1344378

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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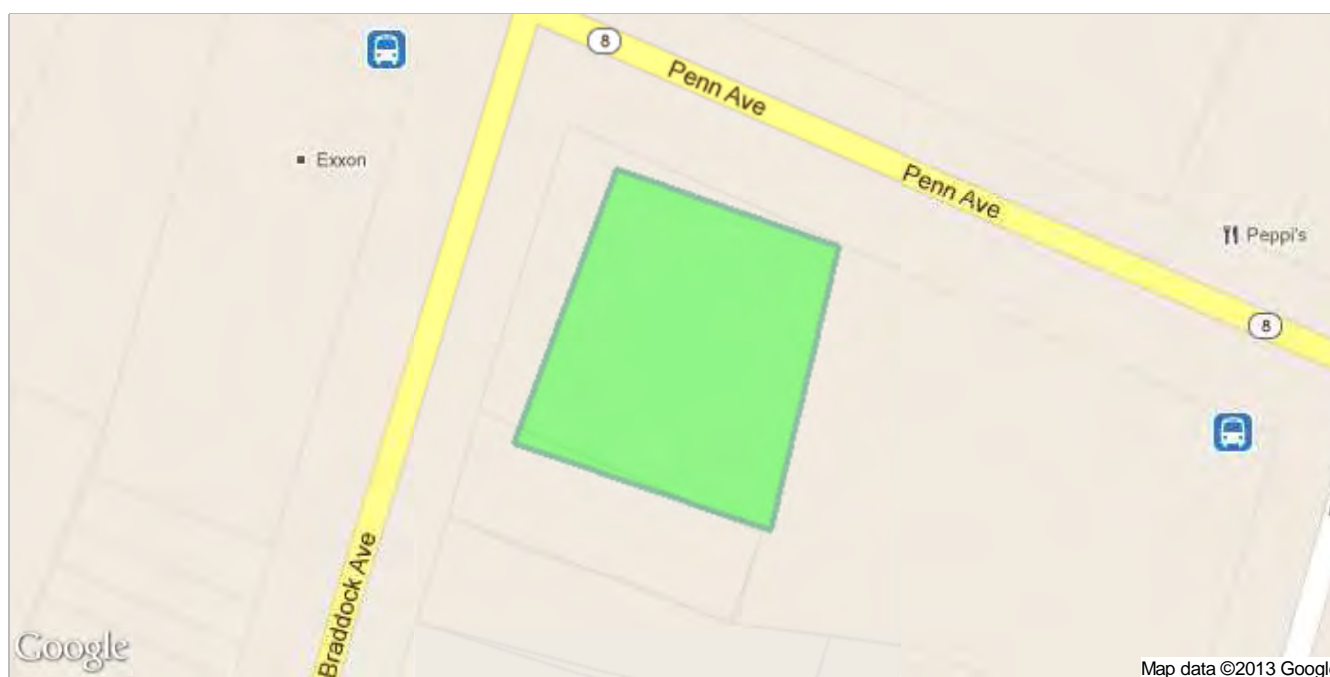
Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-H-11

Project Setting



Site Characteristics

Project size: 0.26 acres

Total project cost: \$16,000

Priority area ranking: Medium-Medium (4.71/10)

Design depth: 1 inches

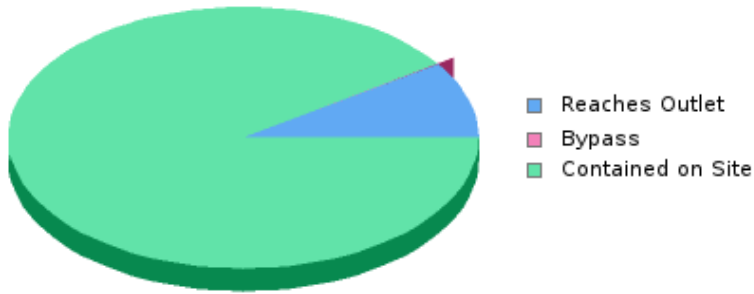
Total impervious area: 0.3 acres

POC(s)/Regulator(s): A-42-00 (LBs_1344320); M-47-00 (LBs_1344378)

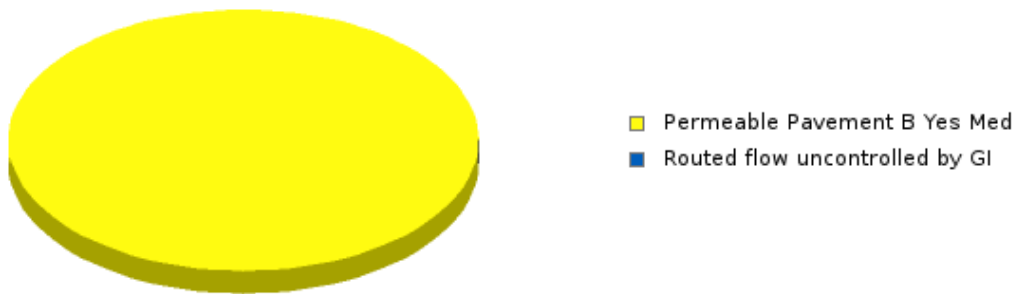
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.87 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.78 acre-ft
Total Outlets	0.08 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
LBs_1344320	Green Infrastructure Capacity			3,100 gallons (0.1 acre-in) 0.011 acres	
	Building	0.034	0.09	100% flow	
	Impervious-Low	0.08	0.2	100% flow	
	Pervious-Low-D	0.029	0.01	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.27 acre-ft	
LBs_1344378	Green Infrastructure Capacity			5,944 gallons (0.2 acre-in) 0.021 acres	
	Building	0.066	0.17	100% flow	
	Impervious-Low	0.155	0.39	100% flow	
	Pervious-Low-D	0.03	0.01	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.52 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344320	Permeable Pavement B Yes Med	\$5,300	\$200	20	\$5,500
LBs_1344378	Permeable Pavement B Yes Med	\$10,100	\$300	20	\$10,400

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344320	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
LBs_1344378	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344320

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1344378

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-H-11

Project Setting



Site Characteristics

Project size: 0.14 acres

Total project cost: \$7,000

Priority area ranking: Medium-Medium (5.28/10)

Design depth: 1 inches

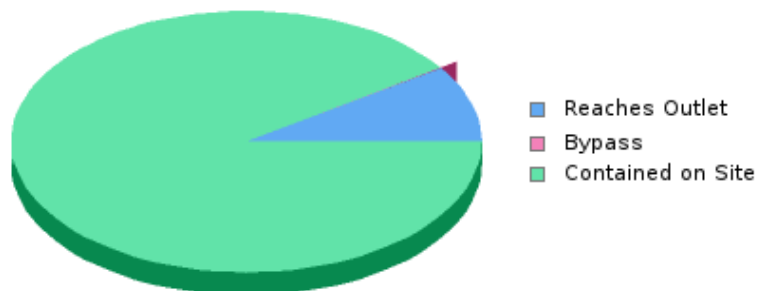
Total impervious area: 0.2 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344378)

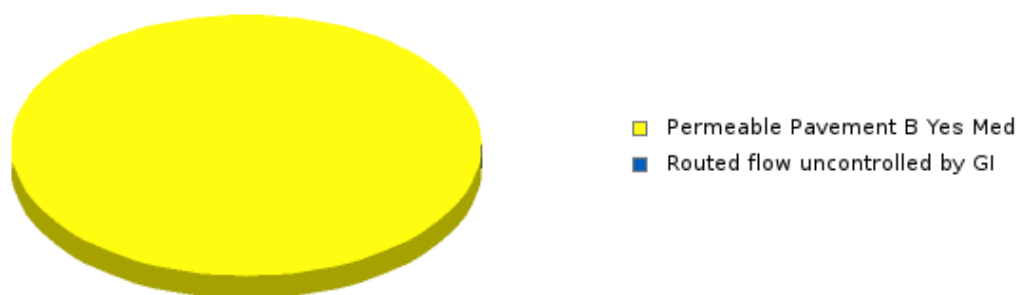
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.38 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.34 acre-ft
Total Outlets	0.04 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
	Green Infrastructure Capacity			3,961 gallons (0.1 acre-in) 0.014 acres
	Impervious-Low	0.15	0.38	100% flow
LBs_1344378	Design Depth			1 inches
	Percent BMP Effectiveness			90.49%
	BMP Runoff Reduction			0.34 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344378	Permeable Pavement B Yes Med	\$6,700	\$200	20	\$6,900

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344378	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1344378

Permeable Pavement B Yes Med Effluent: 0 acre-ft

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Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-H-11

Project Setting



Site Characteristics

Project size: 0.12 acres

Total project cost: \$14,000

Priority area ranking: Medium-Medium (5.41/10)

Design depth: 1 inches

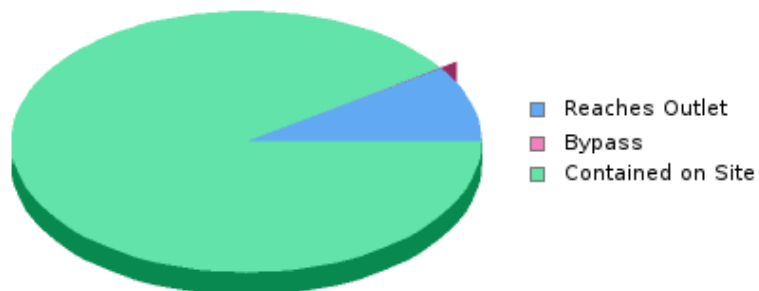
Total impervious area: 0.3 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344347); M-47-00 (LBs_1344378)

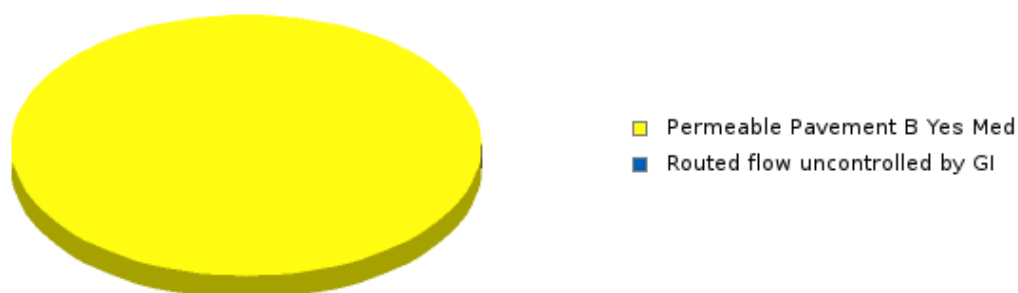
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution






Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.79 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.71 acre-ft
Total Outlets	0.08 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
LBs_1344347	Green Infrastructure Capacity			697 gallons (0 acre-in) 0.003 acres	
	Impervious-Low	0.025	0.06	100% flow	
	Pervious-Low-D	0.015	0	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.06 acre-ft	
LBs_1344378	Green Infrastructure Capacity			7,536 gallons (0.3 acre-in) 0.027 acres	
	Impervious-Low	0.281	0.71	100% flow	
	Pervious-Low-D	0.047	0.01	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.65 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344347	Permeable Pavement B Yes Med	\$1,200	<\$100	20	\$1,200
LBs_1344378	Permeable Pavement B Yes Med	\$12,800	\$400	20	\$13,200

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be

called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344347	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
LBs_1344378	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344347

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1344378

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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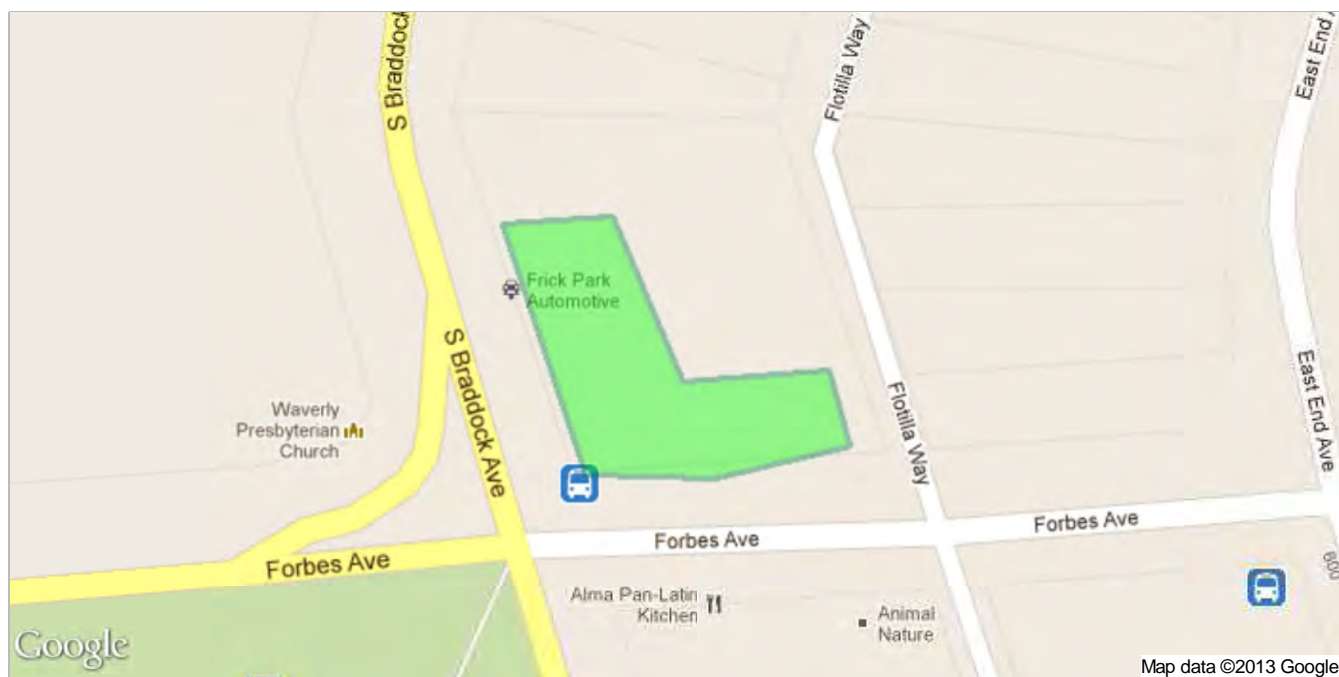
Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-H-11

Project Setting



Site Characteristics

Project size: 0.16 acres

Total project cost: \$11,000

Priority area ranking: Medium-Medium (5.3/10)

Design depth: 1 inches

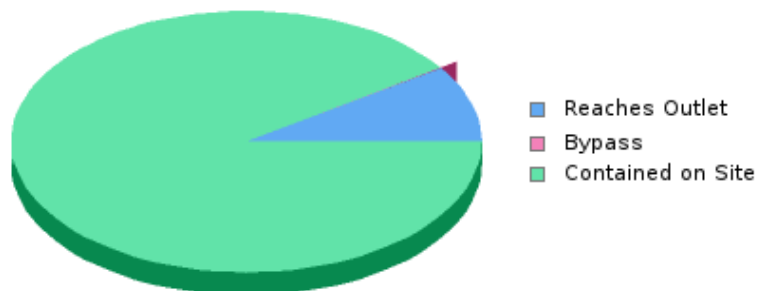
Total impervious area: 0.2 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344378)

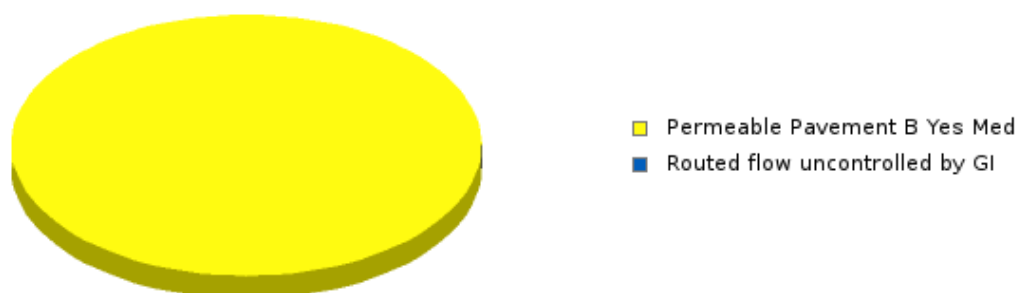
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution





Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.59 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.53 acre-ft
Total Outlets	0.06 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			6,164 gallons (0.2 acre-in) 0.022 acres	
LBs_1344378	Building	0.023	0.06	100% flow	
	Impervious-Low	0.205	0.52	100% flow	
	Pervious-Low-D	0.016	0	100% flow	
	Pervious-Low-B	0.037	0.01	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.53 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344378	Permeable Pavement B Yes Med	\$10,500	\$300	20	\$10,800

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344378	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344378

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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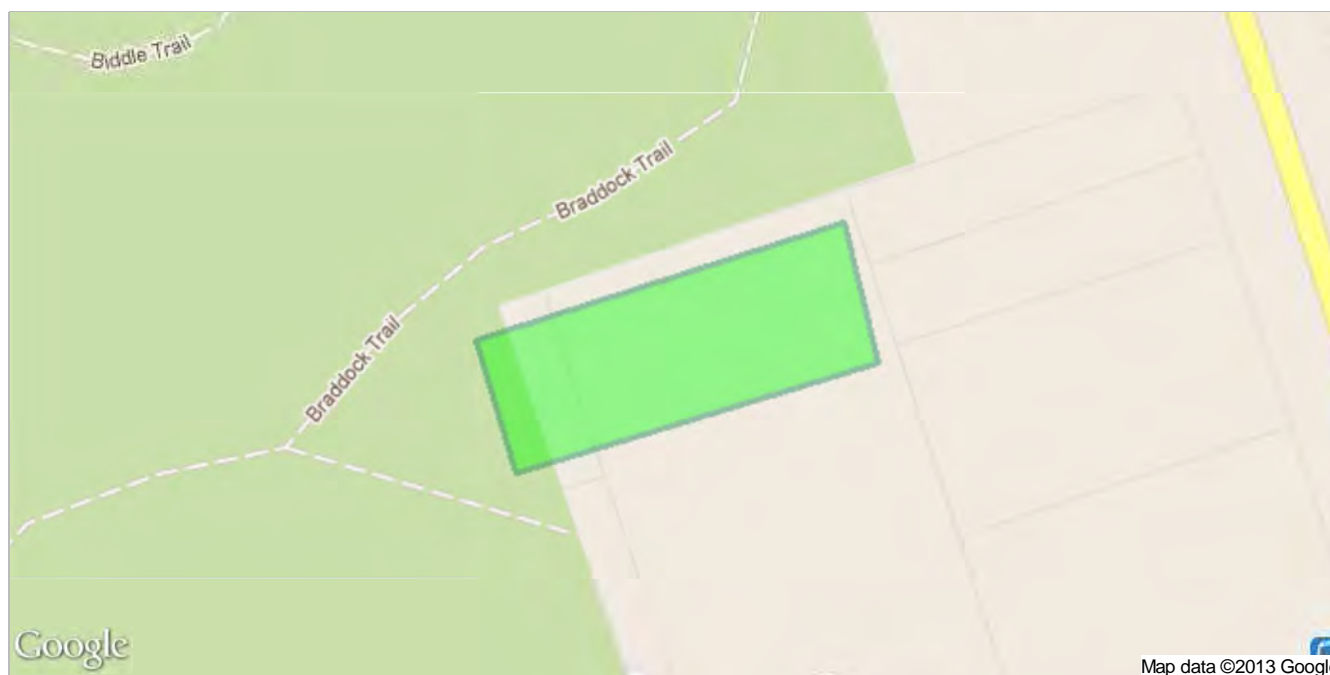
Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-H-11

Project Setting



Site Characteristics

Project size: 0.19 acres

Total project cost: \$27,000

Priority area ranking: Medium-High (5.93/10)

Design depth: 1 inches

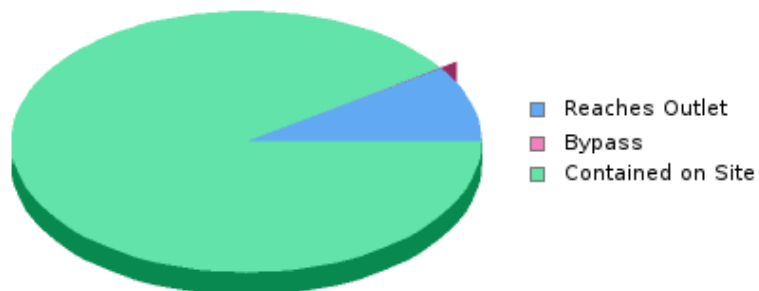
Total impervious area: 0.6 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344378)

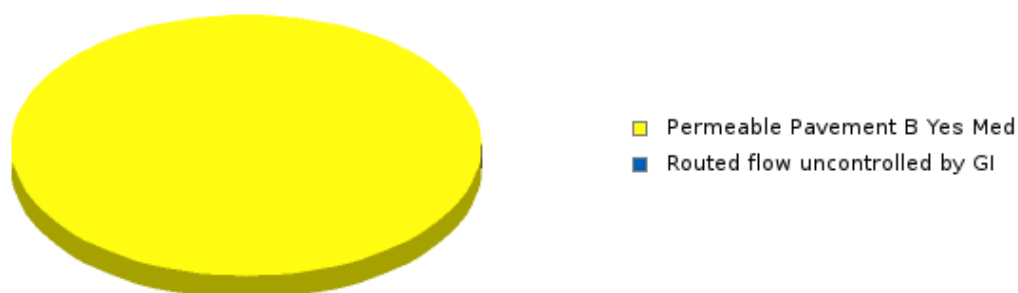
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution









Relative GI Reduction of Runoff



Total Runoff pre-BMP	1.5 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	1.35 acre-ft
Total Outlets	0.14 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			15,605 gallons (0.6 acre-in) 0.056 acres	
	Building	0.34	0.88	100% flow	
	Impervious-Mod	0.096	0.25	100% flow	
	Impervious-Low	0.118	0.3	100% flow	
LBs_1344378	Pervious-Mod-C	0.03	0	100% flow	
	Pervious-Low-D	0.275	0.07	100% flow	
	Pervious-Low-C	0.014	0	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			1.35 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344378	Permeable Pavement B Yes Med	\$26,500	\$800	20	\$27,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344378	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344378

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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NMR_Commercial_13

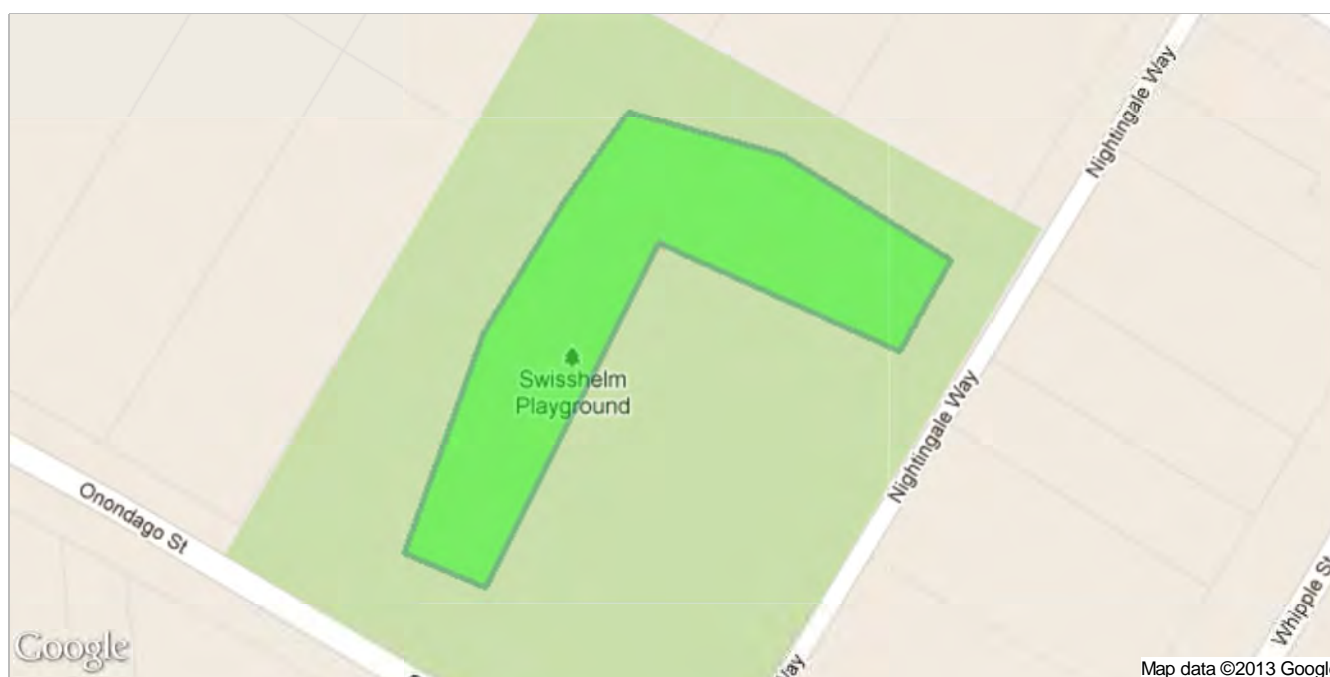
Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Subcatchment PWSA-H-11

Project Setting



Site Characteristics

Project size: 0.29 acres

Total project cost: \$10,000

Priority area ranking: Medium-High (6.11/10)

Design depth: 1 inches

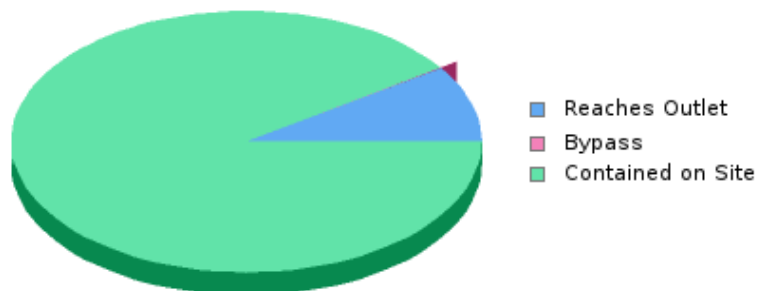
Total impervious area: 0.2 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344652)

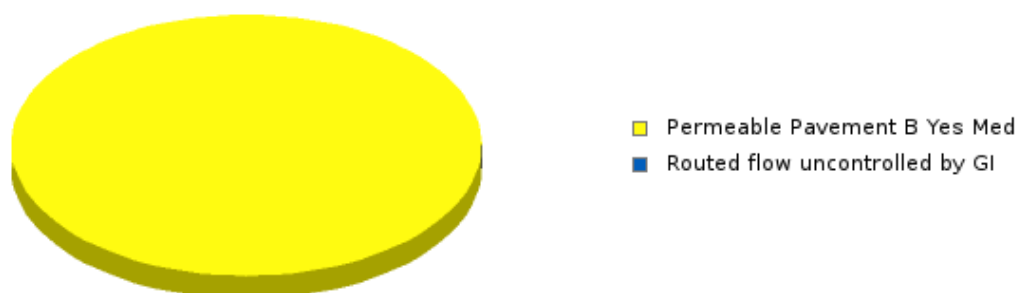
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution








Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.55 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.5 acre-ft
Total Outlets	0.05 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			5,715 gallons (0.2 acre-in) 0.021 acres	
	Impervious-Mod	0.137	0.35	100% flow	
	Impervious-Low	0.066	0.17	100% flow	
	Pervious-Mod-D	0.037	0.01	100% flow	
LBs_1344652	Pervious-Mod-B	0.054	0	100% flow	
	Pervious-Low-D	0.053	0.01	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.5 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344652	Permeable Pavement B Yes Med	\$9,700	\$300	20	\$10,000

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs

are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344652	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344652

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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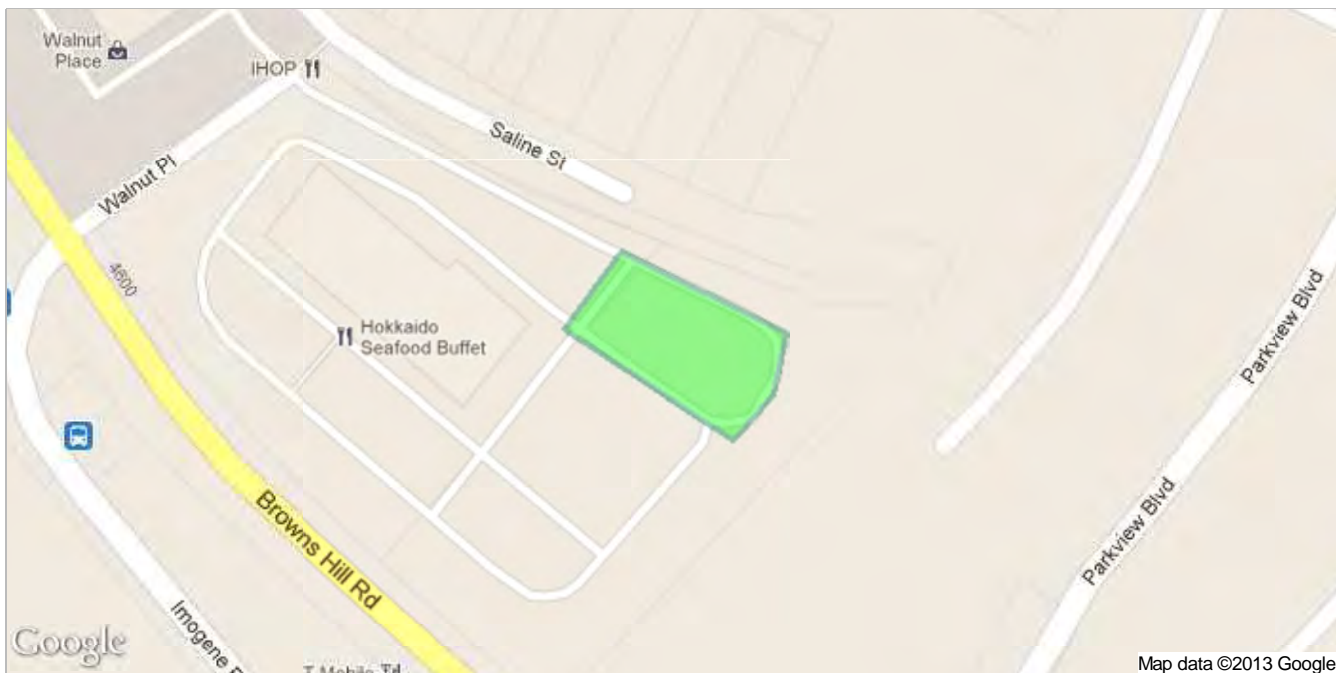
NMR_Commercial_15

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.31 acres

Total project cost: \$16,000

Priority area ranking: Medium-Medium (5.47/10)

Design depth: 1 inches

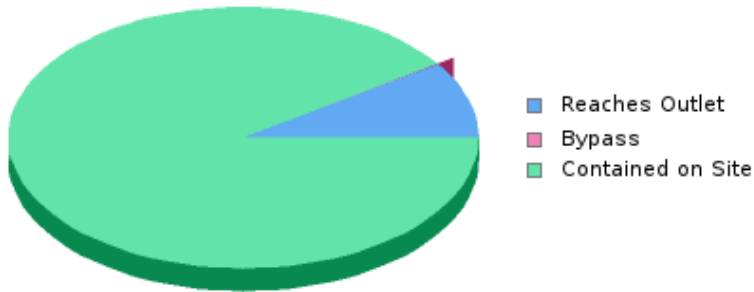
Total impervious area: 0.3 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344734)

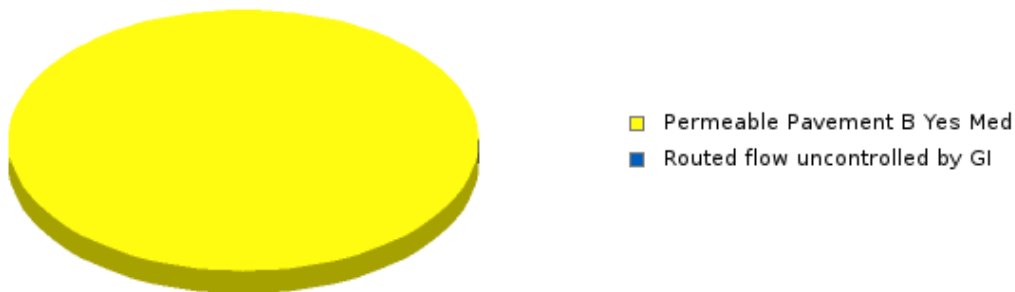
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution








Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.85 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.77 acre-ft
Total Outlets	0.08 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			8,899 gallons (0.3 acre-in) 0.032 acres	
	Impervious-Mod	0.29	0.75	100% flow	
	Pervious-High-C	0.221	0.04	100% flow	
	Pervious-High-B	0.013	0	100% flow	
LBs_1344734	Pervious-Mod-C	0.235	0.04	100% flow	
	Pervious-Mod-B	0.328	0.02	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.77 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344734	Permeable Pavement B Yes Med	\$15,100	\$400	20	\$15,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs

are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344734	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344734

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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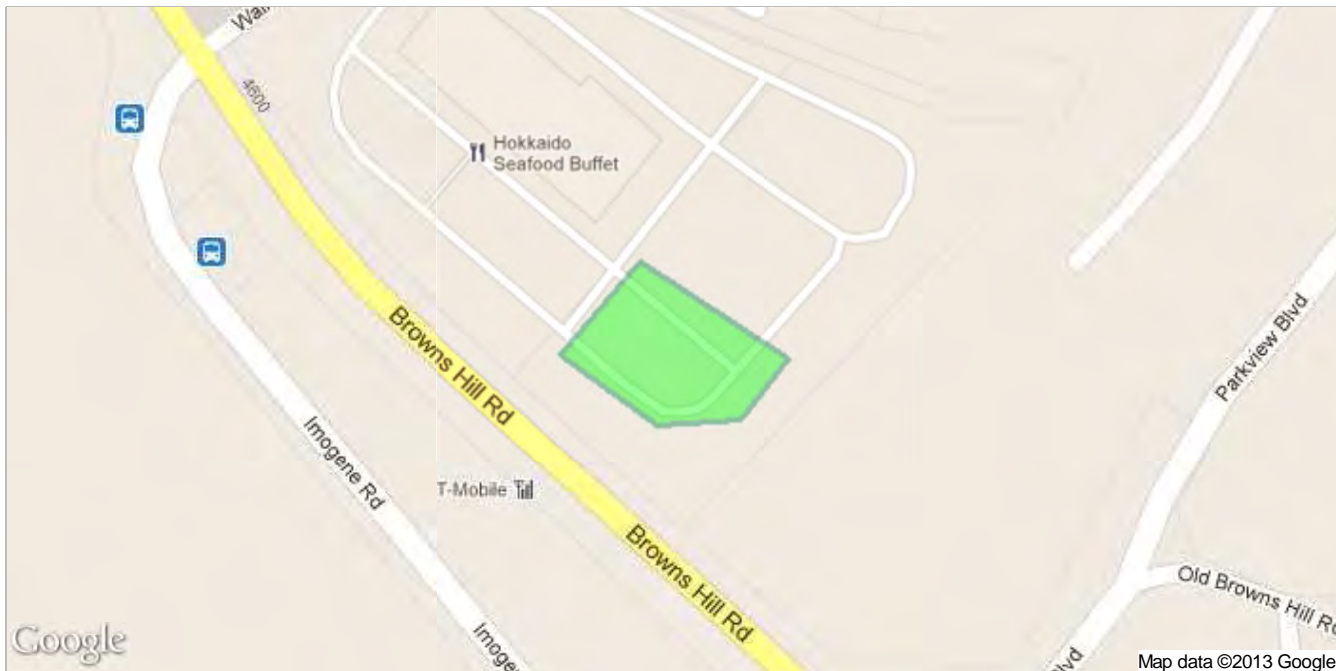
NMR_Commercial_16

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.3 acres

Total project cost: \$73,000

Priority area ranking: Medium-Medium (5.45/10)

Design depth: 1 inches

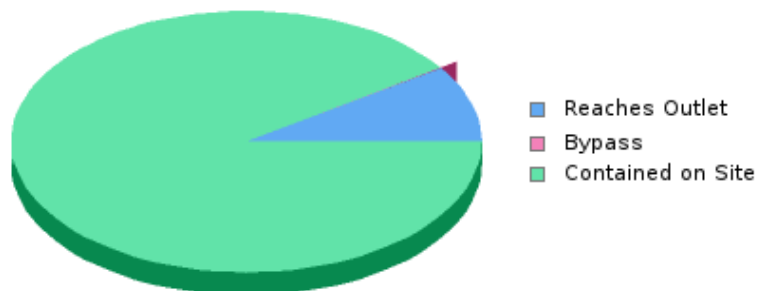
Total impervious area: 1.5 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344734)

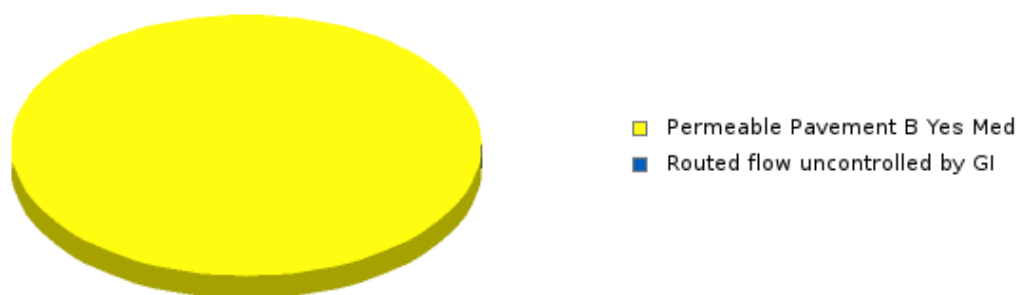
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution







Relative GI Reduction of Runoff



Total Runoff pre-BMP	3.99 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	3.61 acre-ft
Total Outlets	0.38 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			41,569 gallons (1.5 acre-in) 0.149 acres	
	Building	0.361	0.93	100% flow	
	Impervious-Low	1.179	2.98	100% flow	
LBs_1344734	Pervious-Mod-B	0.012	0	100% flow	
	Pervious-Low-B	0.286	0.07	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			3.61 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344734	Permeable Pavement B Yes Med	\$70,700	\$2,000	20	\$72,700

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1344734	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1344734

Permeable Pavement B Yes Med Effluent: 0.4 acre-ft

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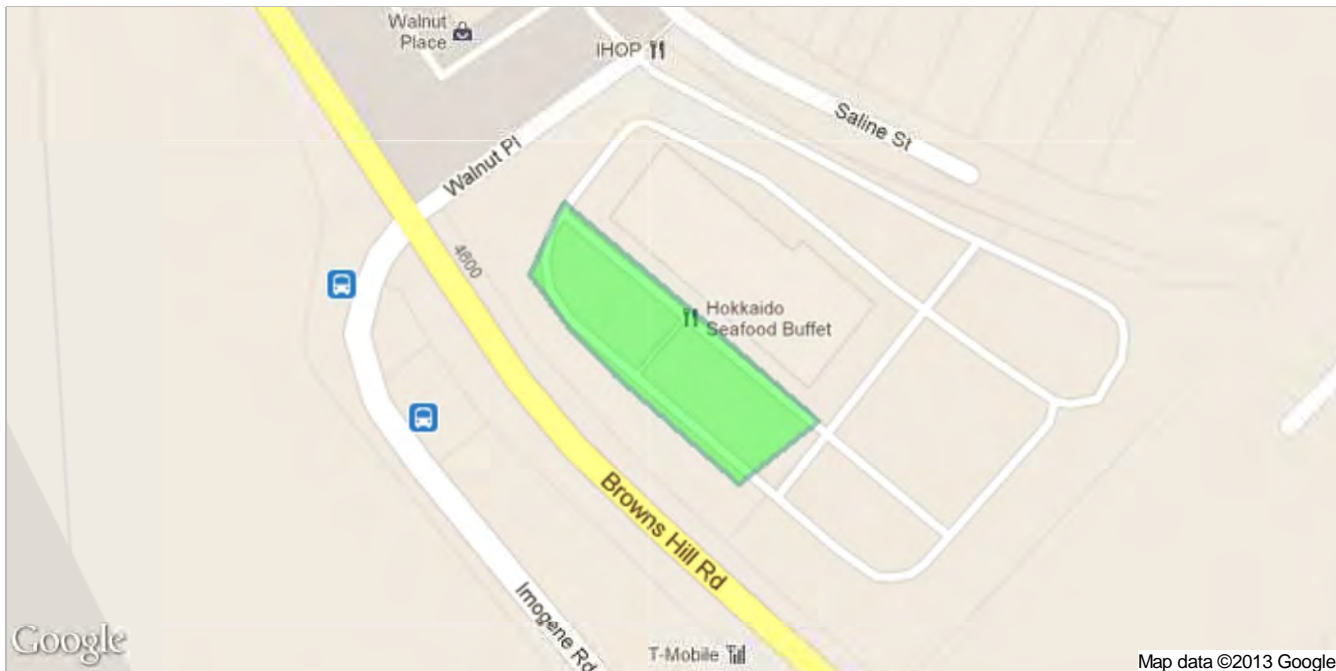
NMR_Commercial_17

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.42 acres

Total project cost: \$27,000

Priority area ranking: Medium-Medium (5.38/10)

Design depth: 1 inches

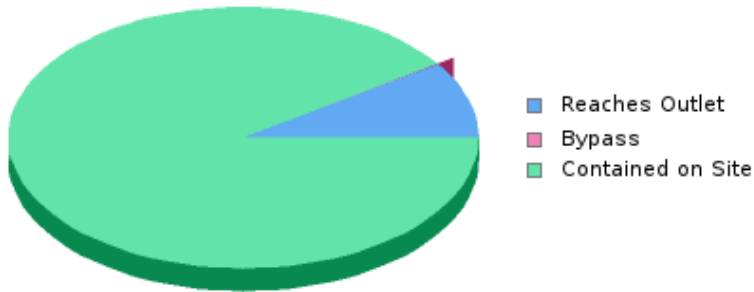
Total impervious area: 0.6 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344734)

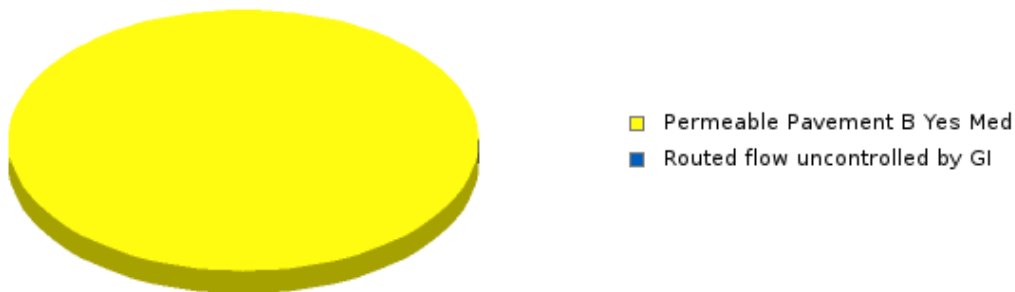
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution






Relative GI Reduction of Runoff



Total Runoff pre-BMP	1.48 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	1.34 acre-ft
Total Outlets	0.14 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			15,463 gallons (0.6 acre-in) 0.056 acres	
LBs_1344734	Building	0.013	0.03	100% flow	
	Impervious-Low	0.555	1.41	100% flow	
	Pervious-Low-B	0.185	0.04	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction				1.34 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344734	Permeable Pavement B Yes Med	\$26,300	\$700	20	\$27,000

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure	Construction Cost	O&M Costs (\$/year)	Lifespan
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	BMP	(\$/sqft)	/sqft)	(years)
LBS_1344734	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1344734

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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NMR_Commercial_18

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.18 acres

Total project cost: \$30,000

Priority area ranking: Medium-Medium (5.21/10)

Design depth: 1 inches

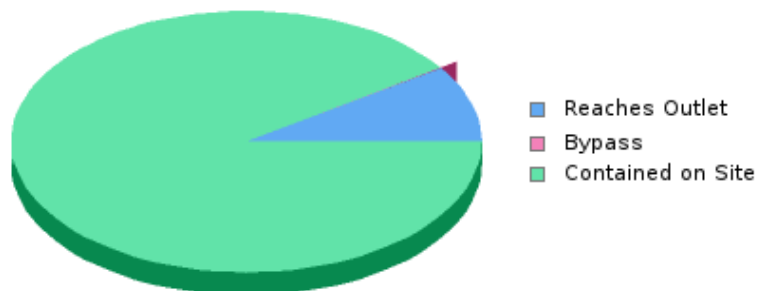
Total impervious area: 0.6 acres

POC(s)/Regulator(s): M-47-00 (LBs_1344734)

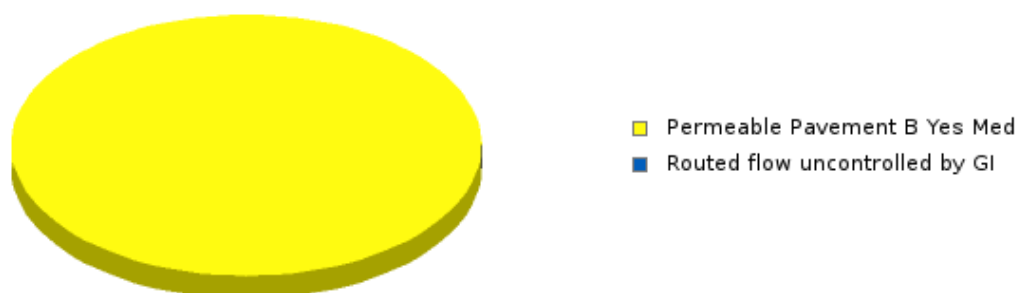
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution







Relative GI Reduction of Runoff



Total Runoff pre-BMP	1.64 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	1.48 acre-ft
Total Outlets	0.16 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			17,085 gallons (0.6 acre-in) 0.061 acres	
LBs_1344734	Building	0.065	0.17	100% flow	
	Impervious-High	0.015	0.04	100% flow	
	Impervious-Mod	0.217	0.56	100% flow	
	Impervious-Low	0.344	0.87	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			1.48 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344734	Permeable Pavement B Yes Med	\$29,100	\$800	20	\$29,900

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1344734	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1344734

Permeable Pavement B Yes Med Effluent: 0.2 acre-ft

**APPENDIX A
RAINWAYS
OUTPUT
REGULATOR
REPORTS**

Regulator DC089C001-2B

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 10.3 acres
 Number of Projects: 1
 Total Cost: \$26,000
 Total Green Infrastructure Project Area: 10.3 acres
 Total GI Project Impervious Area: 3.4 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		5.614e-3 M Gallon		1.404e-2 M Gallon		2.807e-2 M Gallon		8.421e-2 M Gallon		2.246e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
M-47-00	DC089C001-2B	13	1.285e+0	13	1.198e+0	12	1.115e+0	10	1.027e+0	7	6.524e-1	2	1.981e-1

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
NMR_PWSA-B-Lower_BR	10.3	9.8	2	11.1	1.1	0.534
Total runoff pre-green infrastructure	9.8 acre-feet (3.188e+0 MGPY)					
Total Reduction within GI	11.1 %					
Total Runoff Captured	1.1 acre-ft (3.526e-1 MGPY)					
Total GI Outlets	8.7 acre-ft (3.159e+0 MGPY)					
Total GI Capacity	0.04 acre-ft					

	(1.450e-2 Million Gallons)
Number of CSOs Prevented	2 (15 %)
Overflow Volume Reduced	0.53 acre-ft (1.732e-1 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
NMR_PWSA-B-Lower_BR	\$25,000	\$1,000	\$26,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator CSO128R002

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 460.6 acres
 Number of Projects: 13
 Total Cost: \$2,662,000
 Total Green Infrastructure Project Area: 814 acres
 Total GI Project Impervious Area: 282 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		2.501e-1 M Gallon		6.253e-1 M Gallon		1.251e+0 M Gallon		3.752e+0 M Gallon		1.001e+1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
M-47-00	CSO128R002	27	1.723e+1	26	1.650e+1	24	1.551e+1	24	1.396e+1	16	9.225e+0	7	3.140e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
NMR_PWSA-G_BR	212	202.2	2	11.1	22.5	11.287
NMR_PWSA-F-9_BR	93.8	86.5	2	5.2	4.5	2.098
NMR_PWSA-E-8-8A_BR	37.4	36.3	2	11	4	1.895
NMR_PWSA-H-11_BR	85.9	103.9	2	12.3	12.8	6.44
NMR_PWSA-I-10_BR	9.4	6	1	4.9	0.3	0.148
NMR_PWSA-J_BR	10.6	11.3	2	5.4	0.6	0.301
NMR_PWSA-K_BR	7.5	8.9	1	3.9	0.4	0.177

NMR_PWSA-H-11_PP	85.9	103.9	1	31	32.2	13.676
NMR_PWSA-1ALT_PP	4	4.6	1	12.9	0.6	0.25
NMR_PWSA-J_PP	10.6	11.3	1	11.9	1.3	0.568
NMR_PWSA-G_PP	212	202.2	1	19.4	39.2	16.636
NMR_PWSA-K_PP	7.5	8.9	1	34.2	3	1.292
NMR_PWSA-E-8-8A_PP	37.4	36.3	1	3.2	1.2	0.494
Total runoff pre-green infrastructure	822.1 acre-feet (2.679e+2 MGPY)					
Total Reduction within GI	14.9 %					
Total Runoff Captured	122.6 acre-ft (3.994e+1 MGPY)					
Total GI Outlets	699.6 acre-ft (2.646e+2 MGPY)					
Total GI Capacity	4.61 acre-ft (1.501e+0 Million Gallons)					
Number of CSOs Prevented	4 (15 %)					
Overflow Volume Reduced	11.48 acre-ft (3.742e+0 MGPY)					

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
NMR_PWSA-G_BR	\$540,000	\$30,000	\$570,000
NMR_PWSA-F-9_BR	\$83,000	\$4,000	\$87,000
NMR_PWSA-E-8-8A_BR	\$79,000	\$4,000	\$83,000
NMR_PWSA-H-11_BR	\$310,000	\$17,000	\$327,000
NMR_PWSA-I-10_BR	\$7,000	\$0	\$8,000
NMR_PWSA-J_BR	\$14,000	\$1,000	\$15,000
NMR_PWSA-K_BR	\$9,000	\$0	\$9,000

NMR_PWSA-H-11_PP	\$632,000	\$18,000	\$650,000
NMR_PWSA-1ALT_PP	\$12,000	\$0	\$12,000
NMR_PWSA-J_PP	\$26,000	\$1,000	\$27,000
NMR_PWSA-G_PP	\$768,000	\$22,000	\$790,000
NMR_PWSA-K_PP	\$60,000	\$2,000	\$61,000
NMR_PWSA-E-8-8A_PP	\$23,000	\$1,000	\$23,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator M-47-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an annualized basis.

Characteristics

Total Drainage Area: 2852 acres
 Number of Projects: 14
 Total Cost: \$1,381,000
 Total Green Infrastructure Project Area: 589.6 acres
 Total GI Project Impervious Area: 147.6 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		1.549e+0 M Gallon		3.872e+0 M Gallon		7.745e+0 M Gallon		2.323e+1 M Gallon		6.196e+1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
M-47-00	M-47-OF	64	2.002e+2	64	1.930e+2	63	1.930e+2	62	1.706e+2	62	1.386e+2	62	9.839e+1

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
NMR_PWSA-D-5_BR	75.5	61.6	1	11.9	7.3	3.698
NMR_PWSA-C-6_BR	30.9	27.1	1	5.8	1.6	0.788
NMR_PWSA-L_BR	9.2	9.5	1	2.1	0.2	0.101
NMR_PWSA-M_BR	9.5	8.9	1	10.2	0.9	0.459
NMR_PWSA-O_BR	34.9	23.5	1	10.3	2.4	1.228
NMR_PWSA-N_BR	130.7	99.7	2	5.5	5.5	2.888

NMR_PWSA-A_BR	4.1	3.7	1	15	0.6	0.282
NMR_PWSA-L_PP	9.2	9.5	1	12.8	1.2	0.578
NMR_PWSA-M_PP	9.5	8.9	1	14.5	1.3	0.739
NMR_PWSA-D-5_PP	75.5	61.6	1	12.2	7.5	3.193
NMR_PWSA-N_PP	130.7	99.7	1	25.7	25.6	10.861
NMR_PWSA-C-6_PP	30.9	27.1	1	4.3	1.2	0.494
NMR_PWSA-A_PP	4.1	3.7	1	12.5	0.5	0.267
NMR_PWSA-O_PP	34.9	23.5	1	33.7	7.9	3.358
Total runoff pre-green infrastructure	468 acre-feet (1.525e+2 MGPY)					
Total Reduction within GI	13.6 %					
Total Runoff Captured	63.6 acre-ft (2.072e+1 MGPY)					
Total GI Outlets	404.5 acre-ft (1.508e+2 MGPY)					
Total GI Capacity	2.41 acre-ft (7.857e-1 Million Gallons)					
Number of CSOs Prevented	0 (0 %)					
Overflow Volume Reduced	11.27 acre-ft (3.673e+0 MGPY)					

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
NMR_PWSA-D-5_BR	\$179,000	\$10,000	\$189,000
NMR_PWSA-C-6_BR	\$38,000	\$2,000	\$40,000
NMR_PWSA-L_BR	\$5,000	\$0	\$5,000
NMR_PWSA-M_BR	\$22,000	\$1,000	\$23,000

NMR_PWSA-O_BR	\$59,000	\$3,000	\$63,000
NMR_PWSA-N_BR	\$114,000	\$6,000	\$120,000
NMR_PWSA-A_BR	\$14,000	\$1,000	\$14,000
NMR_PWSA-L_PP	\$27,000	\$1,000	\$27,000
NMR_PWSA-M_PP	\$34,000	\$1,000	\$35,000
NMR_PWSA-D-5_PP	\$147,000	\$4,000	\$152,000
NMR_PWSA-N_PP	\$502,000	\$14,000	\$516,000
NMR_PWSA-C-6_PP	\$23,000	\$1,000	\$23,000
NMR_PWSA-A_PP	\$12,000	\$0	\$13,000
NMR_PWSA-O_PP	\$155,000	\$4,000	\$160,000

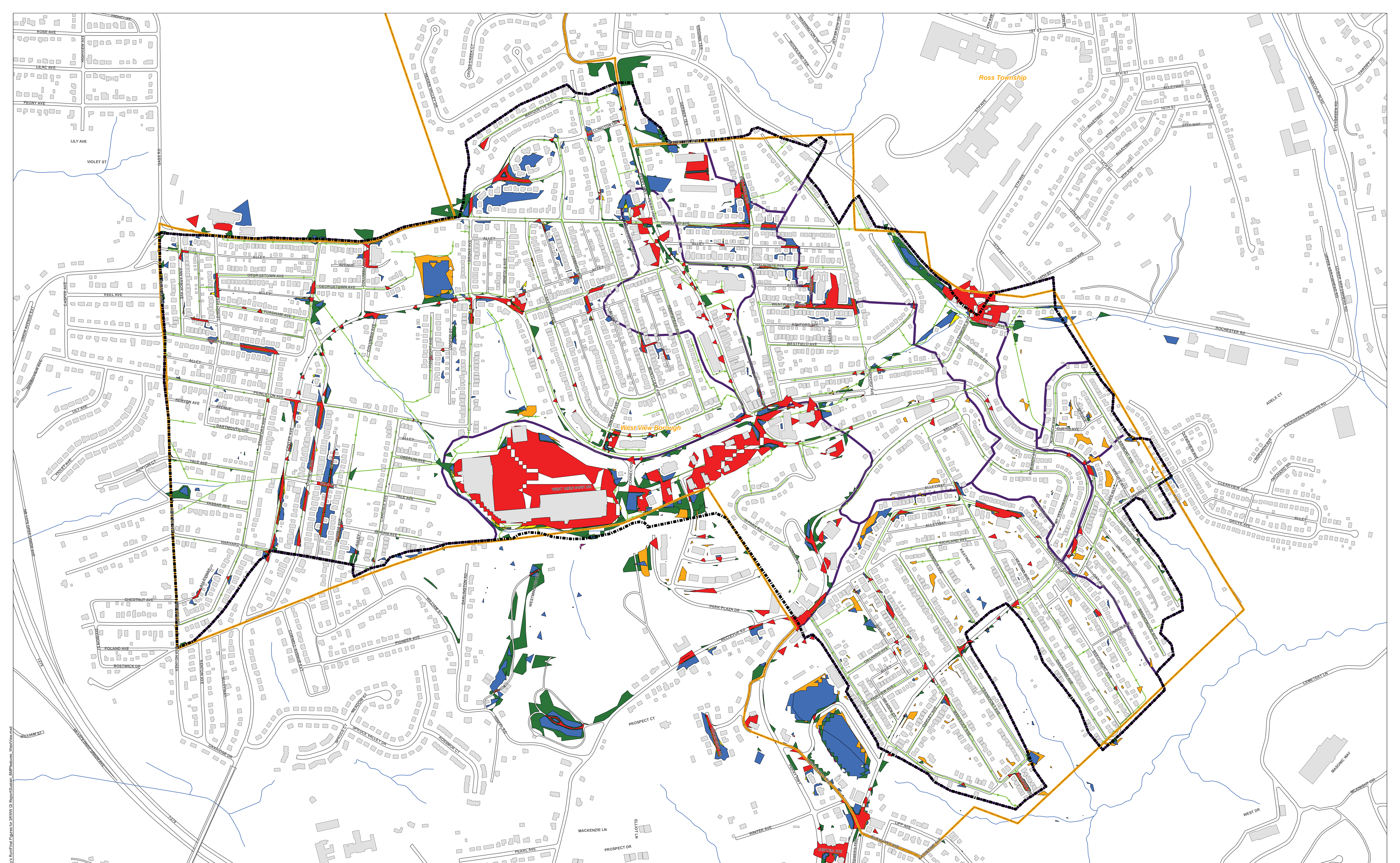
Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

APPENDIX B

APPENDIX B
FIGURES



- Permeable Pavement
- Vegetated Filter Strips
- Sewerlines
- Combined Area Tributary to POC A-67
- Bioretention Basins
- Grass Swales
- Edge of Pavement
- Combined Sewer Subcatchment
- Infiltration Basins / Trench
- Constructed Wetlands
- Building Footprint
- Municipal Boundaries

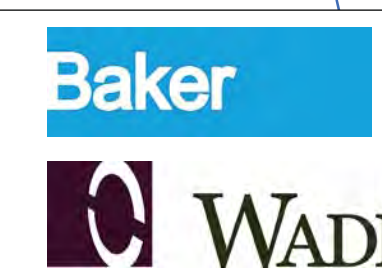
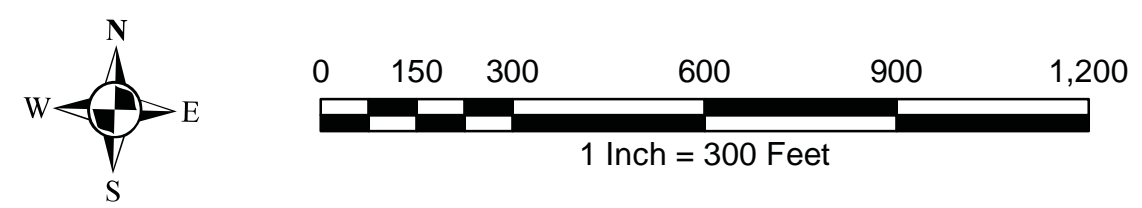
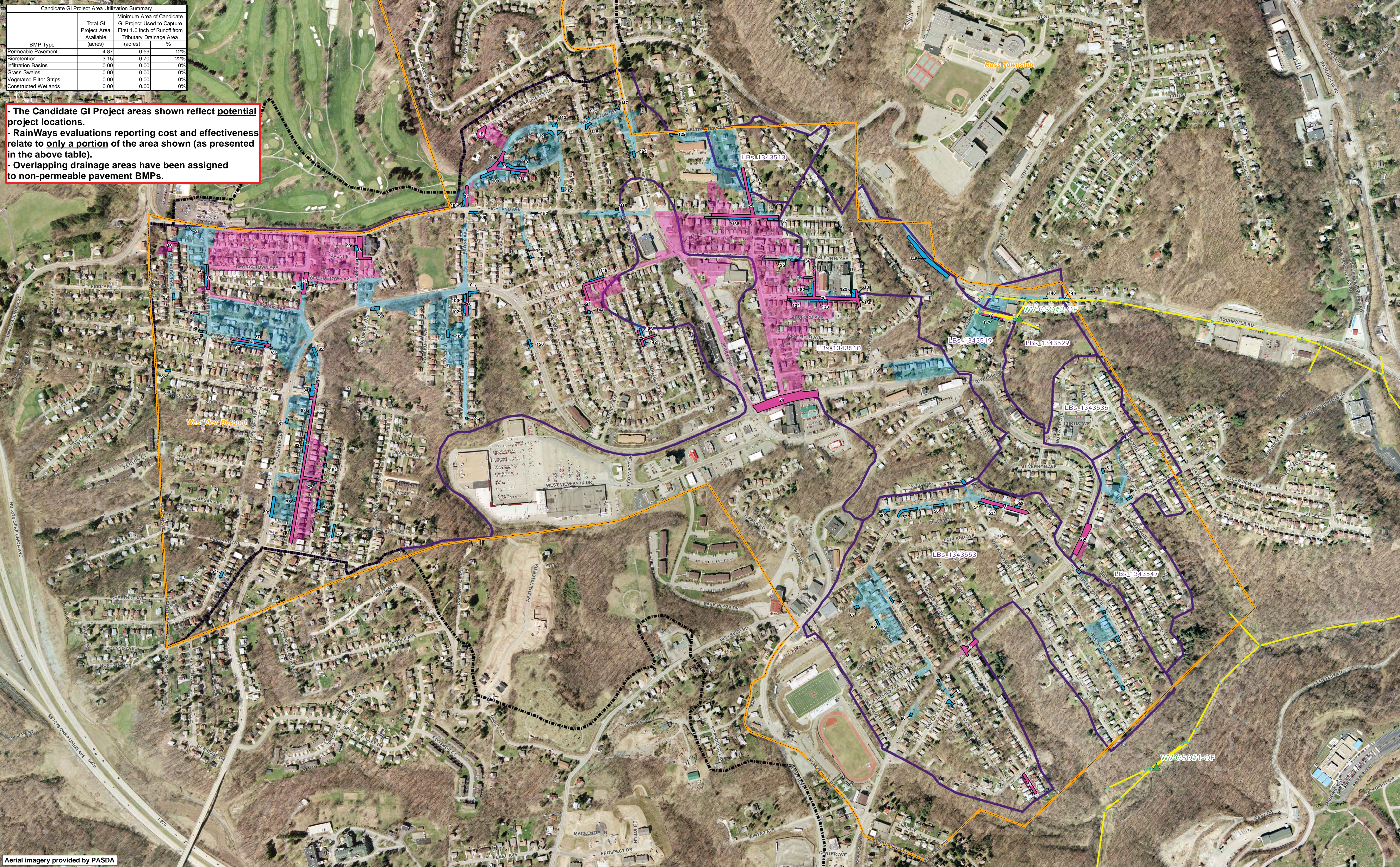


Figure B-1
Girty's Run - West View
BMP GIS Features

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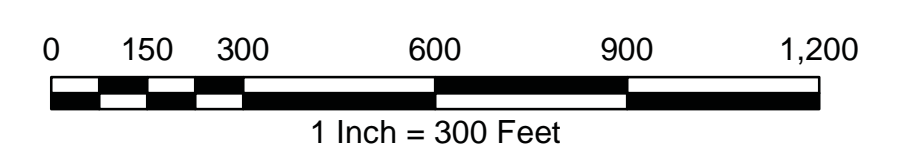
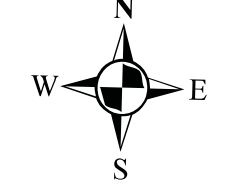
Candidate GI Project Area Utilization Summary			
BMP Type	Total GI Project Area Available (acres)	Minimum Area of Candidate GI Project Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	%
Permeable Pavement	4.87	0.59	12%
Bioretention	3.15	0.70	22%
Infiltration Basins	0.00	0.00	0%
Grass Swales	0.00	0.00	0%
Vegetated Filter Strips	0.00	0.00	0%
Constructed Wetlands	0.00	0.00	0%

- The Candidate GI Project areas shown reflect potential project locations.
 - RainWays evaluations reporting cost and effectiveness relate to **only a portion** of the area shown (as presented in the above table).
 - Overlapping drainage areas have been assigned to non-permeable pavement BMPs.



