

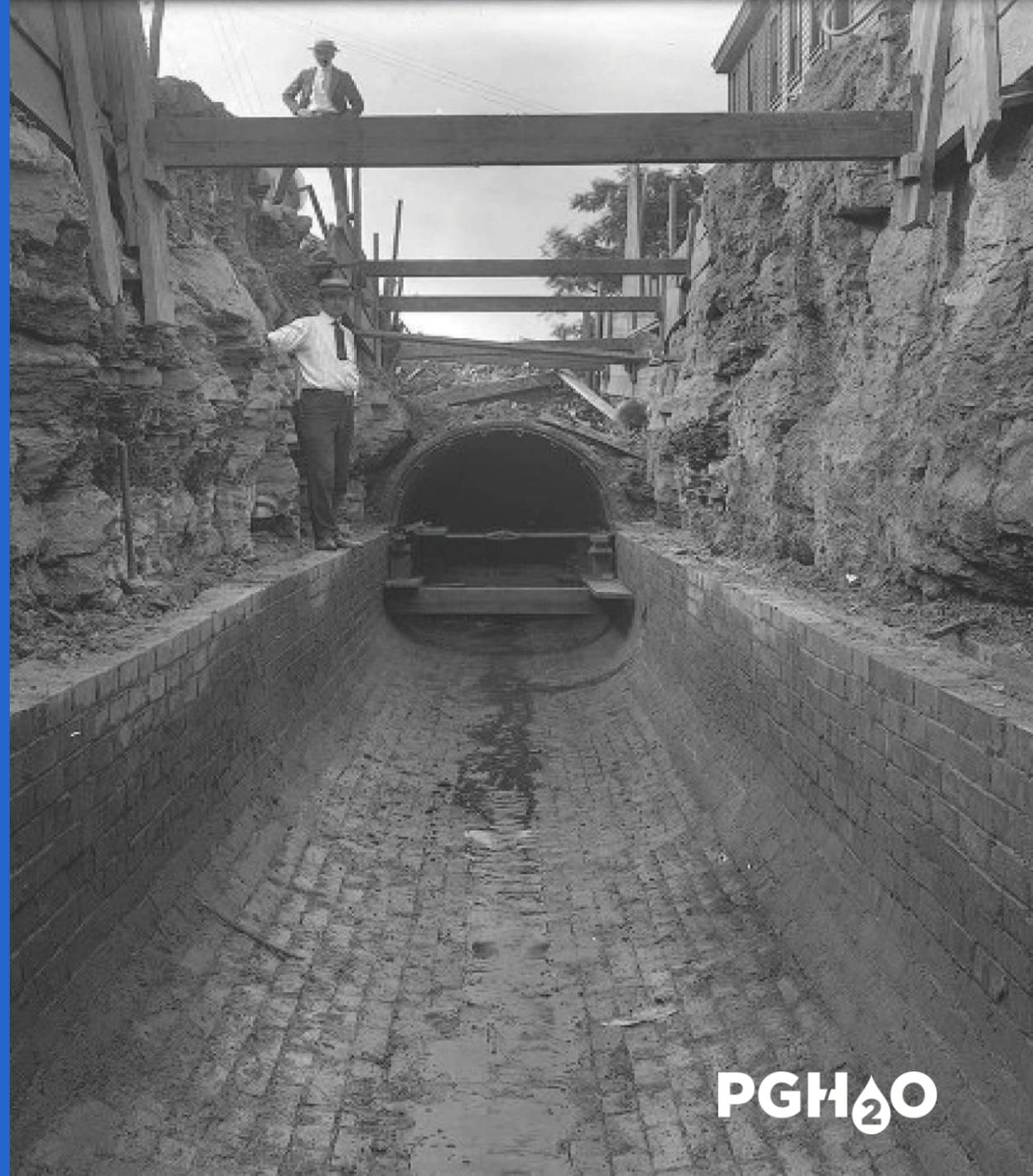


Green First City-Wide Stormwater Assessment

September 26, 2016

PGH20

At the turn of the 20th century, Pittsburgh embarked on its biggest infrastructure improvement campaign, building sewers, water lines, roads, power lines that created the city we know today.



THE PROBLEM -

We have a **STORMWATER MANAGEMENT** problem resulting in:

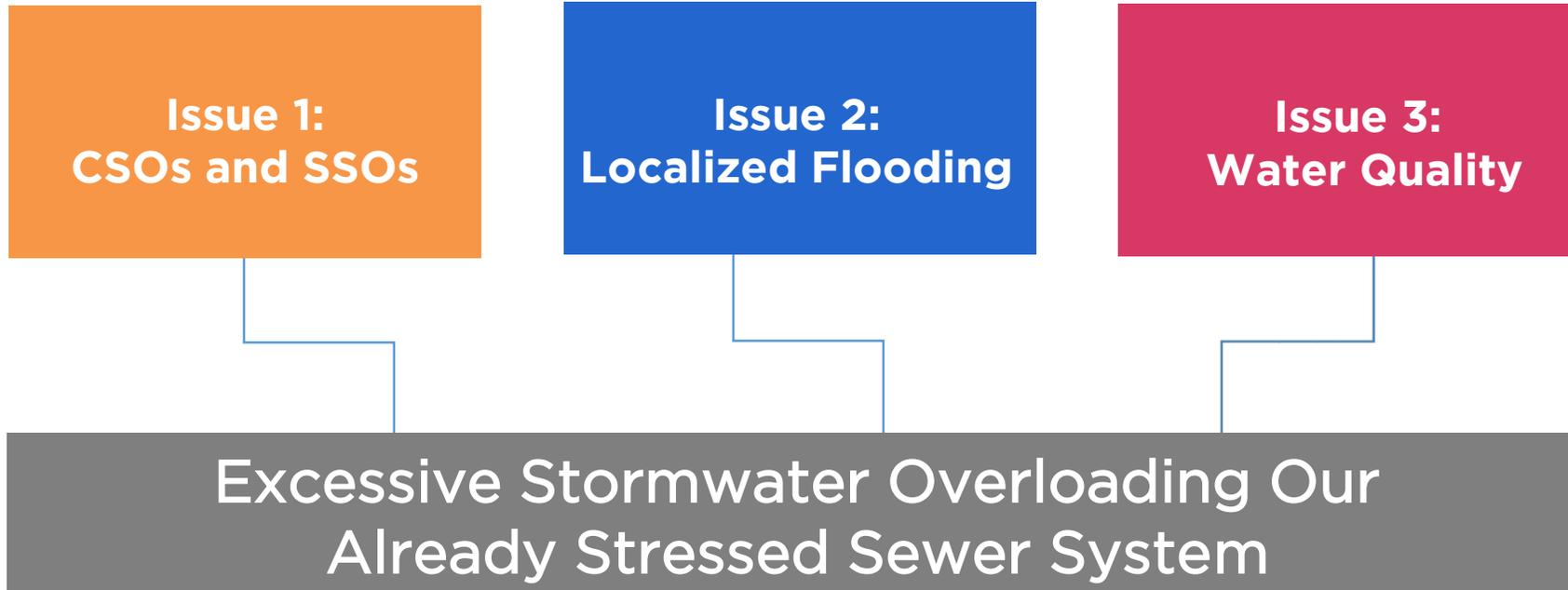
- Poor Water Quality
- CSOs/SSOs
- Illicit Discharges – sewage in storm sewers
- Surface Flooding
- Basement Sewage Flooding
- Sewers that are 80 – > 100 years old
- Consent Decree and MS4 Requirements

We need an **AFFORDABLE PLAN** to address **ALL OF THESE ISSUES**



Overflows | Flooding | Water Quality

SAME ROOT CAUSE



Solution: Invest in stormwater management at the surface and optimize the sewer system

**As the Pittsburgh
Region grows, we
seek a comprehensive
SYSTEMS approach
to address all of our
community and
infrastructure needs
with one investment.**



PGH₂O

The Clean & Green plan presents solutions that are:

COMPLIANT
AFFORDABLE
ENGINEERED
BENEFICIAL
REPLICABLE

Provides a unified, comprehensive, & long term approach toward regulatory compliance

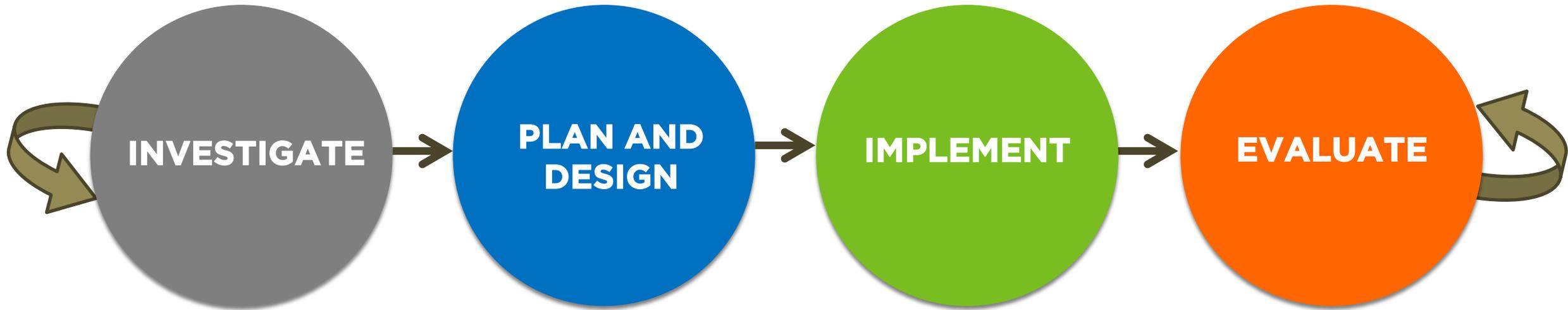
More cost effective to address multiple issues, solving the problem rather than addressing a single symptom.

