AKRF

Achieving Multi-Objective Community Co-Benefits with MS4 Projects

Presentation to SPC Water Resource Center and Member Communities

Thursday July 30, 2020

PRESENTATION OVERVIEW

- Why Multi-Objective Planning?
- MS4 Pollutant Crediting
- Project Case Studies
- Q&A

MS4 Projects
Improve Water Quality of Impaired Streams

Ecological Co-Benefits

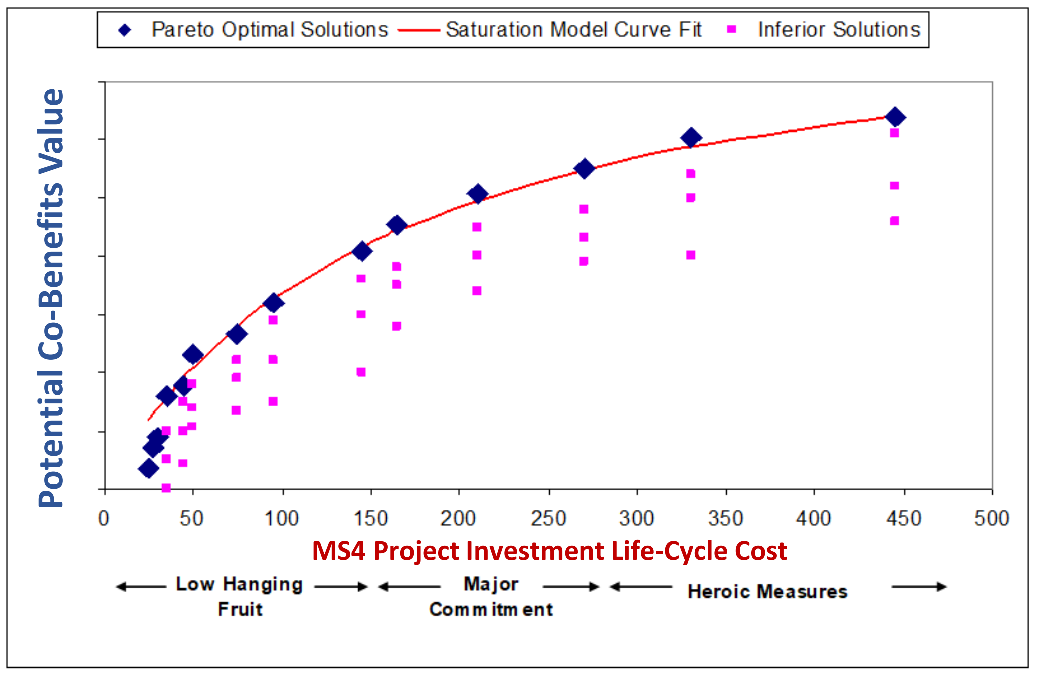
- ❑ Increased vegetation
- ❑ Improve habitat
- ❑ Increased biodiversity
- ❑ Floodplain restoration
- ❑ Restore pre-development hydrology
  - Groundwater recharge
  - Reduced stream temperature
  - Reduced stream power
  - Reduced flooding

Community Co-Benefits

- ❑ Reduced burden on existing infrastructure and flood reduction
- ❑ Increased health and social well being
- ❑ Recreational opportunity
- ❑ Community gathering spaces
- ❑ Safer pedestrian corridors
- ❑ Neighborhood and park space beautification
- ❑ Improved air quality
- ❑ Reduced heat island

Multi-Objective Planning and Co-Benefits

- For every level of MS4 project investment that are lots of potential co-benefit outcomes.
- Key is finding the projects that maximize the benefits and fit within the context of the project and community.
- Requires planning for projects through a multi-objective lens.



Water Environment Federation National MS4 Needs Survey

National MS4 Challenges

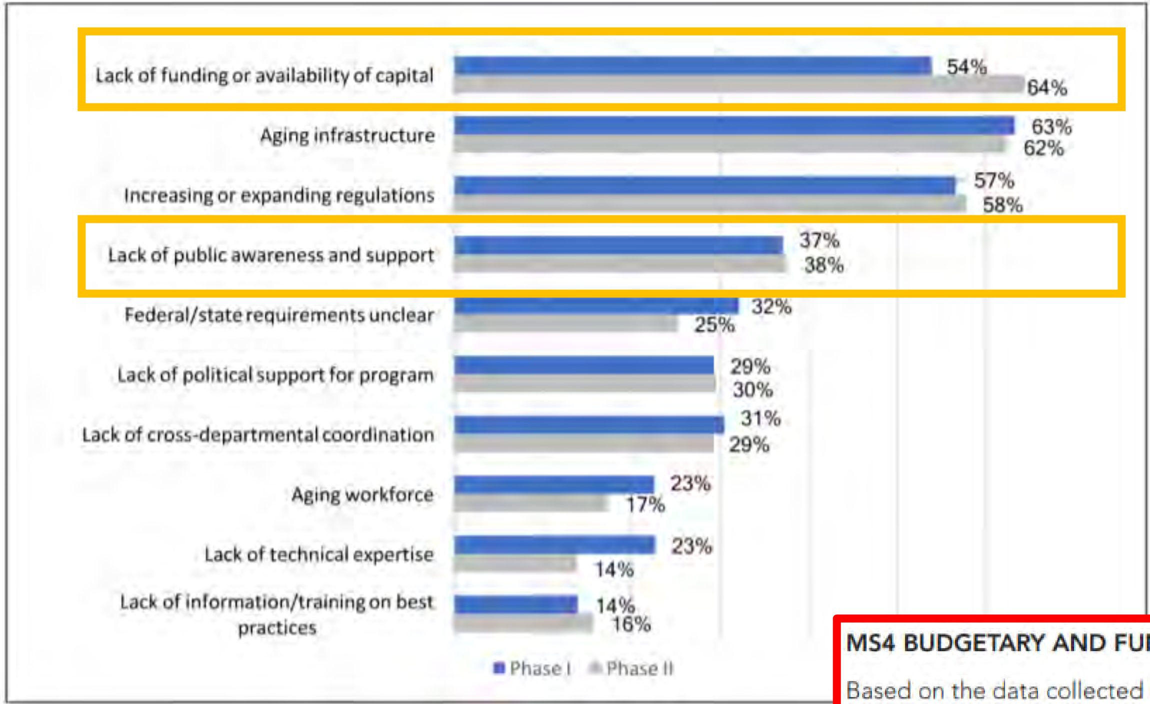


Figure 3 - Phase I and Phase II Program Challenges

MS4 challenges are multi-faceted and often extend beyond just meeting federal and state water quality regulations.