Aerial imagery provided by PASDA

- ▲ Outfalls
- Model Junctions
- ALCOSAN Girty's Run Modeled Pipe Network Extent
- Bioretention Basin
- Vegetated Filter Strips
- Permeable Pavement
- Bioretention Basin Drainage Area
- Vegetated Filter Strip Drainage Area
- Permeable Pavement Drainage Area
- Combined Area Tributary to POC A-67
- Combined Sewer Subcatchment
- Municipal Boundaries



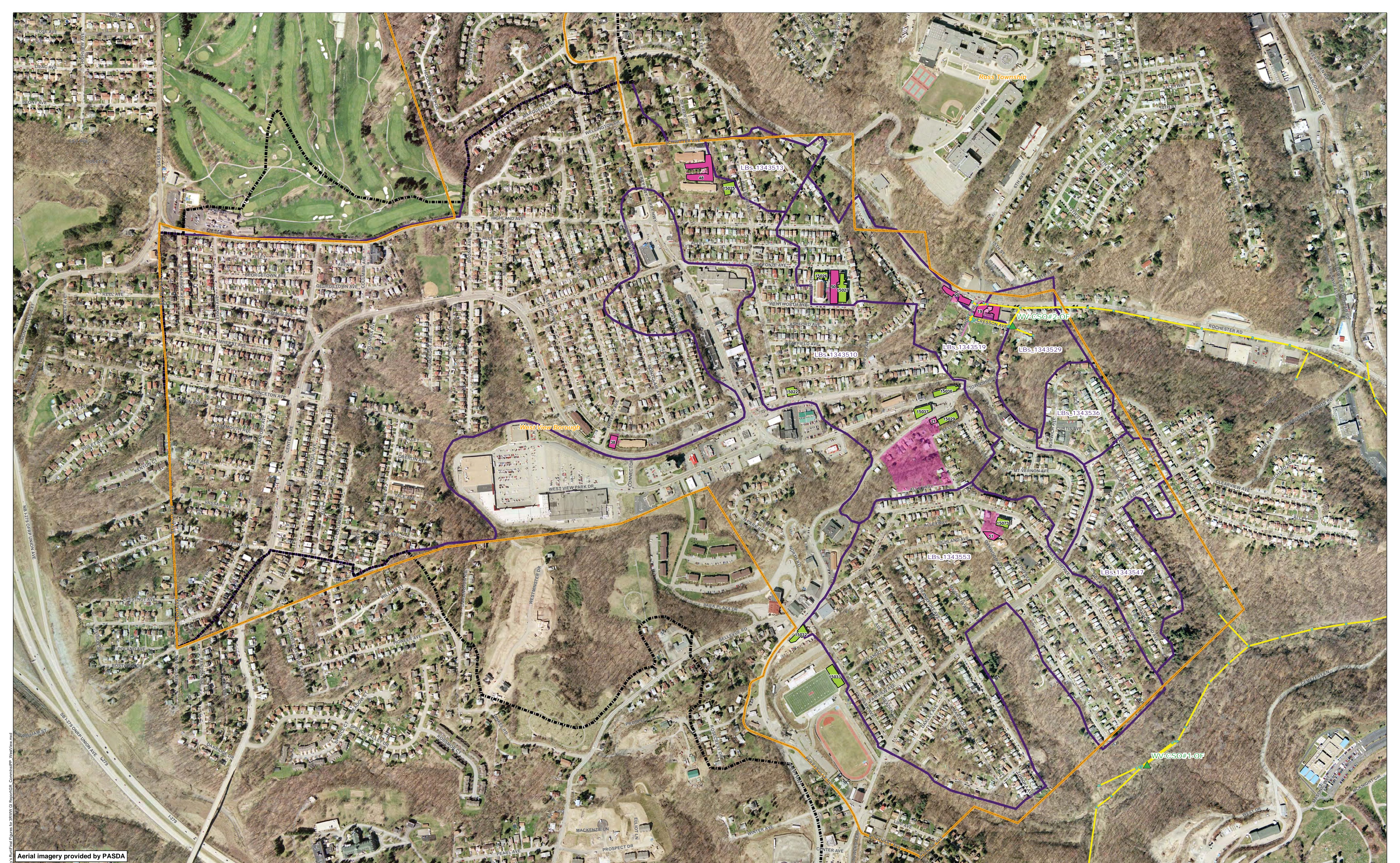
3 Rivers
Wet Weather

Baker

Landbase Systems

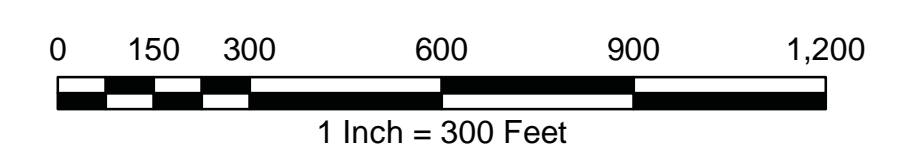
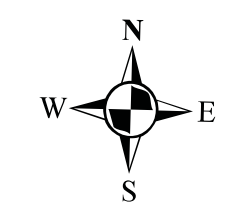
WADETRIM

Figure B-2
 Girty's Run - West View
 Concept Municipal GI Projects



Aerial imagery provided by PASDA

- ▲ Outfalls
- Model Junctions
- ALCOSAN Girty's Run Modeled Pipe Network Extent
- Green Roof Candidate Projects
- Permeable Pavement Candidate GI Projects
- Permeable Pavement Candidate GI Project Drainage Areas
- Combined Area Tributary to POC A-67
- Combined Sewer Subcatchment
- Municipal Boundaries

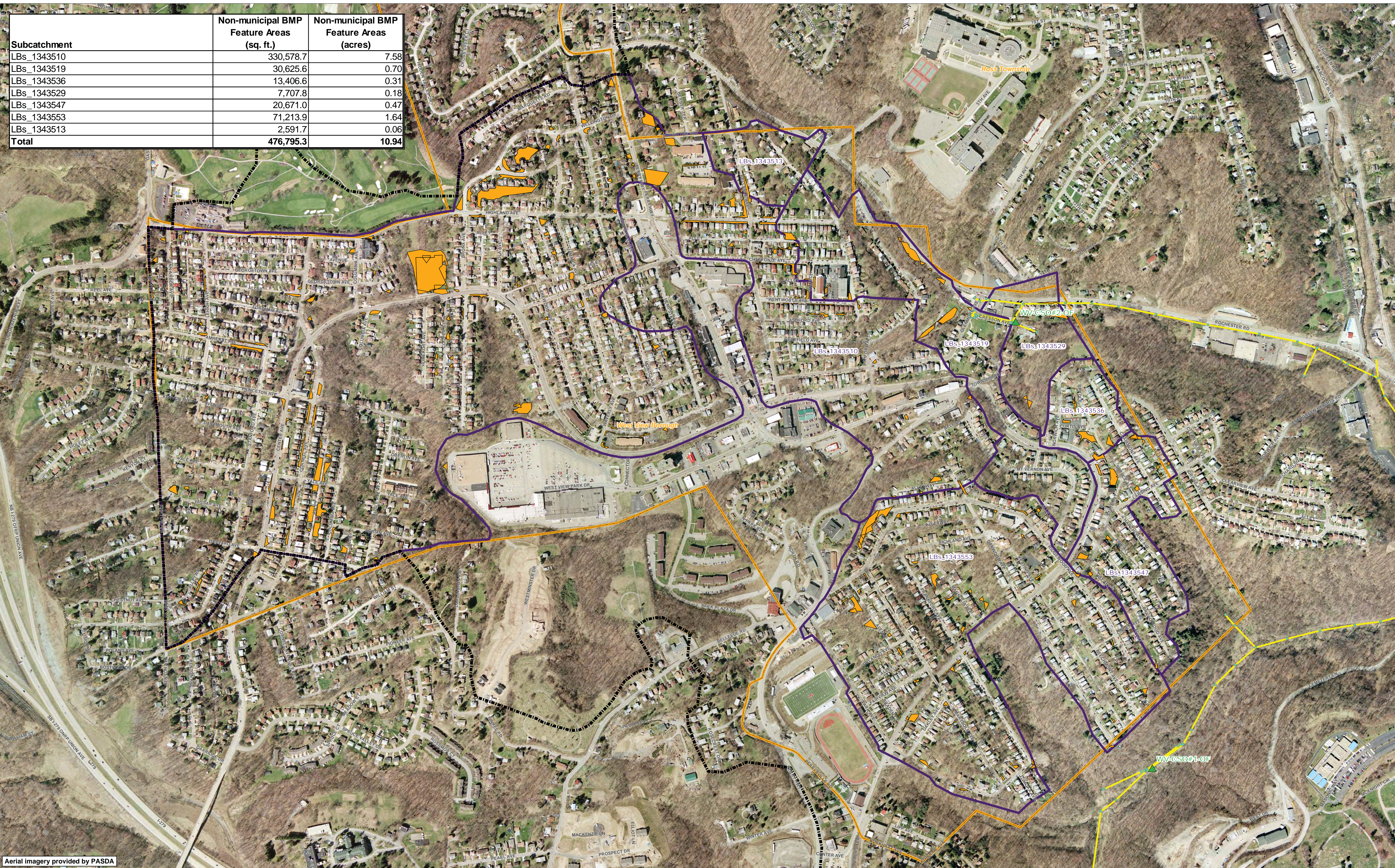


3 Rivers Wet Weather

Figure B-3
Girty's Run - West View
Concept Commercial / Institutional
GI Projects

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Subcatchment	Non-municipal BMP Feature Areas (sq. ft.)	Non-municipal BMP Feature Areas (acres)
LBs_1343510	330,578.7	7.58
LBs_1343519	30,625.6	0.70
LBs_1343536	13,406.6	0.31
LBs_1343529	7,707.8	0.18
LBs_1343547	20,671.0	0.47
LBs_1343553	71,213.9	1.64
LBs_1343513	2,591.7	0.06
Total	476,795.3	10.94



Aerial imagery provided by PASDA

- Infiltration Type BMP
- Model Junctions
- Combined Area Tributary to POC A-67
- Outfalls
- ALCOSAN Girty's Run Modeled Pipe Network Extent
- Combined Sewer Subcatchment
- Municipal Boundaries

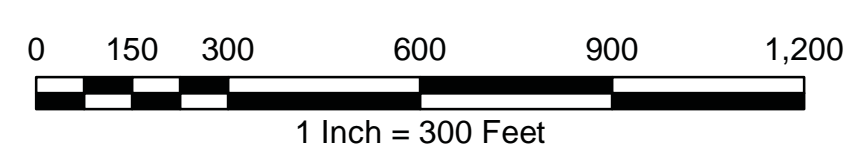
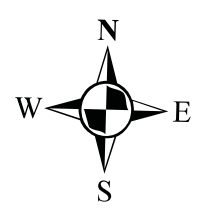


Figure B-4
Girty's Run - West View Residential BMP Features

APPENDIX B
TABLES 1.1
THROUGH 1.6

Table B-1.1
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	LBs_1343510
Subcatchment Size	289.39 acres
Total Annual Subcatchment Runoff (RainWays)	113.16 MG
Drainage Area Tributary to Municipal GI Projects	34.34 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips***	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.55	0.41	0.00	0.00	0.00	0.00	0.95
Number of Candidate GI Projects	21	65	0	0	2	0	88
Annual Combined Sewer Area Runoff Captured (MG)*	4.31	5.16	0	0	0	0	9.47
Combined Sewer Area Runoff Capture (%)	3.8%	4.6%	0.0%	0.0%	0.0%	0.0%	8.4%
Opinion of Probable Cost****							
Construction Cost	\$260,000	\$ 389,000	\$ -	\$ -	\$ -	\$ -	\$649,000
O/M Cost (20 years)	\$10,000	\$ 22,000	\$ -				\$32,000
Present Worth Cost**	\$269,000	\$ 409,000	\$ -				\$678,000
Present Worth Cost per Drainage Area Treated (acres)	\$22,000	\$ 19,000	\$ -				\$20,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***Capture values for these Candidate GI Projects were negligible in this subcatchment.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table B-1.2
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343513**
Subcatchment Size 8.31 acres
Total Annual Subcatchment Runoff (RainWays) 1.69 MG
Drainage Area Tributary to Municipal GI Projects 1.49 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.02	0.00	0.00	0.00	0.00	0.02
Number of Candidate GI Projects	1	4	0	0	0	0	5
Annual Combined Sewer Area Runoff Captured (MG)*	0.02	0.24	0	0	0	0	0.26
Combined Sewer Area Runoff Capture (%)	1.3%	14.2%	0.0%	0.0%	0.0%	0.0%	15.5%
Opinion of Probable Cost***							
Construction Cost	\$2,000	\$ 19,000	\$ -	\$ -	\$ -	\$ -	\$21,000
O/M Cost (20 years)	\$1,000	\$ 1,000	\$ -				\$2,000
Present Worth Cost**	\$3,000	\$ 20,000	\$ -				\$23,000
Present Worth Cost per Drainage Area Treated (acres)	\$30,000	\$ 14,000					\$16,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table B-1.3
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343519**
Subcatchment Size 36.62 acres
Total Annual Subcatchment Runoff (RainWays) 9.91 MG
Drainage Area Tributary to Municipal GI Projects 6.97 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.02	0.14	0.00	0.00	0.00	0.00	0.16
Number of Candidate GI Projects	1	4	0	0	0	0	5
Annual Combined Sewer Area Runoff Captured (MG)*	0.14	1.79	0	0	0	0	1.92
Combined Sewer Area Runoff Capture (%)	1.4%	18.1%	0.0%	0.0%	0.0%	0.0%	19.4%
Opinion of Probable Cost***							
Construction Cost	\$9,000	\$ 139,000	\$ -	\$ -	\$ -	\$ -	\$148,000
O/M Cost (20 years)	\$1,000	\$ 8,000	\$ -				\$9,000
Present Worth Cost**	\$10,000	\$ 146,000	\$ -				\$156,000
Present Worth Cost per Drainage Area Treated (acres)	\$27,000	\$ 23,000	\$ -				\$23,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table B-1.4
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343529**
Subcatchment Size 11.53 acres
Total Annual Subcatchment Runoff (RainWays) 1.69 MG
Drainage Area Tributary to Municipal GI Projects 0.48 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.02	0.00	0.00	0.00	0.00	0.02
Number of Candidate GI Projects	0	2	0	0	0	0	2
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.28	0	0	0	0	0.28
Combined Sewer Area Runoff Capture (%)	0.0%	16.8%	0.0%	0.0%	0.0%	0.0%	16.8%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 23,000	\$ -	\$ -	\$ -	\$ -	\$23,000
O/M Cost (20 years)	\$0	\$ 2,000	\$ -				\$2,000
Present Worth Cost**	\$0	\$ 25,000	\$ -				\$25,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 52,000					\$52,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table B-1.5
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343547**
Subcatchment Size 19.33 acres
Total Annual Subcatchment Runoff (RainWays) 5.04 MG
Drainage Area Tributary to Municipal GI Projects 0.66 acres

	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.01	0.01	0.00	0.00	0.00	0.00	0.02
Number of Candidate GI Projects	1	2	0	0	0	0	3
Annual Combined Sewer Area Runoff Captured (MG)*	0.04	0.15	0	0	0	0	0.19
Combined Sewer Area Runoff Capture (%)	0.8%	3.0%	0.0%	0.0%	0.0%	0.0%	3.8%
Opinion of Probable Cost***							
Construction Cost	\$3,000	\$ 12,000	\$ -	\$ -	\$ -	\$ -	\$15,000
O/M Cost (20 years)	\$1,000	\$ 1,000	\$ -				\$2,000
Present Worth Cost**	\$4,000	\$ 13,000	\$ -				\$17,000
Present Worth Cost per Drainage Area Treated (acres)	\$37,000	\$ 24,000					\$26,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table B-1.6
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343553**
Subcatchment Size 87.77 acres
Total Annual Subcatchment Runoff (RainWays) 24.00 MG
Drainage Area Tributary to Municipal GI Projects 4.17 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.01	0.09	0.00	0.00	0.00	0.00	0.11
Number of Candidate GI Projects	3	19	0	0	0	0	22
Annual Combined Sewer Area Runoff Captured (MG)*	0.11	1.14	0	0	0	0	1.25
Combined Sewer Area Runoff Capture (%)	0.5%	4.8%	0.0%	0.0%	0.0%	0.0%	5.2%
Opinion of Probable Cost***							
Construction Cost	\$7,000	\$ 89,000	\$ -	\$ -	\$ -	\$ -	\$96,000
O/M Cost (20 years)	\$1,000	\$ 5,000	\$ -				\$6,000
Present Worth Cost**	\$8,000	\$ 94,000	\$ -				\$102,000
Present Worth Cost per Drainage Area Treated (acres)	\$56,000	\$ 24,000	\$ -				\$25,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

**APPENDIX B
TABLES 2.1
THROUGH 2.6**

Table B-2.1
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343510**
Subcatchment Size 289.39 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	51.516	2.308	4.5%	3.201	6.2%
Impervious-High	2.443	0.004	0.1%	0.010	0.4%
Impervious-Mod	30.881	2.412	7.8%	2.346	7.6%
Impervious-Low	34.937	2.958	8.5%	4.408	12.6%
Pervious-High-D	0.540	0.000	0.0%	0.000	0.0%
Pervious-High-C	26.491	0.028	0.1%	0.007	0.0%
Pervious-High-B	1.830	0.025	1.4%	0.000	0.0%
Pervious-Mod-D	5.074	0.131	2.6%	0.001	0.0%
Pervious-Mod-C	136.916	6.604	4.8%	6.650	4.9%
Pervious-Mod-B	11.139	0.993	8.9%	0.000	0.0%
Pervious-Low-D	5.781	0.005	0.1%	0.047	0.8%
Pervious-Low-C	60.044	6.497	10.8%	7.410	12.3%
Pervious-Low-B	2.929	0.000	0.0%	0.000	0.0%
Totals	370.521	21.965		24.079	

Table B-2.2
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBS_1343513**
Subcatchment Size 8.31 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	0.839	0.153	18.2%	0.153	18.2%
Impervious-High	0.145	0.000	0.0%	0.000	0.0%
Impervious-Mod	0.473	0.054	11.3%	0.078	16.5%
Impervious-Low	0.124	0.112	90.5%	0.121	97.6%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-C	1.272	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	5.089	1.077	21.2%	1.078	21.2%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-C	0.366	0.090	24.6%	0.054	14.9%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	8.308	1.909		1.484	

Table B-2.3
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343519**
Subcatchment Size 36.62 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	4.257	0.576	13.5%	0.204	4.8%
Impervious-High	0.372	0.040	10.8%	0.006	1.6%
Impervious-Mod	3.963	1.847	46.6%	0.642	16.2%
Impervious-Low	1.632	0.189	11.6%	0.261	16.0%
Pervious-High-D	1.370	0.002	0.1%	0.000	0.0%
Pervious-High-C	3.892	0.096	2.5%	0.000	0.0%
Pervious-High-B	1.413	0.009	0.6%	0.002	0.1%
Pervious-Mod-D	2.748	0.585	21.3%	0.064	2.3%
Pervious-Mod-C	4.278	0.103	2.4%	0.000	0.0%
Pervious-Mod-B	9.140	2.768	30.3%	1.063	11.6%
Pervious-Low-D	1.285	0.245	19.1%	0.043	3.3%
Pervious-Low-C	1.980	0.064	3.2%	0.256	12.9%
Pervious-Low-B	0.287	0.062	21.4%	0.025	8.6%
Totals	36.617	6.586		2.564	

Table B-2.4
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343529**
Subcatchment Size 11.53 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	0.417	0.066	15.9%
Impervious-High	0.130	0.048	37.2%
Impervious-Mod	0.379	0.116	30.7%
Impervious-Low	0.386	0.224	58.1%
Pervious-High-D	0.715	0.004	0.6%
Pervious-High-C	2.784	0.000	0.0%
Pervious-High-B	2.315	0.000	0.0%
Pervious-Mod-D	1.407	0.022	1.6%
Pervious-Mod-C	0.735	0.000	0.0%
Pervious-Mod-B	1.295	0.000	0.0%
Pervious-Low-D	0.764	0.000	0.0%
Pervious-Low-C	0.020	0.000	0.0%
Pervious-Low-B	0.185	0.000	0.0%
Totals	11.532	0.482	

Table B-2.5
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBS_1343547**
Subcatchment Size 19.33 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	2.487	0.051	2.1%	0.000	0.0%
Impervious-High	0.190	0.000	0.0%		0.0%
Impervious-Mod	2.230	0.120	5.4%	0.055	2.5%
Impervious-Low	0.577	0.083	14.3%	0.127	22.1%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-B	1.630	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	0.140	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	10.139	0.292	2.9%	0.018	0.2%
Pervious-Low-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-B	1.935	0.000	0.0%	0.075	3.9%
Totals	19.328	0.546		0.275	

Table B-2.6
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343553**
Subcatchment Size 87.77 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	12.962	0.486	3.7%	0.000	0.0%
Impervious-High	1.136	0.000	0.0%	0.003	0.2%
Impervious-Mod	8.268	0.425	5.1%	0.188	2.3%
Impervious-Low	3.500	0.771	22.0%	0.338	9.6%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-C	2.361	0.000	0.0%	0.000	0.0%
Pervious-High-B	6.301	0.000	0.0%	0.001	0.0%
Pervious-Mod-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	7.967	0.016	0.2%	0.000	0.0%
Pervious-Mod-B	35.372	1.011	2.9%	0.114	0.3%
Pervious-Low-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-C	0.869	0.003	0.4%	0.000	0.0%
Pervious-Low-B	9.037	1.313	14.5%	0.150	1.7%
Totals	87.773	4.026		0.793	

APPENDIX B
TABLE 3

Table B-3
3RWW GI Project
Concept Municipal GI Project Evaluation Summary
West View
February 19, 2013

Total Combined Sewer Area 460.1 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 157.94 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.59	0.70	0.00	0.00	0.00	0.00	1.28
Number of Candidate GI Projects	27	93	0	0	0	0	120
Portion of Drainage Area Tributary to Concept GI Projects (acres)	13.11	35.09	0.00	0.00	0.00	0.00	48.20
Annual Combined Sewer Area Runoff Captured (MG)*	4.62	8.77	0.00	0.00	0.00	0.00	13.39
Combined Sewer Area Runoff Capture (%)	2.9%	5.6%	0.0%	0.0%	0.0%	0.0%	8.5%
Opinion of Probable Cost***							
Construction Cost	\$ 281,000	\$ 671,000	\$ -	\$ -	\$ -	\$ -	\$ 952,000
O/M Cost (20 years)	\$ 14,000	\$ 39,000	\$ -	\$ -	\$ -	\$ -	\$ 53,000
Present Worth Cost**	\$ 294,000	\$ 707,000	\$ -	\$ -	\$ -	\$ -	\$ 1,001,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 23,000	\$ 21,000	\$ -	\$ -	\$ -	\$ -	\$ 21,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX B
TABLES 4.1 & 4.2

Table B-4.1
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary - Regulator WV-CSO#1
West View
February 19, 2013

Total Combined Sewer Area 87.77 acres
 Total Annual Combined Sewer Area Runoff 24.00 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	
	LBS_1343553	Totals
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.022	0.02
Number of Candidate GI Projects	1	1.00
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.54	0.54
Annual Combined Sewer Area Runoff Captured (MG)*	0.18	0.18
Combined Sewer Area Runoff Capture (%)**	0.73%	0.73%
Opinion of Probable Cost****		
Construction Cost	\$ 11,000	\$ 11,000
O/M Cost (20 years)	\$ 1,000	\$ 1,000
Present Worth Cost***	\$ 12,000	\$ 12,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 23,000	\$ 23,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

***Present Worth calculated assuming a 20 year term at 1% interest.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table B-4.2
3RWW GI Project
Concept Commercial/Institutional GI Projects Permeable Pavement Summary - Regulator WV-CSO#2
West View
February 19, 2013

Total Combined Sewer Area 334.32 acres
 Total Annual Combined Sewer Area Runoff 124.77 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement		
	LBs_1343510	LBs_1343519	Totals
Subcatchment			
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.115	0.064	0.18
Number of Candidate GI Projects	3	3	6.00
Portion of Drainage Area Tributary to Concept GI Projects (acres)	4.53	0.69	5.22
Annual Combined Sewer Area Runoff Captured (MG)*	0.91	0.50	1.41
Combined Sewer Area Runoff Capture (%)**	0.8%	5.1%	1.1%
Opinion of Probable Cost****			
Construction Cost	\$ 55,000	\$ 31,000	\$ 86,000
O/M Cost (20 years)	\$ 3,000	\$ 2,000	\$ 5,000
Present Worth Cost***	\$ 57,000	\$ 31,000	\$ 88,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 2,000	\$ 45,000	\$ 47,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

***Present Worth calculated assuming a 20 year term at 1% interest.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX B
TABLES 5.1 & 5.2

Table B-5.1
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary - Regulator WV-CSO#1
West View
February 19, 2013

Total Combined Sewer Area 87.77 acres
 Total Annual Combined Sewer Area Runoff 24.00 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	LBs_1343553	Totals
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.57	0.57
Number of Candidate GI Projects	3	3
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.57	0.57
Annual Combined Sewer Area Runoff Captured (MG)**	0.48	0.48
Combined Sewer Area Runoff Capture (%)***	2.01%	2.01%
Opinion of Probable Cost*****		
Construction Cost	\$589,000	\$589,000
O/M Cost (20 years)	\$10,000	\$10,000
Present Worth Cost****	\$598,000	\$598,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,045,000	\$1,045,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table B-5.2
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary - Regulator WV-CSO#2
West View
February 19, 2013

Total Combined Sewer Area 334.32 acres
 Total Annual Combined Sewer Area Runoff 124.77 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*		
	LBs_1343510	LBs_1343519	Total
Subcatchment			
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	1.34	0.39	1.73
Number of Candidate GI Projects	16	2	18
Portion of Drainage Area Tributary to Concept GI Projects (acres)	1.34	0.39	1.73
Annual Combined Sewer Area Runoff Captured (MG)**	1.13	0.33	1.46
Combined Sewer Area Runoff Capture (%)***	1.00%	3.29%	1.17%
Opinion of Probable Cost****			
Construction Cost	\$1,382,000	\$398,000	\$1,780,000
O/M Cost (20 years)	\$24,000	\$7,000	\$31,000
Present Worth Cost****	\$1,404,000	\$405,000	\$1,809,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,045,000	\$1,048,000	\$1,046,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX B
TABLE 6

Table B-6
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary
West View
February 19, 2013

Total Combined Sewer Area 460.1 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 157.94 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement		
	WV-CSO#1	WV-CSO#2	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.022	0.179	0.20
Number of Candidate GI Projects	1	6	7
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.54	5.22	5.76
Annual Combined Sewer Area Runoff Captured (MG)*	0.18	1.41	1.58
Combined Sewer Area Runoff Capture (%)**	0.73%	1.1%	1.0%
Opinion of Probable Cost****			
Construction Cost	\$ 11,000	\$ 11,000	\$ 97,000
O/M Cost (20 years)	\$ 1,000	\$ 1,000	\$ 6,000
Present Worth Cost***	\$ 12,000	\$ 12,000	\$ 100,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 23,000	\$ 23,000	\$ 70,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each regulator. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the entire sewershed.

***Present Worth calculated assuming a 20 year term at 1% interest.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX B
TABLE 7

Table B-7
3RWW GI Project
Concept Commercial/Institutional GI Projects Green Roofs Summary
West View
February 19, 2013

Total Combined Sewer Area 460.1 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 157.94 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roofs*		
	WV-CSO#1	WV-CSO#2	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.57	1.73	2.30
Number of Candidate GI Projects	3	18	21
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.57	1.73	2.30
Annual Combined Sewer Area Runoff Captured (MG)**	0.48	1.46	1.94
Combined Sewer Area Runoff Capture (%)***	2.01%	1.17%	1.23%
Opinion of Probable Cost****			
Construction Cost	\$589,000	\$1,780,000	\$2,369,000
O/M Cost (20 years)	\$10,000	\$31,000	\$41,000
Present Worth Cost****	\$598,000	\$1,809,000	\$2,407,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,045,000	\$1,046,000	\$1,046,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each regulator. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the entire sewershed.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

**APPENDIX B
RAINWAYS
OUTPUT**

**APPENDIX B
RAINWAYS
OUTPUT
INFILTRATION
BMPs**

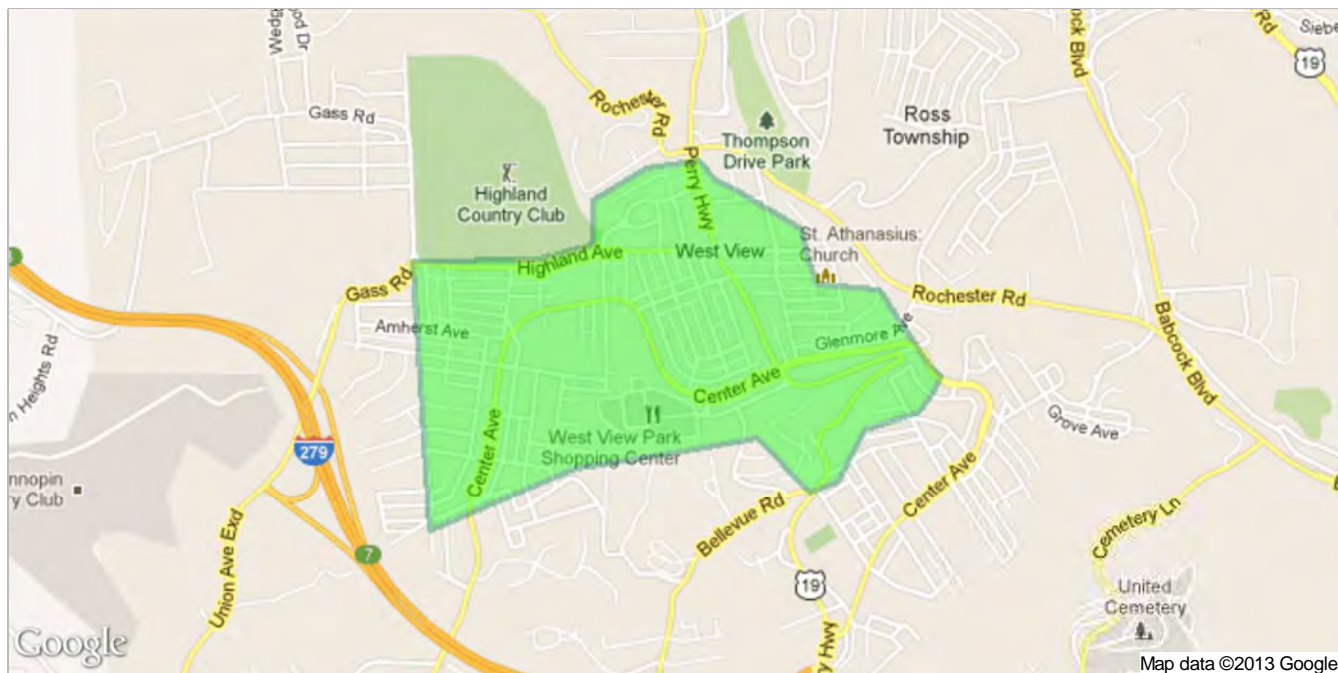
GR_LBs_1343510_BR (revised)

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 419.36 acres

Total project cost: \$409,000

Priority area ranking: Medium-High (5.73/10)

Design depth: 1 inches

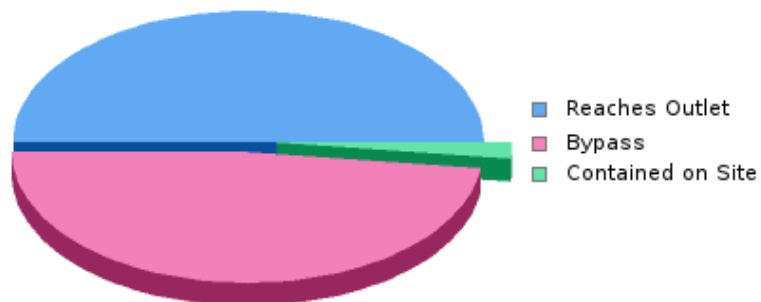
Total impervious area: 141.5 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343453); O-15-00 (LBs_1343463); O-15-00 (LBs_1343495); O-15-00 (LBs_1343507); A-67-00 (LBs_1343510); A-67-00 (LBs_1343511); A-67-00 (LBs_1343513); A-67-00 (LBs_1343519); A-67-00 (LBs_1343522); O-18-00 (LBs_1343527); A-67-00 (LBs_1343536); A-67-00 (LBs_1343547); A-67-00 (LBs_1343553); A-67-00 (LBs_1343556); A-67-00 (LBs_1343560); A-67-00 (LBs_1343562); O-18-00 (LBs_1343567); A-67-00 (LBs_1343578)

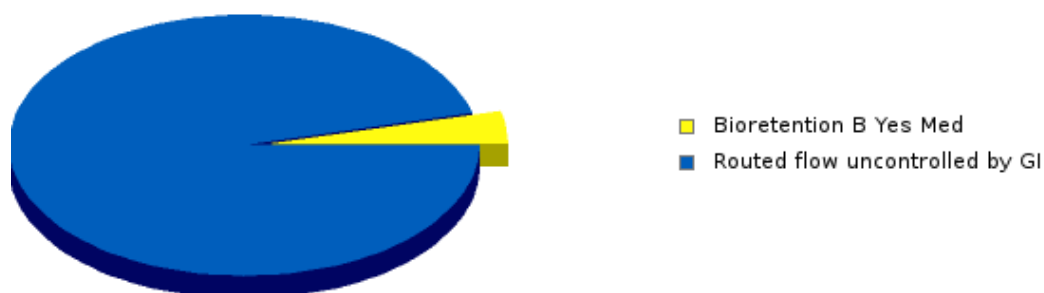
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	413.84 acre-ft
Total Reduction	3.8 %
Total Runoff Captured	15.84 acre-ft
Total Outlets	398 acre-ft















Sewershed Green Infrastructure Performance





This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.












Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
LBs_1343453	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	0.204	0.53	0% flow	
	Impervious-Mod	0.045	0.12	0% flow	
	Impervious-Low	0.086	0.22	0% flow	
	Pervious-Mod-C	0.797	0.13	0% flow	
	Pervious-Low-C	0.733	0.09	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
LBs_1343463	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	0.062	0.16	0% flow	
	Impervious-Mod	0.044	0.11	0% flow	
	Impervious-Low	0.041	0.1	0% flow	
	Pervious-High-C	0.02	0	0% flow	
	Pervious-Mod-C	2.013	0.33	0% flow	
	Pervious-Low-C	0.4	0.05	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
BMP Runoff Reduction			0 acre-ft		

	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343495	Pervious-High-C	0.483	0.09	0% flow	
	Pervious-Mod-C	1.349	0.22	0% flow	
	Pervious-Low-C	0.543	0.07	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
		Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres
LBs_1343507	Building	0.064	0.17	0% flow	
	Impervious-Mod	0.305	0.79	0% flow	
	Impervious-Low	0.629	1.59	0% flow	
	Pervious-Mod-C	0.082	0.01	0% flow	
	Pervious-Low-C	0.065	0.01	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			217,483 gallons (8 acre-in) 0.405 acres	
LBs_1343510	Building	51.516	133	4% flow	
	Impervious-High	2.443	6.36	0% flow	
	Impervious-Mod	30.881	79.72	8% flow	

	Impervious-Low	34.937	88.45	8% flow	
	Pervious-High-D	0.54	0.18	0% flow	
	Pervious-High-C	26.491	5.01	0% flow	
	Pervious-High-B	1.83	0.16	1% flow	
	Pervious-Mod-D	5.074	1.48	3% flow	
	Pervious-Mod-C	136.916	22.48	5% flow	
	Pervious-Mod-B	11.139	0.78	9% flow	
	Pervious-Low-D	5.781	1.37	0% flow	
	Pervious-Low-C	60.044	7.61	11% flow	
	Pervious-Low-B	2.929	0.69	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			4.56%	
	BMP Runoff Reduction			15.84 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Impervious-Mod	0.018	0.05	0% flow	
	Impervious-Low	0.016	0.04	0% flow	
LBs_1343511	Pervious-Mod-C	5.672	0.93	0% flow	
	Pervious-Low-C	4.036	0.51	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	

	BMP Runoff Reduction		0 acre-ft		
	Green Infrastructure Capacity		0 gallons (0 acre-in) 0 acres		
LBs_1343513	Building	0.361	0.93	0% flow	
	Impervious-Mod	0.259	0.67	0% flow	
	Impervious-Low	0.124	0.31	0% flow	
	Pervious-Mod-C	2.782	0.46	0% flow	
	Pervious-Low-C	0.332	0.04	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction		0 acre-ft		
	Green Infrastructure Capacity		0 gallons (0 acre-in) 0 acres		
LBs_1343519	Building	2.106	5.44	0% flow	
	Impervious-Mod	2.221	5.73	0% flow	
	Impervious-Low	0.766	1.94	0% flow	
	Pervious-High-D	0.147	0.05	0% flow	
	Pervious-High-C	1.144	0.22	0% flow	
	Pervious-High-B	0.93	0.08	0% flow	
	Pervious-Mod-D	0.429	0.13	0% flow	
	Pervious-Mod-C	1.142	0.19	0% flow	
	Pervious-Mod-B	6.264	0.44	0% flow	





	Pervious-Low-D	0.036	0.01	0% flow	
	Pervious-Low-C	1.355	0.17	0% flow	
	Pervious-Low-B	0.153	0.04	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343522	Building	0.157	0.41	0% flow	
	Impervious-Mod	0.088	0.23	0% flow	
	Impervious-Low	0.561	1.42	0% flow	
	Pervious-Mod-C	0.348	0.06	0% flow	
	Pervious-Low-C	0.56	0.07	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343527	Building	1.806	4.66	0% flow	
	Impervious-Mod	1.845	4.76	0% flow	
	Impervious-Low	0.978	2.48	0% flow	
	Pervious-High-C	1.2	0.23	0% flow	

	Pervious-Mod-C	7.716	1.27	0% flow	
	Pervious-Low-C	3.348	0.42	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343536	Building	0.359	0.93	0% flow	
	Impervious-Mod	0.378	0.98	0% flow	
	Impervious-Low	0.449	1.14	0% flow	
	Pervious-Mod-B	1.238	0.09	0% flow	
	Pervious-Low-B	0.575	0.14	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343547	Impervious-Mod	0.055	0.14	0% flow	
	Impervious-Low	0.126	0.32	0% flow	
	Pervious-Mod-B	0.094	0.01	0% flow	
	Pervious-Low-B	0.076	0.02	0% flow	
	Design Depth			1 inches	

	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	1.529	3.95	0% flow	
	Impervious-Mod	0.468	1.21	0% flow	
	Impervious-Low	0.813	2.06	0% flow	
	Pervious-High-C	0.013	0	0% flow	
	Pervious-High-B	0.135	0.01	0% flow	
LBs_1343553	Pervious-Mod-C	0.498	0.08	0% flow	
	Pervious-Mod-B	1.917	0.13	0% flow	
	Pervious-Low-C	0.139	0.02	0% flow	
	Pervious-Low-B	2.385	0.56	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	0.879	2.27	0% flow	
LBs_1343556	Impervious-High	0.101	0.26	0% flow	
	Impervious-Mod	0.534	1.38	0% flow	
	Impervious-Low	0.457	1.16	0% flow	

	Pervious-High-C	0.383	0.07	0% flow	
	Pervious-High-B	0.054	0	0% flow	
	Pervious-Mod-C	1.378	0.23	0% flow	
	Pervious-Mod-B	2.053	0.14	0% flow	
	Pervious-Low-C	0.632	0.08	0% flow	
	Pervious-Low-B	0.238	0.06	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Impervious-Mod	0.031	0.08	0% flow	
	Impervious-Low	0.046	0.12	0% flow	
	Pervious-High-C	2.518	0.48	0% flow	
	Pervious-High-B	0.101	0.01	0% flow	
LBs_1343560	Pervious-Mod-C	2.305	0.38	0% flow	
	Pervious-Mod-B	0.25	0.02	0% flow	
	Pervious-Low-C	0.067	0.01	0% flow	
	Pervious-Low-B	0.181	0.04	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	

	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343562	Building	0.167	0.43	0% flow	
	Impervious-Mod	0.148	0.38	0% flow	
	Pervious-High-C	0.245	0.05	0% flow	
	Pervious-Mod-C	5.484	0.9	0% flow	
	Pervious-Low-C	0.603	0.08	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343567	Building	0.782	2.02	0% flow	
	Impervious-Mod	1.156	2.98	0% flow	
	Impervious-Low	0.148	0.37	0% flow	
	Pervious-Mod-C	4.928	0.81	0% flow	
	Pervious-Low-C	0.496	0.06	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
LBs_1343578	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	

Impervious-Mod	0.041	0.11	0% flow	
Impervious-Low	0.237	0.6	0% flow	
Pervious-Mod-C	0.174	0.03	0% flow	
Pervious-Low-C	0.132	0.02	0% flow	
Design Depth	1 inches			
Percent BMP Effectiveness	0%			
BMP Runoff Reduction	0 acre-ft			

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343453	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343463	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343495	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343507	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343510	Bioretention B Yes Med	\$387,800	\$21,300	20	\$409,100
LBs_1343511	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343513	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343519	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343522	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343527	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343536	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343547	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343553	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343556	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343560	Bioretention B Yes Med	<\$100	<\$100	20	<\$100

LBs_1343562	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343567	Bioretention B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343578	Bioretention B Yes Med	<\$100	<\$100	20	<\$100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343453	Bioretention B Yes Med	\$0	\$0	20
LBs_1343463	Bioretention B Yes Med	\$0	\$0	20
LBs_1343495	Bioretention B Yes Med	\$0	\$0	20
LBs_1343507	Bioretention B Yes Med	\$0	\$0	20
LBs_1343510	Bioretention B Yes Med	\$22.01	\$0.06	20
LBs_1343511	Bioretention B Yes Med	\$0	\$0	20
LBs_1343513	Bioretention B Yes Med	\$0	\$0	20
LBs_1343519	Bioretention B Yes Med	\$0	\$0	20
LBs_1343522	Bioretention B Yes Med	\$0	\$0	20
LBs_1343527	Bioretention B Yes Med	\$0	\$0	20
LBs_1343536	Bioretention B Yes Med	\$0	\$0	20
LBs_1343547	Bioretention B Yes Med	\$0	\$0	20

LBs_1343553	Bioretention B Yes Med	\$0	\$0	20
LBs_1343556	Bioretention B Yes Med	\$0	\$0	20
LBs_1343560	Bioretention B Yes Med	\$0	\$0	20
LBs_1343562	Bioretention B Yes Med	\$0	\$0	20
LBs_1343567	Bioretention B Yes Med	\$0	\$0	20
LBs_1343578	Bioretention B Yes Med	\$0	\$0	20

Project BMP Routing

Outlets

LBs_1343453

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343463

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343495

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343507

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343510

Bioretention B Yes Med Effluent: 5 acre-ft

LBs_1343511

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343513

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343519

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343522

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343527

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343536

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343547

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343553

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343556

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343560

Bioretention B Yes Med Effluent: 0 acre-ft

LBs_1343562

Bioretention B Yes Med Effluent: 0 acre-ft

LBS_1343567

Bioretention B Yes Med Effluent: 0 acre-ft

LBS_1343578

Bioretention B Yes Med Effluent: 0 acre-ft

GR_LBs_1343513_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 8.31 acres

Total project cost: \$20,000

Priority area ranking: Medium-Medium (5.47/10)

Design depth: 1 inches

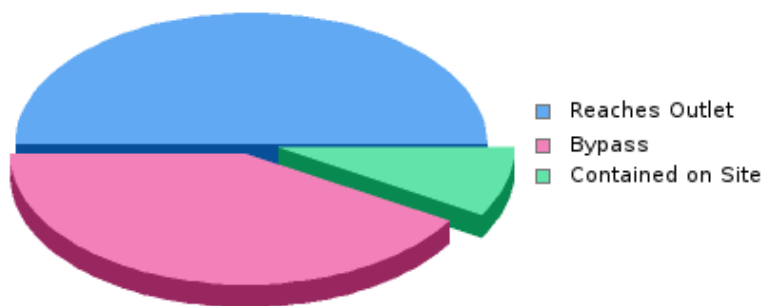
Total impervious area: 1.6 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343513)

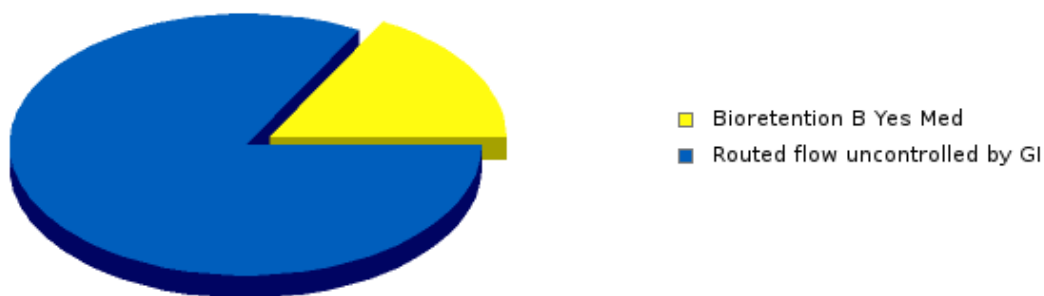
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	5.2 acre-ft
Total Reduction	14.6 %
Total Runoff Captured	0.76 acre-ft
Total Outlets	4.44 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)
LBs_1343513	Green Infrastructure Capacity			10,398 gallons (0.4 acre-in) 0.019 acres

Building	0.839	2.17	18% flow	
Impervious-High	0.145	0.38	0% flow	
Impervious-Mod	0.473	1.22	11% flow	
Impervious-Low	0.124	0.31	91% flow	
Pervious-High-C	1.272	0.24	0% flow	
Pervious-Mod-C	5.089	0.84	21% flow	
Pervious-Low-C	0.366	0.05	25% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			14.56%	
BMP Runoff Reduction			0.76 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343513	Bioretention B Yes Med	\$18,500	\$1,000	20	\$19,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343513	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343513

Bioretention B Yes Med Effluent: 0.2 acre-ft

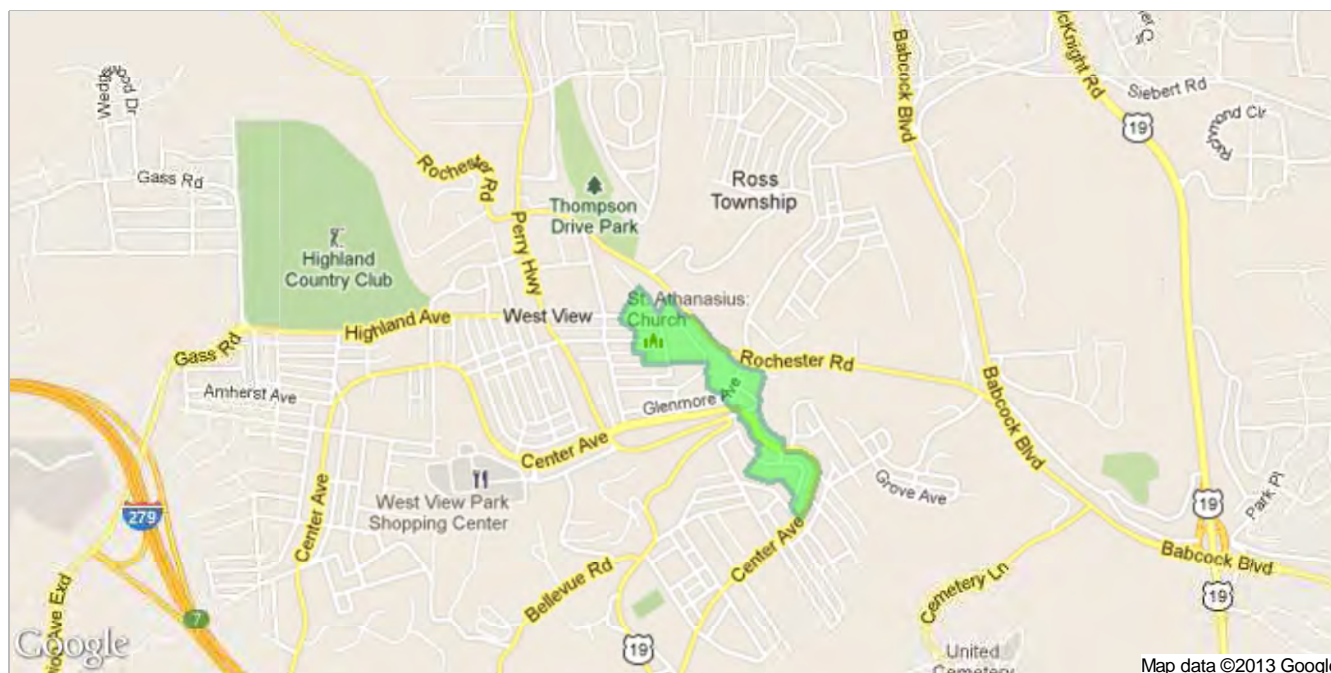
GR_LBs_1343519_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 36.62 acres

Total project cost: \$146,000

Priority area ranking: Medium-High (5.77/10)

Design depth: 1 inches

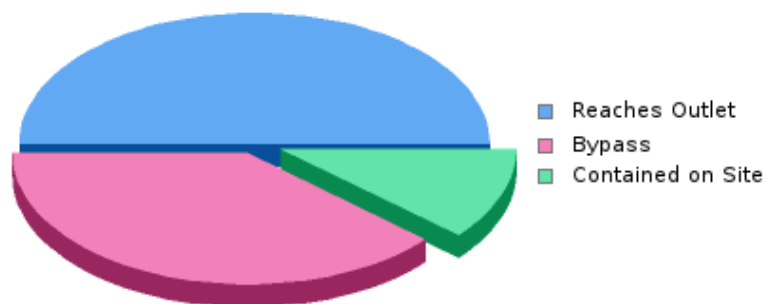
Total impervious area: 10.2 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343519)

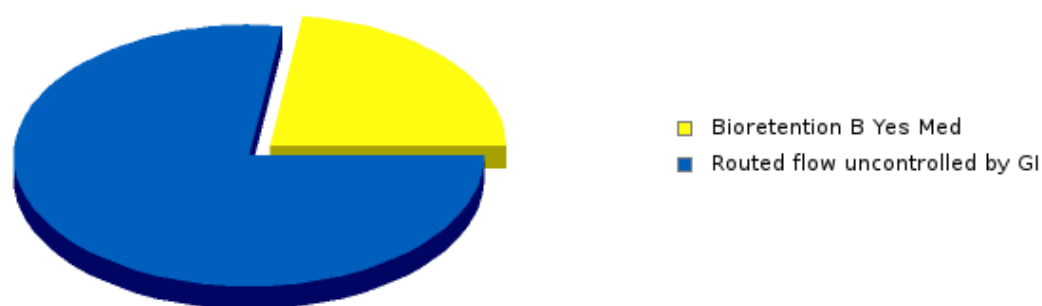
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	30.4 acre-ft
Total Reduction	18.6 %
Total Runoff Captured	5.64 acre-ft
Total Outlets	24.75 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			77,471 gallons (2.9 acre-in) 0.144 acres	
	Building	4.257	10.99	14% flow	
	Impervious-High	0.372	0.97	11% flow	
	Impervious-Mod	3.963	10.23	47% flow	
	Impervious-Low	1.632	4.13	12% flow	
	Pervious-High-D	1.37	0.45	0% flow	
	Pervious-High-C	3.892	0.74	3% flow	
	Pervious-High-B	1.413	0.12	1% flow	
LBs_1343519	Pervious-Mod-D	2.748	0.8	21% flow	
	Pervious-Mod-C	4.278	0.7	2% flow	
	Pervious-Mod-B	9.14	0.64	30% flow	
	Pervious-Low-D	1.285	0.3	19% flow	
	Pervious-Low-C	1.98	0.25	3% flow	
	Pervious-Low-B	0.287	0.07	21% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			18.56%	
	BMP Runoff Reduction			5.64 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343519	Bioretention B Yes Med	\$138,100	\$7,600	20	\$145,700

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343519	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343519

Bioretention B Yes Med Effluent: 1.8 acre-ft

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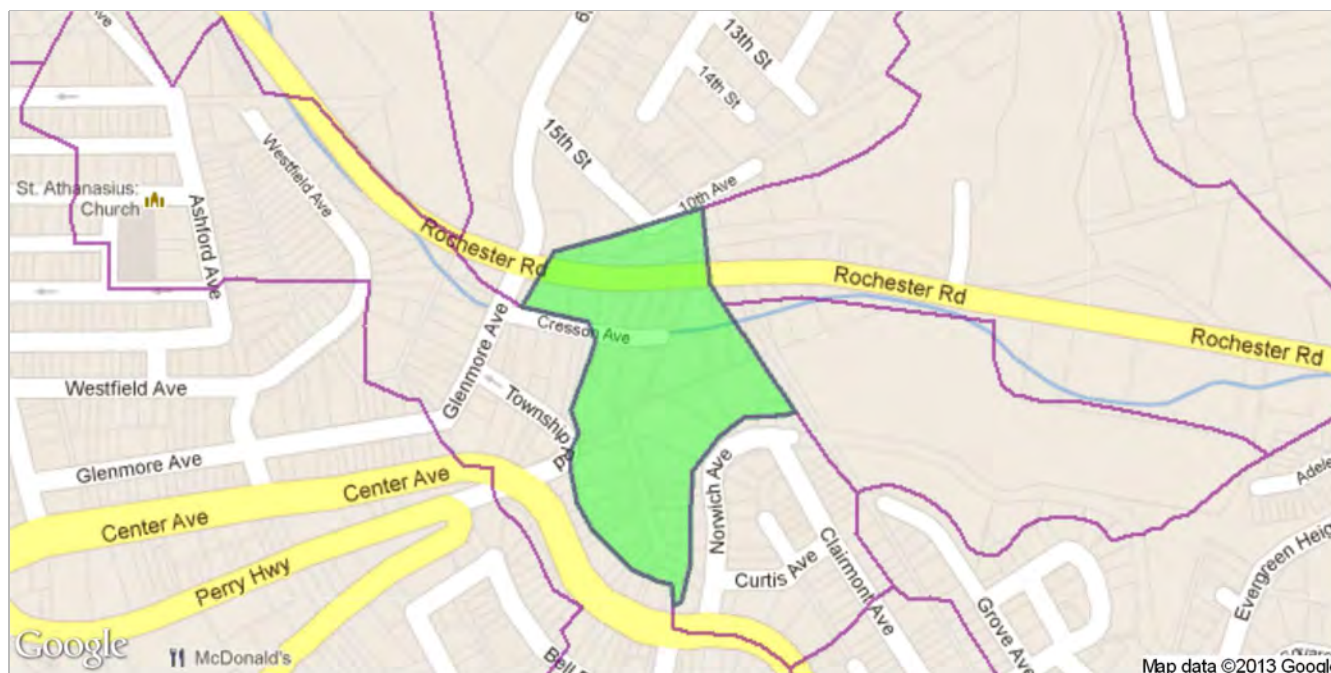
GR_LBs_1343529_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 11.53 acres

Total project cost: \$23,000

Priority area ranking: Medium-Medium (5.45/10)

Design depth: 1 inches

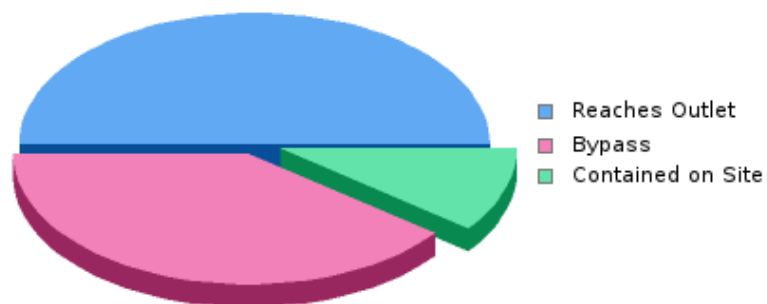
Total impervious area: 1.3 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343529)

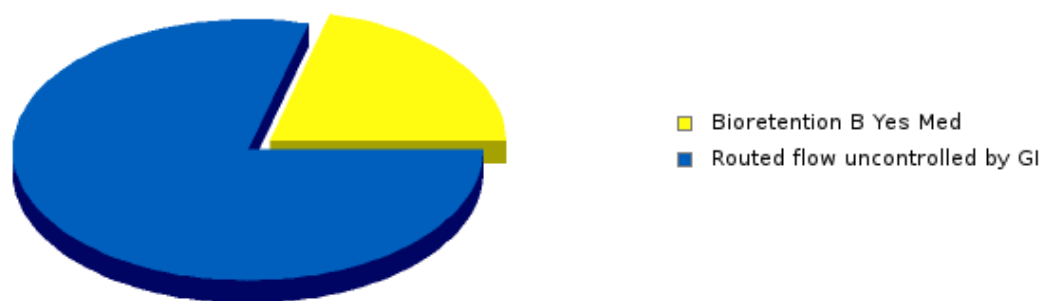
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	5.18 acre-ft
Total Reduction	17.3 %
Total Runoff Captured	0.9 acre-ft
Total Outlets	4.29 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			12,289 gallons (0.5 acre-in) 0.023 acres	
	Building	0.417	1.08	16% flow	
	Impervious-High	0.13	0.34	37% flow	
	Impervious-Mod	0.379	0.98	31% flow	
	Impervious-Low	0.386	0.98	58% flow	
	Pervious-High-D	0.715	0.23	1% flow	
	Pervious-High-C	2.784	0.53	0% flow	
	Pervious-High-B	2.315	0.2	0% flow	
LBs_1343529	Pervious-Mod-D	1.407	0.41	2% flow	
	Pervious-Mod-C	0.735	0.12	0% flow	
	Pervious-Mod-B	1.295	0.09	0% flow	
	Pervious-Low-D	0.764	0.18	0% flow	
	Pervious-Low-C	0.02	0	0% flow	
	Pervious-Low-B	0.185	0.04	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			17.27%	
	BMP Runoff Reduction			0.9 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343529	Bioretention B Yes Med	\$21,900	\$1,200	20	\$23,100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343529	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343529

Bioretention B Yes Med Effluent: 0.3 acre-ft

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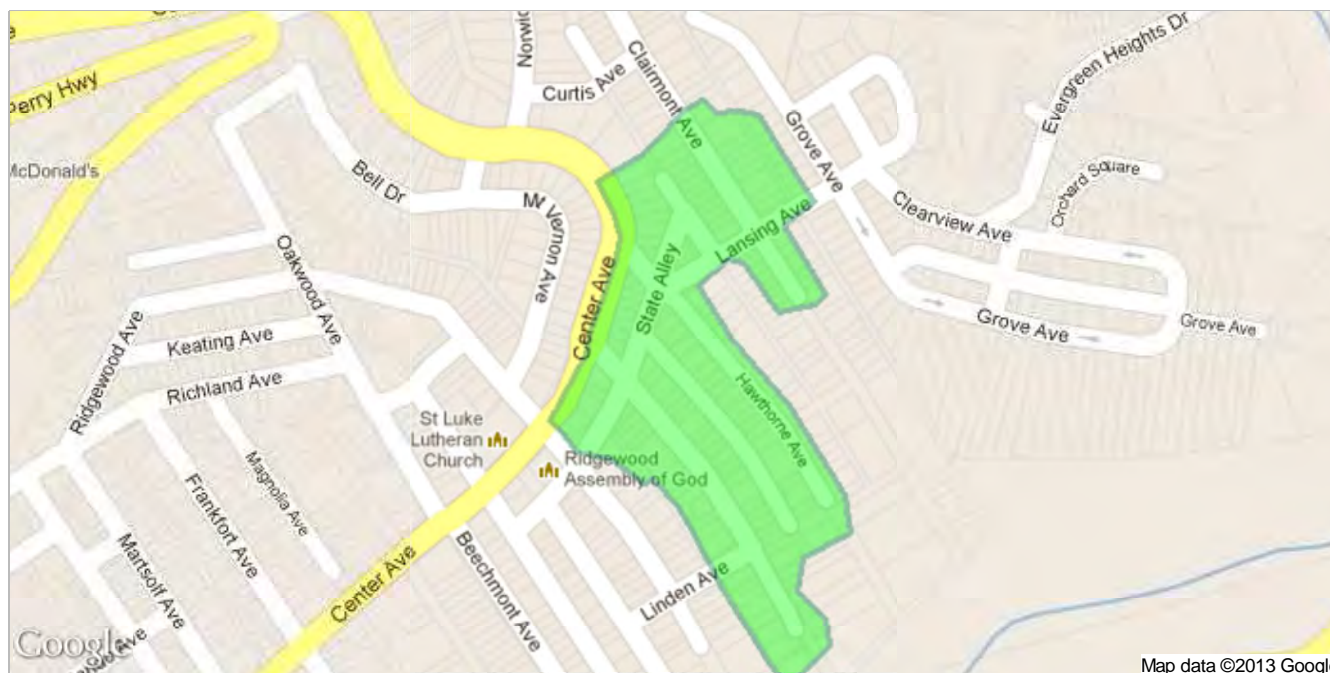
GR_LBs_1343547_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 19.33 acres

Total project cost: \$13,000

Priority area ranking: Medium-Medium (5.38/10)

Design depth: 1 inches

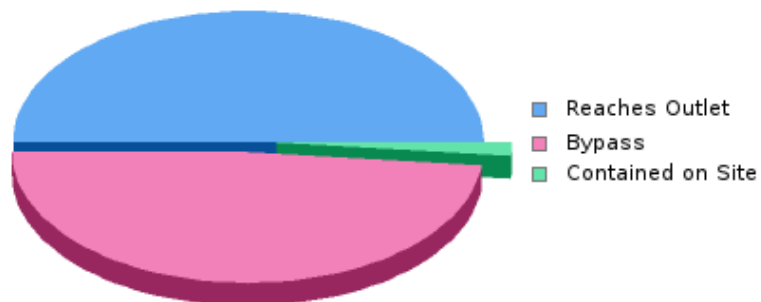
Total impervious area: 5.5 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343547)

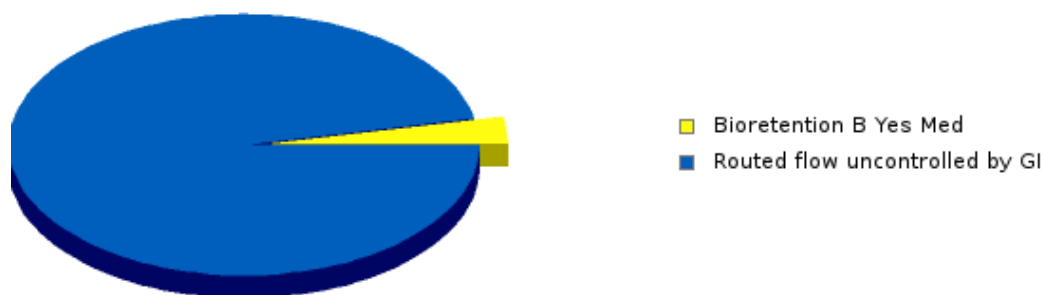
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution











Relative GI Reduction of Runoff



Total Runoff pre-BMP	15.47 acre-ft
Total Reduction	3.2 %
Total Runoff Captured	0.49 acre-ft
Total Outlets	14.98 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			6,697 gallons (0.2 acre-in) 0.012 acres	
	Building	2.487	6.42	2% flow	
	Impervious-High	0.19	0.49	0% flow	
	Impervious-Mod	2.23	5.76	5% flow	
	Impervious-Low	0.577	1.46	14% flow	
LBs_1343547	Pervious-High-B	1.63	0.14	0% flow	
	Pervious-Mod-C	0.14	0.02	0% flow	
	Pervious-Mod-B	10.139	0.71	3% flow	
	Pervious-Low-B	1.935	0.46	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			3.15%	
	BMP Runoff Reduction			0.49 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343547	Bioretention B Yes Med	\$11,900	\$700	20	\$12,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1343547	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBS_1343547

Bioretention B Yes Med Effluent: 0.2 acre-ft

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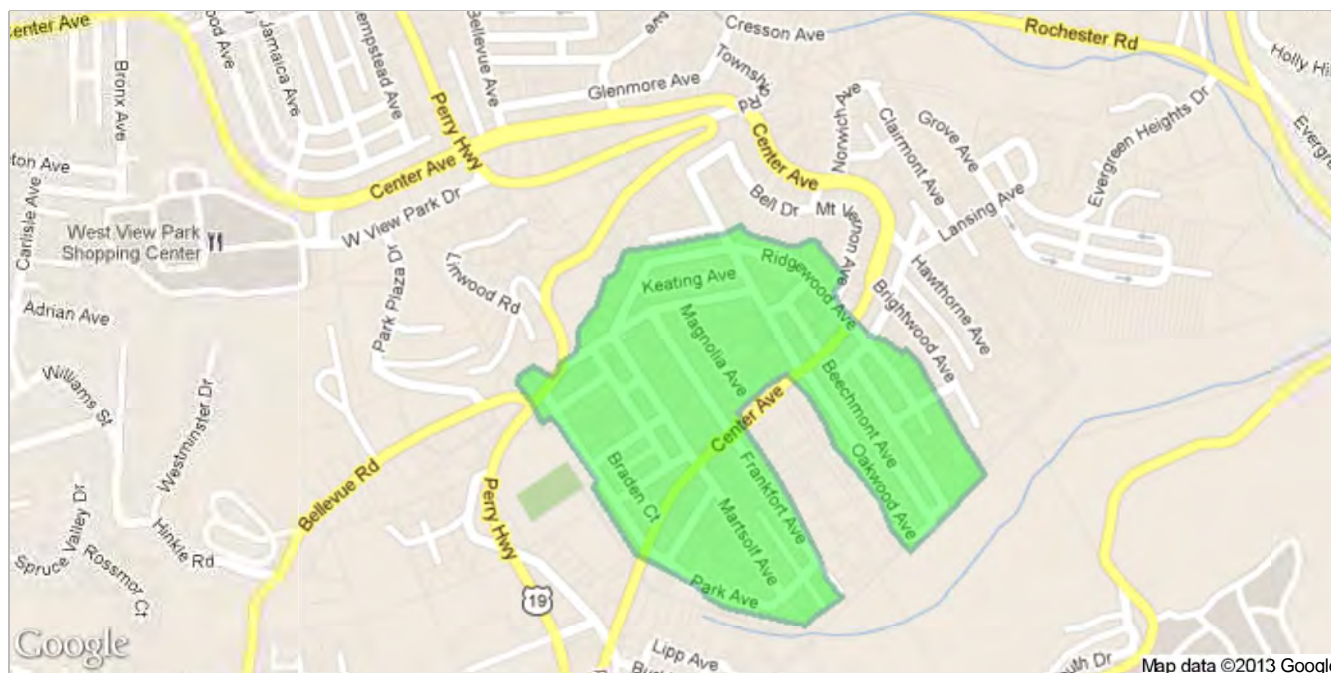
GR_LBs_1343553_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 87.77 acres

Total project cost: \$93,000

Priority area ranking: Medium-High (5.78/10)

Design depth: 1 inches

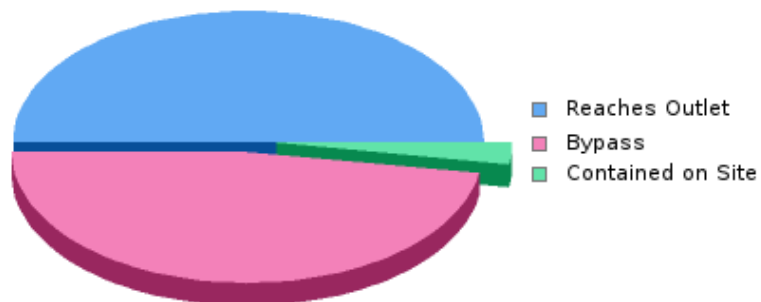
Total impervious area: 25.9 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343553)

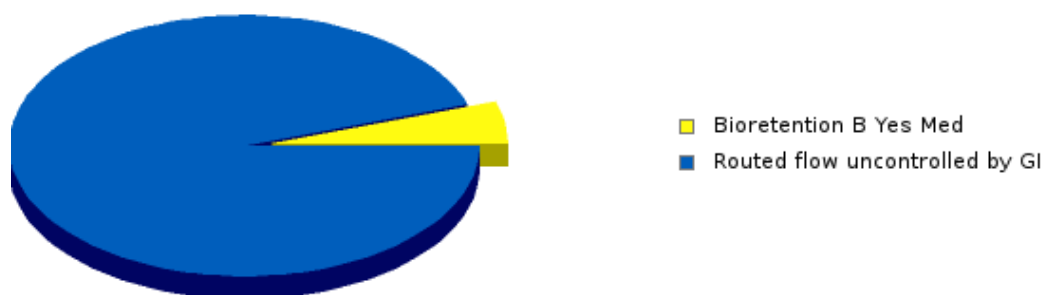
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	73.65 acre-ft
Total Reduction	4.9 %
Total Runoff Captured	3.61 acre-ft
Total Outlets	70.04 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			49,560 gallons (1.8 acre-in) 0.092 acres	
	Building	12.962	33.46	4% flow	
	Impervious-High	1.136	2.96	0% flow	
	Impervious-Mod	8.268	21.35	5% flow	
	Impervious-Low	3.5	8.86	22% flow	
	Pervious-High-C	2.361	0.45	0% flow	
LBs_1343553	Pervious-High-B	6.301	0.55	0% flow	
	Pervious-Mod-C	7.967	1.31	0% flow	
	Pervious-Mod-B	35.372	2.48	3% flow	
	Pervious-Low-C	0.869	0.11	1% flow	
	Pervious-Low-B	9.037	2.14	15% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			4.9%	
	BMP Runoff Reduction			3.61 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343553	Bioretention B Yes Med	\$88,400	\$4,900	20	\$93,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343553	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343553

Bioretention B Yes Med Effluent: 1.1 acre-ft

**APPENDIX B
RAINWAYS
OUTPUT
PERMEABLE
PAVEMENT**

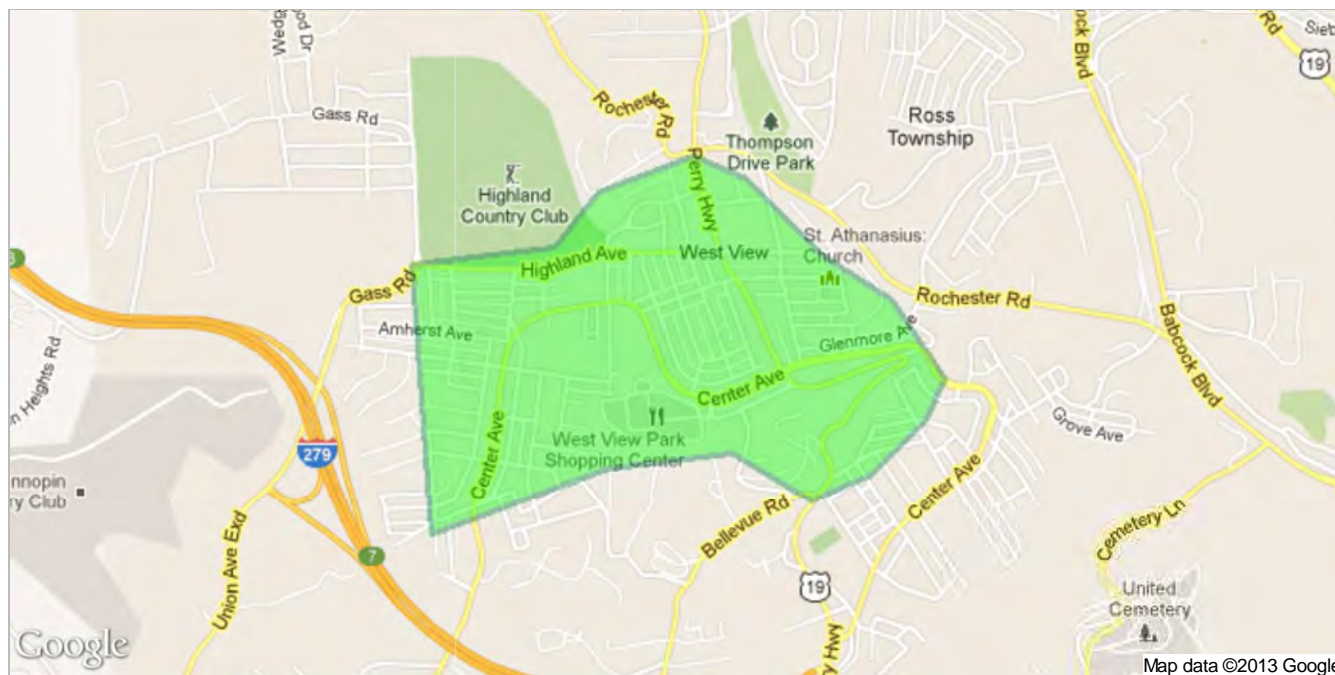
GR_LBs_1343510_PP_revised

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 458.21 acres

Total project cost: \$509,000

Priority area ranking: Medium-High (5.7/10)