Strategic design for system integration & optimization to increase resiliency

Maximize triple bottom line - environmental, economic and social benefits

Methodology and protocol for implementation across all watersheds

The Clean & Green plan: ADAPTIVE PROCESS



- **CSO reduction**
- **basement flooding elimination**
- **water quality**
- **stream inflow**
- **hazard location**
- **field verification**

- **private-public partnerships**
- **urban planning**
- **market studies**
- **coordinate with developers**
- **policy & code changes**

- **small-scale individual projects**
- **large demonstrations**
- **education & trainings**
- **integrated watershed management**

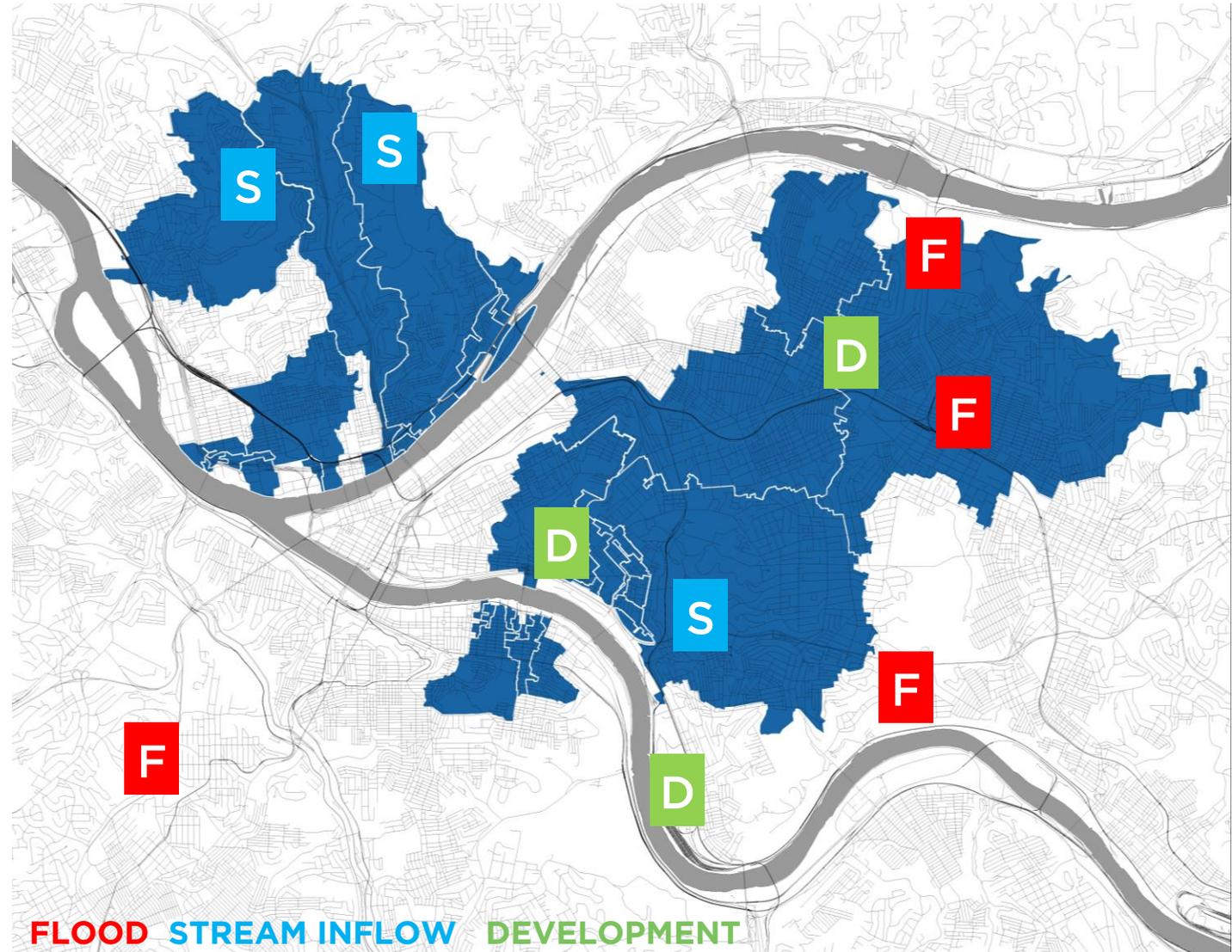
- **monitoring projects**
- **monitoring CSO reduction**
- **triple bottom line assessment**

The Clean & Green plan: PROCESS

We need to keep rainwater out of the system. We can be most effective by focusing efforts on the sheds that contribute the most to the system.

We identified the **top 30 sheds** and overlaid other criteria:

RISK	LOWER RISK
OPPORTUNITY	EASE OF IMPLEMENTING
DEVELOPMENT	HIGH ACTIVITY
SYNERGIES	MULTIPLE BENEFITS

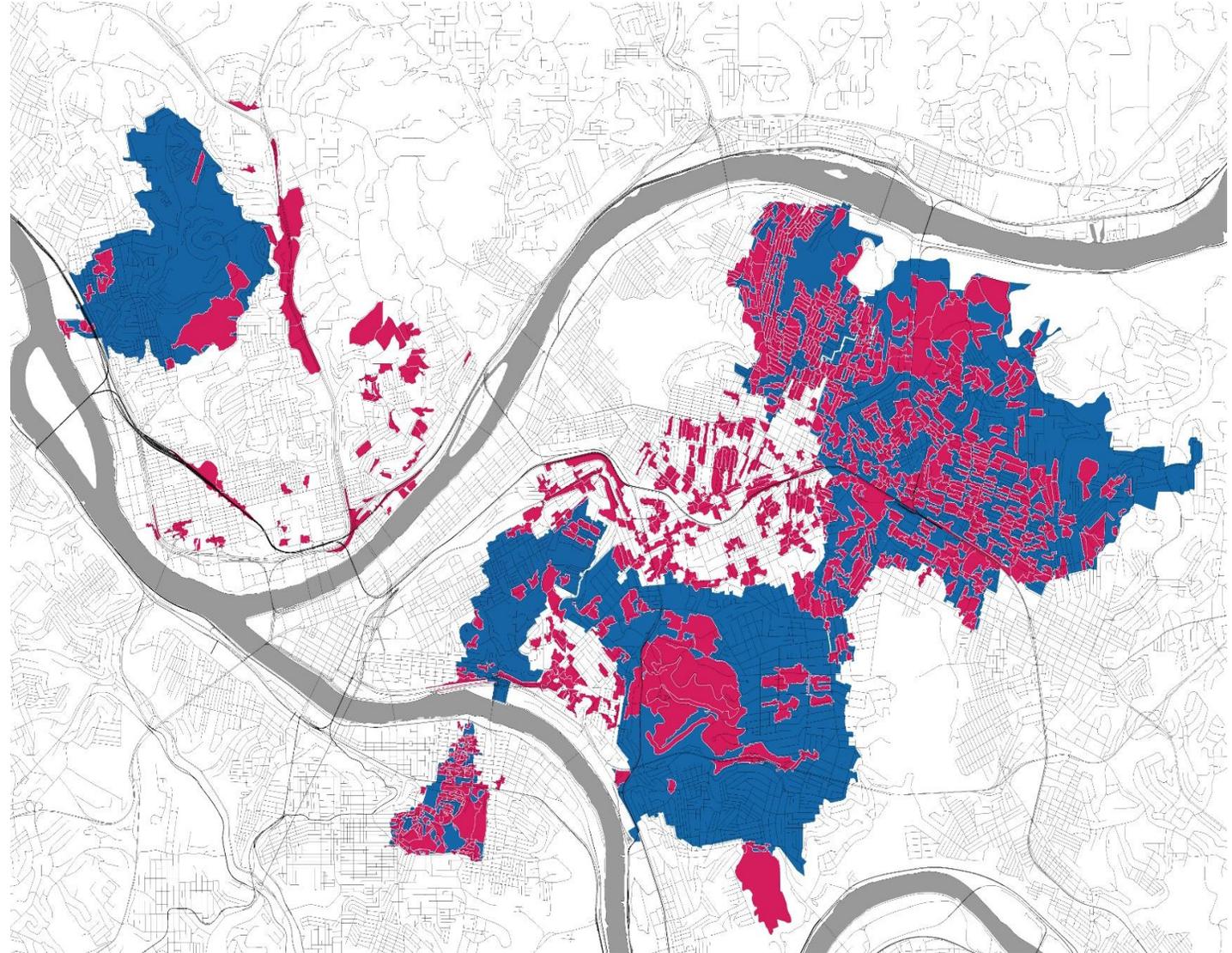


The Clean & Green plan is **ENGINEERED**

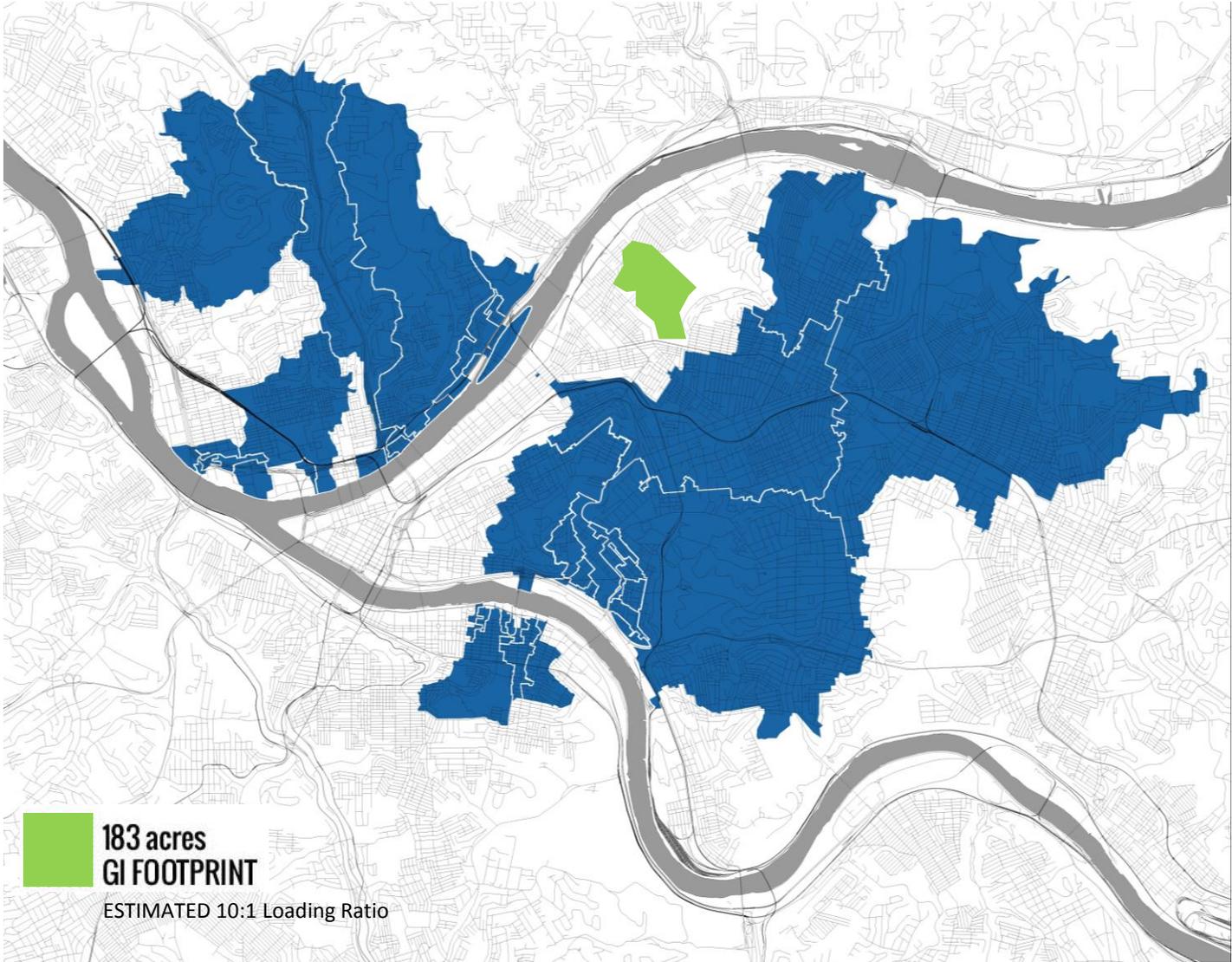
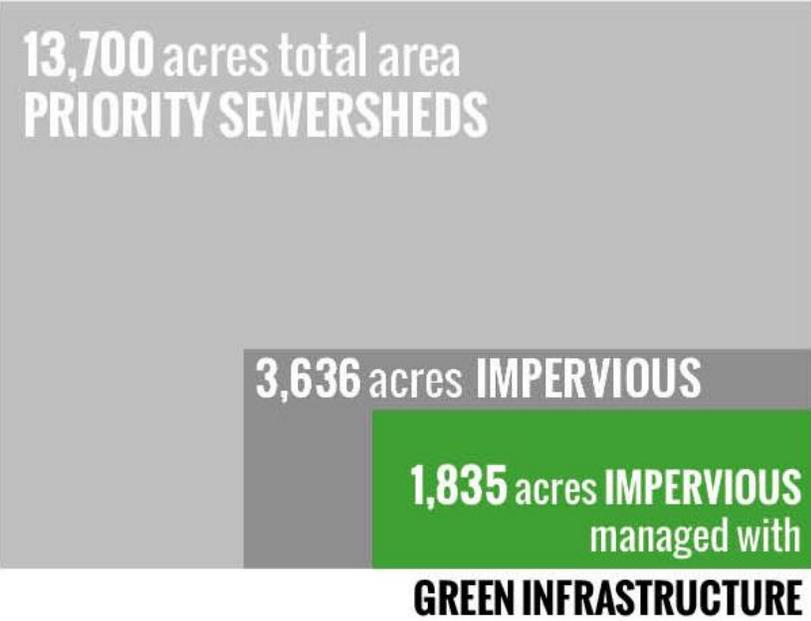
Identify **highest contributing** PWSA Stormwater inlets based on total impervious area.

Prioritize how we select locations for green infrastructure implementation projects.

This approach addresses the city's stormwater issues with **one investment.**



The Clean & Green plan is **ENGINEERED**



The Clean & Green Infrastructure Plan is a “Stormwater Overlay” to guide our future vision.

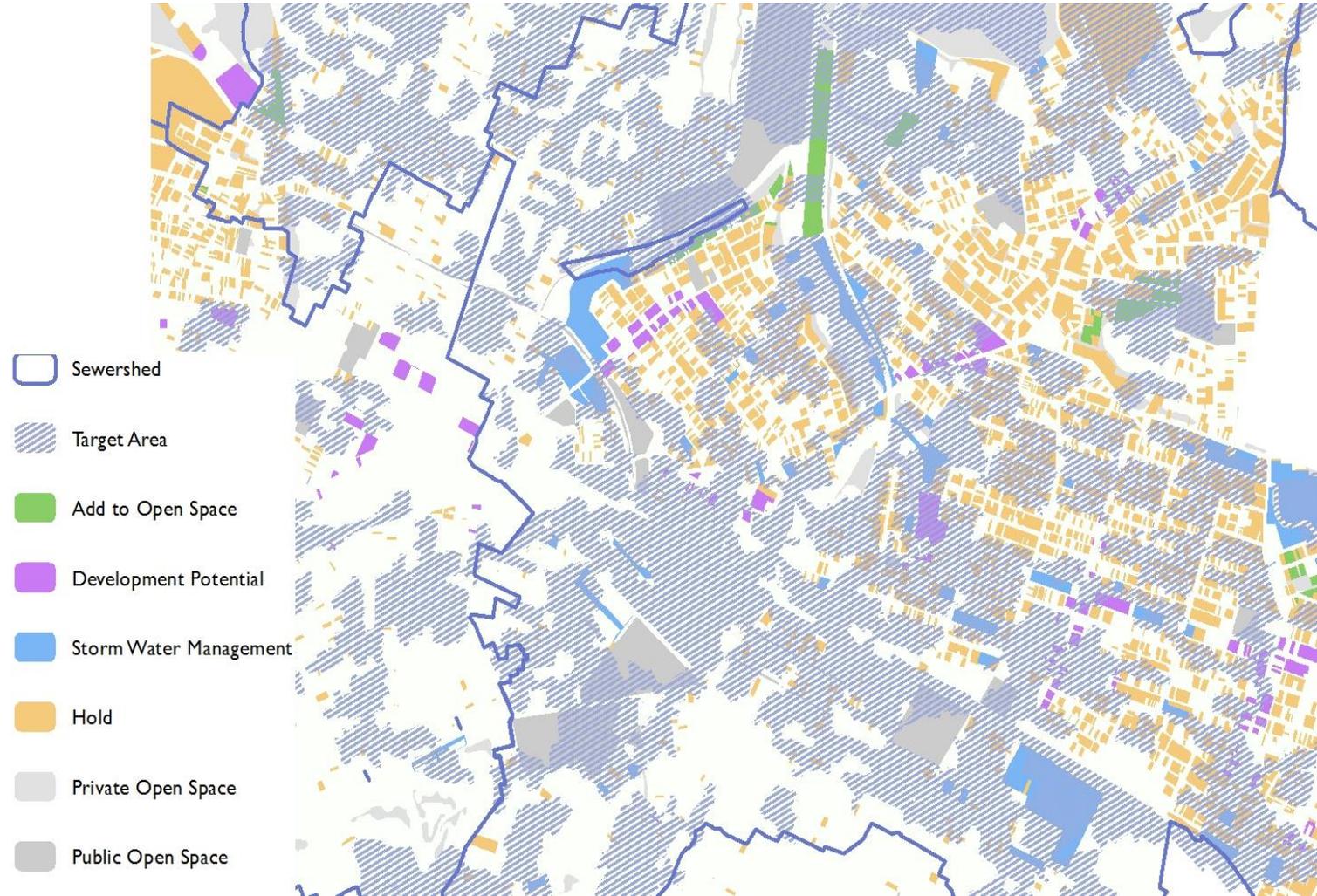
The purpose of the City-Wide Assessment is to create a “Green First” approach to regulatory compliance that :