Funding and public support go hand in hand.

Including focus on co-benefits can help bridge that divide.

MS4 BUDGETARY AND FUNDING NEEDS

Based on the data collected in this survey, the annual funding gap in the MS4 sector has been estimated to be $7.5 billion.

Water Environment Federation National MS4 Needs Survey

National MS4 Needs

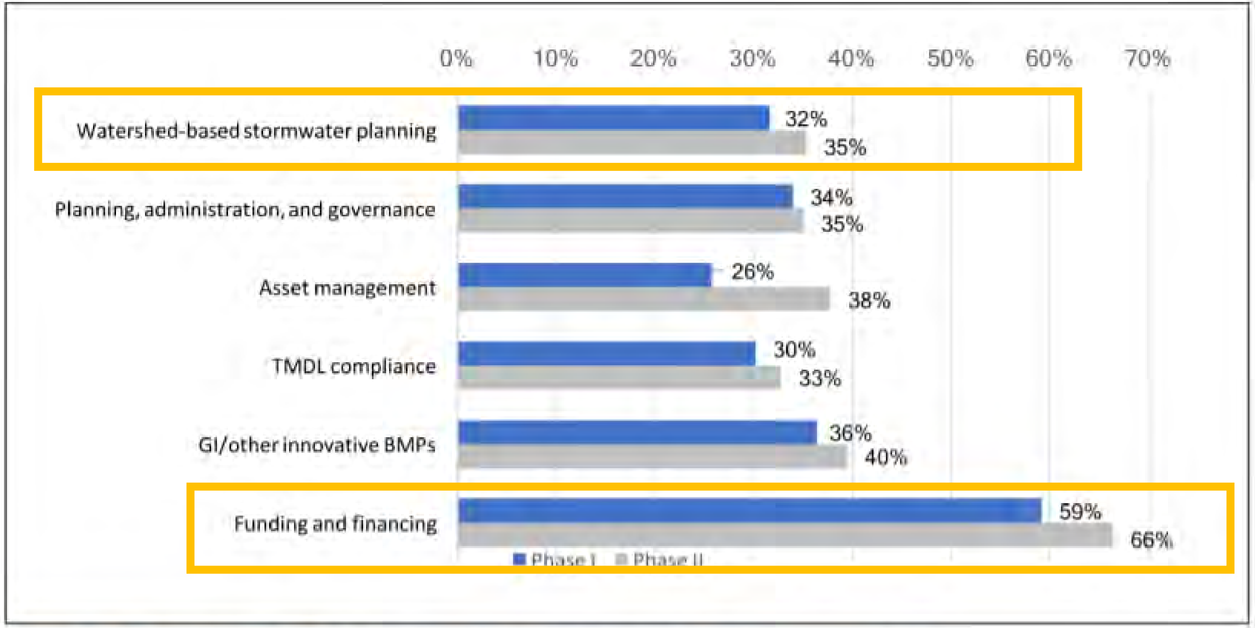


Figure 4 - Phase I and Phase II Permittee Areas of Information and Resources Needs

"EPA reports that only about 1,600 out of more than 7,500 U.S. Municipal Separate Storm Sewer System (MS4) permittees have a dedicated stormwater funding source in place, such as a stormwater tax or stormwater utility fee."

America’s Water Infrastructure Act of 2018

One Hundred Fifteenth Congress
of the
United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Wednesday, the third day of January, two thousand and eighteen

An Act

To provide for improvements to the rivers and harbors of the United States, to provide for the conservation and development of water and related resources, to provide for water pollution control activities, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

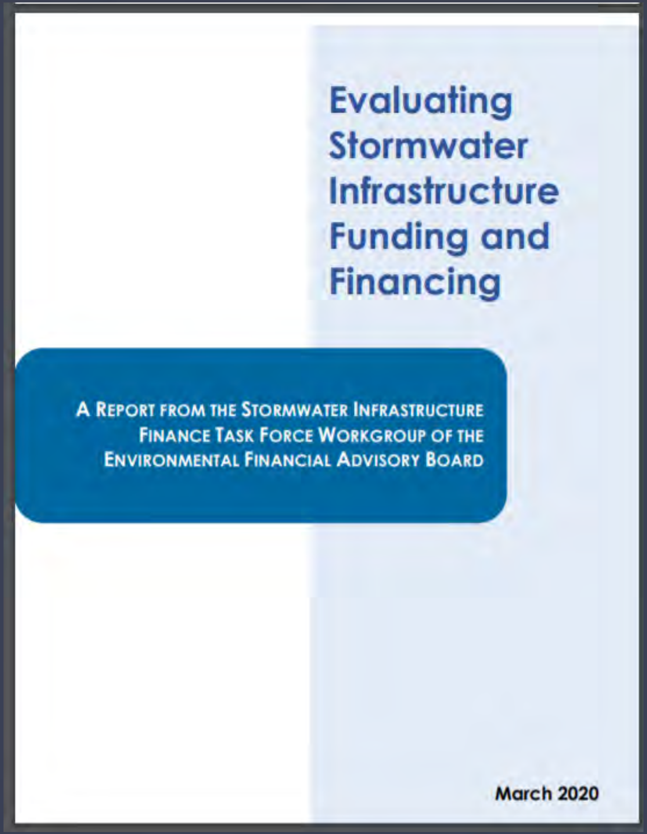
(a) SHORT TITLE.—This Act may be cited as “America’s Water Infrastructure Act of 2018”.

(b) TABLE OF CONTENTS.—The table of contents for this Act is as follows:

SEC. 4101. STORMWATER INFRASTRUCTURE FUNDING TASK FORCE.

- Establish a stormwater task force under EPA guidance within 180 days of passage.
- Develop roadmap for “recommendations to improve, the availability of public and private sources of funding” for stormwater infrastructure
- Issue report no later than 18 months.

2020 Stormwater Task Force Report



- Report recommendations:
  - Increase Section 319 grant program to states.
  - Additional funds to CWSRF allocated solely to stormwater.
  - Increased public education and increased awareness of multiple benefits of stormwater investment.