Design depth: 1 inches

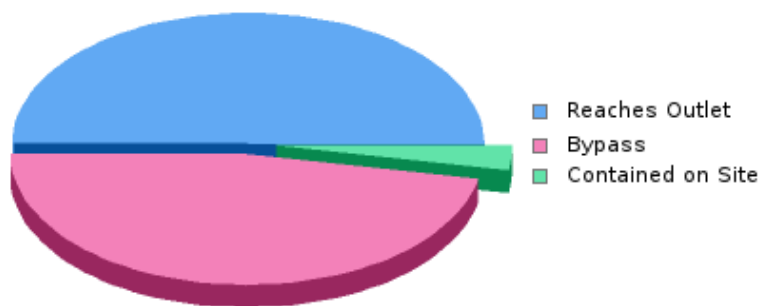
Total impervious area: 151.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343453); O-15-00 (LBs_1343463); O-15-00 (LBs_1343495); O-15-00 (LBs_1343507); A-67-00 (LBs_1343510); A-67-00 (LBs_1343511); A-67-00 (LBs_1343513); A-67-00 (LBs_1343519); A-67-00 (LBs_1343522); O-18-00 (LBs_1343527); A-67-00 (LBs_1343536); A-67-00 (LBs_1343547); A-67-00 (LBs_1343553); A-67-00 (LBs_1343556); A-67-00 (LBs_1343560); A-67-00 (LBs_1343562); O-18-00 (LBs_1343567); A-67-00 (LBs_1343578)

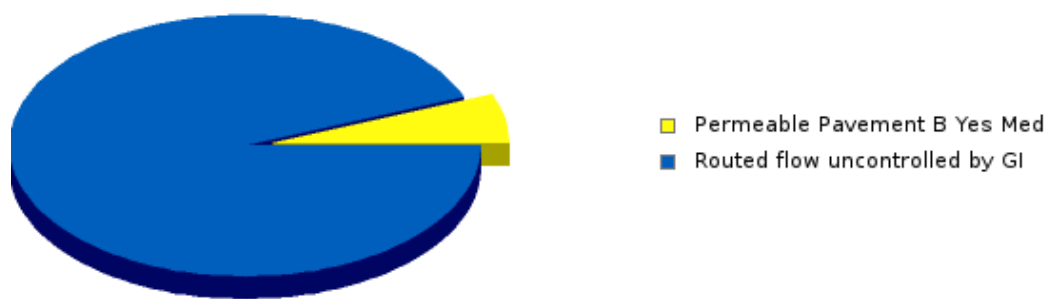
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff













Total Runoff pre-BMP	443.05 acre-ft
Total Reduction	5.7 %
Total Runoff Captured	25.25 acre-ft
Total Outlets	417.8 acre-ft





Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343453	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres


	Building	0.501	1.29	0% flow	
	Impervious-Mod	0.167	0.43	0% flow	
	Impervious-Low	0.086	0.22	0% flow	
	Pervious-Mod-C	2.816	0.46	0% flow	
	Pervious-Low-C	0.882	0.11	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343463	Building	0.189	0.49	0% flow	
	Impervious-Mod	0.052	0.13	0% flow	
	Impervious-Low	0.093	0.24	0% flow	
	Pervious-High-C	0.06	0.01	0% flow	
	Pervious-Mod-C	2.153	0.35	0% flow	
	Pervious-Low-C	0.839	0.11	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343495	Pervious-High-C	0.989	0.19	0% flow	
	Pervious-Mod-C	3.532	0.58	0% flow	
	Pervious-Low-C	0.913	0.12	0% flow	


	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343507	Building	0.064	0.17	0% flow	
	Impervious-Mod	0.312	0.81	0% flow	
	Impervious-Low	0.642	1.63	0% flow	
	Pervious-Mod-C	0.135	0.02	0% flow	
	Pervious-Low-C	0.075	0.01	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			291,079 gallons (10.7 acre-in) 1.045 acres	
LBs_1343510	Building	51.516	133	6% flow	
	Impervious-High	2.443	6.36	0% flow	
	Impervious-Mod	30.881	79.72	8% flow	
	Impervious-Low	34.937	88.45	13% flow	
	Pervious-High-D	0.54	0.18	0% flow	
	Pervious-High-C	26.491	5.01	0% flow	
	Pervious-High-B	1.83	0.16	0% flow	
	Pervious-Mod-D	5.074	1.48	0% flow	


	Pervious-Mod-C	136.916	22.48	5% flow	
	Pervious-Mod-B	11.139	0.78	0% flow	
	Pervious-Low-D	5.781	1.37	1% flow	
	Pervious-Low-C	60.044	7.61	12% flow	
	Pervious-Low-B	2.929	0.69	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			7.27%	
	BMP Runoff Reduction			25.25 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343511	Impervious-Mod	0.018	0.05	0% flow	
	Impervious-Low	0.016	0.04	0% flow	
	Pervious-Mod-C	5.686	0.93	0% flow	
	Pervious-Low-C	4.128	0.52	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343513	Building	0.389	1	0% flow	
	Impervious-Mod	0.316	0.82	0% flow	
	Impervious-Low	0.124	0.31	0% flow	
	Pervious-Mod-C	2.814	0.46	0% flow	
	Pervious-Low-C	0.332	0.04	0% flow	

Design Depth				1 inches
Percent BMP Effectiveness				0%
BMP Runoff Reduction				0 acre-ft


Green Infrastructure Capacity				0 gallons (0 acre-in) 0 acres
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Building	2.836	7.32		0% flow	
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Impervious-High	0.013	0.03		0% flow	
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Impervious-Mod	2.828	7.3		0% flow	
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Impervious-Low	0.99	2.51		0% flow	
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Pervious-High-D	0.153	0.05		0% flow	
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Pervious-High-C	2.056	0.39		0% flow	
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Pervious-High-B	0.95	0.08		0% flow	
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LBs_1343519


Pervious-Mod-D	0.579	0.17		0% flow	
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Pervious-Mod-C	2.573	0.42		0% flow	
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Pervious-Mod-B	6.692	0.47		0% flow	
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Pervious-Low-D	0.046	0.01		0% flow	
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Pervious-Low-C	1.97	0.25		0% flow	
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Pervious-Low-B	0.17	0.04		0% flow	
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Design Depth				1 inches
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Percent BMP Effectiveness				0%
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BMP Runoff Reduction				0 acre-ft
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Green Infrastructure Capacity				0 gallons (0 acre-in) 0 acres
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LBs_1343522


Building	0.405	1.05		0% flow	
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	Impervious-Mod	0.088	0.23	0% flow	
	Impervious-Low	0.679	1.72	0% flow	
	Pervious-Mod-C	0.351	0.06	0% flow	
	Pervious-Low-C	0.7	0.09	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343527	Building	2.215	5.72	0% flow	
	Impervious-Mod	2.118	5.47	0% flow	
	Impervious-Low	1.247	3.16	0% flow	
	Pervious-High-C	1.202	0.23	0% flow	
	Pervious-Mod-C	11.413	1.87	0% flow	
	Pervious-Low-C	3.814	0.48	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343536	Building	0.359	0.93	0% flow	
	Impervious-Mod	0.378	0.98	0% flow	
	Impervious-Low	0.449	1.14	0% flow	
	Pervious-Mod-B	1.238	0.09	0% flow	

	Pervious-Low-B	0.575	0.14	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343547	Impervious-Mod	0.055	0.14	0% flow	
	Impervious-Low	0.126	0.32	0% flow	
	Pervious-Mod-B	0.094	0.01	0% flow	
	Pervious-Low-B	0.076	0.02	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343553	Building	2.75	7.1	0% flow	
	Impervious-High	0.334	0.87	0% flow	
	Impervious-Mod	1.108	2.86	0% flow	
	Impervious-Low	1.37	3.47	0% flow	
	Pervious-High-C	0.017	0	0% flow	
	Pervious-High-B	1.33	0.12	0% flow	
	Pervious-Mod-C	0.541	0.09	0% flow	
	Pervious-Mod-B	4.453	0.31	0% flow	
	Pervious-Low-C	0.151	0.02	0% flow	

	Pervious-Low-B	3.626	0.86	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	1.386	3.58	0% flow	
	Impervious-High	0.677	1.76	0% flow	
	Impervious-Mod	1.83	4.72	0% flow	
	Impervious-Low	0.67	1.7	0% flow	
	Pervious-High-C	1.161	0.22	0% flow	
	Pervious-High-B	0.59	0.05	0% flow	
LBs_1343556	Pervious-Mod-C	1.64	0.27	0% flow	
	Pervious-Mod-B	3.995	0.28	0% flow	
	Pervious-Low-C	0.711	0.09	0% flow	
	Pervious-Low-B	0.435	0.1	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Impervious-Mod	0.161	0.42	0% flow	
LBs_1343560	Impervious-Low	0.057	0.14	0% flow	
	Pervious-High-C	2.665	0.5	0% flow	

	Pervious-High-B	0.104	0.01	0% flow	
	Pervious-Mod-C	5.019	0.82	0% flow	
	Pervious-Mod-B	0.256	0.02	0% flow	
	Pervious-Low-C	0.379	0.05	0% flow	
	Pervious-Low-B	0.373	0.09	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343562	Building	0.271	0.7	0% flow	
	Impervious-Mod	0.225	0.58	0% flow	
	Impervious-Low	0.051	0.13	0% flow	
	Pervious-High-C	0.255	0.05	0% flow	
	Pervious-Mod-C	8.157	1.34	0% flow	
	Pervious-Low-C	2.279	0.29	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343567	Building	0.782	2.02	0% flow	
	Impervious-Mod	1.156	2.98	0% flow	
	Impervious-Low	0.148	0.37	0% flow	

	Pervious-Mod-C	4.928	0.81	0% flow	
	Pervious-Low-C	0.496	0.06	0% flow	
	Design Depth				1 inches
	Percent BMP Effectiveness				0%
	BMP Runoff Reduction				0 acre-ft
	Green Infrastructure Capacity				0 gallons (0 acre-in) 0 acres
	Impervious-Mod	0.061	0.16	0% flow	
	Impervious-Low	0.509	1.29	0% flow	
LBs_1343578	Pervious-Mod-C	0.22	0.04	0% flow	
	Pervious-Low-C	0.297	0.04	0% flow	
	Design Depth				1 inches
	Percent BMP Effectiveness				0%
	BMP Runoff Reduction				0 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343453	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343463	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343495	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343507	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343510	Permeable Pavement B Yes Med	\$495,100	\$14,100	20	\$509,200
LBs_1343511	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100

LBs_1343513	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343519	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343522	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343527	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343536	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343547	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343553	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343556	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343560	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343562	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343567	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343578	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
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LBs_1343453	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343463	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343495	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343507	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343510	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
LBs_1343511	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343513	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343519	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343522	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343527	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343536	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343547	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343553	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343556	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343560	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343562	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343567	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343578	Permeable Pavement B Yes Med	\$0	\$0	20

Project BMP Routing

Outlets

LBs_1343453

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343463

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343495

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343507

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343510

Permeable Pavement B Yes Med Effluent: 2.7 acre-ft

LBS_1343511

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343513

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343519

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343522

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343527

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343536

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343547

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343553

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343556

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343560

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343562

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343567

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343578

Permeable Pavement B Yes Med Effluent: 0 acre-ft

GR_LBs_1343513_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting

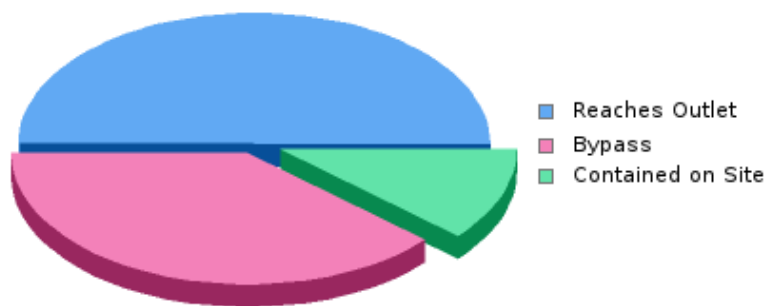


Site Characteristics

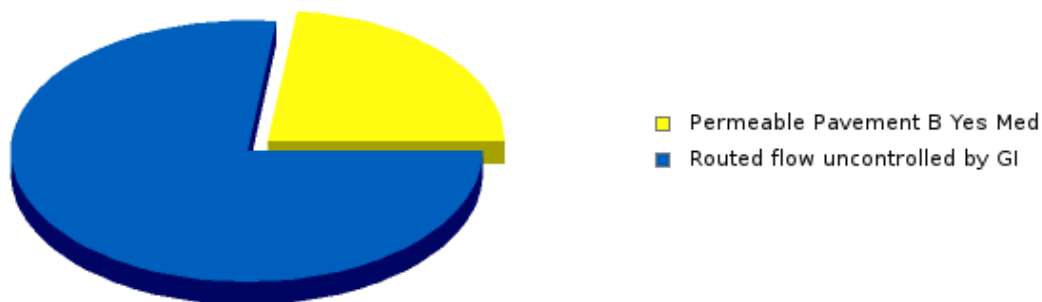
- Project size: 8.31 acres
- Total project cost: \$20,000
- Priority area ranking: Medium-Medium (5.47/10)
- Design depth: 1 inches
- Total impervious area: 1.6 acres
- POC(s)/Regulator(s): A-67-00 (LBs_1343513)
- Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	5.2 acre-ft
Total Reduction	18.7 %
Total Runoff Captured	0.97 acre-ft
Total Outlets	4.23 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343513	Green Infrastructure Capacity			11,216 gallons (0.4 acre-in) 0.04 acres

Building	0.839	2.17	18% flow	
Impervious-High	0.145	0.38	0% flow	
Impervious-Mod	0.473	1.22	16% flow	
Impervious-Low	0.124	0.31	98% flow	
Pervious-High-C	1.272	0.24	0% flow	
Pervious-Mod-C	5.089	0.84	21% flow	
Pervious-Low-C	0.366	0.05	15% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			18.71%	
BMP Runoff Reduction			0.97 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343513	Permeable Pavement B Yes Med	\$19,100	\$500	20	\$19,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343513	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343513

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

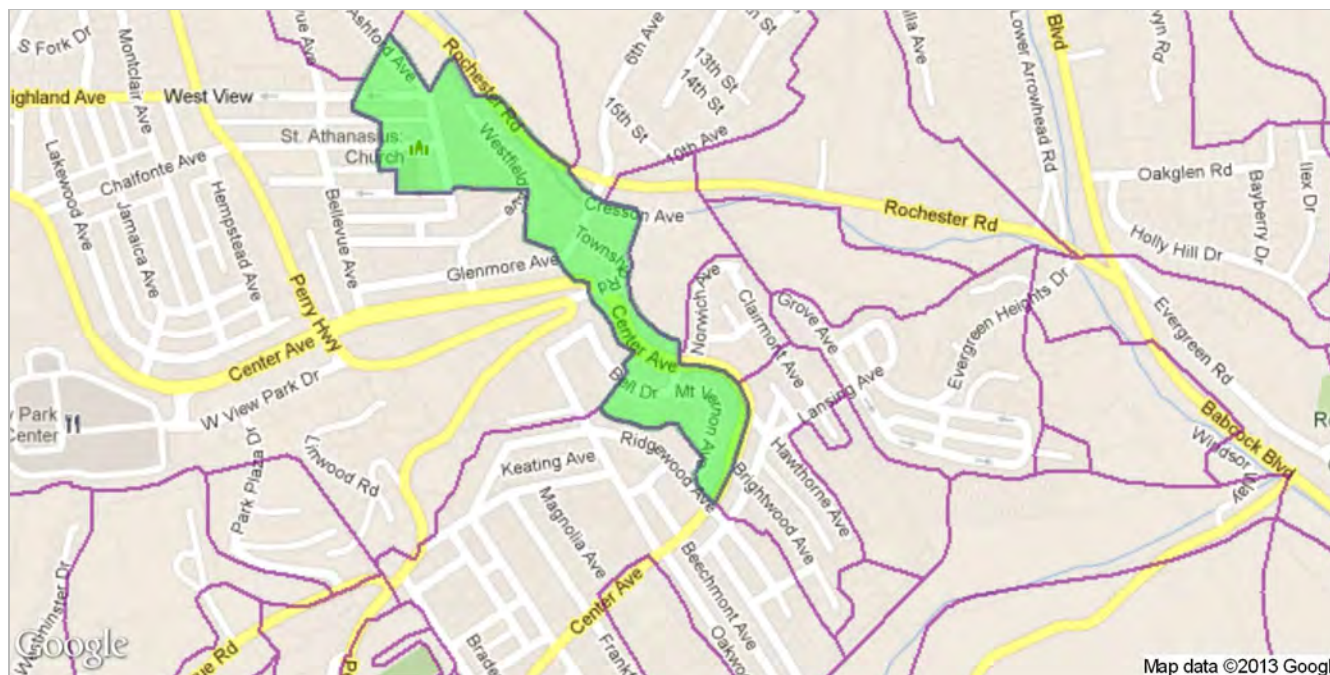
GR_LBs_1343519_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 36.62 acres

Total project cost: \$55,000

Priority area ranking: Medium-High (5.77/10)

Design depth: 1 inches

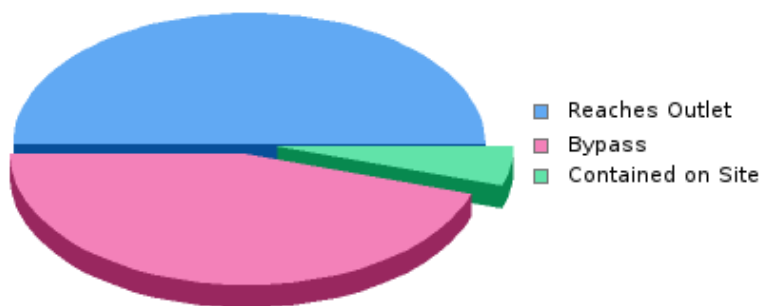
Total impervious area: 10.2 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343519)

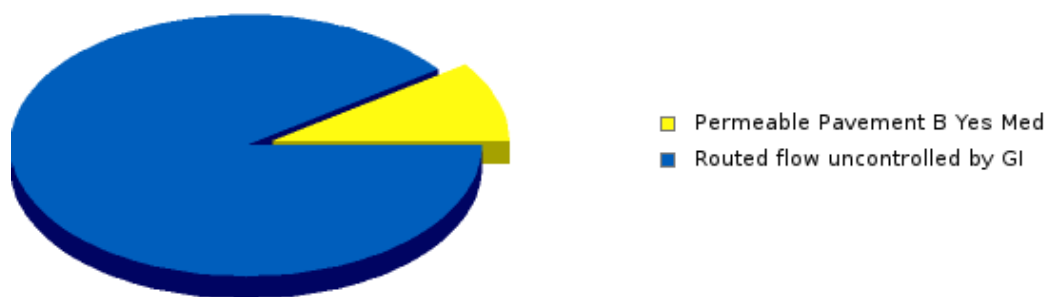
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	30.4 acre-ft
Total Reduction	9 %
Total Runoff Captured	2.72 acre-ft
Total Outlets	27.68 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343519	Green Infrastructure Capacity			31,371 gallons (1.2 acre-in) 0.113 acres

Building	4.257	10.99	5% flow	
Impervious-High	0.372	0.97	2% flow	
Impervious-Mod	3.963	10.23	16% flow	
Impervious-Low	1.632	4.13	16% flow	
Pervious-High-D	1.37	0.45	0% flow	
Pervious-High-C	3.892	0.74	0% flow	
Pervious-High-B	1.413	0.12	0% flow	
Pervious-Mod-D	2.748	0.8	2% flow	
Pervious-Mod-C	4.278	0.7	0% flow	
Pervious-Mod-B	9.14	0.64	12% flow	
Pervious-Low-D	1.285	0.3	3% flow	
Pervious-Low-C	1.98	0.25	13% flow	
Pervious-Low-B	0.287	0.07	9% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			8.95%	
BMP Runoff Reduction			2.72 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343519	Permeable Pavement B Yes Med	\$53,400	\$1,500	20	\$54,900

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the

infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343519	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343519

Permeable Pavement B Yes Med Effluent: 0.3 acre-ft

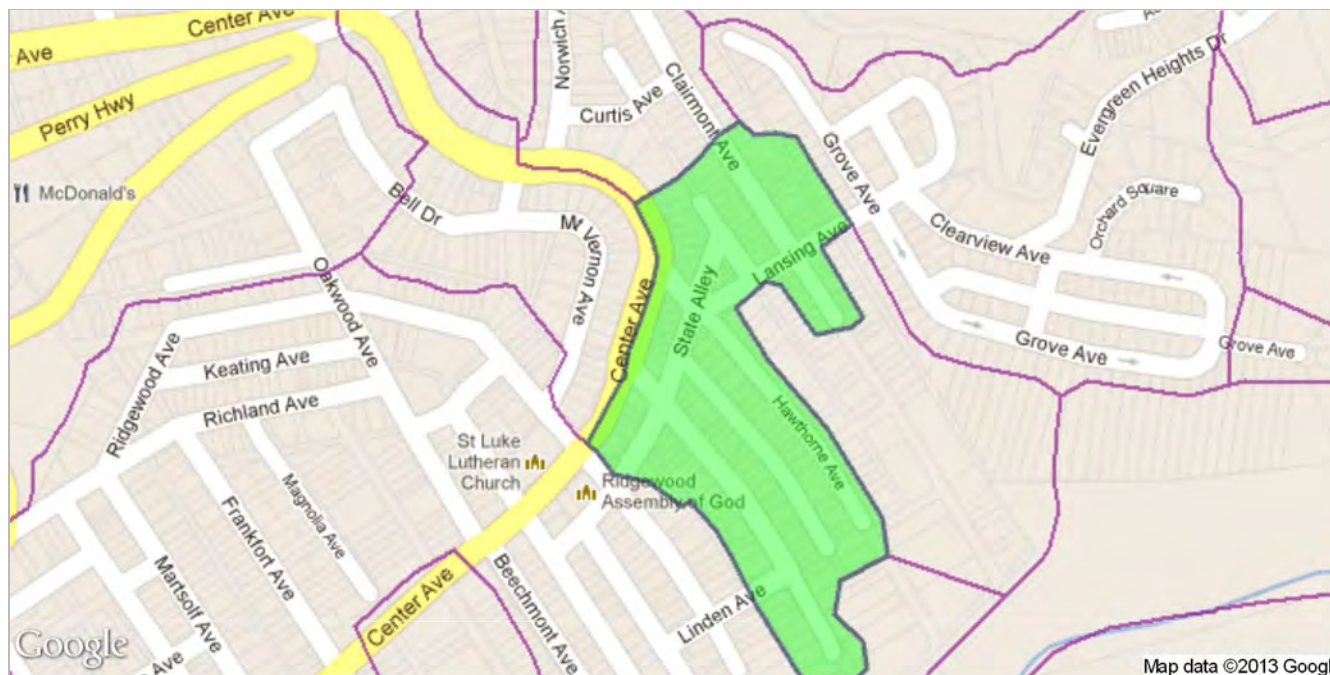
GR_LBs_1343547_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 19.33 acres

Total project cost: \$8,000

Priority area ranking: Medium-Medium (5.38/10)

Design depth: 1 inches

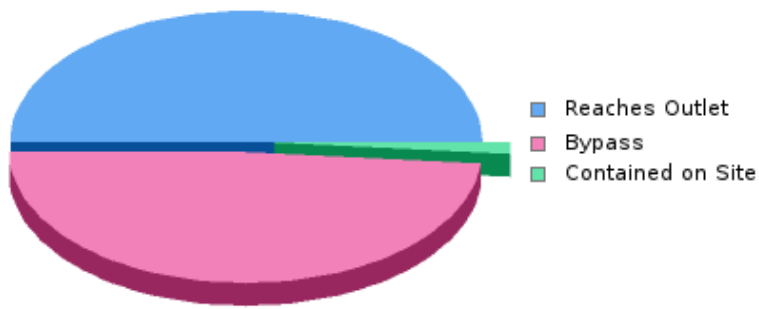
Total impervious area: 5.5 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343547)

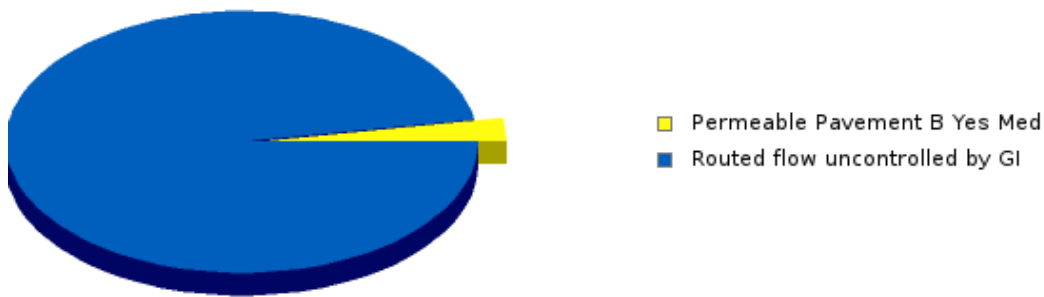
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	15.47 acre-ft
Total Reduction	2.7 %
Total Runoff Captured	0.41 acre-ft
Total Outlets	15.05 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343547	Green Infrastructure Capacity			4,744 gallons (0.2 acre-in) 0.017 acres

Building	2.487	6.42	0% flow	
Impervious-High	0.19	0.49	0% flow	
Impervious-Mod	2.23	5.76	2% flow	
Impervious-Low	0.577	1.46	22% flow	
Pervious-High-B	1.63	0.14	0% flow	
Pervious-Mod-C	0.14	0.02	0% flow	
Pervious-Mod-B	10.139	0.71	0% flow	
Pervious-Low-B	1.935	0.46	4% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			2.66%	
BMP Runoff Reduction			0.41 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343547	Permeable Pavement B Yes Med	\$8,100	\$200	20	\$8,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343547	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343547

Permeable Pavement B Yes Med Effluent: 0 acre-ft

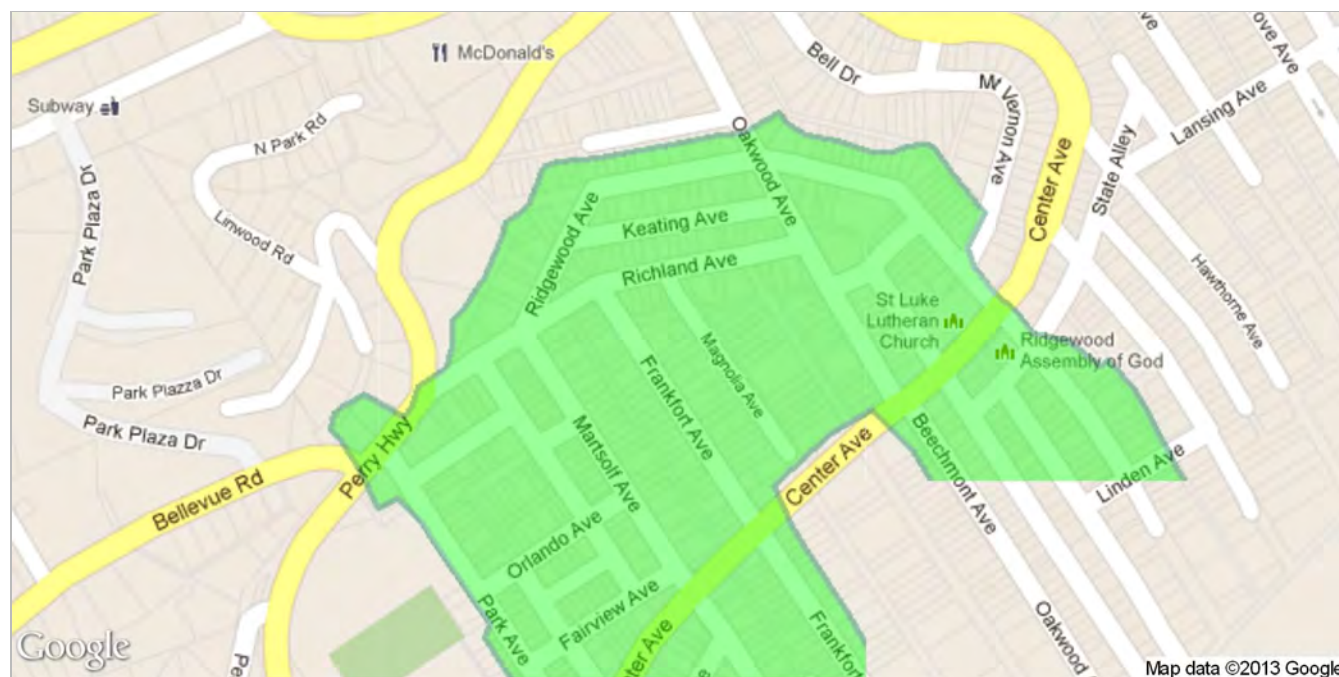
GR_LBs_1343553_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 87.77 acres

Total project cost: \$25,000

Priority area ranking: Medium-High (5.78/10)

Design depth: 1 inches

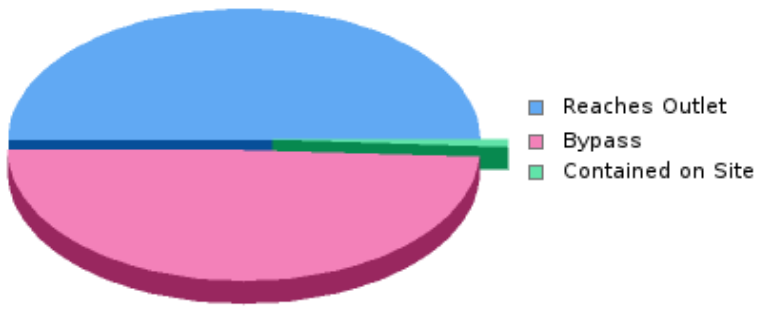
Total impervious area: 25.9 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343553)

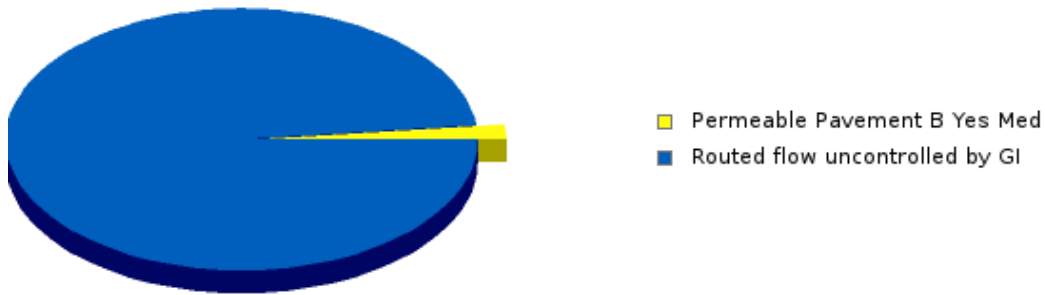
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff













Total Runoff pre-BMP	73.65 acre-ft
Total Reduction	1.7 %
Total Runoff Captured	1.23 acre-ft
Total Outlets	72.43 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343553	Green Infrastructure Capacity			14,141 gallons (0.5 acre-in) 0.051 acres

Building	12.962	33.46	0% flow	
Impervious-High	1.136	2.96	0% flow	
Impervious-Mod	8.268	21.35	2% flow	
Impervious-Low	3.5	8.86	10% flow	
Pervious-High-C	2.361	0.45	0% flow	
Pervious-High-B	6.301	0.55	0% flow	
Pervious-Mod-C	7.967	1.31	0% flow	
Pervious-Mod-B	35.372	2.48	0% flow	
Pervious-Low-C	0.869	0.11	0% flow	
Pervious-Low-B	9.037	2.14	2% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			1.67%	
BMP Runoff Reduction			1.23 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343553	Permeable Pavement B Yes Med	\$24,100	\$700	20	\$24,800

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343553	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343553

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

**APPENDIX B
RAILWAYS
OUTPUT
COMMERCIAL-
INSTITUTIONAL**

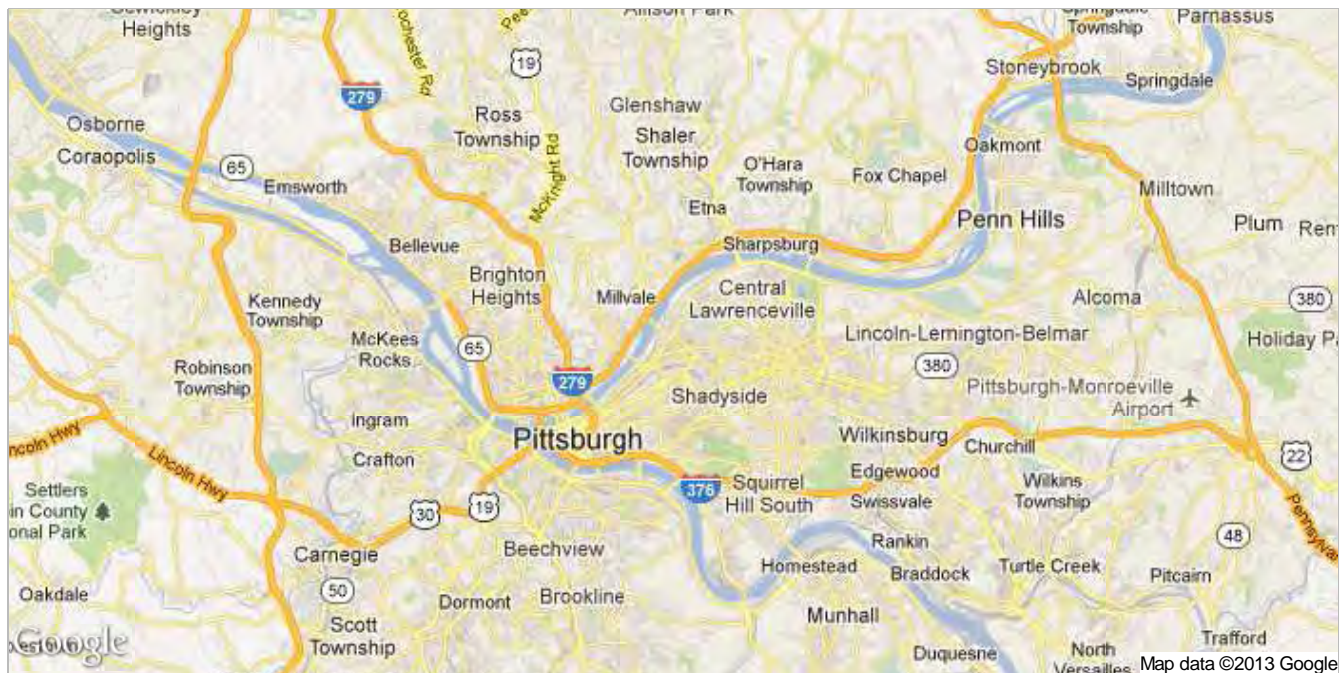
GR_LBs_1343510_Comm(Revised)

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 492.27 acres

Total project cost: \$56,000

Priority area ranking: Medium-High (5.64/10)

Design depth: 1 inches

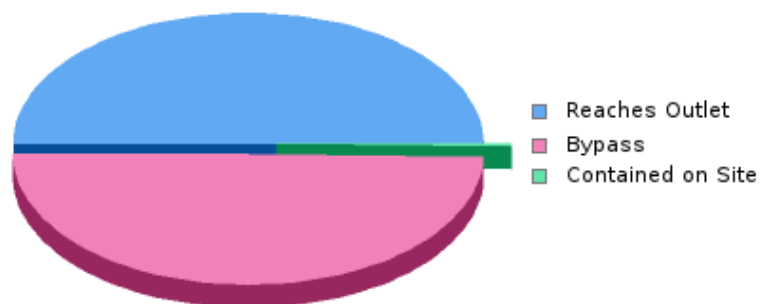
Total impervious area: 155.3 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343453); O-15-00 (LBs_1343463); O-15-00 (LBs_1343495); O-15-00 (LBs_1343507); A-67-00 (LBs_1343510); A-67-00 (LBs_1343511); A-67-00 (LBs_1343513); A-67-00 (LBs_1343519); A-67-00 (LBs_1343522); O-18-00 (LBs_1343527); A-67-00 (LBs_1343536); A-67-00 (LBs_1343547); A-67-00 (LBs_1343553); A-67-00 (LBs_1343556); A-67-00 (LBs_1343560); A-67-00 (LBs_1343562); O-18-00 (LBs_1343567); A-67-00 (LBs_1343578)

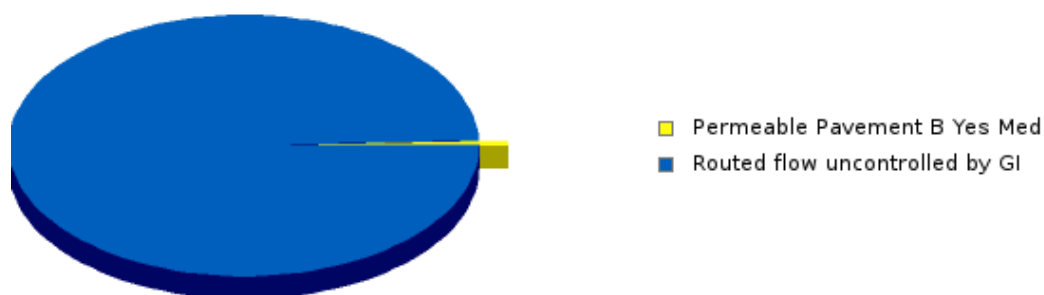
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	457.96 acre-ft
Total Reduction	0.6 %
Total Runoff Captured	2.78 acre-ft
Total Outlets	455.19 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
LBs_1343453	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	0.305	0.79	0% flow	
	Impervious-Mod	0.079	0.2	0% flow	
	Impervious-Low	0.109	0.28	0% flow	
	Pervious-Mod-C	1.59	0.26	0% flow	
	Pervious-Low-C	1.116	0.14	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
LBs_1343463	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	0.264	0.68	0% flow	
	Impervious-Mod	0.069	0.18	0% flow	
	Impervious-Low	0.203	0.51	0% flow	
	Pervious-High-C	0.063	0.01	0% flow	
	Pervious-Mod-C	2.605	0.43	0% flow	
	Pervious-Low-C	1.249	0.16	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	





	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343495	Pervious-High-C	1.002	0.19	0% flow	
	Pervious-Mod-C	4.986	0.82	0% flow	
	Pervious-Low-C	0.969	0.12	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343507	Building	0.064	0.17	0% flow	
	Impervious-Mod	0.334	0.86	0% flow	
	Impervious-Low	0.659	1.67	0% flow	
	Pervious-Mod-C	0.457	0.08	0% flow	
	Pervious-Low-C	0.12	0.02	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
BMP Runoff Reduction			0 acre-ft		
	Green Infrastructure Capacity			31,997 gallons (1.2 acre-in) 0.115 acres	
LBs_1343510	Building	51.516	133	0% flow	
	Impervious-High	2.443	6.36	3% flow	

	Impervious-Mod	30.881	79.72	2% flow	
	Impervious-Low	34.937	88.45	1% flow	
	Pervious-High-D	0.54	0.18	0% flow	
	Pervious-High-C	26.491	5.01	5% flow	
	Pervious-High-B	1.83	0.16	12% flow	
	Pervious-Mod-D	5.074	1.48	0% flow	
	Pervious-Mod-C	136.916	22.48	0% flow	
	Pervious-Mod-B	11.139	0.78	12% flow	
	Pervious-Low-D	5.781	1.37	0% flow	
	Pervious-Low-C	60.044	7.61	0% flow	
	Pervious-Low-B	2.929	0.69	5% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0.8%	
	BMP Runoff Reduction			2.78 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343511	Impervious-Mod	0.018	0.05	0% flow	
	Impervious-Low	0.016	0.04	0% flow	
	Pervious-Mod-C	5.687	0.93	0% flow	
	Pervious-Low-C	4.082	0.52	0% flow	

	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343513	Building	0.367	0.95	0% flow	
	Impervious-Mod	0.278	0.72	0% flow	
	Impervious-Low	0.124	0.31	0% flow	
	Pervious-Mod-C	2.826	0.46	0% flow	
	Pervious-Low-C	0.332	0.04	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343519	Building	3.174	8.19	0% flow	
	Impervious-High	0.221	0.58	0% flow	
	Impervious-Mod	2.857	7.38	0% flow	
	Impervious-Low	0.981	2.48	0% flow	
	Pervious-High-D	0.367	0.12	0% flow	
	Pervious-High-C	3.297	0.62	0% flow	
	Pervious-High-B	0.947	0.08	0% flow	













	Pervious-Mod-D	0.747	0.22	0% flow	
	Pervious-Mod-C	3.478	0.57	0% flow	
	Pervious-Mod-B	6.738	0.47	0% flow	
	Pervious-Low-D	0.103	0.02	0% flow	
	Pervious-Low-C	1.972	0.25	0% flow	
	Pervious-Low-B	0.159	0.04	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	0.408	1.05	0% flow	
	Impervious-Mod	0.088	0.23	0% flow	
	Impervious-Low	0.722	1.83	0% flow	
LBs_1343522	Pervious-Mod-C	0.351	0.06	0% flow	
	Pervious-Low-C	0.713	0.09	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343527	Building	3.578	9.24	0% flow	







	Impervious-Mod	3.148	8.13	0% flow	
	Impervious-Low	1.482	3.75	0% flow	
	Pervious-High-C	1.296	0.25	0% flow	
	Pervious-Mod-C	19.762	3.24	0% flow	
	Pervious-Low-C	5.898	0.75	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	0.359	0.93	0% flow	
	Impervious-Mod	0.378	0.98	0% flow	
	Impervious-Low	0.449	1.14	0% flow	
LBs_1343536	Pervious-Mod-B	1.238	0.09	0% flow	
	Pervious-Low-B	0.575	0.14	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343547	Impervious-Mod	0.055	0.14	0% flow	
	Impervious-Low	0.126	0.32	0% flow	

	Pervious-Mod-B	0.094	0.01	0% flow	
	Pervious-Low-B	0.076	0.02	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	2.962	7.65	0% flow	
	Impervious-High	0.335	0.87	0% flow	
	Impervious-Mod	1.237	3.19	0% flow	
	Impervious-Low	1.396	3.53	0% flow	
	Pervious-High-C	0.017	0	0% flow	
	Pervious-High-B	1.33	0.12	0% flow	
LBs_1343553	Pervious-Mod-C	1.311	0.22	0% flow	
	Pervious-Mod-B	4.848	0.34	0% flow	
	Pervious-Low-C	0.151	0.02	0% flow	
	Pervious-Low-B	3.75	0.89	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
LBs_1343556	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	

Building	1.389	3.59	0% flow	
Impervious-High	0.691	1.8	0% flow	
Impervious-Mod	1.979	5.11	0% flow	
Impervious-Low	0.703	1.78	0% flow	
Pervious-High-C	1.171	0.22	0% flow	
Pervious-High-B	0.598	0.05	0% flow	
Pervious-Mod-C	1.652	0.27	0% flow	
Pervious-Mod-B	4.11	0.29	0% flow	
Pervious-Low-C	0.73	0.09	0% flow	
Pervious-Low-B	0.435	0.1	0% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			0%	
BMP Runoff Reduction			0 acre-ft	
Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
Impervious-Mod	0.283	0.73	0% flow	
Impervious-Low	0.057	0.14	0% flow	
Pervious-High-C	3.676	0.7	0% flow	
Pervious-High-B	0.104	0.01	0% flow	
Pervious-Mod-C	7.812	1.28	0% flow	

LBS_1343560

	Pervious-Mod-B	0.26	0.02	0% flow	
	Pervious-Low-C	0.855	0.11	0% flow	
	Pervious-Low-B	0.386	0.09	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343562	Building	0.437	1.13	0% flow	
	Impervious-Mod	0.425	1.1	0% flow	
	Impervious-Low	0.068	0.17	0% flow	
	Pervious-High-C	0.334	0.06	0% flow	
	Pervious-Mod-C	12.201	2	0% flow	
	Pervious-Low-C	3.065	0.39	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
LBs_1343567	Building	0.782	2.02	0% flow	
	Impervious-Mod	1.156	2.98	0% flow	
	Impervious-Low	0.148	0.37	0% flow	

	Pervious-Mod-C	4.928	0.81	0% flow	
	Pervious-Low-C	0.496	0.06	0% flow	
	Design Depth	1 inches			
	Percent BMP Effectiveness	0%			
	BMP Runoff Reduction	0 acre-ft			
	Green Infrastructure Capacity	0 gallons (0 acre-in) 0 acres			
	Impervious-Mod	0.061	0.16	0% flow	
	Impervious-Low	0.463	1.17	0% flow	
LBs_1343578	Pervious-Mod-C	0.22	0.04	0% flow	
	Pervious-Low-C	0.297	0.04	0% flow	
	Design Depth	1 inches			
	Percent BMP Effectiveness	0%			
	BMP Runoff Reduction	0 acre-ft			

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343453	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343463	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343495	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343507	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100

LBs_1343510	Permeable Pavement B Yes Med	\$54,400	\$1,600	20	\$56,000
LBs_1343511	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343513	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343519	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343522	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343527	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343536	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343547	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343553	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343556	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343560	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343562	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343567	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1343578	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343453	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343463	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343495	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343507	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343510	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
LBs_1343511	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343513	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343519	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343522	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343527	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343536	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343547	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343553	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343556	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343560	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343562	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1343567	Permeable Pavement B Yes Med	\$0	\$0	20

LBs_1343578	Permeable Pavement B Yes Med	\$0	\$0	20
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Project BMP Routing

Outlets

LBs_1343453

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343463

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343495

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343507

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343510

Permeable Pavement B Yes Med Effluent: 0.3 acre-ft

LBs_1343511

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343513

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343519

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343522

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343527

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343536

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343547

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343553

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343556

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343560

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343562

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343567

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1343578

Permeable Pavement B Yes Med Effluent: 0 acre-ft

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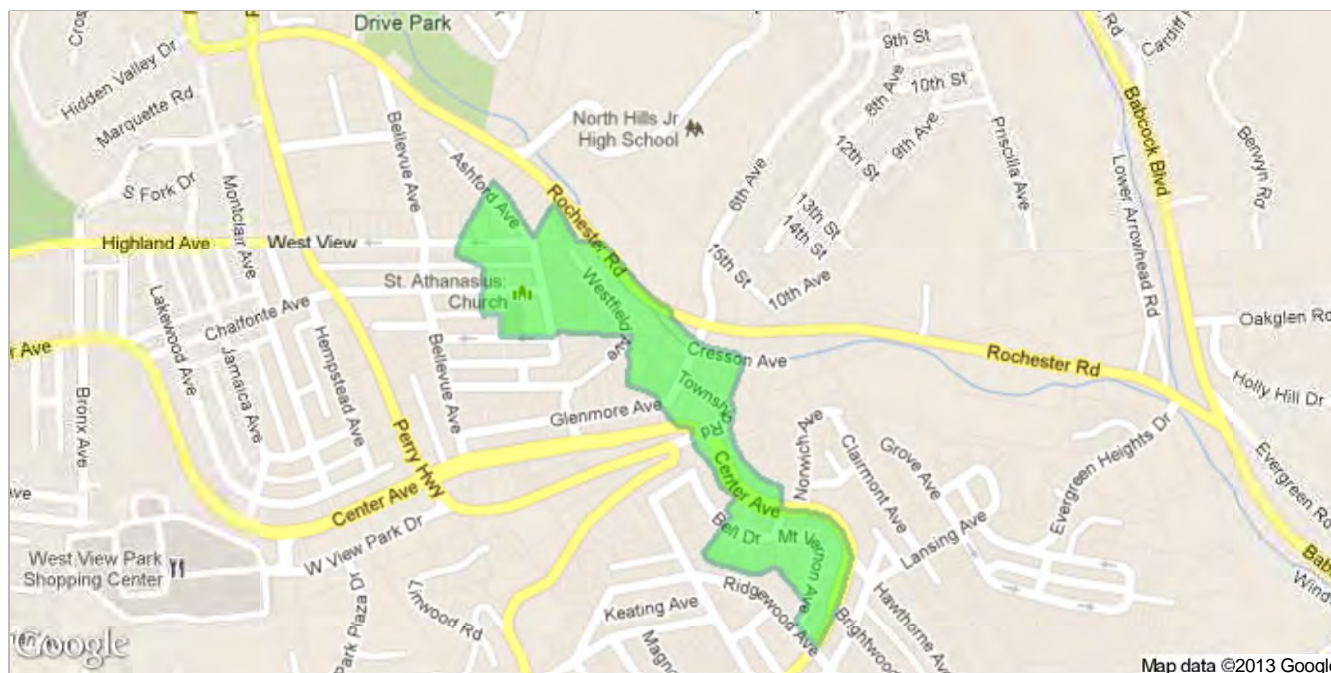
GR_LBs_1343519_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 36.62 acres

Total project cost: \$31,000

Priority area ranking: Medium-High (5.77/10)

Design depth: 1 inches

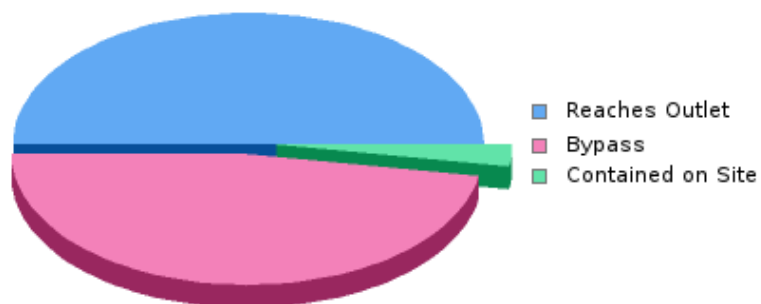
Total impervious area: 10.2 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343519)

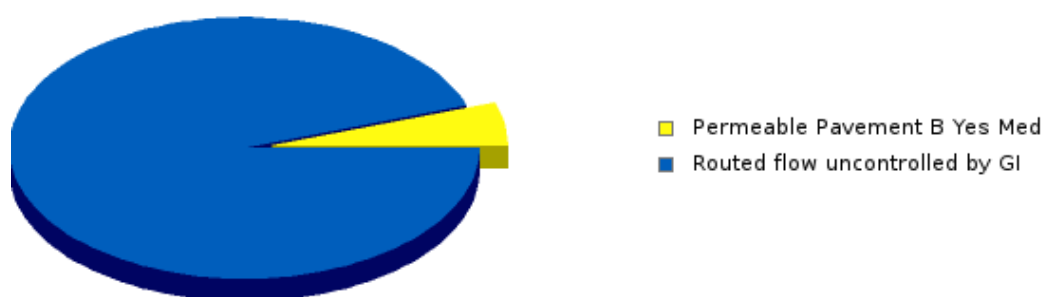
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution
















Relative GI Reduction of Runoff



Total Runoff pre-BMP	30.4 acre-ft
Total Reduction	5.1 %
Total Runoff Captured	1.54 acre-ft
Total Outlets	28.86 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			17,765 gallons (0.7 acre-in) 0.064 acres	
	Building	4.257	10.99	1% flow	
	Impervious-High	0.372	0.97	0% flow	
	Impervious-Mod	3.963	10.23	3% flow	
	Impervious-Low	1.632	4.13	31% flow	
	Pervious-High-D	1.37	0.45	0% flow	
	Pervious-High-C	3.892	0.74	0% flow	
	Pervious-High-B	1.413	0.12	0% flow	
LBs_1343519	Pervious-Mod-D	2.748	0.8	0% flow	
	Pervious-Mod-C	4.278	0.7	0% flow	
	Pervious-Mod-B	9.14	0.64	0% flow	
	Pervious-Low-D	1.285	0.3	1% flow	
	Pervious-Low-C	1.98	0.25	1% flow	
	Pervious-Low-B	0.287	0.07	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			5.07%	
	BMP Runoff Reduction			1.54 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343519	Permeable Pavement B Yes Med	\$30,200	\$900	20	\$31,100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343519	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343519

Permeable Pavement B Yes Med Effluent: 0.2 acre-ft

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GR_LBs_1343553_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.08 acres

Total project cost: \$11,000

Priority area ranking: Medium-High (5.71/10)

Design depth: 1 inches

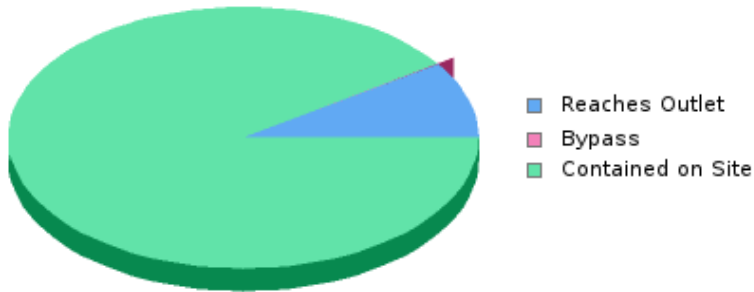
Total impervious area: 0.2 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343553)

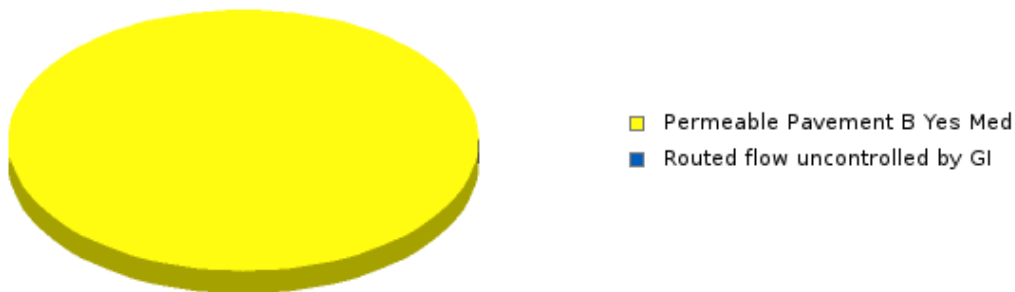
Municipalities: West View Borough

Overall Green Infrastructure Performance

Runoff Distribution









Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.6 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.54 acre-ft
Total Outlets	0.06 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			6,223 gallons (0.2 acre-in) 0.022 acres	
LBs_1343553	Building	0.027	0.07	100% flow	
	Impervious-High	0.077	0.2	100% flow	
	Impervious-Mod	0.071	0.18	100% flow	
	Impervious-Low	0.041	0.1	100% flow	
	Pervious-Mod-B	0.224	0.02	100% flow	
	Pervious-Low-B	0.1	0.02	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.54 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343553	Permeable Pavement B Yes Med	\$10,600	\$300	20	\$10,900

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343553	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343553

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

**APPENDIX B
RAINWAYS
OUTPUT
REGULATOR
REPORTS**

Print this page

Regulator UT-PumpC

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 4762.3 acres
 Number of Projects: 7
 Total Cost: \$1,001,000
 Total Green Infrastructure Project Area: 944.4 acres
 Total GI Project Impervious Area: 308 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		2.586e+0 M Gallon		6.466e+0 M Gallon		1.293e+1 M Gallon		3.880e+1 M Gallon		1.035e+2 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	UT-PumpC	0	0.000e+0	0	0.000e+0	0	0.000e+0	0	0.000e+0	0	0.000e+0	0	0.000e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343547_BR	19.3	15.5	1	3.2	0.5	0.247
GR_LBs_1343529_BR	11.5	5.2	1	17.3	0.9	0.453
GR_LBs_1343547_PP	19.3	15.5	1	2.7	0.4	0.175
GR_LBs_1343513_PP	8.3	5.2	1	18.7	1	0.413
GR_LBs_1343513_BR	8.3	5.2	1	14.6	0.8	0.383
GR_LBs_1343510_PP_revised	458.2	443.1	18	5.7	25.3	10.719

GR_LBs_1343510_BR (revised)	419.4	413.8	18	3.8	15.8	8.009
Total runoff pre-green infrastructure	903.4 acre-feet (2.944e+2 MGPY)					
Total Reduction within GI	4.9 %					
Total Runoff Captured	44.6 acre-ft (1.454e+1 MGPY)					
Total GI Outlets	858.8 acre-ft (2.932e+2 MGPY)					
Total GI Capacity	1.7 acre-ft (5.539e-1 Million Gallons)					
Number of CSOs Prevented	0 (0 %)					
Overflow Volume Reduced	0 acre-ft (0.000e+0 MGPY)					

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343547_BR	\$12,000	\$1,000	\$13,000
GR_LBs_1343529_BR	\$22,000	\$1,000	\$23,000
GR_LBs_1343547_PP	\$8,000	\$0	\$8,000
GR_LBs_1343513_PP	\$19,000	\$1,000	\$20,000
GR_LBs_1343513_BR	\$19,000	\$1,000	\$20,000
GR_LBs_1343510_PP_revised	\$495,000	\$14,000	\$509,000
GR_LBs_1343510_BR (revised)	\$388,000	\$21,000	\$409,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator WV-CSO#1-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 102.1 acres
 Number of Projects: 4
 Total Cost: \$1,036,000
 Total Green Infrastructure Project Area: 1053.1 acres
 Total GI Project Impervious Area: 344.3 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		5.547e-2 M Gallon		1.387e-1 M Gallon		2.774e-1 M Gallon		8.321e-1 M Gallon		2.219e+0 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	WV-CSO#1-OF	38	5.995e+0	35	5.788e+0	33	5.491e+0	27	5.002e+0	18	3.669e+0	11	1.925e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343553_BR	87.8	73.7	1	4.9	3.6	1.825
GR_LBs_1343553_PP	87.8	73.7	1	1.7	1.2	0.521
GR_LBs_1343510_PP_revised	458.2	443.1	18	5.7	25.3	10.719
GR_LBs_1343510_BR (revised)	419.4	413.8	18	3.8	15.8	8.009
Total runoff pre-green infrastructure		1004.2 acre-feet (3.272e+2 MGPY)				
Total Reduction within GI		4.6 %				

Total Runoff Captured	45.9 acre-ft (1.497e+1 MGPY)
Total GI Outlets	958.3 acre-ft (3.260e+2 MGPY)
Total GI Capacity	1.76 acre-ft (5.723e-1 Million Gallons)
Number of CSOs Prevented	16 (42 %)
Overflow Volume Reduced	5.22 acre-ft (1.702e+0 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343553_BR	\$88,000	\$5,000	\$93,000
GR_LBs_1343553_PP	\$24,000	\$1,000	\$25,000
GR_LBs_1343510_PP_revised	\$495,000	\$14,000	\$509,000
GR_LBs_1343510_BR (revised)	\$388,000	\$21,000	\$409,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator WV-CSO#2-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 443.9 acres
 Number of Projects: 4
 Total Cost: \$1,119,000
 Total Green Infrastructure Project Area: 950.8 acres
 Total GI Project Impervious Area: 313 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		2.411e-1 M Gallon		6.026e-1 M Gallon		1.205e+0 M Gallon		3.616e+0 M Gallon		9.642e+0 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	WV-CSO#2-OF	58	2.750e+1	56	2.626e+1	50	2.454e+1	44	2.215e+1	31	1.582e+1	28	8.914e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343519_BR	36.6	30.4	1	18.6	5.6	2.853
GR_LBs_1343519_PP	36.6	30.4	1	9	2.7	1.155
GR_LBs_1343510_PP_revised	458.2	443.1	18	5.7	25.3	10.719
GR_LBs_1343510_BR (revised)	419.4	413.8	18	3.8	15.8	8.009
Total runoff pre-green infrastructure	917.7 acre-feet (2.990e+2 MGPY)					
Total Reduction within GI	5.4 %					

Total Runoff Captured	49.5 acre-ft (1.612e+1 MGPY)
Total GI Outlets	868.2 acre-ft (2.977e+2 MGPY)
Total GI Capacity	1.89 acre-ft (6.174e-1 Million Gallons)
Number of CSOs Prevented	9 (16 %)
Overflow Volume Reduced	9.25 acre-ft (3.016e+0 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343519_BR	\$138,000	\$8,000	\$146,000
GR_LBs_1343519_PP	\$53,000	\$2,000	\$55,000
GR_LBs_1343510_PP_revised	\$495,000	\$14,000	\$509,000
GR_LBs_1343510_BR (revised)	\$388,000	\$21,000	\$409,000

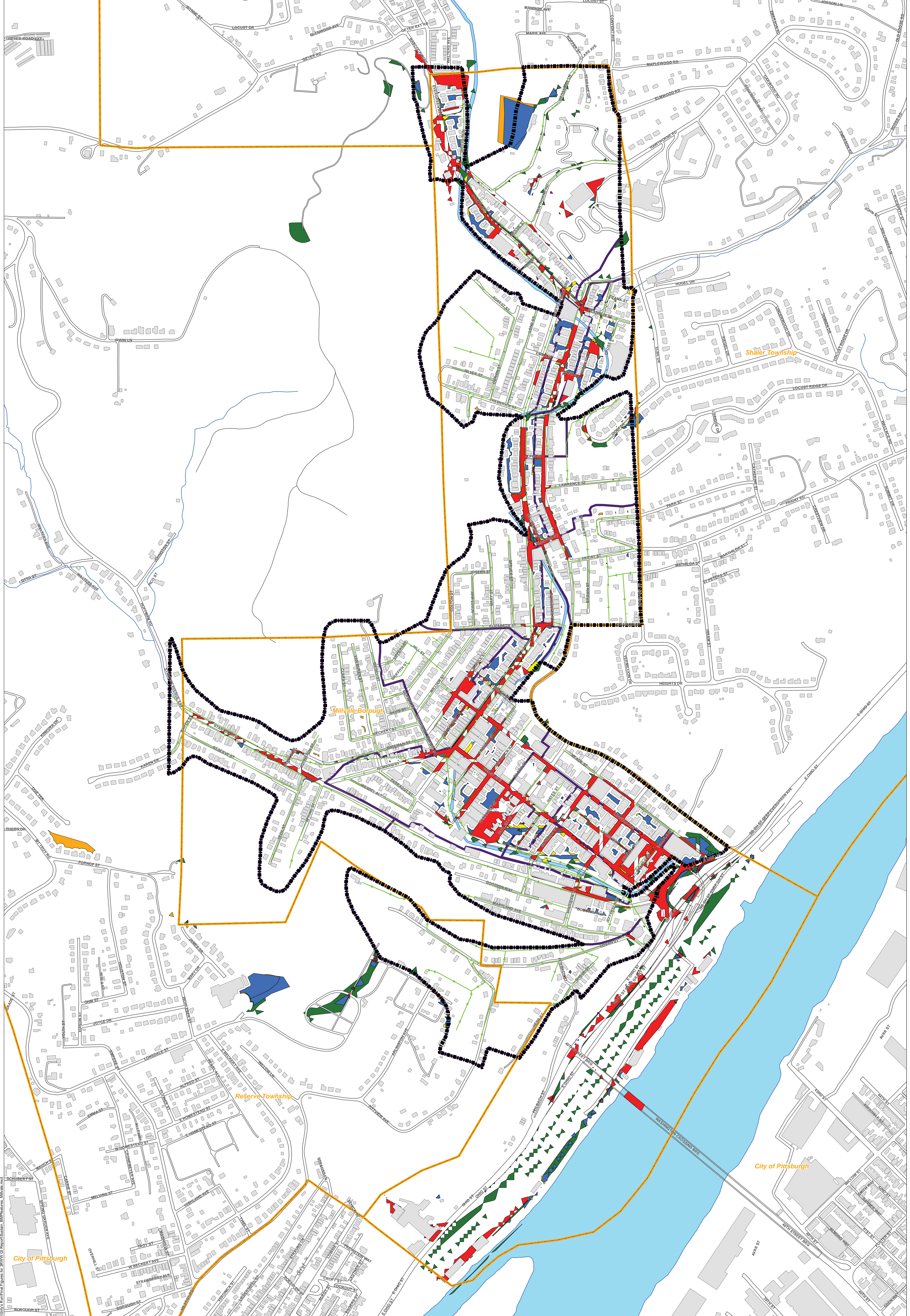
Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

APPENDIX C

APPENDIX C
FIGURES



Permeable Pavement	Vegetated Filter Strips	Sewerlines	Combined Sewer Subcatchment
Bioretention Basins	Grass Swales	Edge of Pavement	Combined Area Tributary to POC A-67
Infiltration Basins / Trench	Constructed Wetlands	Building Footprint	Municipal Boundaries

0 150 300 600 900
1 Inch = 300 Feet

3 Rivers
Wet Weather
Improving our region's water quality.

Baker

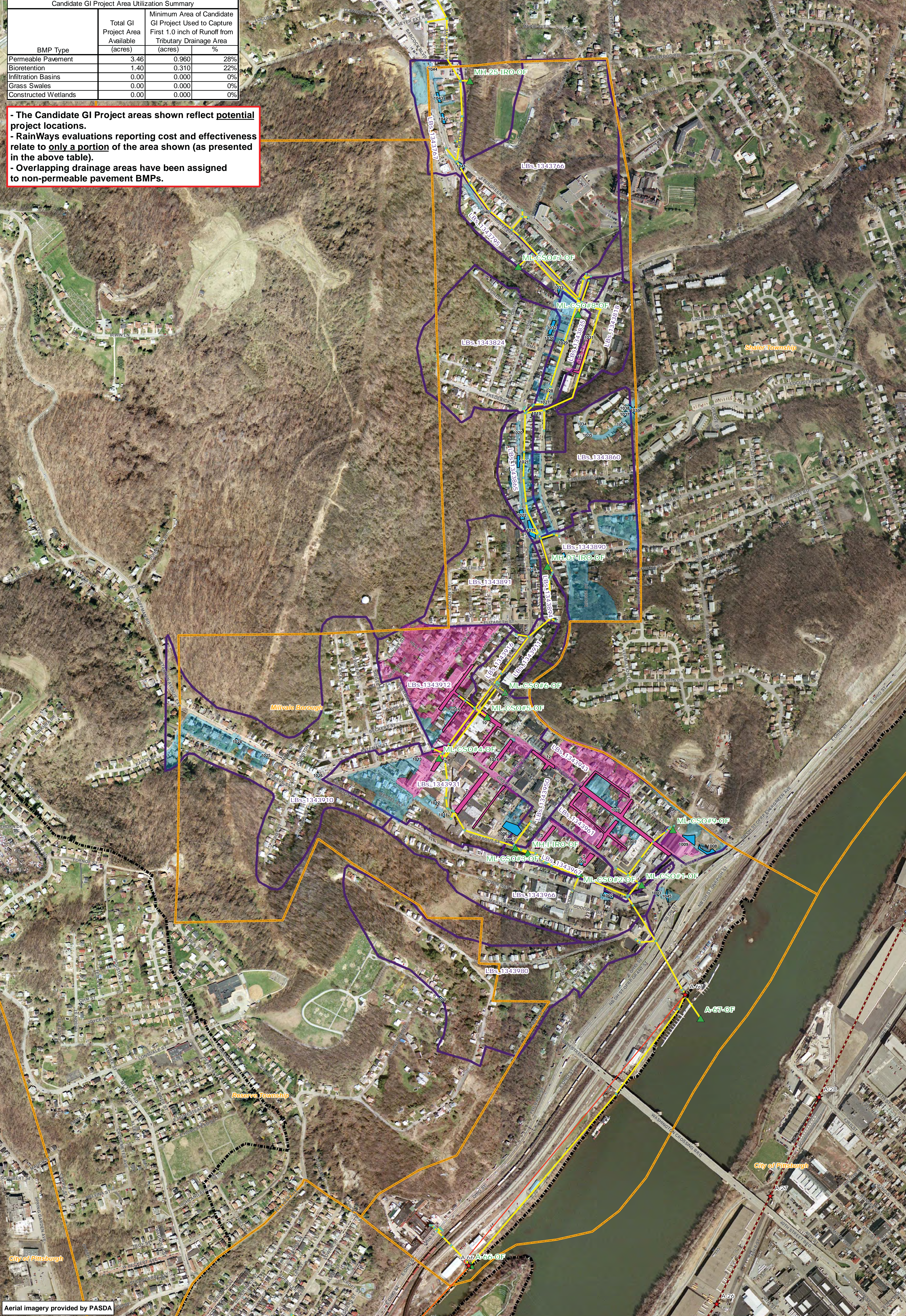
WADETRIM

Figure C-1
Girty's Run - Millvale
SUSTAIN BMP Features

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 Date: 11/15/2017 10:58:11 AM
 User: jhughes

Candidate GI Project Area Utilization Summary			
BMP Type	Total GI Project Area Available (acres)	Minimum Area of Candidate GI Project Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	%
Permeable Pavement	3.46	0.960	28%
Bioretention	1.40	0.310	22%
Infiltration Basins	0.00	0.000	0%
Grass Swales	0.00	0.000	0%
Constructed Wetlands	0.00	0.000	0%

- The Candidate GI Project areas shown reflect potential project locations.
 - RainWays evaluations reporting cost and effectiveness relate to only a portion of the area shown (as presented in the above table).
 - Overlapping drainage areas have been assigned to non-permeable pavement BMPs.



