Volume II-Problem Area Analysis

Luzerne County Act 167 Phase II

Stormwater Management Plan

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County of Luzerne
PENNSYLVANIA
ESTABLISHED 1786

Submitted to:

Luzerne County Planning Commission

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Wilkes-Barre, PA 18711

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VOLUME II

PROBLEM AREAS AND SOLUTIONS

1. Introduction

One key goal of the Luzerne County Act 167 Stormwater Management Plan is to maintain or improve the hydrologic regime of the watershed through Municipal ordinance implementation. Maintaining the hydrologic regime encompasses promotion of infiltration to recharge aquifers and stream baseflow, improving water quality, minimizing streambank erosion, and minimizing flooding through management of runoff rates and volumes throughout the County. Stormwater problem areas identified during the Phase I process by the municipalities, County staff, Luzerne Conservation District, and other PAC members, provide a snapshot of the conditions in each watershed in the County. These problem areas include increased flooding caused by new impervious surfaces, substandard bridges, culverts, and storm sewers, streambank erosion, sedimentation accumulations, and water quality problems. A requirement of this Act 167 Plan is to provide a survey of existing stormwater problems and proposed solutions. 254 problem areas were identified during the Phase I process, and were investigated during this Phase II planning effort. This volume provides an inventory of documented problem areas throughout the County along with possible solutions.

2. Map

A map illustrating the location of the problem areas is provided on Map 10.A in Appendix 2 of Volume I, and is duplicated here for easy reference. It is evident in Map 10.A that although stormwater problems exist throughout the County, the highest concentrations of problems are located in areas with more urbanization.

3. Problem Area Classification: Detailed or General

Problem areas have been classified as either “detailed” or “general”; based on their location. Problems located within the Abrahams Creek, Nescopeck Creek, and Toby Creek watersheds were classified as “detailed” problems, because hydrologic modeling of these watersheds allowed for a more intensive hydrologic investigation. Reporting for these areas included field observation, documentation, and a hydrologic summary including calculations of drainage area, design storm peak flow rates, and runoff volume or stream velocities where appropriate. Evaluation of possible solutions for each problem area and general cost ranges typically associated with the nature of the solutions is provided. Prior to construction of any solution, detailed design calculations, necessary permitting and construction document preparation for each area will be required. The solutions presented in this report provide a starting point for analysis.

Problem areas located outside of the Abrahams Creek, Nescopeck Creek, and Toby Creek watersheds were classified as “general” problem areas. The investigation process for “general” problem areas included field observations, documentation, and an identification of potential

solutions that may be applied to these types of problems. Hydrologic calculations and cost assessments for the "general" problem areas are not provided.

Where possible, solutions focused on recognized Best Management Practices (BMP's) outlined in the PADEP *Stormwater Best Management Practices Manual*. Additionally, conventional stormwater management measures including storm drainage piping and flood proofing were considered and recommended where alternative BMP's were found to be ineffective.

A separate Growing Greener funded study for the Toby Creek watershed was conducted concurrently with this Act 167 Plan. The Toby Creek Watershed Assessment under the Growing Greener study focused on streambank erosion problems in the watershed, and a summary of those problems and solutions is provided in this report.

4. Problem Area Type

Stormwater problem area types identified on the inventory forms include the following:

- Flooding
- Deficient Bridges/Culverts
- Erosion
- Sedimentation
- Water Pollution/Groundwater
- Other

Each problem area form includes a photograph of the location of concern, a description of the problem including probable causes if identifiable, and suggested solutions. Several problems will require further investigation to determine the optimal solution and associated costs; these problem areas are noted accordingly.

5. Evaluation of Problem Areas

The first step in analyzing possible solutions for a problem area was to conduct a field observation to determine the probable cause. Potential solutions were then identified for further evaluation. An outline of evaluation process and typical solutions for each problem type are provided below.

Evaluation of "detailed" problem areas included an estimate of the peak runoff rate, and in some instances peak volume, at the problem area location. Conventional hydrologic calculation methods, including StreamStats, SCS TR-55 and the Rational Method, were used to prepare the runoff flow estimates. Variables used in these calculations are included on the problem area forms. Calculated rates and volumes are also provided on the problem area forms and are intended for preliminary capacity analysis of conveyance features including storm piping, culverts, and bridge openings. Prior to implementing any proposed solution, detailed design, applicable permitting, and construction document preparation will be required. Evaluation of "general" problem areas was similar to the detailed with the exception of runoff calculations and cost projections which are not provided.

A description of the solutions considered for each of the problem areas is provided in Section 6. Solutions to Problem Areas below.

Cost projections are provided for the "detailed" problem areas. These projections are preliminary in nature, and are intended for use in comparing alternatives and providing an order of magnitude estimate. Solutions to any problem area will require detailed design and permitting beyond the scope of this Plan and should include a confirmation of the costs discussed herein. References used in the preparation of cost evaluations include published RS Means Cost Data and engineering experience.

Effectiveness and cost for each solution were considered and compared to develop a preferred solution. Several problem areas will require further analysis to access the feasibility and associated cost of potential solutions and are noted accordingly.

6. Solutions to Problem Areas

A. Regional Flooding

Flooding problem areas were identified as areas where the flow occurring in a waterway frequently exceeds its capacity resulting in overbank conditions causing hazards and or damage to adjacent properties and structures. This type of problem is regional in nature and not typically caused by undersized bridges or culverts, which are addressed as a different problem area type. Very often, regional flooding is attributable to new impervious surfaces created by development within the watershed. Increased impervious surfaces reduce natural infiltration and change the timing of the storm peaks.

Correction of regional flooding problems typically requires addressing the problem source. Measures such as reestablishment of riparian stream buffers, reducing existing impervious surfaces, and the creation of regional stormwater management basins can be effective in mitigating regional flooding problems. An Act 167 Stormwater Management Plan can be helpful in promoting these measures by considering portions of existing impervious surfaces as undeveloped for new stormwater facility design. Establishment of release rate criteria within the watershed will also help minimize future degradation associated with new development. Other structural solutions can also be applied, including: levees, floodwalls, regional storage areas, stream restoration or channel improvement, and pumping facilities.

Low-impact development (LID) and low-impact redevelopment (RID) can also be effective techniques in preventing degradation of waterways within the County. If this is not an option, regional basins could be constructed upstream to contain the peak in those management districts.

B. Deficient Bridges/Culverts

Drainage problem areas may also be the result of undersized or clogged conveyance systems, including culverts, storm sewers and bridges. Regular maintenance of existing

facilities is typically the starting point to resolving these problems. Storm sewer system upgrades including trash racks, sediment basins or energy dissipaters can be effective in preventing future clogging and would be helpful for those pipes that are prone to frequent clogging. The cause of the local drainage problem may also be due to undersized facilities. For these situations, the existing facilities will need to be removed and replaced with facilities sized to convey the design storm for the particular location. Detailed design calculations, required permitting and construction document preparation will need to be completed as part of any replacement project. In the more urbanized areas of the County including Wilkes-Barre City, Pittston City, and Conyngham Borough, clogged or undersized storm sewers were frequently noted problems. Cleaning of storm sewer, adding inlets, and enlarging pipes are all potential solutions to these problems.