PEOPLE: increases resiliency and minimizes hazards

PLANET: improves our rainwater system functioning

PLACE: enhances urban environments

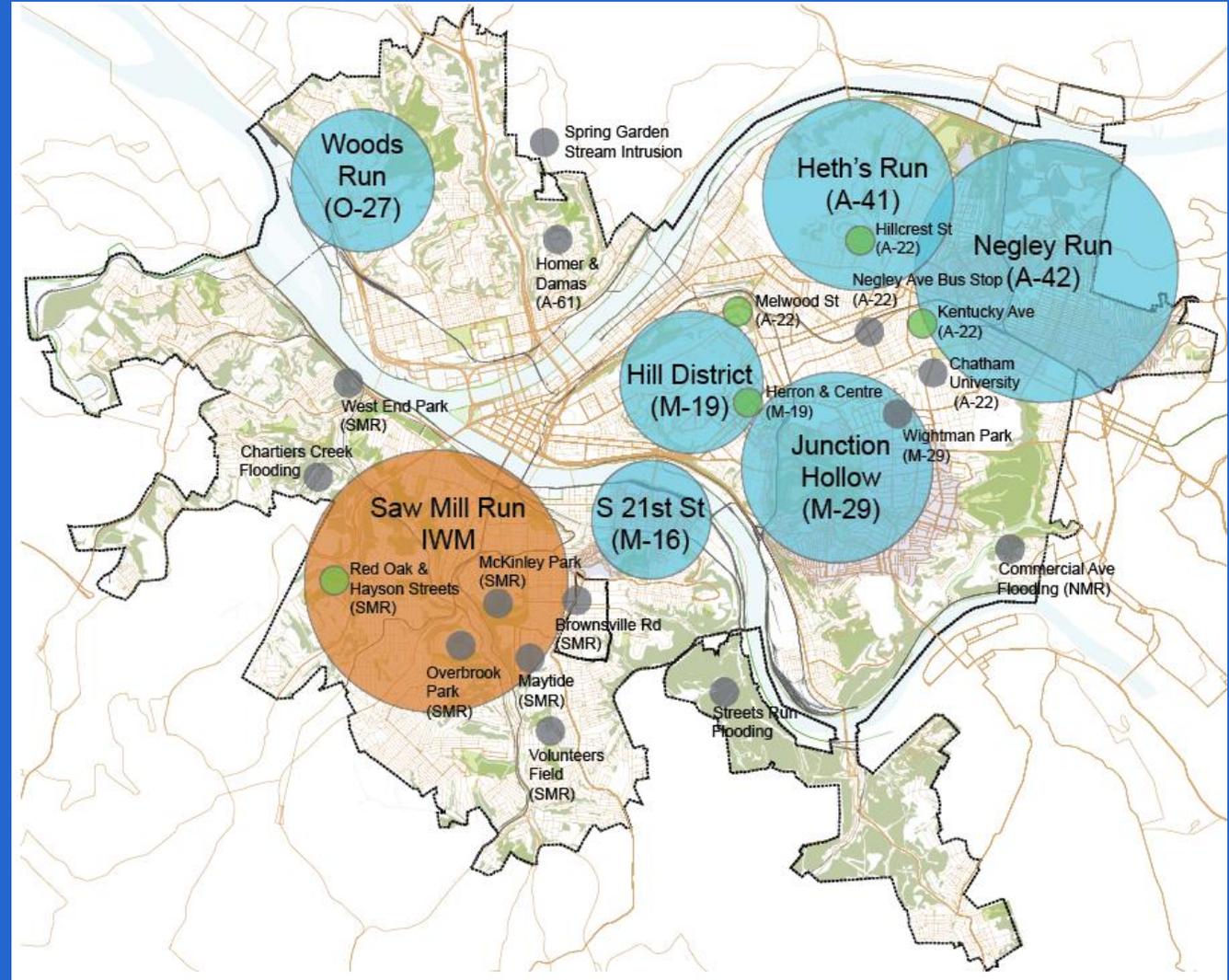
PERFORMANCE: stimulates economic growth



PROJECT ACTION AREAS:

- ❑ A42: Negley Run/Washington Blvd
- ❑ M29: Four Mile Run/Junction Hollow
- ❑ A22: East End/Shadyside
- ❑ Saw Mill Run
- ❑ M42: Streets Run

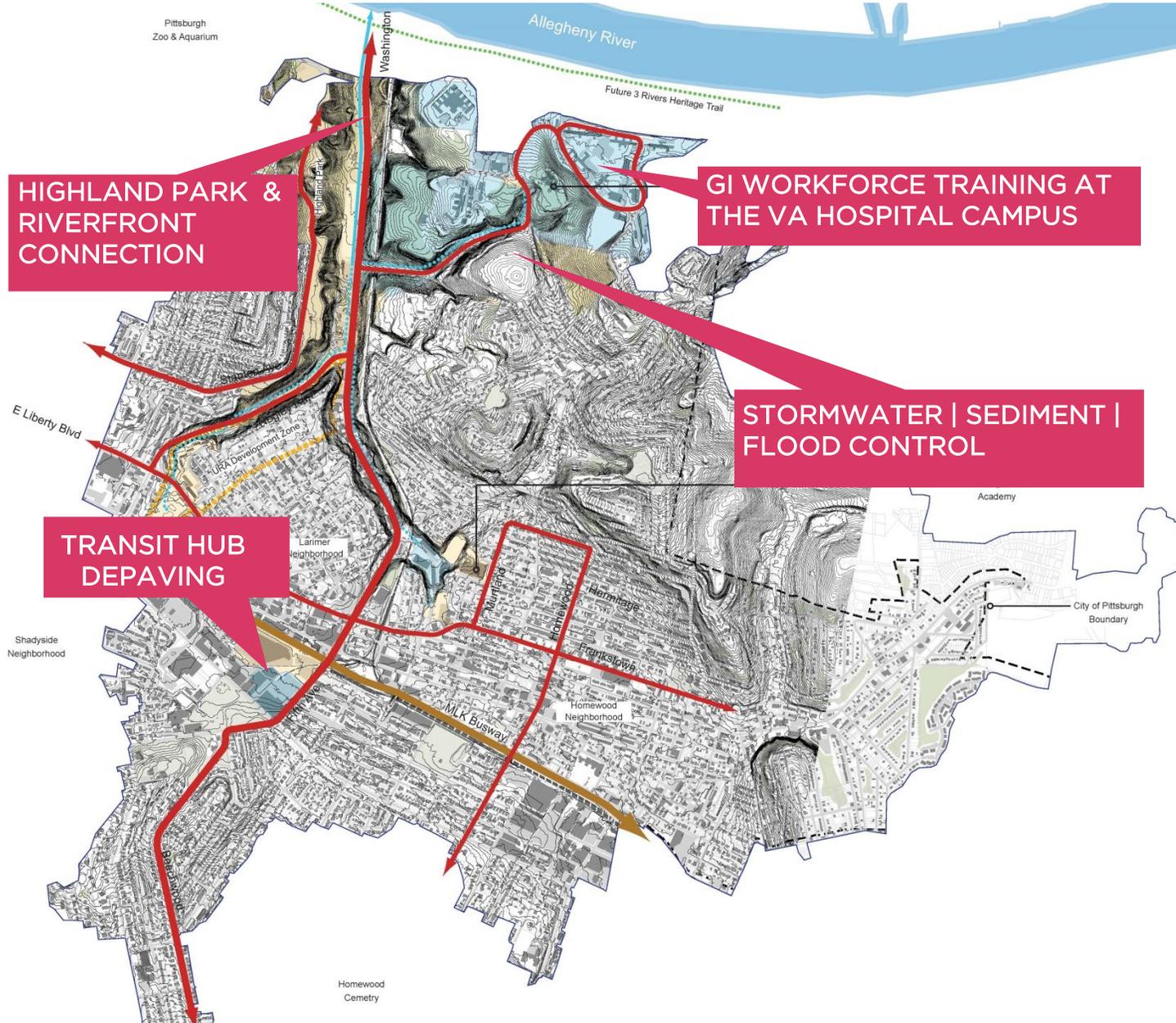
Comprehensive watershed scale solutions with a single investment



