HOLISTIC GREEN INFRASTRUCTURE
INTEGRATION INTO PITTSBURGH’S URBAN FABRIC

TABLE OF CONTENTS

Holistic Green Infrastructure and Process
Existing Condition Assessment and Collaborative Planning
Urban Design Framework
Green Infrastructure Concepts Plans
HOLISTIC GREEN INFRASTRUCTURE

To ensure a successful city-wide green infrastructure plan the team used a process they defined as “strategic” urban planning. A process that is focused on developing a holistic “green infrastructure-first” approach. This approach emphasizes the identification of opportunities that support both resilient infrastructure strategies and are catalytic redevelopment opportunities within each Pittsburgh sewershed.

...opportunities that support both resilient infrastructure strategies and are catalytic redevelopment opportunities...
AN INTEGRATED AND SYSTEM-BASED APPROACH

To achieve the vision of holistic green infrastructure the team used an iterative and integral process outlined below:

> **STEP ONE:** Digital Database of Existing Conditions - Review and analyze existing conditions along with a collaborative planning process with multiple City Departments, coordinating existing plans and studies completed to date for study area

> **STEP TWO:** Urban Design Framework Plan - Synthesized digital database into key nodes and community assets connected by corridors

> **STEP THREE:** Green Infrastructure Concept Plans - Refine the Framework plans with community input and technical analysis to develop GI concept plans and opportunities in each sewershed for a connected GI system.

**Step 1:**
**Compile a digital database of:**
- existing conditions
- coordinate planning
- guiding principles

**Step 2:**
**Synthesize database, create urban design framework:**
- nodes
- community assets
- corridors

**Step 3:**
**Refine framework, develop GI concept plan & opportunities:**
- individual project areas
- GI strategies
- catalytic revitalization
A FOUNDATION GROUNDED ON EXISTING CONDITIONS

The initial step in the process was gathering data and developing mapping related to the conditions that existed within the sewersheds. The understanding of these conditions grounded the opportunities and constraints for each area. This data extended beyond sewershed related infrastructure like sewershed boundaries and pipes, to other conditions, that play and integral role in urban planning like topography, land use, corridors, and nodes. Hazard areas of steep slopes, landslide prone, and undermined areas were clearly defined and avoided where practical. Field observation was completely to supplement the mapping and enrich the teams understanding.

...understanding of these conditions grounded the opportunities and constraints...
COLLABORATIVE PLANNING APPROACH

The City of Pittsburgh has many active planning pursuits that focus on the same streets, neighborhoods, and parks where green infrastructure is being targeted. By understanding the community assets, current planning processes, community goals, and engaging in stakeholder input, the integration of green infrastructure can be “leveraged” into multiple smart infrastructure systems through a highly collaborative planning process. To achieve this goal multiple meetings with the Urban Redevelopment Authority (URA), City Planning, and associated City agencies were conducted to obtain the relevant development plans for the City.

...the integration of green infrastructure can be “leveraged” into multiple smart infrastructure systems..

COMMUNITY OUTREACH REFINES THE VISION

The initial framework was shared with multiple City departments along with the Mayor’s office. Community outreach meetings were conducted at multiple levels, including small groups of key stakeholders like Universities as well as larger sessions with many participants. When commentary necessitated changes, refinements were made. These refinements served to inform the next steps; developing the concepts identifying specific opportunities for GI within the sewersheds.

...when commentary necessitated changes, refinements were made.
GUIDING PRINCIPLES FOR REGENERATIVE SYSTEM

The team established a set of Guiding Principles to further assist in the selection of the GI locations with the sewersheds that combined the data driven, technical metrics used to measure the effectiveness of CSO reduction within the priority sewersheds discussed in the previous section. These Guiding Principles emerged from discussions with the Mayor’s office and his staff, multiple City departments, and key community stakeholders.

Many of these guiding principles support the quantitative outcomes for CSO reduction discussed in the previous sections; others, however serve to broaden the lens and establish qualitative outcomes to improve the communities where these investments are being made, further complementing the redevelopment efforts proposed in these areas. The Guiding Principles offer an additional benefit: they better leverage the limited resources of each City department into a shared effort.