Aerial imagery provided by PASDA

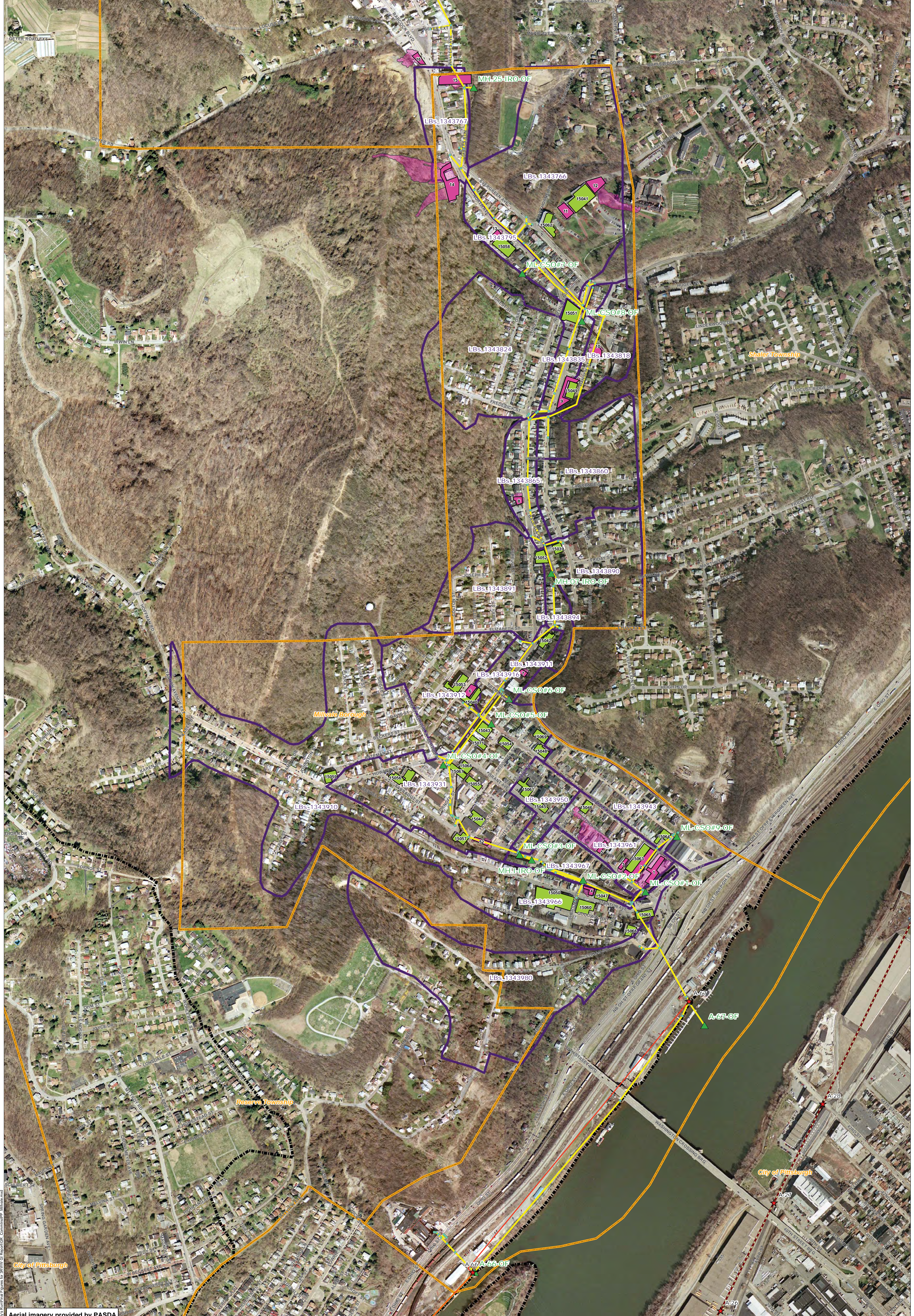
- ★ ALCOSAN Structures
- Model Junctions
- ALCOSAN Shallow-Cut Interceptor
- ALCOSAN Girty's Run Modeled Pipe Network Extent
- ALCOSAN Deep Tunnel Interceptor
- Combined Area Tributary to POC A-67
- ▲ Outfalls
- Combined Sewer Subcatchment
- Municipal Boundaries

- Bioretention Basin
- Permeable Pavement
- Bioretention Basin Drainage Area
- Permeable Pavement Drainage Area



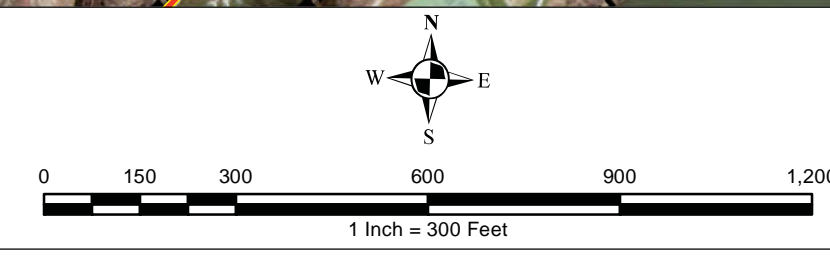
3 Rivers Wet Weather Baker Landbase Systems WADETRIM

Figure C-2
 Girty's Run - Millvale
 Concept Municipal GI Projects



Aerial imagery provided by PASDA

- ★ ALCOSAN Structures
- ALCOSAN Shallow-Cut Interceptor
- ALCOSAN Deep Tunnel Interceptor
- ▲ Outfalls
- Model Junctions
- ALCOSAN Girty's Run Modeled Pipe Network Extent
- Green Roof Candidate Projects
- Permeable Pavement Candidate GI Projects
- Permeable Pavement Candidate GI Project Drainage Areas
- Combined Area Tributary to POC A-67
- Combined Sewer Subcatchment
- Municipal Boundaries



3 Rivers
Wet Weather
Researching our region, better quality

Baker

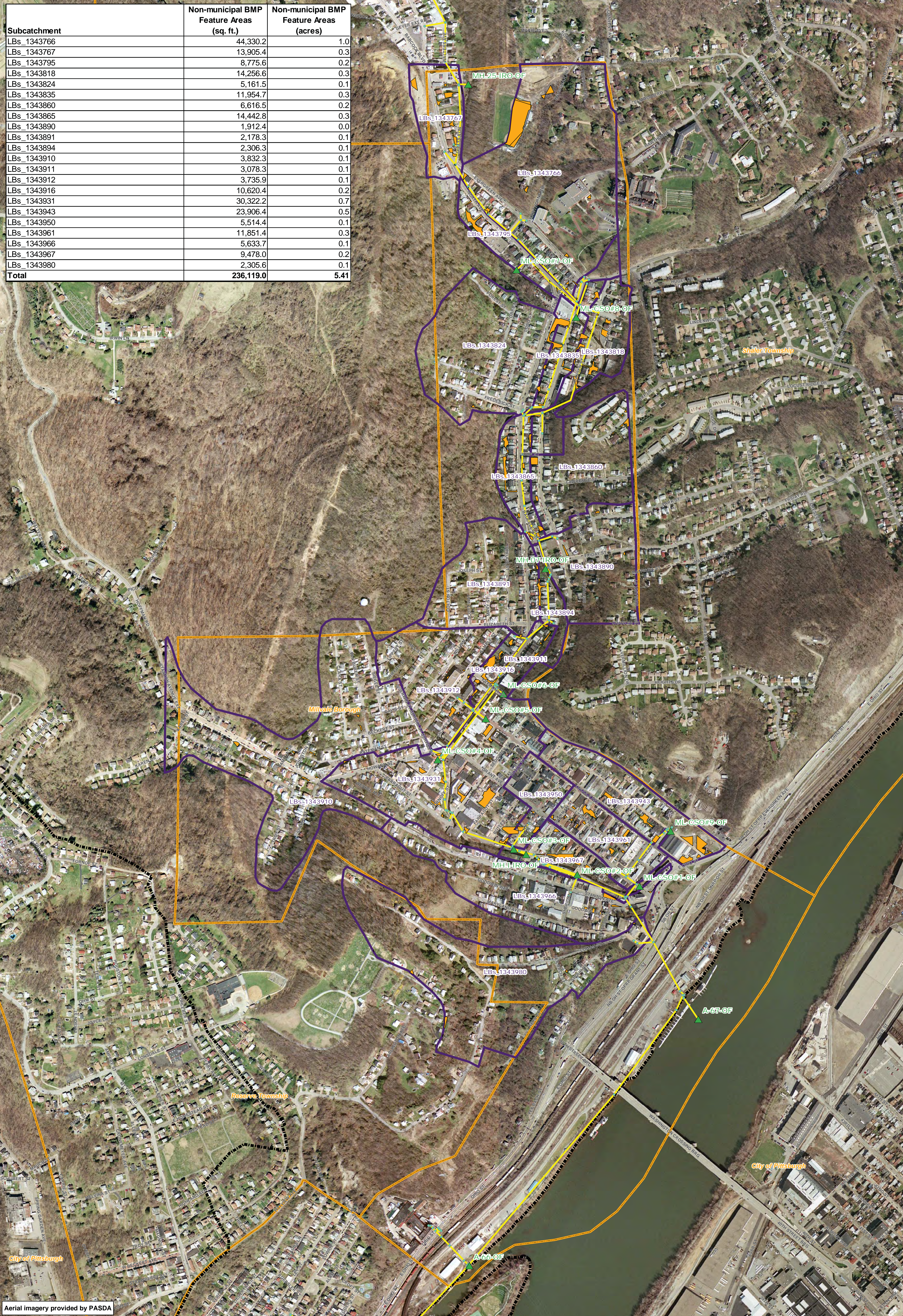
Landbase Systems

WADETRIM

Figure C-3
Girty's Run - Millvale
Concept Commercial / Institutional
GI Projects

File: N:\PROJ\343434-04-13\Girty's Run\Final Figures for RRM\GI Report\GIS - Commas\GP - Millvale.mxd
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 User: jgibson

Subcatchment	Non-municipal BMP Feature Areas (sq. ft.)	Non-municipal BMP Feature Areas (acres)
LBs_1343766	44,330.2	1.0
LBs_1343767	13,905.4	0.3
LBs_1343795	8,775.6	0.2
LBs_1343818	14,256.6	0.3
LBs_1343824	5,161.5	0.1
LBs_1343835	11,954.7	0.3
LBs_1343860	6,616.5	0.2
LBs_1343865	14,442.8	0.3
LBs_1343890	1,912.4	0.0
LBs_1343891	2,178.3	0.1
LBs_1343894	2,306.3	0.1
LBs_1343910	3,832.3	0.1
LBs_1343911	3,078.3	0.1
LBs_1343912	3,735.9	0.1
LBs_1343916	10,620.4	0.2
LBs_1343931	30,322.2	0.7
LBs_1343943	23,906.4	0.5
LBs_1343950	5,514.4	0.1
LBs_1343961	11,851.4	0.3
LBs_1343966	5,633.7	0.1
LBs_1343967	9,478.0	0.2
LBs_1343980	2,305.6	0.1
Total	236,119.0	5.41



Aerial imagery provided by PASDA

- Infiltration Type BMP
- ▲ Outfalls
- Model Junctions
- ALCOSAN Girty's Run Modeled Pipe Network Extent
- Combined Area Tributary to POC A-67
- Combined Sewer Subcatchment
- Municipal Boundaries

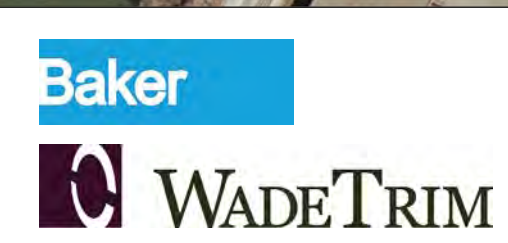
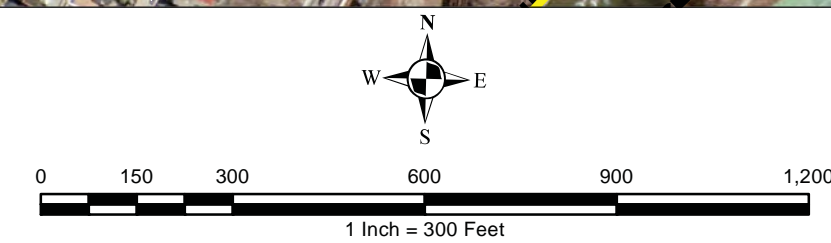


Figure C-4
Girty's Run - Millvale
Residential BMP Features

APPENDIX C
TABLES 1.1
THROUGH 1.16

**Table C-1.1
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary**

February 19, 2013

Subcatchment **LBS_1343767**
 Subcatchment Size 4.98 acres
 Total Annual Subcatchment Runoff (RainWays) 2.49 MG
 Drainage Area Tributary to Municipal GI Projects 0.364 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Number of Candidate GI Projects	0	4	0	0	0	0	4
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.12	0	0	0	0	0.12
Combined Sewer Area Runoff Capture (%)	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%	5.0%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 10,000	\$ -	\$ -	\$ -	\$ -	\$10,000
O/M Cost (20 years)	\$0	\$ 1,000	\$ -				\$1,000
Present Worth Cost**	\$0	\$ 11,000	\$ -				\$11,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 31,000	\$ -				\$31,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.2
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343795**
Subcatchment Size 3.05 acres
Total Annual Subcatchment Runoff (RainWays) 1.69 MG
Drainage Area Tributary to Municipal GI Projects 0.133 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.004	0.00	0.00	0.00	0.00	0.004
Number of Candidate GI Projects	0	1	0	0	0	0	1
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.05	0	0	0	0	0.05
Combined Sewer Area Runoff Capture (%)	0.0%	2.7%	0.0%	0.0%	0.0%	0.0%	2.7%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 4,000	\$ -	\$ -	\$ -	\$ -	\$4,000
O/M Cost (20 years)	\$0	\$ 1,000	\$ -				\$1,000
Present Worth Cost**	\$0	\$ 5,000	\$ -				\$5,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 38,000	\$ -				\$38,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.3
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343818**
Subcatchment Size 9.7 acres
Total Annual Subcatchment Runoff (RainWays) 3.84 MG
Drainage Area Tributary to Municipal GI Projects 0.28 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.02	0.002	0.00	0.00	0.00	0.00	0.019
Number of Candidate GI Projects	1	2	0	0	0	0	3
Annual Combined Sewer Area Runoff Captured (MG)*	0.13	0.02	0	0	0	0	0.15
Combined Sewer Area Runoff Capture (%)	3.5%	0.5%	0.0%	0.0%	0.0%	0.0%	4.0%
Opinion of Probable Cost***							
Construction Cost	\$9,000	\$ 2,000	\$ -	\$ -	\$ -	\$ -	\$11,000
O/M Cost (20 years)	\$1,000	\$ 1,000	\$ -	\$ -	\$ -	\$ -	\$2,000
Present Worth Cost**	\$10,000	\$ 3,000	\$ -	\$ -	\$ -	\$ -	\$13,000
Present Worth Cost per Drainage Area Treated (acres)	\$49,000	\$ 42,000	\$ -	\$ -	\$ -	\$ -	\$47,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.4
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBS_1343824**
Subcatchment Size 20.29 acres
Total Annual Subcatchment Runoff (RainWays) 4.53 MG
Drainage Area Tributary to Municipal GI Projects 0.132 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.004	0.00	0.00	0.00	0.00	0.004
Number of Candidate GI Projects	0	2	0	0	0	0	2
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.05	0	0	0	0	0.05
Combined Sewer Area Runoff Capture (%)	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	1.1%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 4,000	\$ -	\$ -	\$ -	\$ -	\$4,000
O/M Cost (20 years)	\$0	\$ 1,000	\$ -				\$1,000
Present Worth Cost**	\$0	\$ 5,000	\$ -				\$5,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 38,000	\$ -				\$38,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.5
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343835**
Subcatchment Size 3.86 acres
Total Annual Subcatchment Runoff (RainWays) 1.82 MG
Drainage Area Tributary to Municipal GI Projects 1.06 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.03	0.00	0.00	0.00	0.00	0.03
Number of Candidate GI Projects	0	3	0	0	0	0	3
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.37	0	0	0	0	0.37
Combined Sewer Area Runoff Capture (%)	0.0%	20.4%	0.0%	0.0%	0.0%	0.0%	20.4%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 29,000	\$ -	\$ -	\$ -	\$ -	\$29,000
O/M Cost (20 years)	\$0	\$ 2,000	\$ -				\$2,000
Present Worth Cost**	\$0	\$ 31,000	\$ -				\$31,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 30,000	\$ -				\$30,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.6
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343860**
Subcatchment Size 13.64 acres
Total Annual Subcatchment Runoff (RainWays) 3.57 MG
Drainage Area Tributary to Municipal GI Projects 0.63 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Number of Candidate GI Projects	0	6	0	0	0	0	6
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.17	0	0	0	0	0.17
Combined Sewer Area Runoff Capture (%)	0.0%	4.7%	0.0%	0.0%	0.0%	0.0%	4.7%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 13,000	\$ -	\$ -	\$ -	\$ -	\$13,000
O/M Cost (20 years)	\$0	\$ 1,000	\$ -				\$1,000
Present Worth Cost**	\$0	\$ 14,000	\$ -				\$14,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 23,000	\$ -				\$23,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.7
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343865**
Subcatchment Size 4.99 acres
Total Annual Subcatchment Runoff (RainWays) 2.02 MG
Drainage Area Tributary to Municipal GI Projects 1.41 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.04	0.00	0.00	0.00	0.00	0.04
Number of Candidate GI Projects	0	5	0	0	0	0	5
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.46	0	0	0	0	0.46
Combined Sewer Area Runoff Capture (%)	0.0%	22.5%	0.0%	0.0%	0.0%	0.0%	22.5%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 36,000	\$ -	\$ -	\$ -	\$ -	\$36,000
O/M Cost (20 years)	\$0	\$ 2,000	\$ -				\$2,000
Present Worth Cost**	\$0	\$ 38,000	\$ -				\$38,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 27,000	\$ -				\$27,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.8
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	LBs_1343890
Subcatchment Size	13.11 acres
Total Annual Subcatchment Runoff (RainWays)	3.75 MG
Drainage Area Tributary to Municipal GI Projects	4.12 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.02	0.00	0.00	0.00	0.00	0.02
Number of Candidate GI Projects	0	2	0	0	0	0	2
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.45	0	0	0	0	0.45
Combined Sewer Area Runoff Capture (%)	0.0%	11.9%	0.0%	0.0%	0.0%	0.0%	11.9%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 20,000	\$ -	\$ -	\$ -	\$ -	\$20,000
O/M Cost (20 years)	\$0	\$ 1,000	\$ -				\$1,000
Present Worth Cost**	\$0	\$ 21,000	\$ -				\$21,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 6,000	\$ -				\$6,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.9
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	LBs_1343891
Subcatchment Size	13.51 acres
Total Annual Subcatchment Runoff (RainWays)	4.54 MG
Drainage Area Tributary to Municipal GI Projects	0.089 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.002	0.00	0.00	0.00	0.00	0.002
Number of Candidate GI Projects	0	1	0	0	0	0	1
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.03	0	0	0	0	0.03
Combined Sewer Area Runoff Capture (%)	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.6%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 2,000	\$ -	\$ -	\$ -	\$ -	\$2,000
O/M Cost (20 years)	\$0	\$ 1,000	\$ -				\$1,000
Present Worth Cost**	\$0	\$ 3,000	\$ -				\$3,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 34,000	\$ -				\$34,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.10
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343910**
Subcatchment Size 35.09 acres
Total Annual Subcatchment Runoff (RainWays) 10.36 MG
Drainage Area Tributary to Municipal GI Projects 1.87 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.03	0.00	0.00	0.00	0.00	0.03
Number of Candidate GI Projects	0	3	0	0	0	0	3
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.42	0	0	0	0	0.42
Combined Sewer Area Runoff Capture (%)	0.0%	4.0%	0.0%	0.0%	0.0%	0.0%	4.0%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 32,600	\$ -	\$ -	\$ -	\$ -	\$32,600
O/M Cost (20 years)	\$0	\$ 2,000	\$ -				\$2,000
Present Worth Cost**	\$0	\$ 35,000	\$ -				\$35,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 19,000	\$ -				\$19,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.11
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343912**
Subcatchment Size 12.97 acres
Total Annual Subcatchment Runoff (RainWays) 5.05 MG
Drainage Area Tributary to Municipal GI Projects 9.80 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.39	0.01	0.00	0.00	0.00	0.00	0.40
Number of Candidate GI Projects	1	1	0	0	0	0	2
Annual Combined Sewer Area Runoff Captured (MG)*	3.09	0.11	0	0	0	0	3.20
Combined Sewer Area Runoff Capture (%)	61.1%	2.1%	0.0%	0.0%	0.0%	0.0%	63.3%
Opinion of Probable Cost***							
Construction Cost	\$187,000	\$ 9,000	\$ -	\$ -	\$ -	\$ -	\$196,000
O/M Cost (20 years)	\$7,000	\$ 1,000	\$ -				\$8,000
Present Worth Cost**	\$194,000	\$ 10,000	\$ -				\$204,000
Present Worth Cost per Drainage Area Treated (acres)	\$21,000	\$ 22,000	\$ -				\$21,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.12
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment	LBs_1343931
Subcatchment Size	24.7 acres
Total Annual Subcatchment Runoff (RainWays)	11.55 MG
Drainage Area Tributary to Municipal GI Projects	6.47 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.15	0.08	0.00	0.00	0.00	0.00	0.23
Number of Candidate GI Projects	5	6	0	0	0	0	11
Annual Combined Sewer Area Runoff Captured (MG)*	1.21	0.93	0	0	0	0	2.14
Combined Sewer Area Runoff Capture (%)	10.5%	8.0%	0.0%	0.0%	0.0%	0.0%	18.5%
Opinion of Probable Cost***							
Construction Cost	\$73,000	\$ 72,000	\$ -	\$ -	\$ -	\$ -	\$145,000
O/M Cost (20 years)	\$3,000	\$ 4,000	\$ -				\$7,000
Present Worth Cost**	\$76,000	\$ 76,000	\$ -				\$152,000
Present Worth Cost per Drainage Area Treated (acres)	\$26,000	\$ 23,000	\$ -				\$24,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.13
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment **LBs_1343943**
Subcatchment Size 10.69 acres
Total Annual Subcatchment Runoff (RainWays) 4.76 MG
Drainage Area Tributary to Municipal GI Projects 5.58 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.26	0.04	0.00	0.00	0.00	0.00	0.30
Number of Candidate GI Projects	2	3	0	0	0	0	5
Annual Combined Sewer Area Runoff Captured (MG)*	2.02	0.48	0	0	0	0	2.50
Combined Sewer Area Runoff Capture (%)	42.5%	10.0%	0.0%	0.0%	0.0%	0.0%	52.5%
Opinion of Probable Cost***							
Construction Cost	\$122,000	\$ 37,000	\$ -	\$ -	\$ -	\$ -	\$159,000
O/M Cost (20 years)	\$5,000	\$ 2,000	\$ -				\$7,000
Present Worth Cost**	\$127,000	\$ 39,000	\$ -				\$166,000
Present Worth Cost per Drainage Area Treated (acres)	\$31,000	\$ 29,000					\$30,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-1.15
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary

February 19, 2013

Subcatchment

LBs_1343966

Subcatchment Size 17.28 acres
 Total Annual Subcatchment Runoff (RainWays) 7.19 MG
 Drainage Area Tributary to Municipal GI Projects 0.337 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Number of Candidate GI Projects	0	3	0	0	0	0	3
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.09	0	0	0	0	0.09
Combined Sewer Area Runoff Capture (%)	0.0%	1.2%	0.0%	0.0%	0.0%	0.0%	1.2%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 7,000	\$ -	\$ -	\$ -	\$ -	\$7,000
O/M Cost (20 years)	\$0	\$ 1,000	\$ -				\$1,000
Present Worth Cost**	\$0	\$ 8,000	\$ -				\$8,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 24,000	\$ -				\$24,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

**Table C-1.16
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary**

February 19, 2013

Subcatchment	LBs_1343967
Subcatchment Size	5.12 acres
Total Annual Subcatchment Runoff (RainWays)	1.77 acre-ft
Drainage Area Tributary to Municipal GI Projects	0.56 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.04	0.00	0.00	0.00	0.00	0.00	0.04
Number of Candidate GI Projects	2		0	0	0	0	2
Annual Combined Sewer Area Runoff Captured (MG)*	0.28	0.01	0	0	0	0	0.28
Combined Sewer Area Runoff Capture (%)	15.7%	0.4%	0.0%	0.0%	0.0%	0.0%	16.1%
Opinion of Probable Cost***							
Construction Cost	\$17,000	\$ 1,000	\$ -	\$ -	\$ -	\$ -	\$18,000
O/M Cost (20 years)	\$1,000	\$ 1,000	\$ -				\$2,000
Present Worth Cost**	\$18,000	\$ 2,000	\$ -				\$20,000
Present Worth Cost per Drainage Area Treated (acres)	\$35,000	\$ 61,000	\$ -				\$36,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX C
TABLES 2.1
THROUGH 2.16

Table C-2.1
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343767**
Subcatchment Size 4.98 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	0.672	0.025183	3.7%
Impervious-High	0.131	-	0.0%
Impervious-Mod	0.366	0.059341	16.2%
Impervious-Low	1.626	0.099933	6.1%
Pervious-High-D	0.131	-	0.0%
Pervious-High-C	0.095	-	0.0%
Pervious-High-B	0	-	0.0%
Pervious-Mod-D	0.284	0.013502	4.8%
Pervious-Mod-C	0	-	0.0%
Pervious-Mod-B	0	-	0.0%
Pervious-Low-D	1.518	0.166256	11.0%
Pervious-Low-C	0	-	0.0%
Pervious-Low-B	0	-	0.0%
Totals	4.823	0.364	

Table C-2.2
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343795**
Subcatchment Size 3.05 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	0.723	0.000	0.1%
Impervious-High	0.025	0.000	0.0%
Impervious-Mod	0.062	0.000	0.0%
Impervious-Low	1.114	0.061	5.5%
Pervious-High-D	0.139	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%
Pervious-Mod-D	0.143	0.000	0.0%
Pervious-Mod-C	0.000	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%
Pervious-Low-D	0.795	0.071	8.9%
Pervious-Low-C	0.000	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%
Totals	3.001	0.133	

Table C-2.3
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343818**
Subcatchment Size 9.7 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	2.380	0.001	0.0%	0.038	1.6%
Impervious-High	0.069	0.000	0.0%	0.000	0.0%
Impervious-Mod	0.197	0.000	0.0%	0.000	0.0%
Impervious-Low	1.414	0.031	2.2%	0.133	9.4%
Pervious-High-D	0.564	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.512	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	1.389	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	2.875	0.041	1.4%	0.107	3.7%
Pervious-Low-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	9.400	0.073		0.277	

Table C-2.4
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

LBS_1343824
20.29 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	2.371	0.000281	0.0%
Impervious-High	0.336	-	0.0%
Impervious-Mod	1.328	0.009905	0.7%
Impervious-Low	0.533	0.053743	10.1%
Pervious-High-D	0.06	-	0.0%
Pervious-High-C	4.258	-	0.0%
Pervious-High-B	3.856	-	0.0%
Pervious-Mod-D	0.95	0.026371	2.8%
Pervious-Mod-C	1.045	-	0.0%
Pervious-Mod-B	4.706	-	0.0%
Pervious-Low-D	0.802	0.041730	5.2%
Pervious-Low-C		-	0.0%
Pervious-Low-B		-	0.0%
Totals	20.245	0.132	

Table C-2.5
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBS_1343835**
Subcatchment Size 3.86 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	1.096	0.504	45.9%
Impervious-High	0.000	0.000	0.0%
Impervious-Mod	0.073	0.005	7.5%
Impervious-Low	0.862	0.042	4.9%
Pervious-High-D	0.000	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%
Pervious-Mod-D	0.033	0.001	3.5%
Pervious-Mod-C	0.000	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%
Pervious-Low-D	1.621	0.508	31.3%
Pervious-Low-C	0.000	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%
Totals	3.685	1.060	

Table C-2.6
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343860**
Subcatchment Size 13.64 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	2.021	0.002169	0.1%
Impervious-High	0.131	0.020561	15.7%
Impervious-Mod	0.492	0.052239	10.6%
Impervious-Low	0.666	0.173769	26.1%
Pervious-High-D	2.978	-	0.0%
Pervious-High-C	3.053	0.038780	1.3%
Pervious-High-B	0.222	-	0.0%
Pervious-Mod-D	1.642	-	0.0%
Pervious-Mod-C	0.652	0.043546	6.7%
Pervious-Mod-B	0.176	-	0.0%
Pervious-Low-D	0.668	-	0.0%
Pervious-Low-C	0.934	0.301666	32.3%
Pervious-Low-B		-	0.0%
Totals	13.635	0.633	

Table C-2.7
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343865**
Subcatchment Size 4.99 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	0.998	0.256	25.7%
Impervious-High	0.000	0.000	0.0%
Impervious-Mod	0.110	0.085	77.4%
Impervious-Low	1.043	0.325	31.1%
Pervious-High-D	0.188	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%
Pervious-Mod-D	0.392	0.096	24.6%
Pervious-Mod-C	0.000	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%
Pervious-Low-D	2.257	0.647	28.7%
Pervious-Low-C	0.000	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%
Totals	4.988	1.410	

Table C-2.8
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343890**
Subcatchment Size 13.11 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	1.959	0.541	27.6%
Impervious-High	0.682	0.301	44.1%
Impervious-Mod	0.605	0.167	27.6%
Impervious-Low	0.357	0.050	13.9%
Pervious-High-D	1.866	0.238	12.8%
Pervious-High-C	3.113	1.676	53.8%
Pervious-High-B	0.000	0.000	0.0%
Pervious-Mod-D	2.329	0.853	36.6%
Pervious-Mod-C	1.073	0.216	20.2%
Pervious-Mod-B	0.674	0.000	0.0%
Pervious-Low-D	0.448	0.076	17.0%
Pervious-Low-C	0.000	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%
Totals	13.106	4.119	

Table C-2.9
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBS_1343891**
Subcatchment Size 13.51 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	2.292	0.019	0.8%
Impervious-High	0.607	0.000	0.0%
Impervious-Mod	0.911	0.000	0.0%
Impervious-Low	0.618	0.018	3.0%
Pervious-High-D	3.504	0.000	0.0%
Pervious-High-C	1.755	0.000	0.0%
Pervious-High-B	0	0.000	0.0%
Pervious-Mod-D	2.893	0.000	0.0%
Pervious-Mod-C	0.056	0.000	0.0%
Pervious-Mod-B	0	0.000	0.0%
Pervious-Low-D	0.798	0.052	6.5%
Pervious-Low-C	0	0.000	0.0%
Pervious-Low-B	0	0.000	0.0%
Totals	13.434	0.089	

Table C-2.10
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343910**
Subcatchment Size 35.09 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	5.778	0.456	7.9%
Impervious-High	0.753	0.002	0.2%
Impervious-Mod	2.643	0.060	2.3%
Impervious-Low	1.092	0.014	1.3%
Pervious-High-D	4.749	0.044	0.9%
Pervious-High-C	6.776	0.000	0.0%
Pervious-High-B	0.593	0.000	0.0%
Pervious-Mod-D	5.043	0.881	17.5%
Pervious-Mod-C	1.131	0.000	0.0%
Pervious-Mod-B	4.636	0.000	0.0%
Pervious-Low-D	1.587	0.381	24.0%
Pervious-Low-C	0.091	0.036	39.1%
Pervious-Low-B	0.214	0.000	0.0%
Totals	35.086	1.873	

Table C-2.11
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchme

February 19, 2013

Subcatchment **LBs_1343912**
Subcatchment Size 12.97 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	3.288	0.062	1.9%	2.228	67.7%
Impervious-High	0.068	0.000	0.0%	0.010	14.2%
Impervious-Mod	1.370	0.049	3.6%	1.125	82.1%
Impervious-Low	0.584	0.020	3.4%	0.445	76.2%
Pervious-High-D	0.935	0.000	0.0%	0.406	43.4%
Pervious-High-C	0.060	0.000	0.0%	0.017	27.6%
Pervious-High-B	0.594	0.000	0.0%	0.462	77.7%
Pervious-Mod-D	3.692	0.107	2.9%	3.058	82.8%
Pervious-Mod-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	1.104	0.000	0.0%	0.925	83.8%
Pervious-Low-D	1.272	0.229	18.0%	0.735	57.8%
Pervious-Low-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	12.967	0.466		9.409	

Table C-2.12
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBS_1343931**
Subcatchment Size 24.7 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	7.077	0.785	11.1%	1.303	18.4%
Impervious-High	0.245	0.098	40.2%	0.065	26.7%
Impervious-Mod	1.264	0.240	19.0%	0.396	31.3%
Impervious-Low	4.022	0.118	2.9%	1.233	30.6%
Pervious-High-D	2.412	1.572	65.2%	0.493	20.5%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.167	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	3.069	0.000	0.0%	1.085	35.3%
Pervious-Mod-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	5.908	0.637	10.8%	1.196	20.2%
Pervious-Low-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	24.164	3.449		5.771	

Table C-2.13
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343943**
Subcatchment Size 10.69 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	3.165	0.428	13.5%	1.699	53.7%
Impervious-High	0.239	0.000	0.2%	0.165	68.9%
Impervious-Mod	0.789	0.144	18.2%	0.441	55.9%
Impervious-Low	0.922	0.102	11.1%	0.625	67.8%
Pervious-High-D	0.484	0.414	85.5%	0.199	41.1%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.398	0.000	0.0%	0.263	66.1%
Pervious-Mod-D	2.882	0.000	0.0%	0.662	23.0%
Pervious-Mod-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	0.172	0.000	0.0%	0.105	61.2%
Pervious-Low-D	1.636	0.273	16.7%	0.544	33.2%
Pervious-Low-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	10.687	1.361		4.703	

Table C-2.14
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343961**
Subcatchment Size 7.25 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	2.224	0.106	4.7%	0.553	24.8%
Impervious-High	0.000	0.000	0.0%	0.000	0.0%
Impervious-Mod	0.000	0.000	0.0%	0.000	0.0%
Impervious-Low	2.574	0.168	6.5%	0.543	21.1%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	2.453	0.256	10.5%	0.566	23.1%
Pervious-Low-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	7.251	0.530		1.661	

Table C-2.15
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343966**
Subcatchment Size 17.28 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	4.353	0.004	0.1%
Impervious-High	0.918	0.000	0.0%
Impervious-Mod	1.474	0.007	0.5%
Impervious-Low	0.873	0.107	12.2%
Pervious-High-D	1.627	0.000	0.0%
Pervious-High-C	3.519	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%
Pervious-Mod-D	3.095	0.138	4.5%
Pervious-Mod-C	0.470	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%
Pervious-Low-D	0.952	0.081	8.6%
Pervious-Low-C	0.000	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%
Totals	17.281	0.337	

Table C-2.16
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1343967**
Subcatchment Size 5.12 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	1.050	0.000	0.0%	0.071	6.8%
Impervious-High	0.000	0.000	0.0%	0.000	0.0%
Impervious-Mod	0.000	0.000	0.0%	0.000	0.0%
Impervious-Low	0.812	0.007	0.9%	0.287	35.4%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.144	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	2.604	0.026	1.0%	0.220	8.4%
Pervious-Low-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	4.610	0.033		0.579	

APPENDIX C
TABLE 3

Table C-3
3RWW GI Project
Concept Municipal GI Project Evaluation Summary
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 277.34 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 91.34 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.96	0.30	0.00	0.00	0.00	0.00	1.26
Number of Candidate GI Projects	12	44	0	0	0	0	56
Portion of Drainage Area Tributary to Concept GI Projects (acres)	18.77	16.06	0.00	0.00	0.00	0.00	34.83
Annual Combined Sewer Area Runoff Captured (MG)*	7.55	3.93	0.00	0.00	0.00	0.00	11.48
Combined Sewer Area Runoff Capture (%)	8.27%	4.3%	0.0%	0.0%	0.0%	0.0%	12.6%
Opinion of Probable Cost***							
Construction Cost	\$ 458,000	\$ 294,600	\$ -	\$ -	\$ -	\$ -	\$ 752,600
O/M Cost (20 years)	\$ 19,000	\$ 23,000	\$ -	\$ -	\$ -	\$ -	\$ 42,000
Present Worth Cost**	\$ 477,000	\$ 318,000	\$ -	\$ -	\$ -	\$ -	\$ 795,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 26,000	\$ 20,000	\$ -	\$ -	\$ -	\$ -	\$ 23,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

**APPENDIX C
TABLES 4.1
THROUGH 4.6**

Table C-4.1
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary- Regulator CSO#1
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 7.25 acres
Total Annual Combined Sewer Area Runoff (RainWays) 4.18 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	
	LBs_1343961	Total
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.093	0.093
Number of Candidate GI Projects	4	4
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.43	0.43
Annual Combined Sewer Area Runoff Captured (MG)*	0.73	0.73
Combined Sewer Area Runoff Capture (%)**	17.4%	17.4%
Opinion of Probable Cost****		
Construction Cost	\$ 45,000	\$45,000
O/M Cost (20 years)	\$ 2,000	\$2,000
Present Worth Cost***	\$ 47,000	\$47,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 109,213	\$110,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

***Present Worth calculated assuming a 20 year term at 1% interest.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-4.2
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary- Regulator CSO#2
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 17.28 acres
Total Annual Combined Sewer Area Runoff (RainWays) 7.19 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	
	LBs_1343966	Total
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.01	0.01
Number of Candidate GI Projects	1	1
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.12	0.12
Annual Combined Sewer Area Runoff Captured (MG)*	0.08	0.08
Combined Sewer Area Runoff Capture (%)**	1.1%	1.1%
Opinion of Probable Cost****		
Construction Cost	\$ 5,000	\$5,000
O/M Cost (20 years)	\$ 1,000	\$1,000
Present Worth Cost***	\$ 6,000	\$6,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 53,000	\$53,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

***Present Worth calculated assuming a 20 year term at 1% interest.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-4.3
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary- Regulator MH.I-IRO-OF-Hayes SSO
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 29.83 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 13.47 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement		
	LBS_1343911	LBS_1343931	Total
Subcatchment			
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.007	0.01	0.02
Number of Candidate GI Projects	1	1	2.00
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.09	0.11	0.20
Annual Combined Sewer Area Runoff Captured (MG)*	0.06	0.08	0.14
Combined Sewer Area Runoff Capture (%)**	4.89%	0.71%	1.0%
Opinion of Probable Cost****			
Construction Cost	\$ 4,000	\$ 5,000	\$ 9,000
O/M Cost (20 years)	\$ 1,000	\$ 1,000	\$ 2,000
Present Worth Cost***	\$ 5,000	\$ 5,000	\$ 10,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 59,000	\$ 47,000	\$ 106,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

***Present Worth calculated assuming a 20 year term at 1% interest.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-4.4
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary- Regulator CSO#5
Girty's Run - Millvale
February 19, 2013

Table C-4.4

Total Combined Sewer Area 12.97 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 5.05 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	
	LBs_1343912	Total
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.009	0.01
Number of Candidate GI Projects	1	1
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.09	0.09
Annual Combined Sewer Area Runoff Captured (MG)*	0.07168722	0.07
Combined Sewer Area Runoff Capture (%)**	1.42%	1.42%
Opinion of Probable Cost****		
Construction Cost	\$ 5,000	\$5,000
O/M Cost (20 years)	\$ 1,000	\$1,000
Present Worth Cost***	\$ 5,000	\$5,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 54,000	\$54,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

***Present Worth calculated assuming a 20 year term at 1% interest.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-4.5
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary- Regulator MH.07-IRO-OF
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 106 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 30.56 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement						
	LBs_1343766	LBs_1343818	LBs_1343767	LBs_1343785	LBs_1343835	LBs_1343865	Total
Subcatchment							
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.05	0.024	0.066	0.037	0.022	0.008	0.21
Number of Candidate GI Projects	1	2	2	1	1	1	8
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.95	0.25	0.80	1.32	0.24	0.12	3.68
Annual Combined Sewer Area Runoff Captured (MG)*	0.39	0.19	0.52	0.29	0.17	0.07	1.63
Combined Sewer Area Runoff Capture (%)**	4.9%	4.92%	20.81%	14.2%	9.48%	3.22%	5.33%
Opinion of Probable Cost****							
Construction Cost	\$24,000	\$ 12,000	\$ 32,000	\$ 18,000	\$ 11,000	\$ 4,000	\$101,000
O/M Cost (20 years)	\$1,000	\$ 1,000	\$ 2,000	\$ 1,000	\$ 1,000	\$ 1,000	\$7,000
Present Worth Cost***	\$24,000	\$ 12,000	\$ 34,000	\$ 19,000	\$ 12,000	\$ 5,000	\$106,000
Present Worth Cost per Drainage Area Treated (acres)	\$26,000	\$ 48,000	\$ 43,000	\$ 15,000	\$ 52,000	\$ 41,000	\$29,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

***Present Worth calculated assuming a 20 year term at 1% interest.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table C-4.6
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary- Regulator CSO#7
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 3.05 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 1.69 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	
	LBs_1343795	Totals
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.009	0.01
Number of Candidate GI Projects	1	1
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.097	0.10
Annual Combined Sewer Area Runoff Captured (MG)*	0.07	0.07
Combined Sewer Area Runoff Capture (%)**	4.24%	4.24%
Opinion of Probable Cost****		
Construction Cost	\$ 5,000	\$5,000
O/M Cost (20 years)	\$ 1,000	\$1,000
Present Worth Cost***	\$ 5,000	\$5,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 52,000	\$52,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

***Present Worth calculated assuming a 20 year term at 1% interest.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX C
TABLES 5.1
THROUGH 5.9

Table C-5.1
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary- Regulator CSO#1
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 7.25 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 4.18 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	LBs_1343961	Total
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.44	0.44
Number of Candidate GI Projects	2	2
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.44	0.44
Annual Combined Sewer Area Runoff Captured (MG)**	0.37	0.37
Combined Sewer Area Runoff Capture (%)***	8.96%	8.96%
Opinion of Probable Cost*****		
Construction Cost	\$458,000	\$458,000
O/M Cost (20 years)	\$8,000	\$8,000
Present Worth Cost****	\$465,000	\$465,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,046,000	\$1,046,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT

Table C-5.2
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary- Regulator CSO#9
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 10.69 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 4.76 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	LBs_1343943	Totals
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.14	0.14
Number of Candidate GI Projects	1	1
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.14	0.14
Annual Combined Sewer Area Runoff Captured (MG)**	0.12	0.12
Combined Sewer Area Runoff Capture (%)***	2.55%	2.55%
Opinion of Probable Cost*****		
Construction Cost	\$149,000	\$149,000
O/M Cost (20 years)	\$3,000	\$3,000
Present Worth Cost****	\$152,000	\$152,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,056,000	\$1,056,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth Cost calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT

Table C-5.3
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary- Regulator CSO#2
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 17.28 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 7.19 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	LBS_1343966	Total
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	1.49	1.49
Number of Candidate GI Projects	5	5
Portion of Drainage Area Tributary to Concept GI Projects (acres)	1.49	1.49
Annual Combined Sewer Area Runoff Captured (MG)**	1.26	1.26
Combined Sewer Area Runoff Capture (%)***	17.52%	17.52%
Opinion of Probable Cost*****		
Construction Cost	\$1,535,000	\$1,535,000
O/M Cost (20 years)	\$27,000	\$27,000
Present Worth Cost****	\$1,559,000	\$1,559,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,045,000	\$1,045,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT

Table C-5.4
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary- Regulator CSO#3
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 4.42 acres
Total Annual Combined Sewer Area Runoff (RainWays) 2.09 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	LBs_1343950	Total
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.34	0.34
Number of Candidate GI Projects	2	2
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.34	0.34
Annual Combined Sewer Area Runoff Captured (MG)**	0.28	0.28
Combined Sewer Area Runoff Capture (%)***	13.60%	13.60%
Opinion of Probable Cost*****		
Construction Cost	\$347,000	\$347,000
O/M Cost (20 years)	\$6,000	\$6,000
Present Worth Cost*****	\$353,000	\$353,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,048,000	\$1,048,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT

Table C-5.5
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary- Regulator MH.I-RO-OF-Hayes SSO
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 29.83 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 13.47 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*			
	LBs_1343894	LBs_1343911	LBs_1343931	Total
Subcatchment				
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.18	0.14	1.83	2.15
Number of Candidate GI Projects	1	1	11	13
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.18	0.14	1.83	2.15
Annual Combined Sewer Area Runoff Captured (MG)**	0.16	0.12	1.54	1.82
Combined Sewer Area Runoff Capture (%)***	19.85%	10.55%	13.34%	13.49%
Opinion of Probable Cost*****				
Construction Cost	\$190,000	\$146,000	\$1,880,000	\$2,216,000
O/M Cost (20 years)	\$4,000	\$3,000	\$32,000	\$39,000
Present Worth Cost****	\$193,000	\$149,000	\$1,909,000	\$2,251,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,048,000	\$1,050,000	\$1,044,000	\$1,045,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT

Table C-5.6
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary- Regulator CSO#4
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 35.09 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 10.36 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	LBs_1343910	Totals
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.15	0.15
Number of Candidate GI Projects	1	1
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.15	0.15
Annual Combined Sewer Area Runoff Captured (MG)**	0.13	0.13
Combined Sewer Area Runoff Capture (%)***	1.23%	1.23%
Opinion of Probable Cost*****		
Construction Cost	\$156,000	\$156,000
O/M Cost (20 years)	\$3,000	\$3,000
Present Worth Cost*****	\$159,000	\$159,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,054,000	\$1,054,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT

Table C-5.7
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary- Regulator CSO#5
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 12.97 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 5.05 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	LBs_1343912	Total
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.42	0.42
Number of Candidate GI Projects	2	2
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.42	0.42
Annual Combined Sewer Area Runoff Captured (MG)**	0.35	0.35
Combined Sewer Area Runoff Capture (%)***	7.01%	7.01%
Opinion of Probable Cost*****		
Construction Cost	\$433,000	\$433,000
O/M Cost (20 years)	\$8,000	\$8,000
Present Worth Cost****	\$440,000	\$440,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,047,000	\$1,047,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT

Table C-5.8
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary- Regulator MH.07-IRO-OF
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 106 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 30.56 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*				
	LBs_1343766	LBs_1343818	LBs_1343835	LBs_1343890	Total
Subcatchment					
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.77	0.18	0.37	0.12	1.44
Number of Candidate GI Projects	2	1	1	1	5
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.77	0.18	0.37	0.12	1.44
Annual Combined Sewer Area Runoff Captured (MG)**	0.65	0.15	0.31	0.10	1.21
Combined Sewer Area Runoff Capture (%)***	7.97%	3.97%	17.22%	2.59%	3.96%
Opinion of Probable Cost*****					
Construction Cost	\$790,000	\$187,000	\$383,000	\$119,000	\$1,479,000
O/M Cost (20 years)	\$14,000	\$4,000	\$7,000	\$3,000	\$28,000
Present Worth Cost****	\$803,000	\$190,000	\$389,000	\$121,000	\$1,503,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,046,000	\$1,050,000	\$1,046,000	\$1,049,000	\$1,047,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT

Table C-5.9
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary- Regulator CSO#7
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 3.05 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 1.69 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	LBs_1343795	Totals
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.35	0.35
Number of Candidate GI Projects	1	1
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.35	0.35
Annual Combined Sewer Area Runoff Captured (MG)**	0.29	0.29
Combined Sewer Area Runoff Capture (%)***	17.41%	17.41%
Opinion of Probable Cost*****		
Construction Cost	\$360,000	\$360,000
O/M Cost (20 years)	\$7,000	\$7,000
Present Worth Cost****	\$366,000	\$366,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,048,000	\$1,048,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT

APPENDIX C
TABLE 6

Table C-6
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 277.34 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 91.34 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement						Totals
	CSO#1	CSO#2	MH.I-IRO-OF-Hayes SSO	CSO#5	MH.07-IRO-OF	CSO#7	
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.093	0.01	0.017	0.009	0.207	0.009	0.35
Number of Candidate GI Projects	4	1	2	1	8	1	17
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.43	0.115	0.198	0.094	3.676	0.097	4.61
Annual Combined Sewer Area Runoff Captured (MG)*	0.73	0.08	0.14	0.07	1.63	0.07	2.72
Combined Sewer Area Runoff Capture (%)**	17.4%	1.1%	1.0%	1.4%	5.3%	4.2%	3.0%
Opinion of Probable Cost****							
Construction Cost	\$ 45,000	\$ 5,000	\$ 9,000	\$ 5,000	\$ 101,000	\$ 5,000	\$ 170,000
O/M Cost (20 years)	\$ 2,000	\$ 1,000	\$ 2,000	\$ 1,000	\$ 7,000	\$ 1,000	\$ 14,000
Present Worth Cost***	\$ 47,000	\$ 6,000	\$ 10,000	\$ 5,000	\$ 106,000	\$ 5,000	\$ 184,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 110,000	\$ 53,000	\$ 106,000	\$ 54,000	\$ 29,000	\$ 52,000	\$ 39,913

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each regulator. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the entire sewershed.

***Present Worth calculated assuming a 20 year term at 1% interest.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX C
TABLE 7

Table C-7
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary
Girty's Run - Millvale
February 19, 2013

Total Combined Sewer Area 277.34 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 91.34 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roofs*									
	CSO#1	CSO#9	CSO#2	CSO#3	MH.I-IRO-OF-Hayes SSO	CSO#4	CSO#5	MH.07-IRO-OF	CSO#7	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.44	0.14	1.49	0.34	2.15	0.15	0.42	1.44	0.35	6.93
Number of Candidate GI Projects	2	1	5	2	13	1	2	5	1	32
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.44	0.14	1.49	0.34	2.15	0.15	0.42	1.44	0.35	6.93
Annual Combined Sewer Area Runoff Captured (MG)**	0.37	0.12	1.26	0.28	1.82	0.13	0.35	1.21	0.29	5.84
Combined Sewer Area Runoff Capture (%)***	8.96%	2.55%	17.52%	13.60%	13.49%	1.23%	7.01%	3.96%	17.41%	6.40%
Opinion of Probable Cost*****										
Construction Cost	\$458,000	\$149,000	\$1,535,000	\$347,000	\$2,216,000	\$156,000	\$433,000	\$1,479,000	\$360,000	\$7,133,000
O/M Cost (20 years)	\$8,000	\$3,000	\$27,000	\$6,000	\$39,000	\$3,000	\$8,000	\$28,000	\$7,000	\$129,000
Present Worth Cost*****	\$465,000	\$152,000	\$1,559,000	\$353,000	\$2,251,000	\$159,000	\$440,000	\$1,503,000	\$366,000	\$7,248,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,046,000	\$1,056,000	\$1,045,000	\$1,048,000	\$1,045,000	\$1,054,000	\$1,047,000	\$1,047,000	\$1,048,000	\$1,046,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each regulator. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the entire sewershed.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX C
RAINWAYS
OUTPUT

**APPENDIX C
RAINWAYS
OUTPUT
INFILTRATION
BMPs**

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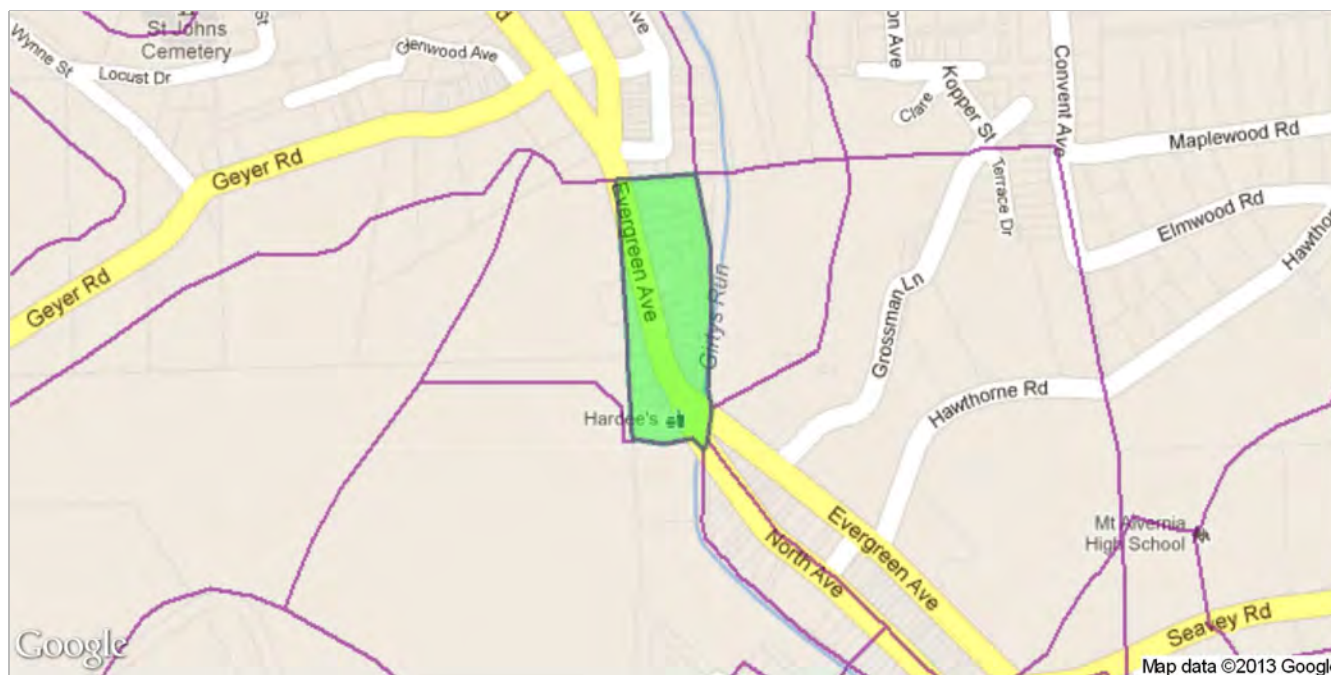
GR_LBs_1343767_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 4.98 acres

Total project cost: \$10,000

Priority area ranking: Medium-Medium (5.39/10)

Design depth: 1 inches

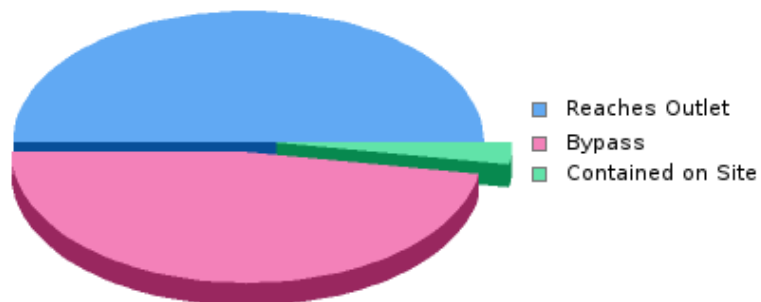
Total impervious area: 2.8 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343767)

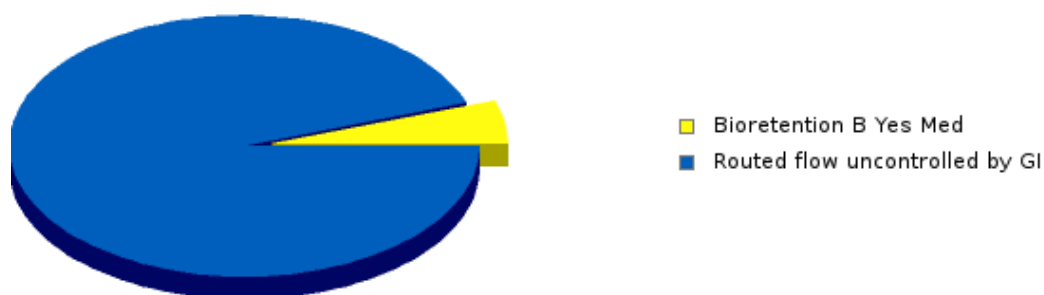
Municipalities: Reserve Township

Overall Green Infrastructure Performance

Runoff Distribution












Relative GI Reduction of Runoff



Total Runoff pre-BMP	7.64 acre-ft
Total Reduction	5.1 %
Total Runoff Captured	0.39 acre-ft
Total Outlets	7.25 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			5,333 gallons (0.2 acre-in) 0.01 acres	
	Water	0.157	0	0% flow	
	Building	0.672	1.73	4% flow	
	Impervious-High	0.131	0.34	0% flow	
	Impervious-Mod	0.366	0.94	16% flow	
	Impervious-Low	1.626	4.12	6% flow	
LBs_1343767	Pervious-High-D	0.131	0.04	0% flow	
	Pervious-High-C	0.095	0.02	0% flow	
	Pervious-Mod-D	0.284	0.08	5% flow	
	Pervious-Low-D	1.518	0.36	11% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			5.08%	
	BMP Runoff Reduction			0.39 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343767	Bioretention B Yes Med	\$9,500	\$500	20	\$10,000

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343767	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343767

Bioretention B Yes Med Effluent: 0.1 acre-ft

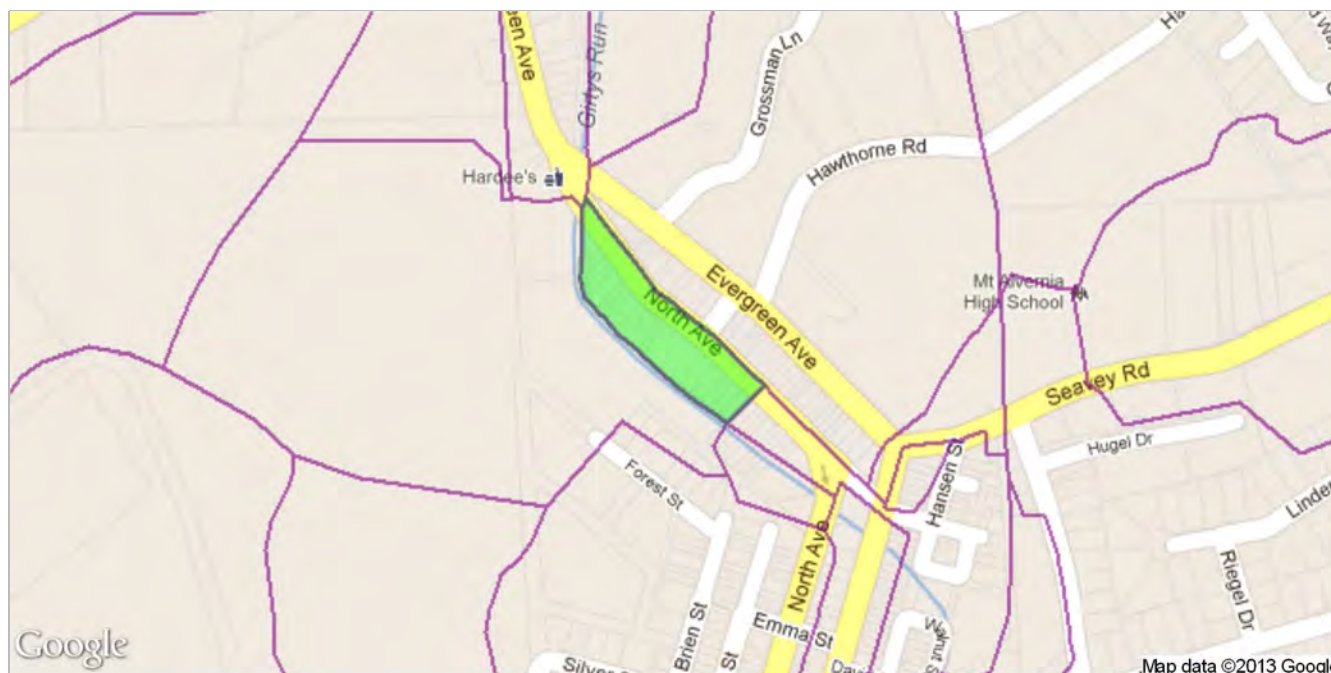
GR_LBs_1343795_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 3.05 acres

Total project cost: \$4,000

Priority area ranking: Medium-High (6.08/10)

Design depth: 1 inches

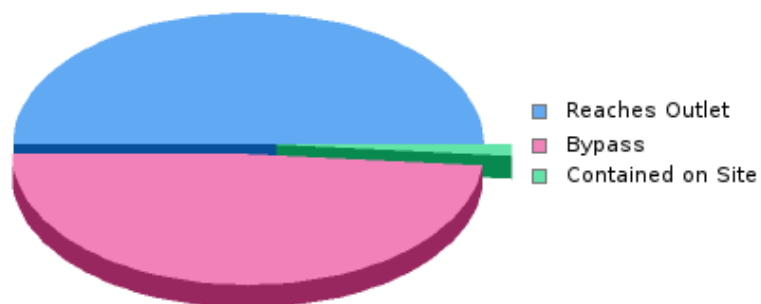
Total impervious area: 1.9 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343795)

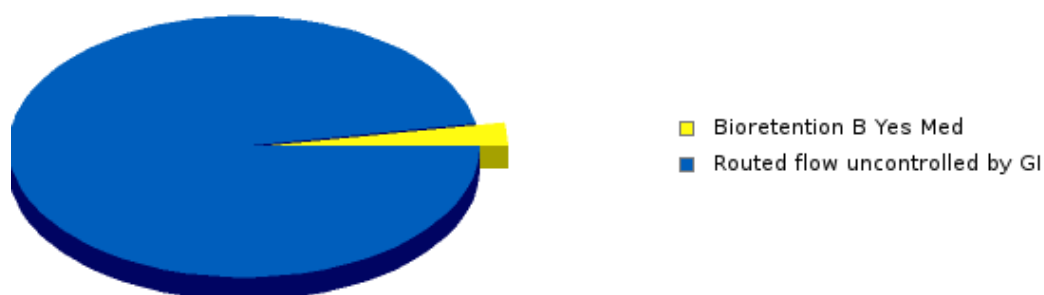
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution











Relative GI Reduction of Runoff



Total Runoff pre-BMP	5.19 acre-ft
Total Reduction	2.7 %
Total Runoff Captured	0.14 acre-ft
Total Outlets	5.05 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			1,942 gallons (0.1 acre-in) 0.004 acres	
	Water	0.049	0	0% flow	
	Building	0.723	1.87	0% flow	
	Impervious-High	0.025	0.07	0% flow	
	Impervious-Mod	0.062	0.16	0% flow	
LBs_1343795	Impervious-Low	1.114	2.82	6% flow	
	Pervious-High-D	0.139	0.05	0% flow	
	Pervious-Mod-D	0.143	0.04	0% flow	
	Pervious-Low-D	0.795	0.19	9% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			2.73%	
	BMP Runoff Reduction			0.14 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343795	Bioretention B Yes Med	\$3,500	\$200	20	\$3,700

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1343795	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBS_1343795

Bioretention B Yes Med Effluent: 0 acre-ft

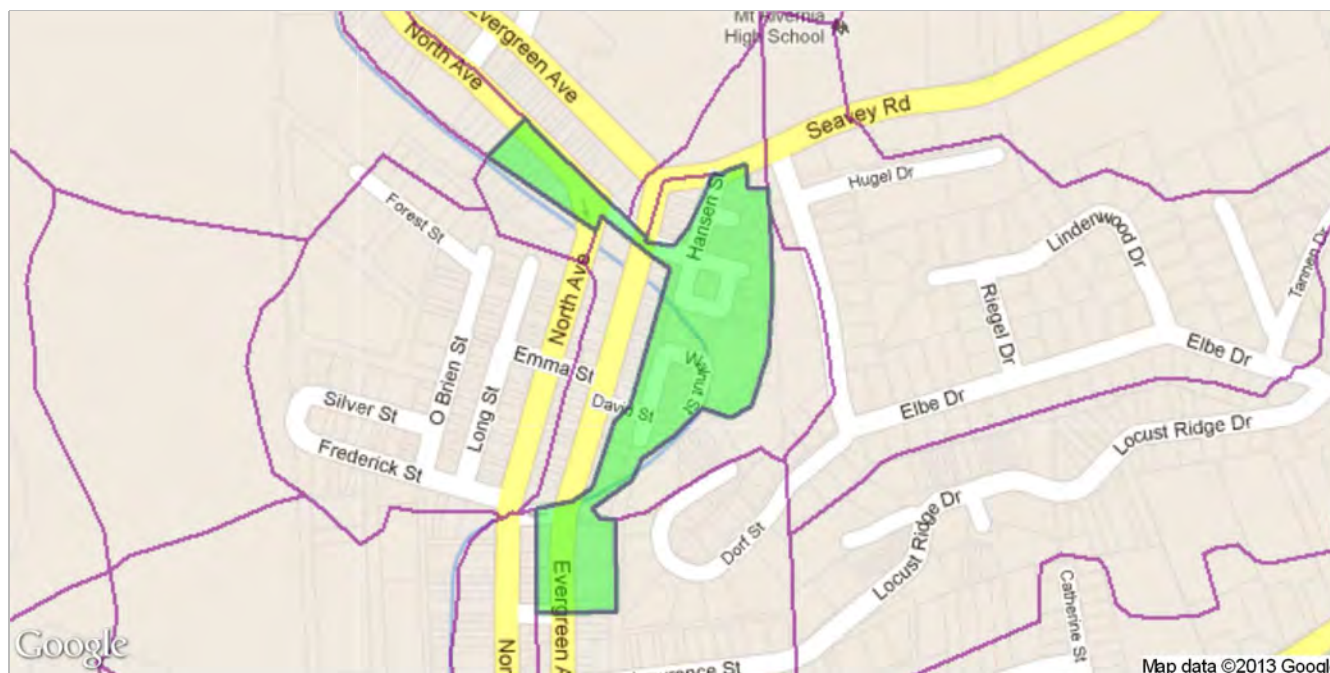
GR_LBs_1343818_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 9.7 acres

Total project cost: \$2,000

Priority area ranking: Medium-High (5.96/10)

Design depth: 1 inches

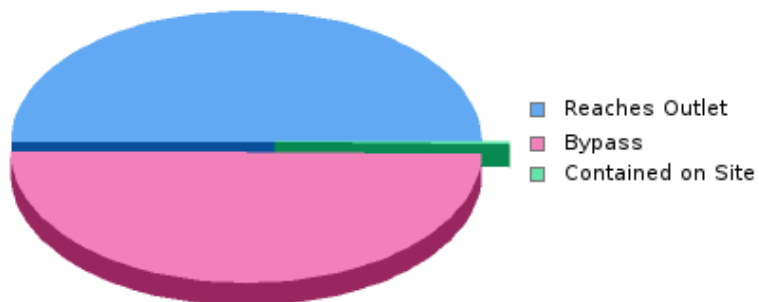
Total impervious area: 4.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343818)

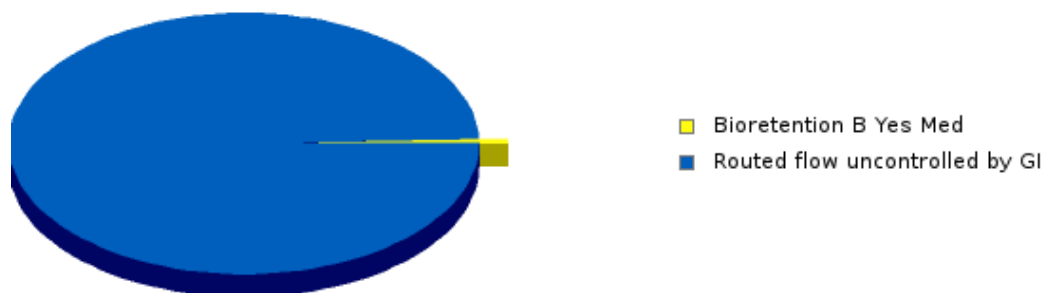
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	11.78 acre-ft
Total Reduction	0.5 %
Total Runoff Captured	0.06 acre-ft
Total Outlets	11.72 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			889 gallons (0 acre-in) 0.002 acres	
	Water	0.302	0	0% flow	
	Building	2.38	6.14	0% flow	
	Impervious-High	0.069	0.18	0% flow	
	Impervious-Mod	0.197	0.51	0% flow	
	Impervious-Low	1.414	3.58	2% flow	
LBs_1343818	Pervious-High-D	0.564	0.18	0% flow	
	Pervious-High-C	0.512	0.1	0% flow	
	Pervious-Mod-D	1.389	0.41	0% flow	
	Pervious-Low-D	2.875	0.68	2% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0.55%	
	BMP Runoff Reduction			0.06 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343818	Bioretention B Yes Med	\$1,600	\$100	20	\$1,700

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343818	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343818

