Headwater Stream Restoration

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Dewberry

PENNDOT

District 6-0

Philadelphia PWD Water Department

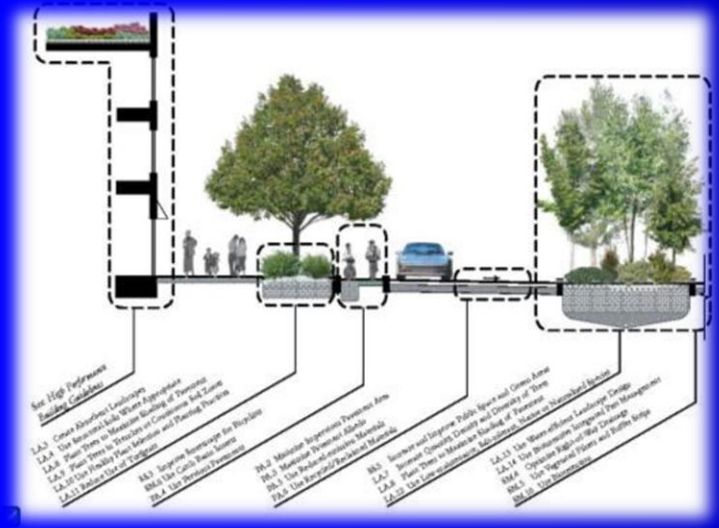
U.S. 202 (Section 300)

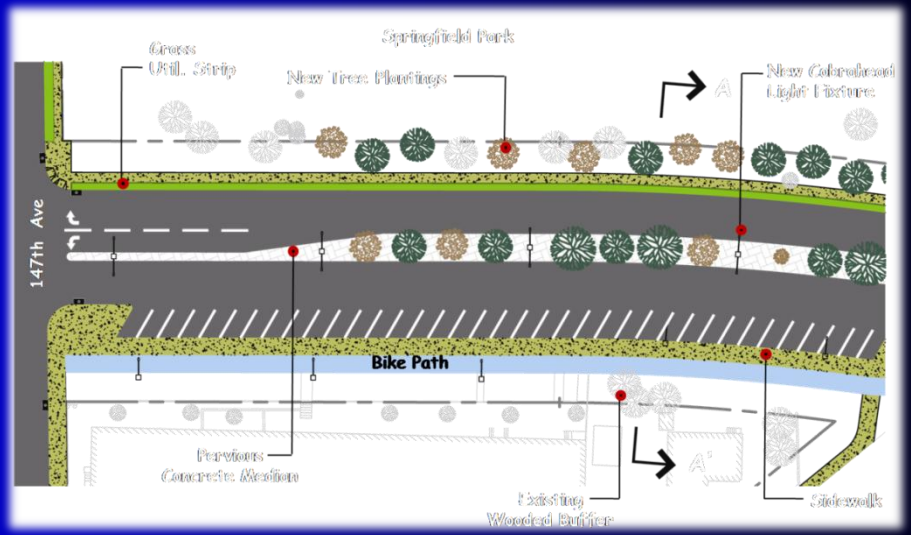
EXTON-PAOLI

Acknowledgements:
Michael Baker Corporation
Jacobs Engineering
GTS Technologies
HRG Inc.

Headwater Systems

- Smaller catchment/drainage areas
- Steeper stream channel gradients (velocity/bedload)
- Direct hydrogeologic connection and response
- More readily impaired by impervious cover changes
- Associated collection and conveyance alternations
- Subject to rapid, high flow stormwater runoff response
- Shorter duration higher intensity events of recent experience





above: NYC's High Performance Infrastructure Guidelines

Watershed and Site Specific Considerations

Man made:

- Historical and recent prior land development and watershed alteration
- Infrastructure (roads, sewers, storm sewers and outfalls, other utilities
- Park and recreation and trail facilities

Natural:

- Unique or Karst subsurface hydrogeologic conditions
- Deep colluvial soils
- Thick alluvium and legacy sediments
- Protected wetlands, threatened and endangered species habitat
- Site restoration alternatives analysis, design and construction phase evaluations
- Opportunities and Constraints

Green/Sustainable (Site) BMP Strategies

Protect Resources

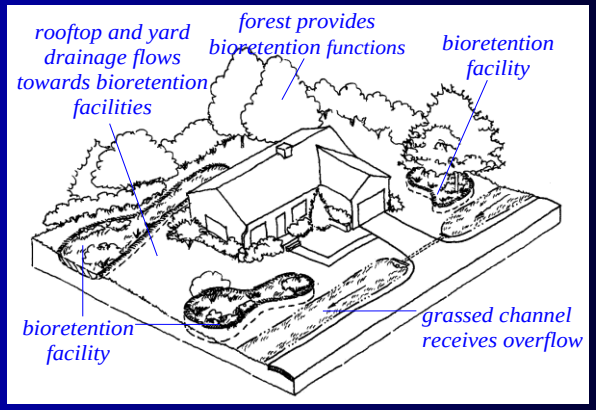
- Site Assessment and Resource Inventory

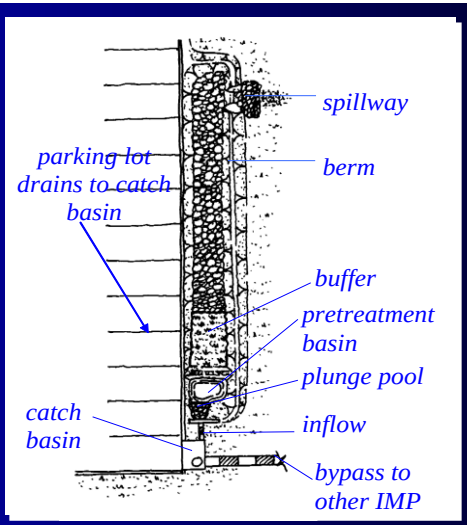
Maintain /Restore pre-development hydrologic conditions

- Conservation and Minimization: Limit Disturbance, Impervious
- Pollution Prevention: E&S Control; SWM Quantity, Quality