When deficient bridges/culvert problems arise, the following process can be used to develop an effective solution:

a. Identify the type of problem, (i.e., clogging with debris or sediment, inadequate inlet spacing, increased stormwater runoff).
b. Determine if problem can be resolved with more frequent maintenance.
c. Identify the pipe network connected to the system.
d. Define the drainage area and flow draining to the inlet and conveyed in the system.
e. Determine if additional inlets, debris or sediment collection device, or pipe capacity is required. If additional capacity cannot be added, consider constructing an upstream detention basin to reduce the amount of conveyance needed.
f. Size the required feature based on the design flow and obtain the necessary permits and approval to install the proposed changes to the system.

C. Erosion

Stream bank erosion is present in various areas throughout the County and occurs when stream flow velocities, or shear stress, create scour conditions along the bank of a stream. Negative impacts of stream bank erosion include loss of property due to an expanding top of bank, sedimentation of downstream reaches or structures, structural instability of adjacent roads and buildings, and unsightly conditions. The main stem of the Nescopeck Creek, the main stem of Toby Creek, as well as several of the tributaries in both watersheds, contain substantial lengths which are severely eroded. Typically, these problems are caused by increases in stormwater runoff in the watershed and can be difficult to remedy.

There are numerous stabilization techniques available including those using bioengineering, such as turf reinforcement mats, natural fiber rolls, reforestation with live plantings, and hooks and veins to divert flow away from problem areas. In certain areas with high shear stress and velocities, stream bank armoring with rock rip-rap, gabion walls, or concrete may be required. A common source of funding for these problems,

particularly in areas owned by a municipality, is the State's Growing Greener program.

The addition of buffers can also help stabilize stream banks and prevent future erosion problems from developing by reducing stormwater peak runoff rates and volumes through infiltration and evapotranspiration. However, without watershed-based stormwater management standards and criteria the impact of these buffers will be limited.

D. Sedimentation

Sedimentation problems are closely related to erosion problems. Generally, these problems arise when eroded soil is deposited downstream at locations where stream velocities decrease or change alignment. Often this occurs due to flow being interrupted by a structure. Sediment accumulations in bridge openings and culverts can create flooding conditions by reducing available cross sectional area.

Another source of sedimentation is from land disturbance activities associated with construction. The Luzerne Conservation District is responsible for administering PA Title 25, Chapter 102 (Erosion Control Regulations) which addresses accelerated erosion and the resulting sedimentation from earthmoving activities.

Permanent stabilization of disturbed areas and measures used during construction, such as sediment basins/traps and silt fence, will reduce soil erosion and the resulting sedimentation problems. Improvements in the watershed can be realized by ensuring plans for new developments incorporate appropriate methods and techniques to minimize soil erosion, conducting inspections to ensure the methods specified are being installed properly and maintained, and investigating and documenting any existing sedimentation problems. Generally, the best way to correct a sedimentation problem is to correct the source erosion problem.

E. Water Pollution/Groundwater

Water pollution can be defined as the contamination of surface or groundwater by human activities which cause harm to the water body and its surrounding and inhabitants. Water pollution to surface water tends to come from either point sources or nonpoint sources. Point sources are discharged from a specific location in a concentrated form. Examples of point discharges are pipe outfalls from an industrial or commercial facility. Contamination distributed through surface or "sheet" flow is referred to as nonpoint sources of pollution. Active farmland is an example of a nonpoint source where the pollutants could be sedimentation, fertilizer, or animal wastes which mix with runoff and flow toward the water body in sheet flow. Both point and nonpoint sources of pollution problem areas were identified in this report.

Non-point pollution sources can be effectively addressed through the use of increased stream buffers which filter particulates and allow for biological uptake of organic pollutants by the buffer vegetation. Other techniques such as proper soil tilling, and storage of fertilizer and animal wastes can also be effective. Outfall protection including

riprap aprons and stable swales can be effective in addressing erosion related point sources. Proper treatment of the point source effluent to remove/reduce sediment and other pollutants including nitrogen and phosphorous need to be included in the design of new development projects. These measures can include sediment basins/traps for active construction sites and mechanical separation/filtration devices for post construction conditions.

Groundwater issues can be from contaminated runoff that filters into the water table and underlying aquifers, or can also be from increased development and impervious areas depleting the supply of runoff to groundwater resources. Solutions to contaminated groundwater involve collecting and treating runoff before it enters the ground. Solutions to depleted water tables include infiltration facilities and limiting the amount of impervious areas over rechargeable soils.

7. Description of Problem Area Data Sheets

The following data sheets include forms for both "general" and "detailed" problem areas. Each sheet provides a description of the problem, photograph (if available), and a description of the potential solutions. "Detailed" sheets also include summary hydrologic and hydraulic data and a range of costs for potential solutions.

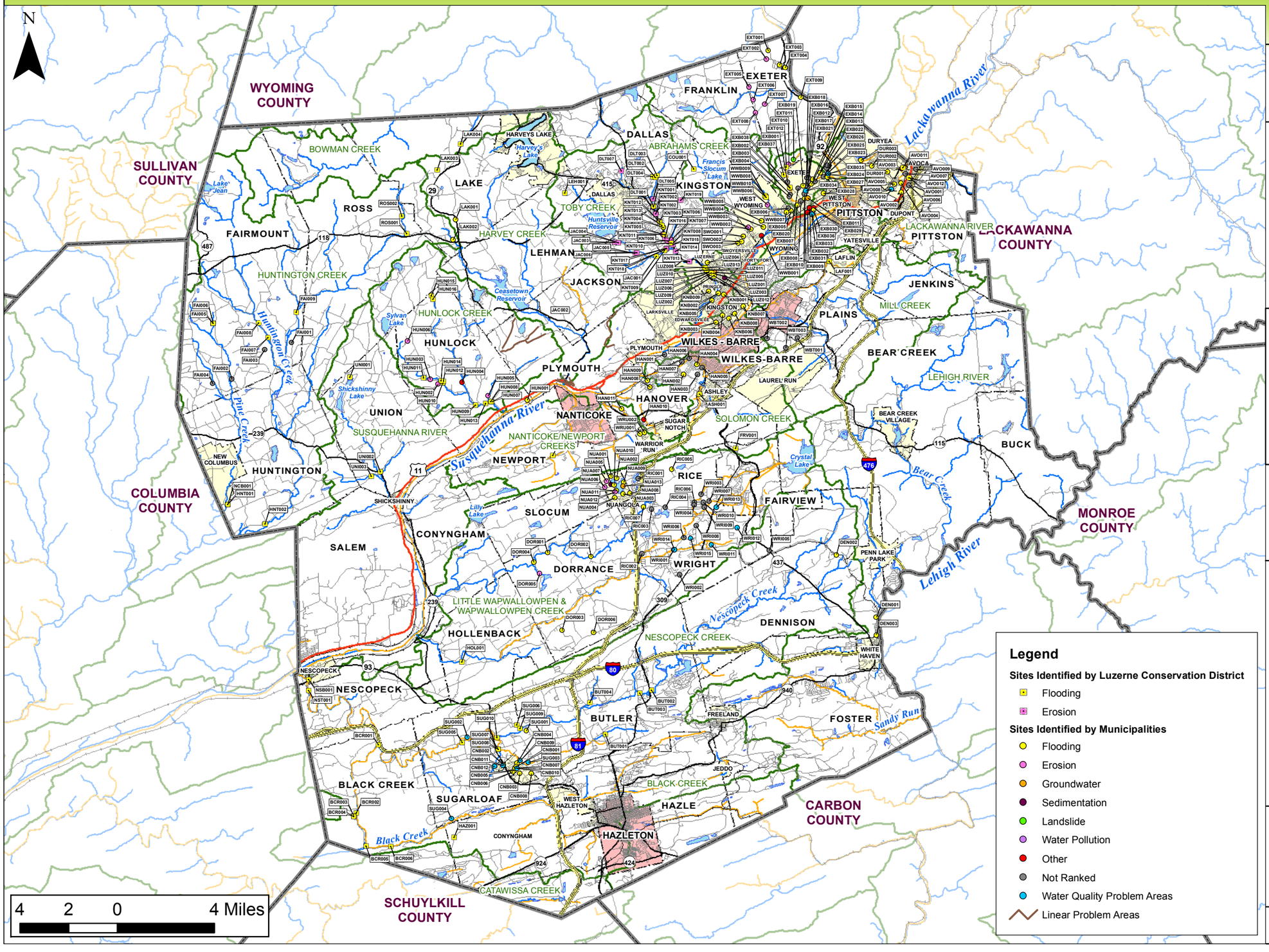
On the data sheets for "general" problem areas, the "Solution" box gives a variety of potential solutions based on both traditional and alternative engineering techniques. Traditional solutions link to Section 6 of this document. For instance, if the problem area is due to a deficient bridge or culvert, the "Solution" box on the data sheet will list 6.B as a potential solution. This means that Section 6.B Deficient Bridges/Culverts of this document provides a description of how to correct the problem. If the problem is erosion, the "Solution" box will list 6.C as a potential solution, meaning that Section 6.C Erosion of this document provides the description of how to correct the problem. Similarly, alternative solutions based on Chapters 5 and 6 of the *Pennsylvania Stormwater Best Management Practices Manual* (BMP Manual) are also provided in the "Solution" box on the data sheets. These solutions link to Table II.1 below. For instance, if a potential solution is an infiltration basin, the "Solution" box will list 6.4.2 as a potential solution (from Table II.1 below). If a potential solution is to reduce impervious cover, the "Solution" box will list 5.7.1 as a potential solution (from Table II.1 below).