“ The educational goals should demonstrate that stormwater management investment directly benefits the health, safety and economic opportunity for citizens and residents through the overall improvement of water quality and resiliency of communities. ”

2020 Stormwater Task Force Report

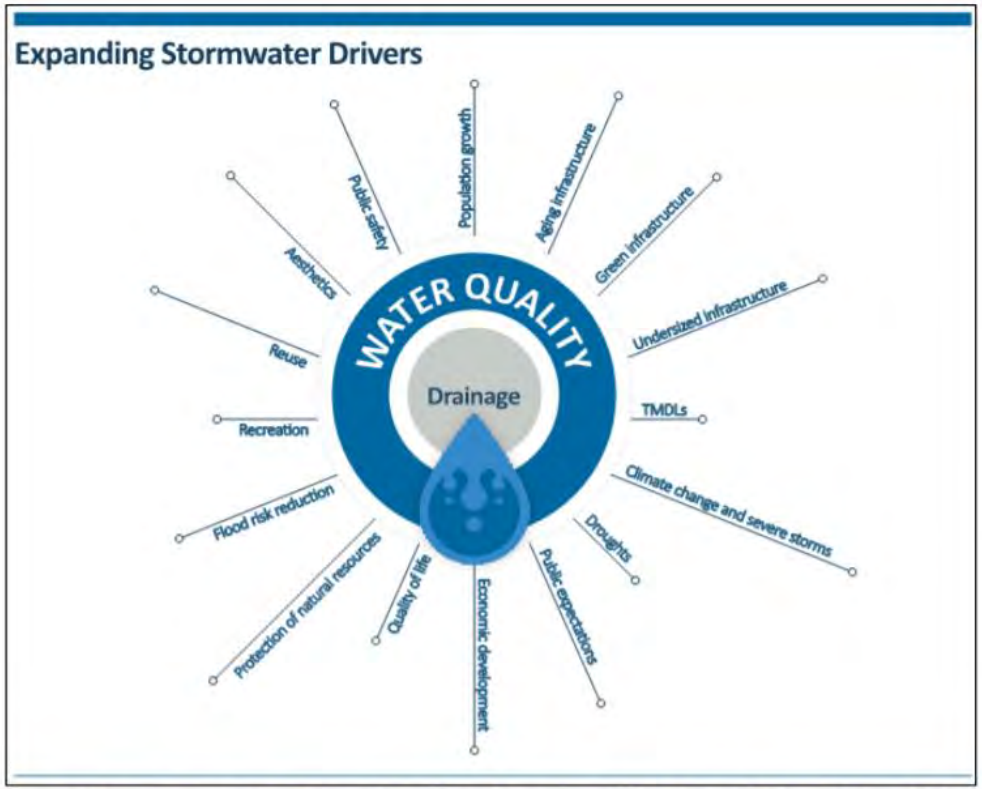


Figure 1. *Graphic representing the growing number of environmental and societal factors that are shifting the*

Stormwater management is undergoing a significant paradigm shift. Local programs often have multiple responsibilities including:

- Water quality & quantity
- Floodplain Management
- Resilience planning & response
- Regulation of development
- Multi-objective planning
- Ecosystem health
- Increasing community expectations for environmental quality

Why Multi-Objective Framework?

- Living in the COVID-19 era of financial uncertainty and budgets.
- Demonstrate the value of stormwater investment to public rate payers.
  - Single lens of pollutant loading likely lower on public concern.
  - Multi-benefits like reducing flooding, increasing public safety, and infrastructure upgrades more likely for acceptance.
- Alternative funding mechanisms such as grants and loans easier to access when including multiple objectives.
- Full lifecycle cost evaluation critical. Need to quantify benefits beyond just capital cost.

MS4 Pollutant Crediting

MS4 Crediting Overview

- Common Qualifying BMP Types
  - <u>Stream Restoration</u>
  - Buffers
  - Stormwater BMPs/Green Infrastructure
  - Non-structural BMPs (e.g., street sweeping)

AKRF Approach to Site Selection

- Finding cost effective projects
  - Desktop
  - Field Assessments
- Work with community to align with other capital investments and maximize co-benefits
  - Parks improvements
  - Neighborhood streetscapes and paving programs
  - Streambank restoration
  - Floodplain and wetland restoration

AKRF in-situ measurement of bank erodibility

MS4 Crediting Overview – Stream Restoration

- PA DEP Requirements
  - Meet qualifying criteria of "expert panel report"*
  - If using simple method for existing loads – default rate of 44.88 lb/ft sediment credit
  - If using watershed modeling use default rate of 115 lb/ft sediment credit
    - Or use expert panel protocols…
      - P1 – Prevented sediment during stormflow
      - P2 - Instream and riparian nutrient processing
      - P3 – Floodplain reconnection volume
      - P4 – Dry Channel RSCs

* Consensus Recommendations for Improving the Application of the Prevented Sediment Protocol for Urban Stream Restoration Projects Built for Pollutant Removal Credit, Chesapeake Stormwater Network, Revised 2/27/2020

* Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects, Chesapeake Stormwater Network, Revised 9/8/2014