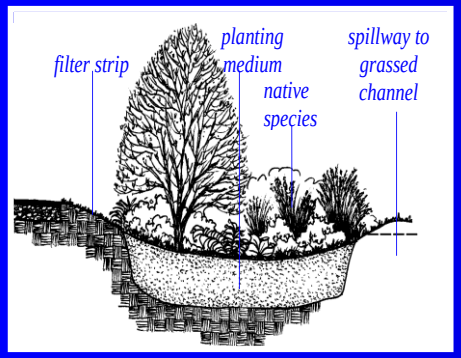
Enhance Design

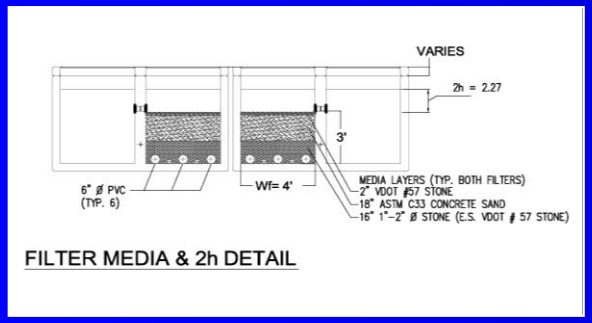
- Encourage energy efficiency through well designed site features
- Smart Material Selection
- Explore innovative alternatives
- Create design synergies

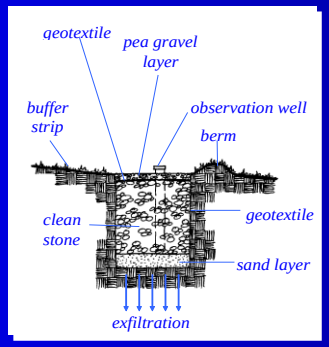




Green/LID Stormwater (BMPs)







Quantity Control

- Rate= Detention/Retention
- Volume= Infiltration or Reuse

Quality Control

- Filtration
- Sedimentation

Integrated Management Practices (IMPs)

- encourage infiltration
- interact with other site systems and runoff sources

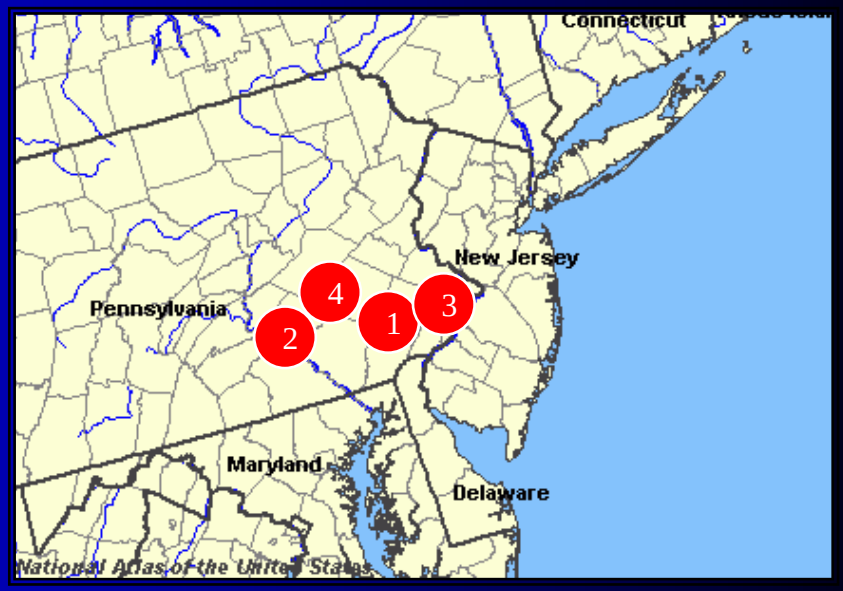
Headwater Stream Restoration

1. Mill Lane Tributary to Valley Creek, Chester County, PA: Lower Piedmont, Legacy sediments over karst drainage, sanitary sewer conflicts. Location: Ecology Park, East Whiteland Township, PA

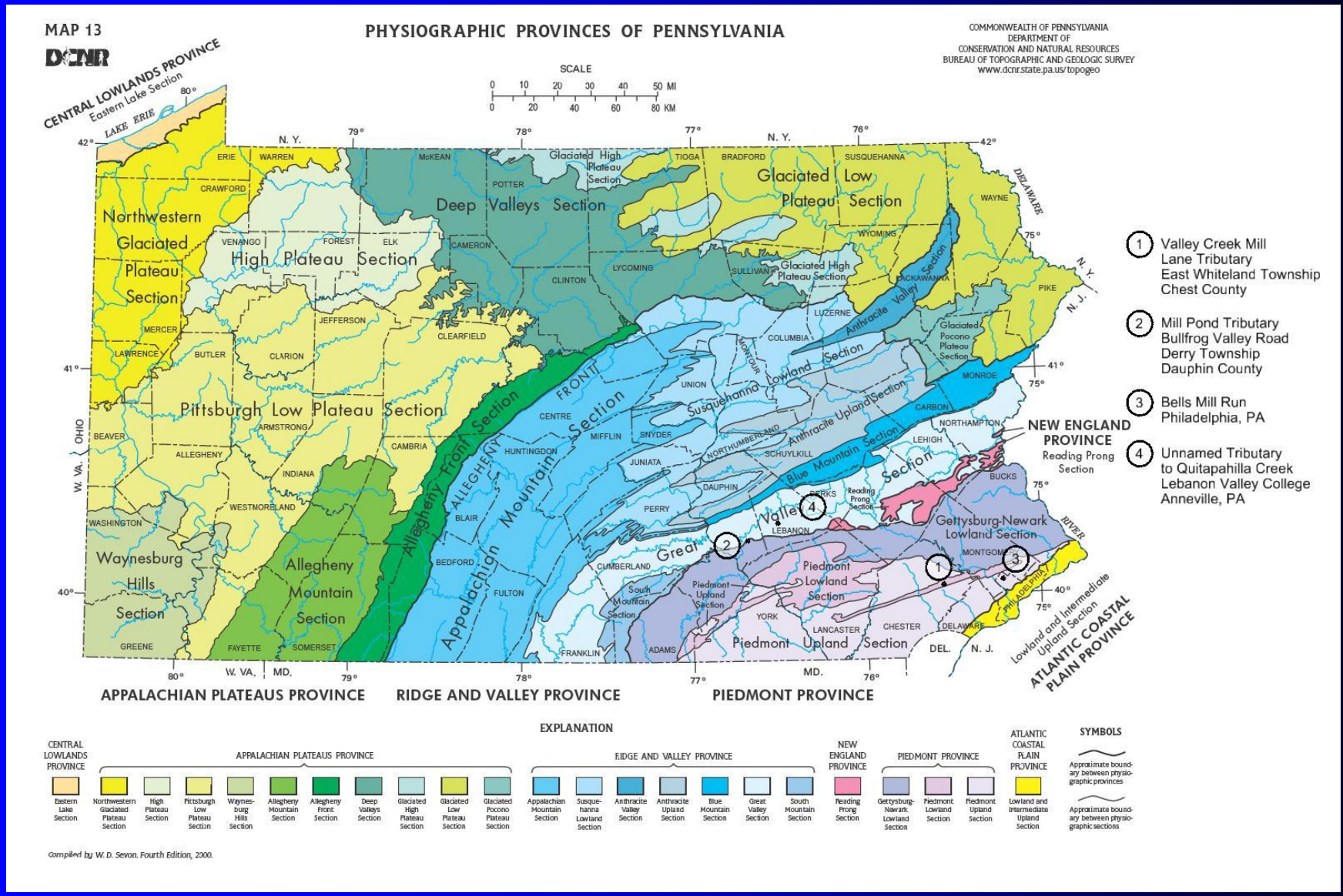
2. Bullfrog Valley Road, Mill Creek Tributary, Hershey, PA: Upper Piedmont, Colluvium over karst terrain, gas line conflicts. Location: Millpond Park, Derry Township, PA