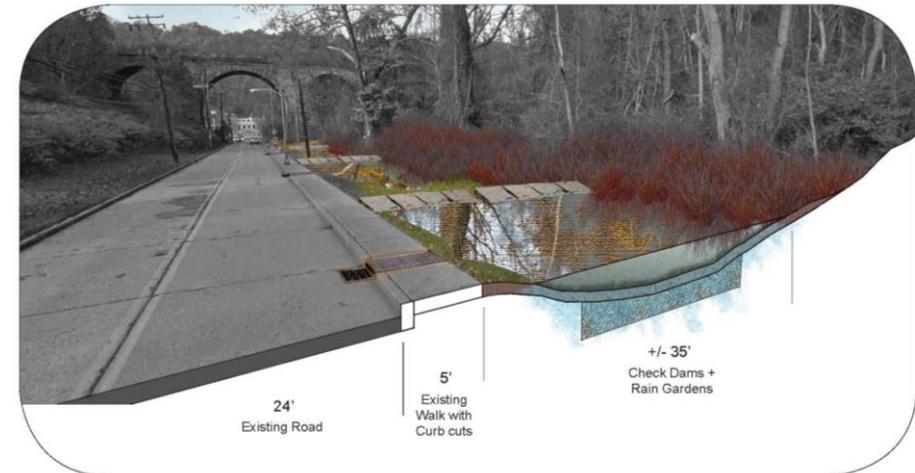
A42: WASHINGTON BLVD | NEGLEY RUN



A42: WASHINGTON BLVD | NEGLEY RUN



Leech Farm Road - Before



Leech Farm Road - After

A42: WASHINGTON BLVD | NEGLEY RUN

Little Negley Run

is a daylighting project that disconnects new development via an open air sewer separation project.

Community vetted project as part of the Choice Neighborhood Planning grant.

Secured **\$1.2 Million** in design funds in a partnership with Army Corps.