Table II.1. Alternative Runoff Control Techniques per Pennsylvania Stormwater Best Management Practices Manual.

Chapter 5. Non-Structural BMPs	Chapter 6. Structural BMPs
BMP 5.4.1 Protect Sensitive and Special Value Features	BMP 6.4.1 Pervious Pavement with Infiltration Bed
BMP 5.4.2 Protect/Conserve/Enhance Riparian Areas	BMP 6.4.2 Infiltration Basin
BMP 5.4.3 Protect/Utilize Natural Flow Pathways in Overall Stormwater Planning and Design	BMP 6.4.3 Subsurface Infiltration Bed
BMP 5.5.1 Cluster Uses at Each Site; Build on Smallest Area Possible	BMP 6.4.4 Infiltration Trench
BMP 5.5.2 Concentrate Uses Area-wide Through Smart Growth Practices	BMP 6.4.5 Rain Garden and Bioretention
BMP 5.6.1 Minimize Total Disturbed Area	BMP 6.4.6 Dry Well or Seepage Pit
BMP 5.6.2 Minimize Soil Compaction in Disturbed Areas	BMP 6.4.7 Constructed Filter
BMP 5.6.3 Re-vegetate and Re-forest Disturbed Areas Using Native Species	BMP 6.4.8 Vegetated Swale
BMP 5.7.1 Reduce Street Impervious Cover	BMP 6.4.9 Vegetated Filter Strip
BMP 5.7.2 Reduce Parking Impervious Cover	BMP 6.4.10 Infiltration Berm and Retentive Grading
BMP 5.8.1 Rooftop Disconnection	BMP 6.5.1 Vegetated Roof
BMP 5.8.2 Storm Sewer Disconnection	BMP 6.5.2 Runoff Capture and Reuse
BMP 5.9.1 Streetsweeping	BMP 6.6.1 Constructed Wetlands
	BMP 6.6.2 Wet Pond or Retention Basin
	BMP 6.6.3 Dry Extended Detention Basin
	BMP 6.6.4 Water Quality Filter
	BMP 6.7.1 Riparian Buffer Restoration
	BMP 6.7.2 Landscape Restoration
	BMP 6.7.3 Soil Amendment and Restoration
	BMP 6.7.4 Floodplain Restoration
	BMP 6.8.1 Level Spreader
	BMP 6.8.2 Special Detention Areas

LUZERNE COUNTY ACT 167 STORMWATER MANAGEMENT PLAN PHASE II STUDY

MAP 10.A. PROBLEM AREAS



Legend

Sites Identified by Luzerne Conservation District

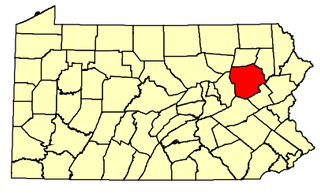
- Flooding
- Erosion

Sites Identified by Municipalities

- Flooding
- Erosion
- Groundwater
- Sedimentation
- Landslide
- Water Pollution
- Other
- Not Ranked
- Water Quality Problem Areas
- Linear Problem Areas

Legend

- County Boundaries
- Cities
- Boroughs
- Municipal Boundaries
- Watershed Boundaries
- Water Bodies
- Impaired Streams
- Streams
- Interstates
- U.S. Highways
- PA State Routes
- Other Roads
- Railroads



LOCATION MAP

Prepared For:
Luzerne County
200 North River Street
Wilkes-Barre, PA 18711

County of Luzerne
Pennsylvania
Established 1786

NOTES:
Portions of this map were generated from the existing data sources noted below. Certain elements of the base map such as municipal boundaries, railroad locations, stream alignments and road networks are provided primarily for reference purposes only and were not directly used for hydrologic computations. In the development of the mapping Borton-Lawson has noted some inconsistencies in the data used for the map. Where obvious inconsistencies in the geographic data were observed the data was adjusted, as needed, to prepare a reasonably accurate map. Although the geographic data was adjusted to compensate for these inconsistencies it is not part of the work plan for this project to correct mapping inconsistencies. Therefore, some geographic inconsistencies may remain on the map.

DATA SOURCES:
Roads - PennDOT
Counties - PennDOT
Municipalities - PennDOT
Streams - PADEP
Water Bodies - USFWS (Derived from NWI Wetlands)
Problem Areas - Luzerne County Municipalities and Luzerne Conservation District

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PREPARED BY: SAV DATE: 3/18/2010
CHECKED BY: PROJECT NO.: 2008-2426-00

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	ASH001	Comments
Municipality:	Ashley Borough	The Conservation District reported flooding, streambank erosion, and a damaged foot bridge at the intersection of Sively and Preston Streets.
Subwatershed:	Solomon Creek	
Stream name:	Sugar Notch Run	
Inspected By/Date:	PAK 6/26/2009	
Checked By/Date:	Date: DEW 1/12/2010	
Type of Problem (highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Downstream face of the culvert. This portion of the stream is channelized.

Description

Looking upstream of the culvert. Streambank erosion can also be seen along the right bank.

Solution	6.7.1, 6.B, 6.C

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	AVO001 and AVO012
Municipality:	Avoca Borough
Subwatershed:	Mill Creek
Stream name:	Local Drainage
Inspected By/Date:	PAK 6/18/2009
Checked By/Date:	DEW 1/7/2010
Type of Problem (highlighted):	
1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

Both Avoca Borough and the Conservation District identified the 700 block of Grove Street as a problem area. Flooding, erosion, sedimentation, landslides, and groundwater were problems reported. Runoff from the adjacent highway reportedly causes flooding of this area.