3. Bells Mill Run Tributary to Wissahickon Creek, Philadelphia, PA: Upper Coastal Plain, Metamorphosed Schist, Stormwater outfalls and sanitary sewer lines. Location: Fairmount Park, Philadelphia, PA

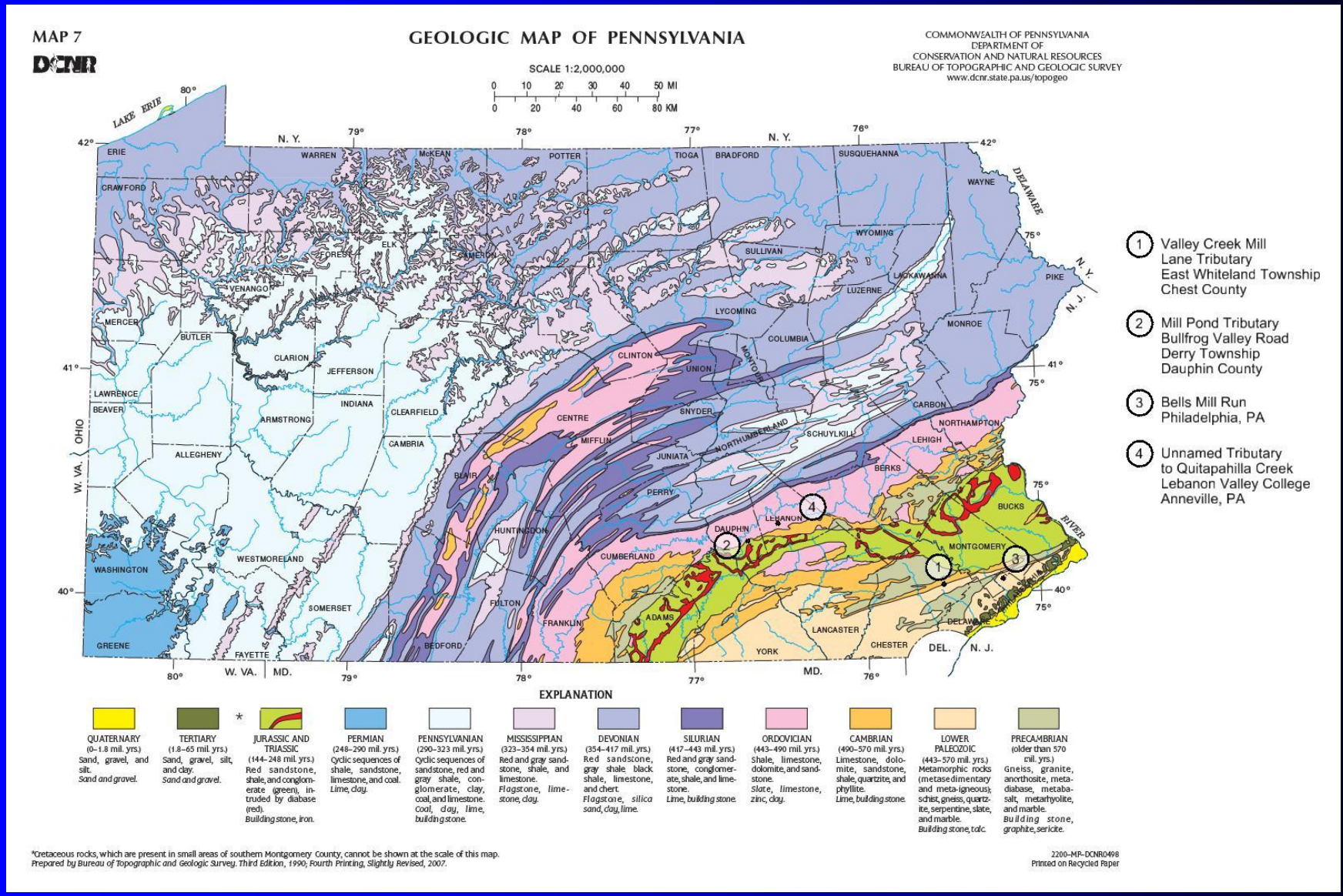
4. Tributary to Quittapahilla Creek, Annville, Lebanon County, PA: Upper Piedmont, Limey shale with Swallow holes, stormwater pond, dam and bridge. Lebanon Valley College Campus Natural Area, Annville, PA