The seven Guiding Principles are outlined below along with a brief description for each:

1) Public Realm Investment = Cost Effective:
By investing in City-owned property within the public realm the cost of acquired private property for GI is avoided. Furthermore, improvements can be more efficiently shared across City departments when other planned improvements are coordinated.

2) Create Workforce Development Opportunities:
Investment in GI should be viewed as an opportunity to provide jobs, especially within communities that would best benefit from access to new or better employment opportunities. Workforce development will encompass all segments of the population to develop lifelong careers, research and monitoring to construction and maintenance.

3) Re-Establish Riverfront Connections:
As Pittsburgh further redevelops and enhances its numerous riverfront areas, opportunities to improve and create new riverfront connections should be explored in conjunction with proposed GI, providing pathways linking people and runoff to the City’s three rivers.

4) Complete Streets
Pittsburgh is looking to develop a network of key City corridors into Complete Streets, which are streets that focus multiple modes of transportation, placing emphasis on public transit, bicyclists, and pedestrians. GI should be incorporated within these Complete Streets as many of the corridors also have the highest potential to reduce CSO.

5) Focus on Healthy, Walkable Communities
Emphasis should be placed on enhancing corridors to improve access to recreation and healthy food, and encourage walking beyond the Complete Street corridors. GI can be leveraged to further enhance the effectiveness of improving the overall health and safety of a community.

6) Resilient Infrastructure
GI can be used to support the efforts of the City in becoming more resilient by reducing flooding, decentralizing runoff capture, and upgrading the aging infrastructure. Creating a smart system that more effectively and efficiently handles stormwater today and in the future.

7) People, Planet, Place and Performance
Pittsburgh’s P4 initiative looks to forge a new model for urban growth and development that is innovative, inclusive and sustainable. GI addresses all four of the components of this framework.
After the sewersheds were selected, and Guiding Principles established, an important early step in this process identified the nodes, corridors, and connectivity that should be focused on when looking at opportunities for GI. This early planning process was referred to as the Urban Design Framework. The Urban Design Framework served as a synthesis of the redevelopment plans, key corridors, and important nodes within the community. Nodes could be important intersections of corridors or key areas within the community like business districts, institutions, or open space well positioned to capture high yield areas. Furthermore, emphasis was placed on Complete Streets, connectivity to rivers, and areas within in community where redevelopment had been proposed.

...the Framework served as a synthesis of the redevelopment plans, key corridors, and important nodes...

**URBAN DESIGN FRAMEWORK**

1. **STEP ONE**
   - **EXISTING CONDITIONS ANALYSIS**

2. **STEP TWO**
   - **URBAN DESIGN FRAMEWORK**
     - SYNTHESIZE DATABASE, CREATE URBAN DESIGN FRAMEWORK:
       - nodes
       - community assets
       - corridors

3. **STEP THREE**
   - **GI CONCEPT PLANS**
     - REFINING FRAMEWORK, DEVELOP GI CONCEPT PLAN & OPPORTUNITIES:
       - individual project areas
       - GI strategies
       - catalytic revitalization
FOUR MILE RUN OPPORTUNITIES AND CONSTRAINTS

The Four Mile Run sewershed surrounds its greatest asset for green infrastructure: Schenley Park. The Park is well positioned within the sewershed to accept stormwater from the combined system in Squirrel Hill. Corridors through and nearby the park are already being targeted as future Complete Streets. Junction Hollow provides high volume capture potential and could accommodate a connection to the river.

- Flood Control At The Run (Lower Junction Hollow)
- Restore Squirrel Hill Runoff Into Schenley Park
- Schenley Park Ecological Restoration Opportunities
- Institutions Offer Partnership and Research Opportunities
- Junction Hollow Has Large Capture Potential
- Flagstaff Hill GI Education and Demonstration
- Schenley Drive + Forbes as Park to Park Green Street
- Restore Panther Hollow Lake
- Riverfront Connection and Daylighted Stream

Runoff from green area restored to Panther Hollow Run.
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FOUR MILE RUN URBAN DESIGN FRAMEWORK

- A UNIVERSITIES DISTRICT
- B FLAGSTAFF HILL
- C FORBES AVENUE + SCHENLEY DRIVE
- D SQUIRREL HILL
- E PANTHER HOLLOW RUN
- F PANTHER HOLLOW LAKE
- G JUNCTION HOLLOW
- H THE RUN (LOWER JUNCTION HOLLOW)
- I RIVERFRONT CONNECTION
The Washington Boulevard and Negley Run Sewershed has large-scale stormwater capture areas. Key development corridors and site specific projects like Westinghouse Academy can revitalize portions of Homewood. Strong potential partnerships for workforce development exist at the former VA Hospital, the VA Center, Job Corps, and the Shuman Juvenile Detention Center.