M29: FOUR MILE RUN | JUNCTION HOLLOW



SCHENLEY DRIVE

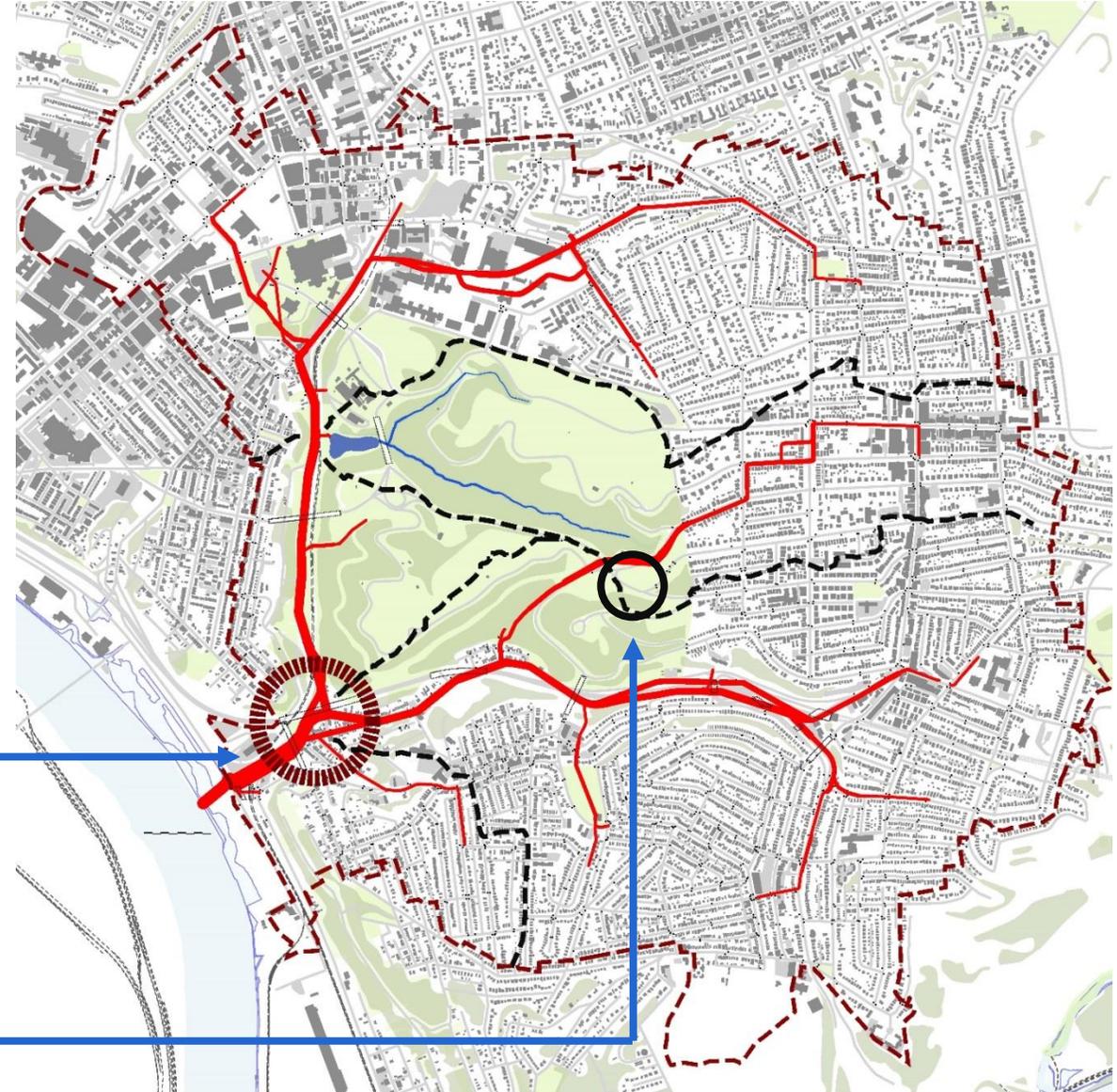
PANTHER HOLLOW LAKE

JUNCTION HOLLOW STREAM DAYLIGHTING

ALMONO SITE

-  PERVIOUS PAVEMENTS
-  BIOSWALES & RAIN GARDENS
-  RETENTION/DETENTION

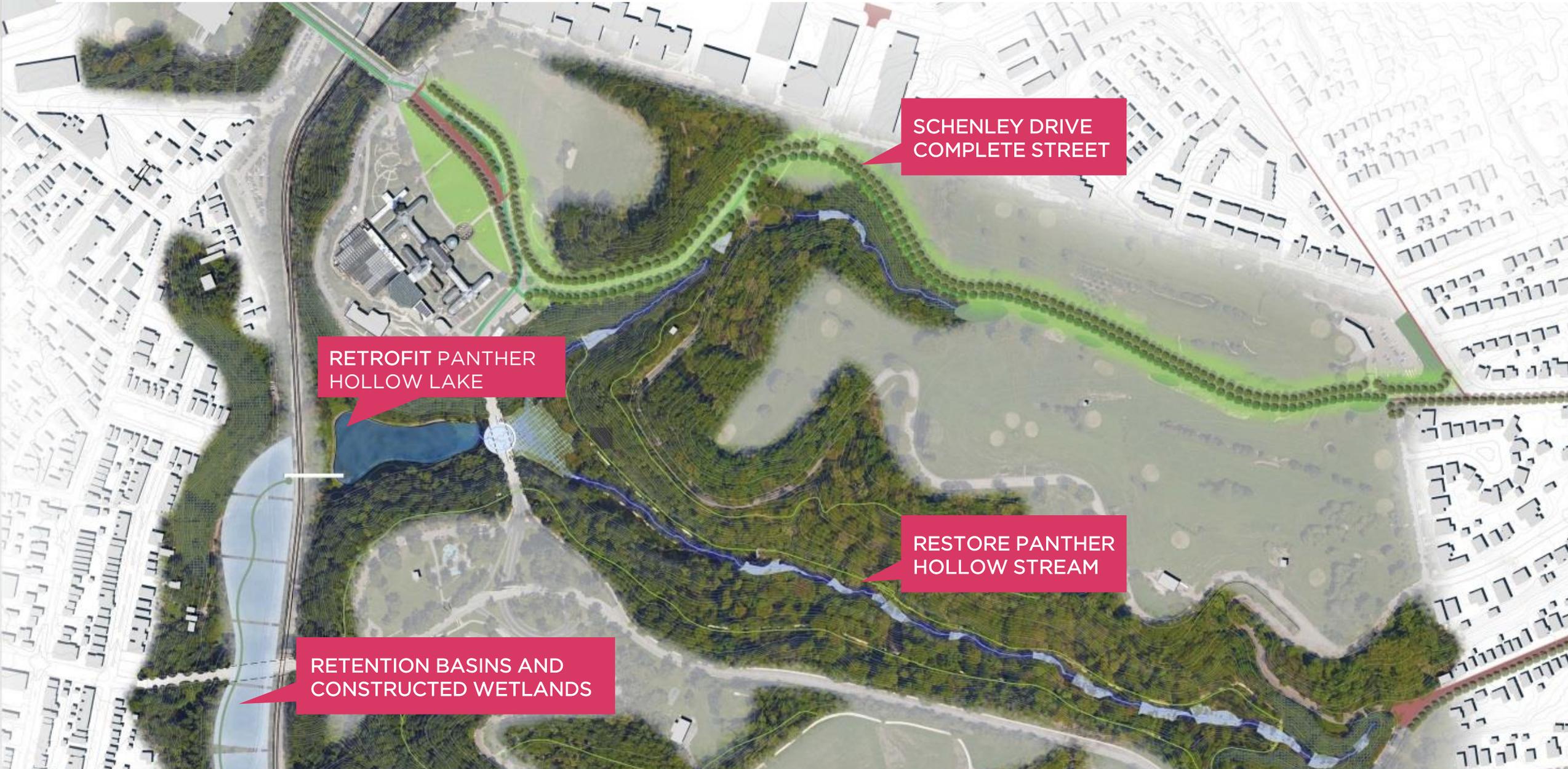
M29: FOUR MILE RUN | JUNCTION HOLLOW



This plan **addresses flooding** at the bottom of the 4 Mile Run watershed that impacts nearby residents and businesses.

Stormwater runoff from the **Squirrel Hill Neighborhood** is reestablished in the historic Panther Hollow stream channel.

M29: FOUR MILE RUN | JUNCTION HOLLOW



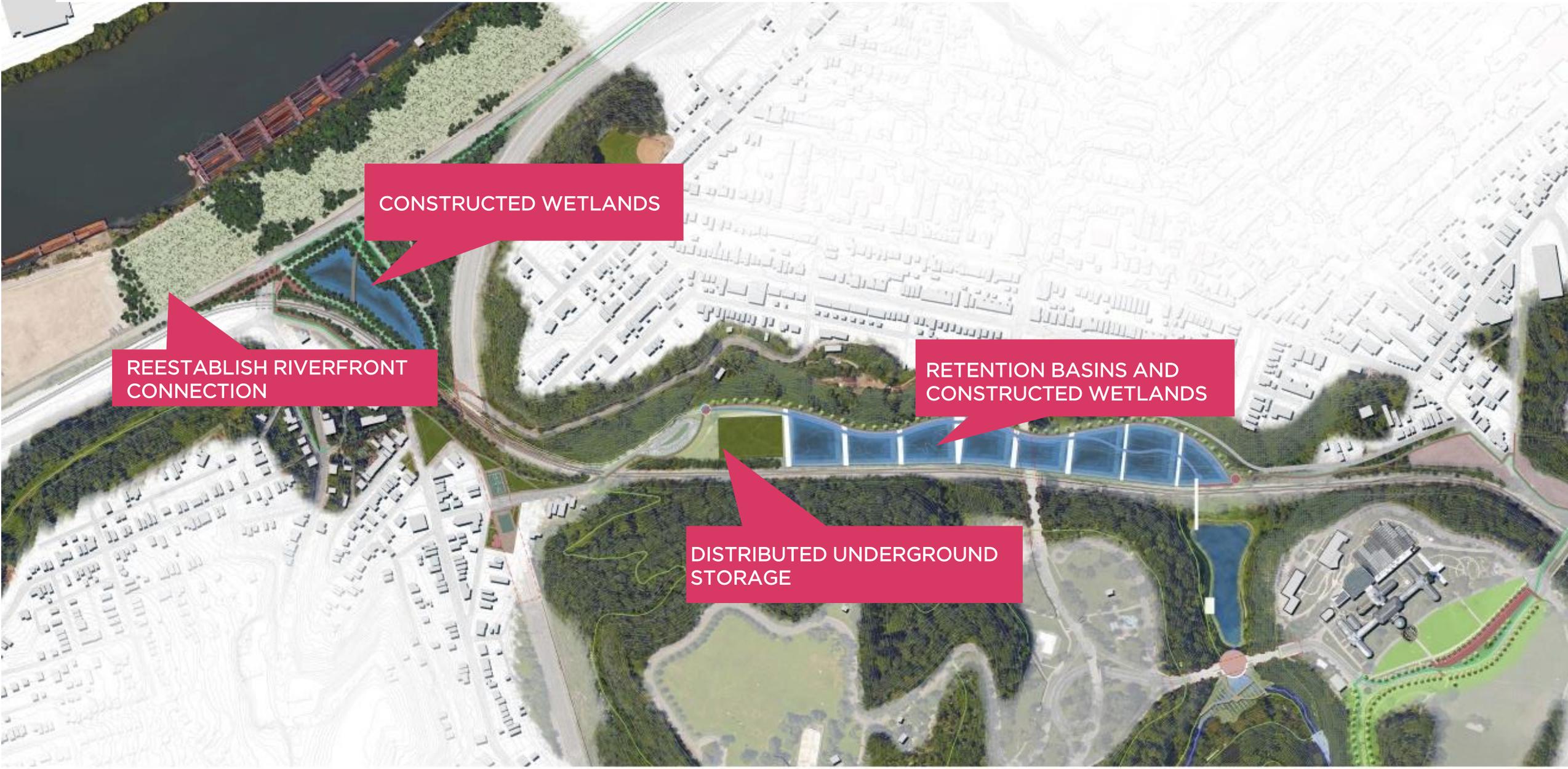
RETROFIT PANTHER HOLLOW LAKE

RETENTION BASINS AND CONSTRUCTED WETLANDS

SCHENLEY DRIVE COMPLETE STREET

RESTORE PANTHER HOLLOW STREAM

M29: FOUR MILE RUN | JUNCTION HOLLOW



CONSTRUCTED WETLANDS

REESTABLISH RIVERFRONT CONNECTION

RETENTION BASINS AND CONSTRUCTED WETLANDS

DISTRIBUTED UNDERGROUND STORAGE

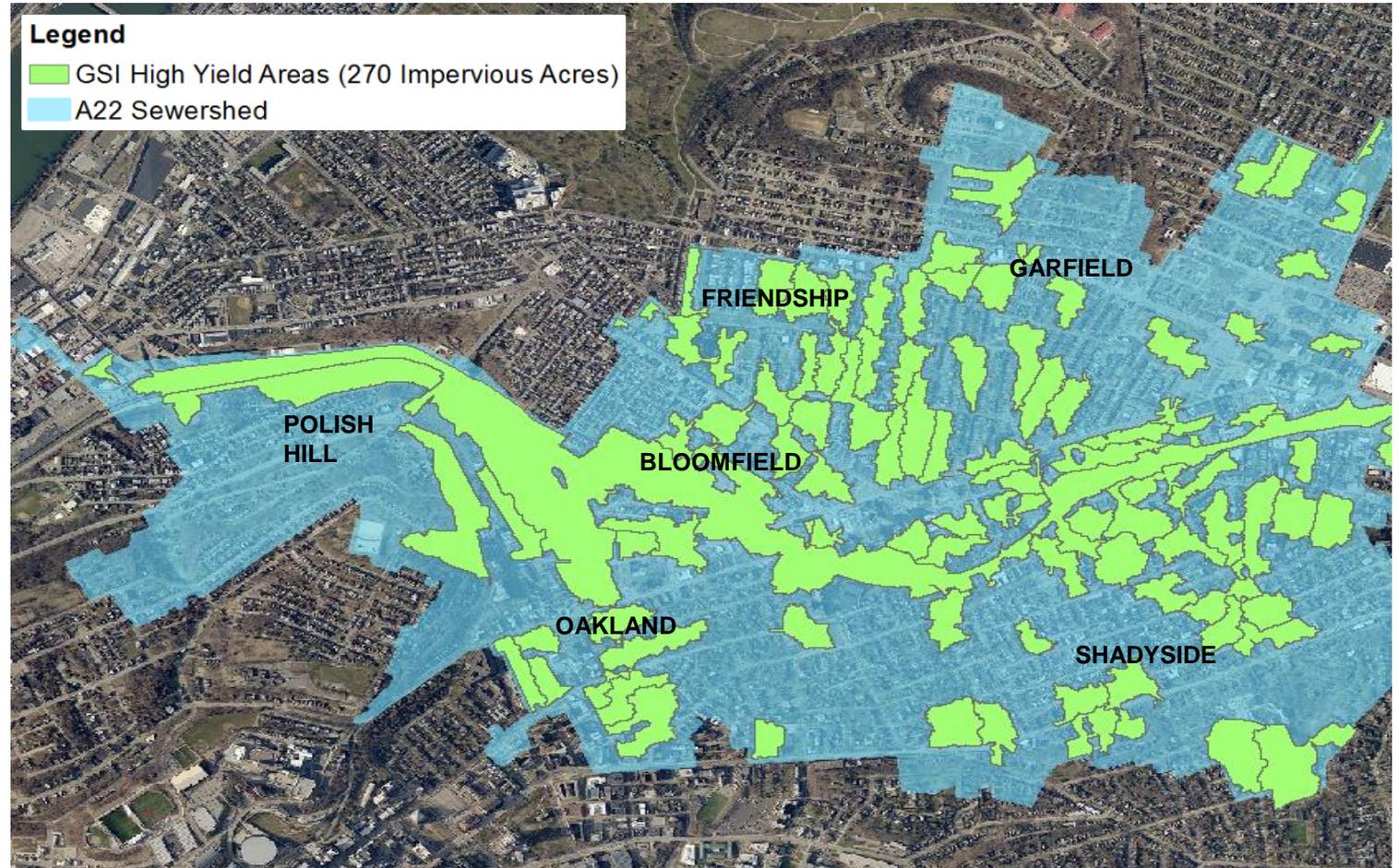
A22 SEWERSHED | EAST END FLOODING



**August 31, 2014 Rain Event:
1.05" in 15 Minutes**

ISSUES:

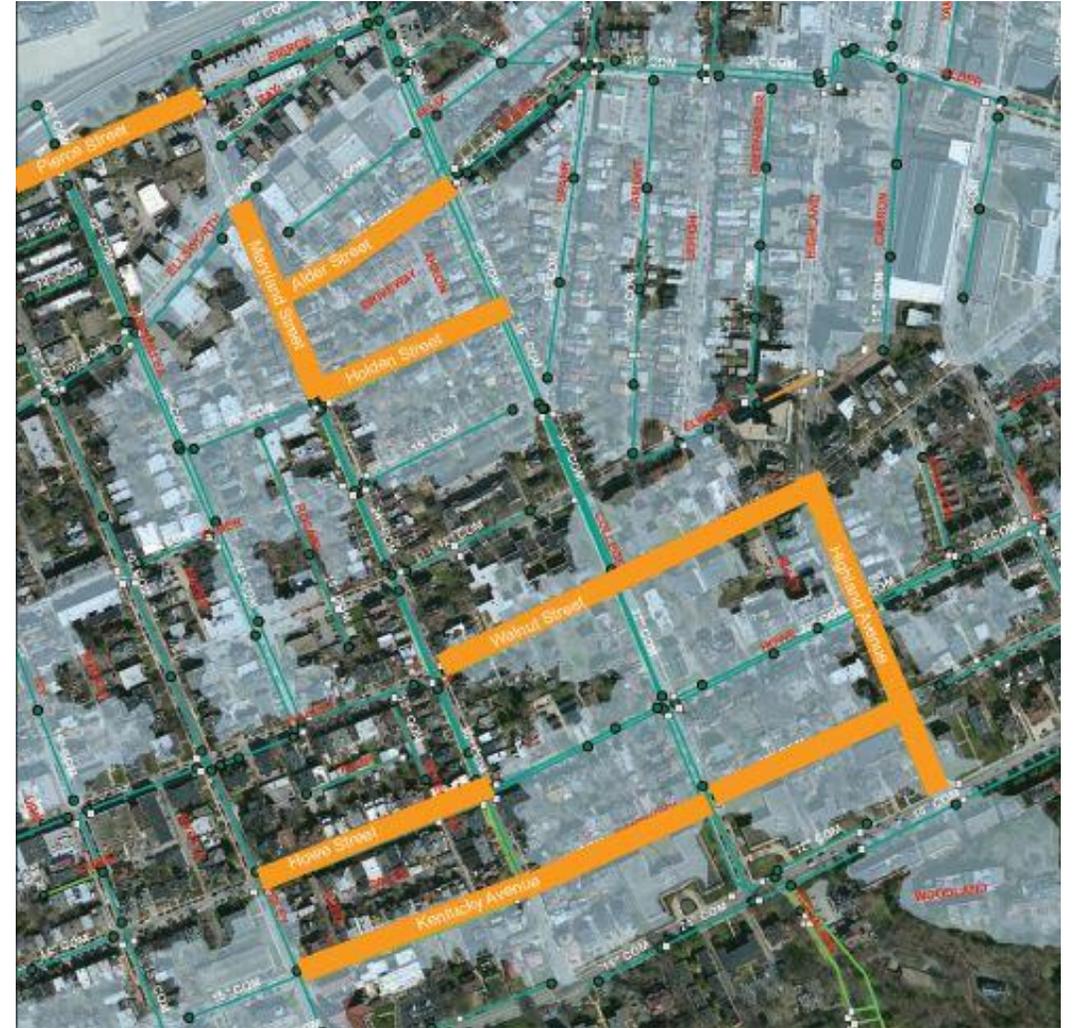
Surface Flooding, Only 11 Basement Sewage Flooding (Backups) Officially Reported
2015 Homeowner Survey Revealed Actual Chronic 136 Basement Backups