Bioretention B Yes Med Effluent: 0 acre-ft

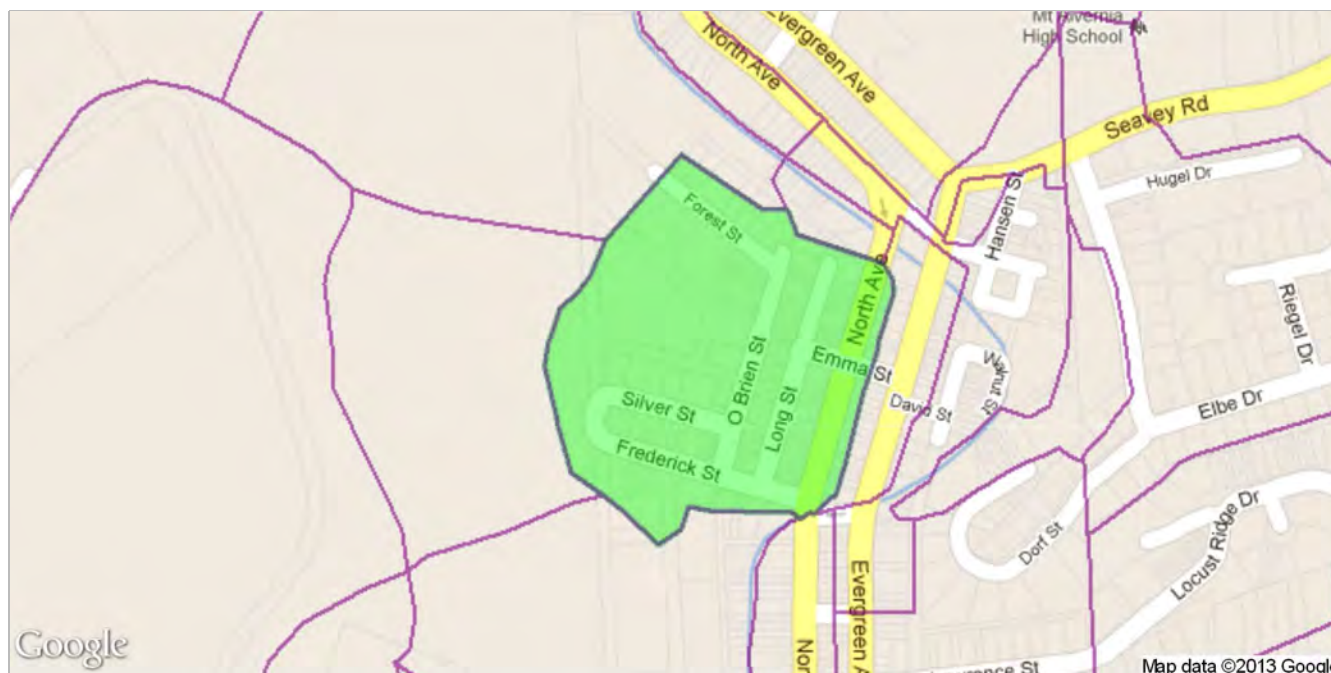
GR_LBs_1343824_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 20.29 acres

Total project cost: \$4,000

Priority area ranking: Medium-High (5.94/10)

Design depth: 1 inches

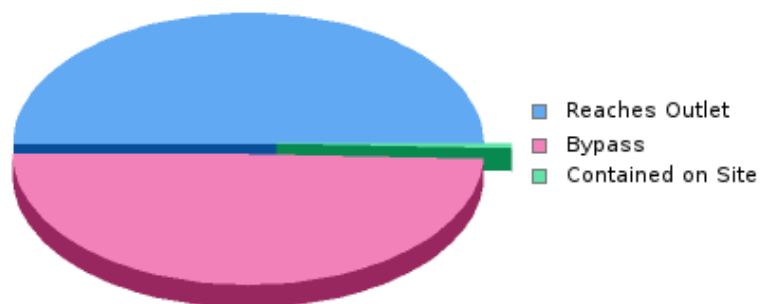
Total impervious area: 4.6 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343824)

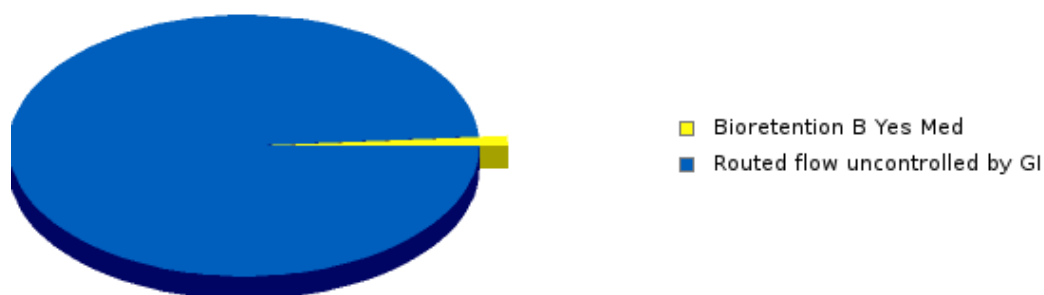
Municipalities: Reserve Township

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	13.9 acre-ft
Total Reduction	1.1 %
Total Runoff Captured	0.15 acre-ft
Total Outlets	13.75 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			2,092 gallons (0.1 acre-in) 0.004 acres	
	Water	0.04	0	0% flow	
	Building	2.371	6.12	0% flow	
	Impervious-High	0.336	0.87	0% flow	
	Impervious-Mod	1.328	3.43	1% flow	
	Impervious-Low	0.533	1.35	11% flow	
	Pervious-High-D	0.06	0.02	0% flow	
LBs_1343824	Pervious-High-C	4.258	0.81	0% flow	
	Pervious-High-B	3.856	0.33	0% flow	
	Pervious-Mod-D	0.95	0.28	3% flow	
	Pervious-Mod-C	1.045	0.17	0% flow	
	Pervious-Mod-B	4.706	0.33	0% flow	
	Pervious-Low-D	0.802	0.19	5% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			1.1%	
	BMP Runoff Reduction			0.15 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
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LBs_1343824	Bioretention B Yes Med	\$3,700	\$200	20	\$3,900
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Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343824	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343824

Bioretention B Yes Med Effluent: 0 acre-ft

GR_LBs_1343835_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 3.86 acres

Total project cost: \$30,000

Priority area ranking: Medium-High (5.58/10)

Design depth: 1 inches

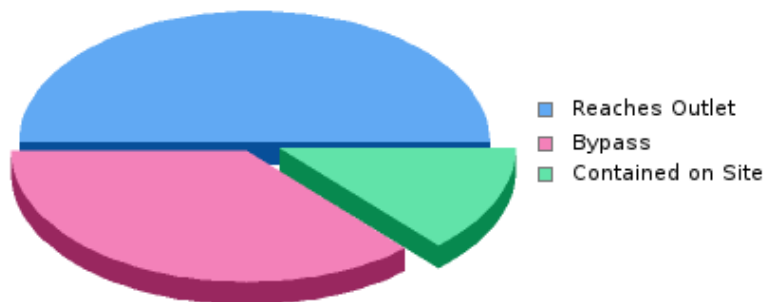
Total impervious area: 2 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343835)

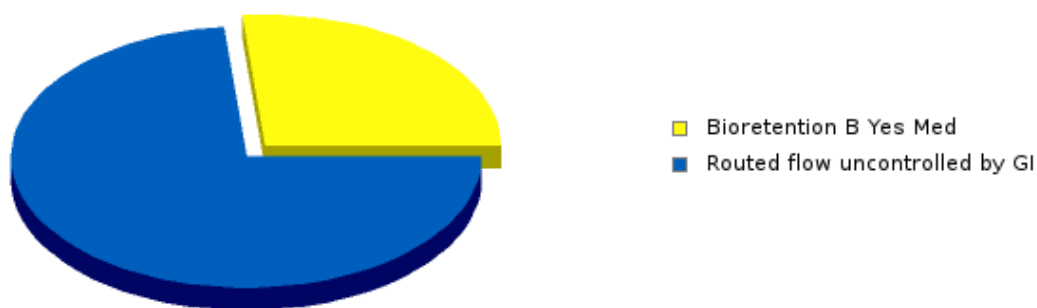
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution






Relative GI Reduction of Runoff



Total Runoff pre-BMP	5.59 acre-ft
Total Reduction	21 %
Total Runoff Captured	1.17 acre-ft
Total Outlets	4.42 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			16,116 gallons (0.6 acre-in) 0.03 acres	
	Water	0.177	0	0% flow	
	Building	1.096	2.83	46% flow	
	Impervious-Mod	0.073	0.19	8% flow	
LBs_1343835	Impervious-Low	0.862	2.18	5% flow	
	Pervious-Mod-D	0.033	0.01	4% flow	
	Pervious-Low-D	1.621	0.38	31% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			20.99%	
	BMP Runoff Reduction			1.17 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343835	Bioretention B Yes Med	\$28,700	\$1,600	20	\$30,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343835	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343835

Bioretention B Yes Med Effluent: 0.4 acre-ft

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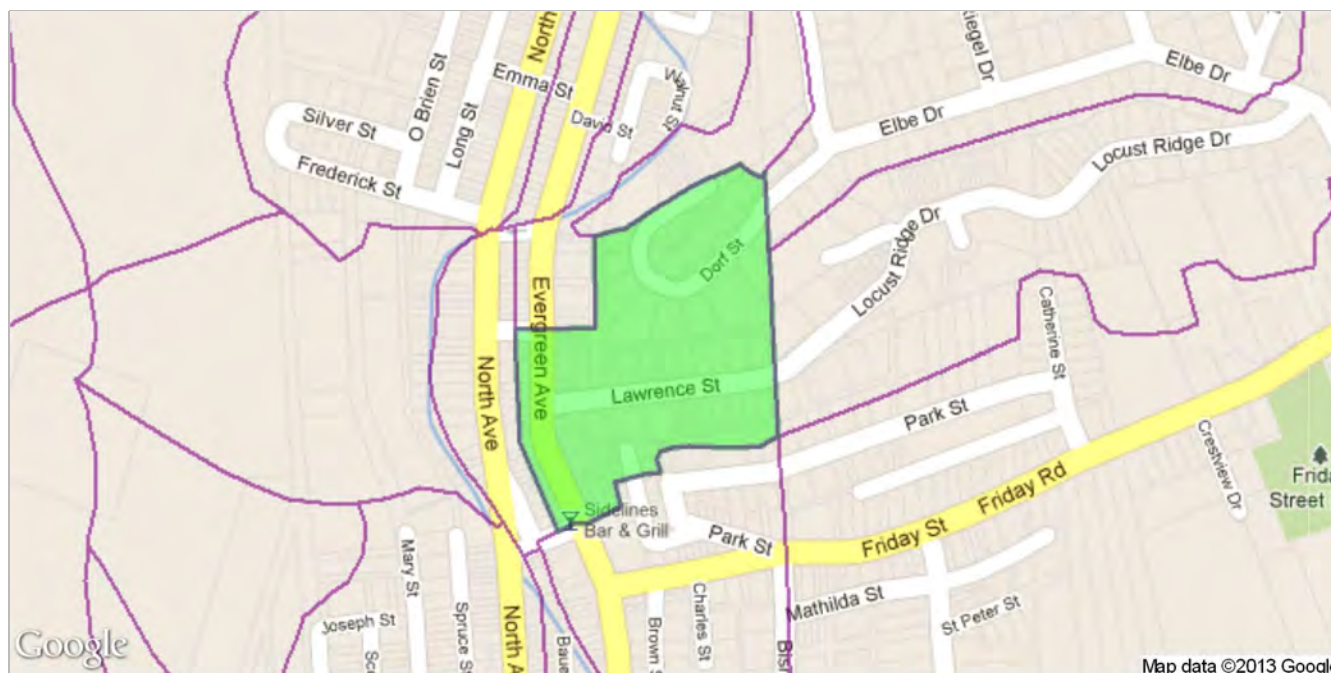
GR_LBs_1343860_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 13.64 acres

Total project cost: \$13,000

Priority area ranking: Medium-High (6.01/10)

Design depth: 1 inches

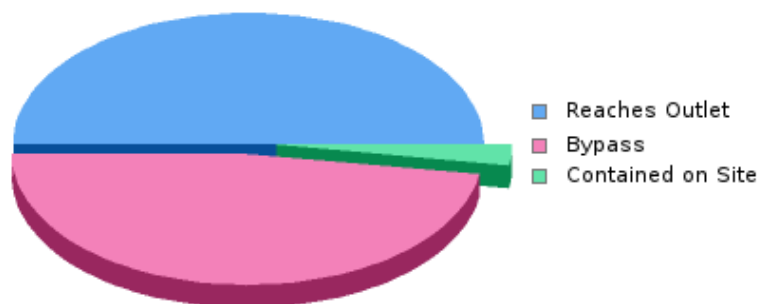
Total impervious area: 3.3 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343860)

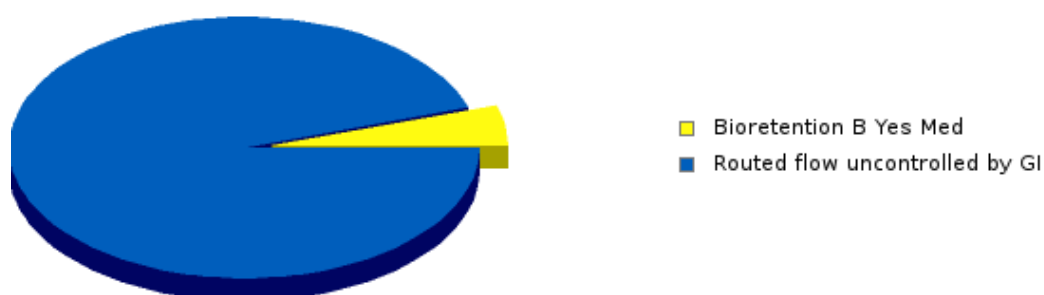
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	10.96 acre-ft
Total Reduction	4.7 %
Total Runoff Captured	0.52 acre-ft
Total Outlets	10.44 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			7,132 gallons (0.3 acre-in) 0.013 acres	
	Building	2.021	5.22	0% flow	
	Impervious-High	0.131	0.34	16% flow	
	Impervious-Mod	0.492	1.27	11% flow	
	Impervious-Low	0.666	1.69	26% flow	
	Pervious-High-D	2.978	0.98	0% flow	
	Pervious-High-C	3.053	0.58	1% flow	
LBs_1343860	Pervious-High-B	0.222	0.02	0% flow	
	Pervious-Mod-D	1.642	0.48	0% flow	
	Pervious-Mod-C	0.652	0.11	7% flow	
	Pervious-Mod-B	0.176	0.01	0% flow	
	Pervious-Low-D	0.668	0.16	0% flow	
	Pervious-Low-C	0.934	0.12	32% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			4.74%	
	BMP Runoff Reduction			0.52 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
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LBs_1343860	Bioretention B Yes Med	\$12,700	\$700	20	\$13,400
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Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343860	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343860

Bioretention B Yes Med Effluent: 0.2 acre-ft

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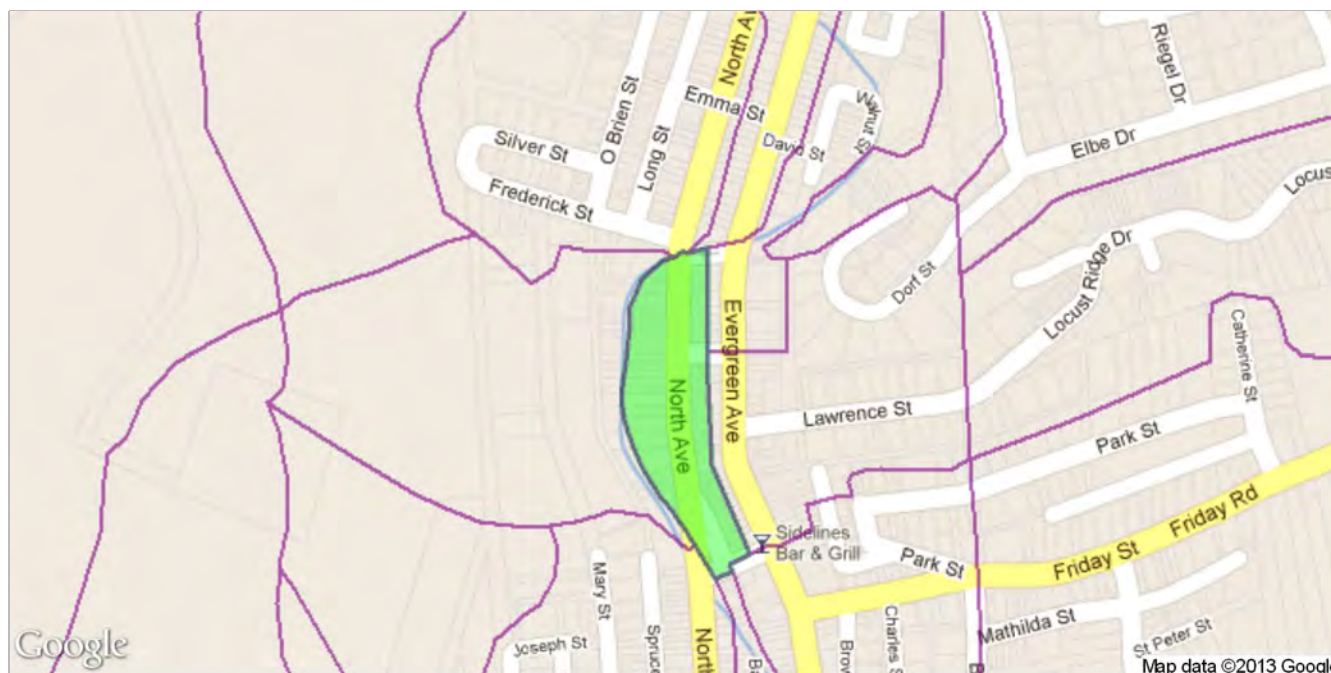
GR_LBs_1343865_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 4.99 acres

Total project cost: \$37,000

Priority area ranking: Medium-High (6/10)

Design depth: 1 inches

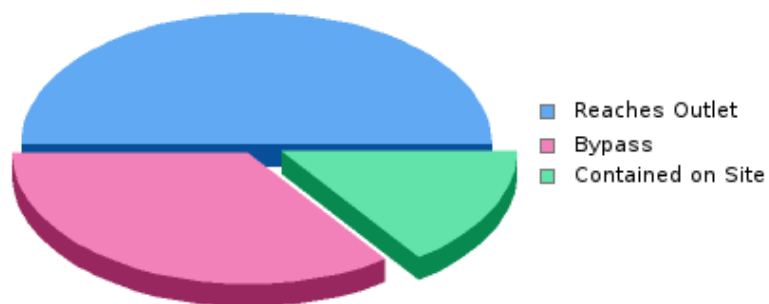
Total impervious area: 2.2 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343865)

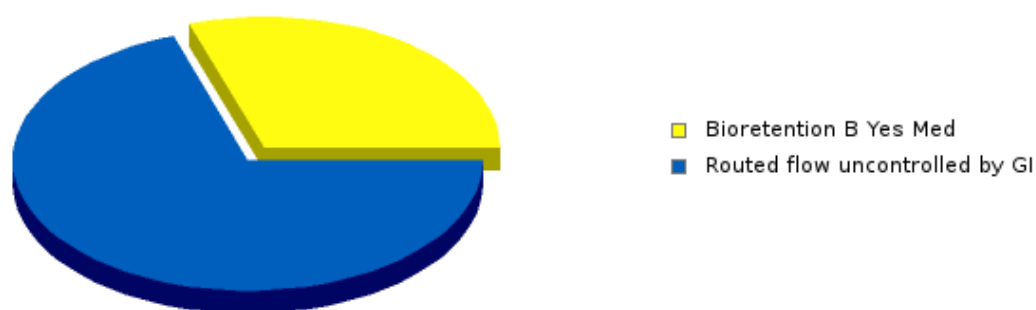
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	6.21 acre-ft
Total Reduction	23.2 %
Total Runoff Captured	1.44 acre-ft
Total Outlets	4.77 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			19,751 gallons (0.7 acre-in) 0.037 acres	
	Building	0.998	2.58	26% flow	
	Impervious-Mod	0.11	0.28	78% flow	
	Impervious-Low	1.043	2.64	31% flow	
LBs_1343865	Pervious-High-D	0.188	0.06	0% flow	
	Pervious-Mod-D	0.392	0.11	25% flow	
	Pervious-Low-D	2.257	0.53	29% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			23.16%	
	BMP Runoff Reduction			1.44 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343865	Bioretention B Yes Med	\$35,200	\$1,900	20	\$37,100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343865	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343865

Bioretention B Yes Med Effluent: 0.5 acre-ft

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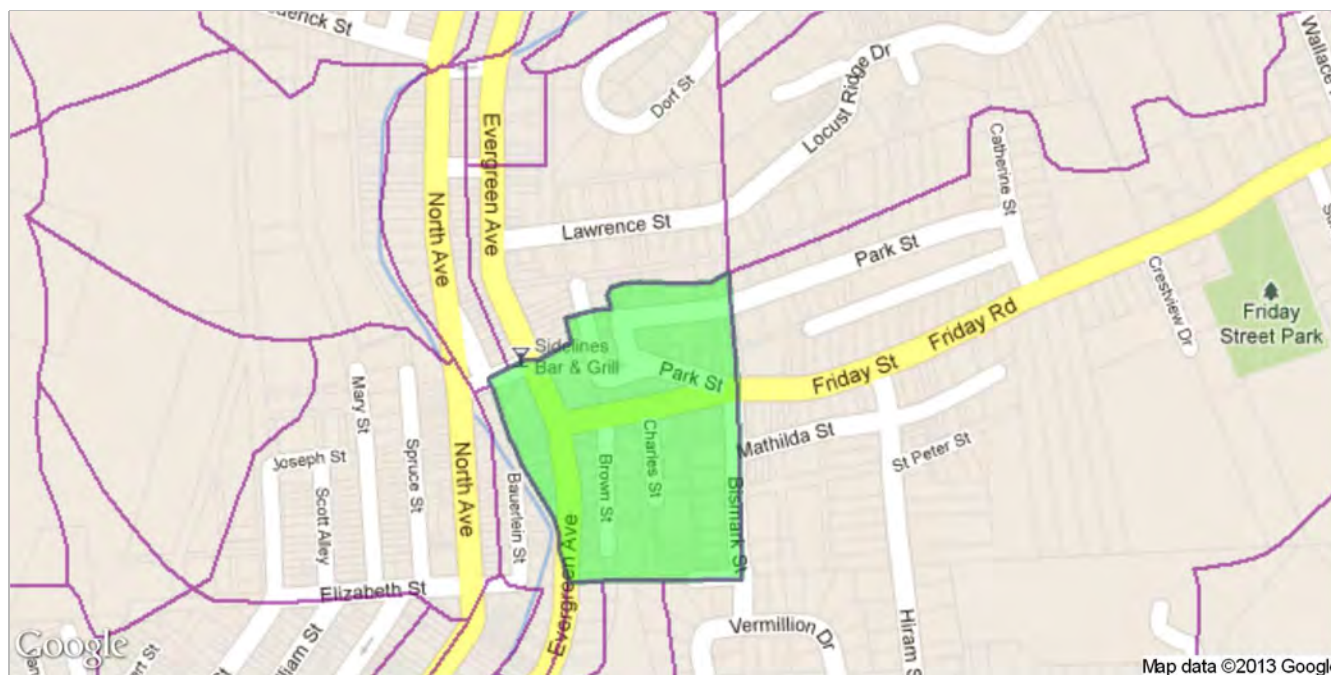
GR_LBs_1343890_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 13.11 acres

Total project cost: \$20,000

Priority area ranking: Medium-High (5.96/10)

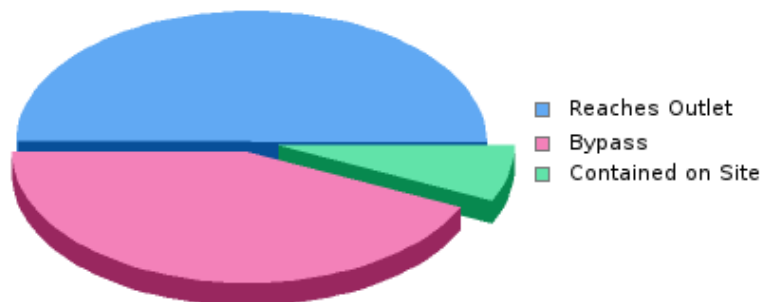
Total impervious area: 3.6 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343890)

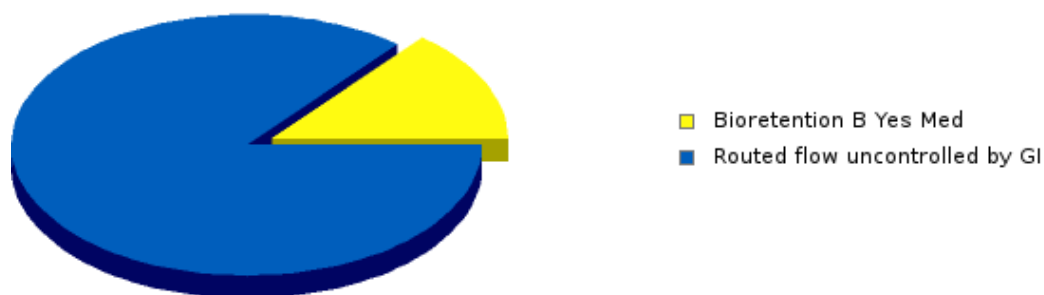
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	11.51 acre-ft
Total Reduction	12.2 %
Total Runoff Captured	1.41 acre-ft
Total Outlets	10.1 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			10,753 gallons (0.4 acre-in) 0.02 acres	
	Building	1.959	5.06	28% flow	
	Impervious-High	0.682	1.78	44% flow	
	Impervious-Mod	0.605	1.56	28% flow	
	Impervious-Low	0.357	0.9	14% flow	
	Pervious-High-D	1.866	0.61	13% flow	
LBs_1343890	Pervious-High-C	3.113	0.59	54% flow	
	Pervious-Mod-D	2.329	0.68	37% flow	
	Pervious-Mod-C	1.073	0.18	20% flow	
	Pervious-Mod-B	0.674	0.05	0% flow	
	Pervious-Low-D	0.448	0.11	17% flow	
	Design Depth			0.3 inches	
	Percent BMP Effectiveness			12.24%	
	BMP Runoff Reduction			1.41 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343890	Bioretention B Yes Med	\$19,200	\$1,100	20	\$20,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343890	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343890

Bioretention B Yes Med Effluent: 2.1 acre-ft

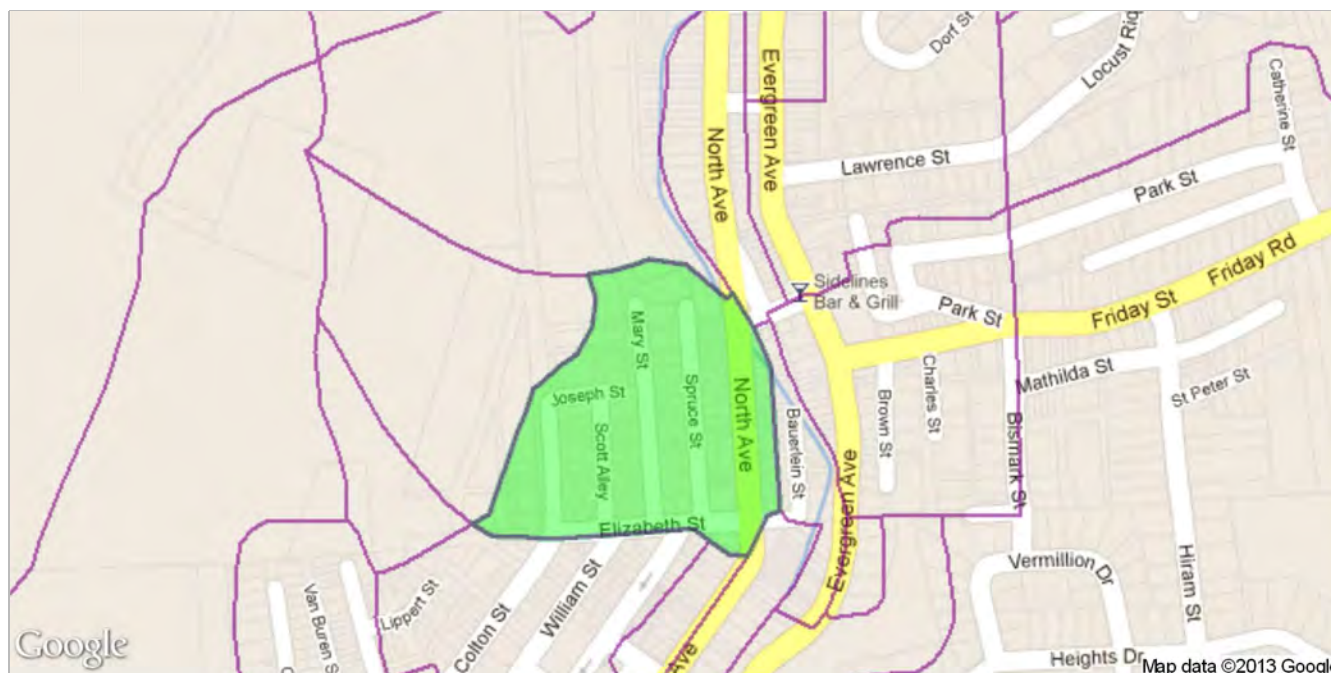
GR_LBs_1343891_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 13.51 acres

Total project cost: \$2,000

Priority area ranking: Medium-High (5.9/10)

Design depth: 1 inches

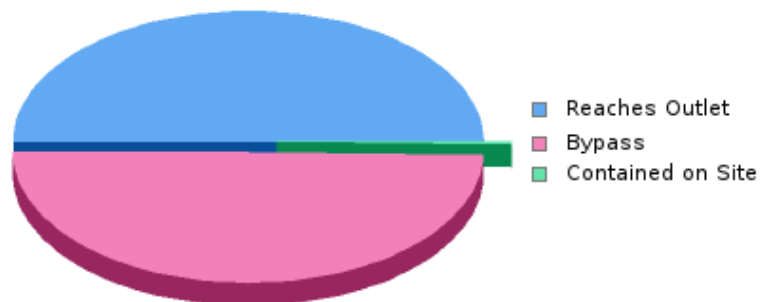
Total impervious area: 4.4 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343891)

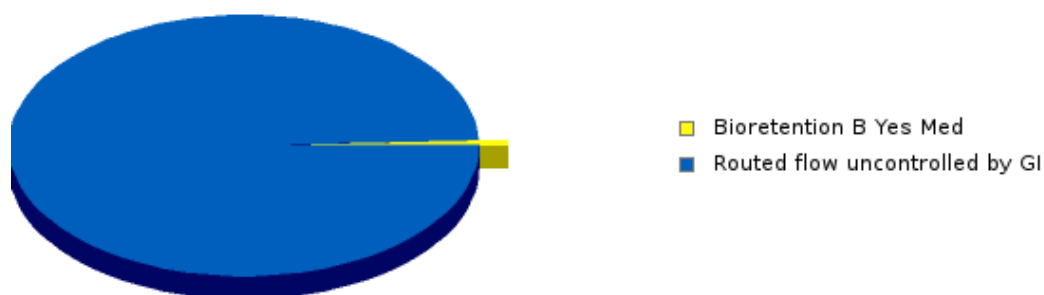
Municipalities: Reserve Township

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	13.94 acre-ft
Total Reduction	0.7 %
Total Runoff Captured	0.09 acre-ft
Total Outlets	13.85 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			1,245 gallons (0 acre-in) 0.002 acres	
	Water	0.075	0	0% flow	
	Building	2.292	5.92	1% flow	
	Impervious-High	0.607	1.58	0% flow	
	Impervious-Mod	0.911	2.35	0% flow	
	Impervious-Low	0.618	1.56	3% flow	
LBs_1343891	Pervious-High-D	3.504	1.15	0% flow	
	Pervious-High-C	1.755	0.33	0% flow	
	Pervious-Mod-D	2.893	0.85	0% flow	
	Pervious-Mod-C	0.056	0.01	0% flow	
	Pervious-Low-D	0.798	0.19	7% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0.65%	
	BMP Runoff Reduction			0.09 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343891	Bioretention B Yes Med	\$2,200	\$100	20	\$2,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343891	Bioretention B Yes Med	\$22.01	\$0.06	20

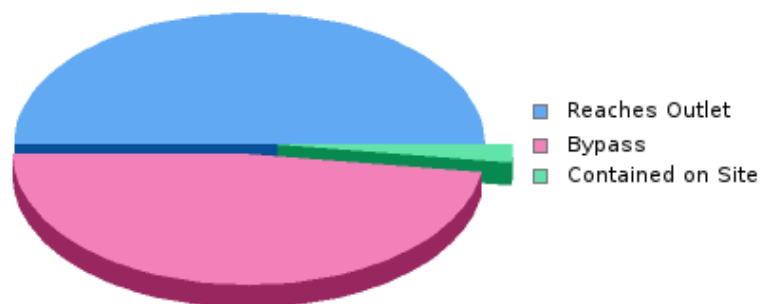
Project BMP Routing

Outlets

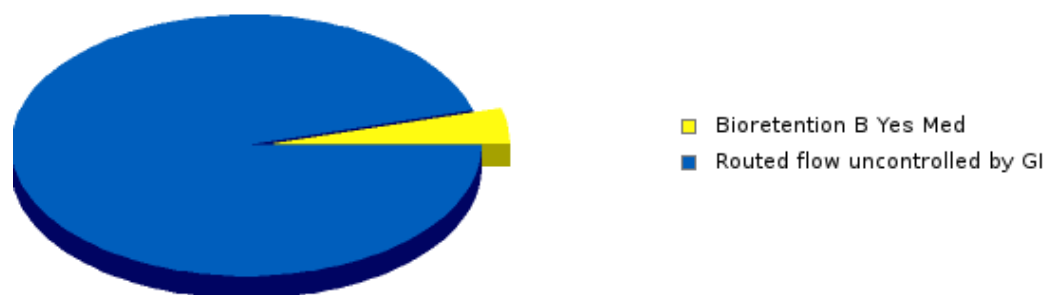
LBs_1343891

Bioretention B Yes Med Effluent: 0 acre-ft

Runoff Distribution















Relative GI Reduction of Runoff



Total Runoff pre-BMP	31.78 acre-ft
Total Reduction	4.1 %
Total Runoff Captured	1.32 acre-ft
Total Outlets	30.46 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			18,078 gallons (0.7 acre-in) 0.034 acres	
	Building	5.778	14.92	8% flow	
	Impervious-High	0.753	1.96	0% flow	
	Impervious-Mod	2.643	6.82	2% flow	
	Impervious-Low	1.092	2.76	1% flow	
	Pervious-High-D	4.749	1.56	1% flow	
	Pervious-High-C	6.776	1.28	0% flow	
	Pervious-High-B	0.593	0.05	0% flow	
LBs_1343910	Pervious-Mod-D	5.043	1.48	18% flow	
	Pervious-Mod-C	1.131	0.19	0% flow	
	Pervious-Mod-B	4.636	0.32	0% flow	
	Pervious-Low-D	1.587	0.38	24% flow	
	Pervious-Low-C	0.091	0.01	39% flow	
	Pervious-Low-B	0.214	0.05	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			4.14%	
	BMP Runoff Reduction			1.32 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343910	Bioretention B Yes Med	\$32,200	\$1,800	20	\$34,000

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343910	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343910

Bioretention B Yes Med Effluent: 0.4 acre-ft

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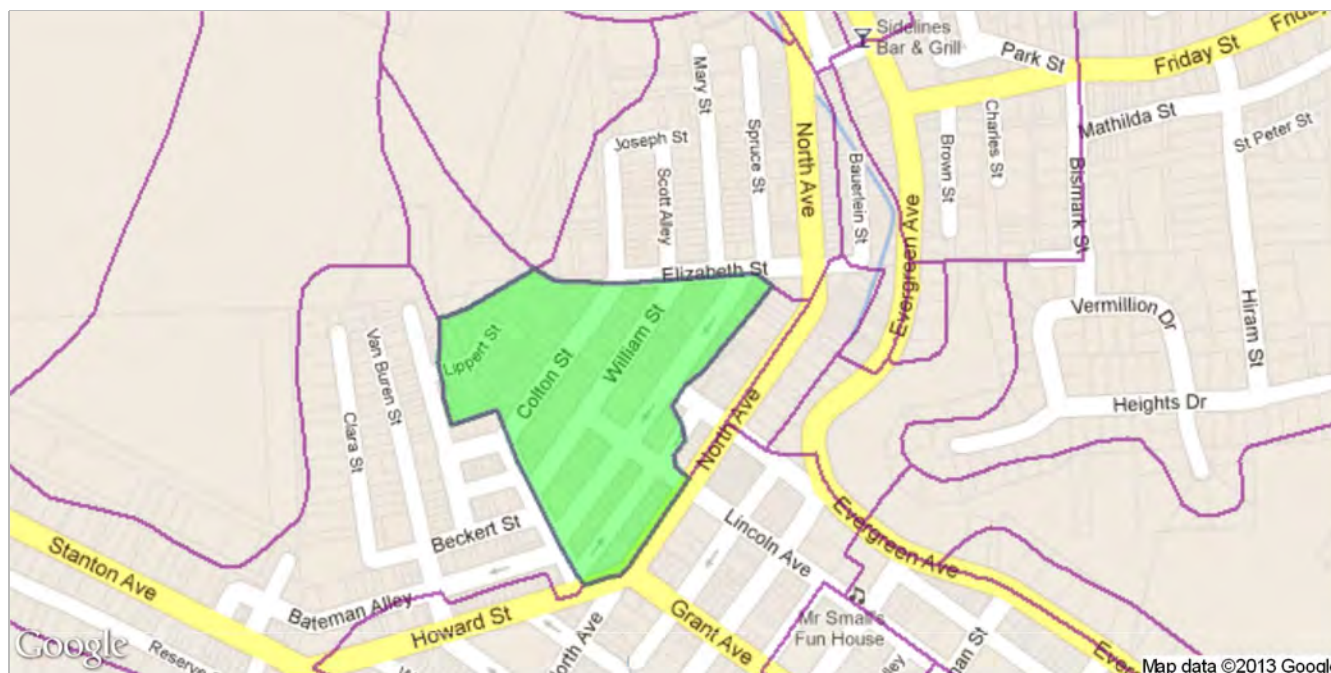
GR_LBs_1343912_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 12.97 acres

Total project cost: \$9,000

Priority area ranking: Medium-High (5.95/10)

Design depth: 1 inches

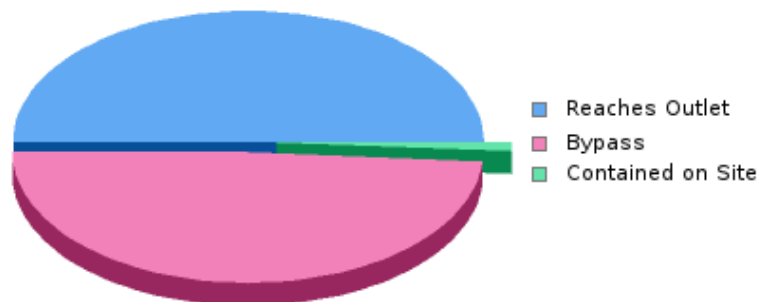
Total impervious area: 5.3 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343912)

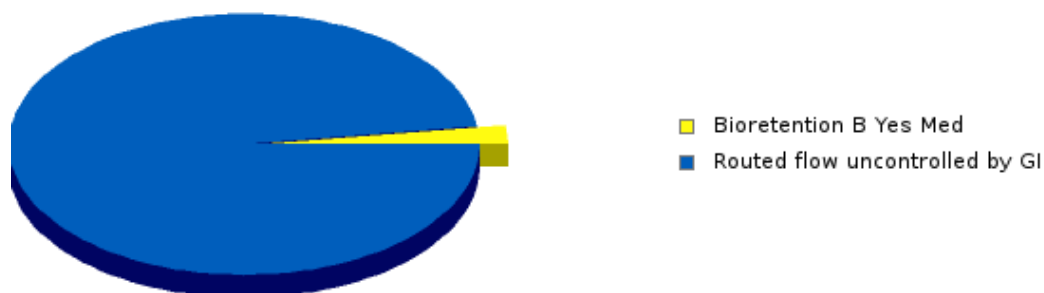
Municipalities: Reserve Township

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	15.51 acre-ft
Total Reduction	2.2 %
Total Runoff Captured	0.34 acre-ft
Total Outlets	15.17 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			4,612 gallons (0.2 acre-in) 0.009 acres	
	Building	3.288	8.49	2% flow	
	Impervious-High	0.068	0.18	0% flow	
	Impervious-Mod	1.37	3.54	4% flow	
	Impervious-Low	0.584	1.48	3% flow	
	Pervious-High-D	0.935	0.31	0% flow	
LBS_1343912	Pervious-High-C	0.06	0.01	0% flow	
	Pervious-High-B	0.594	0.05	0% flow	
	Pervious-Mod-D	3.692	1.08	3% flow	
	Pervious-Mod-B	1.104	0.08	0% flow	
	Pervious-Low-D	1.272	0.3	18% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			2.17%	
	BMP Runoff Reduction			0.34 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBS_1343912	Bioretention B Yes Med	\$8,200	\$500	20	\$8,700

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343912	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343912

Bioretention B Yes Med Effluent: 0.1 acre-ft

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GR_LBs_1343931_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 24.7 acres

Total project cost: \$76,000

Priority area ranking: Medium-High (6/10)

Design depth: 1 inches

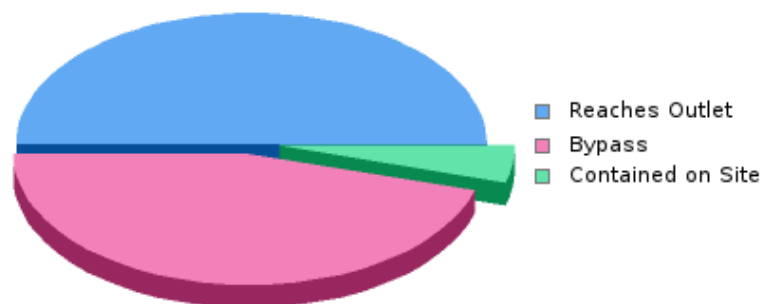
Total impervious area: 12.6 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343931)

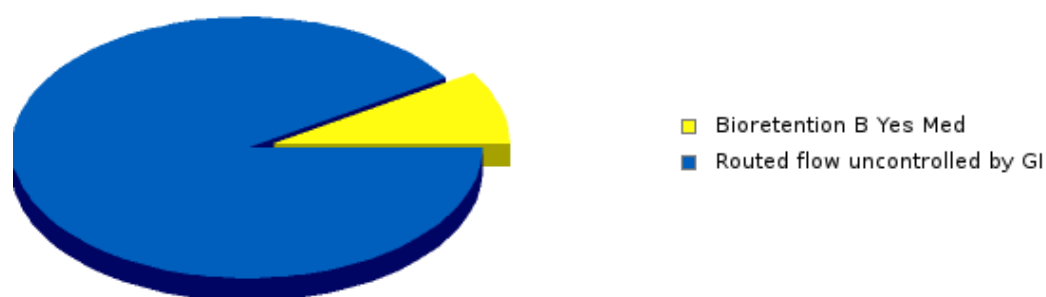
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution












Relative GI Reduction of Runoff



Total Runoff pre-BMP	35.45 acre-ft
Total Reduction	8.3 %
Total Runoff Captured	2.93 acre-ft
Total Outlets	32.52 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			40,237 gallons (1.5 acre-in) 0.075 acres	
	Water	0.537	0	0% flow	
	Building	7.077	18.27	11% flow	
	Impervious-High	0.245	0.64	40% flow	
	Impervious-Mod	1.264	3.26	19% flow	
	Impervious-Low	4.022	10.18	3% flow	
LBs_1343931	Pervious-High-D	2.412	0.79	65% flow	
	Pervious-High-B	0.167	0.01	0% flow	
	Pervious-Mod-D	3.069	0.9	0% flow	
	Pervious-Low-D	5.908	1.4	11% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			8.27%	
	BMP Runoff Reduction			2.93 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343931	Bioretention B Yes Med	\$71,700	\$3,900	20	\$75,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration

rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1343931	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBS_1343931

Bioretention B Yes Med Effluent: 0.9 acre-ft

GR_LBs_1343943_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 10.69 acres

Total project cost: \$39,000

Priority area ranking: Medium-High (5.83/10)

Design depth: 1 inches

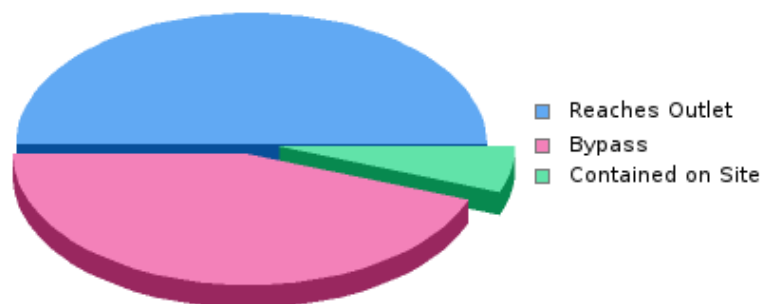
Total impervious area: 5.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343943)

Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	14.6 acre-ft
Total Reduction	10.2 %
Total Runoff Captured	1.5 acre-ft
Total Outlets	13.1 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			20,543 gallons (0.8 acre-in) 0.038 acres	
	Building	3.165	8.17	14% flow	
	Impervious-High	0.239	0.62	0% flow	
	Impervious-Mod	0.789	2.04	18% flow	
	Impervious-Low	0.922	2.33	11% flow	
	Pervious-High-D	0.484	0.16	86% flow	
LBs_1343943	Pervious-High-B	0.398	0.03	0% flow	
	Pervious-Mod-D	2.882	0.84	0% flow	
	Pervious-Mod-B	0.172	0.01	0% flow	
	Pervious-Low-D	1.636	0.39	17% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			10.25%	
	BMP Runoff Reduction			1.5 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343943	Bioretention B Yes Med	\$36,600	\$2,000	20	\$38,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration

rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1343943	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBS_1343943

Bioretention B Yes Med Effluent: 0.5 acre-ft

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GR_LBs_1343961_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 7.25 acres

Total project cost: \$16,000

Priority area ranking: Medium-Medium (5.36/10)

Design depth: 1 inches

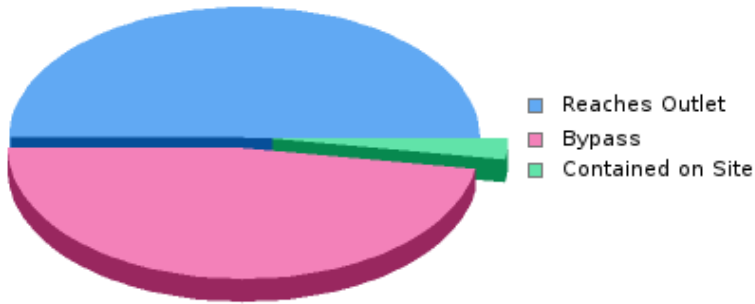
Total impervious area: 4.8 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343961)

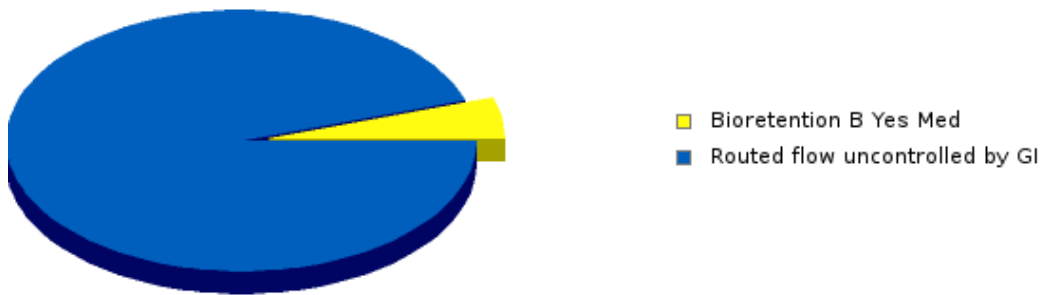
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution






Relative GI Reduction of Runoff



Total Runoff pre-BMP	12.84 acre-ft
Total Reduction	4.8 %
Total Runoff Captured	0.61 acre-ft
Total Outlets	12.23 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			8,418 gallons (0.3 acre-in) 0.016 acres	
LBs_1343961	Building	2.224	5.74	5% flow	
	Impervious-Low	2.574	6.52	7% flow	
	Pervious-Low-D	2.453	0.58	11% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			4.78%	
	BMP Runoff Reduction			0.61 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343961	Bioretention B Yes Med	\$15,000	\$800	20	\$15,800

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure	Construction Cost	O&M Costs (\$/year)	Lifespan
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	BMP	(\$/sqft)	/sqft)	(years)
LBs_1343961	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343961

Bioretention B Yes Med Effluent: 0.2 acre-ft

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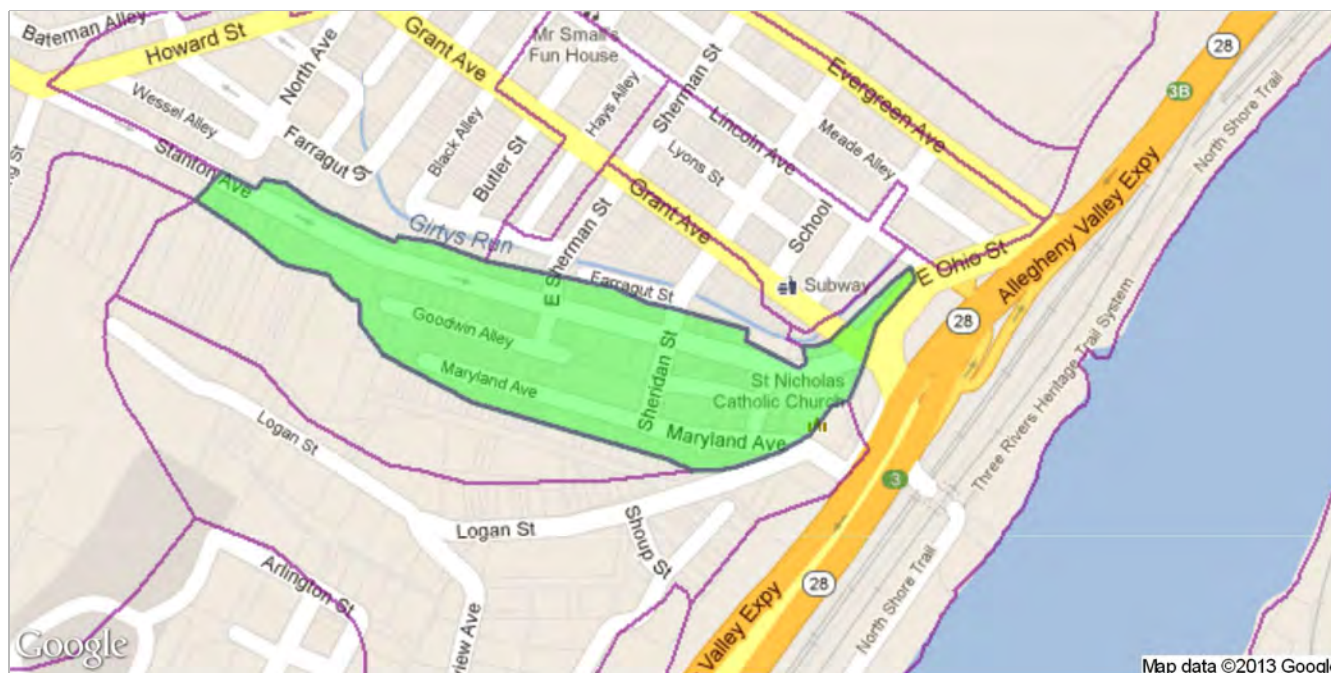
GR_LBs_1343966_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 17.28 acres

Total project cost: \$7,000

Priority area ranking: Medium-High (6.22/10)

Design depth: 1 inches

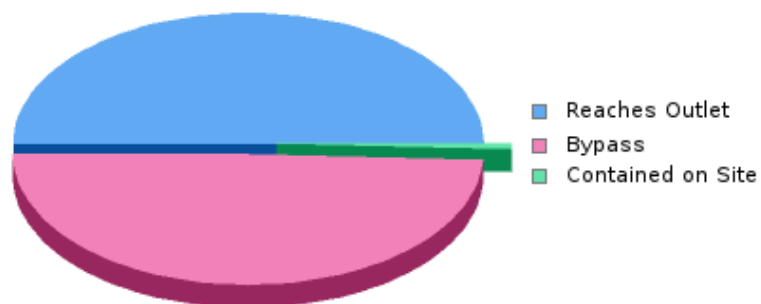
Total impervious area: 7.6 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343966)

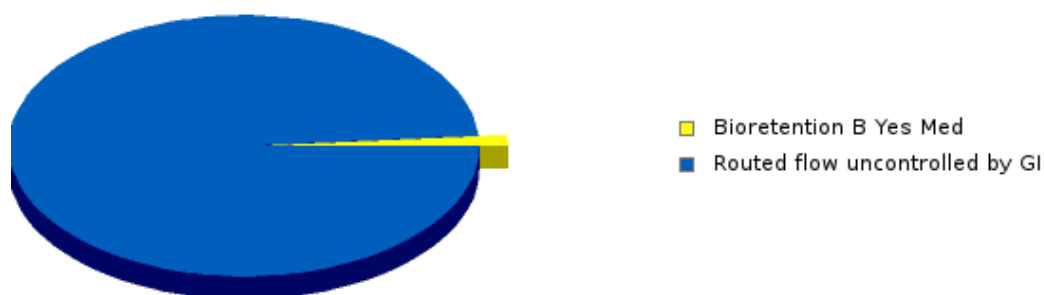
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	22.05 acre-ft
Total Reduction	1.3 %
Total Runoff Captured	0.28 acre-ft
Total Outlets	21.77 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			3,847 gallons (0.1 acre-in) 0.007 acres	
	Building	4.353	11.24	0% flow	
	Impervious-High	0.918	2.39	0% flow	
	Impervious-Mod	1.474	3.81	1% flow	
	Impervious-Low	0.873	2.21	12% flow	
	Pervious-High-D	1.627	0.53	0% flow	
LBs_1343966	Pervious-High-C	3.519	0.67	0% flow	
	Pervious-Mod-D	3.095	0.91	5% flow	
	Pervious-Mod-C	0.47	0.08	0% flow	
	Pervious-Low-D	0.952	0.23	9% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			1.27%	
	BMP Runoff Reduction			0.28 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343966	Bioretention B Yes Med	\$6,900	\$400	20	\$7,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343966	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343966

Bioretention B Yes Med Effluent: 0.1 acre-ft

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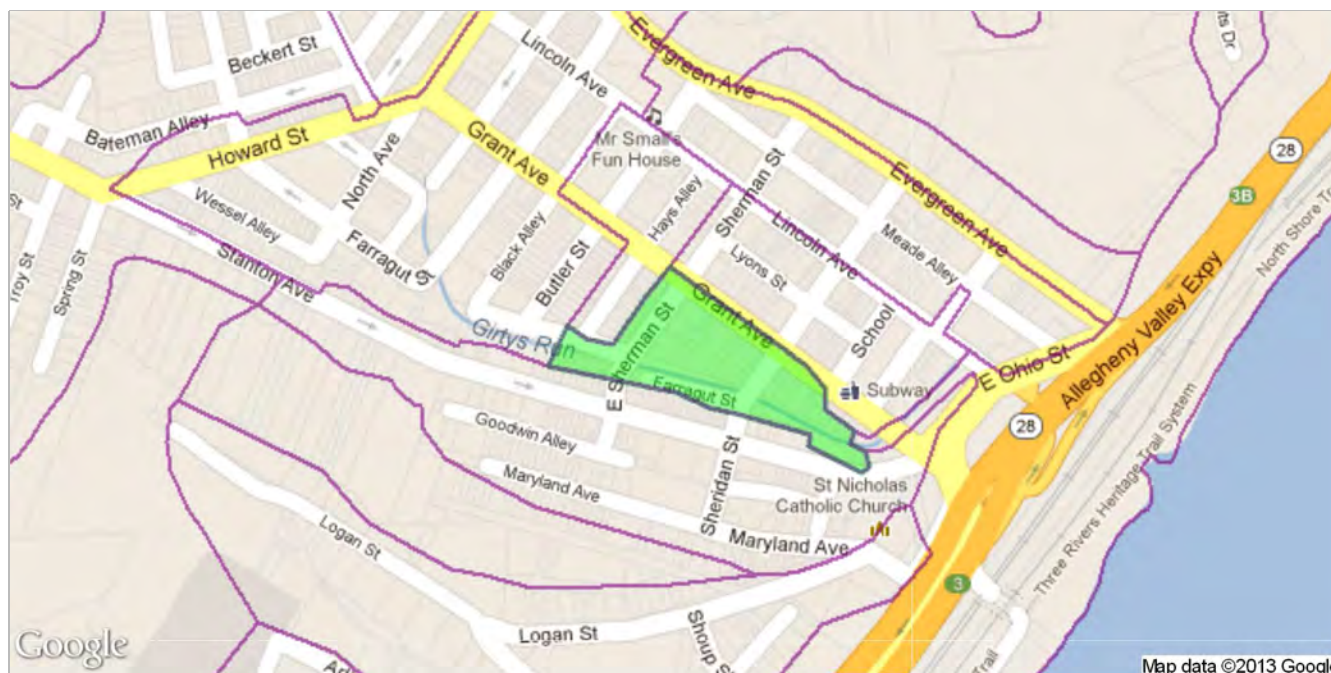
GR_LBs_1343967_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 5.12 acres

Total project cost: \$1,000

Priority area ranking: Medium-Medium (5.54/10)

Design depth: 1 inches

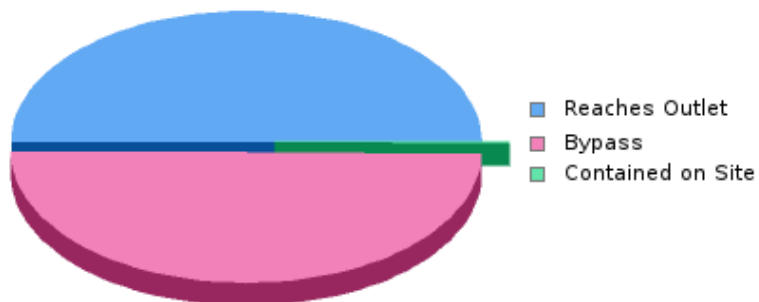
Total impervious area: 1.9 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343967)

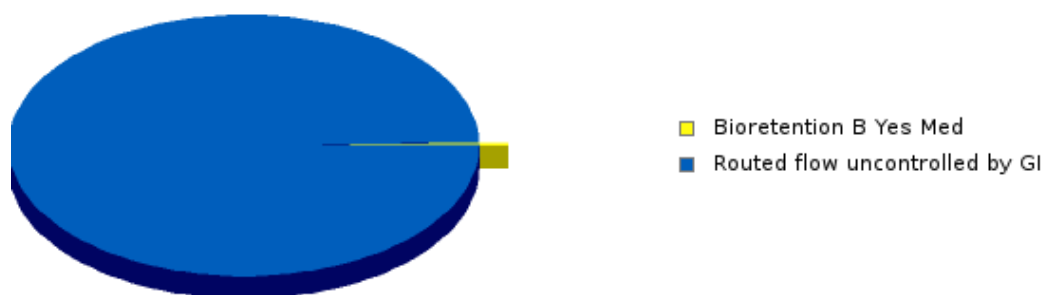
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution








Relative GI Reduction of Runoff



Total Runoff pre-BMP	5.42 acre-ft
Total Reduction	0.4 %
Total Runoff Captured	0.02 acre-ft
Total Outlets	5.4 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			279 gallons (0 acre-in) 0.001 acres	
LBs_1343967	Water	0.539	0	0% flow	
	Building	1.05	2.71	0% flow	
	Impervious-Low	0.812	2.06	1% flow	
	Pervious-Mod-D	0.114	0.03	0% flow	
	Pervious-Low-D	2.604	0.62	1% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0.37%	
	BMP Runoff Reduction			0.02 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343967	Bioretention B Yes Med	\$500	<\$100	20	\$500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343967	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1343967

Bioretention B Yes Med Effluent: 0 acre-ft

**APPENDIX C
RAINWAYS
OUTPUT
PERMEABLE
PAVEMENT**

GR_LBs_1343818_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 9.7 acres

Total project cost: \$9,000

Priority area ranking: Medium-High (5.96/10)

Design depth: 1 inches

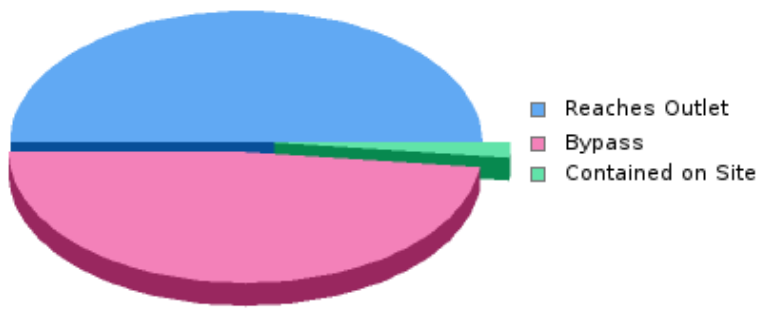
Total impervious area: 4.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343818)

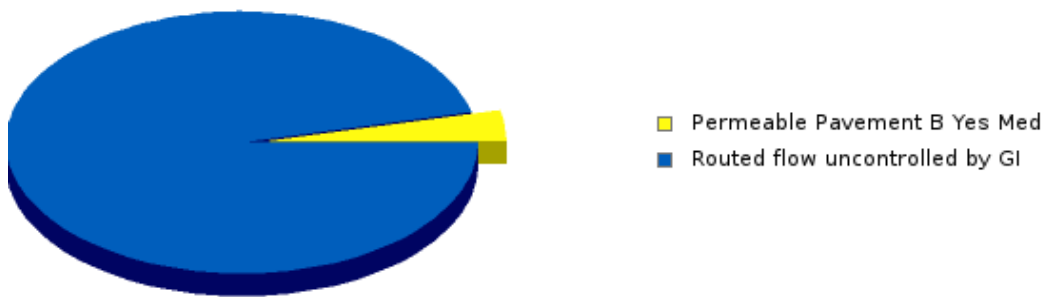
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff












Total Runoff pre-BMP	11.78 acre-ft
Total Reduction	3.6 %
Total Runoff Captured	0.43 acre-ft
Total Outlets	11.35 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343818	Green Infrastructure Capacity			4,926 gallons (0.2 acre-in) 0.018 acres

Water	0.302	0	0% flow	
Building	2.38	6.14	2% flow	
Impervious-High	0.069	0.18	0% flow	
Impervious-Mod	0.197	0.51	0% flow	
Impervious-Low	1.414	3.58	9% flow	
Pervious-High-D	0.564	0.18	0% flow	
Pervious-High-C	0.512	0.1	0% flow	
Pervious-Mod-D	1.389	0.41	0% flow	
Pervious-Low-D	2.875	0.68	4% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			3.63%	
BMP Runoff Reduction			0.43 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343818	Permeable Pavement B Yes Med	\$8,400	\$200	20	\$8,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343818	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

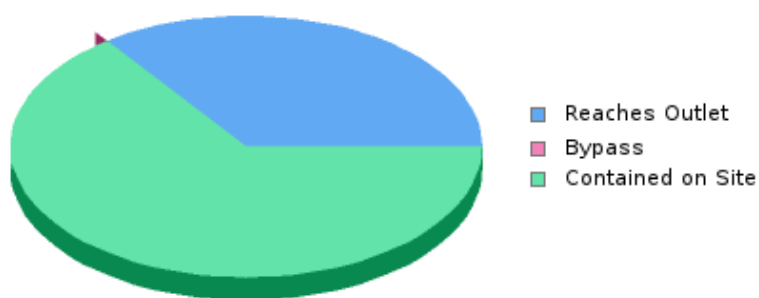
Project BMP Routing

Outlets

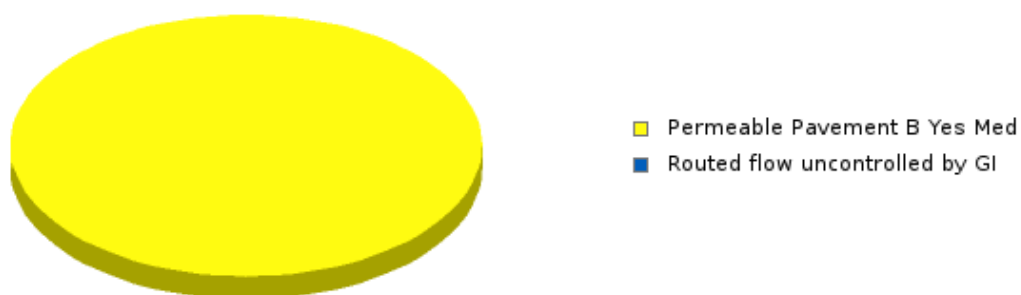
LBs_1343818

Permeable Pavement B Yes Med Effluent: 0 acre-ft

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	15.51 acre-ft
Total Reduction	65 %
Total Runoff Captured	10.07 acre-ft
Total Outlets	5.44 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343912	Green Infrastructure Capacity			116,110 gallons (4.3 acre-in) 0.417 acres

Building	3.288	8.49	68% flow	
Impervious-High	0.068	0.18	14% flow	
Impervious-Mod	1.37	3.54	82% flow	
Impervious-Low	0.584	1.48	76% flow	
Pervious-High-D	0.935	0.31	43% flow	
Pervious-High-C	0.06	0.01	28% flow	
Pervious-High-B	0.594	0.05	78% flow	
Pervious-Mod-D	3.692	1.08	83% flow	
Pervious-Mod-B	1.104	0.08	84% flow	
Pervious-Low-D	1.272	0.3	58% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			64.95%	
BMP Runoff Reduction			10.07 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343912	Permeable Pavement B Yes Med	\$197,500	\$5,600	20	\$203,100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343912	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343912

Permeable Pavement B Yes Med Effluent: 1.1 acre-ft

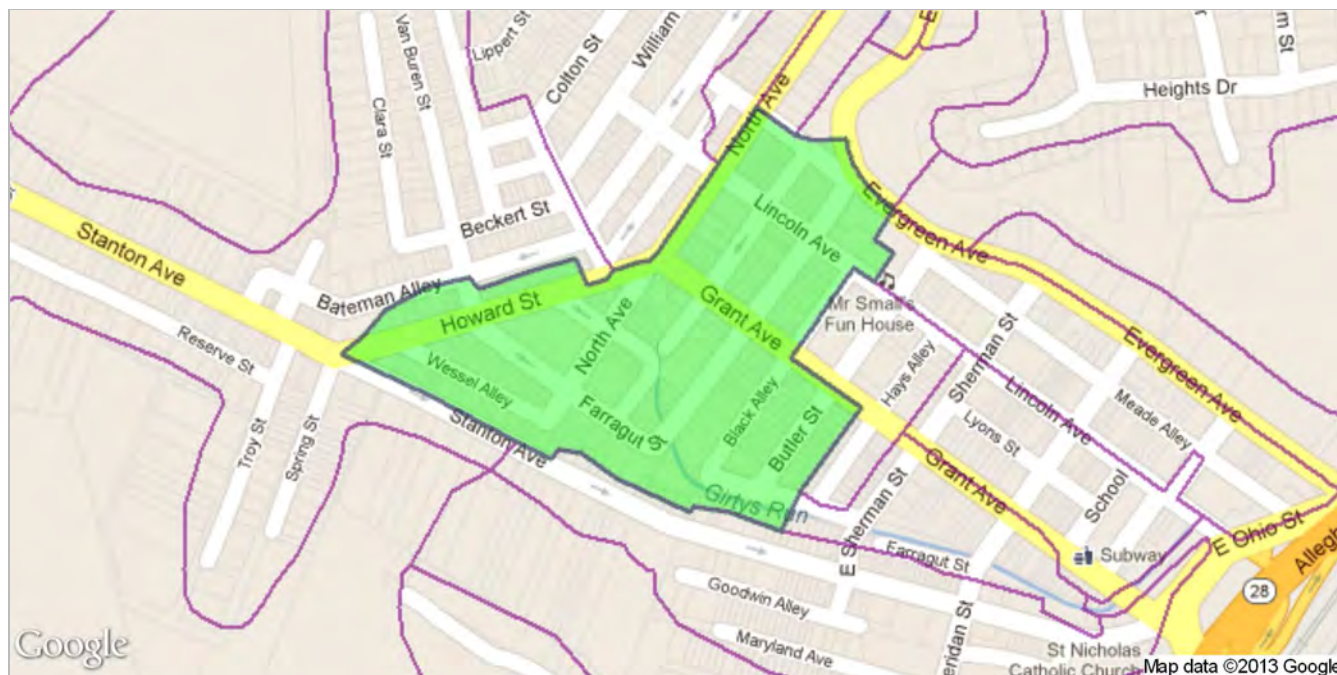
GR_LBs_1343931_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 24.7 acres

Total project cost: \$153,000

Priority area ranking: Medium-High (6/10)

Design depth: 1 inches

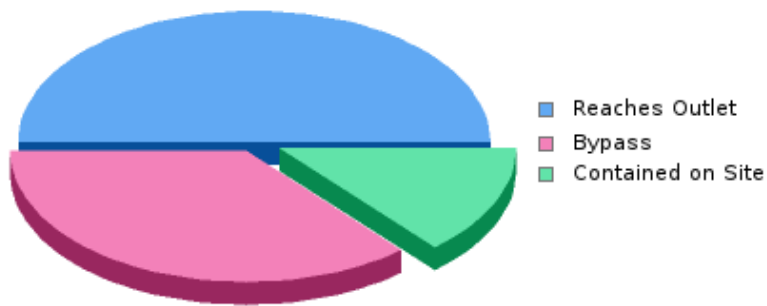
Total impervious area: 12.6 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343931)