- Workforce Training at VA Campus
- Reduce Flooding at Washington Boulevard
- Washington Boulevard Large Capture Potential
- Highland Collects and Negley Run Conveys
- Westinghouse Academy | Silver Lake Neighborhood Revitalization
- Reduce Impervious Area on MLK Busway and Fifth Avenue Parking Lots
- Beechwood Conveys to Mellon Park
- Westinghouse Park Capture Potential
- 7800 Susquhanna Training and Demonstration
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NEGLEY RUN URBAN DESIGN FRAMEWORK

A VA CAMPUS
B WASHINGTON BOULEVARD
C NEGLEY RUN
D HIGHLAND PARK
E WESTINGHOUSE ACADEMY
F MLK BUSWAY AND FIFTH AVE PARKING LOTS
G BEECHWOOD AND MELLON PARK
H WESTINGHOUSE PARK
I 7800 SUSQUEHANNA
South Side Park has the potential to capture a large quantity of stormwater. South 21st Street can convey this stored water as the first of three major corridors, including Carson Street (a major mixed use pedestrian oriented retail corridor), and South 18th Street, which already has an existing railroad crossing and connection to the Riverfront. Existing access to the river is unique among the priority sewersheds and it provides a great opportunity for an enhanced riverfront connection or potential daylighting of spring fed flow from South Side Park.

- Existing Riverfront Connection at South 18th Street
- Carson Street As a Greener/Pedestrian Friendly Retail Corridor
- Leverage Proposed Investment by PennDOT in Carson
- South 21st Street Extends from Existing Valley of South Side Park
- South Side Park Has Large Capture Areas
- Reduce Paving in South Side Park
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SOUTH SIDE URBAN DESIGN FRAMEWORK

A RIVERFRONT PARK
B S. 18th STREET
C E. CARSON STREET
D S. 21st STREET
E SOUTH SIDE PARK
F QUARRY FIELD

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Design principles established in the Framework plan, and opportunities and constraints identified in the existing conditions analysis, sets the stage for successful selection of individual projects and for concept plans to emerge. Ways to leverage the opportunities identified in Framework were woven into a larger vision that creates neighborhood nodes and corridors, and links community assets with interconnected GI strategies. This sewershed-based, systems approach uses urban planning and community revitalization to shape the Green Infrastructure Concept Plans; serving as a catalyst for a broader vision that can be implemented. A true collaboration will require City leadership, community, and stakeholder members to be an integral part of the process moving forward towards implementation opportunities.

...link community assets with interconnected GI strategies, serving as a catalyst for a broader vision...
The upper portions of the sewershed, “Upland Neighborhoods,” are often more developed with more impervious areas, making them suited for pervious pavement opportunities that can also convey runoff down the system. Upper portions are most effective at collecting runoff since they often contain numerous high yield areas and high amounts of impervious surface. When these areas are not in the public realm, public-private partnerships could be developed to expand opportunities.

In the middle portions of the sewershed, or “Tributary Gateways,” conveyance becomes more of a priority. Runoff collected in the upper sewershed as well as high yield areas within the middle zone provide the stormwater flow carried by the conveyance system. Ideally this conveyance is accomplished with bioswales where street widths can be narrowed or within existing valleys through more natural settings like parks. Where steeper slopes exist, check dams are provided to slow the velocity and erosive power of water and provide storage volume as well. Many of the existing valleys would benefit from ecological restoration that reduce the amount of sediment washing into the system in addition to offering more resilient and diverse habitats. Where bioswales are not possible, pervious pavements can be utilized to convey runoff through highly porous gravels and supplemental underdrain pipes.

The lower portions, “Greenway Boulevards” provide great opportunities to provide larger capture basins for the runoff that is collected and conveyed from the upper and middle portions. Many of these areas offer large, more gradually sloped areas in publicly owned parks or open space. These are ideal locations for storage. When practical, this should enhance the connection to the riverfront.