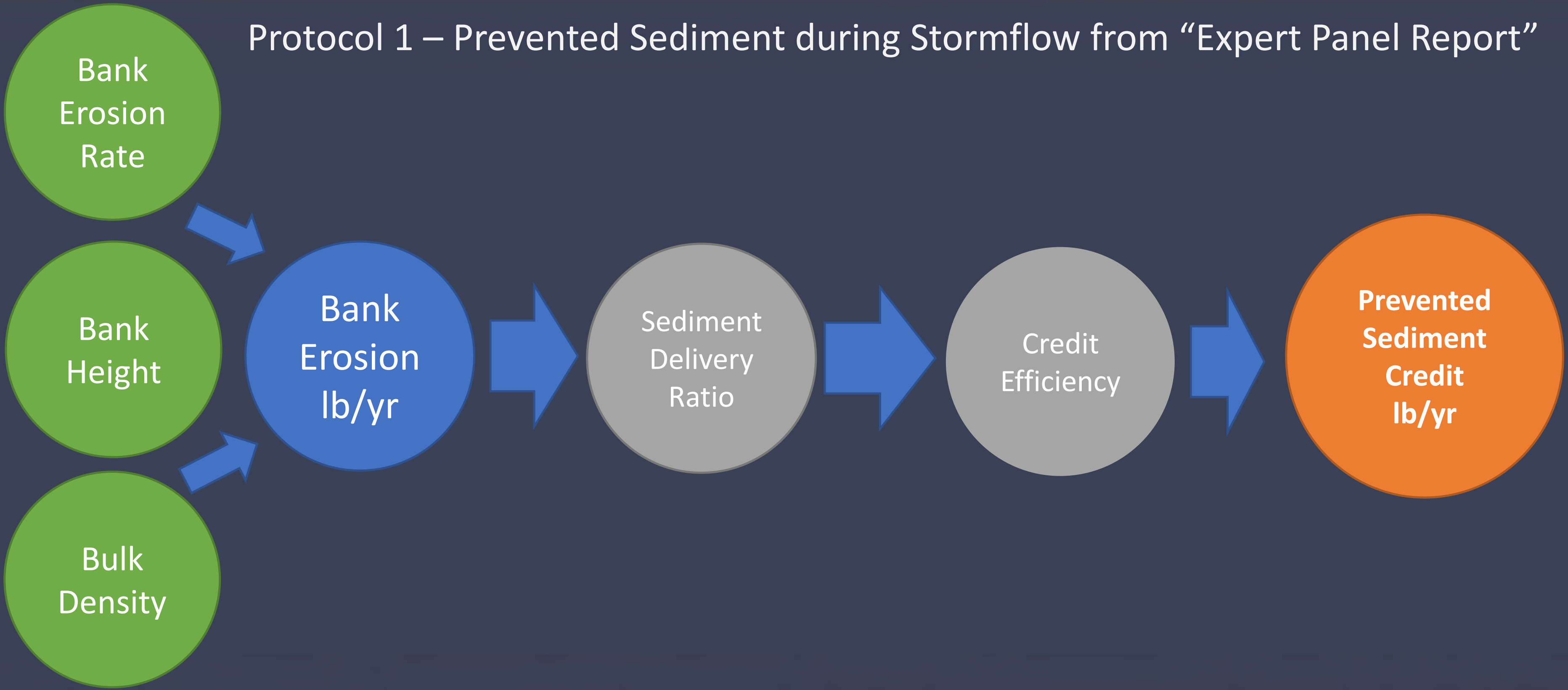
MS4 Crediting Overview – Stream Restoration

- PA DEP Requirements/Suggestions
  - Holistic approach – emphasize floodplain reconnection
  - No credit for armoring
  - 35 ft. min buffer
  - Min 100 feet project length
  - Treat upstream impervious
  - Both sides of channel

PADEP - Considerations of Stream Restoration Projects in Pennsylvania for eligibility as an MS4 Best Management Practice
May 11, 2018

MS4 Crediting Overview – Prevented Sediment Credit

Protocol 1 – Prevented Sediment during Stormflow from “Expert Panel Report”



Case Studies

Multi-Objective Stream Restoration Design for Whitford Country Club, Chester County, PA

- Site Characteristics
  - Headwater stream flowing through golf course
  - Repeated damage to course from erosion and flooding
  - History of “band aid” solutions

Multi-Objective Stream Restoration Design for Whitford Country Club, Chester County, PA

- Goals
  - Reduce nutrient and sediment loading
  - Protect near course assets from flooding and erosion
  - Reduce clogging of irrigation intake
  - Improve aquatic habitat
  - Enhance course aesthetics
  - Manage maintenance facility runoff

Multi-Objective Stream Restoration Design for Whitford Country Club, Chester County, PA

- Approach
  - Stabilize banks
  - Build floodplain storage
  - Create buffers
  - Reroute stream away from course assets
  - Replace irrigation intake
  - Redesign bridges
  - Green infrastructure

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Wises Mill Run, Philadelphia, PA

- Site Characteristics
  - Steep headwater tributary system feeding impaired Wissahickon Creek
  - Park setting surrounding stream
  - Highly impervious drainage area
  - Significant bank erosion

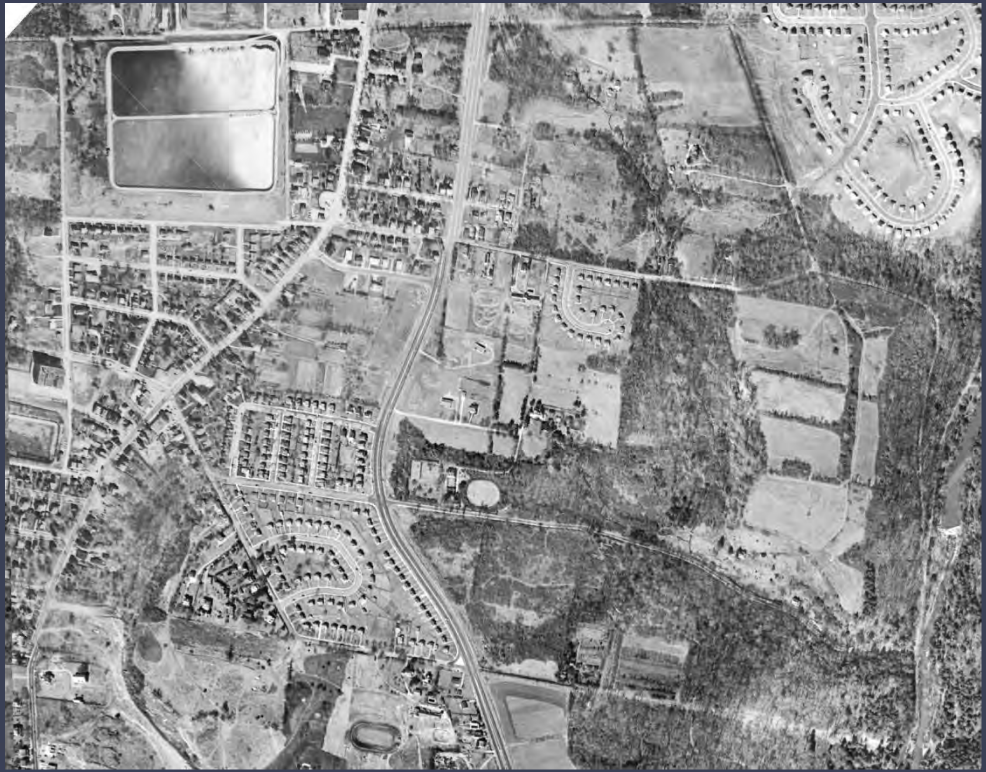
Wises Mill Run, Philadelphia

Wises Mill Run Stream Restoration, Philadelphia, PA

- Goals
  - Reduce streambank sediment and nutrient loads
  - Improve aquatic habitat quality
  - Protect and repair near-stream infrastructure
  - Preserve historic character