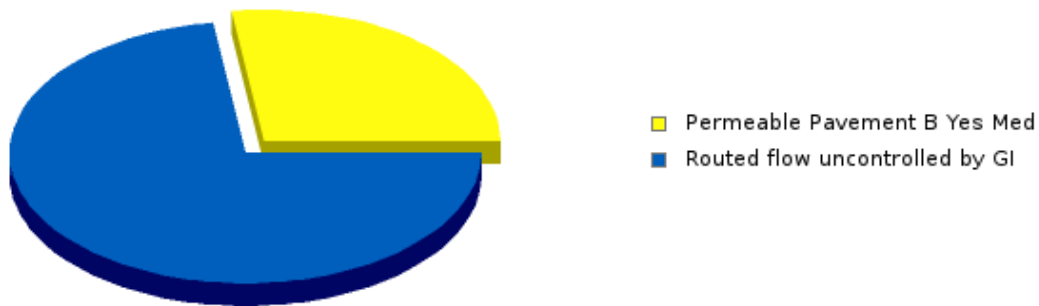
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff












Total Runoff pre-BMP	35.45 acre-ft
Total Reduction	21.4 %
Total Runoff Captured	7.58 acre-ft
Total Outlets	27.87 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343931	Green Infrastructure Capacity			87,417 gallons (3.2 acre-in) 0.314 acres

Water	0.537	0	0% flow	
Building	7.077	18.27	18% flow	
Impervious-High	0.245	0.64	27% flow	
Impervious-Mod	1.264	3.26	31% flow	
Impervious-Low	4.022	10.18	31% flow	
Pervious-High-D	2.412	0.79	20% flow	
Pervious-High-B	0.167	0.01	0% flow	
Pervious-Mod-D	3.069	0.9	35% flow	
Pervious-Low-D	5.908	1.4	20% flow	
Design Depth	1 inches			
Percent BMP Effectiveness	21.39%			
BMP Runoff Reduction	7.58 acre-ft			

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343931	Permeable Pavement B Yes Med	\$148,700	\$4,200	20	\$152,900

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343931	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343931

Permeable Pavement B Yes Med Effluent: 0.8 acre-ft

GR_LBs_1343943_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 10.69 acres

Total project cost: \$146,000

Priority area ranking: Medium-High (5.83/10)

Design depth: 1 inches

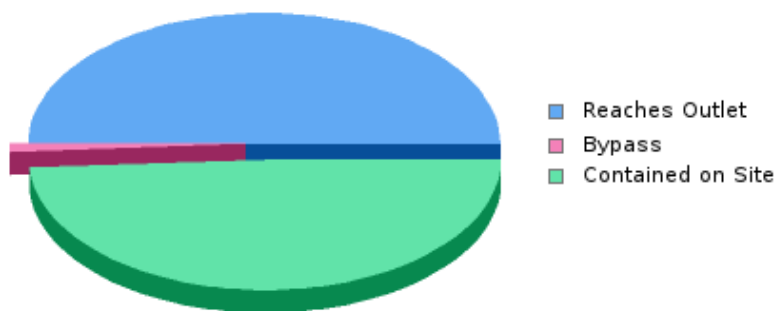
Total impervious area: 5.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343943)

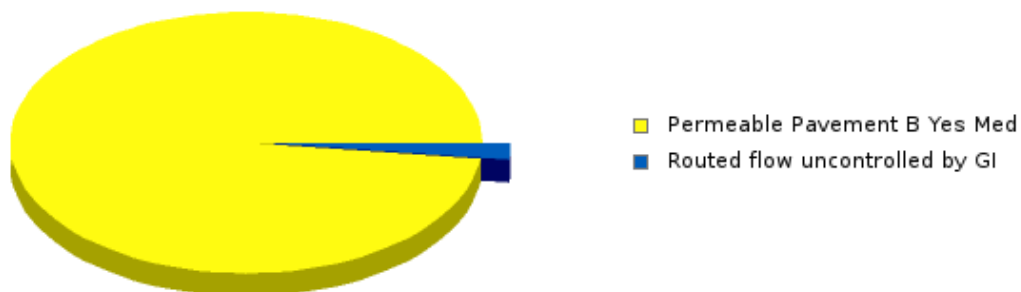
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	14.6 acre-ft
Total Reduction	49.5 %
Total Runoff Captured	7.23 acre-ft
Total Outlets	7.37 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343943	Green Infrastructure Capacity			83,302 gallons (3.1 acre-in) 0.299 acres

Building	3.165	8.17	54% flow	
Impervious-High	0.239	0.62	69% flow	
Impervious-Mod	0.789	2.04	56% flow	
Impervious-Low	0.922	2.33	68% flow	
Pervious-High-D	0.484	0.16	41% flow	
Pervious-High-B	0.398	0.03	66% flow	
Pervious-Mod-D	2.882	0.84	23% flow	
Pervious-Mod-B	0.172	0.01	61% flow	
Pervious-Low-D	1.636	0.39	33% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			49.5%	
BMP Runoff Reduction			7.23 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343943	Permeable Pavement B Yes Med	\$141,700	\$4,000	20	\$145,700

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343943	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343943

Permeable Pavement B Yes Med Effluent: 0.8 acre-ft

GR_LBs_1343961_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting

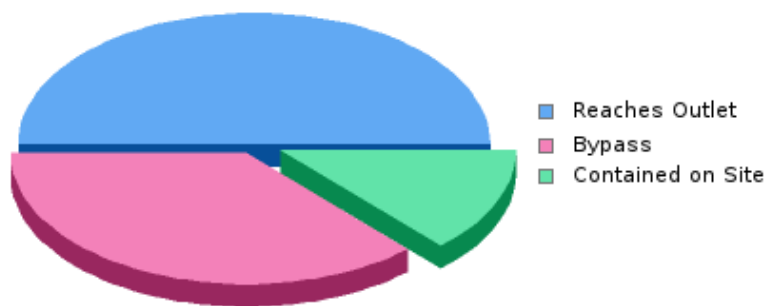


Site Characteristics

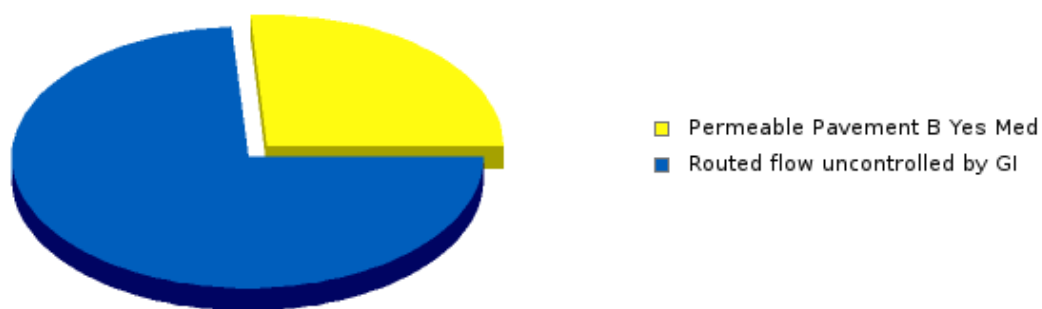
- Project size: 7.25 acres
- Total project cost: \$54,000
- Priority area ranking: Medium-Medium (5.36/10)
- Design depth: 1 inches
- Total impervious area: 4.8 acres
- POC(s)/Regulator(s): A-67-00 (LBs_1343961)
- Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff






Total Runoff pre-BMP	12.84 acre-ft
Total Reduction	20.7 %
Total Runoff Captured	2.66 acre-ft
Total Outlets	10.18 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343961	Green Infrastructure Capacity			30,639 gallons (1.1 acre-in) 0.11 acres

Building	2.224	5.74	25% flow	
Impervious-Low	2.574	6.52	21% flow	
Pervious-Low-D	2.453	0.58	23% flow	
Design Depth	1 inches			
Percent BMP Effectiveness	20.7%			
BMP Runoff Reduction	2.66 acre-ft			

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343961	Permeable Pavement B Yes Med	\$52,100	\$1,500	20	\$53,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343961	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343961

Permeable Pavement B Yes Med Effluent: 0.3 acre-ft

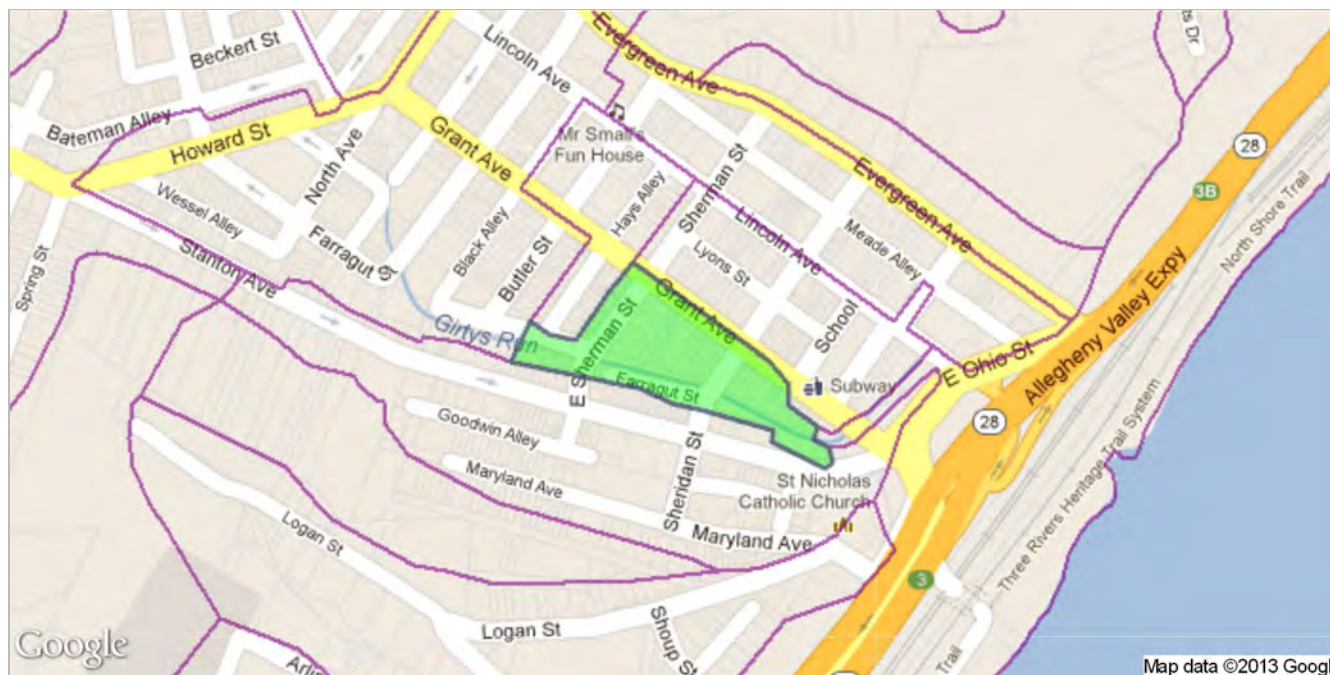
GR_LBs_1343967_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 5.12 acres

Total project cost: \$17,000

Priority area ranking: Medium-Medium (5.54/10)

Design depth: 1 inches

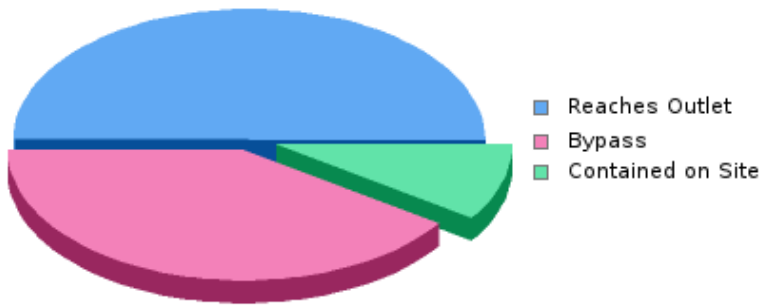
Total impervious area: 1.9 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343967)

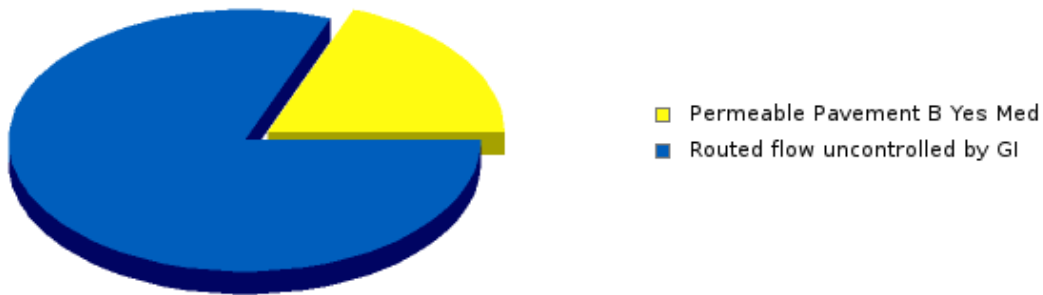
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff








Total Runoff pre-BMP	5.42 acre-ft
Total Reduction	16 %
Total Runoff Captured	0.87 acre-ft
Total Outlets	4.55 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343967	Green Infrastructure Capacity			9,998 gallons (0.4 acre-in) 0.036 acres

Water	0.539	0	0% flow	
Building	1.05	2.71	7% flow	
Impervious-Low	0.812	2.06	35% flow	
Pervious-Mod-D	0.114	0.03	0% flow	
Pervious-Low-D	2.604	0.62	8% flow	
Design Depth	1 inches			
Percent BMP Effectiveness	16.01%			
BMP Runoff Reduction	0.87 acre-ft			

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343967	Permeable Pavement B Yes Med	\$17,000	\$500	20	\$17,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343967	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1343967

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

**APPENDIX C
RAILWAYS
OUTPUT
COMMERCIAL-
INSTITUTIONAL**

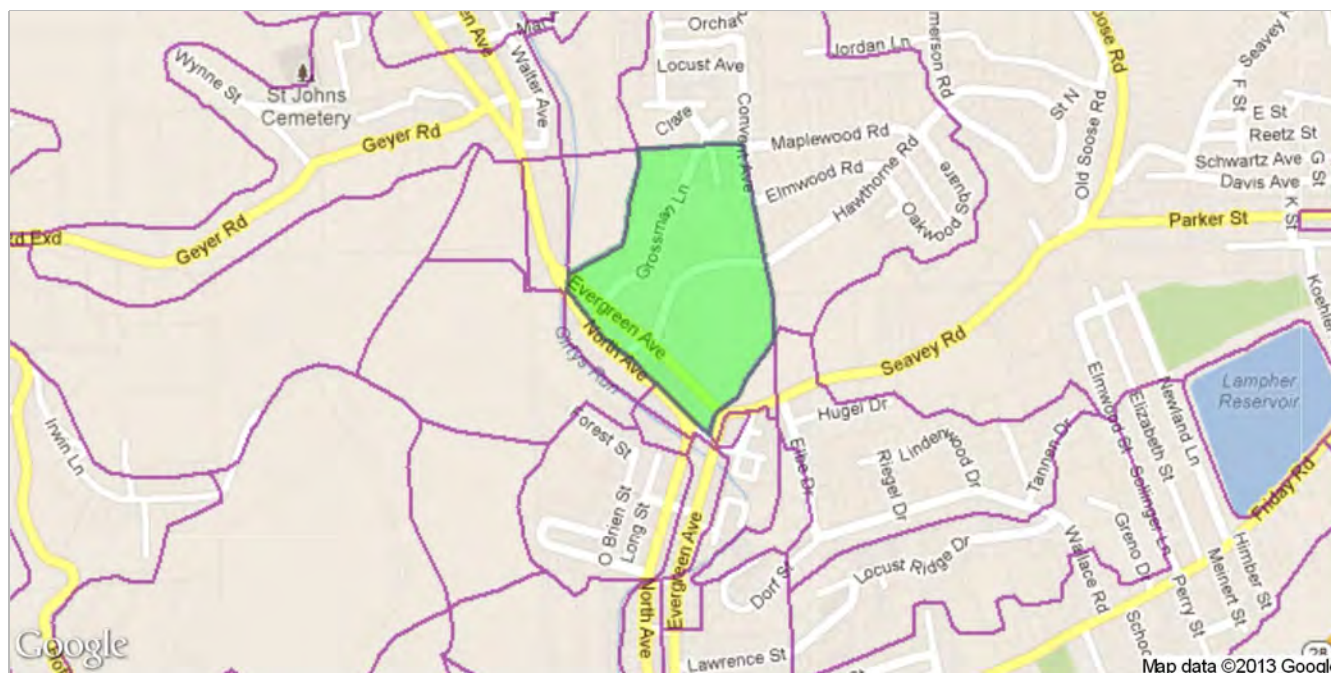
GR_LBs_1343766_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 33.36 acres

Total project cost: \$24,000

Priority area ranking: Medium-High (6.16/10)

Design depth: 1 inches

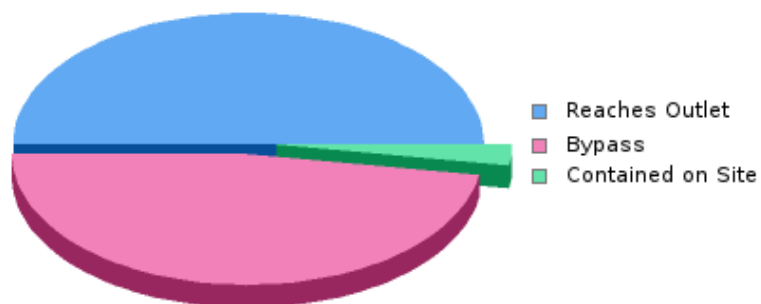
Total impervious area: 7.8 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343766)

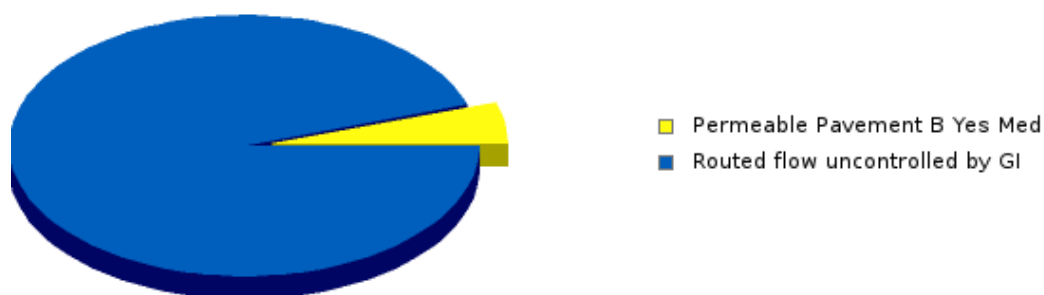
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	24.92 acre-ft
Total Reduction	4.8 %
Total Runoff Captured	1.21 acre-ft
Total Outlets	23.71 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			13,926 gallons (0.5 acre-in) 0.05 acres	
	Building	2.661	6.87	1% flow	
	Impervious-High	0.539	1.4	7% flow	
	Impervious-Mod	3.68	9.5	11% flow	
	Impervious-Low	0.929	2.35	2% flow	
	Pervious-High-D	0.919	0.3	0% flow	
	Pervious-High-C	4.645	0.88	0% flow	
LBs_1343766	Pervious-Mod-D	2.432	0.71	0% flow	
	Pervious-Mod-C	11.586	1.9	4% flow	
	Pervious-Mod-B	0.483	0.03	0% flow	
	Pervious-Low-D	1.918	0.45	0% flow	
	Pervious-Low-C	2.981	0.38	0% flow	
	Pervious-Low-B	0.581	0.14	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			4.85%	
	BMP Runoff Reduction			1.21 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
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LBs_1343766	Permeable Pavement B Yes Med	\$23,700	\$700	20	\$24,400
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Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343766	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343766

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

Print this page

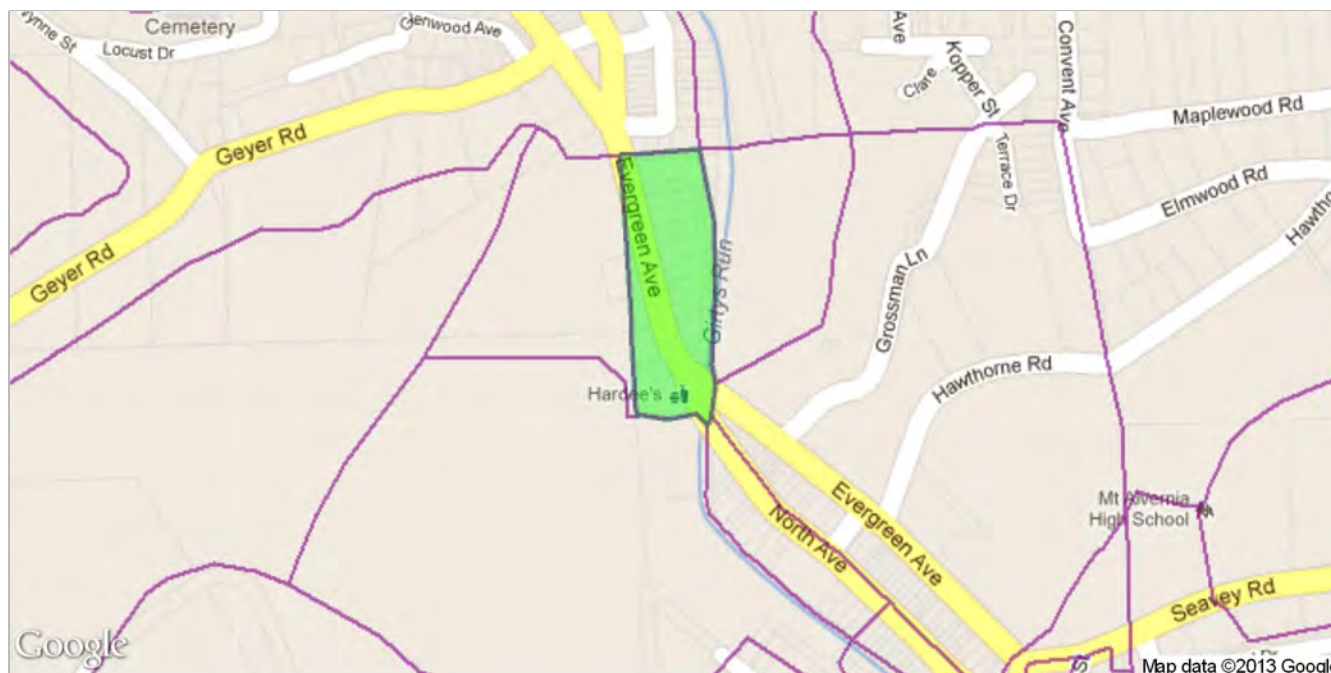
GR_LBs_1343767_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 4.98 acres

Total project cost: \$32,000

Priority area ranking: Medium-Medium (5.39/10)

Design depth: 1 inches

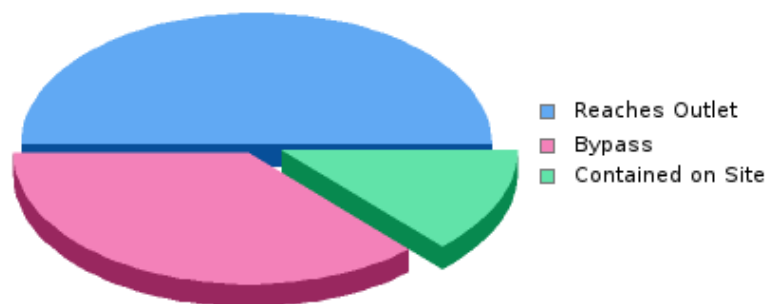
Total impervious area: 2.8 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343767)

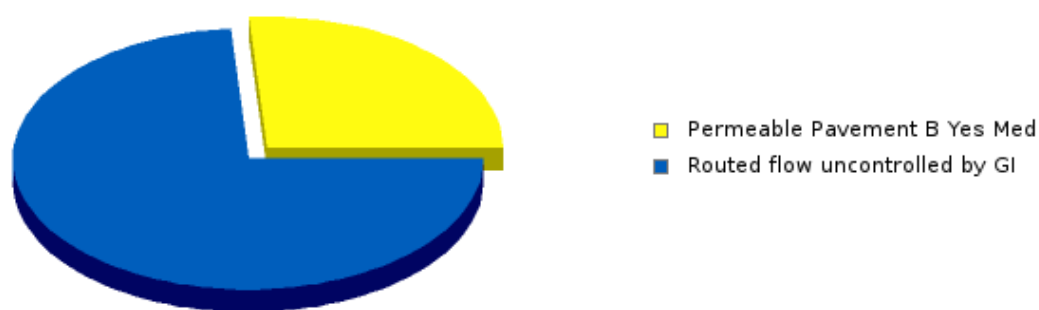
Municipalities: Reserve Township

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	7.64 acre-ft
Total Reduction	20.8 %
Total Runoff Captured	1.59 acre-ft
Total Outlets	6.05 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			18,288 gallons (0.7 acre-in) 0.066 acres	
	Water	0.157	0	0% flow	
	Building	0.672	1.73	10% flow	
	Impervious-High	0.131	0.34	0% flow	
	Impervious-Mod	0.366	0.94	42% flow	
	Impervious-Low	1.626	4.12	28% flow	
LBs_1343767	Pervious-High-D	0.131	0.04	0% flow	
	Pervious-High-C	0.095	0.02	35% flow	
	Pervious-Mod-D	0.284	0.08	16% flow	
	Pervious-Low-D	1.518	0.36	3% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			20.76%	
	BMP Runoff Reduction			1.59 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343767	Permeable Pavement B Yes Med	\$31,100	\$900	20	\$32,000

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration

rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343767	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343767

Permeable Pavement B Yes Med Effluent: 0.2 acre-ft

GR_LBs_1343785_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 28.78 acres

Total project cost: \$18,000

Priority area ranking: Medium-High (6.12/10)

Design depth: 1 inches

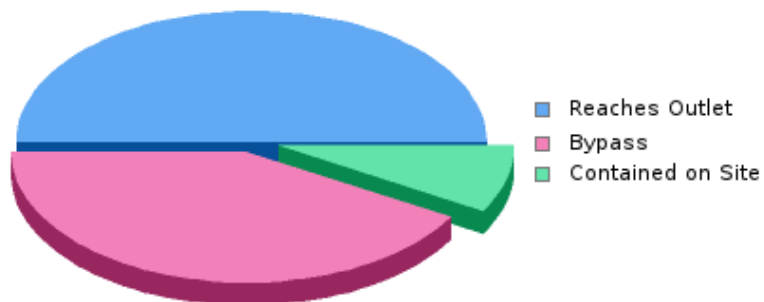
Total impervious area: 0.4 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343785)

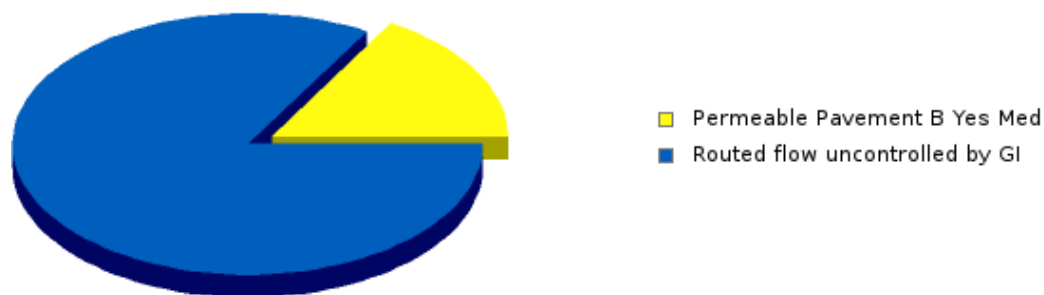
Municipalities: Reserve Township

Overall Green Infrastructure Performance

Runoff Distribution














Relative GI Reduction of Runoff



Total Runoff pre-BMP	6.28 acre-ft
Total Reduction	14.2 %
Total Runoff Captured	0.89 acre-ft
Total Outlets	5.39 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			10,279 gallons (0.4 acre-in) 0.037 acres	
	Water	0.493	0	0% flow	
	Building	0.011	0.03	0% flow	
	Impervious-High	0.065	0.17	68% flow	
	Impervious-Mod	0.211	0.54	75% flow	
	Impervious-Low	0.103	0.26	96% flow	
	Pervious-High-D	0.569	0.19	7% flow	
LBs_1343785	Pervious-High-C	25.044	4.74	4% flow	
	Pervious-High-B	0.295	0.03	0% flow	
	Pervious-Mod-D	0.139	0.04	16% flow	
	Pervious-Mod-C	1.342	0.22	0% flow	
	Pervious-Low-D	0.032	0.01	32% flow	
	Pervious-Low-C	0.477	0.06	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			14.2%	
	BMP Runoff Reduction			0.89 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
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LBs_1343785	Permeable Pavement B Yes Med	\$17,500	\$500	20	\$18,000
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Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343785	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343785

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

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GR_LBs_1343795_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.05 acres

Total project cost: \$4,000

Priority area ranking: Medium-High (6.22/10)

Design depth: 1 inches

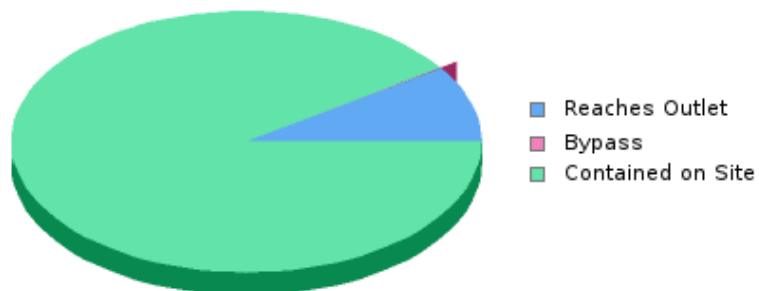
Total impervious area: 0.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343795)

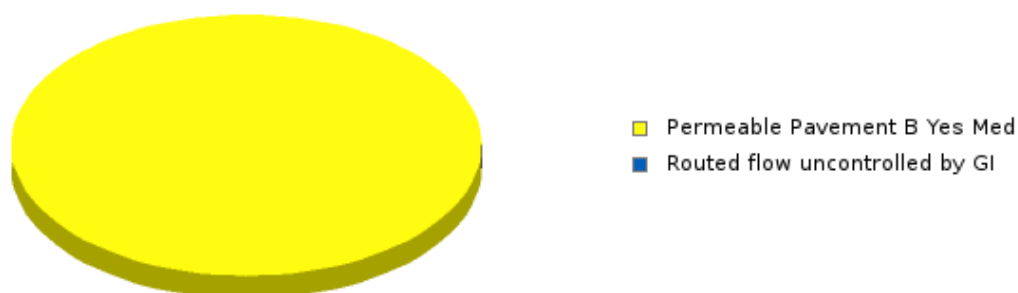
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.25 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.22 acre-ft
Total Outlets	0.02 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
	Green Infrastructure Capacity			2,561 gallons (0.1 acre-in) 0.009 acres
	Impervious-Low	0.097	0.25	100% flow
LBs_1343795	Design Depth			1 inches
	Percent BMP Effectiveness			90.49%
	BMP Runoff Reduction			0.22 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343795	Permeable Pavement B Yes Med	\$4,400	\$100	20	\$4,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343795	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1343795

Permeable Pavement B Yes Med Effluent: 0 acre-ft

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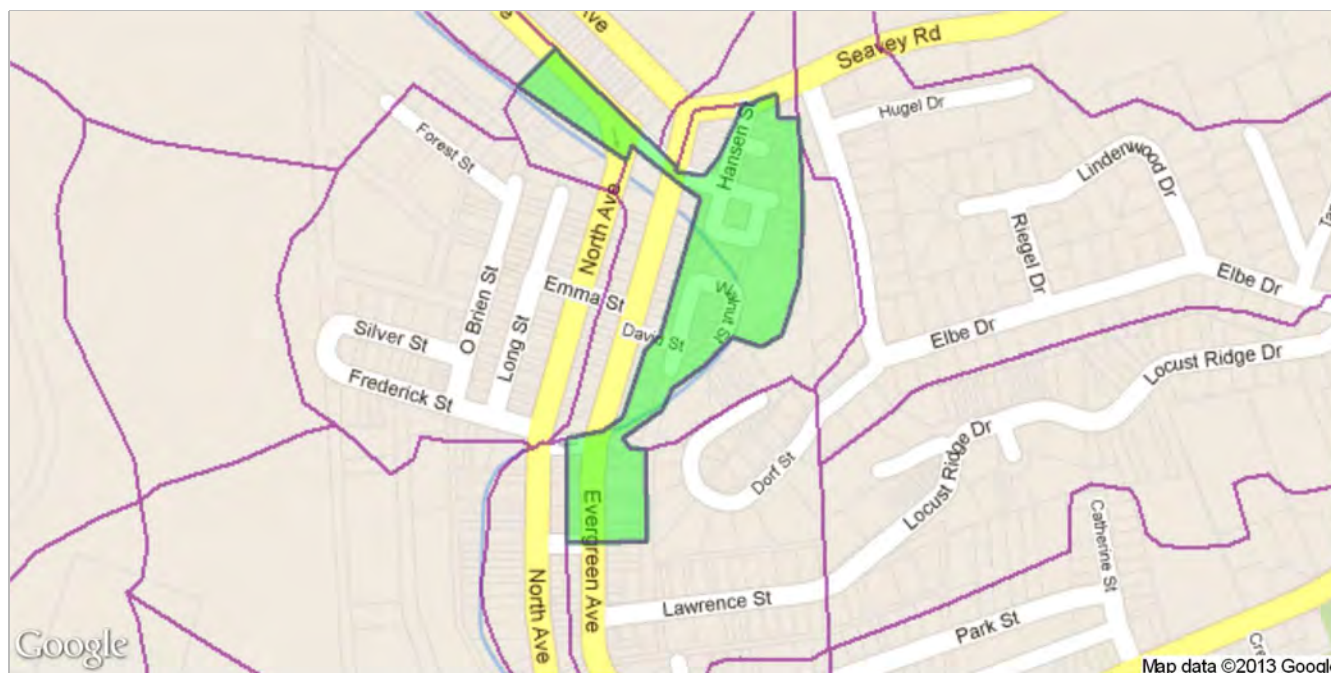
GR_LBs_1343818_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 9.7 acres

Total project cost: \$12,000

Priority area ranking: Medium-High (5.96/10)

Design depth: 1 inches

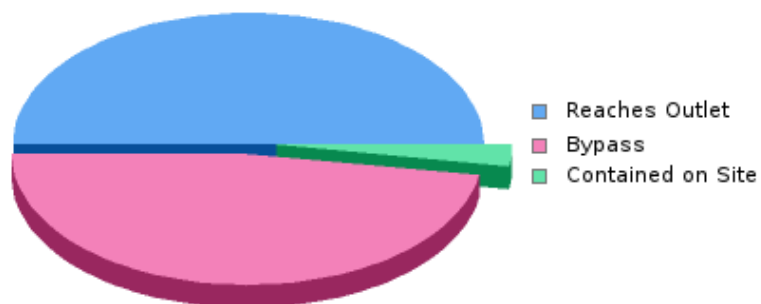
Total impervious area: 4.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343818)

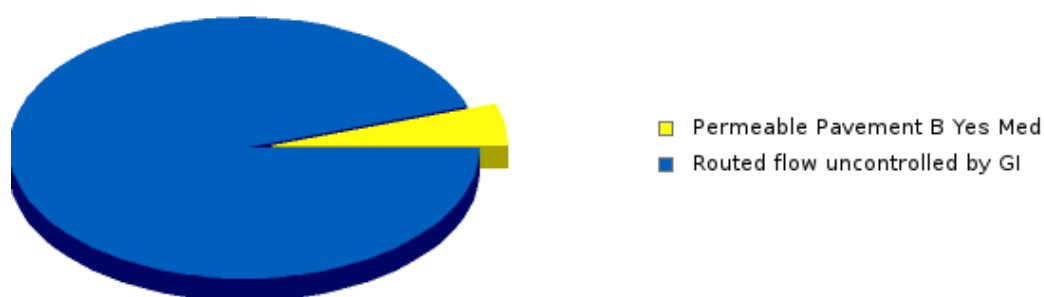
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution












Relative GI Reduction of Runoff



Total Runoff pre-BMP	11.78 acre-ft
Total Reduction	4.9 %
Total Runoff Captured	0.58 acre-ft
Total Outlets	11.2 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			6,657 gallons (0.2 acre-in) 0.024 acres	
	Water	0.302	0	0% flow	
	Building	2.38	6.14	1% flow	
	Impervious-High	0.069	0.18	10% flow	
	Impervious-Mod	0.197	0.51	10% flow	
	Impervious-Low	1.414	3.58	14% flow	
LBs_1343818	Pervious-High-D	0.564	0.18	0% flow	
	Pervious-High-C	0.512	0.1	0% flow	
	Pervious-Mod-D	1.389	0.41	0% flow	
	Pervious-Low-D	2.875	0.68	1% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			4.9%	
	BMP Runoff Reduction			0.58 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343818	Permeable Pavement B Yes Med	\$11,300	\$300	20	\$11,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration

rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343818	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343818

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

GR_LBs_1343835_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 3.86 acres

Total project cost: \$11,000

Priority area ranking: Medium-High (5.58/10)

Design depth: 1 inches

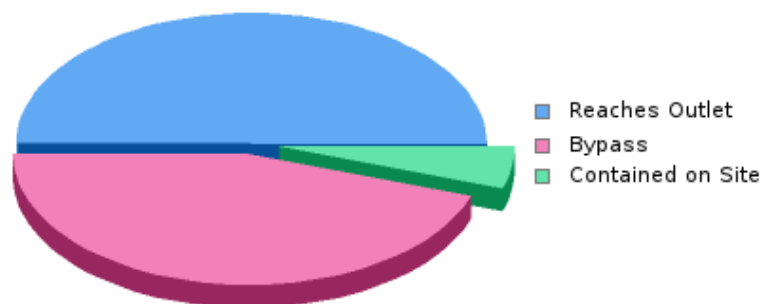
Total impervious area: 2 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343835)

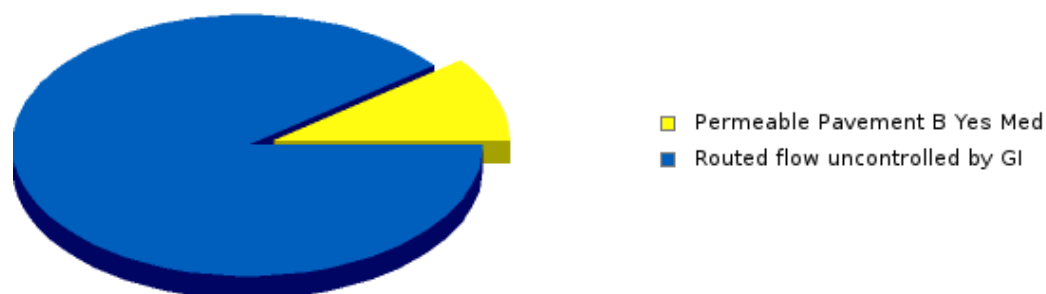
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution









Relative GI Reduction of Runoff



Total Runoff pre-BMP	5.59 acre-ft
Total Reduction	9.5 %
Total Runoff Captured	0.53 acre-ft
Total Outlets	5.06 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			6,102 gallons (0.2 acre-in) 0.022 acres	
	Water	0.177	0	0% flow	
	Building	1.096	2.83	1% flow	
	Impervious-Mod	0.073	0.19	62% flow	
LBs_1343835	Impervious-Low	0.862	2.18	20% flow	
	Pervious-Mod-D	0.033	0.01	35% flow	
	Pervious-Low-D	1.621	0.38	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			9.46%	
	BMP Runoff Reduction			0.53 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343835	Permeable Pavement B Yes Med	\$10,400	\$300	20	\$10,700

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343835	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343835

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

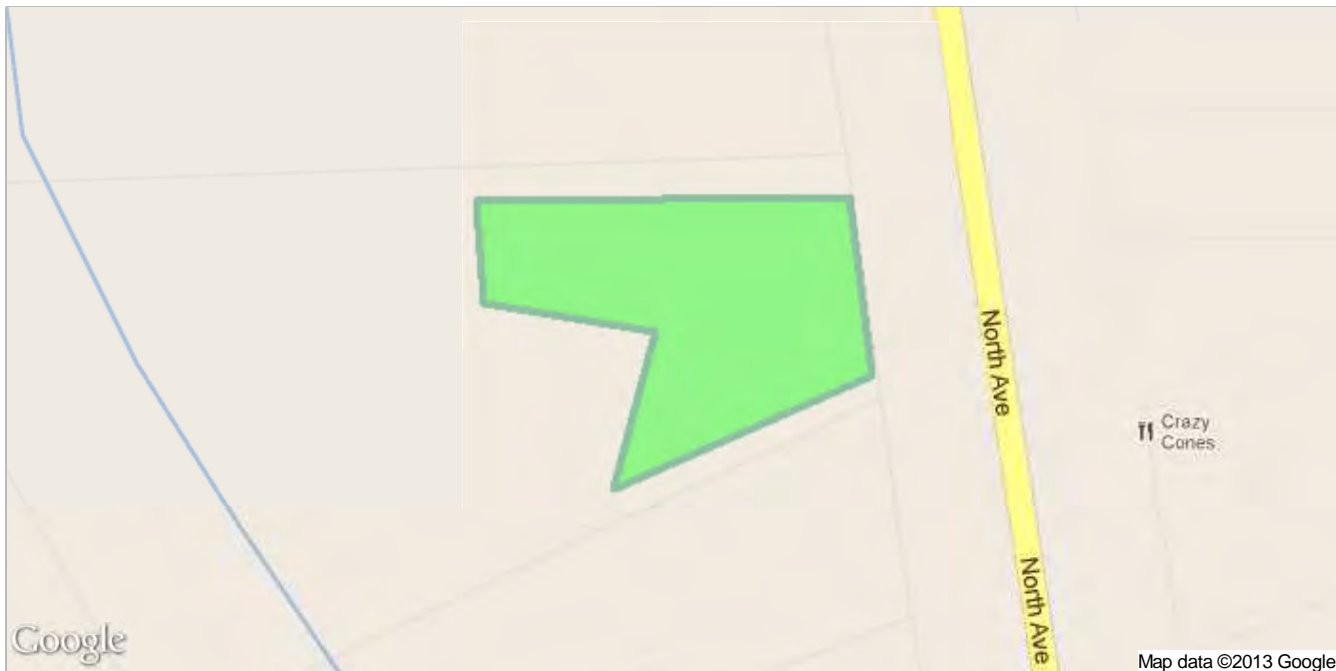
GR_LBs_1343865_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.06 acres

Total project cost: \$4,000

Priority area ranking: Medium-High (5.99/10)

Design depth: 1 inches

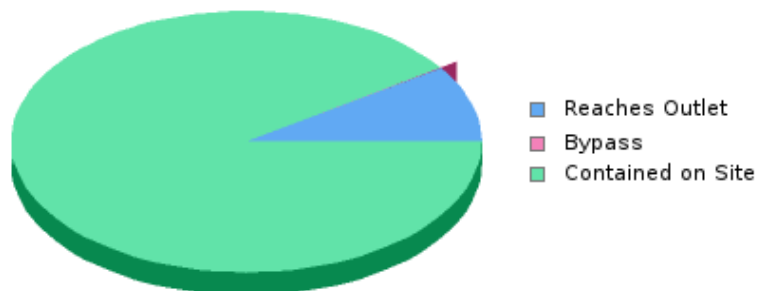
Total impervious area: 0.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343865)

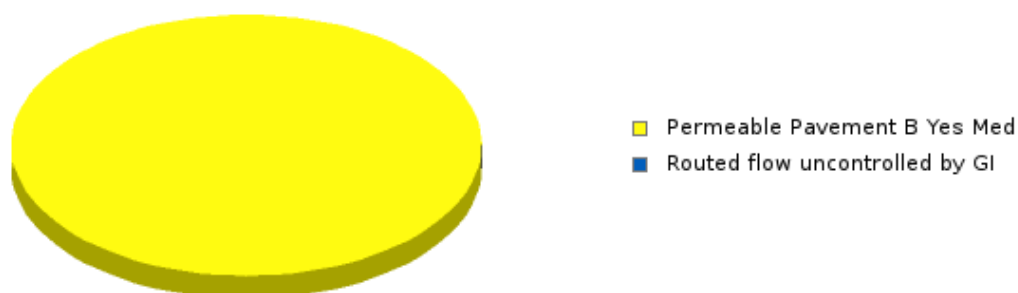
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution





Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.22 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.2 acre-ft
Total Outlets	0.02 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			2,264 gallons (0.1 acre-in) 0.008 acres	
	Impervious-Low	0.082	0.21	100% flow	
LBs_1343865	Pervious-Low-D	0.04	0.01	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.2 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343865	Permeable Pavement B Yes Med	\$3,900	\$100	20	\$4,000

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
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GR_LBs_1343911_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.06 acres

Total project cost: \$3,000

Priority area ranking: Medium-Medium (5.41/10)

Design depth: 1 inches

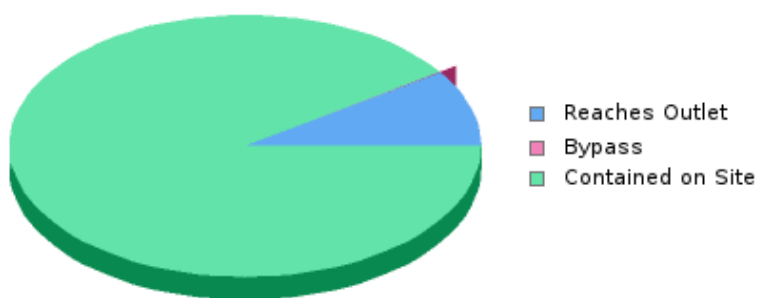
Total impervious area: 0.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343911)

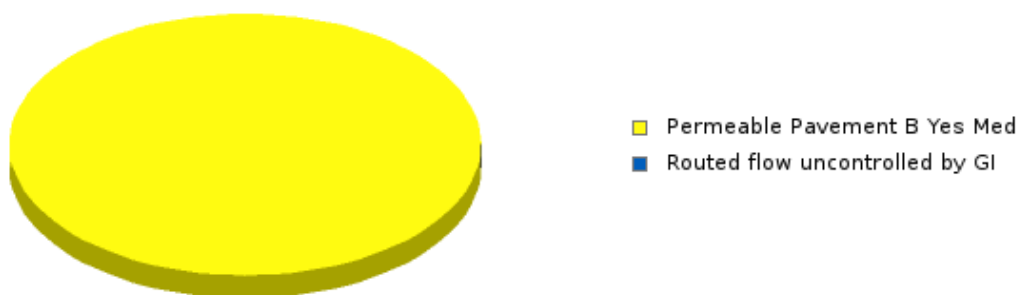
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.19 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.17 acre-ft
Total Outlets	0.02 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343911	Green Infrastructure Capacity			1,957 gallons (0.1 acre-in) 0.007 acres

Impervious-Low	0.073	0.18	100% flow
Pervious-Low-D	0.012	0	100% flow
Design Depth	1 inches		
Percent BMP Effectiveness	90.49%		
BMP Runoff Reduction	0.17 acre-ft		



Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343911	Permeable Pavement B Yes Med	\$3,300	\$100	20	\$3,400

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1343911	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343911

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBS_1343865	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
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Project BMP Routing

Outlets

LBS_1343865

Permeable Pavement B Yes Med Effluent: 0 acre-ft

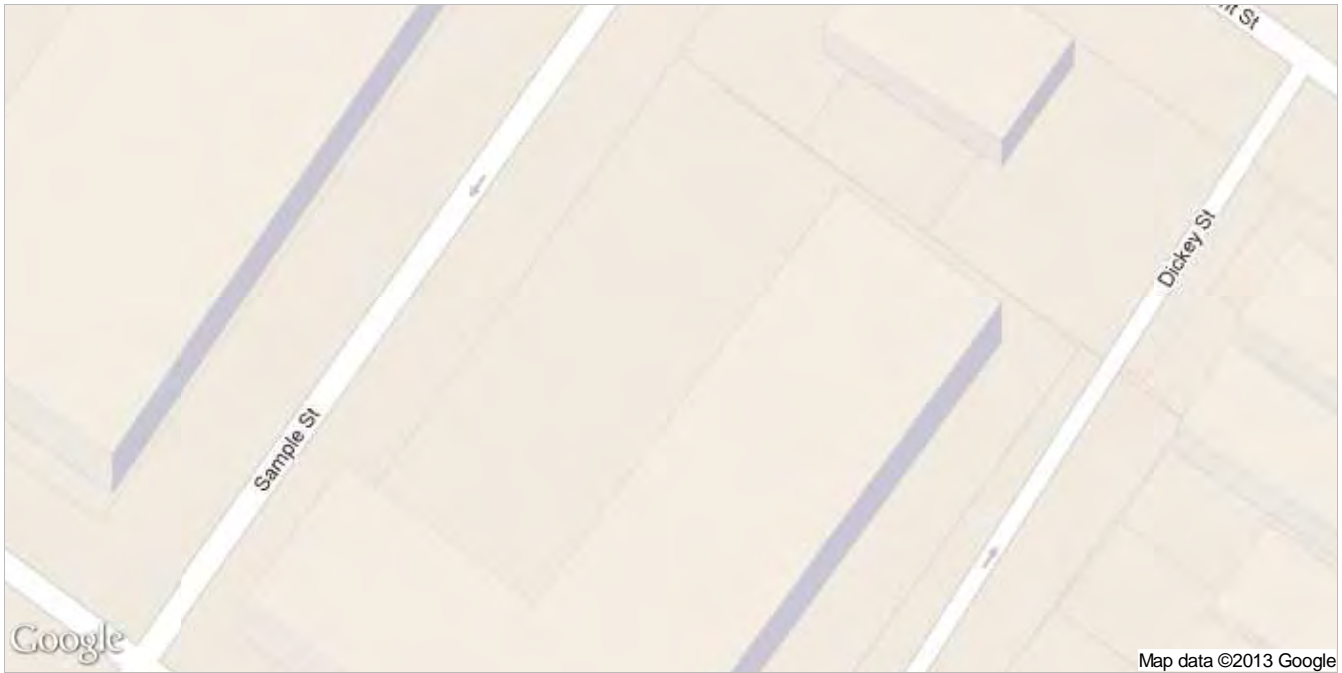
GR_LBs_1343912_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.09 acres

Total project cost: \$4,000

Priority area ranking: Medium-High (5.98/10)

Design depth: 1 inches

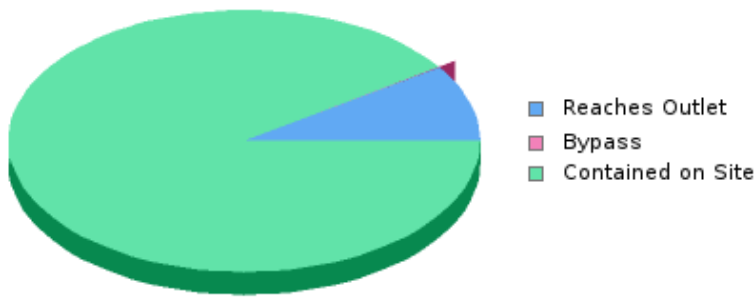
Total impervious area: 0.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343912)

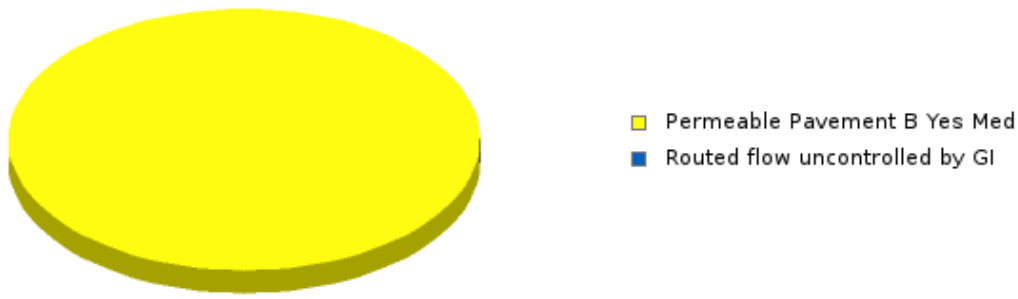
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.23 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.21 acre-ft
Total Outlets	0.02 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1343912	Green Infrastructure Capacity			2,403 gallons (0.1 acre-in) 0.009 acres

Impervious-Low	0.091	0.23	100% flow
Design Depth	1 inches		
Percent BMP Effectiveness	90.49%		
BMP Runoff Reduction	0.21 acre-ft		



Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343912	Permeable Pavement B Yes Med	\$4,100	\$100	20	\$4,200

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1343912	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1343912

Permeable Pavement B Yes Med Effluent: 0 acre-ft

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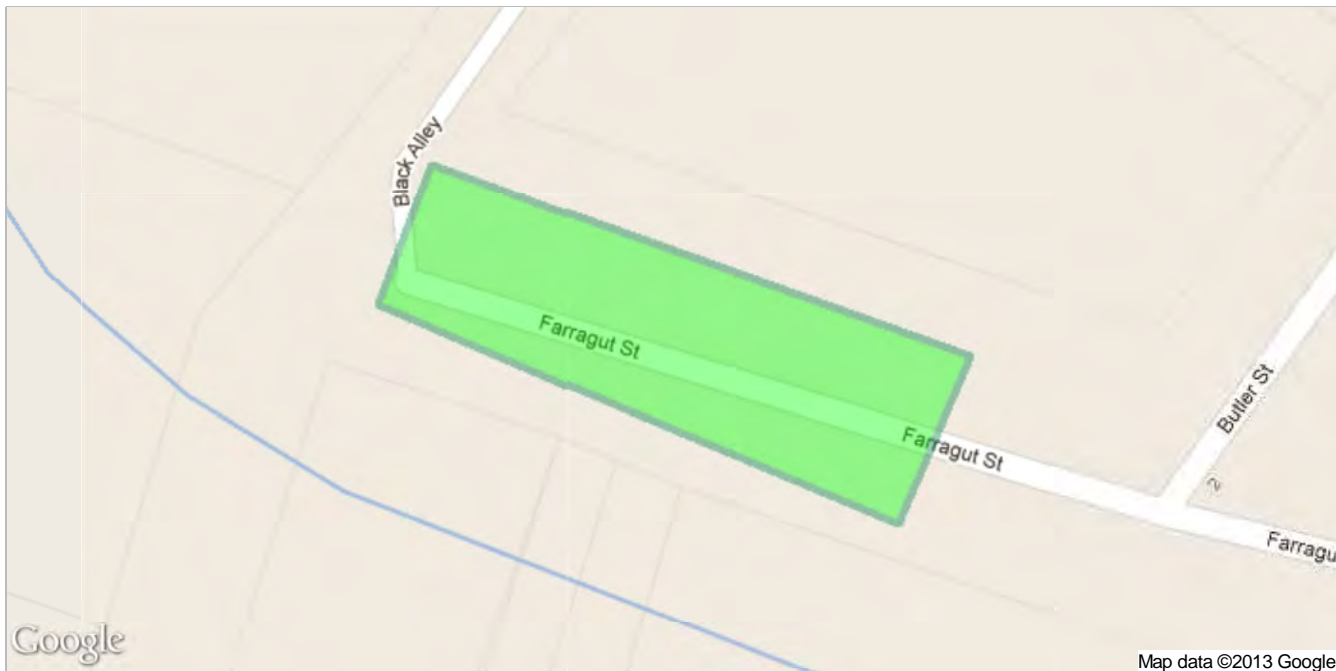
GR_LBs_1343931_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.08 acres

Total project cost: \$5,000

Priority area ranking: Medium-High (6.05/10)

Design depth: 1 inches

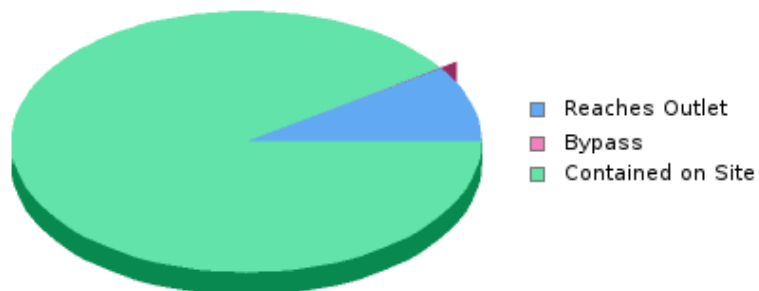
Total impervious area: 0.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343931)

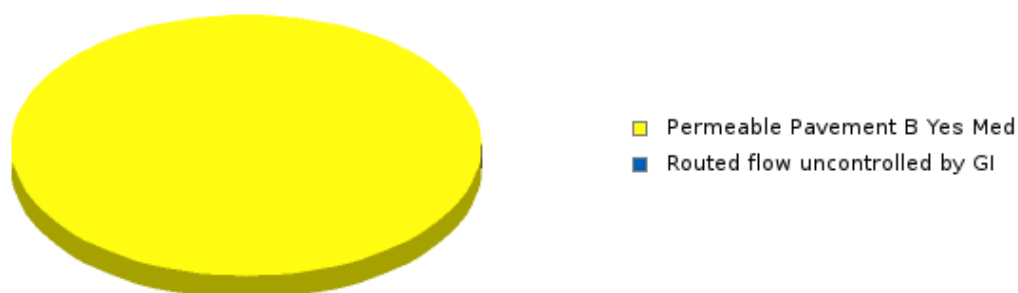
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.28 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.25 acre-ft
Total Outlets	0.03 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
	Green Infrastructure Capacity			2,891 gallons (0.1 acre-in) 0.01 acres
LBs_1343931	Impervious-Mod	0.075	0.19	100% flow
	Impervious-Low	0.033	0.08	100% flow
	Design Depth			1 inches
	Percent BMP Effectiveness			90.49%
	BMP Runoff Reduction			0.25 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343931	Permeable Pavement B Yes Med	\$4,900	\$100	20	\$5,000

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
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LBS_1343931	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
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Project BMP Routing

Outlets

LBS_1343931

Permeable Pavement B Yes Med Effluent: 0 acre-ft

GR_LBs_1343961_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 7.25 acres

Total project cost: \$45,000

Priority area ranking: Medium-Medium (5.36/10)

Design depth: 1 inches

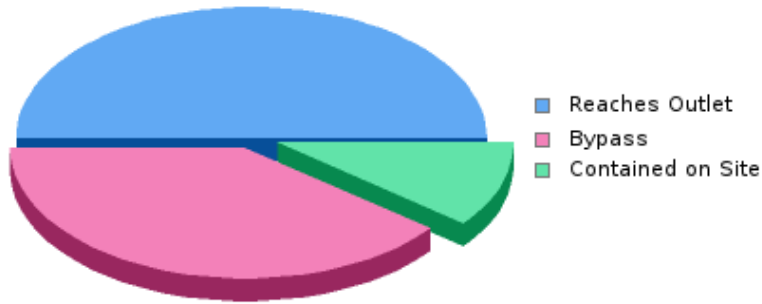
Total impervious area: 4.8 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343961)

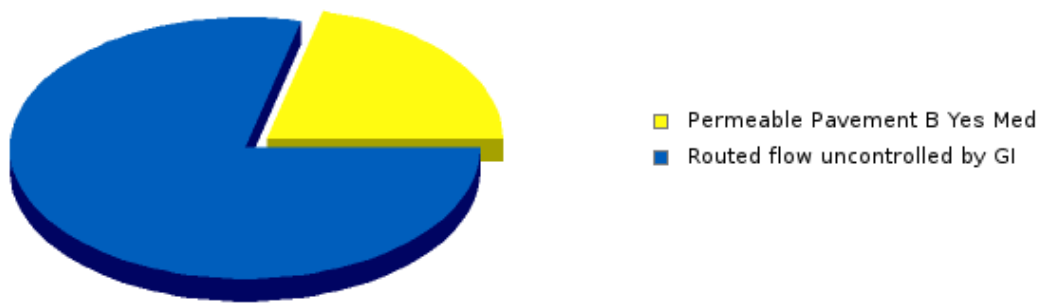
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution






Relative GI Reduction of Runoff



Total Runoff pre-BMP	12.84 acre-ft
Total Reduction	17.5 %
Total Runoff Captured	2.24 acre-ft
Total Outlets	10.6 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			25,859 gallons (1 acre-in) 0.093 acres	
LBs_1343961	Building	2.224	5.74	36% flow	
	Impervious-Low	2.574	6.52	0% flow	
	Pervious-Low-D	2.453	0.58	71% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			17.47%	
	BMP Runoff Reduction				2.24 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343961	Permeable Pavement B Yes Med	\$44,000	\$1,300	20	\$45,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure	Construction Cost	O&M Costs (\$/year)	Lifespan
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	BMP	(\$/sqft)	/sqft)	(years)
LBS_1343961	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1343961

Permeable Pavement B Yes Med Effluent: 0.2 acre-ft

Print this page

GR_LBs_1343966_Comm

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.07 acres

Total project cost: \$5,000

Priority area ranking: Medium-High (6.25/10)

Design depth: 1 inches

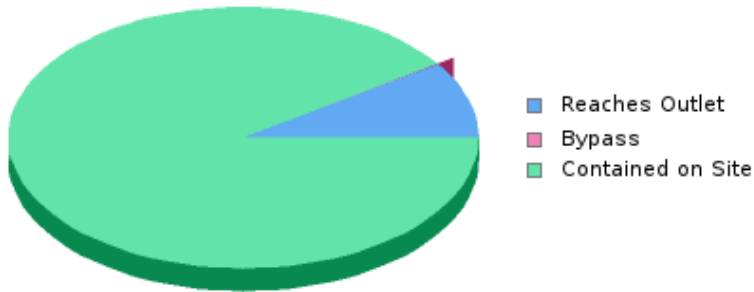
Total impervious area: 0.1 acres

POC(s)/Regulator(s): A-67-00 (LBs_1343966)

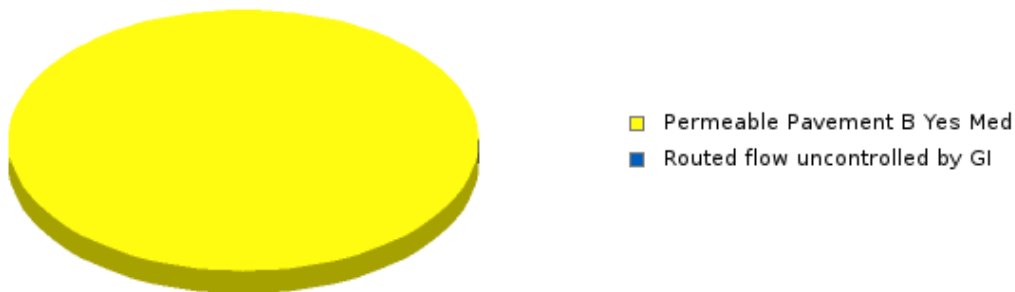
Municipalities: Millvale Borough

Overall Green Infrastructure Performance

Runoff Distribution






Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.26 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.24 acre-ft
Total Outlets	0.02 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			2,738 gallons (0.1 acre-in) 0.01 acres	
LBs_1343966	Building	0.023	0.06	100% flow	
	Impervious-Low	0.079	0.2	100% flow	
	Pervious-Low-D	0.013	0	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction				0.24 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1343966	Permeable Pavement B Yes Med	\$4,700	\$100	20	\$4,800

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure	Construction Cost	O&M Costs (\$/year)	Lifespan
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	BMP	(\$/sqft)	/sqft)	(years)
LBS_1343966	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1343966

Permeable Pavement B Yes Med Effluent: 0 acre-ft

**APPENDIX C
RAINWAYS
OUTPUT
REGULATOR
REPORTS**

Print this page

Regulator A-67-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an annualized basis.