...As the team identified opportunities and concepts for GI in the priority sewersheds the position of the study area within the sewershed played an important role!
FOUR MILE RUN CONCEPTS AND OPPORTUNITIES

This concept looks to redirect stormwater runoff from the Squirrel Hill neighborhood into Schenley Park while also making improvements to the public realm of the neighborhood: specifically, the business district at Squirrel Hill and the wide gateway boulevards leading to the park. Schenley Drive and the parking area around Phipps Conservatory can become a highly-visible green demonstration site and a Complete Street. Junction Hollow has a potential to capture large volumes of stormwater. In addition, daylighting this stream provides a great amenity connecting neighborhoods to parks and to the riverfront.
FOUR MILE RUN GREEN INFRASTRUCTURE
Connects park, institutions, people & riverfront

UNIVERSITIES DISTRICT
Public/Private Partnerships and Monitoring
6.7 M Gallons Capture Potential

JUNCTION HOLLOW
Large Capture Potential and Park Expansion and 12.1 M Gallons Capture Potential
Riverfront Connection/Stream Daylighting

POTENTIAL CAPTURE VOLUME
Pervious 6.8 M Gallons
Bioswale 4.3 M Gallons
Detention 14.7 M Gallons
TOTAL 25.8 M Gallons

LEGEND
- Pervious Collection
- Bioswale Conveyance
- Detention Capture
- Node and Extension
- Ecological Restoration
- Existing Park

FLAGSTAFF HILL
Highly Visible, GI Demonstration and Education
2.1 M Gallons Capture Potential

SCHENLEY DRIVE + FORBES AVENUE
Park to Park Complete Street
0.3 M Gallons Capture Potential

SQUIRREL HILL
Enhance Public Realm at Business District and Reconnect Runoff to Park
2.3 M Gallons Capture Potential

PANTHER HOLLOW RUN
Ecological Restoration and Watershed Reconnection
1.0 M Gallons Capture Potential

PANTHER HOLLOW LAKE
Restoring an Amenity for Park and Community
1.3 M Gallons Capture Potential

THE RUN (LOWER JUNCTION HOLLOW)
Reduce Flooding in Residential Areas

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UNIVERSITIES DISTRICT

The Universities District in the upper portion of the sewershed is a dense urban area with high percentage of impervious area. Forbes Avenue offers a great opportunity for a Complete Street with GI. The Universities and Cultural Institutions offers partnerships for additional GI opportunities. More specifically, the recreation fields at Forbes Ave. and Beeler St. could provide capture potential. The research and monitoring opportunities offered by these institutions should be nurtured further. The runoff of these upland areas should be collected and conveyed to the upper end of Junction Hollow. Within this valley, Boundary/Neville Street provides opportunity for capture and conveyance. Large surface parking lots in this area offer further opportunities for pervious pavement and subsurface capture. Public-private partnerships should be explored where lots are located on privately-owned land.

FLAGSTAFF HILL AND SCHENLEY DRIVE

Schenley Drive at Flagstaff Hill has the opportunity to provide an expanded, highly visible demonstration and education project for GI that would provide opportunities to partner with adjacent institutions: Pittsburgh Parks Conservancy, Phipps Conservatory & the Center for Sustainable Landscapes, Carnegie Mellon University, and University of Pittsburgh. Pervious pavement and reduced pavement in Schenley Drive would enhance the entry and parking experience for visitors.

East of Flagstaff Hill on Schenley Drive, the addition of pervious pavement and reduction of pavement can be continued, increasing the capture and storage potential and continuing the work of the Schenley Drive Green Street Plan design effort. Paralleling this street, Phipps Run would benefit from ecological restoration and additional check dams and small wetland capture areas could be provided.
SQUIRREL HILL

As Schenley Drive transitions into Forbes Avenue, a more urban approach can be taken with pervious pavement collecting and conveying runoff from the vibrant Squirrel Hill business district. In addition, the reduced CSO improvements to this streetscape would improve the pedestrian and biking experience, along with providing an enhanced park-to-park green street between Schenley and Frick Parks. The intersection of Murray and Forbes Avenues can be the nucleus of these improvements.