Physiographic Map of PA



Geologic Map of PA

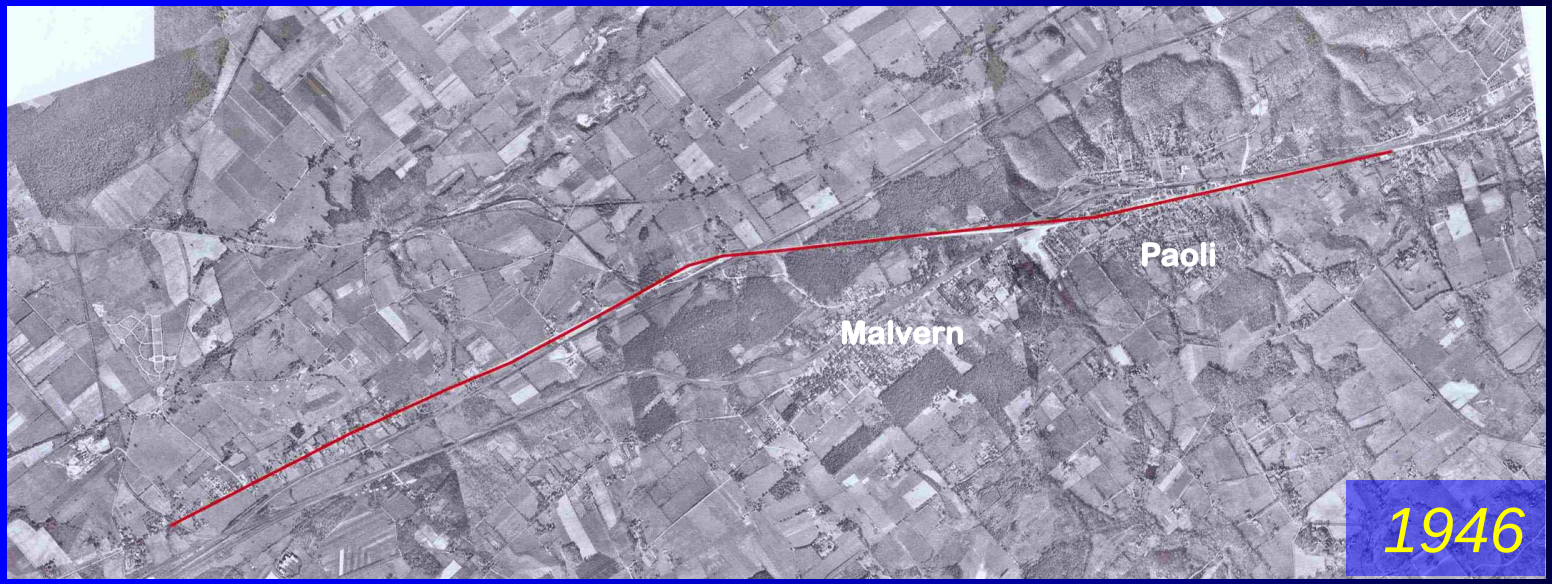


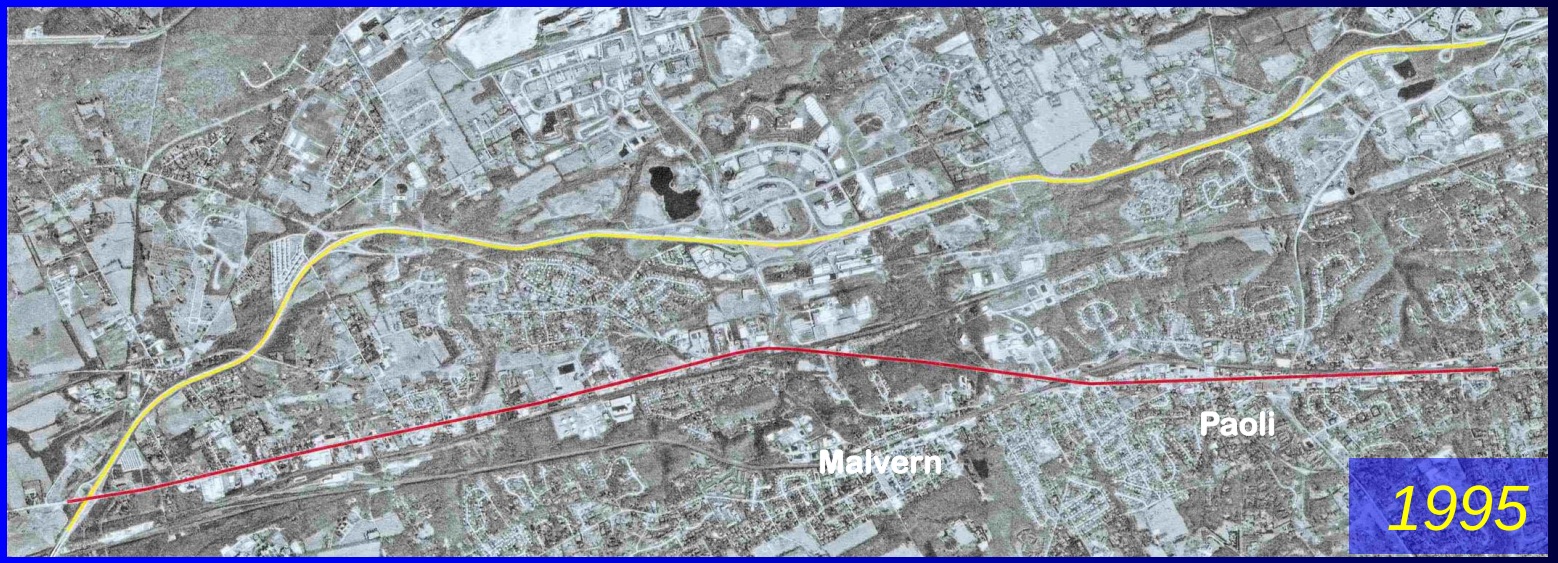
1. Valley Creek Mill
   Lane Tributary
   East Whiteland Township
   Chest County
2. Mill Pond Tributary
   Bullfrog Valley Road
   Derry Township
   Dauphin County
3. Bells Mill Run
   Philadelphia, PA
4. Unnamed Tributary
   to Quitapahilla Creek
   Lebanon Valley College
   Anneville, PA

Mill Lane Tributary to Valley Creek, Chester County, PA

Lower Piedmont, Metamorphosed (Schist)/Limestone
Legacy sediments over karst drainage, sanitary sewer conflicts.
Location: Ecology Park, East Whiteland Township, PA