Characteristics

Total Drainage Area: 45.9 acres
 Number of Projects: 2
 Total Cost: \$18,000
 Total Green Infrastructure Project Area: 10.2 acres
 Total GI Project Impervious Area: 3.7 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		2.493e-2 M Gallon		6.231e-2 M Gallon		1.246e-1 M Gallon		3.739e-1 M Gallon		9.970e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	A-67-OF	53	6.466e+1	53	6.222e+1	53	5.953e+1	53	5.572e+1	48	4.363e+1	48	3.150e+1

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343967_BR	5.1	5.4	1	0.4	0	0.01
GR_LBs_1343967_PP	5.1	5.4	1	16	0.9	0.368
Total runoff pre-green infrastructure	10.8 acre-feet (3.530e+0 MGPY)					
Total Reduction within GI	8.2 %					
Total Runoff Captured	0.9 acre-ft (2.893e-1 MGPY)					

Total GI Outlets	9.9 acre-ft (3.506e+0 MGPY)
Total GI Capacity	0.03 acre-ft (1.028e-2 Million Gallons)
Number of CSOs Prevented	0 (0 %)
Overflow Volume Reduced	3.09 acre-ft (1.007e+0 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343967_BR	\$0	\$0	\$1,000
GR_LBs_1343967_PP	\$17,000	\$0	\$17,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator MH.07-IRO-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 641.7 acres
 Number of Projects: 8
 Total Cost: \$125,000
 Total Green Infrastructure Project Area: 80.3 acres
 Total GI Project Impervious Area: 26.6 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		3.485e-1 M Gallon		8.712e-1 M Gallon		1.742e+0 M Gallon		5.227e+0 M Gallon		1.394e+1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	MH.07-IRO-OF	5	2.910e-1	5	2.629e-1	5	2.290e-1	4	1.663e-1	2	2.090e-2	0	0.000e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343890_BR	13.1	11.5	1	12.2	1.4	0.396
GR_LBs_1343865_BR	5	6.2	1	23.2	1.4	0.727
GR_LBs_1343860_BR	13.6	11	1	4.7	0.5	0.263
GR_LBs_1343835_BR	3.9	5.6	1	21	1.2	0.593
GR_LBs_1343824_BR	20.3	13.9	1	1.1	0.2	0.077
GR_LBs_1343818_BR	9.7	11.8	1	0.5	0.1	0.033

GR_LBs_1343767_BR	5	7.6	1	5.1	0.4	0.196
GR_LBs_1343818_PP	9.7	11.8	1	3.6	0.4	0.181
Total runoff pre-green infrastructure	79.4 acre-feet (2.587e+1 MGPY)					
Total Reduction within GI	7 %					
Total Runoff Captured	5.6 acre-ft (1.816e+0 MGPY)					
Total GI Outlets	73.8 acre-ft (2.571e+1 MGPY)					
Total GI Capacity	0.21 acre-ft (6.699e-2 Million Gallons)					
Number of CSOs Prevented	0 (0 %)					
Overflow Volume Reduced	0.02 acre-ft (5.402e-3 MGPY)					

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343890_BR	\$19,000	\$1,000	\$20,000
GR_LBs_1343865_BR	\$35,000	\$2,000	\$37,000
GR_LBs_1343860_BR	\$13,000	\$1,000	\$13,000
GR_LBs_1343835_BR	\$29,000	\$2,000	\$30,000
GR_LBs_1343824_BR	\$4,000	\$0	\$4,000
GR_LBs_1343818_BR	\$2,000	\$0	\$2,000
GR_LBs_1343767_BR	\$10,000	\$1,000	\$10,000
GR_LBs_1343818_PP	\$8,000	\$0	\$9,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator MH.I-IRO-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 29.4 acres
 Number of Projects: 2
 Total Cost: \$229,000
 Total Green Infrastructure Project Area: 49.4 acres
 Total GI Project Impervious Area: 25.2 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		1.596e-2 M Gallon		3.990e-2 M Gallon		7.980e-2 M Gallon		2.394e-1 M Gallon		6.384e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	MH.I-IRO-OF	24	3.838e+0	22	3.661e+0	21	3.441e+0	20	3.137e+0	14	2.224e+0	9	7.223e-1

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343931_BR	24.7	35.5	1	8.3	2.9	1.482
GR_LBs_1343931_PP	24.7	35.5	1	21.4	7.6	3.219
Total runoff pre-green infrastructure	70.9 acre-feet (2.311e+1 MGPY)					
Total Reduction within GI	14.8 %					
Total Runoff Captured	10.5 acre-ft (3.426e+0 MGPY)					
Total GI Outlets	60.4 acre-ft					

	(2.282e+1 MGPY)
Total GI Capacity	0.39 acre-ft (1.277e-1 Million Gallons)
Number of CSOs Prevented	6 (25 %)
Overflow Volume Reduced	2.99 acre-ft (9.744e-1 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343931_BR	\$72,000	\$4,000	\$76,000
GR_LBs_1343931_PP	\$149,000	\$4,000	\$153,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator ML-CSO#1-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 7.3 acres
 Number of Projects: 2
 Total Cost: \$69,000
 Total Green Infrastructure Project Area: 14.5 acres
 Total GI Project Impervious Area: 9.6 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		3.938e-3 M Gallon		9.845e-3 M Gallon		1.969e-2 M Gallon		5.907e-2 M Gallon		1.575e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	ML-CSO#1-OF	65	5.178e+0	64	5.007e+0	64	4.808e+0	63	4.515e+0	63	3.690e+0	63	2.161e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343961_BR	7.3	12.8	1	4.8	0.6	0.31
GR_LBs_1343961_PP	7.3	12.8	1	20.7	2.7	1.128
Total runoff pre-green infrastructure	25.7 acre-feet (8.367e+0 MGPY)					
Total Reduction within GI	12.7 %					
Total Runoff Captured	3.3 acre-ft (1.066e+0 MGPY)					
Total GI Outlets	22.4 acre-ft (8.278e+0 MGPY)					

Total GI Capacity	0.12 acre-ft (3.906e-2 Million Gallons)
Number of CSOs Prevented	2 (3 %)
Overflow Volume Reduced	3.28 acre-ft (1.069e+0 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343961_BR	\$15,000	\$1,000	\$16,000
GR_LBs_1343961_PP	\$52,000	\$1,000	\$54,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator ML-CSO#2-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 17.3 acres
 Number of Projects: 1
 Total Cost: \$7,000
 Total Green Infrastructure Project Area: 17.3 acres
 Total GI Project Impervious Area: 7.6 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		9.385e-3 M Gallon		2.346e-2 M Gallon		4.692e-2 M Gallon		1.408e-1 M Gallon		3.754e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	ML-CSO#2-OF	28	2.321e+0	26	2.244e+0	25	2.154e+0	24	1.999e+0	20	1.482e+0	18	6.091e-1

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343966_BR	17.3	22	1	1.3	0.3	0.142
Total runoff pre-green infrastructure	22 acre-feet (7.185e+0 MGPY)					
Total Reduction within GI	1.3 %					
Total Runoff Captured	0.3 acre-ft (9.131e-2 MGPY)					
Total GI Outlets	21.8 acre-ft (7.177e+0 MGPY)					

Total GI Capacity	0.01 acre-ft (3.847e-3 Million Gallons)
Number of CSOs Prevented	1 (4 %)
Overflow Volume Reduced	0.1 acre-ft (3.173e-2 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343966_BR	\$7,000	\$0	\$7,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator ML-CSO#4-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 117 acres
 Number of Projects: 1
 Total Cost: \$34,000
 Total Green Infrastructure Project Area: 35.1 acres
 Total GI Project Impervious Area: 10.3 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		6.355e-2 M Gallon		1.589e-1 M Gallon		3.177e-1 M Gallon		9.532e-1 M Gallon		2.542e+0 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	ML-CSO#4-OF	5	4.446e-1	5	3.961e-1	5	3.160e-1	5	1.850e-1	3	6.200e-3	2	2.900e-3

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343910_BR	35.1	31.8	1	4.1	1.3	0.666
Total runoff pre-green infrastructure	31.8 acre-feet (1.035e+1 MGPY)					
Total Reduction within GI	4.1 %					
Total Runoff Captured	1.3 acre-ft (4.291e-1 MGPY)					
Total GI Outlets	30.5 acre-ft (1.032e+1 MGPY)					

Total GI Capacity	0.06 acre-ft (1.808e-2 Million Gallons)
Number of CSOs Prevented	0 (0 %)
Overflow Volume Reduced	0.04 acre-ft (1.380e-2 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343910_BR	\$32,000	\$2,000	\$34,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator ML-CSO#5-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 16.3 acres
 Number of Projects: 2
 Total Cost: \$212,000
 Total Green Infrastructure Project Area: 25.9 acres
 Total GI Project Impervious Area: 10.6 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		8.840e-3 M Gallon		2.210e-2 M Gallon		4.420e-2 M Gallon		1.326e-1 M Gallon		3.536e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	ML-CSO#5-OF	9	1.001e+0	9	9.128e-1	9	8.087e-1	7	6.462e-1	6	2.751e-1	2	9.340e-2

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343912_BR	13	15.5	1	2.2	0.3	0.17
GR_LBs_1343912_PP	13	15.5	1	65	10.1	4.276
Total runoff pre-green infrastructure	31 acre-feet (1.011e+1 MGPY)					
Total Reduction within GI	33.6 %					
Total Runoff Captured	10.4 acre-ft (3.392e+0 MGPY)					
Total GI Outlets	20.6 acre-ft (9.824e+0 MGPY)					

Total GI Capacity	0.37 acre-ft (1.207e-1 Million Gallons)
Number of CSOs Prevented	3 (33 %)
Overflow Volume Reduced	2.07 acre-ft (6.759e-1 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343912_BR	\$8,000	\$0	\$9,000
GR_LBs_1343912_PP	\$197,000	\$6,000	\$203,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator ML-CSO#6-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 27.7 acres
 Number of Projects: 1
 Total Cost: \$2,000
 Total Green Infrastructure Project Area: 13.5 acres
 Total GI Project Impervious Area: 4.4 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		1.504e-2 M Gallon		3.761e-2 M Gallon		7.521e-2 M Gallon		2.256e-1 M Gallon		6.017e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	ML-CSO#6-OF	13	2.928e-1	12	2.643e-1	10	2.288e-1	10	1.841e-1	9	7.570e-2	3	2.980e-2

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343891_BR	13.5	13.9	1	0.7	0.1	0.046
Total runoff pre-green infrastructure	13.9 acre-feet (4.542e+0 MGPY)					
Total Reduction within GI	0.7 %					
Total Runoff Captured	0.1 acre-ft (2.954e-2 MGPY)					
Total GI Outlets	13.8 acre-ft (4.539e+0 MGPY)					

Total GI Capacity	0 acre-ft (1.245e-3 Million Gallons)
Number of CSOs Prevented	1 (8 %)
Overflow Volume Reduced	0.01 acre-ft (2.358e-3 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343891_BR	\$2,000	\$0	\$2,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator ML-CSO#7-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 3 acres
 Number of Projects: 1
 Total Cost: \$4,000
 Total Green Infrastructure Project Area: 3 acres
 Total GI Project Impervious Area: 1.9 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		1.656e-3 M Gallon		4.140e-3 M Gallon		8.281e-3 M Gallon		2.484e-2 M Gallon		6.625e-2 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	ML-CSO#7-OF	0	0.000e+0	0	0.000e+0	0	0.000e+0	0	0.000e+0	0	0.000e+0	0	0.000e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343795_BR	3	5.2	1	2.7	0.1	0.072
Total runoff pre-green infrastructure	5.2 acre-feet (1.690e+0 MGPY)					
Total Reduction within GI	2.7 %					
Total Runoff Captured	0.1 acre-ft (4.608e-2 MGPY)					
Total GI Outlets	5 acre-ft (1.687e+0 MGPY)					

Total GI Capacity	0.01 acre-ft (1.942e-3 Million Gallons)
Number of CSOs Prevented	0 (0 %)
Overflow Volume Reduced	0 acre-ft (0.000e+0 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343795_BR	\$3,000	\$0	\$4,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator ML-CSO#9-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 16 acres
 Number of Projects: 2
 Total Cost: \$184,000
 Total Green Infrastructure Project Area: 21.4 acres
 Total GI Project Impervious Area: 10.2 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		8.672e-3 M Gallon		2.168e-2 M Gallon		4.336e-2 M Gallon		1.301e-1 M Gallon		3.469e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-67-00	ML-CSO#9-OF	61	6.892e+0	61	6.572e+0	58	6.109e+0	58	5.455e+0	55	3.687e+0	55	1.552e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343943_BR	10.7	14.6	1	10.2	1.5	0.757
GR_LBs_1343943_PP	10.7	14.6	1	49.5	7.2	3.068
Total runoff pre-green infrastructure	29.2 acre-feet (9.515e+0 MGPY)					
Total Reduction within GI	29.9 %					
Total Runoff Captured	8.7 acre-ft (2.842e+0 MGPY)					
Total GI Outlets	20.5 acre-ft (9.278e+0 MGPY)					

Total GI Capacity	0.32 acre-ft (1.038e-1 Million Gallons)
Number of CSOs Prevented	6 (10 %)
Overflow Volume Reduced	8.19 acre-ft (2.670e+0 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
GR_LBs_1343943_BR	\$37,000	\$2,000	\$39,000
GR_LBs_1343943_PP	\$142,000	\$4,000	\$146,000

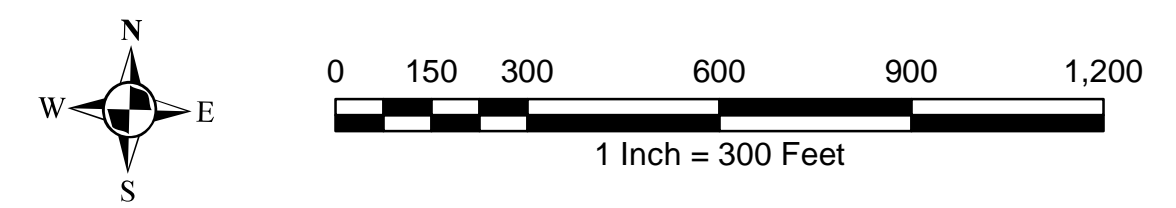
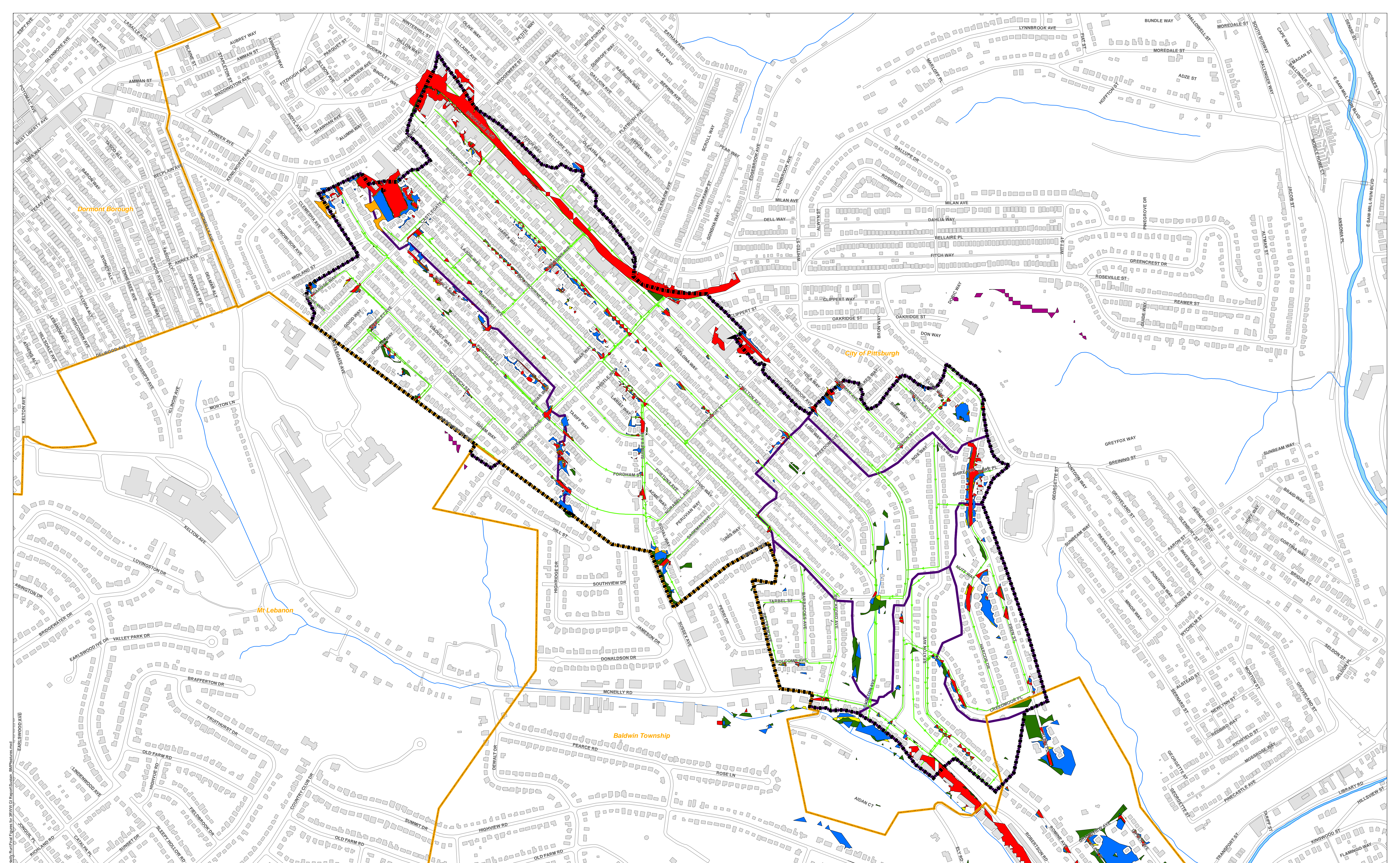
Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

APPENDIX D

APPENDIX D
FIGURES



3 Rivers
Wet Weather
Engineering & Construction

Baker

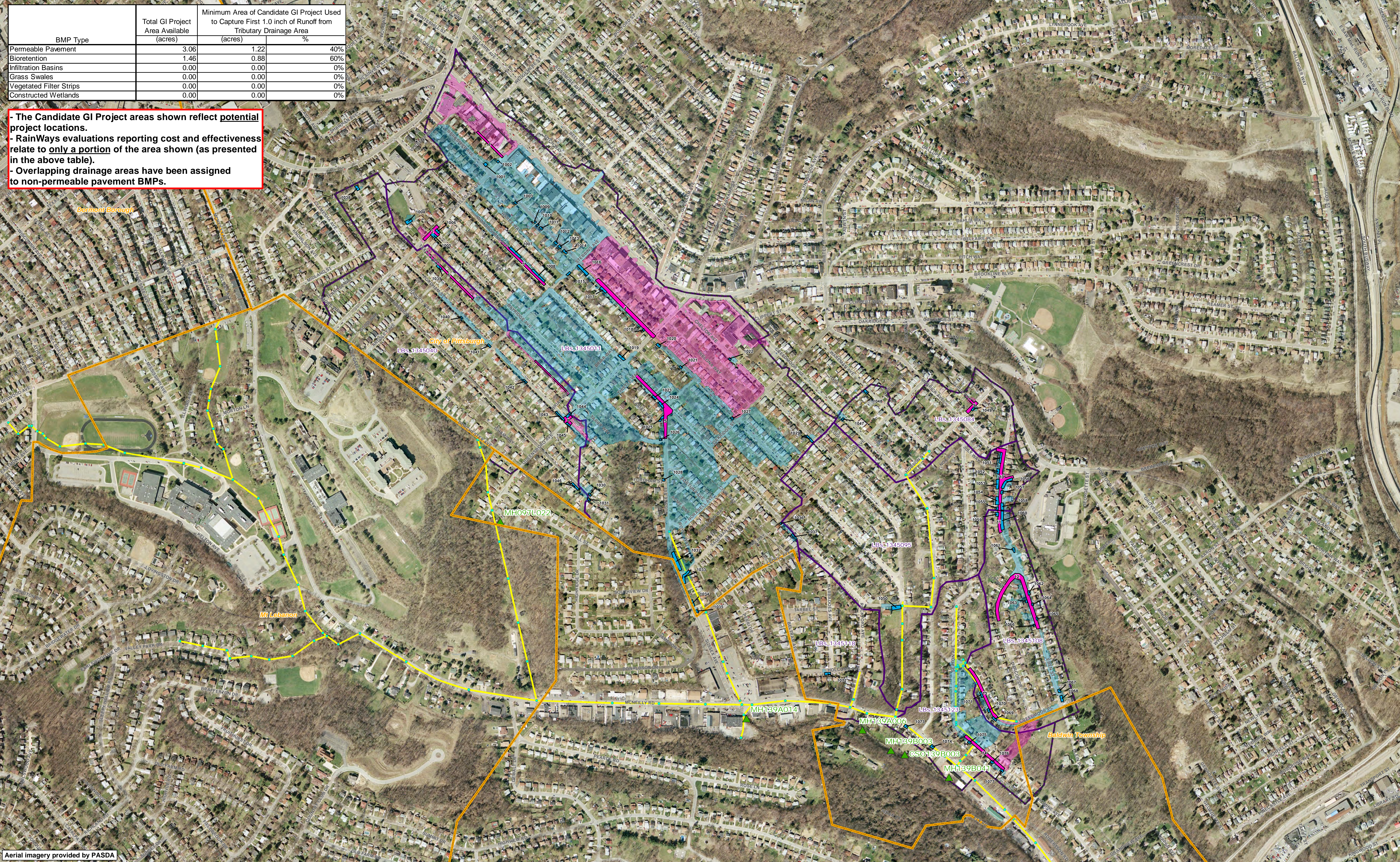
WADETRIM

Figure D-1
McNeilly Run
BMP GIS Features

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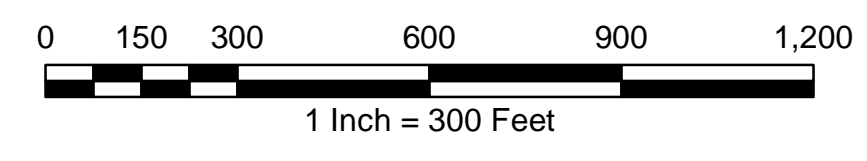
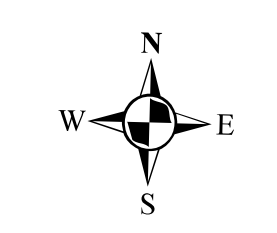
BMP Type	Total GI Project Area Available (acres)	Minimum Area of Candidate GI Project Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area	
	(acres)	(acres)	%
Permeable Pavement	3.06	1.22	40%
Bioretention	1.46	0.88	60%
Infiltration Basins	0.00	0.00	0%
Grass Swales	0.00	0.00	0%
Vegetated Filter Strips	0.00	0.00	0%
Constructed Wetlands	0.00	0.00	0%

- The Candidate GI Project areas shown reflect **potential** project locations.
- RainWays evaluations reporting cost and effectiveness relate to **only a portion** of the area shown (as presented in the above table).
- Overlapping drainage areas have been assigned to **non-permeable pavement BMPs**.



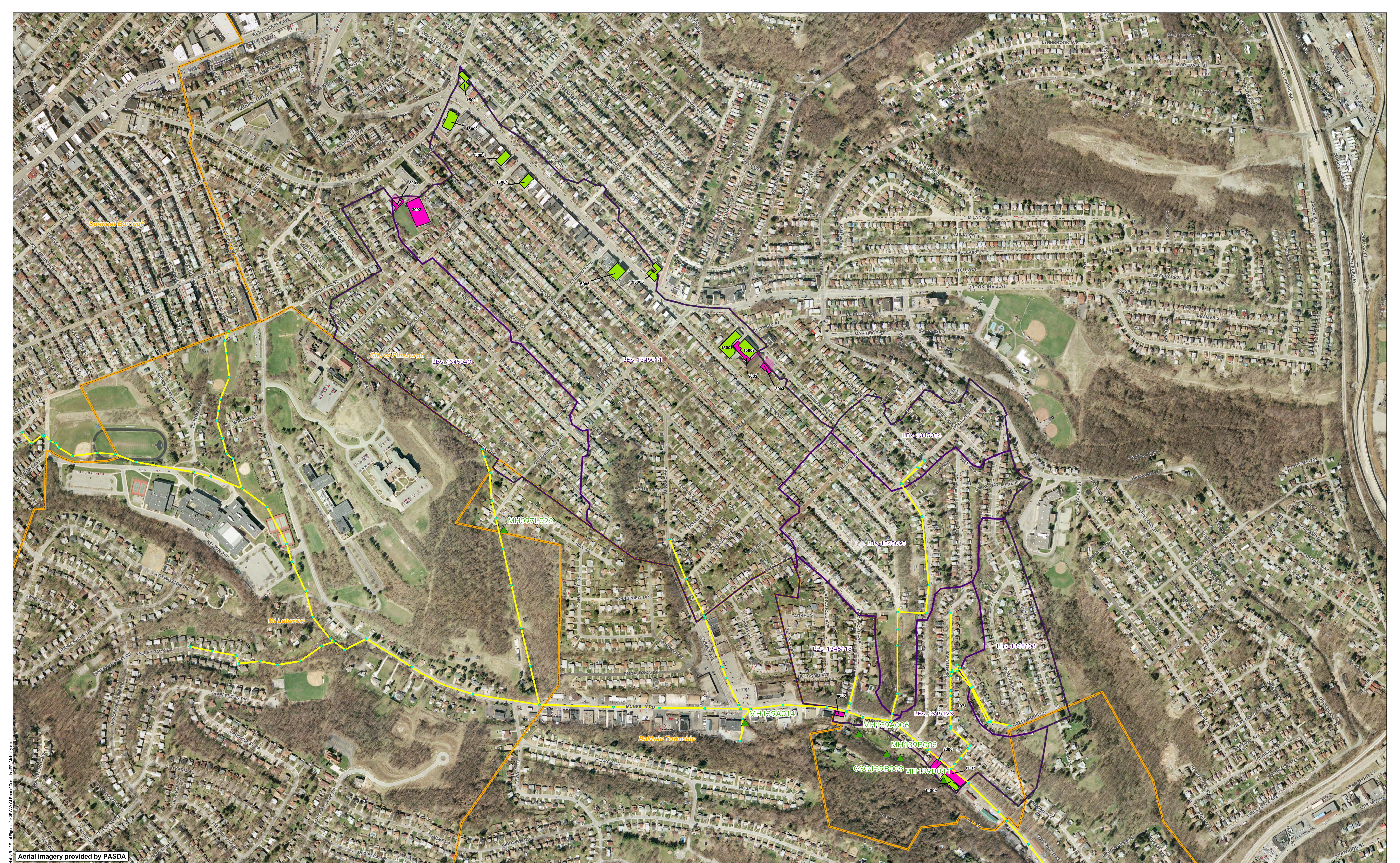
Aerial imagery provided by PASDA

Bioretention Basin	Bioretention Basin Drainage Area	Outfalls	Area Tributary to POC S-15
Permeable Pavement	Permeable Pavement Drainage Area	Model Junctions	Combined Sewer Subcatchment
ALCOSAN McNeilly Run Modeled Pipe Network Extent	Municipal Boundaries		



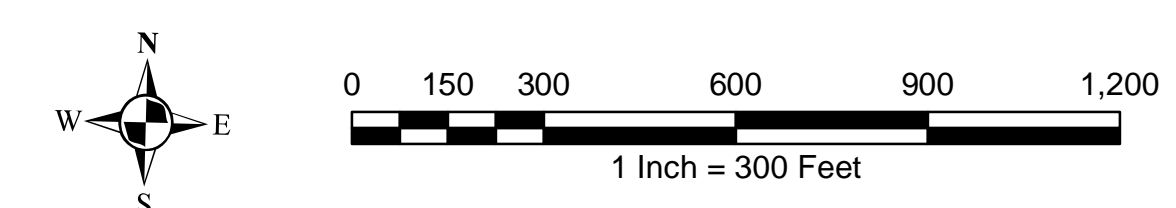
3 Rivers Wet Weather	Baker	Landbase Systems
Lorain Smith, Squatier Engineering, Inc.	WADE TRIM	

Figure D-2
McNeilly Run
Concept Municipal GI Projects



Aerial imagery provided by PASDA

- Green Roof Candidate Projects
- Permeable Pavement Candidate GI Projects
- Permeable Pavement Candidate GI Project Drainage Areas
- Outfalls
- Model Junctions
- Area Tributary to POC S-15
- Combined Sewer Subcatchment
- Municipal Boundaries
- ALCOSAN McNeilly Run Modeled Pipe Network Extent





3 Rivers
Wet Weather



Baker

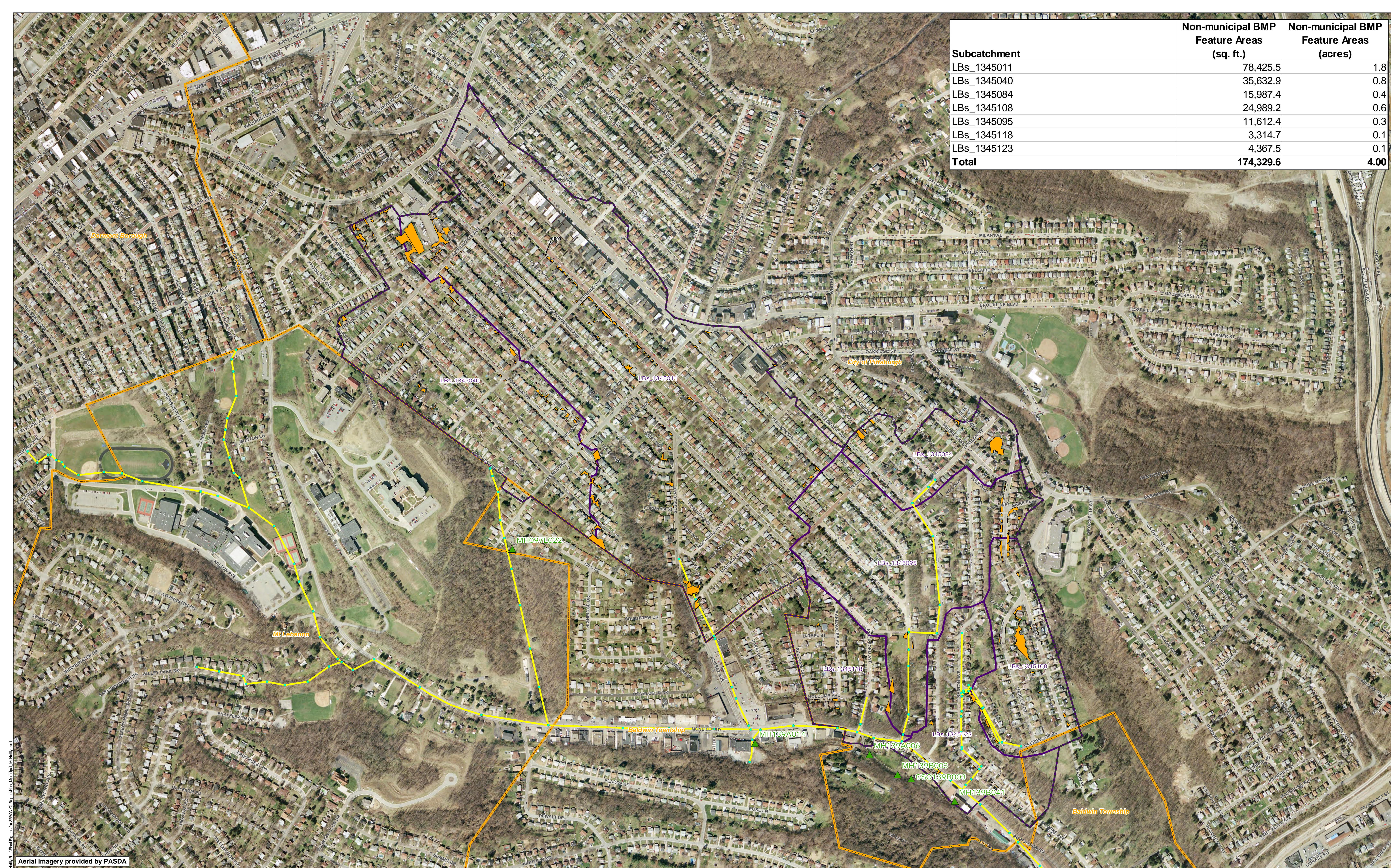


Landbase Systems



Figure D-3
McNeilly Run
Concept Commercial / Institutional
GI Projects

Subcatchment	Non-municipal BMP Feature Areas (sq. ft.)	Non-municipal BMP Feature Areas (acres)
LBs_1345011	78,425.5	1.8
LBs_1345040	35,632.9	0.8
LBs_1345084	15,987.4	0.4
LBs_1345108	24,989.2	0.6
LBs_1345095	11,612.4	0.3
LBs_1345118	3,314.7	0.1
LBs_1345123	4,367.5	0.1
Total	174,329.6	4.00



Aerial imagery provided by PASDA

- Infiltration Type BMP
- Model Junctions
- Area Tributary to POC S-15
- Outfalls
- ALCOSAN McNeilly Run Modeled Pipe Network Extent
- Combined Sewer Subcatchment
- Municipal Boundaries

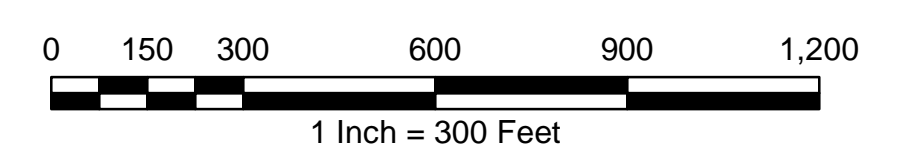
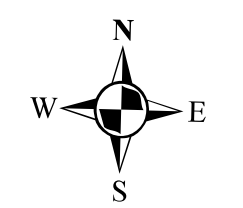


Figure D-4
McNeilly Run
Residential BMP Features

APPENDIX D
TABLES 1.1
THROUGH 1.7

Table D-1.1
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary
February 19, 2013

Subcatchment

LBs_1345011

Subcatchment Size 127.03 acres
 Total Annual Subcatchment Runoff (RainWays) 50.98 MG
 Drainage Area Tributary to Municipal GI Projects 46.39 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.88	0.72	0.00	0.00	0.00	0.00	1.60
Number of Candidate GI Projects	5	37	0	0	0	0	42
Annual Combined Sewer Area Runoff Captured (MG)*	6.95	9.19	0	0	0	0	16.14
Combined Sewer Area Runoff Capture (%)	13.6%	18.0%	0.0%	0.0%	0.0%	0.0%	31.7%
Opinion of Probable Cost***							
Construction Cost	\$419,000	\$ 691,000	\$ -	\$ -	\$ -	\$ -	\$1,110,000
O/M Cost (20 years)	\$16,000	\$ 38,000	\$ -	\$ -	\$ -	\$ -	\$54,000
Present Worth Cost**	\$433,000	\$ 725,000	\$ -	\$ -	\$ -	\$ -	\$1,158,000
Present Worth Cost per Drainage Area Treated (acres)	\$25,000	\$ 26,000					\$25,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table D-1.2
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary
February 19, 2013

Subcatchment

LBs_1345040

Subcatchment Size 45.57 acres
 Total Annual Subcatchment Runoff (RainWays) 15.67 MG
 Drainage Area Tributary to Municipal GI Projects 1.26 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.02	0.02	0.00	0.00	0.00	0.00	0.04
Number of Candidate GI Projects	3	9	0	0	0	0	12
Annual Combined Sewer Area Runoff Captured (MG)*	0.16	0.31	0	0	0	0	0.47
Combined Sewer Area Runoff Capture (%)	1.0%	2.0%	0.0%	0.0%	0.0%	0.0%	3.0%
Opinion of Probable Cost***							
Construction Cost	\$10,000	\$ 24,000	\$ -	\$ -	\$ -	\$ -	\$34,000
O/M Cost (20 years)	\$1,000	\$ 2,000	\$ -	\$ -	\$ -	\$ -	\$3,000
Present Worth Cost**	\$11,000	\$ 26,000	\$ -	\$ -	\$ -	\$ -	\$37,000
Present Worth Cost per Drainage Area Treated (acres)	\$24,000	\$ 34,000					\$30,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table D-1.3
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary
February 19, 2013

Subcatchment

LBs_1345084

Subcatchment Size 14.94 acres
 Total Annual Subcatchment Runoff (RainWays) 5.91 MG
 Drainage Area Tributary to Municipal GI Projects 0.23 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.01	0.002	0.00	0.00	0.00	0.00	0.01
Number of Candidate GI Projects	1	3	0	0	0	0	4
Annual Combined Sewer Area Runoff Captured (MG)*	0.07	0.03	0	0	0	0	0.10
Combined Sewer Area Runoff Capture (%)	1.2%	0.4%	0.0%	0.0%	0.0%	0.0%	1.7%
Opinion of Probable Cost***							
Construction Cost	\$5,000	\$ 2,000	\$ -	\$ -	\$ -	\$ -	\$7,000
O/M Cost (20 years)	\$1,000	\$ 1,000	\$ -	\$ -	\$ -	\$ -	\$2,000
Present Worth Cost**	\$6,000	\$ 3,000	\$ -	\$ -	\$ -	\$ -	\$9,000
Present Worth Cost per Drainage Area Treated (acres)	\$47,000	\$ 32,000					\$40,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table D-1.6
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary
February 19, 2013

Subcatchment **LBs_1345118**
Subcatchment Size 15.17 acres
Total Annual Subcatchment Runoff (RainWays) 4.85 MG
Drainage Area Tributary to Municipal GI Projects 0.03 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Number of Candidate GI Projects	0	1	0	0	0	0	1
Annual Combined Sewer Area Runoff Captured (MG)*	0.00	0.01	0	0	0	0	0.01
Combined Sewer Area Runoff Capture (%)	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.2%
Opinion of Probable Cost***							
Construction Cost	\$0	\$ 1,000	\$ -	\$ -	\$ -	\$ -	\$1,000
O/M Cost (20 years)	\$0	\$ 1,000	\$ -	\$ -	\$ -	\$ -	\$1,000
Present Worth Cost**	\$0	\$ 2,000	\$ -	\$ -	\$ -	\$ -	\$2,000
Present Worth Cost per Drainage Area Treated (acres)	\$0	\$ 65,000					\$65,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table D-1.7
3RWW GI Project
Concept Municipal GI Projects Subcatchment Evaluation Summary
February 19, 2013

Subcatchment

LBs_1345123

Subcatchment Size 20.9 acres
 Total Annual Subcatchment Runoff (RainWays) 6.22 MG
 Drainage Area Tributary to Municipal GI Projects 3.68 acres

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.02	0.05	0.00	0.00	0.00	0.00	0.07
Number of Candidate GI Projects	1	5	0	0	0	0	6
Annual Combined Sewer Area Runoff Captured (MG)*	0.17	0.65	0	0	0	0	0.82
Combined Sewer Area Runoff Capture (%)	2.8%	10.5%	0.0%	0.0%	0.0%	0.0%	13.2%
Opinion of Probable Cost***							
Construction Cost	\$11,000	\$ 49,000	\$ -	\$ -	\$ -	\$ -	\$60,000
O/M Cost (20 years)	\$1,000	\$ 3,000	\$ -	\$ -	\$ -	\$ -	\$4,000
Present Worth Cost**	\$12,000	\$ 52,000	\$ -	\$ -	\$ -	\$ -	\$64,000
Present Worth Cost per Drainage Area Treated (acres)	\$18,000	\$ 18,000					\$18,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX D
TABLES 2.1
THROUGH 2.7

Table D-2.1
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

LBS_1345011
127.03 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	26.315	5.595	21.3%	6.323	24.0%
Impervious-High	0.327	0.164	50.1%	0.046	14.1%
Impervious-Mod	17.121	4.970	29.0%	4.281	25.0%
Impervious-Low	12.422	2.719	21.9%	2.234	18.0%
Pervious-High-D	1.384	0.636	46.0%	0.130	9.4%
Pervious-High-C	4.561	0.199	4.4%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	3.363	1.484	44.1%	0.668	19.9%
Pervious-Mod-C	44.238	9.047	20.5%	10.002	22.6%
Pervious-Mod-B	0.479	0.131	27.4%	0.000	0.0%
Pervious-Low-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-C	14.172	3.130	22.1%	1.388	9.8%
Pervious-Low-B	2.645	0.717	27.1%	0.060	2.3%
Totals	127.027	28.793		25.132	

Table D-2.2
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment **LBs_1345040**
Subcatchment Size 45.57 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	8.306	0.057	0.7%	0.088	1.1%
Impervious-High	0.000	0.000	0.0%	0.000	0.0%
Impervious-Mod	5.109	0.277	5.4%	0.000	0.0%
Impervious-Low	3.048	0.112	3.7%	0.340	11.2%
Pervious-High-D	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	7.756	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	10.346	0.129	1.2%	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	2.047	0.000	0.0%	0.000	0.0%
Pervious-Low-C	7.414	0.186	2.5%	0.454	6.1%
Pervious-Low-B	1.538	0.025	1.6%	0.000	0.0%
Totals	45.564	0.786		1.130	

Table D-2.3
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

LBs_1345084
14.94 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	2.726	0.000	0.0%	0.000	0.0%
Impervious-High	0.2	0.000	0.0%	0.000	0.0%
Impervious-Mod	2.078	0.028	1.4%	0.000	0.0%
Impervious-Low	1.547	0.007	0.5%	0.089	5.8%
Pervious-High-D	0.091	0.000	0.0%	0.000	0.0%
Pervious-High-C	0	0.000	0.0%	0.000	0.0%
Pervious-High-B	0	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	0.363	0.000	0.0%	0.000	0.0%
Pervious-Mod-C	4.292	0.025	0.6%	0.000	0.0%
Pervious-Mod-B	0	0.000	0.0%	0.000	0.0%
Pervious-Low-D	0.02	0.000	0.0%	0.000	0.0%
Pervious-Low-C	3.629	0.036	1.0%	0.036	1.0%
Pervious-Low-B	0	0.000	0.0%	0.000	0.0%
Totals	14.946	0.096		0.126	

Table D-2.4
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

LBS_1345095
42.48 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	5.322	0.021	0.4%	0.002	0.0%
Impervious-High	0.155	0.000	0.0%	0.000	0.0%
Impervious-Mod	5.646	0.040	0.7%	0.000	0.0%
Impervious-Low	1.441	0.332	23.1%	0.378	26.2%
Pervious-High-D	1.201	0.000	0.0%	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	14.273	0.031	0.2%	0.000	0.0%
Pervious-Mod-C	9.412	0.000	0.0%	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	1.848	0.038	2.1%	0.000	0.0%
Pervious-Low-C	3.178	0.265	8.3%	0.189	6.0%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	42.476	0.727		0.569	

Table D-2.5
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

LBS_1345108
18.96 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	2.375	0.056	2.4%	0.667	28.1%
Impervious-High	0.011	0.000	0.0%	0.000	0.7%
Impervious-Mod	2.570	0.324	12.6%	1.260	49.0%
Impervious-Low	1.283	0.684	53.3%	1.166	90.9%
Pervious-High-D	0.583	0.000	0.0%	0.129	22.1%
Pervious-High-C	0.051	0.000	0.0%	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	2.926	0.110	3.8%	0.880	30.1%
Pervious-Mod-C	5.218	0.162	3.1%	1.483	28.4%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	0.087	0.013	15.2%	0.022	25.2%
Pervious-Low-C	3.857	0.714	18.5%	2.098	54.4%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	18.961	2.063		7.705	

Table D-2.6
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

LBs_1345118
15.17 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	1.957	0.000	0.0%
Impervious-High	0.000	0.000	0.0%
Impervious-Mod	2.396	0.000	0.0%
Impervious-Low	0.638	0.012	1.8%
Pervious-High-D	0.000	0.000	0.0%
Pervious-High-C	0.000	0.000	0.0%
Pervious-High-B	0.000	0.000	0.0%
Pervious-Mod-D	2.539	0.000	0.0%
Pervious-Mod-C	6.172	0.000	0.0%
Pervious-Mod-B	0.000	0.000	0.0%
Pervious-Low-D	0.000	0.000	0.0%
Pervious-Low-C	0.791	0.019	2.4%
Pervious-Low-B	0.000	0.000	0.0%
Totals	14.493	0.031	

Table D-2.7
3RWW GI Project
Concept Municipal GI Projects RainWays Input Data by Subcatchment

February 19, 2013

Subcatchment
Subcatchment Size

LBS_1345123
20.9 acres

Hydrologic Runoff Unit (HRU)	Subcatchment Areas from RainWays (Acres)	Bioretention		Permeable Pavement	
		GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects	GI Tributary Drainage Areas from LBS (Acres)	HRU % Tributary to GI Projects
Building	2.026	0.270	13.3%	0.277	13.7%
Impervious-High	0.225	0.001	0.3%	0.022	9.9%
Impervious-Mod	2.947	0.446	15.1%	0.479	16.2%
Impervious-Low	0.610	0.062	10.1%	0.056	9.1%
Pervious-High-D	1.570	0.029	1.9%	0.031	1.9%
Pervious-High-C	0.211	0.000	0.0%	0.007	3.4%
Pervious-High-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Mod-D	10.408	2.016	19.4%	1.869	18.0%
Pervious-Mod-C	2.052	0.012	0.6%	0.222	10.8%
Pervious-Mod-B	0.000	0.000	0.0%	0.000	0.0%
Pervious-Low-D	0.747	0.151	20.3%	0.119	15.9%
Pervious-Low-C	0.106	0.000	0.0%	0.000	0.0%
Pervious-Low-B	0.000	0.000	0.0%	0.000	0.0%
Totals	20.902	2.988		3.082	

APPENDIX D
TABLE 3

**Table D-3
3RWW GI Project
Concept Municipal GI Project Evaluation Summary
McNeilly Run
February 19, 2013**

Total Combined Sewer Area 285.05 acres
Total Annual Combined Sewer Area Runoff (RainWays) 102.46 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	1.22	0.88	0.00	0.00	0.00	0.00	2.10
Number of Candidate GI Projects	14	77	0	0	0	0	91
Portion of Drainage Area Tributary to Concept GI Projects (acres)	25.81	35.48	0.00	0.00	0	0.00	61.30
Annual Combined Sewer Area Runoff Captured (MG)*	9.61	11.18	0.00	0.00	0.00	0.00	20.79
Combined Sewer Area Runoff Capture (%)	9.4%	10.9%	0.0%	0.0%	0.0%	0.0%	20.3%
Opinion of Probable Cost***							
Construction Cost	\$ 582,000	\$ 844,000	\$ -	\$ -	\$ -	\$ -	\$ 1,426,000
O/M Cost (20 years)	\$ 25,000	\$ 50,000	\$ -	\$ -	\$ -	\$ -	\$ 75,000
Present Worth Cost**	\$ 605,000	\$ 890,000	\$ -	\$ -	\$ -	\$ -	\$ 1,495,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 24,000	\$ 26,000	\$ -	\$ -	\$ -	\$ -	\$ 25,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX D
TABLES 4.1 & 4.2

Table D-4.1
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary-Regulator CSO139A001
McNeilly Run
February 19, 2013

Total Combined Sewer Area 127.03 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 50.98 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement	
	LBs_1345011	Total
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.10	0.10
Number of Candidate GI Projects	4	4
Portion of Drainage Area Tributary to Concept GI Projects (acres)	1.10	1.10
Annual Combined Sewer Area Runoff Captured (MG)*	0.80	0.80
Combined Sewer Area Runoff Capture (%)***	1.6%	1.6%
Opinion of Probable Cost****		
Construction Cost	\$ 49,000	\$49,000
O/M Cost (20 years)	\$ 2,000	\$2,000
Present Worth Cost**	\$ 51,000	\$51,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 47,000	\$47,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table D-4.2
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary-Regulator S1500POCL01A
McNeilly Run
February 19, 2013

Total Combined Sewer Area 20.9 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 6.22049559 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement		
	LBs_1345118	LBs_1345123	Totals
Subcatchment			
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.005	0.04	0.05
Number of Candidate GI Projects	1	2	3
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.063	0.466	0.53
Annual Combined Sewer Area Runoff Captured (MG)*	0.04	0.32	0.36
Combined Sewer Area Runoff Capture (%)***	0.8%	5.1%	5.76%
Opinion of Probable Cost****			
Construction Cost	\$ 3,000	\$ 19,000	\$22,000
O/M Cost (20 years)	\$ 1,000	\$ 1,000	\$2,000
Present Worth Cost**	\$ 4,000	\$ 20,000	\$24,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 64,000	\$ 43,000	\$46,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX D
TABLES 5.1 & 5.2

Table D-5.1
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary - Regulator CSO139A001
McNeilly Run
February 19, 2013

Total Combined Sewer Area 127.03 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 50.98 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	LBs_1343912	Total
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	1.67	1.67
Number of Candidate GI Projects	8	8
Portion of Drainage Area Tributary to Concept GI Projects (acres)	1.67	1.67
Annual Combined Sewer Area Runoff Captured (MG)**	1.41	1.41
Combined Sewer Area Runoff Capture (%)***	2.77%	2.77%
Opinion of Probable Cost****		
Construction Cost	\$1,720,000	\$1,720,000
O/M Cost (20 years)	\$30,000	\$30,000
Present Worth Cost****	\$1,747,000	\$1,747,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,045,000	\$1,045,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

Table D-5.2
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Projects Summary - Regulator S1500POCL01A
McNeilly Run
February 19, 2013

Total Combined Sewer Area 20.9 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 6.22 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roof*	
	LBs_1345123	Totals
Subcatchment		
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.16	0.16
Number of Candidate GI Projects	1	1
Portion of Drainage Area Tributary to Concept GI Projects (acres)	0.16	0.16
Annual Combined Sewer Area Runoff Captured (MG)**	0.14	0.14
Combined Sewer Area Runoff Capture (%)***	2.20%	2.20%
Opinion of Probable Cost****		
Construction Cost	\$168,000	\$168,000
O/M Cost (20 years)	\$3,000	\$3,000
Present Worth Cost****	\$171,000	\$171,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,052,000	\$1,052,000

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each subcatchment. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the regulator.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX D
TABLE 6

**Table D-6
3RWW GI Project
Concept Commercial / Institutional Permeable Pavement GI Projects Summary
McNeilly Run
February 19, 2013**

Total Combined Sewer Area 285.05 acres
Total Annual Combined Sewer Area Runoff (RainWays) 102.46 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Permeable Pavement		
	CSO139A001	S1500POCL01A	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	0.10	0.05	0.15
Number of Candidate GI Projects	4	3	7
Portion of Drainage Area Tributary to Concept GI Projects (acres)	1.10	0.53	1.63
Annual Combined Sewer Area Runoff Captured (MG)*	0.80	0.36	1.16
Combined Sewer Area Runoff Capture (%)***	1.6%	5.8%	1.1%
Opinion of Probable Cost****			
Construction Cost	\$49,000	\$22,000	\$71,000
O/M Cost (20 years)	\$2,000	\$2,000	\$4,000
Present Worth Cost**	\$51,000	\$24,000	\$75,000
Present Worth Cost per Drainage Area Treated (acres)	\$47,000	\$46,000	\$93,000

*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each regulator. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the entire sewershed.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX D
TABLE 7

Table D-7
3RWW GI Project
Concept Commercial / Institutional Green Roof GI Project Summary
McNeilly Run
February 19, 2013

Total Combined Sewer Area 285.05 acres
 Total Annual Combined Sewer Area Runoff (RainWays) 102.46 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

Concept GI Project Parameters	Green Roofs*		
	CSO139A001	S1500POCL01A	Totals
Effective Design Area of Concept GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	1.67	0.16	1.84
Number of Candidate GI Projects	8	1	9
Portion of Drainage Area Tributary to Concept GI Projects (acres)	1.67	0.16	1.84
Annual Combined Sewer Area Runoff Captured (MG)**	1.41	0.14	1.55
Combined Sewer Area Runoff Capture (%)***	2.8%	2.2%	1.51%
Opinion of Probable Cost*****			
Construction Cost	\$1,720,000	\$168,000	\$1,888,000
O/M Cost (20 years)	\$30,000	\$3,000	\$33,000
Present Worth Cost****	\$1,747,000	\$171,000	\$1,921,000
Present Worth Cost per Drainage Area Treated (acres)	\$1,045,000	\$1,052,000	\$1,046,561

*This evaluation focused on flat roofs within combined sewer areas with a building footprint of 5,000 square feet or greater.

**Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

***Capture percentage represents the percent of combined sewer area runoff captured within the tributary area of each regulator. The capture percentage in the Totals column represents the percent of combined sewer area runoff captured within the tributary area of the entire sewershed.

****Present Worth calculated assuming a 20 year term at 1% interest.

*****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.

APPENDIX D
RAINWAYS
OUTPUT

**APPENDIX D
RAINWAYS
OUTPUT
INFILTRATION
BMPs**

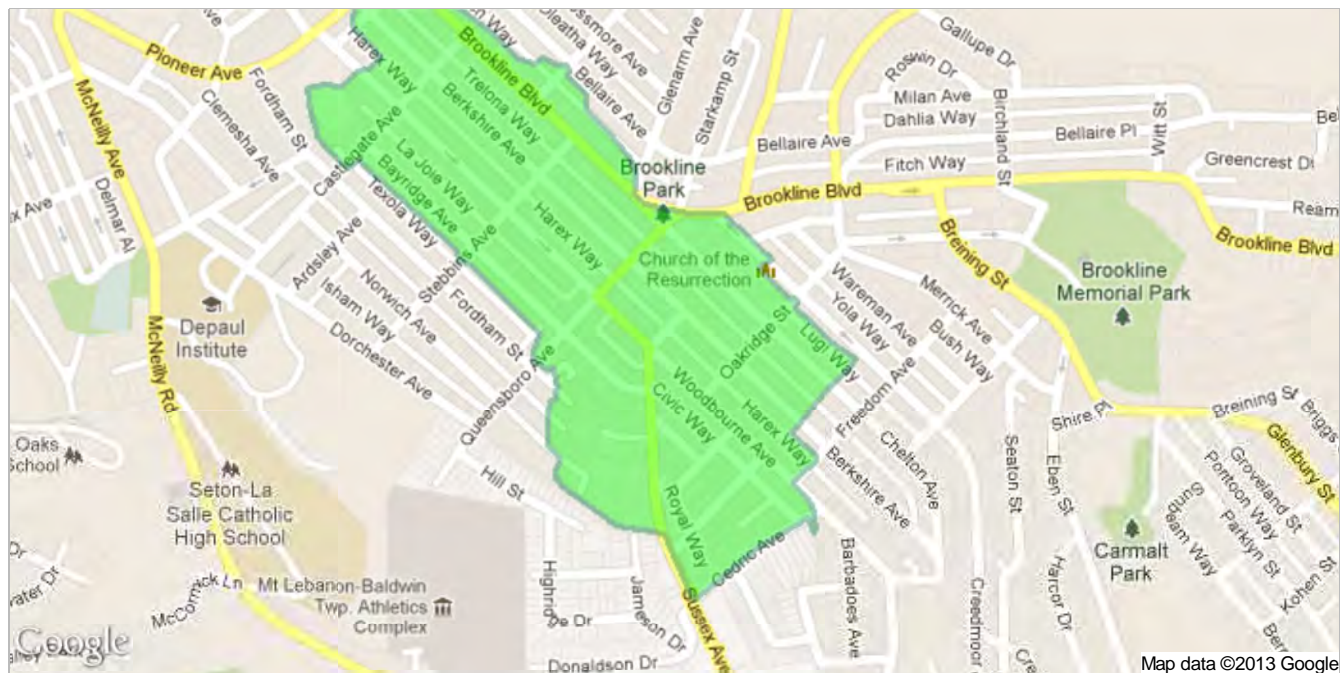
MR_LBs_1345011_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 127.03 acres

Total project cost: \$729,000

Priority area ranking: Medium-Medium (5.47/10)

Design depth: 1 inches

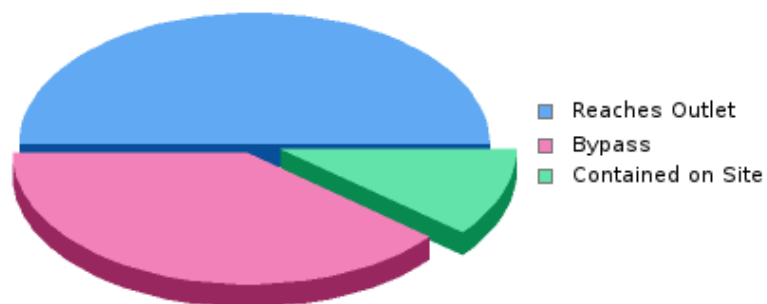
Total impervious area: 56.2 acres

POC(s)/Regulator(s): S-15 (LBs_1345011)

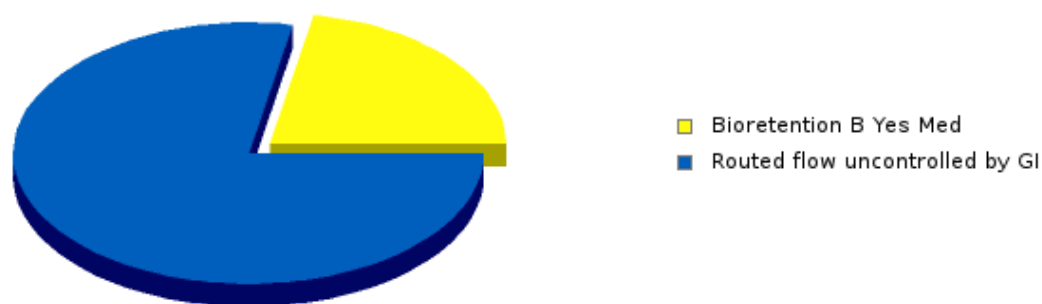
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	156.45 acre-ft
Total Reduction	18 %
Total Runoff Captured	28.21 acre-ft
Total Outlets	128.24 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			387,293 gallons (14.3 acre-in) 0.72 acres	
	Building	26.315	67.94	21% flow	
	Impervious-High	0.327	0.85	50% flow	
	Impervious-Mod	17.121	44.2	29% flow	
	Impervious-Low	12.422	31.45	22% flow	
	Pervious-High-D	1.384	0.45	46% flow	
	Pervious-High-C	4.561	0.86	4% flow	
LBs_1345011	Pervious-Mod-D	3.363	0.98	44% flow	
	Pervious-Mod-C	44.238	7.26	20% flow	
	Pervious-Mod-B	0.479	0.03	27% flow	
	Pervious-Low-C	14.172	1.8	22% flow	
	Pervious-Low-B	2.645	0.63	27% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			18.03%	
	BMP Runoff Reduction			28.21 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345011	Bioretention B Yes Med	\$690,600	\$38,000	20	\$728,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1345011	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBS_1345011

Bioretention B Yes Med Effluent: 8.9 acre-ft

Print this page

MR_LBs_1345040_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 45.57 acres

Total project cost: \$24,000

Priority area ranking: Medium-Medium (5.53/10)

Design depth: 1 inches

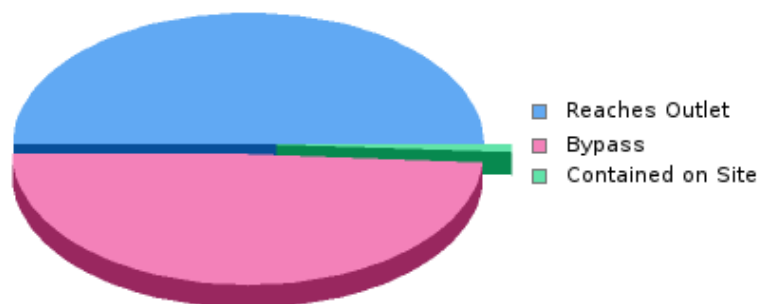
Total impervious area: 16.5 acres

POC(s)/Regulator(s): S-15 (LBs_1345040)

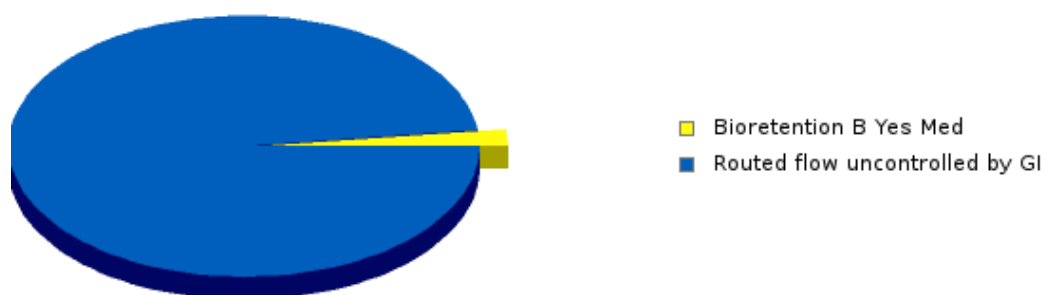
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	48.1 acre-ft
Total Reduction	2 %
Total Runoff Captured	0.94 acre-ft
Total Outlets	47.17 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			12,882 gallons (0.5 acre-in) 0.024 acres	
	Building	8.306	21.44	1% flow	
	Impervious-Mod	5.109	13.19	5% flow	
	Impervious-Low	3.048	7.72	4% flow	
	Pervious-Mod-D	7.756	2.27	0% flow	
LBs_1345040	Pervious-Mod-C	10.346	1.7	1% flow	
	Pervious-Low-D	2.047	0.48	0% flow	
	Pervious-Low-C	7.414	0.94	3% flow	
	Pervious-Low-B	1.538	0.36	2% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			1.95%	
	BMP Runoff Reduction			0.94 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345040	Bioretention B Yes Med	\$23,000	\$1,300	20	\$24,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be

called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type. Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1345040	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1345040

Bioretention B Yes Med Effluent: 0.3 acre-ft

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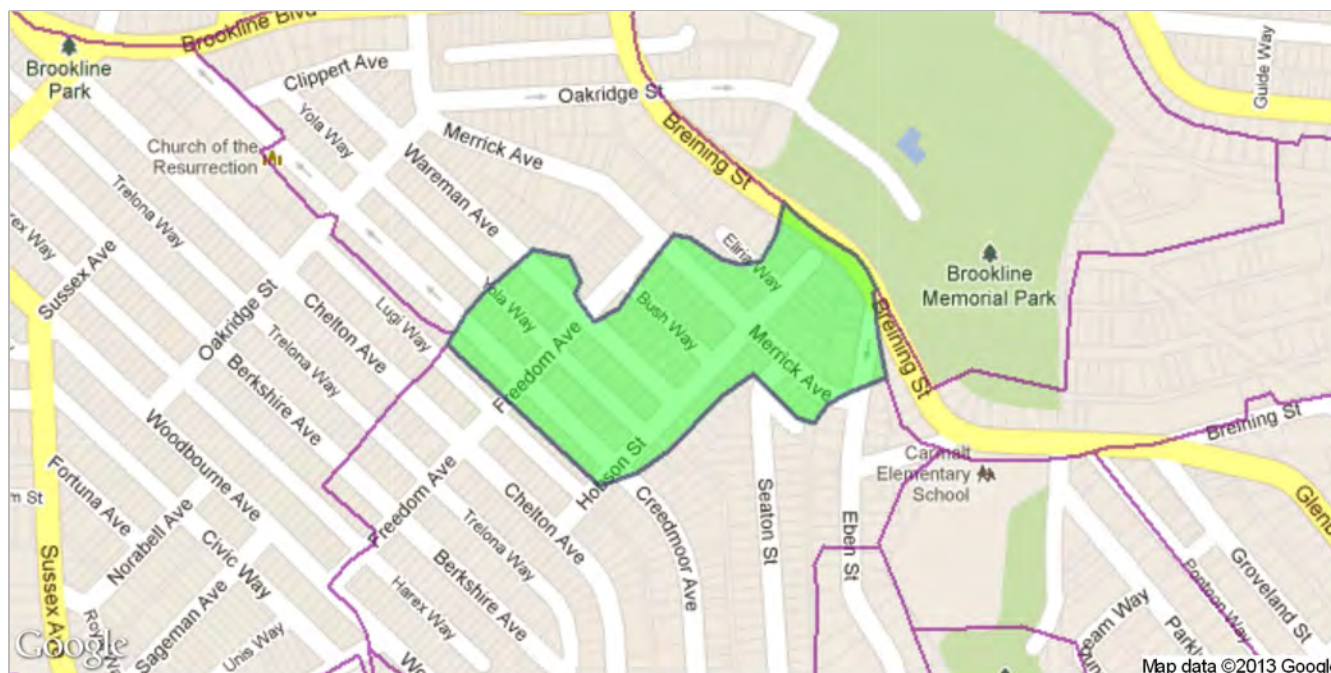
MR_LBs_1345084_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 14.94 acres

Total project cost: \$2,000

Priority area ranking: Medium-Medium (5.46/10)

Design depth: 1 inches

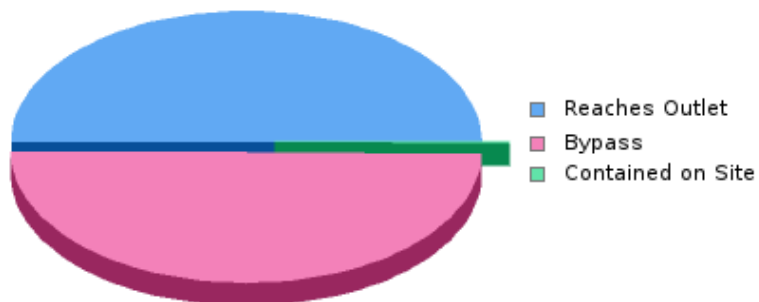
Total impervious area: 6.6 acres

POC(s)/Regulator(s): S-15 (LBs_1345084)

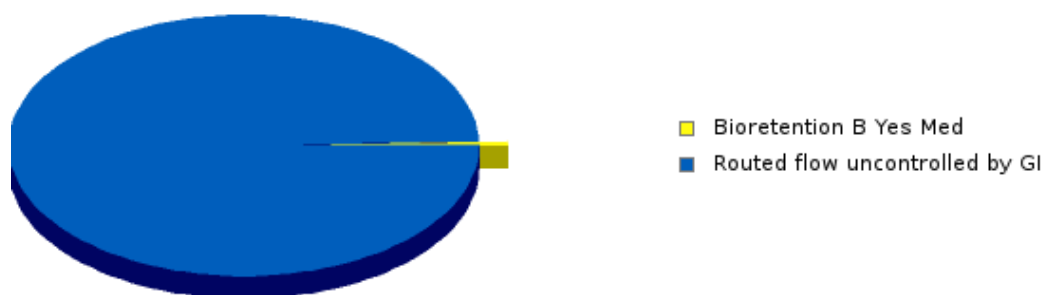
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	18.14 acre-ft
Total Reduction	0.4 %
Total Runoff Captured	0.08 acre-ft
Total Outlets	18.07 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			1,090 gallons (0 acre-in) 0.002 acres	
	Building	2.726	7.04	0% flow	
	Impervious-High	0.2	0.52	0% flow	
	Impervious-Mod	2.078	5.36	1% flow	
	Impervious-Low	1.547	3.92	1% flow	
	Pervious-High-D	0.091	0.03	0% flow	
LBs_1345084	Pervious-Mod-D	0.363	0.11	0% flow	
	Pervious-Mod-C	4.292	0.7	1% flow	
	Pervious-Low-D	0.02	0	0% flow	
	Pervious-Low-C	3.629	0.46	1% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0.44%	
	BMP Runoff Reduction			0.08 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345084	Bioretention B Yes Med	\$1,900	\$100	20	\$2,000

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1345084	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1345084

Bioretention B Yes Med Effluent: 0 acre-ft

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MR_LBs_1345095_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 42.48 acres

Total project cost: \$23,000

Priority area ranking: Medium-Medium (5.52/10)

Design depth: 1 inches

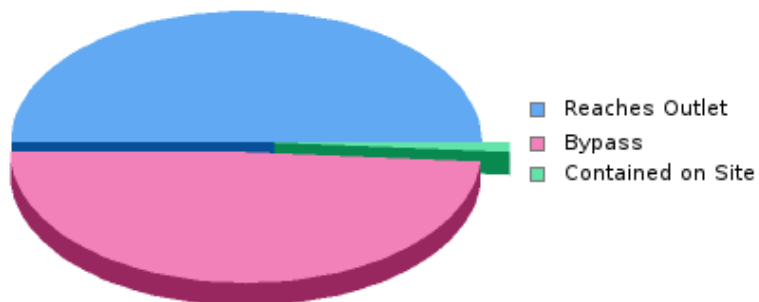
Total impervious area: 12.6 acres

POC(s)/Regulator(s): S-15 (LBs_1345095)

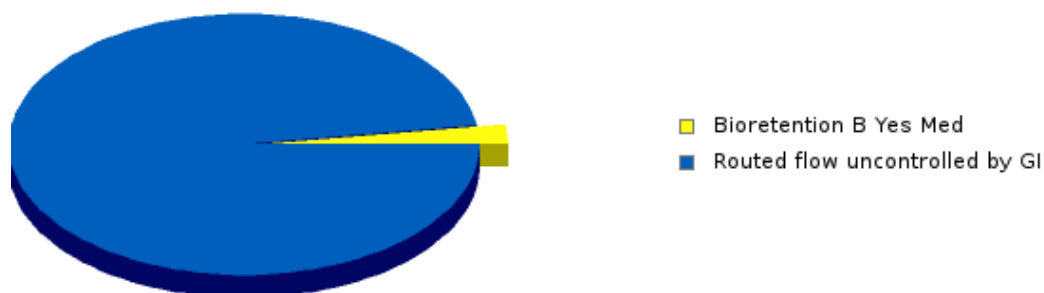
Municipalities: N/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	39.32 acre-ft
Total Reduction	2.2 %
Total Runoff Captured	0.88 acre-ft
Total Outlets	38.44 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			12,133 gallons (0.4 acre-in) 0.023 acres	
	Building	5.322	13.74	1% flow	
	Impervious-High	0.155	0.4	0% flow	
	Impervious-Mod	5.646	14.58	1% flow	
	Impervious-Low	1.441	3.65	23% flow	
	Pervious-High-D	1.201	0.39	0% flow	
LBs_1345095	Pervious-Mod-D	14.273	4.17	0% flow	
	Pervious-Mod-C	9.412	1.55	0% flow	
	Pervious-Low-D	1.848	0.44	2% flow	
	Pervious-Low-C	3.178	0.4	8% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			2.25%	
	BMP Runoff Reduction			0.88 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345095	Bioretention B Yes Med	\$21,600	\$1,200	20	\$22,800

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration

rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBS_1345095	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBS_1345095

Bioretention B Yes Med Effluent: 0.3 acre-ft

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MR_LBs_1345108_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 18.96 acres

Total project cost: \$56,000

Priority area ranking: Medium-Medium (5.05/10)

Design depth: 1 inches

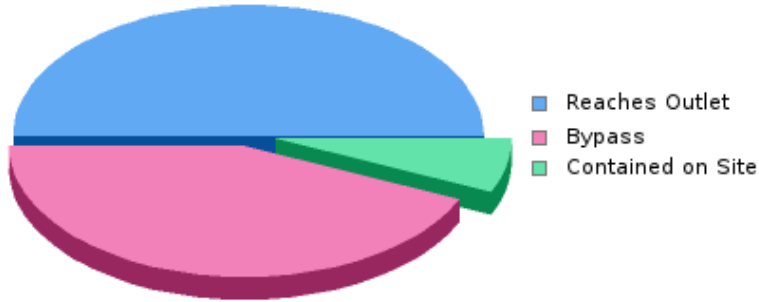
Total impervious area: 6.2 acres

POC(s)/Regulator(s): S-15 (LBs_1345108)

Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution







Total Runoff pre-BMP	18.47 acre-ft
Total Reduction	11.8 %
Total Runoff Captured	2.17 acre-ft
Total Outlets	16.29 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)
	Green Infrastructure Capacity			29,858 gallons (1.1 acre-in) 0.056 acres
LBs_1345108	Building	2.375	6.13	2% flow
	Impervious-High	0.011	0.03	0% flow
	Impervious-Mod	2.57	6.63	13% flow
	Impervious-Low	1.283	3.25	53% flow
	Pervious-High-D	0.583	0.19	0% flow

Pervious-High-C	0.051	0.01	0% flow	
Pervious-Mod-D	2.926	0.86	4% flow	
Pervious-Mod-C	5.218	0.86	3% flow	
Pervious-Low-D	0.087	0.02	15% flow	
Pervious-Low-C	3.857	0.49	19% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			11.78%	
BMP Runoff Reduction			2.17 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345108	Bioretention B Yes Med	\$53,200	\$2,900	20	\$56,100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
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LBs_1345108	Bioretention B Yes Med	\$22.01	\$0.06	20
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Project BMP Routing

Outlets

LBs_1345108

Bioretention B Yes Med Effluent: 0.7 acre-ft

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MR_LBs_1345118_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 15.17 acres

Total project cost: \$1,000

Priority area ranking: Medium-Medium (5.14/10)

Design depth: 1 inches

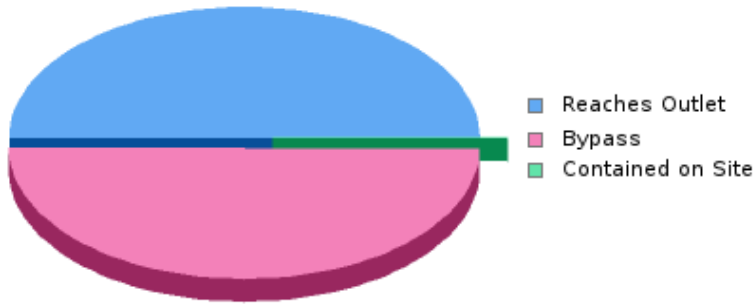
Total impervious area: 5 acres

POC(s)/Regulator(s): S-15 (LBs_1345118)