Description

700 block of Grove Street. The street does not have stormwater collection and conveyance facilities.

Description

Solution	6.4.8, 6.6.2, 6.A, 6.C, 6.D

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	AVO002	Comments
Municipality:	Avoca Borough	Flooding was reported as a problem in this area by Avoca Borough. Based upon field observations, the channelization of Mill Creek under the railroad bridge may cause upstream flooding due to the restriction.
Subwatershed:	Mill Creek	
Stream name:	Mill Creek	
Inspected By/Date:	PAK 6/18/2009	
Checked By/Date:	DEW 1/7/2010	
Type of Problem (highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking at the downstream face of the SR 11 bridge. Railroad tracks located on both sides of the creek.

Description

Looking down from the SR 11 bridge at the railroad bridge and tracks on each side of the creek. Channelization of the creek is shown along the left bank. Stream flows from large storm events could overtop the flood walls.

Solution	6.7.1, 6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	AVO003and AVO011	Comments
Municipality:	Avoca Borough	The Conservation District and Avoca Borough reported sedimentation and ice jam problems in this section of concrete channel.
Subwatershed:	Mill Creek	
Stream name:	Mill Creek	
Inspected By/Date:	PAK 6/18/2009	
Checked By/Date:	DEW 1/18/2010	
Type of Problem (highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking downstream at the York Avenue steel bridge. Narrowing of the channel at the bridge could result in reduced velocity and sedimentation.

Description

Looking upstream at the York Avenue steel bridge. Ice jams were not observed due to the season but could be caused by the narrowing of the channel.

Solution	Maintenance to remove ice as needed, 6.D

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	AVO004	Comments
Municipality:	Avoca Borough	Flooding and sedimentation were reported as problems in this area by Avoca Borough. The Borough indicated that high water from the upstream SR11 bridge over Mill Creek(AVO002) flows along the railroad tracks and floods McAlpine Street.
Subwatershed:	Mill Creek	
Stream name:	Mill Creek	
Inspected By/Date:	PAK 6/18/2009	
Checked By/Date:	DEW 1/7/2010	
Type of Problem (highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Ddownstream face of the McAlpine Street box culvert. The railroad tracks are located to the right in the photo.

Description

Solution	6.A, 6.D

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	AVO005	Comments
Municipality:	Avoca Borough	Flooding was reported as a problem in this area by Avoca Borough. According to forms received by the Borough, the drainage swales along the road do not have sufficient capacity.
Subwatershed:	Mill Creek	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/18/2009	
Checked By/Date:	DEW 1/7/2010	
Type of Problem (circle all that apply):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Culvert and swale system along Pittston Avenue.

Description

Culvert and paved swale along the other side of Pittston Avenue.

Solution	5.7.1, 6.4.8, 6.4.4, 6.4.5, 6.A

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	AVO006
Municipality:	Avoca Borough
Subwatershed:	Mill Creek
Stream name:	Local Drainage
Inspected By/Date:	PAK 6/18/2009
Checked By/Date:	

Type of Problem (Highlighted):

1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

Flooding, sedimentation, and groundwater were reported as problems in this area by Avoca Borough. Reportedly, stormwater runoff from I-81, which runs perpendicular to the eastern end of McAlpine Street, is causing the flooding.

Description

Area of McAlpine Street that experiences flooding problems.

Description

Storm drain on McAlpine Street.

Solution	6.4.4, 6.4.10, 6.A, 6.D, 6.E

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	AVO007	Comments
Municipality:	Avoca Borough	Flooding, sedimentation, and water pollution were reported as problems in this area by Avoca Borough. Access to the property was restricted and these problems could were not observed.
Subwatershed:	Mill Creek	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/18/2009	
Checked By/Date:	DEW 1/7/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Manhole for combination sewer system located next to the railroad tracks.

Description

RCP culvert aligned parallel to the railroad.

Solution	Further investigation required due to access restriction

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	AVO008 and AVO010	Comments
Municipality:	Avoca Borough	This problem area was reported by Avoca Borough. According to forms received by the Borough, stormwater management issues at the Quail Hill Development site are causing flooding and sedimentation problems for the downstream residents on Geddings Street, Pittston Avenue, and Packer Avenue.
Subwatershed:	Mill Creek	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/18/2009	
Checked By/Date:	DEW 1/7/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

This residential development is currently in the construction phase. An empty lot is shown in this photo. Development on other tracts is ongoing and there appeared to be minimal E & S controls in place.

Description

Constructed stormwater conveyance piping and rock lined swales. Stormwater management basin(s), which is expected for this type of development, could not be located.

Solution	6.4.10, 6.6.2, 6.4.5, 6.A, 6.D

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	AVO009	Comments
Municipality:	Avoca Borough	Flooding and groundwater problems in this area were reported by Avoca Borough. Reportedly, flooding is caused by stormwater runoff from the nearby I-81 and mine water surfacing.
Subwatershed:	Mill Creek	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/18/2009	
Checked By/Date:	DEW 1/7/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Intersection of Plane and Williams Streets. The Municipal Borough Maintenance Garage is on the right. No stormwater collection and conveyance systems are visible.

Description

A supervisor at the Municipal Maintenance Garage indicated that stormwater travels down Plane Street and that areas around the playground (shown in the photo) frequently flooded and partially eroded. Curbing was installed in the park to prevent stormwater from flowing onto the sidewalk and prevent erosion.

Solution	6.4.5 in playground area, 6.A, 6.C, 6.D

Luzerne County
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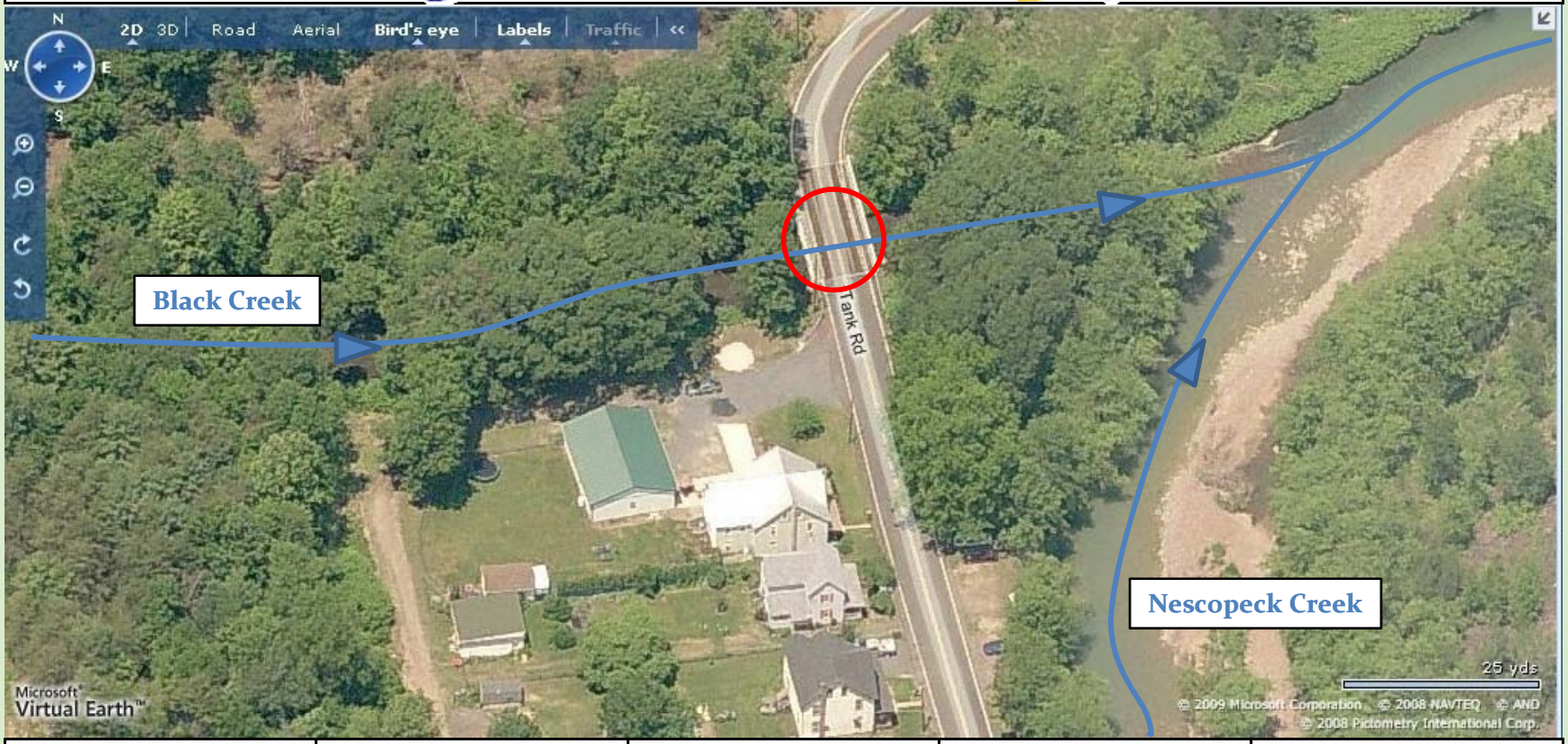