Wises Mill Run Stream Restoration, Philadelphia, PA

- Approach
  - <u>Understand geomorphic processes</u>
  - Stabilize strategically
  - Manage upstream stormwater
  - Rebuild and protect infrastructure



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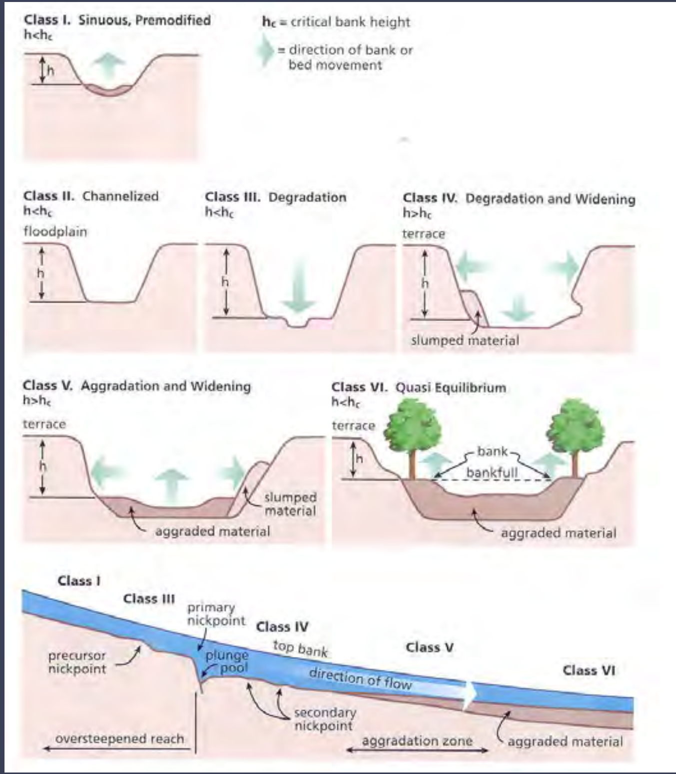
Channel Evolution Model



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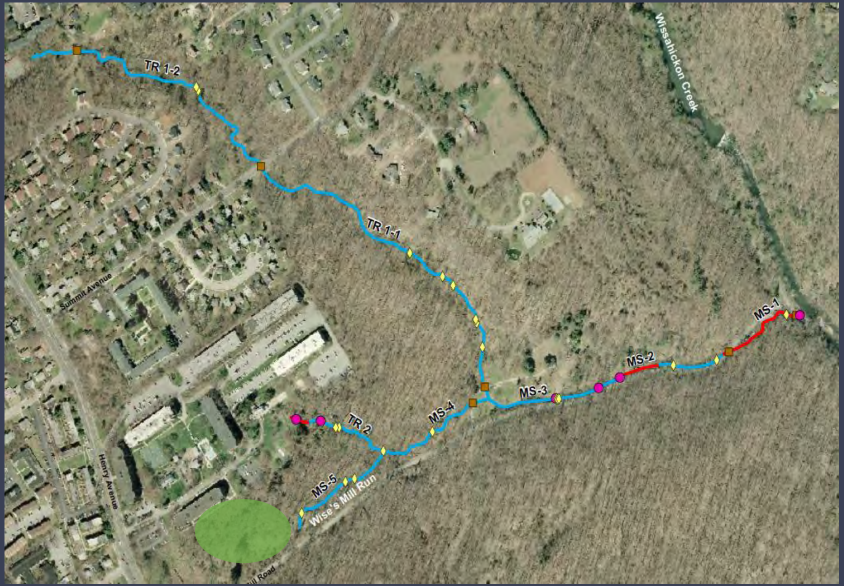
<u>Design Criteria</u>

- **Detention time** - water quality
- **Infiltration volume** - baseflow
- **Excess shear reduction** – channel protection



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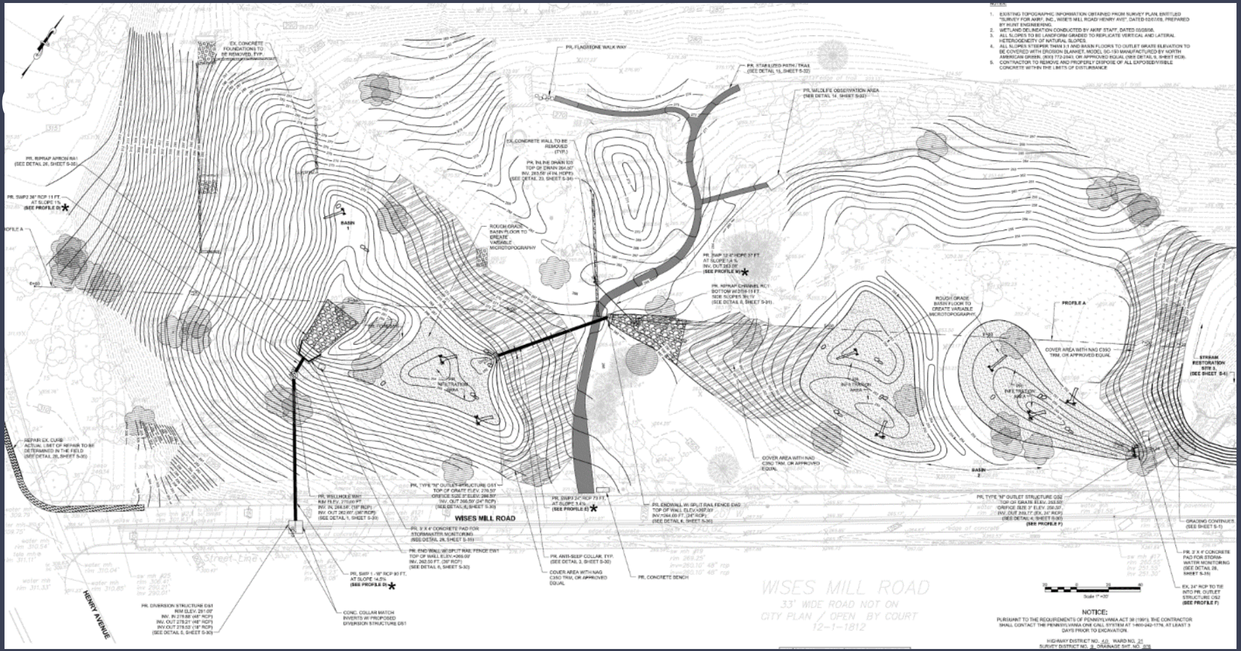