Historic Development





Valley Creek – Exceptional Value Waters

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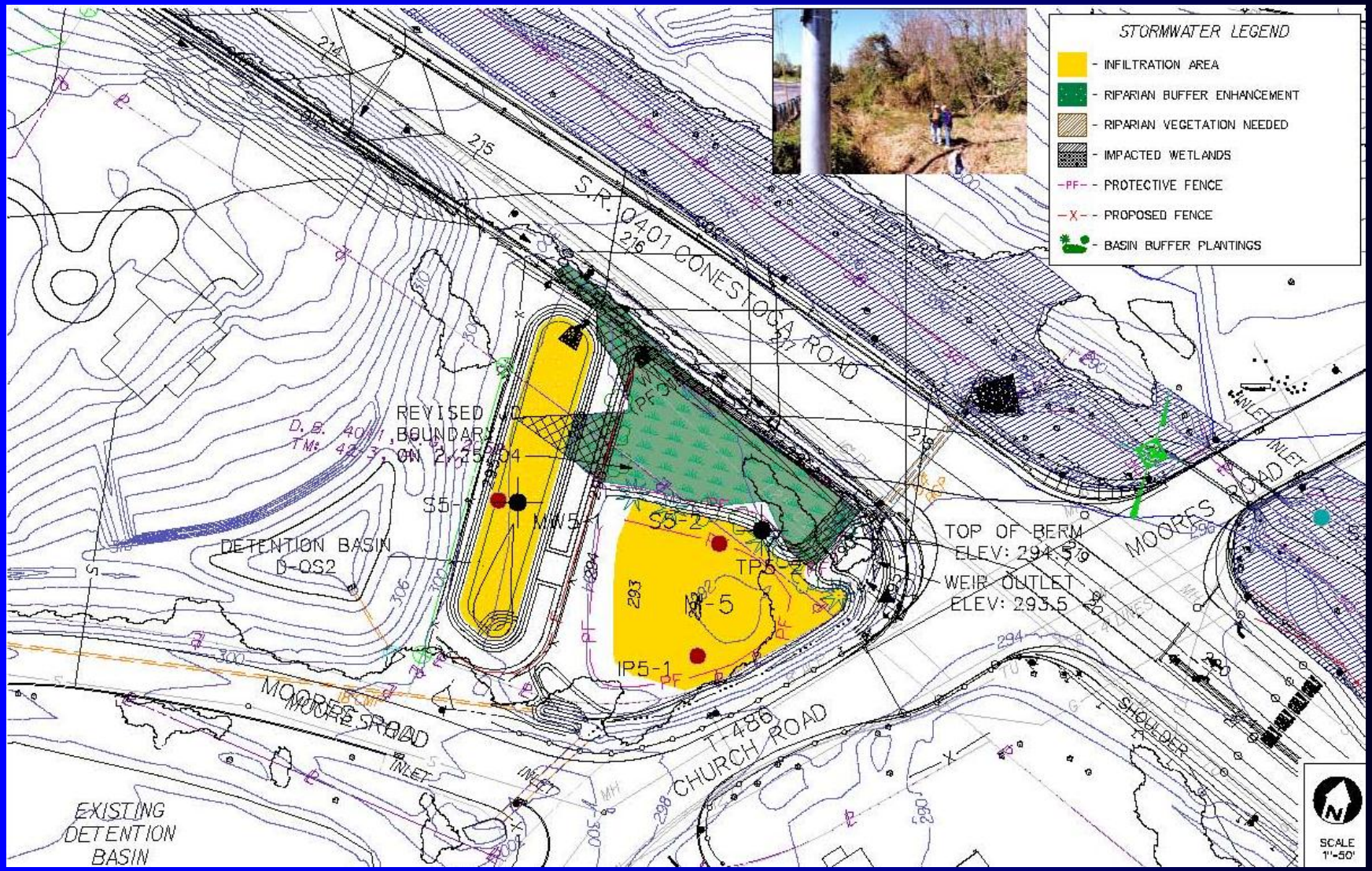