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
BCR001	Black Creek Twp	Nescopeck	Black Creek/ Nescopeck Creek	Proposed Solution: (B)

Explanation: The Conservation District notes in the problem area worksheet that the channel at the upstream face of the bridge became clogged with sediment. Based upon site observations, the problem looks to be the bridge over Black Creek. Options for correcting this condition include maintenance to remove accumulated sediment and replacing the bridge with a structure with an appropriate hydraulic opening.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	BCR001	Inspected By/Date:	PAD 11/12/2080
Municipality:	Black Creek Township	Checked By/Date:	DEW 2/4/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Black Creek		
Drainage Area (mi^2)	61.8		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	2,290	0.06
5	N/A	3,820	0.10
10	N/A	5,050	0.13
50	N/A	8,310	0.21
100	N/A	9,940	0.25
500	N/A	14,400	0.36

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Rocks and sediment from mountain filled a collection basin & culvert causing flooding; blocked storm drain cleaned by property owner to prevent flooding of driveway.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

The Tank Road Bridge has been identified as a problem area by the Conservation District due to a history of debris accumulation, sedimentation, and upstream flooding. Based upon general field observations, this problem is believed to be caused by too small of a hydraulic opening, bridge span low chords below flood elevation, and/or accumulation of sediment and debris causing an obstruction to flow. Possible solutions to this problem are A) removing sediment reducing blocking the hydraulic opening and B) providing more frequent maintenance activities.

Cost Estimates

Option	A	B	C
Cost Range	$1,000-$10,000	$1,000-$5,000/year	N/A

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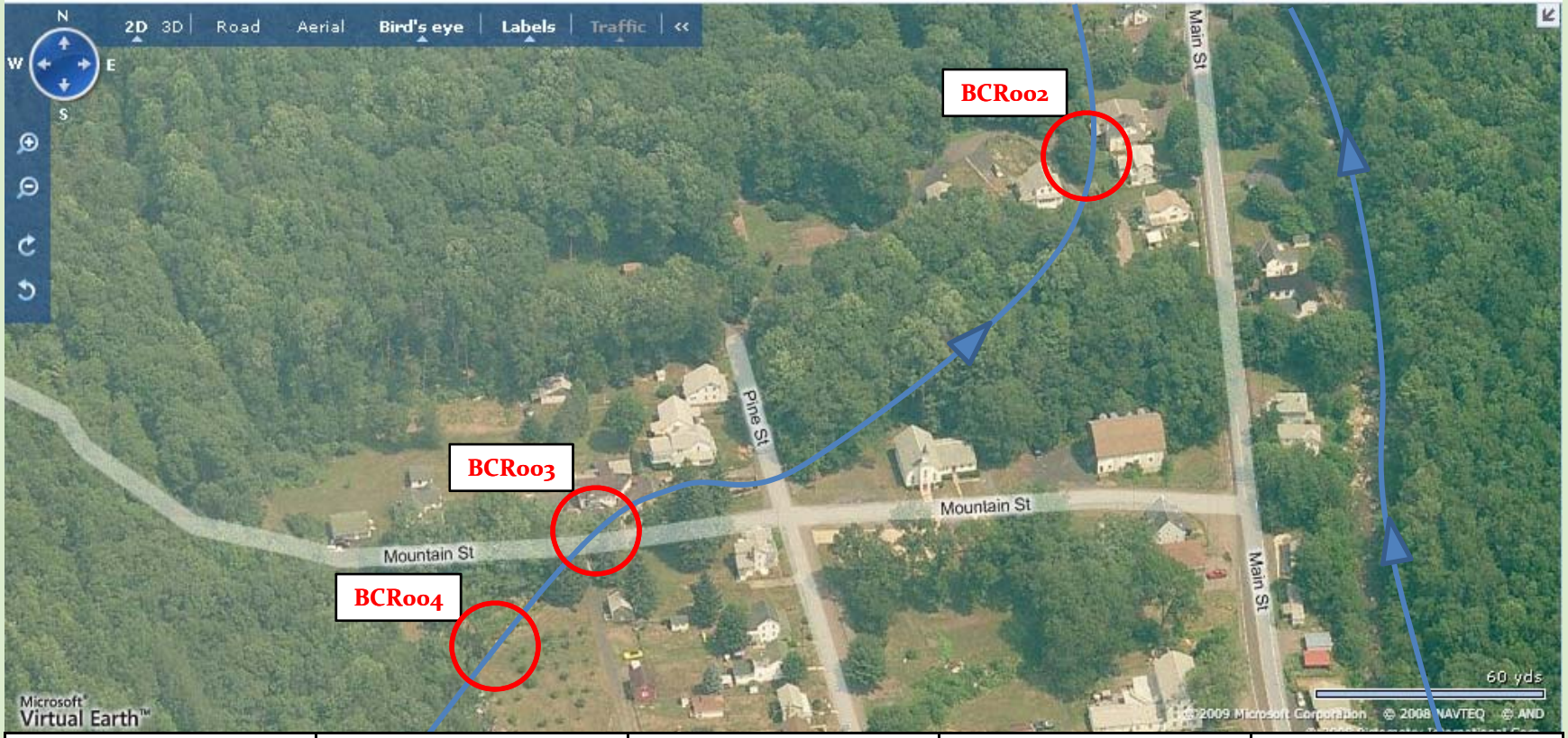

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
BCR002, BCR003, BCR004	Black Creek Twp	Nescopeck	Unnamed Tributary to Black Creek	Proposed Solution (N/A)

