Green First City-Wide Stormwater Assessment

September 26, 2016
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
Excessive Stormwater Overloading Our Already Stressed Sewer System

Issue 1: CSOs and SSOs
Issue 2: Localized Flooding
Issue 3: Water Quality

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.
The Clean & Green plan presents solutions that are:

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

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

**ENGINEERED**
Strategic design for system integration & optimization to increase resiliency

**BENEFICIAL**
Maximize triple bottom line – environmental, economic and social benefits

**REPLICABLE**
Methodology and protocol for implementation across all watersheds
The Clean & Green plan:
ADAPTIVE PROCESS

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

PLAN AND DESIGN
- private-public partnerships
- urban planning
- market studies
- coordinate with developers
- policy & code changes

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

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

13,700 acres total area
PRIORITY SEWERSHEDS

3,636 acres IMPERVIOUS

1,835 acres IMPERVIOUS
managed with GREEN INFRASTRUCTURE

183 acres
GI FOOTPRINT
ESTIMATED 10:1 Loading Ratio
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
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
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

- SCHENLEY DRIVE COMPLETE STREET
- RETROFIT PANTHER HOLLOW LAKE
- RETENTION BASINS AND CONSTRUCTED WETLANDS
- RESTORE PANTHER HOLLOW STREAM
M29: FOUR MILE RUN | JUNCTION HOLLOW

- Constructed Wetlands
- Retention Basins and Constructed Wetlands
- Reestablish Riverfront Connection
- Distributed Underground Storage
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
A22 SEWERSHED: MELWOOD PROJECT
A22 SEWERSHED: GARFIELD PROJECT
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.
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 has triple bottom line benefits. We modeled our results with Autocase software to calculate additional values.
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
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This is a COMPREHENSIVE approach to address the root of the problem and not just one of the symptoms.