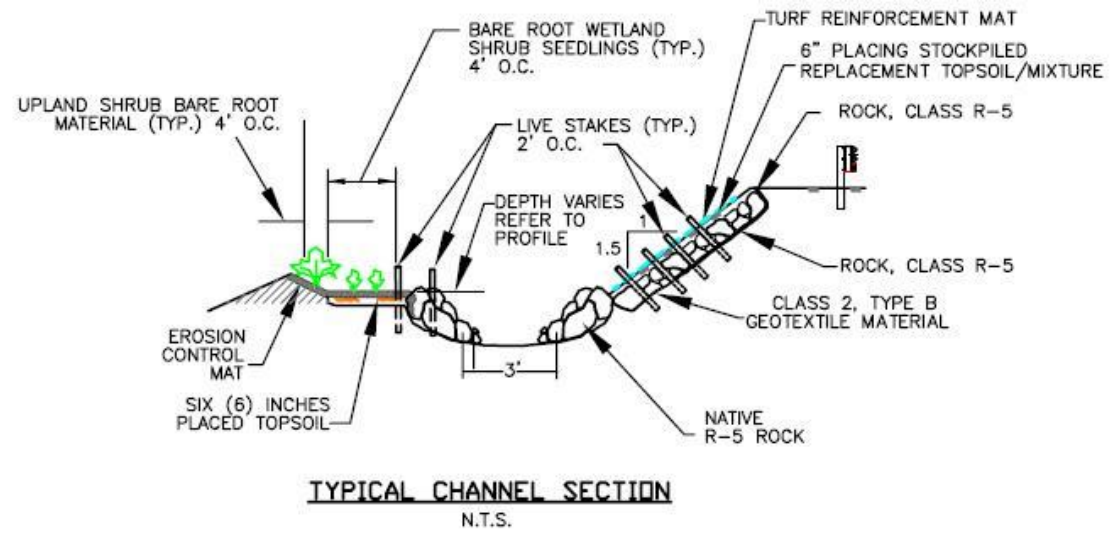
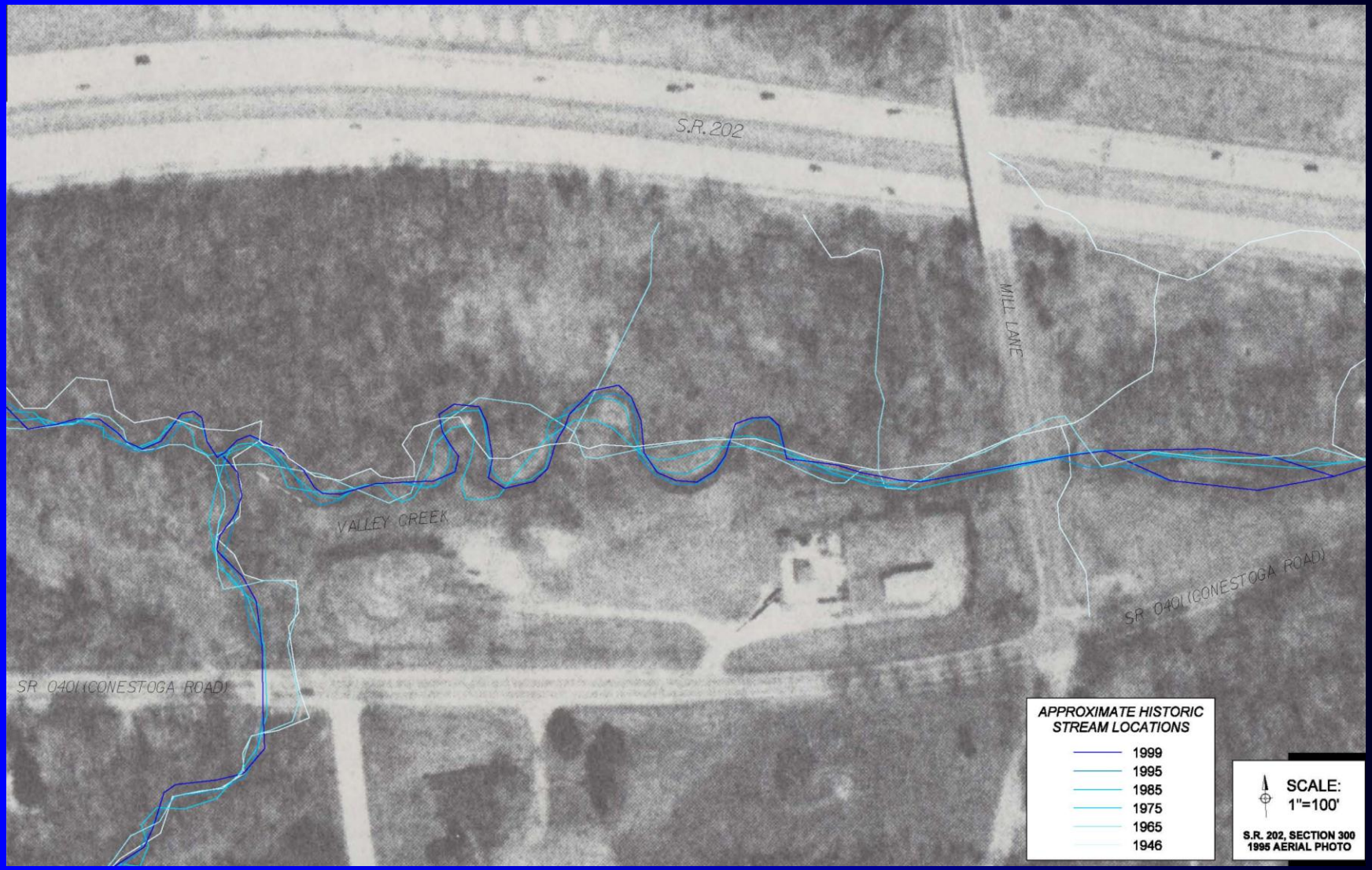
Mitigation Site 5: Riparian Buffer/ Stormwater Infiltration