High-yield capture areas within the Squirrel Hill neighborhood are concentrated near the business-focused corridors of Forbes and Murray Ave. Runoff captured is conveyed from the business district through the neighborhood to Schenley Park’s Panther Hollow Run. The pavement of Wightman Street could be reduced to accommodate a bioswale with adjacent bike lanes. Pervious streets like Murdoch St., with its existing stone cobbles, could further collect and convey runoff to Bartlett St. Bartlett St. is the low point of the existing valley and runoff from Squirrel Hill flows towards Panther Hollow Run.
PANTHER HOLLOW RUN

Runoff from Squirrel Hill would be reintroduced to Panther Hollow Run at Bartlett St., along the west edge of the park. Panther Hollow would benefit from ecological restoration and reintroducing runoff back into the system would be done carefully, overtime, as the valley is restored. Additional opportunities could include capturing and storing runoff for irrigation at the adjacent golf course. At the lower end of the Hollow an existing low slope area would make an ideal wetland for capture and cleaning runoff from both Phipps Run and Panther Hollow Run prior to entering Panther Hollow Lake.

PANTHER HOLLOW LAKE

Dredging Panther Hollow Lake would increase its storage potential and begin to restore the natural systems and diversity of the lake. Additional capture storage could be provided as “freeboard” above the normal lake level. Combined with efforts upstream, the goal would be to restore the lake as a usable amenity for park users. The estimated 68 million gallons of annual flow coming from Panther Hollow Lake can be diverted from the combined sewer system and brought to the surface to serve as baseflow for a daylighted stream in an ecologically engineered channel.
JUNCTION HOLLOW

This daylighted stream would run through Junction Hollow. Junction Hollow’s gentler slopes and broad profile offer large volumes of capture potential. North of Panther Hollow Lake there are large parking areas and streets that can store water beneath pervious pavement. South of Panther Hollow Lake capture is accomplished with storage sites and constructed wetlands. The character of storage can be defined from additional input from the community, providing opportunity for additional park programming. The recreation field at the lower end of Junction Hollow also offers capture potential.

RIVERFRONT CONNECTIVITY

In an effort to address an important City-wide guiding principle seeking direct riverfront connectivity, a partnership with the Almono Development team would help overcome challenges to providing a daylit stream corridor from Junction Hollow Run to the Monogahela River. There is further opportunity to use the existing parcel and surface parking lots bounded by 2nd Street, Saline Street, and Interstate 376 in this effort.

The collective whole of the corridors, public open space, and runs improve the connectivity between institutions, neighborhoods, and other assets surrounding the park. They also offer an enhanced connection to the riverfront.
NEGLEY RUN CONCEPTS AND OPPORTUNITIES

Washington Boulevard has potential pervious pavement and storage sites closer to the River. At the west side of this sewershed in the Highland Park neighborhood, Stanton Avenue and other streets around the Dilworth Academy can capture stormwater. Below and adjacent at Negley Run, East Liberty Boulevard’s existing medians could be converted for capture and conveyance. In the Lincoln-Lemington neighborhood, adjacent to the Allegheny River bluffs, there is significant opportunity to team with one of several institutions on workforce development programming. Streets radiating from Westinghouse Academy can convey rainwater and serve as catalyst for revitalization. Large-scale pervious pavement opportunities exist around the bus terminal and busway. Beechwood Blvd. can capture and convey to storage in Mellon Park.
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NEGLEY RUN GREEN INFRASTRUCTURE
A catalyst for workforce development and revitalization

WASHINGTON BOULEVARD
Large Capture Potential,
Reduce Impervious Parking and
Reduce Flooding
13.6 M Gallons
Capture Potential

STANTON/NEGLEY RUN
Stanton and E. Liberty Blvd. Collect and Convey
to Negley Run Blvd.
4.6 M Gallons
Capture Potential

LEGEND

POTENTIAL CAPTURE VOLUME
Pervious 12.2 M Gallons
Bioswale 4.6 M Gallons
Detention 31.4 M Gallons
TOTAL 48.2 M Gallons

VA CAMPUS
GI Workforce Training and Capture Potential in
Open Space
7.3 M Gallons
Capture Potential

WESTINGHOUSE ACADEMY
Revitalization Around School and Large
Capture Potential at
Former Silver Lake
13.9 M Gallons