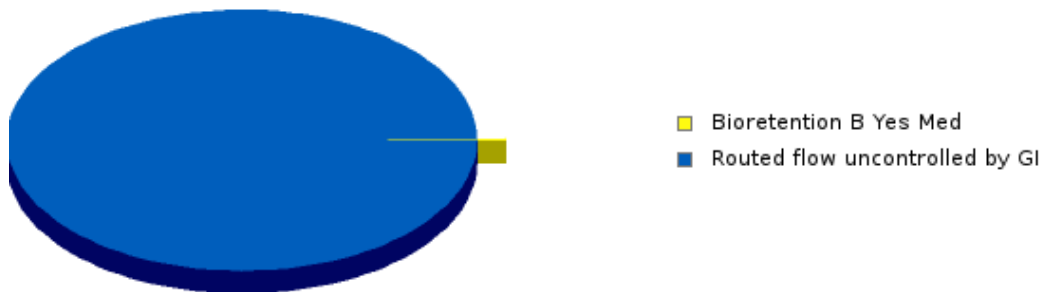
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	14.87 acre-ft
Total Reduction	0.2 %
Total Runoff Captured	0.03 acre-ft
Total Outlets	14.84 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			358 gallons (0 acre-in) 0.001 acres	
	Building	1.957	5.05	0% flow	
	Impervious-Mod	2.396	6.19	0% flow	
	Impervious-Low	0.638	1.62	2% flow	
	Pervious-Mod-D	2.539	0.74	0% flow	
LBs_1345118	Pervious-Mod-C	6.172	1.01	0% flow	
	Pervious-Low-D	0.677	0.16	0% flow	
	Pervious-Low-C	0.791	0.1	2% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0.18%	
	BMP Runoff Reduction			0.03 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345118	Bioretention B Yes Med	\$600	<\$100	20	\$600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1345118	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1345118

Bioretention B Yes Med Effluent: 0 acre-ft

MR_LBs_1345123_BR

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 20.9 acres

Total project cost: \$52,000

Priority area ranking: Medium-Medium (5.44/10)

Design depth: 1 inches

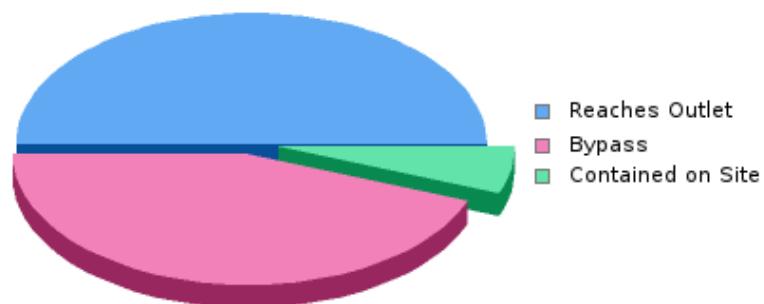
Total impervious area: 5.8 acres

POC(s)/Regulator(s): S-15 (LBs_1345123)

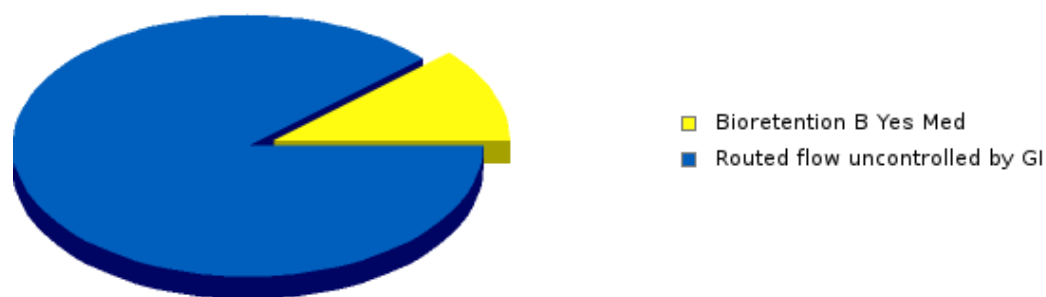
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	19.09 acre-ft
Total Reduction	10.5 %
Total Runoff Captured	2 acre-ft
Total Outlets	17.09 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Bioretention B Yes Med (1)	
	Green Infrastructure Capacity			27,469 gallons (1 acre-in) 0.051 acres	
	Building	2.026	5.23	13% flow	
	Impervious-High	0.225	0.59	0% flow	
	Impervious-Mod	2.947	7.61	15% flow	
	Impervious-Low	0.61	1.54	10% flow	
	Pervious-High-D	1.57	0.51	2% flow	
LBS_1345123	Pervious-High-C	0.211	0.04	0% flow	
	Pervious-Mod-D	10.408	3.04	20% flow	
	Pervious-Mod-C	2.052	0.34	1% flow	
	Pervious-Low-D	0.747	0.18	20% flow	
	Pervious-Low-C	0.106	0.01	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			10.48%	
	BMP Runoff Reduction			2 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBS_1345123	Bioretention B Yes Med	\$49,000	\$2,700	20	\$51,700

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1345123	Bioretention B Yes Med	\$22.01	\$0.06	20

Project BMP Routing

Outlets

LBs_1345123

Bioretention B Yes Med Effluent: 0.6 acre-ft

**APPENDIX D
RAINWAYS
OUTPUT
PERMEABLE
PAVEMENT**

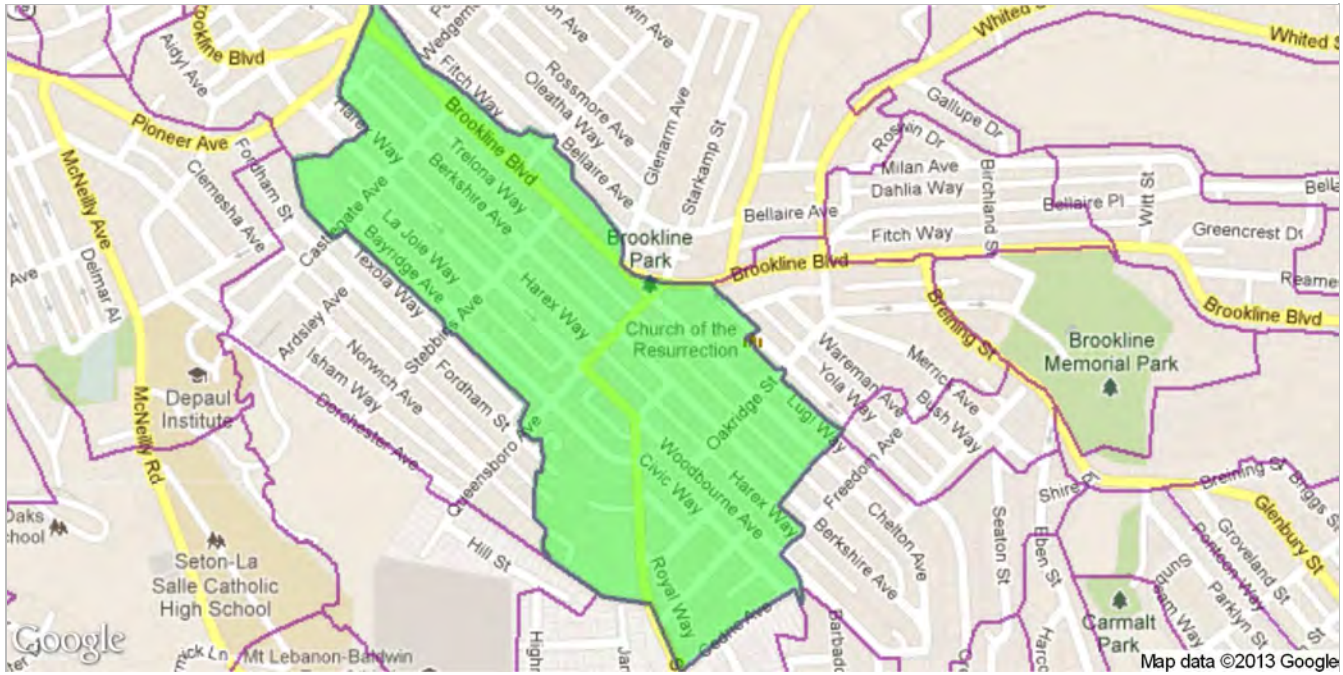
MR_LBs_1345011_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting

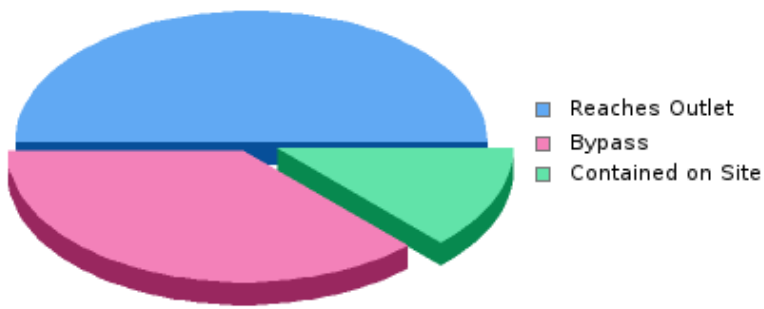


Site Characteristics

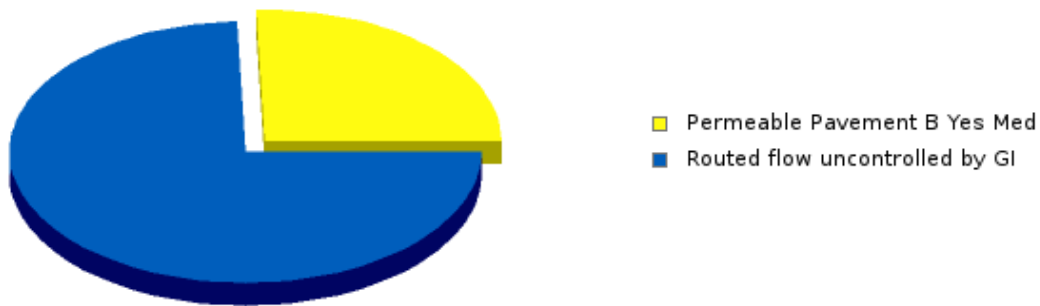
- Project size: 127.03 acres
- Total project cost: \$643,000
- Priority area ranking: Medium-Medium (5.47/10)
- Design depth: 1 inches
- Total impervious area: 56.2 acres
- POC(s)/Regulator(s): S-15 (LBs_1345011)
- Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	156.45 acre-ft
Total Reduction	20.4 %
Total Runoff Captured	31.88 acre-ft
Total Outlets	124.57 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1345011	Green Infrastructure Capacity			367,519 gallons (13.5 acre-in) 1.319 acres

Building	26.315	67.94	24% flow	
Impervious-High	0.327	0.85	14% flow	
Impervious-Mod	17.121	44.2	25% flow	
Impervious-Low	12.422	31.45	18% flow	
Pervious-High-D	1.384	0.45	9% flow	
Pervious-High-C	4.561	0.86	0% flow	
Pervious-Mod-D	3.363	0.98	20% flow	
Pervious-Mod-C	44.238	7.26	23% flow	
Pervious-Mod-B	0.479	0.03	0% flow	
Pervious-Low-C	14.172	1.8	10% flow	
Pervious-Low-B	2.645	0.63	2% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			20.38%	
BMP Runoff Reduction			31.88 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345011	Permeable Pavement B Yes Med	\$625,100	\$17,800	20	\$642,900

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1345011	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1345011

Permeable Pavement B Yes Med Effluent: 3.4 acre-ft

MR_LBs_1345040_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 45.57 acres

Total project cost: \$20,000

Priority area ranking: Medium-Medium (5.53/10)

Design depth: 1 inches

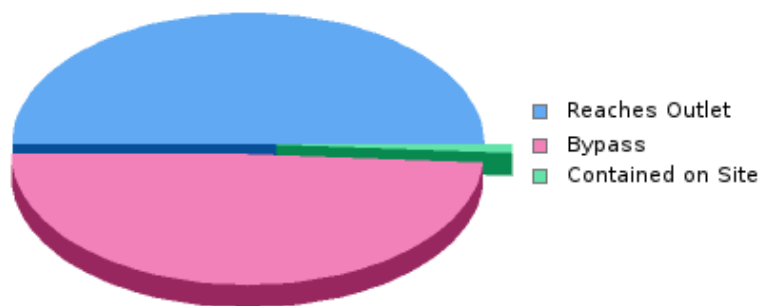
Total impervious area: 16.5 acres

POC(s)/Regulator(s): S-15 (LBs_1345040)

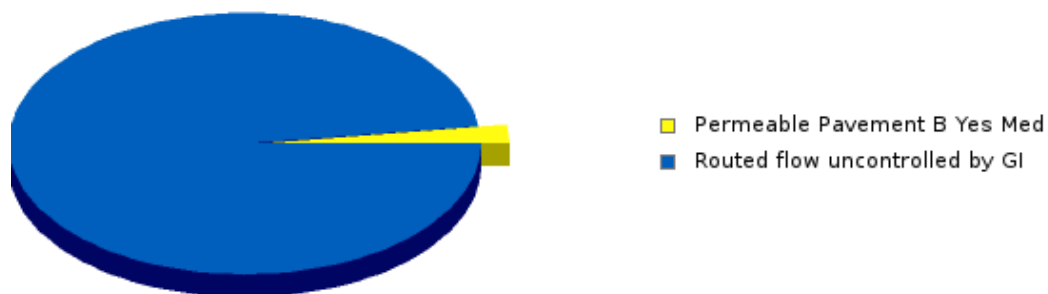
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff





Total Runoff pre-BMP	48.1 acre-ft
Total Reduction	2.1 %
Total Runoff Captured	1.01 acre-ft
Total Outlets	47.09 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1345040	Green Infrastructure Capacity			11,678 gallons (0.4 acre-in) 0.042 acres

Building	8.306	21.44	1% flow	
Impervious-Mod	5.109	13.19	0% flow	
Impervious-Low	3.048	7.72	11% flow	
Pervious-Mod-D	7.756	2.27	0% flow	
Pervious-Mod-C	10.346	1.7	0% flow	
Pervious-Low-D	2.047	0.48	0% flow	
Pervious-Low-C	7.414	0.94	6% flow	
Pervious-Low-B	1.538	0.36	0% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			2.11%	
BMP Runoff Reduction			1.01 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345040	Permeable Pavement B Yes Med	\$19,900	\$600	20	\$20,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1345040	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1345040

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

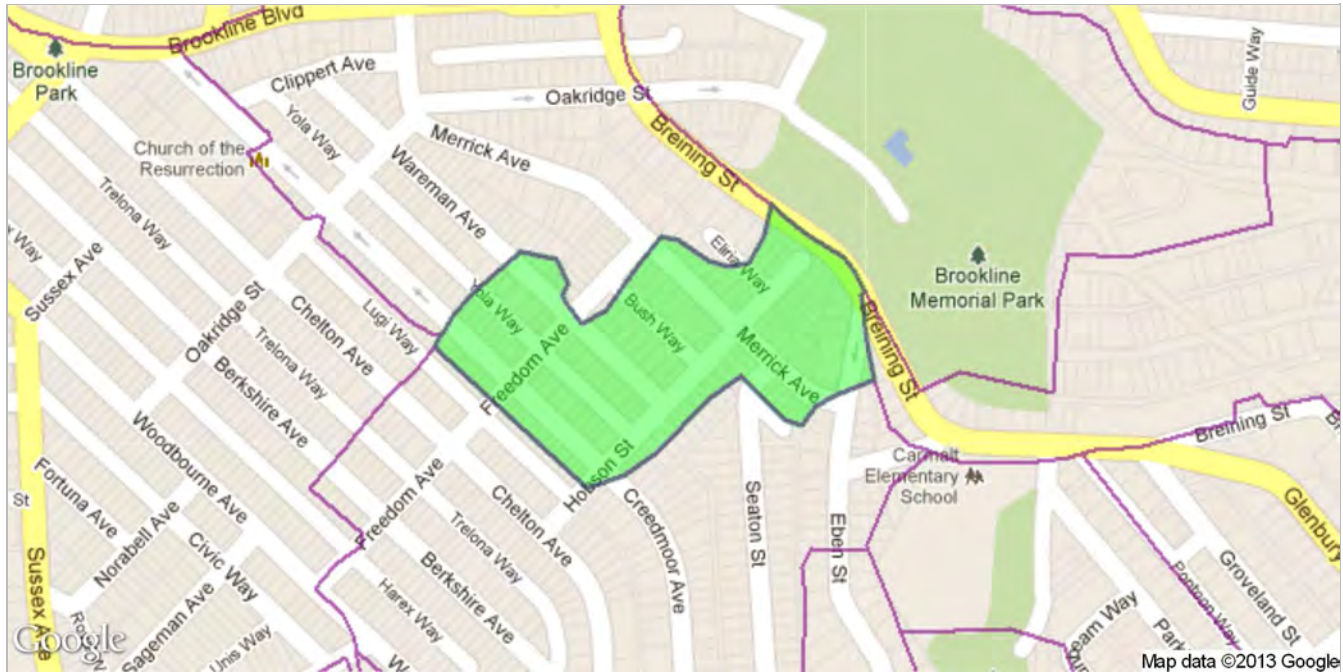
MR_LBs_1345084_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 14.94 acres

Total project cost: \$4,000

Priority area ranking: Medium-Medium (5.46/10)

Design depth: 1 inches

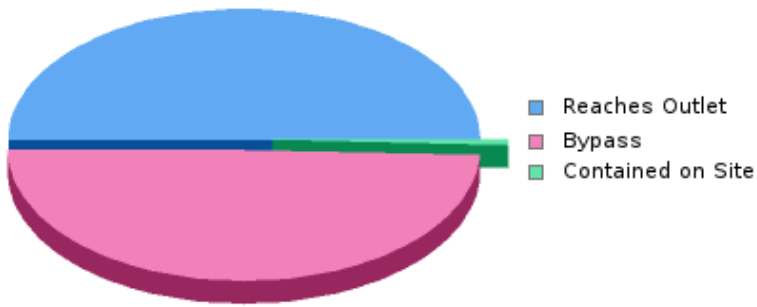
Total impervious area: 6.6 acres

POC(s)/Regulator(s): S-15 (LBs_1345084)

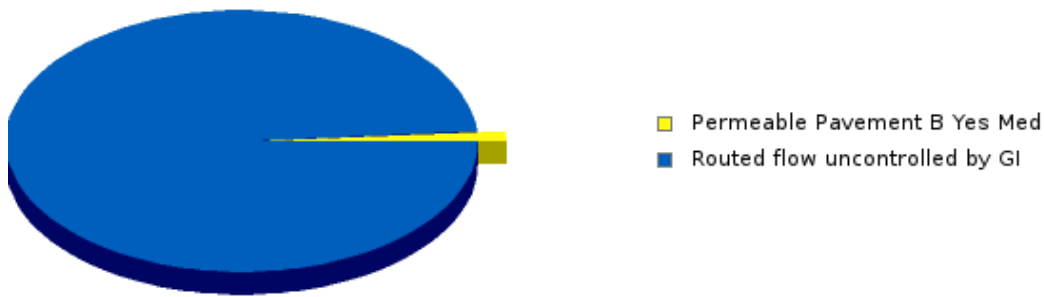
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff







Total Runoff pre-BMP	18.14 acre-ft
Total Reduction	1.2 %
Total Runoff Captured	0.22 acre-ft
Total Outlets	17.93 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1345084	Green Infrastructure Capacity			2,499 gallons (0.1 acre-in) 0.009 acres

Building	2.726	7.04	0% flow	
Impervious-High	0.2	0.52	0% flow	
Impervious-Mod	2.078	5.36	0% flow	
Impervious-Low	1.547	3.92	6% flow	
Pervious-High-D	0.091	0.03	0% flow	
Pervious-Mod-D	0.363	0.11	0% flow	
Pervious-Mod-C	4.292	0.7	0% flow	
Pervious-Low-D	0.02	0	0% flow	
Pervious-Low-C	3.629	0.46	1% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			1.19%	
BMP Runoff Reduction			0.22 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345084	Permeable Pavement B Yes Med	\$4,300	\$100	20	\$4,400

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1345084	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1345084

Permeable Pavement B Yes Med Effluent: 0 acre-ft

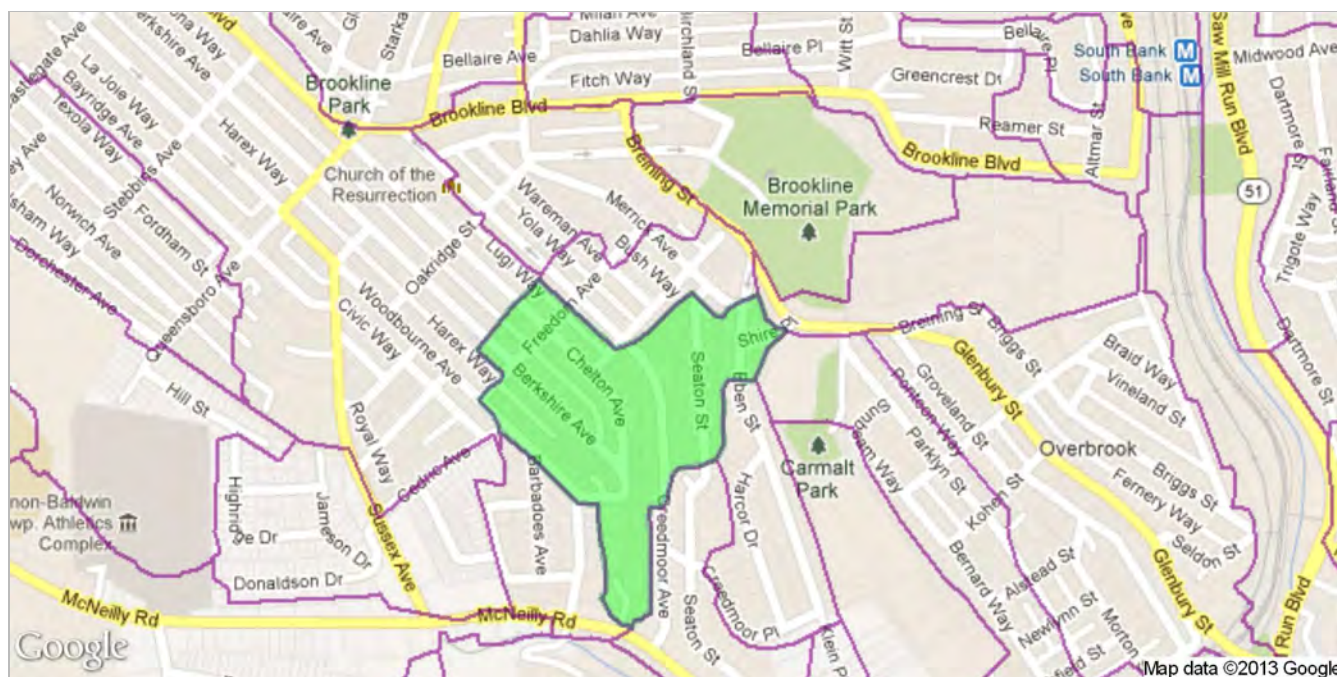
MR_LBs_1345095_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 42.48 acres

Total project cost: \$18,000

Priority area ranking: Medium-Medium (5.52/10)

Design depth: 1 inches

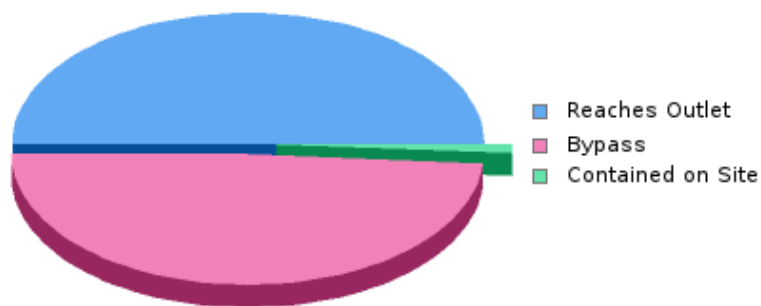
Total impervious area: 12.6 acres

POC(s)/Regulator(s): S-15 (LBs_1345095)

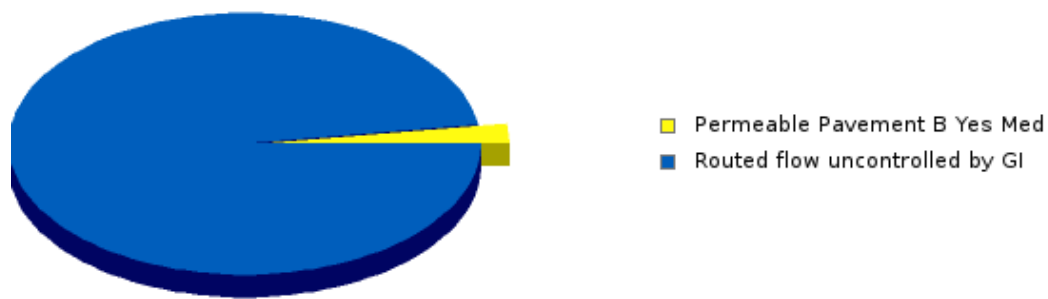
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff












Total Runoff pre-BMP	39.32 acre-ft
Total Reduction	2.2 %
Total Runoff Captured	0.88 acre-ft
Total Outlets	38.44 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1345095	Green Infrastructure Capacity			10,145 gallons (0.4 acre-in) 0.036 acres

Building	5.322	13.74	0% flow	
Impervious-High	0.155	0.4	0% flow	
Impervious-Mod	5.646	14.58	0% flow	
Impervious-Low	1.441	3.65	26% flow	
Pervious-High-D	1.201	0.39	0% flow	
Pervious-Mod-D	14.273	4.17	0% flow	
Pervious-Mod-C	9.412	1.55	0% flow	
Pervious-Low-D	1.848	0.44	0% flow	
Pervious-Low-C	3.178	0.4	6% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			2.24%	
BMP Runoff Reduction			0.88 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345095	Permeable Pavement B Yes Med	\$17,300	\$500	20	\$17,800

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1345095	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1345095

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

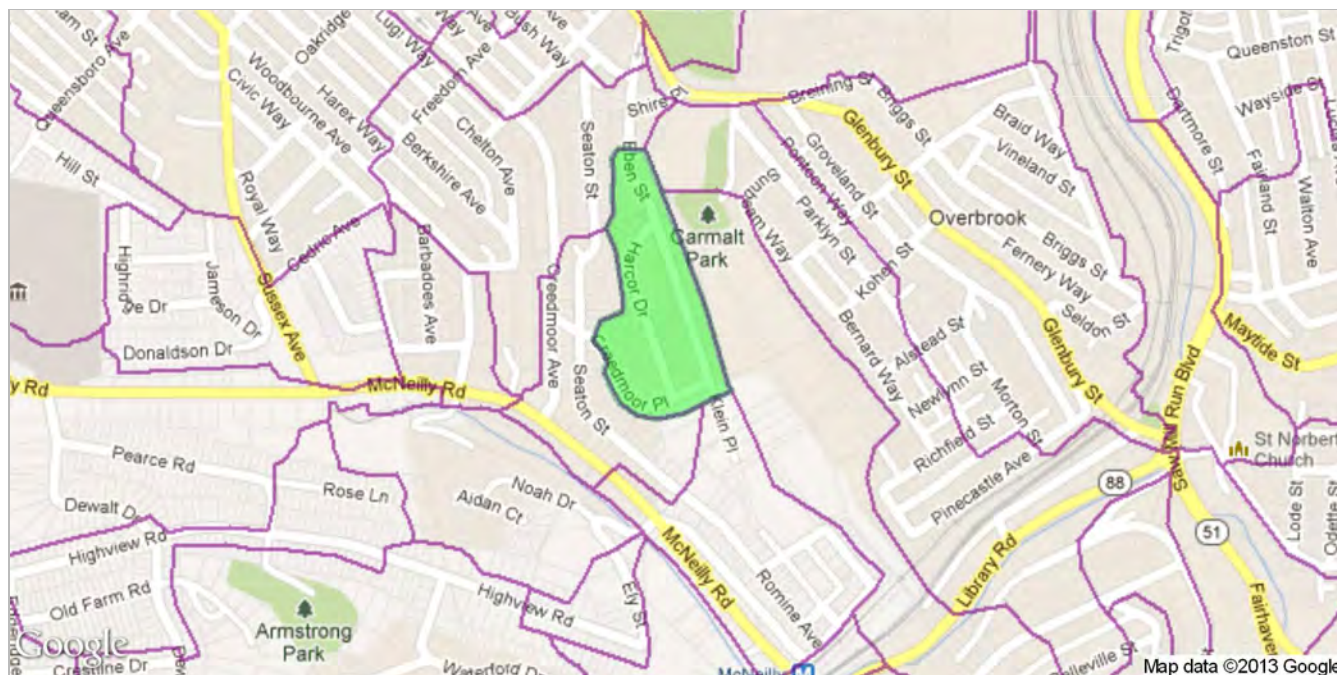
MR_LBs_1345108_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 18.96 acres

Total project cost: \$159,000

Priority area ranking: Medium-Medium (5.05/10)

Design depth: 1 inches

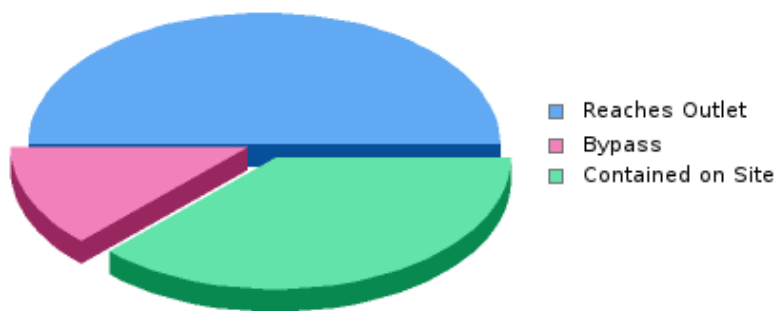
Total impervious area: 6.2 acres

POC(s)/Regulator(s): S-15 (LBs_1345108)

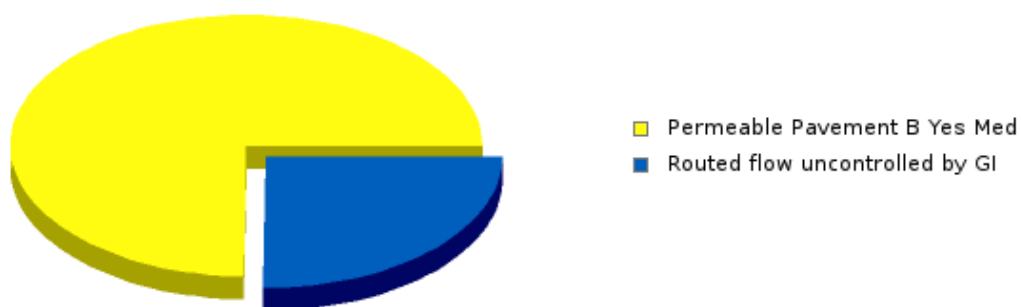
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	18.47 acre-ft
Total Reduction	42.8 %
Total Runoff Captured	7.9 acre-ft
Total Outlets	10.56 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1345108	Green Infrastructure Capacity			91,075 gallons (3.4 acre-in) 0.327 acres

Building	2.375	6.13	28% flow	
Impervious-High	0.011	0.03	1% flow	
Impervious-Mod	2.57	6.63	49% flow	
Impervious-Low	1.283	3.25	91% flow	
Pervious-High-D	0.583	0.19	22% flow	
Pervious-High-C	0.051	0.01	0% flow	
Pervious-Mod-D	2.926	0.86	30% flow	
Pervious-Mod-C	5.218	0.86	28% flow	
Pervious-Low-D	0.087	0.02	25% flow	
Pervious-Low-C	3.857	0.49	54% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			42.79%	
BMP Runoff Reduction			7.9 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345108	Permeable Pavement B Yes Med	\$154,900	\$4,400	20	\$159,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1345108	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1345108

Permeable Pavement B Yes Med Effluent: 0.8 acre-ft

MR_LBs_1345123_PP

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 20.9 acres

Total project cost: \$51,000

Priority area ranking: Medium-Medium (5.44/10)

Design depth: 1 inches

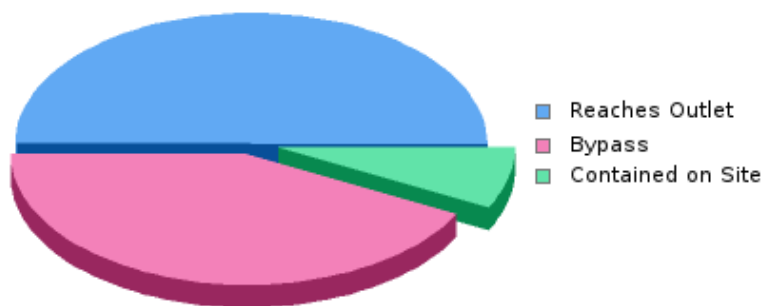
Total impervious area: 5.8 acres

POC(s)/Regulator(s): S-15 (LBs_1345123)

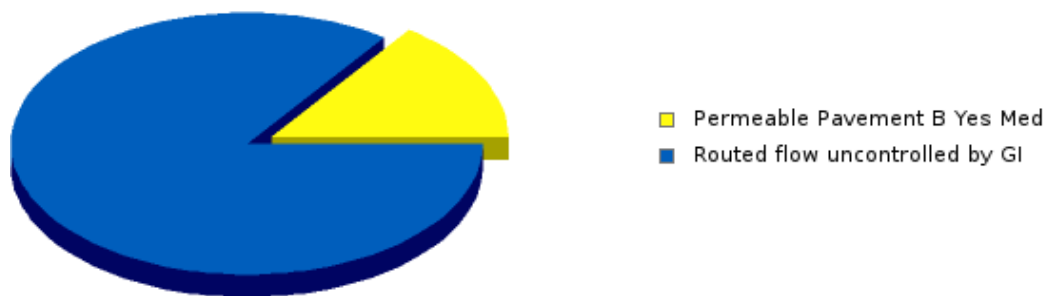
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	19.09 acre-ft
Total Reduction	13.1 %
Total Runoff Captured	2.51 acre-ft
Total Outlets	16.59 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
LBs_1345123	Green Infrastructure Capacity			28,913 gallons (1.1 acre-in) 0.104 acres

Building	2.026	5.23	14% flow	
Impervious-High	0.225	0.59	10% flow	
Impervious-Mod	2.947	7.61	16% flow	
Impervious-Low	0.61	1.54	9% flow	
Pervious-High-D	1.57	0.51	2% flow	
Pervious-High-C	0.211	0.04	3% flow	
Pervious-Mod-D	10.408	3.04	18% flow	
Pervious-Mod-C	2.052	0.34	11% flow	
Pervious-Low-D	0.747	0.18	16% flow	
Pervious-Low-C	0.106	0.01	0% flow	
Design Depth			1 inches	
Percent BMP Effectiveness			13.14%	
BMP Runoff Reduction			2.51 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345123	Permeable Pavement B Yes Med	\$49,200	\$1,400	20	\$50,600

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year/sqft)	Lifespan (years)
LBs_1345123	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1345123

Permeable Pavement B Yes Med Effluent: 0.3 acre-ft

**APPENDIX D
RAINWAYS
OUTPUT
COMMERCIAL-
INSTITUTIONAL**

Print this page

MR_Comm_8001

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.08 acres

Total project cost: \$7,000

Priority area ranking: Medium-High (5.83/10)

Design depth: 1 inches

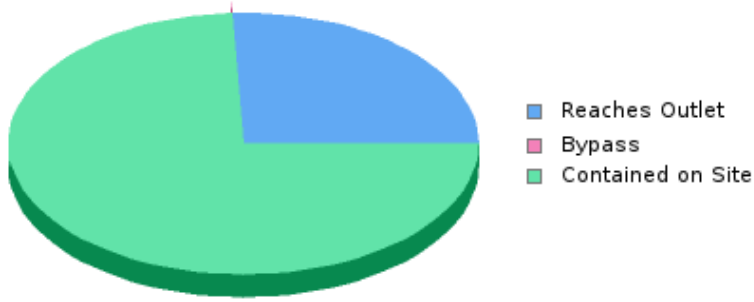
Total impervious area: 0.2 acres

POC(s)/Regulator(s): SMRE-40 (LBs_1344992); S-15 (LBs_1345011); S-15 (LBs_1345040)

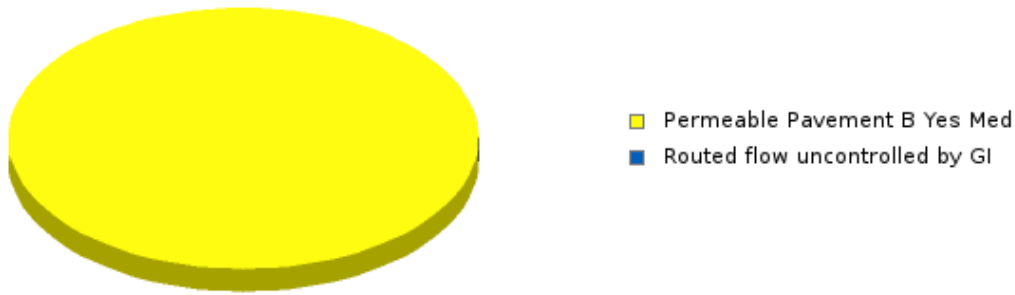
Municipalities: N/APittsburgh

Overall Green Infrastructure Performance

Runoff Distribution







Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.45 acre-ft
Total Reduction	74.2 %
Total Runoff Captured	0.34 acre-ft
Total Outlets	0.12 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
LBs_1344992	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Building	0.013	0.03	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	
LBs_1345011	Green Infrastructure Capacity			3,888 gallons (0.1 acre-in) 0.014 acres	
	Building	0.062	0.16	100% flow	
	Impervious-Low	0.084	0.21	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
LBs_1345040	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres	
	Impervious-Low	0.019	0.05	0% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			0%	
	BMP Runoff Reduction			0 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
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LBs_1344992	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1345011	Permeable Pavement B Yes Med	\$6,600	\$200	20	\$6,800
LBs_1345040	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344992	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1345011	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
LBs_1345040	Permeable Pavement B Yes Med	\$0	\$0	20

Project BMP Routing

Outlets

LBs_1344992

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1345011

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1345040

Permeable Pavement B Yes Med Effluent: 0 acre-ft

Print this page

MR_Comm_8002

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.6 acres

Total project cost: \$30,000

Priority area ranking: Medium-High (6.06/10)

Design depth: 1 inches

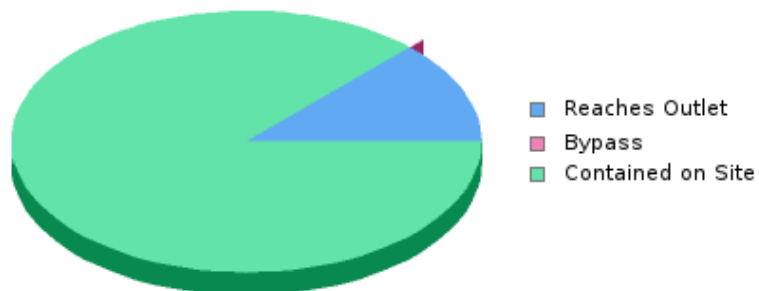
Total impervious area: 0.7 acres

POC(s)/Regulator(s): SMRE-40 (LBs_1344992); S-15 (LBs_1345011)

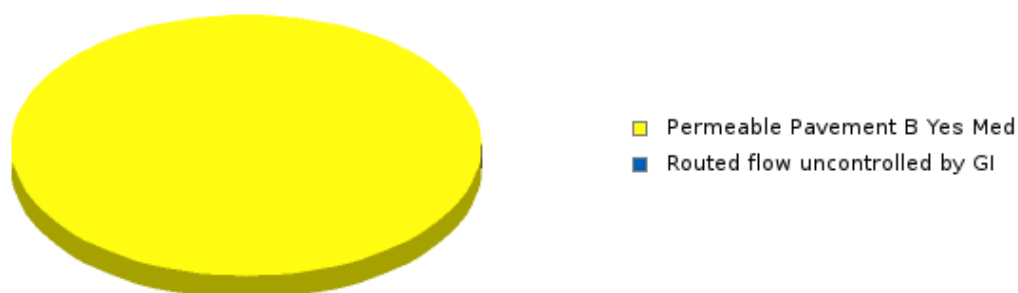
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	1.68 acre-ft
Total Reduction	87.2 %
Total Runoff Captured	1.46 acre-ft
Total Outlets	0.21 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres
LBs_1344992	Impervious-Low	0.024	0.06	0% flow
	Design Depth			1 inches
	Percent BMP Effectiveness			0%
	BMP Runoff Reduction			0 acre-ft
	Green Infrastructure Capacity			16,880 gallons (0.6 acre-in) 0.061 acres
LBs_1345011	Impervious-Low	0.637	1.61	100% flow
	Pervious-Low-B	0.024	0.01	100% flow
	Design Depth			1 inches
	Percent BMP Effectiveness			90.49%
	BMP Runoff Reduction			1.46 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1344992	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100
LBs_1345011	Permeable Pavement B Yes Med	\$28,700	\$800	20	\$29,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1344992	Permeable Pavement B Yes Med	\$0	\$0	20
LBs_1345011	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBs_1344992

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1345011

Permeable Pavement B Yes Med Effluent: 0.2 acre-ft

MR_Comm_8003

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.15 acres

Total project cost: \$9,000

Priority area ranking: Medium-Medium (5.48/10)

Design depth: 1 inches

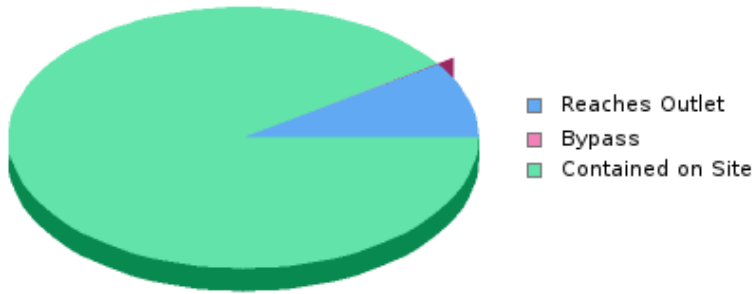
Total impervious area: 0.2 acres

POC(s)/Regulator(s): S-15 (LBs_1345011)

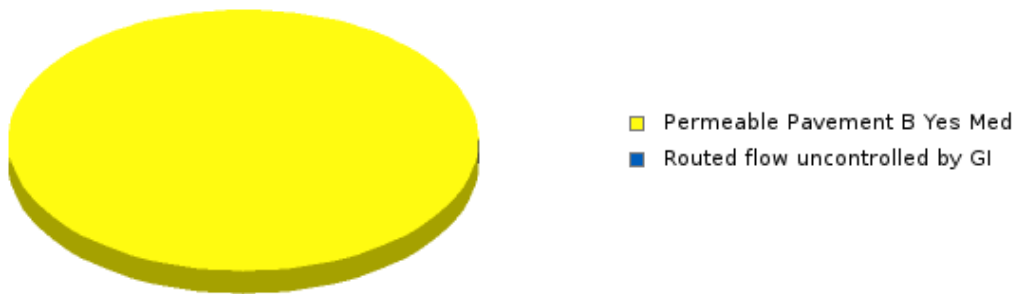
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.47 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.42 acre-ft
Total Outlets	0.04 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
	Green Infrastructure Capacity			4,883 gallons (0.2 acre-in) 0.018 acres
LBs_1345011	Impervious-Mod	0.046	0.12	100% flow
	Impervious-Low	0.138	0.35	100% flow
	Design Depth			1 inches
	Percent BMP Effectiveness			90.49%
	BMP Runoff Reduction			0.42 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345011	Permeable Pavement B Yes Med	\$8,300	\$200	20	\$8,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
-----------	--------------------------	-----------------------------	---------------------------	------------------

LBS_1345011	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
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Project BMP Routing

Outlets

LBS_1345011

Permeable Pavement B Yes Med Effluent: 0 acre-ft

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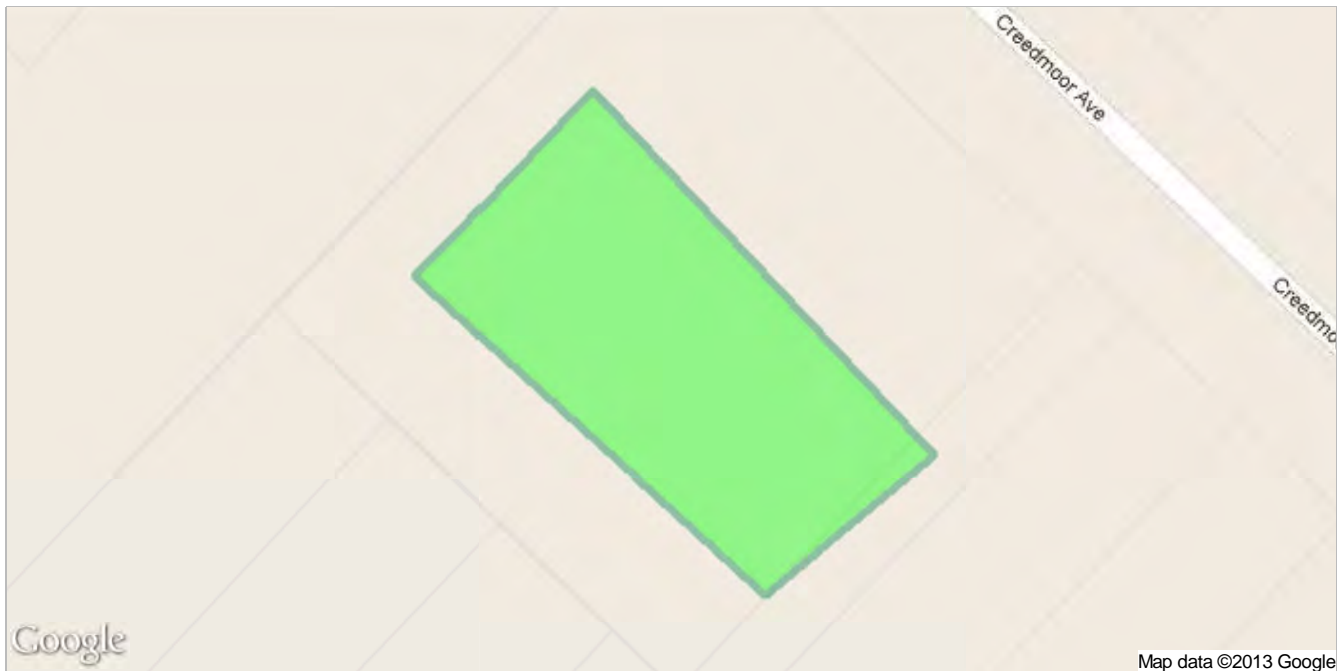
MR_Comm_8004

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.1 acres

Total project cost: \$5,000

Priority area ranking: Medium-High (5.58/10)

Design depth: 1 inches

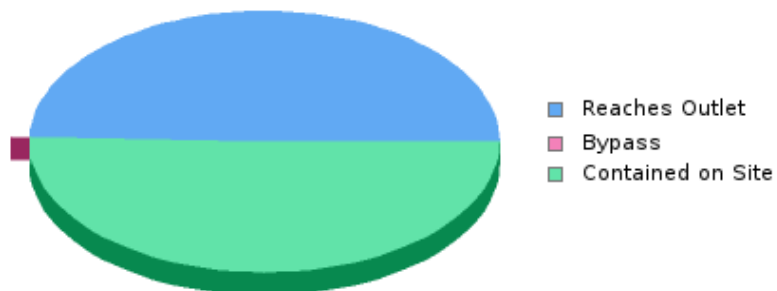
Total impervious area: 0.2 acres

POC(s)/Regulator(s): S-15 (LBs_1345011); MH-77 (LBs_1345057)

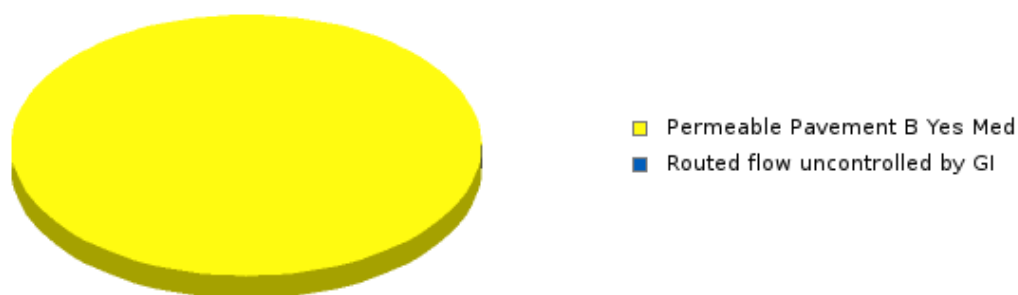
Municipalities: PittsburghN/A

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.48 acre-ft
Total Reduction	50.5 %
Total Runoff Captured	0.24 acre-ft
Total Outlets	0.24 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
	Green Infrastructure Capacity			2,773 gallons (0.1 acre-in) 0.01 acres
	Impervious-Low	0.105	0.27	100% flow
LBs_1345011	Design Depth			1 inches
	Percent BMP Effectiveness			90.49%
	BMP Runoff Reduction			0.24 acre-ft
	Green Infrastructure Capacity			0 gallons (0 acre-in) 0 acres
	Impervious-Low	0.083	0.21	0% flow
LBs_1345057	Design Depth			1 inches
	Percent BMP Effectiveness			0%
	BMP Runoff Reduction			0 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345011	Permeable Pavement B Yes Med	\$4,700	\$100	20	\$4,800
LBs_1345057	Permeable Pavement B Yes Med	<\$100	<\$100	20	<\$100

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
LBs_1345011	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
LBs_1345057	Permeable Pavement B Yes Med	\$0	\$0	20

Project BMP Routing

Outlets

LBs_1345011

Permeable Pavement B Yes Med Effluent: 0 acre-ft

LBs_1345057

Permeable Pavement B Yes Med Effluent: 0 acre-ft

Print this page

MR_Comm_8005

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.05 acres

Total project cost: \$2,000

Priority area ranking: Medium-Medium (4.84/10)

Design depth: 1 inches

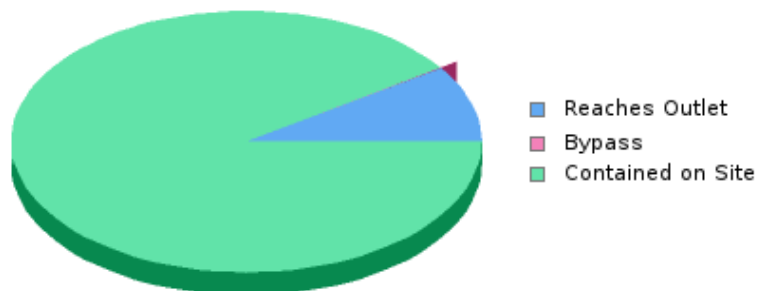
Total impervious area: 0.1 acres

POC(s)/Regulator(s): S-15 (LBs_1345118)

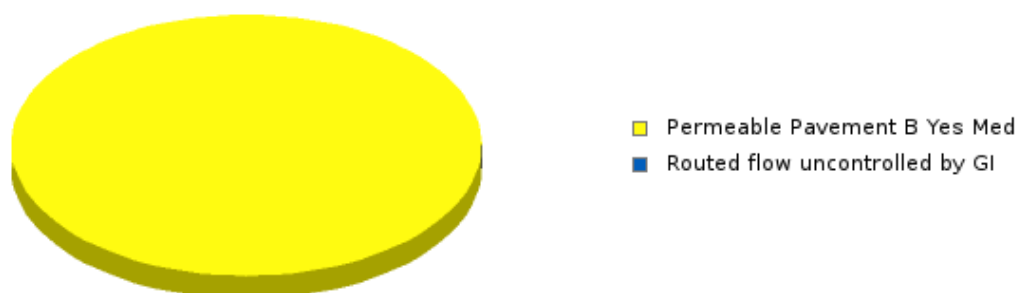
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution





Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.13 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.12 acre-ft
Total Outlets	0.01 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			1,400 gallons (0.1 acre-in) 0.005 acres	
LBs_1345118	Impervious-Low	0.052	0.13	100% flow	
	Pervious-Low-D	0.011	0	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction			0.12 acre-ft	

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345118	Permeable Pavement B Yes Med	\$2,400	\$100	20	\$2,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
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LBS_1345118	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
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Project BMP Routing

Outlets

LBS_1345118

Permeable Pavement B Yes Med Effluent: 0 acre-ft

Print this page

MR_Comm_8006

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.11 acres

Total project cost: \$7,000

Priority area ranking: Medium-Medium (5.25/10)

Design depth: 1 inches

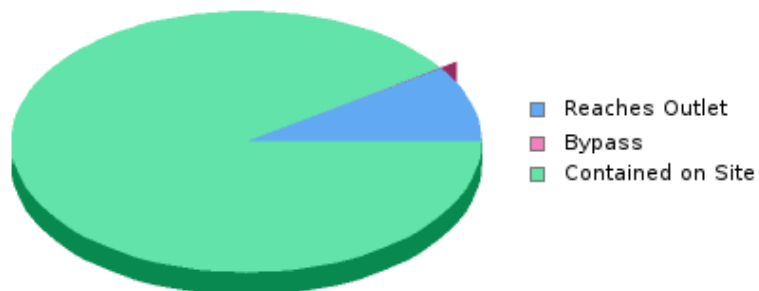
Total impervious area: 0.1 acres

POC(s)/Regulator(s): S-15 (LBs_1345123)

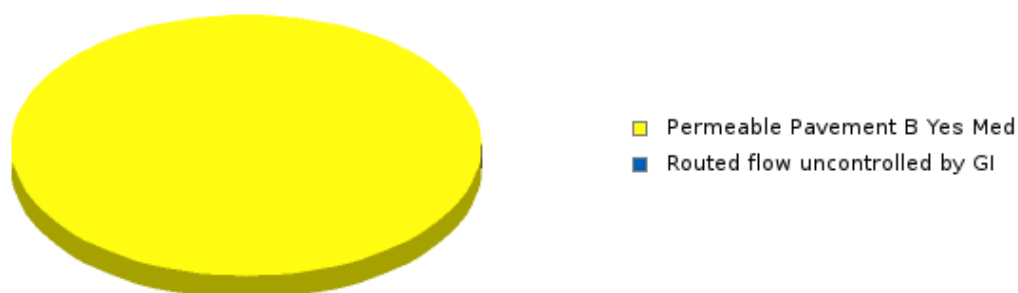
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution



Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.36 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.32 acre-ft
Total Outlets	0.03 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)
	Green Infrastructure Capacity			3,731 gallons (0.1 acre-in) 0.013 acres
	Impervious-Mod	0.133	0.34	100% flow
LBs_1345123	Pervious-Mod-D	0.049	0.01	100% flow
	Design Depth			1 inches
	Percent BMP Effectiveness			90.49%
	BMP Runoff Reduction			0.32 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345123	Permeable Pavement B Yes Med	\$6,300	\$200	20	\$6,500

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure BMP	Construction Cost (\$/sqft)	O&M Costs (\$/year /sqft)	Lifespan (years)
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LBS_1345123	Permeable Pavement B Yes Med	\$10.88	\$0.02	20
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Project BMP Routing

Outlets

LBS_1345123

Permeable Pavement B Yes Med Effluent: 0 acre-ft

Print this page

MR_Comm_8007

Introduction

The project report summarizes project information, site characteristics, BMP performance and configuration, and cost information. BMP performance is calculated based on EPA SUSTAIN derived performance curves for the City of Pittsburgh. All numbers are reported on an **annualized basis**.

Description

Project Setting



Site Characteristics

Project size: 0.23 acres

Total project cost: \$13,000

Priority area ranking: Medium-Medium (5.26/10)

Design depth: 1 inches

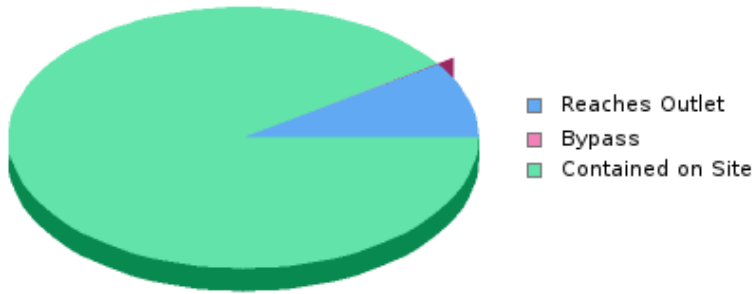
Total impervious area: 0.3 acres

POC(s)/Regulator(s): S-15 (LBs_1345123)

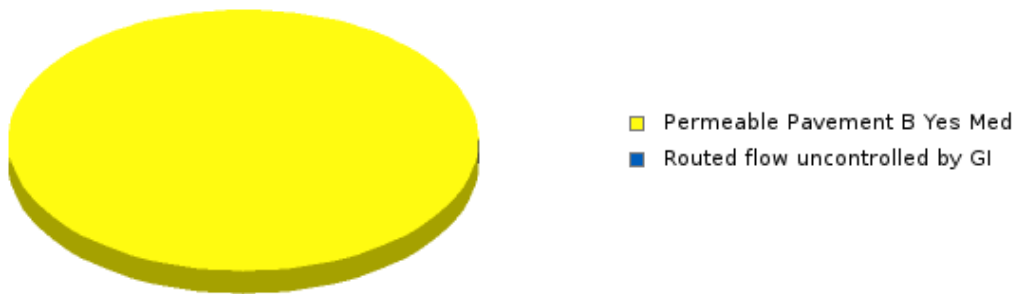
Municipalities: Pittsburgh

Overall Green Infrastructure Performance

Runoff Distribution






Relative GI Reduction of Runoff



Total Runoff pre-BMP	0.73 acre-ft
Total Reduction	90.5 %
Total Runoff Captured	0.66 acre-ft
Total Outlets	0.07 acre-ft

Sewershed Green Infrastructure Performance

This section summarizes Green Infrastructure performance on the sewershed level. Information on capacity, sizing, flow distribution (shown graphically on the right-most column) and performance metrics can be found.

Sewershed	HRU	Acres	Annual flow from HRU (acre-ft)	Permeable Pavement B Yes Med (1)	
	Green Infrastructure Capacity			7,583 gallons (0.3 acre-in) 0.027 acres	
LBs_1345123	Impervious-High	0.042	0.11	100% flow	
	Impervious-Mod	0.1	0.26	100% flow	
	Impervious-Low	0.142	0.36	100% flow	
	Design Depth			1 inches	
	Percent BMP Effectiveness			90.49%	
	BMP Runoff Reduction				0.66 acre-ft

Project Green Infrastructure Cost

Sewershed	Green Infrastructure BMP	Construction Cost	O&M Costs (total, present value)	Lifespan (years)	Total Cost
LBs_1345123	Permeable Pavement B Yes Med	\$12,900	\$400	20	\$13,300

Appendix

BMP Description

BMPs are named based on three criteria: the underlying soil type, whether they have an underdrain, and the infiltration rate. These are noted in the BMP description following the BMP type.

For example, a Bioretention BMP with a USGS soil type B, no underdrain and high background infiltration rate would be called "Bioretention B No High".

HRU Description

HRUs are named for their type, degree of pervious- or imperviousness, and optionally, the underlying USGS soil type.

Abbreviations for high, moderate and low are "High", "Mod" and "Low", respectively.

BMP Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Cost Assumptions

Sewershed	Green Infrastructure	Construction Cost	O&M Costs (\$/year)	Lifespan
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	BMP	(\$/sqft)	/sqft)	(years)
LBS_1345123	Permeable Pavement B Yes Med	\$10.88	\$0.02	20

Project BMP Routing

Outlets

LBS_1345123

Permeable Pavement B Yes Med Effluent: 0.1 acre-ft

**APPENDIX D
RAINWAYS
OUTPUT
REGULATOR
REPORTS**

Regulator MH139B003

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized** basis.

Characteristics

Total Drainage Area: 57.4 acres
 Number of Projects: 1
 Total Cost: \$2,000
 Total Green Infrastructure Project Area: 14.9 acres
 Total GI Project Impervious Area: 6.6 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		3.118e-2 M Gallon		7.796e-2 M Gallon		1.559e-1 M Gallon		4.678e-1 M Gallon		1.247e+0 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
S-15	MH139B003	16	3.179e-1	16	2.758e-1	16	2.227e-1	14	1.672e-1	12	8.260e-2	3	1.120e-2

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
MR_LBs_1345084_BR	14.9	18.1	1	0.4	0.1	0.04
Total runoff pre-green infrastructure	18.1 acre-feet (5.912e+0 MGPY)					
Total Reduction within GI	0.4 %					
Total Runoff Captured	0.1 acre-ft (2.586e-2 MGPY)					
Total GI Outlets	18.1 acre-ft (5.910e+0 MGPY)					
Total GI Capacity	0 acre-ft (1.090e-3 Million Gallons)					
Number of CSOs Prevented	0 (0 %)					
Overflow Volume Reduced	0 acre-ft (1.471e-3 MGPY)					

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
MR_LBs_1345084_BR	\$2,000	\$0	\$2,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Print this page

Regulator MH097L022

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an annualized basis.

Characteristics

Total Drainage Area: 45.6 acres
 Number of Projects: 2
 Total Cost: \$45,000
 Total Green Infrastructure Project Area: 91.1 acres
 Total GI Project Impervious Area: 32.9 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		2.475e-2 M Gallon		6.186e-2 M Gallon		1.237e-1 M Gallon		3.712e-1 M Gallon		9.898e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
S-15	MH097L022	7	3.550e-1	7	3.256e-1	7	2.935e-1	7	2.632e-1	4	1.897e-1	1	6.910e-2

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
MR_LBs_1345040_BR	45.6	48.1	1	2	0.9	0.474
MR_LBs_1345040_PP	45.6	48.1	1	2.1	1	0.43
Total runoff pre-green infrastructure	96.2 acre-feet (3.135e+1 MGPY)					
Total Reduction within GI	2 %					
Total Runoff Captured	2 acre-ft (6.359e-1 MGPY)					

Total GI Outlets	94.3 acre-ft (3.130e+1 MGPY)
Total GI Capacity	0.08 acre-ft (2.456e-2 Million Gallons)
Number of CSOs Prevented	0 (0 %)
Overflow Volume Reduced	0.09 acre-ft (2.918e-2 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
MR_LBs_1345040_BR	\$23,000	\$1,000	\$24,000
MR_LBs_1345040_PP	\$20,000	\$1,000	\$20,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Print this page

Regulator MH139A006

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an annualized basis.

Characteristics

Total Drainage Area: 15.2 acres
 Number of Projects: 1
 Total Cost: \$1,000
 Total Green Infrastructure Project Area: 15.2 acres
 Total GI Project Impervious Area: 5 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		8.239e-3 M Gallon		2.060e-2 M Gallon		4.119e-2 M Gallon		1.236e-1 M Gallon		3.295e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
S-15	MH139A006	2	4.060e-2	2	3.190e-2	1	1.950e-2	1	1.060e-2	0	0.000e+0	0	0.000e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
MR_LBs_1345118_BR	15.2	14.9	1	0.2	0	0.013
Total runoff pre-green infrastructure	14.9 acre-feet (4.845e+0 MGPY)					
Total Reduction within GI	0.2 %					
Total Runoff Captured	0 acre-ft (8.494e-3 MGPY)					
Total GI Outlets	14.8 acre-ft (4.845e+0 MGPY)					

Total GI Capacity	0 acre-ft (3.579e-4 Million Gallons)
Number of CSOs Prevented	0 (0 %)
Overflow Volume Reduced	0 acre-ft (3.779e-4 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
MR_LBs_1345118_BR	\$1,000	\$0	\$1,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Print this page

Regulator MH139A014

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an annualized basis.

Characteristics

Total Drainage Area: 139.7 acres
 Number of Projects: 2
 Total Cost: \$1,371,000
 Total Green Infrastructure Project Area: 254.1 acres
 Total GI Project Impervious Area: 112.4 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		7.589e-2 M Gallon		1.897e-1 M Gallon		3.795e-1 M Gallon		1.138e+0 M Gallon		3.036e+0 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
S-15	MH139A014	31	1.061e+1	31	1.026e+1	30	9.744e+0	26	8.919e+0	20	6.565e+0	13	2.594e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
MR_LBs_1345011_BR	127	156.5	1	18	28.2	14.263
MR_LBs_1345011_PP	127	156.5	1	20.4	31.9	13.534
Total runoff pre-green infrastructure	312.9 acre-feet (1.020e+2 MGPY)					
Total Reduction within GI	19.2 %					
Total Runoff Captured	60.1 acre-ft (1.958e+1 MGPY)					

Total GI Outlets	252.8 acre-ft (1.003e+2 MGPY)
Total GI Capacity	2.32 acre-ft (7.548e-1 Million Gallons)
Number of CSOs Prevented	8 (26 %)
Overflow Volume Reduced	8.77 acre-ft (2.859e+0 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
MR_LBs_1345011_BR	\$691,000	\$38,000	\$729,000
MR_LBs_1345011_PP	\$625,000	\$18,000	\$643,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Print this page

Regulator MH139B003

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an annualized basis.

Characteristics

Total Drainage Area: 57.4 acres
 Number of Projects: 4
 Total Cost: \$47,000
 Total Green Infrastructure Project Area: 114.8 acres
 Total GI Project Impervious Area: 38.2 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		3.118e-2 M Gallon		7.796e-2 M Gallon		1.559e-1 M Gallon		4.678e-1 M Gallon		1.247e+0 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
S-15	MH139B003	16	3.179e-1	16	2.758e-1	16	2.227e-1	14	1.672e-1	12	8.260e-2	3	1.120e-2

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
MR_LBs_1345084_BR	14.9	18.1	1	0.4	0.1	0.04
MR_LBs_1345095_BR	42.5	39.3	1	2.2	0.9	0.447
MR_LBs_1345084_PP	14.9	18.1	1	1.2	0.2	0.092
MR_LBs_1345095_PP	42.5	39.3	1	2.2	0.9	0.374
Total runoff pre-green infrastructure	114.9 acre-feet (3.745e+1 MGPY)					
Total Reduction within GI	1.8 %					

Total Runoff Captured	2.1 acre-ft (6.713e-1 MGPY)
Total GI Outlets	112.9 acre-ft (3.739e+1 MGPY)
Total GI Capacity	0.08 acre-ft (2.587e-2 Million Gallons)
Number of CSOs Prevented	0 (0 %)
Overflow Volume Reduced	0.11 acre-ft (3.492e-2 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
MR_LBs_1345084_BR	\$2,000	\$0	\$2,000
MR_LBs_1345095_BR	\$22,000	\$1,000	\$23,000
MR_LBs_1345084_PP	\$4,000	\$0	\$4,000
MR_LBs_1345095_PP	\$17,000	\$0	\$18,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

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Regulator MH139B041

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an annualized basis.

Characteristics

Total Drainage Area: 19 acres
 Number of Projects: 2
 Total Cost: \$215,000
 Total Green Infrastructure Project Area: 37.9 acres
 Total GI Project Impervious Area: 12.5 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		1.030e-2 M Gallon		2.574e-2 M Gallon		5.148e-2 M Gallon		1.545e-1 M Gallon		4.119e-1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
S-15	MH139B041	24	1.948e-1	23	1.724e-1	23	1.470e-1	22	1.195e-1	18	7.620e-2	9	2.980e-2

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
MR_LBs_1345108_BR	19	18.5	1	11.8	2.2	1.1
MR_LBs_1345108_PP	19	18.5	1	42.8	7.9	3.354
Total runoff pre-green infrastructure	36.9 acre-feet (1.203e+1 MGPY)					
Total Reduction within GI	27.3 %					
Total Runoff Captured	10.1 acre-ft (3.283e+0 MGPY)					

Total GI Outlets	26.9 acre-ft (1.176e+1 MGPY)
Total GI Capacity	0.37 acre-ft (1.209e-1 Million Gallons)
Number of CSOs Prevented	5 (21 %)
Overflow Volume Reduced	0.32 acre-ft (1.045e-1 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
MR_LBs_1345108_BR	\$53,000	\$3,000	\$56,000
MR_LBs_1345108_PP	\$155,000	\$4,000	\$159,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.

Regulator S1500POCL01A-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an **annualized basis**.

Characteristics

Total Drainage Area: 765.5 acres
 Number of Projects: 2
 Total Cost: \$102,000
 Total Green Infrastructure Project Area: 41.8 acres
 Total GI Project Impervious Area: 11.6 acres

System Assessment

		Storage Capacity											
		0.000e+0 M Gallon		4.158e-1 M Gallon		1.039e+0 M Gallon		2.079e+0 M Gallon		6.236e+0 M Gallon		1.663e+1 M Gallon	
POC	Reg. ID	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
S-15	S1500POCL01A-OF	0	0.000e+0	0	0.000e+0	0	0.000e+0	0	0.000e+0	0	0.000e+0	0	0.000e+0

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
MR_LBs_1345123_BR	20.9	19.1	1	10.5	2	1.012
MR_LBs_1345123_PP	20.9	19.1	1	13.1	2.5	1.065
Total runoff pre-green infrastructure	38.2 acre-feet (1.244e+1 MGPY)					
Total Reduction within GI	11.8 %					
Total Runoff Captured	4.5 acre-ft (1.469e+0 MGPY)					
Total GI Outlets	33.7 acre-ft (1.232e+1 MGPY)					

Total GI Capacity	0.17 acre-ft (5.638e-2 Million Gallons)
Number of CSOs Prevented	0 (0 %)
Overflow Volume Reduced	0 acre-ft (0.000e+0 MGPY)

Project Costs

Project	Construction Cost	O&M Costs (total, present value)	Total Cost
MR_LBs_1345123_BR	\$49,000	\$3,000	\$52,000
MR_LBs_1345123_PP	\$49,000	\$1,000	\$51,000

Appendix

Green Infrastructure Cost

Total present O&M costs are calculated based on an interest rate of 3% ($i = 0.03$) and a given design lifespan. All costs are in present value.