Mitigation Site 5: Stream Stabilization

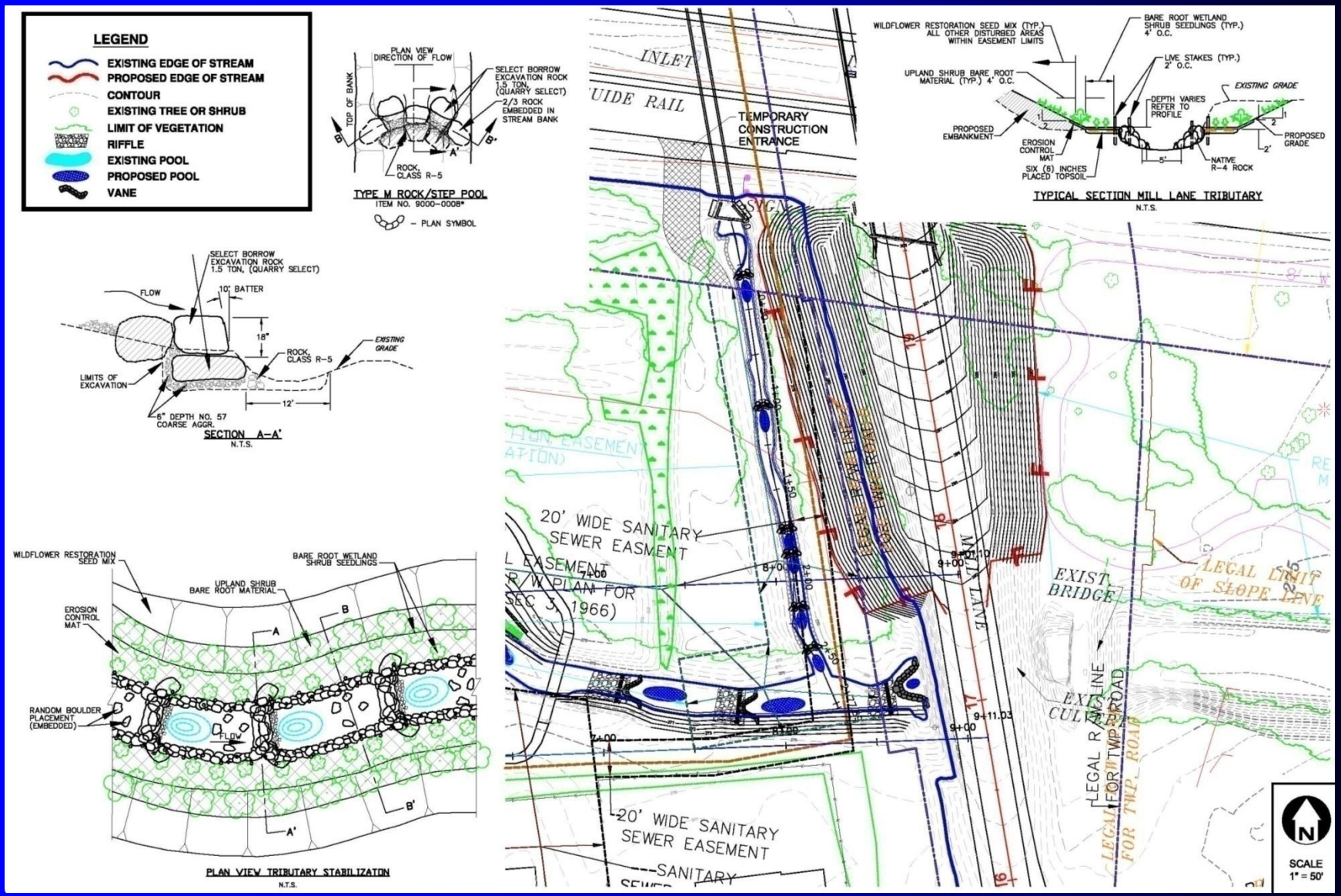


Valley Creek/Mill Lane Tributary



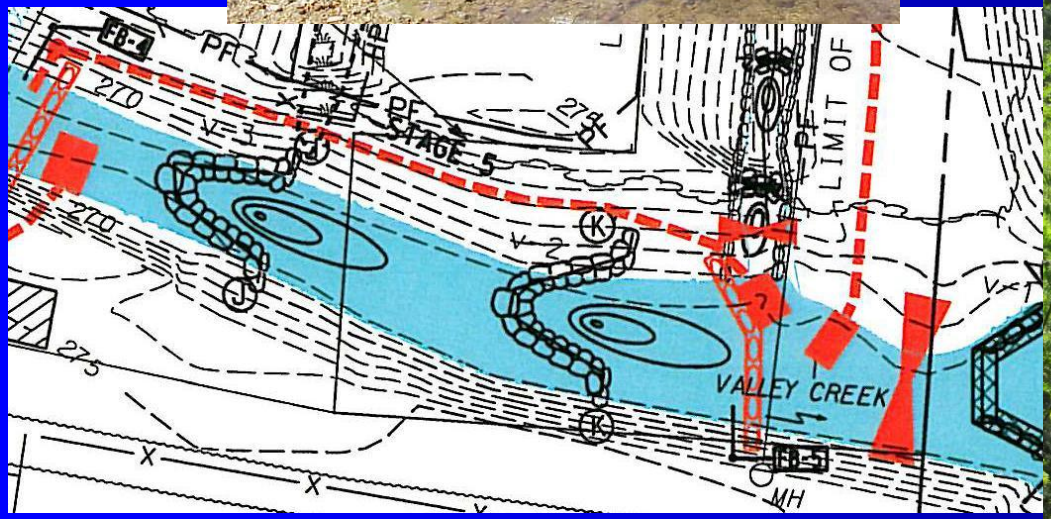
Valley Creek/Mill Lane Tributary

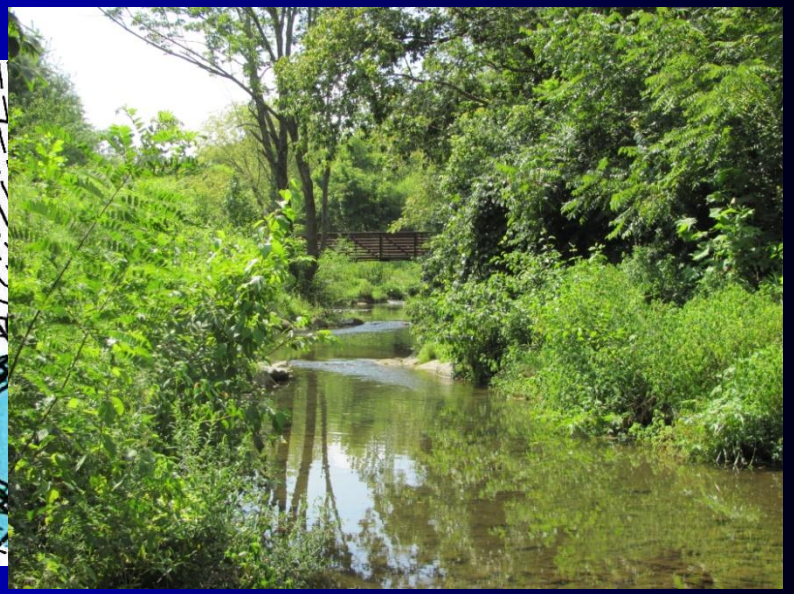
Mill Lane: Tributary Stabilization



Mill Lane: Tributary Stabilization

Ecology Park: Stream Stabilization





Bullfrog Valley Road, Mill Creek Tributary, Hershey, PA (Stream Daylighting)

- Location: Millpond Park, Derry Township, PA
- Upper Piedmont, Colluvium over karst terrain
- Gettysburg/Great Valley (Red Sandstone/Limestone)
- Utility gas line conflicts (upstream control)
- Upstream Development – Hydrologic Impact
- Existing floodplain encroachment
  - Utilities (8” gas line)
  - Stormwater Basin/Pond/Bridges
  - Downstream Crossing

Bullfrog Valley Road, Mill Creek Tributary, Hershey, PA (Stream Daylighting)

Bullfrog Valley Road, Mill Creek Tributary, Hershey, PA (Stream Daylighting)

Bullfrog Valley Road, Mill Creek Tributary

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Bells Mill Run Tributary to Wissahickon Creek, Philadelphia, PA

- Piedmont Upland/Upper Coastal Plain, Metamorphosed Schist/Gneiss, Stormwater outfalls, sanitary sewerlines, roads, and trails.
- Location: Fairmount Park, Philadelphia, PA

Bells Mill Run Tributary to Wissahickon Creek, Philadelphia, PA

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Tributary to Quittapahilla Creek, Annville, Lebanon County, PA

- Great Valley/Upper Piedmont, Limey shale with Swallow holes, stormwater pond, dam and bridge.
- Location: Lebanon Valley College Campus Natural Area, Annville, PA