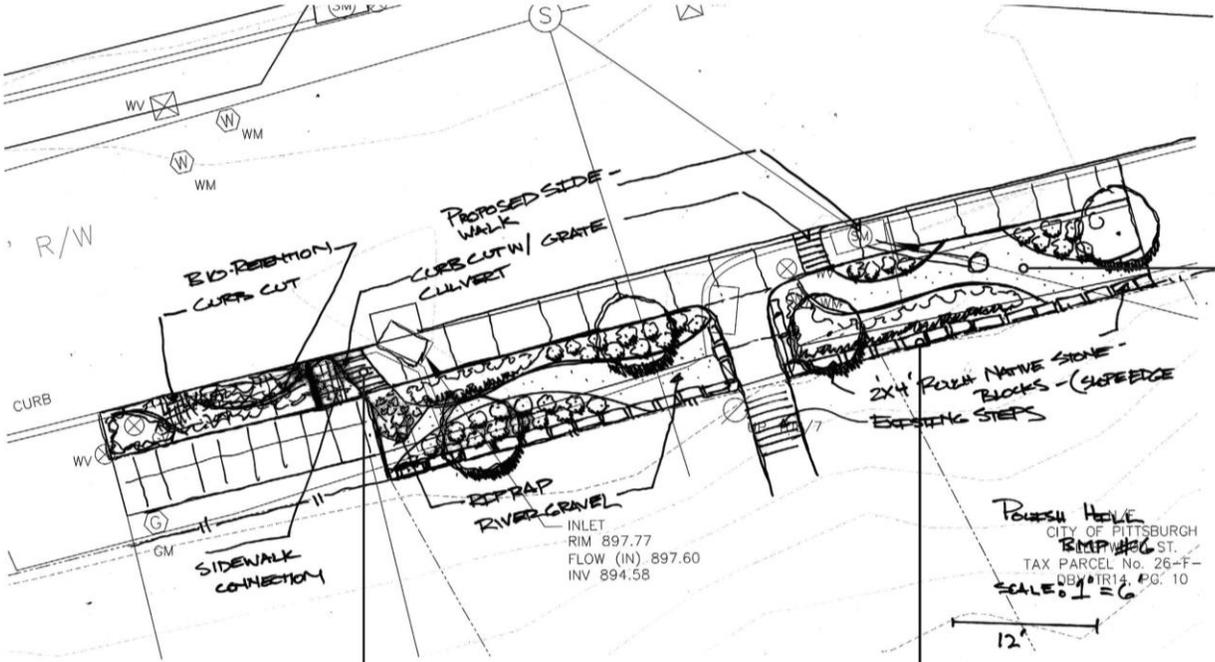
A22 SEWERSHED: SHADYSIDE PROJECT



PLANTS FILTER AND TRANSPIRE WATER WHILE ENHANCING THE STREETScape



A22 SEWERSHED: MELWOOD PROJECT



GRAVEL BED OF BIORETENTION



SIDEWALK GRATE



LIMESTONE BLOCK 1 COURSE HIGH TO TERMINATE SLOPE

A22 SEWERSHED: GARFIELD PROJECT



① flex lawn & berm



② d/g flex space



③ weir



④ bioretention plantings



⑤ curb cut



⑥ gravel bottom retention area

Saw Mill Run Watershed Planning

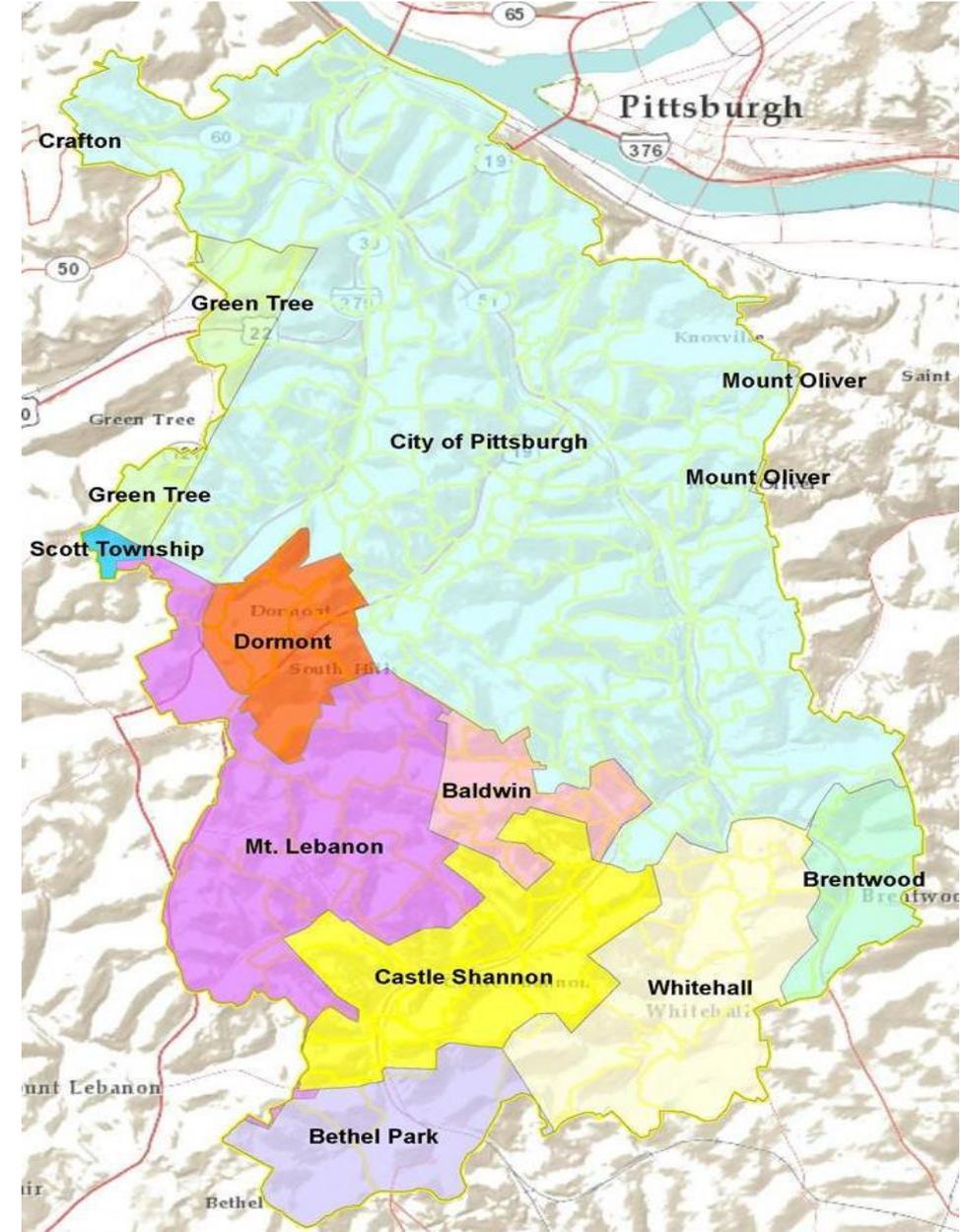
PROCESS

Frequent flooding of Saw Mill Run Watershed has contributed to **disinvestment** in the watershed communities.

Integrated Watershed Management is a **water quality**-based approach to meet all of the federally mandated reductions in sewage overflow and stormwater pollution.

Working together with the **11 other municipalities**, DEP, ALCOSAN, and Army Corps of Engineers, PWSA is developing projects with the most water quality and **community benefits**, regardless of municipal borders.

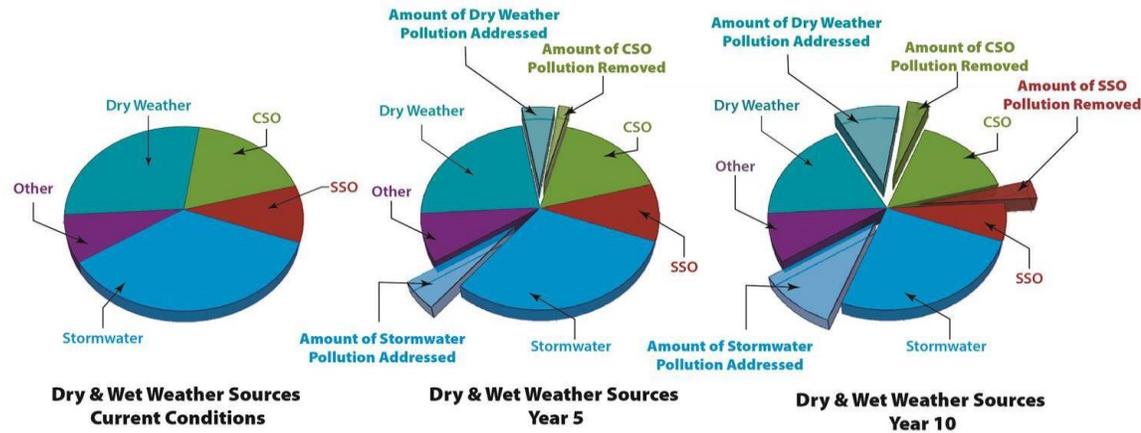
DEP conducted biological sampling and found very few fish and macroinvertebrates, indicating very impaired water quality.



Saw Mill Run Watershed Planning

In ACTION

Watershed Pollution Source Distributions



Maximize cost-effective water quality:

- Collecting water quality data from multiple sampling locations in the stream
- Monitoring flow in sewer system and at outfall
- Demonstration projects selected by water quality improvements
- Developing a model (with Army Corps assistance) that we will use to identify additional projects to improve water quality.



STREETS RUN: HAYS AREA FLOODING



STREETS RUN: HAYS AREA FLOODING

Issue:

Flooding occurs for a 2-year design storm and larger events meaning over 0.718” in 15 minutes.

Solution:

Manage 30% contributing area (pervious or impervious) to eliminate flooding and provide a higher level of service for customers.



Flooding limits from the August 31, 2014 event

We sought the most effective projects and systems that would provide community benefits in each shed.



The Clean & Green plan is **BENEFICIAL**

We know there are many
documented direct economic GI
benefits* ...among them are:

- Minimized Business Disruption from Gray Infrastructure
- Reduced Flood Damage Costs
- Uplift in Property Values
- Increase in Commercial and Residential Occupancy
- Resident Labor Force Participation

*USEPA 2013 - Evaluation of Green Alternatives for Combined Sewer Overflow Mitigation: A Proposed Economic Impact Framework and Illustration of its Application



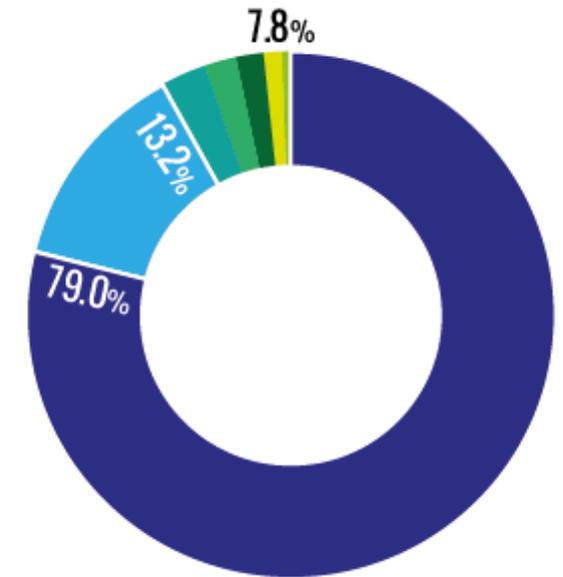
The Clean & Green plan is **BENEFICIAL**



The Clean & Green plan has triple bottom line benefits. We modeled our results with Autocase software to calculate additional values.

TRIPLE BOTTOM LINE BENEFITS 50 YEAR LIFE CYCLE

- Local Flood Mitigation
- Property Value Increase
- Recreational Value Added
- Economic Water Quality
- Air Pollution Reduction
- Heat Island Effect Reduction
- Carbon Reduction



TBL TOTAL BENEFIT
BENEFIT PER RETROFITTED
IMPERVIOUS ACRE

	LOW	HIGH
TBL TOTAL BENEFIT	\$428M	\$850M
BENEFIT PER RETROFITTED IMPERVIOUS ACRE	\$233,000	\$462,000

The PWSA is a Partner Organization in The National Green Infrastructure Certification Program



Advances the establishment of Sustainable Communities by:

- ❑ Supporting development of proficient green workforces & establishing a career path for skilled GI workers.
- ❑ Developing Standards for GI Construction, Maintenance, and Inspection
- ❑ Supports long-term performance of GI facilities. Covers full life-cycle of GI.
- ❑ Sets national certification standards for GI construction, inspection, and maintenance workers
- ❑ Designed to meet international best-practice standards



THE SOLUTION TODAY:

**We have a STORMWATER
MANAGEMENT Plan to
address:**

- Poor Water Quality
- CSOs/SSOs
- Illicit Discharges – sewage in storm sewers
- Surface Flooding
- Basement Sewage Flooding
- Sewers that are 80 – > 100 years old
- Consent Decree and MS4 Requirements

**This is a COMPREHENSIVE
approach to address the root
of the problem and not just
one of the symptoms.**