MLK BUSWAY AND FIFTH AVENUE PARKING LOTS
Reduce Impervious Pavement and Improve
Connectivity
7.4 M Gallons
Capture Potential

BEECHWOOD BLVD/
MELLON PARK
Complete Street Conveys to
Park
1.4 M Gallons
Capture Potential

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25
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The Highland Park neighborhood has a number of high yield areas, and streets like Stanton Ave., Highland Ave., and Heberton St. can be used to collect and convey runoff to Negley Run Boulevard. Negley Run Blvd. is a good candidate for a Complete Street and construction is already underway for some GI improvements. Adjacent Negley Run Boulevard, a natural drainage channel can convey runoff from East Liberty Avenue. Proposed redevelopment in the Larimer neighborhood includes stormwater improvements that support this approach with community and stakeholder input.

Beechwood Boulevard provides an important connection to the south and offers opportunity as a Complete Street and to collect and convey runoff to Mellon Park. Westinghouse Park shares similar capture potential from surrounding streets like McPherson St.
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MLK BUSWAY & ADJACENT PARKING LOTS

Pervious pavement and reduced impervious area would serve to collect runoff along the MLK Busway, bus terminal, and additional large surface parking lots at Chatham University - East Side Campus. Improvement to the Busway should also look to improve surrounding residents’ access to public transportation.

WASHINGTON BOULEVARD

Washington Boulevard lies in the valley that serves as a convergence for the various sub-basins draining to it. The street itself has the potential to be a Complete Street. Large surface lots adjacent the City Police and Fire facilities, along with a bike track, offer pervious pavement and subsurface capture potential. Towards the northern edge of the valley, lower slopes and a broad profile offer high volumes for storage to the west of the Boulevard and can provide sedimentation capture areas to reduce the need for cleaning often clogged catch basins. A goal beyond the CSO reduction should be to reduce flooding in this low lying area. Proposed GI upstream from this will also improve this condition.
VA CAMPUS / HIGHLAND DRIVE

The area surrounding the VA Center, Juvenile Detention Center, and Job Corps west of Washington Boulevard offers a different approach for GI solutions thanks to larger areas of open space and undeveloped areas. Runoff from building and surface lots can be collected and conveyed to basins along Highland Drive where runoff is ultimately taken to Washington Boulevard (see section views below). Beyond the potential volumes of capture surrounding these institutions, they offer a tremendous opportunity for workforce training and development focused on GI and sustainable development.
HOMEWOOD / WESTINGHOUSE ACADEMY

The Westinghouse Academy and surrounding Homewood neighborhood provide a great opportunity to reinvest in the public realm and serve as catalyst for redevelopment: an approach that is supported by previous planning and community engagement efforts. Streets radiating out from the school like Hermitage St. and Murtland Ave. work to collect and convey stormwater downstream. Hermitage St. is also the location of a former school at Lang Avenue that could serve as a nucleus for redevelopment. The athletic field east of the school offers capture potential, along with the former Silver Lake site, now an industrial site. This large flat site provides a high volume of potential capture for storage sites, which could make a great amenity for the neighborhood. In short, GI reinvestment would serve as catalyst, or what can be referred to as Urban Acupuncture, to begin to revitalize Homewood.

• Westinghouse Academy A Nucleus for Public Realm Improvement
• Transit Oriented Development Within 5 Minute Walk
• Over 400 Vacant Lots within 5 Minute Radius = Infill Opportunity
• Large Number of Vacant Lots Offer Infill Opportunity
• Healthy, Walkable Corridors Connected to Transit
• Former Silver Lake Could Be Restored As Amenity and GI
• Hermitage School Could Take Advantage of Surrounding Public-Realm Improvements
URBAN ACUPUNCTURE FOR HOMEWOOD + WESTINGHOUSE ACADEMY

1. COMMUNITY ASSETS
   - Westinghouse is a nucleus for neighborhood
   - YMCA nearby on Frankstown
   - Hermitage School could be redeveloped
   - Commercial buildings on Lang
   - +/- 750 structures within 5 minutes of school
   - +/- 450 vacant lots within 5 minutes of school
   - Many streets drain to athletic field and below
   - Existing community garden