Tributary to Quittapahilla Creek, Annville, Lebanon County, PA

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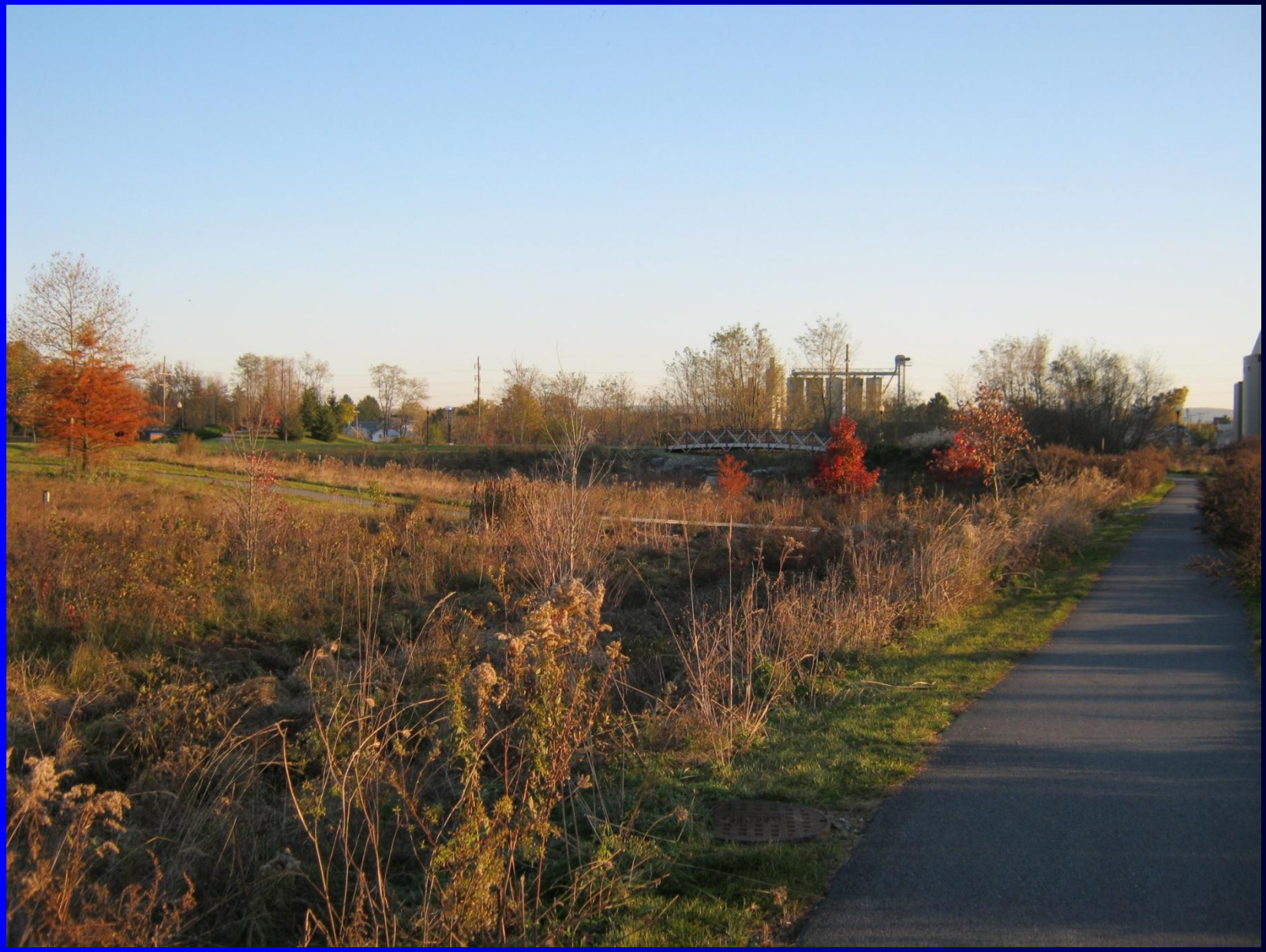
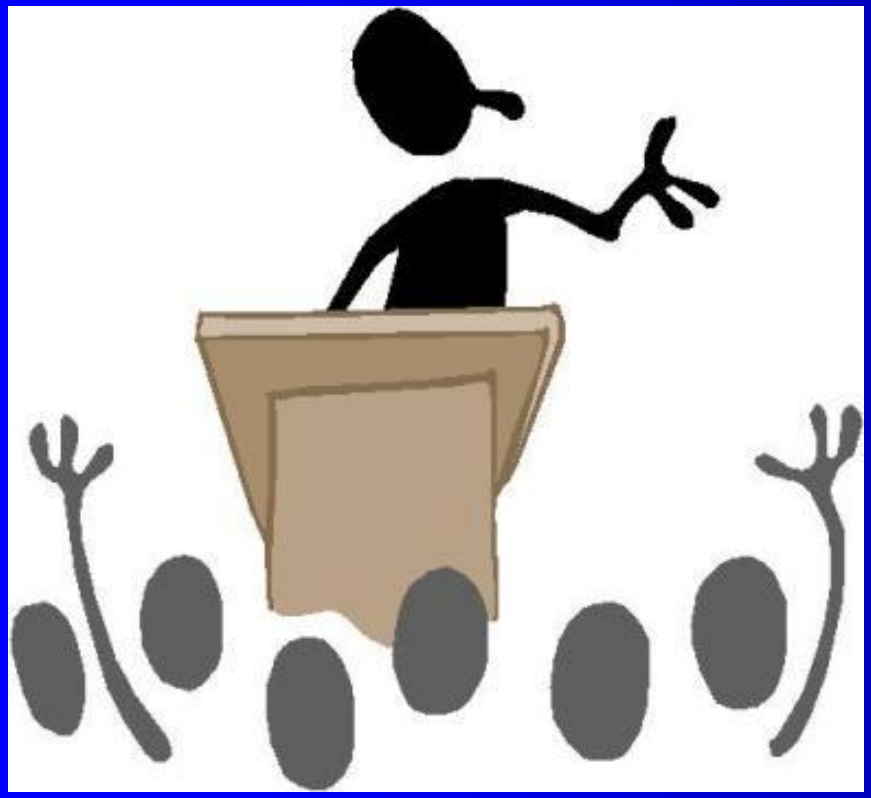


Tributary to Quittapahilla Creek

Questions or Comments?



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