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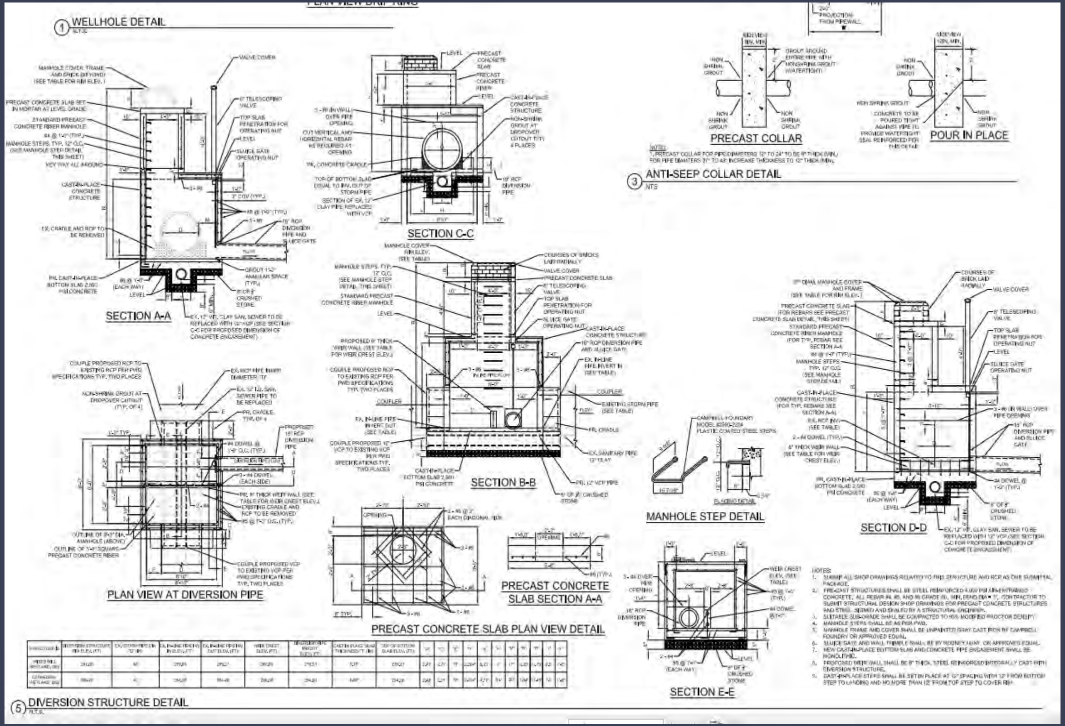

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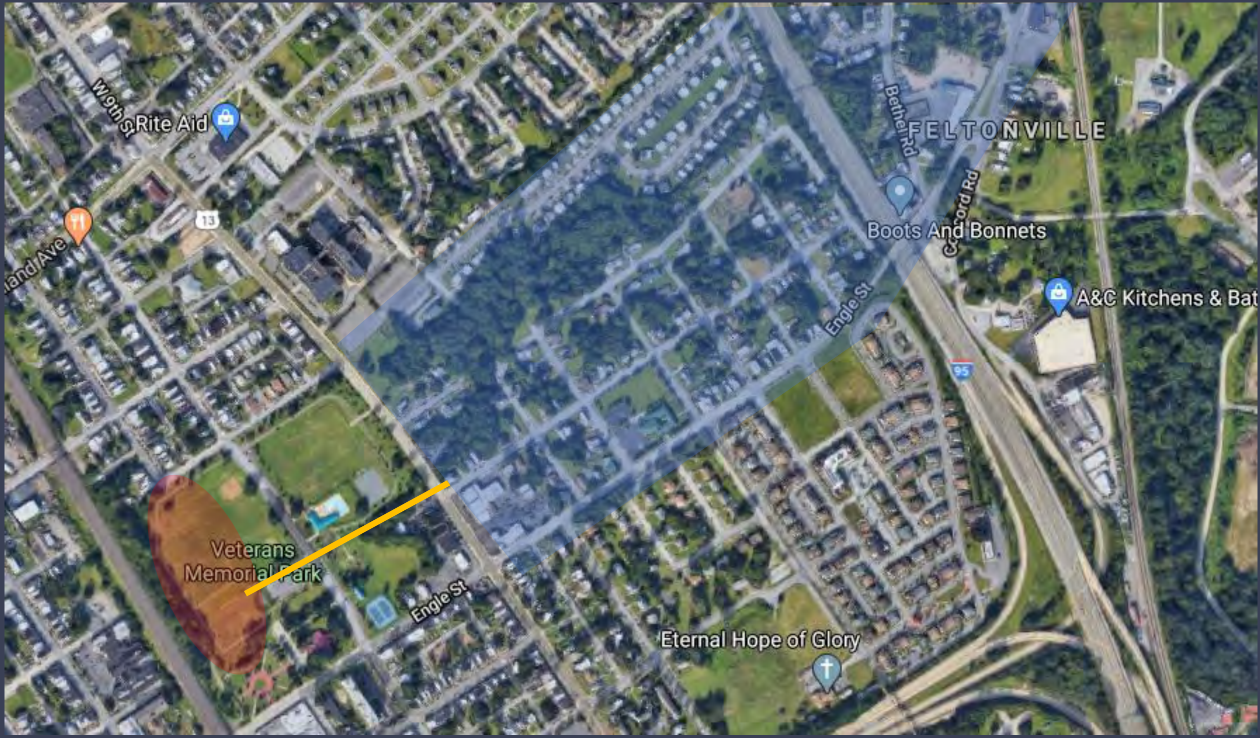
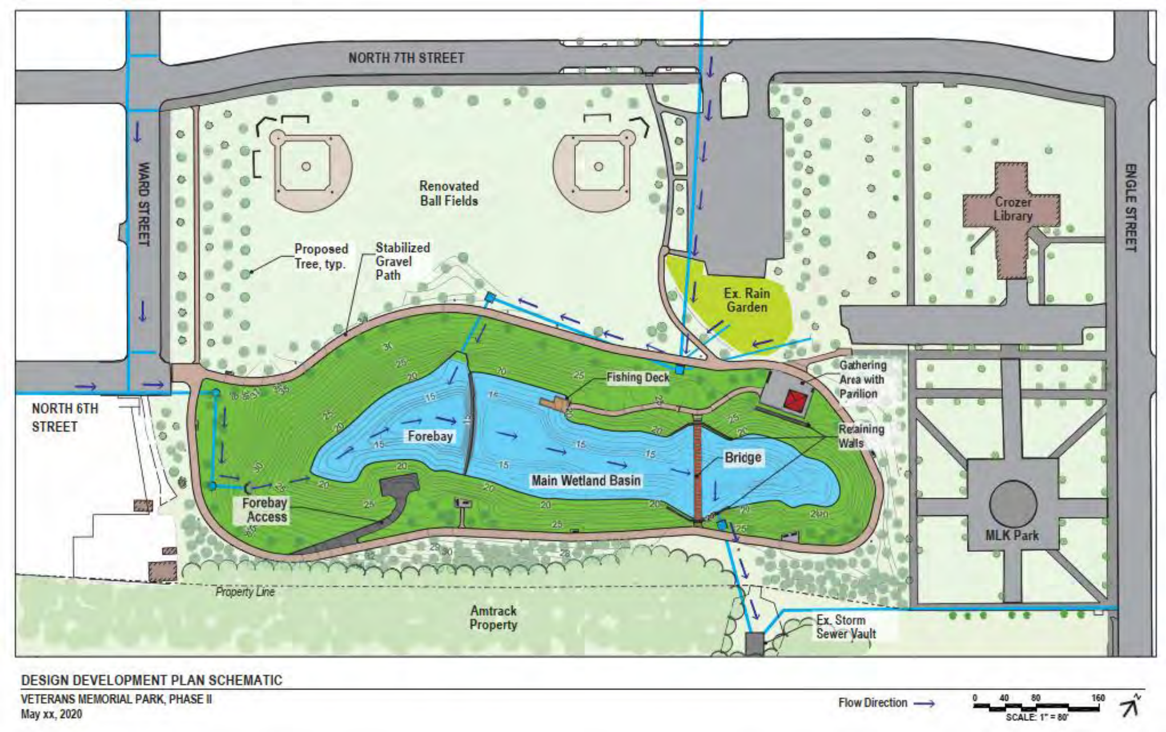
Veteran's Memorial Park, Chester, PA