2. HEALTHY CORRIDORS
   - Public realm reinvestment a catalyst for growth
   - Green infrastructure and complete streets
   - Healthier walkable community
   - Access to trails and outdoor amenities
   - Opportunities to interact with nature
   - Improved safety for pedestrians and cyclists
   - Better access to healthy food

3. HOUSING INFILL + RENOVATE
   - Phase 1 (Murtland): 41 vacant lots + 33 structures
   - Phase 2 (Hermitage): 23 vacant lots + 25 structures
   - Phase 3 (Lang): 82 vacant lots + 28 structures
   - Phase 4 (Frankstown): 5 vacant lots + 4 structures
   - Phase 5 (Upland/Lincoln): 30 vacant lots + 45 structures
   - Combined - 175 vacant lots & 170 structures
   - Workforce development and training

4. TRANSIT LINES
   - Improved connection to transit on Frankstown
   - Transit-oriented development (tod)
   - Expand possible funding streams
   - Busway and terminal within 10 minute
   - Improved access to jobs and higher education
   - New connection to transit on Washington

2015 COMMUNITY CONSSENSUS VISION
Homewood Cluster Planning Operation Better Block, Inc.
- Create Neighborhood Park on Lang Avenue
- Vacant land for stormwater or flood prone
- Infill Housing and Renovate Existing Stock
- Provide Street Parks and Community Gardens
- Renovate Hermitage School
- Provide Mixed-Use on Lang Avenue

DRAFT

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SOUTH SIDE CONCEPTS AND OPPORTUNITIES

South Side Park has the potential to capture large volumes of stormwater along its western edge, including Quarry Field. Here groundwater seeps could be daylighted through the park. From the park, South 21st Street can convey water north utilizing pervious pavement and green street improvements. At E Carson Street, bioswales and pervious pavement convey the stormwater west to South 18th Street. Along the vibrant mixed-use street, Carson improvements should be coordinated with future PennDOT projects to improve the pedestrian experience and safety. South 18th Street provides the final connection to the existing riverfront via an at-grade railroad crossing.
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**SOUTH SIDE GREEN INFRASTRUCTURE**

*Park to riverfront connection enhances Carson Street district*

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**S.18TH STREET**
Existing Riverfront Connection and Pervious Street
0.5 M Gallons Capture Potential

**S. 21 STREET**
Convey Runoff from South Side Park and Pervious Street
1.1 M Gallons Capture Potential

**E. CARSON STREET**
Enhance Streetscape in Business District with Bioswale and Pervious Pavement
0.6 M Gallons Capture Potential

**SOUTH SIDE PARK**
Large Capture Volume Potential with Detention and Reduced Impervious Areas
8.8 M Gallons Capture Potential

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**POTENTIAL CAPTURE VOLUME**

- Pervious: 2.5 M Gallons
- Bioswale: 0.3 M Gallons
- Detention: 8.2 M Gallons
- **TOTAL**: 11.0 M Gallons

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**LEGEND**
- Pervious Collection
- Bioswale Conveyance
- Detention Capture
- Node and Extension
- Ecological Restoration
- Existing Park

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Quarry Field
Daylight Existing Ground Seep Adjacent the Field
**SOUTH 18TH STREET**

The existing riverfront connection at South 18th Street is unique in comparison to the other priority sewersheds; enhancing this connection will further strengthen awareness of the Riverfront Park, highlight connectivity for people throughout the sewershed, and allow the completion of a green infrastructure conveyance system or a daylighted stream flow that begins in South Side Park.

**SOUTH 21ST STREET**

GI has been proposed in South 21st Street in redevelopment plans and is supported by the community. The gentle slope of the street lends itself to the introduction of pervious pavement and additional GI in the street. South 21st Street connects Carson to South Side Park and should be considered as a green boulevard and gateway to an underutilized portion of the park.
**MLK BUSWAY & ADJACENT PARKING LOTS**

South Side Park is a critical area for CSO reduction in the sewershed. It contains large areas of high yield in addition to providing areas for large storage volumes. These storage sites are placed within the existing valley on the western edge of park. The lower slopes and broad cross-section of this valley accommodate a series of stepped ponds. Quarry Field is at the upper reaches of the valley and the adjacent hillside groundwater seep could serve as baseflow for a daylighted stream that continues down the valley. At the base of the valley where South 21st Street terminates, existing unused parking lots could be depaved or transformed to pervious pavement. This area at the base of the valley has also been discussed as a potential site for a PWSA Operations Center that would be integrated into the environmental education programming in the park, complementing GI concepts in this sewershed.