Explanation: The problem at this location is regional flooding, which is caused by what appears to be development and channelization of the floodplain. Problems include flooding of nearby roads and homes. Options for correction include construction of a regional detention facility upstream of the area, applying specific floodproofing measures to the homes, or restoring the natural floodplain.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	BCR002	Inspected By/Date:	PAD 11/12/2008
Municipality:	Black Creek Township	Checked By/Date:	DEW 2/4/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to Black Creek		
Drainage Area (mi^2)	1.82		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.16	164	0.14
5	3.91	226	0.19
10	4.57	272	0.23
50	6.53	514	0.44
100	7.63	652	0.56
500	10.98	1,070	0.92

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Conservation District reported washed out driveways; blockage caused by retaining walls; large boulders remain in stream channel; gravel bars in creek; bank erosion in back lots along Tomhicken Rd. Site Visit: Channelized stream that is included in a detailed FEMA study. The channel is approximately 10-11 feet wide, 4 feet deep, has vertical side walls, a natural bottom. The composition of the sidewalls vary from stone to concrete.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Repeated flooding in Rock Glen has been identified by the Conservation District. Based upon general field observations, this problem is believed to be caused by structures constructed in FEMA floodplain with floor elevation below flood elevation and the channelization of the tributary which has resulted in flood damage. Possible solutions to this problem are A) construction of a regional basin upstream, B) raise or apply flooding proof measure to structures, or C) remove structures the floodplain and reestablish a stream buffer.

Cost Estimates

Option	A	B	C
Cost Range	further invest. req'd	further invest. req'd	further invest. req'd

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	BCR003	Inspected By/Date:	PAD 11/12/2080
Municipality:	Black Creek Township	Checked By/Date:	DEW 2/4/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to Black Creek		
Drainage Area (mi^2)	1.81		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.16	164	0.14
5	3.91	226	0.20
10	4.57	272	0.23
50	6.53	514	0.44
100	7.63	652	0.56
500	10.98	1,070	0.92

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	TConservation District reported relocated stream channel, bridge may have been blocked which redirected flow across Mtn. Road and down driveways during June 2006 flood. Property damage including 1.5' of water on first floor of adjacent residence. Site Visit: Creek overflows into backyard; deficient size bridge; steps at bottom undermined by scour hole; channelized stream; erosion and flooding problems.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Repeated flooding in Rock Glen has been identified by the Conservation District. Based upon general field observations, this problem is believed to be caused by structures constructed in floodplain with floor elevation below flood elevation and channelization of the tributary which has resulted in flood damage. Possible solutions to this problem are A) construction of a regional basin upstream, B) raise or apply flood proofing measure to structures, or C) remove structures in the floodplain and reestablish a stream buffer.

Cost Estimates

Option	A	B	C
Cost Range	further invest. req'd	further invest. req'd	further invest. req'd

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	BCR004	Inspected By/Date:	PAK 12/3/2008
Municipality:	Black Creek Township	Checked By/Date:	DEW 2/4/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to Black Creek		
Drainage Area (mi^2)	1.81		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.16	164	0.14
5	3.91	226	0.20
10	4.57	271	0.23
50	6.53	513	0.44
100	7.63	651	0.56
500	10.98	1,070	0.92

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Conservation District reported overflow of tributary into backyard of adjacent properties and basement flooding of up to 4 feet. Site visit: Deficient size bridge; sediment buildup under bridge.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Repeated flooding in Rock Glen has been identified by the Conservation District. Based on field observations, this problem is believed to be caused by structures constructed in the floodplain with floor elevation below flood elevation and restrictions created by a deficient bridge. Possible solutions to these problems are A) replace the bridge with a properly sized structure, B) raise or apply flooding proof measure to structures, or C) remove structures the floodplain and reestablish a stream buffer.

Cost Estimates

Option	A	B	C
Cost Range	further invest. req'd	further invest. req'd	further invest. req'd

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
BCR005	Black Creek Twp	Nescopeck	Swale to Black Creek	Proposed Solution: (A)

Explanation: This is the location of a former strip mine. Stormwater travels down gradient across unstabilized soil causing erosion. Sediment is deposited in downstream areas causing impacts including a blocked culvert.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	BCR005	Inspected By/Date:	PAD 11/12/2008
Municipality:	Black Creek Township	Checked By/Date:	DEW 2/4/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to Black Creek		
Drainage Area (mi^2)	3.56		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	313	0.14
5	N/A	428	0.19
10	N/A	520	0.23
50	N/A	972	0.43
100	N/A	1,228	0.54
500	N/A	2,006	0.88

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Property is adjacent to an abandoned mine. Uncontrolled runoff crossing unvegetated land appears to be causing erosion and downstream sedimentation. A culvert to the east of the site has become clogged with sediment.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Prior strip mining activity at the Yamulla Property has been identified as the cause of stormwater problems by the Conservation District. Based upon general field observations, stormwater problems at this location include increased runoff rate and volume caused by unvegetated bare-soil conditions. Additional impacts include soil erosion, sediment laden runoff entering waterways, and clogging of a downstream culvert. Possible solutions to this problem include A) drainage control with stabilized swales and sediment traps/basins, B) reclaiming the mine by establishing vegetative cover or C) annual maint. to remove sediment.

Cost Estimates

Option	A	B	C
Cost Range	$100,000-$250,000	$1,000,000-$4,000,000	$2,000/year

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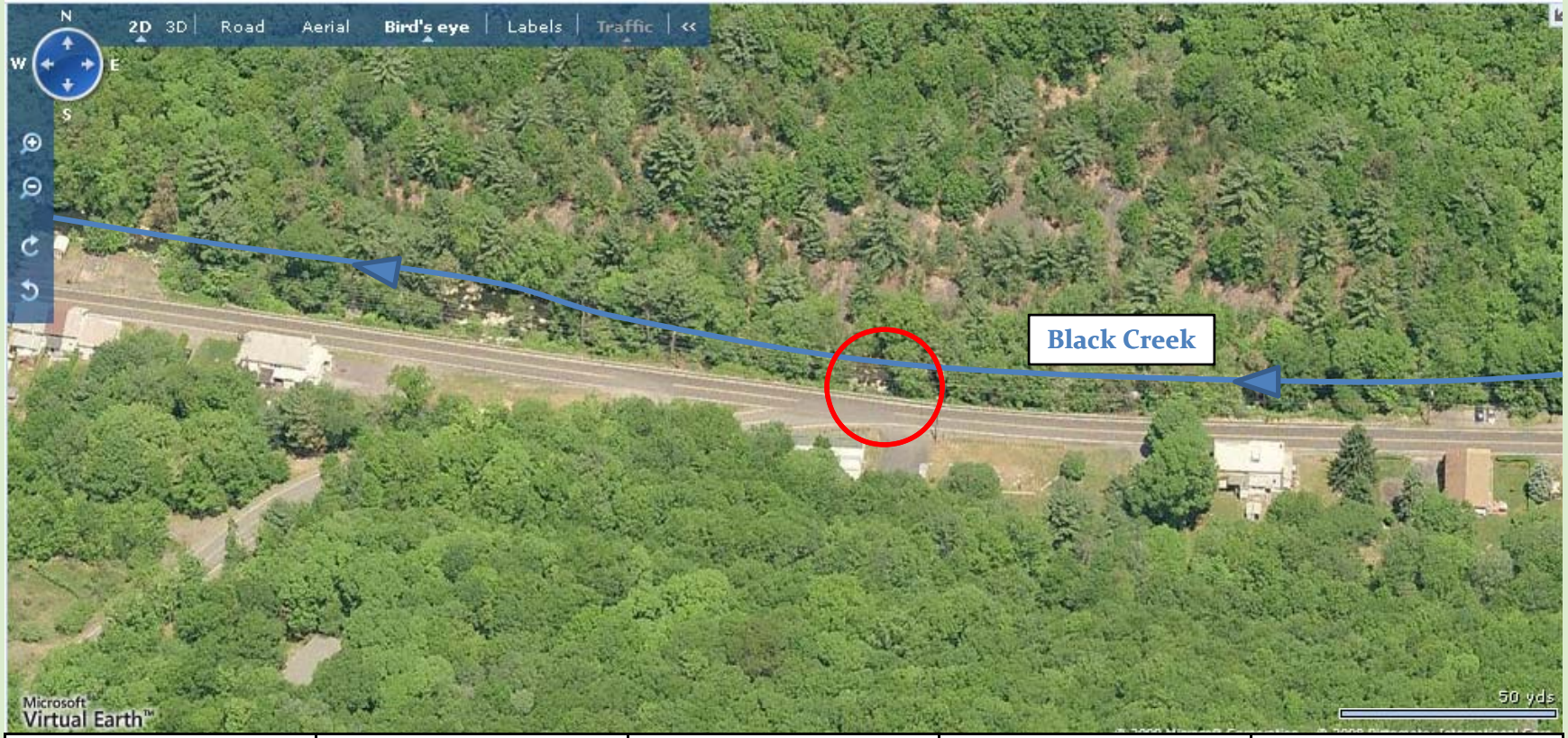