- Goals
  - Flood mitigation for the park and downstream neighborhoods
  - Create natural and aquatic habitat
  - Provide water quality treatment for upstream runoff
  - Provide nature-based recreation opportunities for the community



Veteran’s Memorial Park, Chester, PA

- Project approach
  - Build flood storage
  - Provide detention for water quality
  - Create wetland, meadow, and open water habitats
  - Provide fishing opportunities



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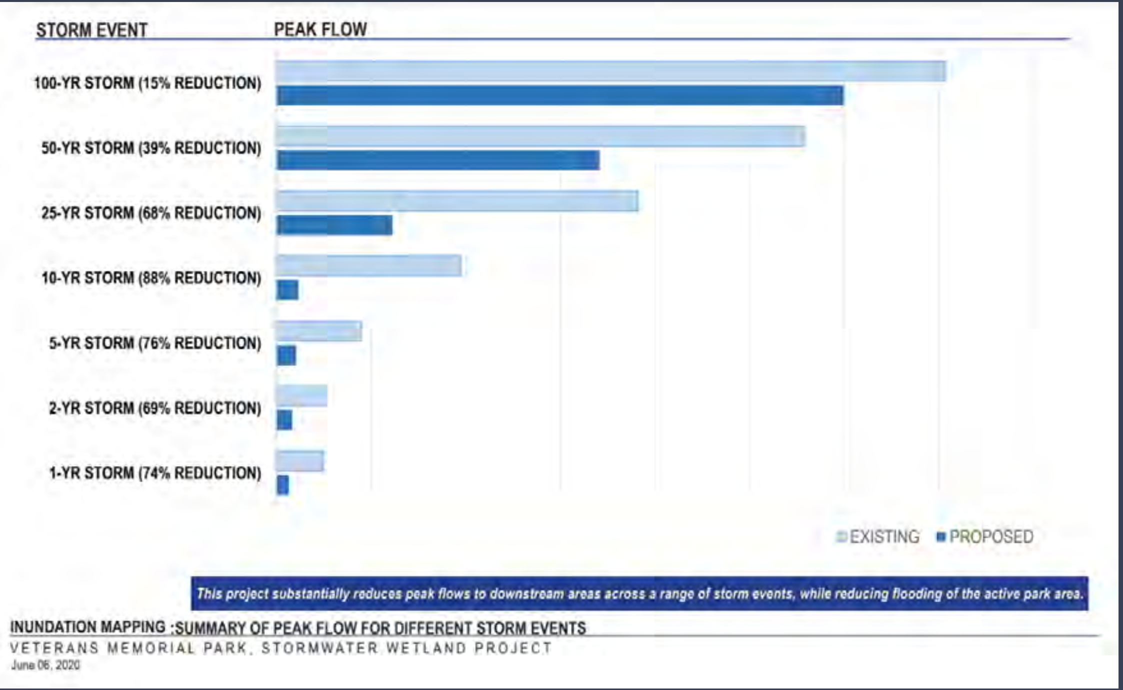
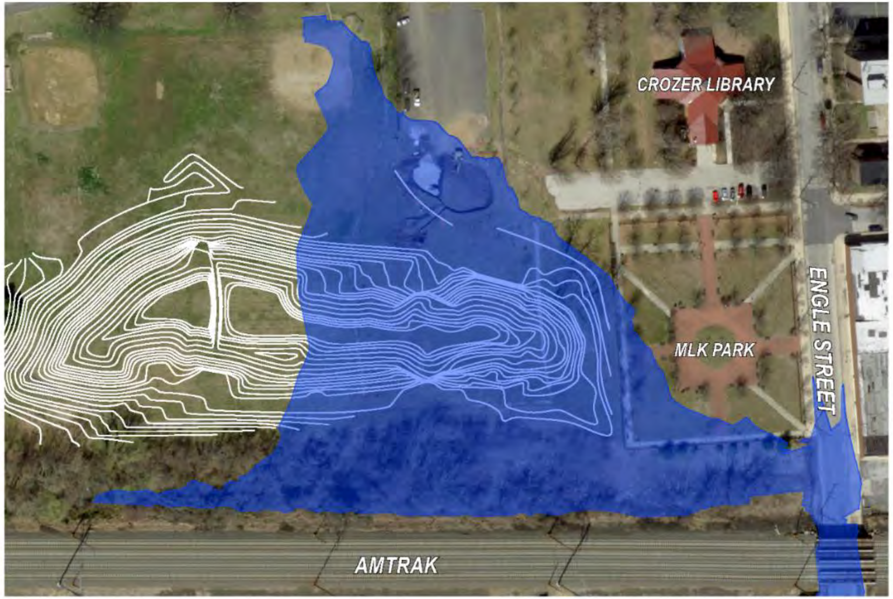
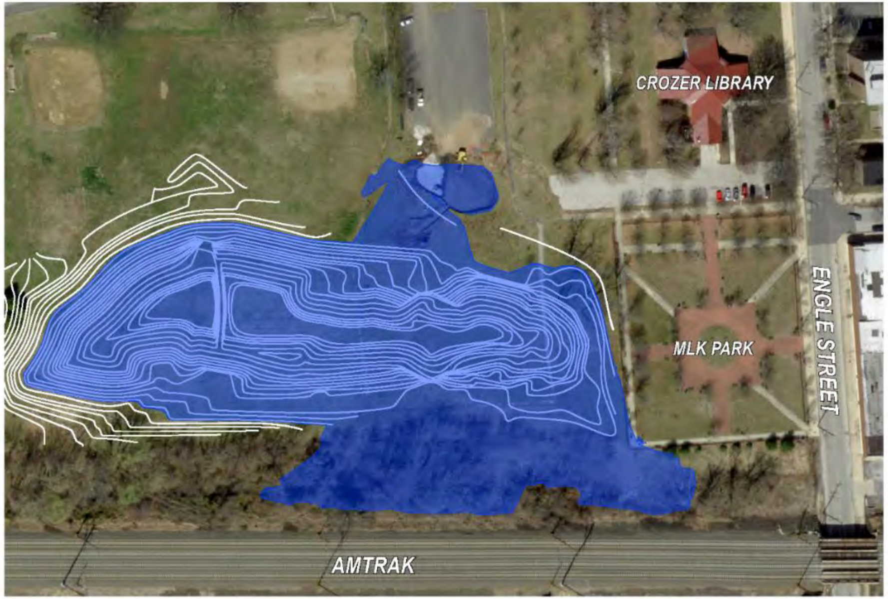