**EAST CARSON STREET**

E Carson Street serves as the nucleus for retail in the South Side neighborhood. This vibrant street would be improved by making it more pedestrian and bike friendly. As PennDOT looks to make improvements on this state highway, GI should be incorporated. The existing street width and sidewalks accommodate the introduction of a center bioswale and pervious pavement would further reduce runoff and collection and capture opportunities (see section views on following page). E Carson Street connects with South 21st Street, four blocks to the west of South 18th Street.
SOUTH SIDE GREEN INFRASTRUCTURE VISUALIZATION

Existing Cross Section: East Carson Street

Proposed Cross Section: East Carson Street with integrated green infrastructure
**KIT OF PARTS ENHANCES ADAPTABILITY OF CONCEPTS**

GI concepts will be refined in the next stage using a “kit of parts approach” with this approach multiple opportunities exist that best suit the needs of each area. Within the upper portion of the sewershed the kit of parts would focus on collection. Here pervious pavement shifts the constraint of traditional concrete and asphalt roadways (impervious surfaces) that shed stormwater as runoff and provides opportunities where pervious solutions help to reduce runoff from these surfaces by allowing stormwater to be absorbed into the ground and subsurface capture areas. Examples include pervious concrete, the use of non-rigid pavers, and open-celled pavers. Bioswales are constructed, linear depressions intended to convey stormwater towards a drainage feature, or intercept flow along the length of a parking lot or green field. Bioswales encourage infiltration into the groundwater aquifer, and help to filter containments out of stormwater prior to overflow in the larger capture areas. Detention areas are basins used for capture, often vegetated with native plants, they are not designed to permit permanent impoundment of water, instead the are designed to detain the volume for up to 48 hours. The basin is designed with aggregate below the topsoil to hold stormwater and not drown plant material. These basins serve watersheds larger than two acres.

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<th>COLLECT</th>
<th>PERVERIOUS PAVEMENT</th>
<th>GREEN ROOF</th>
<th>BLUE ROOF</th>
<th>STREET TREE VAULT</th>
<th>STORMWATER PLANTER</th>
<th>RAIN GARDEN</th>
<th>PHOTOCATALY CONCRETE</th>
<th>FOREBAY</th>
<th>FILTRATION SYSTEM</th>
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<tr>
<td>CONVEY</td>
<td>BIORETENTION SWALE</td>
<td>TURF SWALE</td>
<td>PIPE</td>
<td>LEVEL SPREADER</td>
<td>CHECK DAM</td>
<td>STREAM RESTORATION</td>
<td>COMPLETE STREETS</td>
<td>STREETSCAPE</td>
<td>SOD FILTER STRIP</td>
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<td>CAPTURE</td>
<td>WET BASIN</td>
<td>SUBSURFACE STORAGE</td>
<td>CISTERNS</td>
<td>WET / DRY DETENTION</td>
<td>BIORETENTION GARDEN</td>
<td>URBAN REFORESTATION</td>
<td>URBAN AGRICULTURE</td>
<td>NATIVE LANDSCAPES</td>
<td>ECOLOGICAL RESTORATION</td>
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REPLICATION IN OTHER SEWERSHEDS

As the City looks to expand opportunities for “regenerative green infrastructure” into other sewersheds around Pittsburgh, the approach outlined in the document can be easily replicated. A process that first identifies opportunities and constraints based on existing conditions and other collaborative planning efforts, then synthesizes this information into priority nodes and community assets that are connected with GI corridors, and finally, identifies individual projects and GI strategies that make the City more resilient while also revitalizing communities.

“Designing a dream city is easy, rebuilding a living one takes imagination.”
- Jane Jacobs

<table>
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<tr>
<th>AREA/SEWERSHED</th>
<th>OUTFALL</th>
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<tr>
<td>A</td>
<td>Four Mile Run</td>
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<td>B</td>
<td>Negley Run</td>
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<td>C</td>
<td>South Side</td>
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