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
BCR006	Black Creek Twp	Nescopeck	Black Creek	Proposed Solution (A)

Explanation: The Luzerne Conservation District reports that a collapsed mine has caused significant erosion leading to property loss. Options for correction involve armoring the banks with riprap and placement of natural vegetation to stabilize the banks.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Problem Area ID:	BCR006	Inspected By/Date:	PAD 11/12/2008
Municipality:	Black Creek Township	Checked By/Date:	DEW 2/4/2010
Subwatershed:	Nescopeck Watershed	No Photo Available	
Stream name:	Black Creek		
Drainage Area (mi^2)	45.8		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	1730	0.06
5	N/A	2920	0.10
10	N/A	3870	0.13
50	N/A	6390	0.22
100	N/A	7660	0.26
500	N/A	11,200	0.38

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	After the June 2006 flood, large subsidence was caused by subsurface mine collapse. The mine collapse caused changes in runoff patterns resulting in erosion. This has led to structural problems for nearby residential properties.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Streambank erosion near the intersection of Tomhicken and Nuremburg Mtn. Road has been identified by the Conservation District. Based upon the forms and aerial photography, this problem is believed to be caused by a subsurface mine collapse which caused Black Creek to detour slightly. Possible implications are undercutting of the bank resulting in instability and loss of trees and vegetation, steep and hazardous stream banks, as well as documented damage to existing structures and utilities. Possible solutions to this problem are A) restoration and stabilization of the stream bank

Cost Estimates

Option	A	B	C
Cost Range	$25,000-$50,000	N/A	N/A

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
BUT001	Butler Twp	Nescopeck	Little Nescopeck Creek	Proposed Solution (N/A)

Explanation: The Luzerne Conservation District stream bank erosion at this location. The little Nescopeck passes behind a private residence that includes a privately owned stone arch bridge, which appears to be undersized. This problem appears to have been corrected with the channel lined with riprap upstream of the bridge.

Note: Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	BUT001	Inspected By/Date:	PAK 12/3/2008
Municipality:	Butler Township	Checked By/Date:	DEW 2/4/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Little Nescopeck Creek		
Drainage Area (mi^2)	3.85		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	390	0.16
5	N/A	529	0.21
10	N/A	640	0.26
50	N/A	1,172	0.48
100	N/A	1,471	0.60
500	N/A	2,372	0.96

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	The Little Nescopeck Creek crossing by a stone arch bridge was observed across a private residence. Riprap is present on both left and right banks upstream of the bridge. No riparioan buffer present, the house appeared to be out of the floodplain.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Streambank erosion along Little Nescopeck Creek, at the property of 190 Middle Road, was reported by the Conservation District. Based upon general field observations, this problem is believed to be caused by an undersized bridge that is creating high stream flow velocities. Possible implications are undercutting of the bank resulting in instability and loss of trees and vegetation, steep stream banks, downstream deposition of sediment. Based upon field observations, this problem has been addressed by armoring the stream banks with riprap.

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

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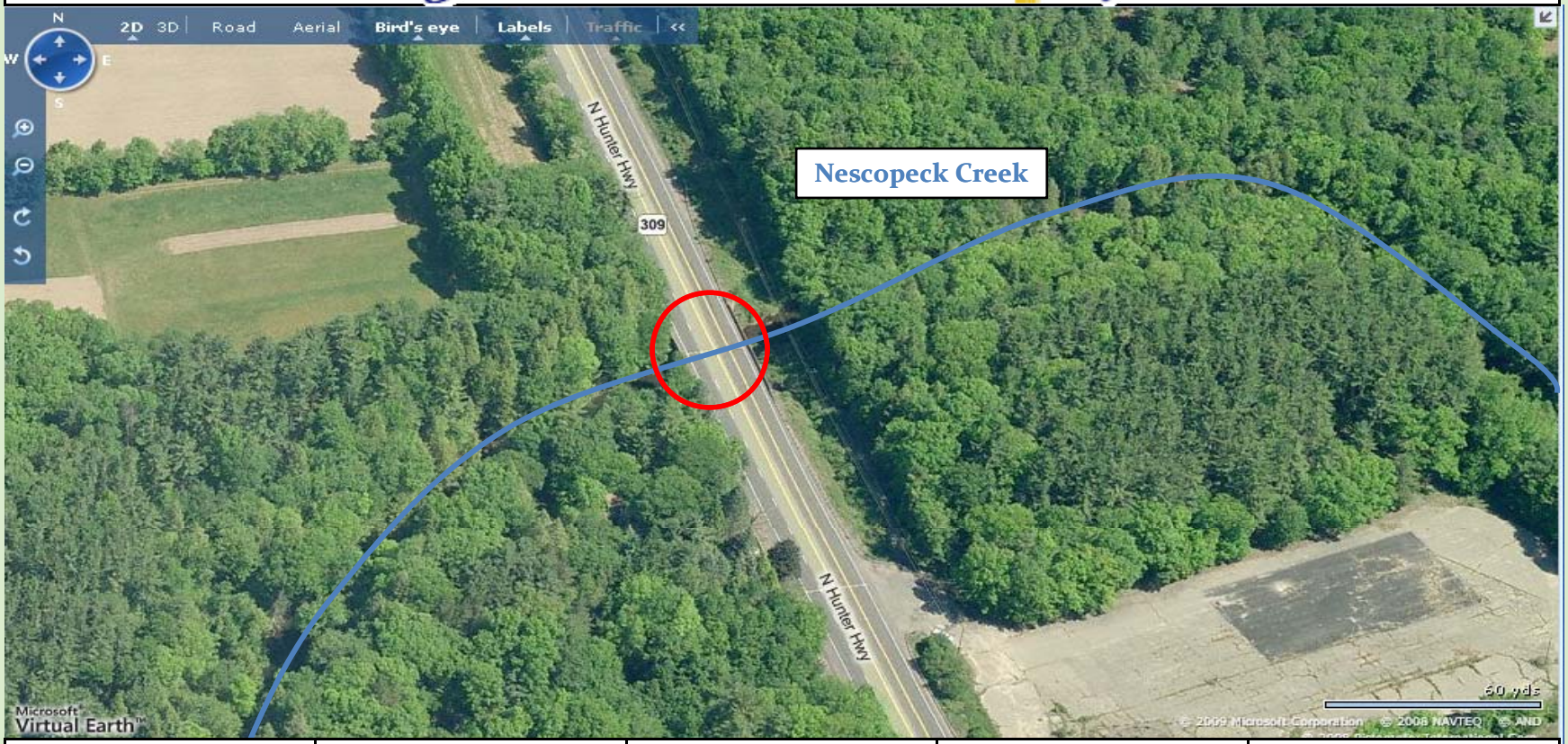