Veteran's Memorial Park, Chester, PA



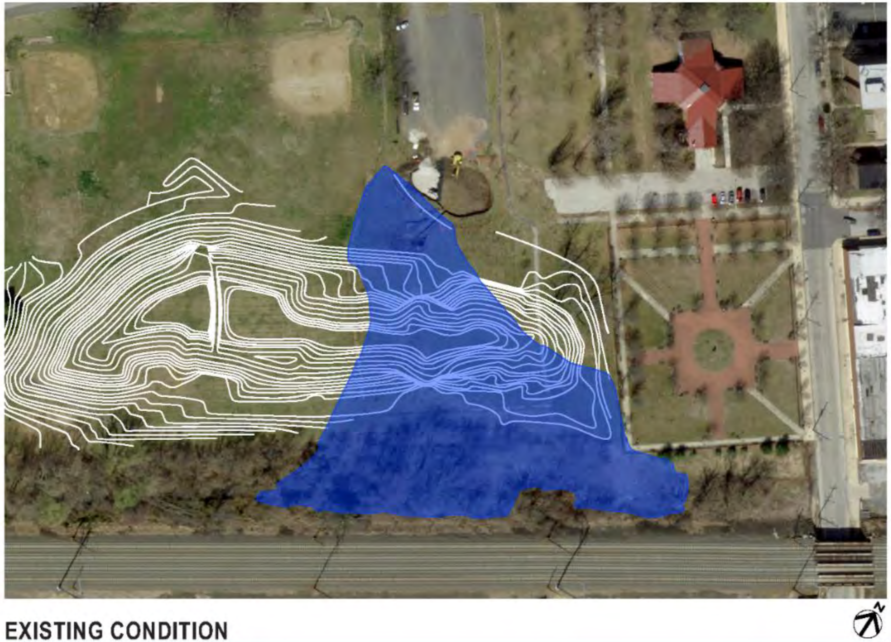
EXISTING CONDITION



PROPOSED CONDITION

68% Peak Flow Reduction

Veteran's Memorial Park, Chester, PA



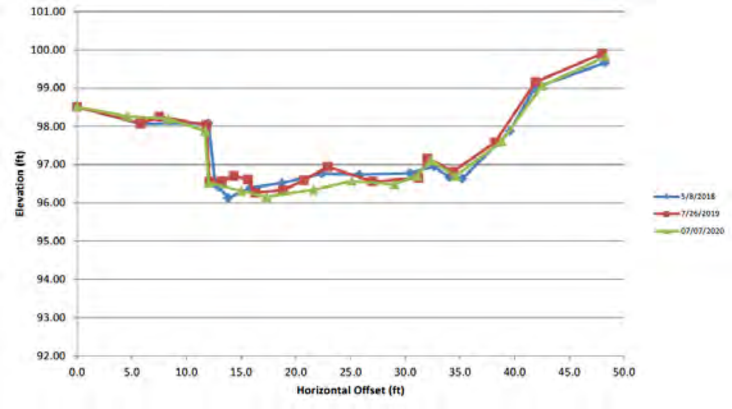
EXISTING CONDITION

PROPOSED CONDITION

69% Peak Flow Reduction

Wissahickon Park, Lansdale Borough, Montgomery County

- Wissahickon Creek (3rd Order Stream; DA = 0.99 sq.mi.)
- System of Bioretention Basins and Bioswales, along with Vegetative Bank Stabilization and Native Plantings, Revitalized a Community Park
- Cross-section monitoring and documentation of channel stability



About AKRF

Design practice built on multi-disciplinary environmental planning core

Roots in environmental assessment and analysis

Focus on both complex urban systems and rural

Q&A and Discussion

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