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
BUT002	Butler Twp	Nescopeck	Nescopeck Creek	Proposed Solution (B)

Explanation: The two span bridge carrying Rt. 309 over the Nescopeck Creek has flow though only the northern span due to sedimentation. Additionally fallen trees caused by erosion block the flow upstream of the bridge. Options for correction include clearing the sediment under the southern span and removing the fallen trees.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	BUT002	Inspected By/Date:	PAK 12/3/2008
Municipality:	Butler Township	Checked By/Date:	DEW 2/4/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Black Creek		
Drainage Area (mi^2)	47.4		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	1,680	0.06
5	N/A	2,840	0.09
10	N/A	3,760	0.12
50	N/A	6,250	0.21
100	N/A	7,510	0.25
500	N/A	11,000	0.36

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Stream bank erosion upstream of 309 bridge, tree root exposure, and sediment deposition under the bridge were observed.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

The Route 309 Bridge over Nescopeck Creek has been identified as a problem area by the Conservation District due to a history of debris accumulation and sedimentation. Based upon general field observations, this problem is believed to be caused by accumulation of sediment and debris under the southern span causing an obstruction of flow. Possible solutions to this problem are A) restore and stabilize stream bank upstream of the bridge B) provide more frequent maintenance activities to remove sedimentation under bridge.

Cost Estimates

Option	A	B	C
Cost Range	$25,000-$50,000	$5,000-$10,000/year	N/A

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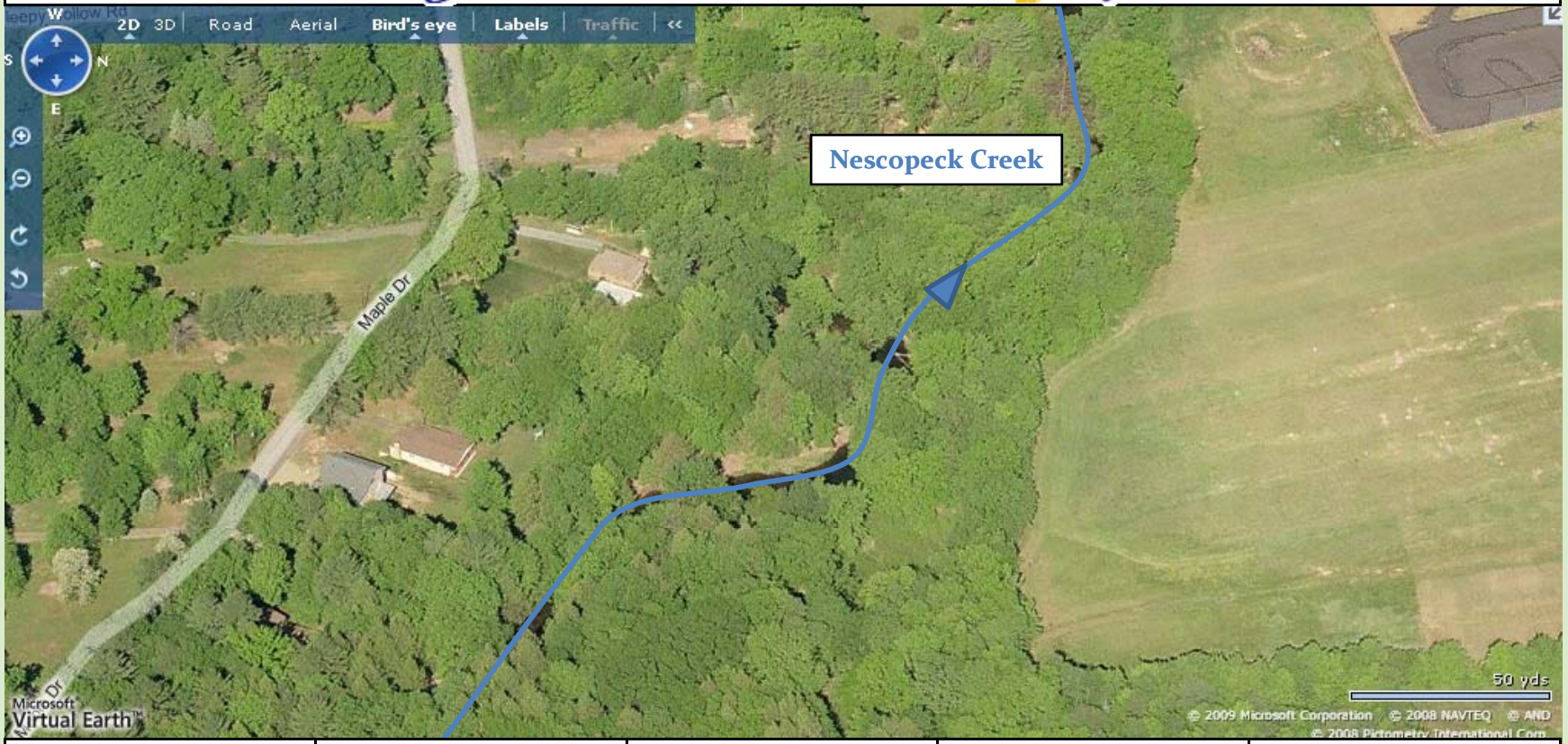

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
BUT003	Butler Twp	Nescopeck	Nescopeck Creek	Proposed Solution (B)

Explanation: The Conservation District reports that houses located along Maple Dr. are experiencing flooding. Additional issues include stream erosion and what looks to be insufficiently-sized conveyance systems. Options for correction include construction of a floodwall or levee, floodproofing the houses, or changing the stream configuration to allow more flow to be carried within the banks.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Problem Area ID:	BUT003	Inspected By/Date:	PAK 12/3/2008
Municipality:	Butler Township	Checked By/Date:	DEW 2/4/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Black Creek		
Drainage Area (mi^2)	47.8		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	1,700	0.06
5	N/A	2,850	0.09
10	N/A	3,790	0.12
50	N/A	6,290	0.21
100	N/A	7,510	0.25
500	N/A	11,100	0.36

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Homes along creek appear to be within the floodplain. Additional problems include heavy bank erosion along the Nescopeck Creek and a drainage swale-culvert system that appears to be undersized to handle large flows.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Repeated flooding at private residences on Maple Drive along the Nescopeck Creek have been identified by the Conservation District. Based upon general field observations, this problem is believed to be caused by construction in floodplain with floor elevation below the flood elevation, which has resulted in flood damage. Possible solutions to this problem are A) construction of a floodwall or levee, B) apply flooding proof measure to structures, C) remove structure from the floodplain. Additional investigation required to develop costs for these options.

Cost Estimates

Option	A	B	C
Cost Range	Addn'l invest. Req'd	Addn'l invest. Req'd	Addn'l invest. Req'd

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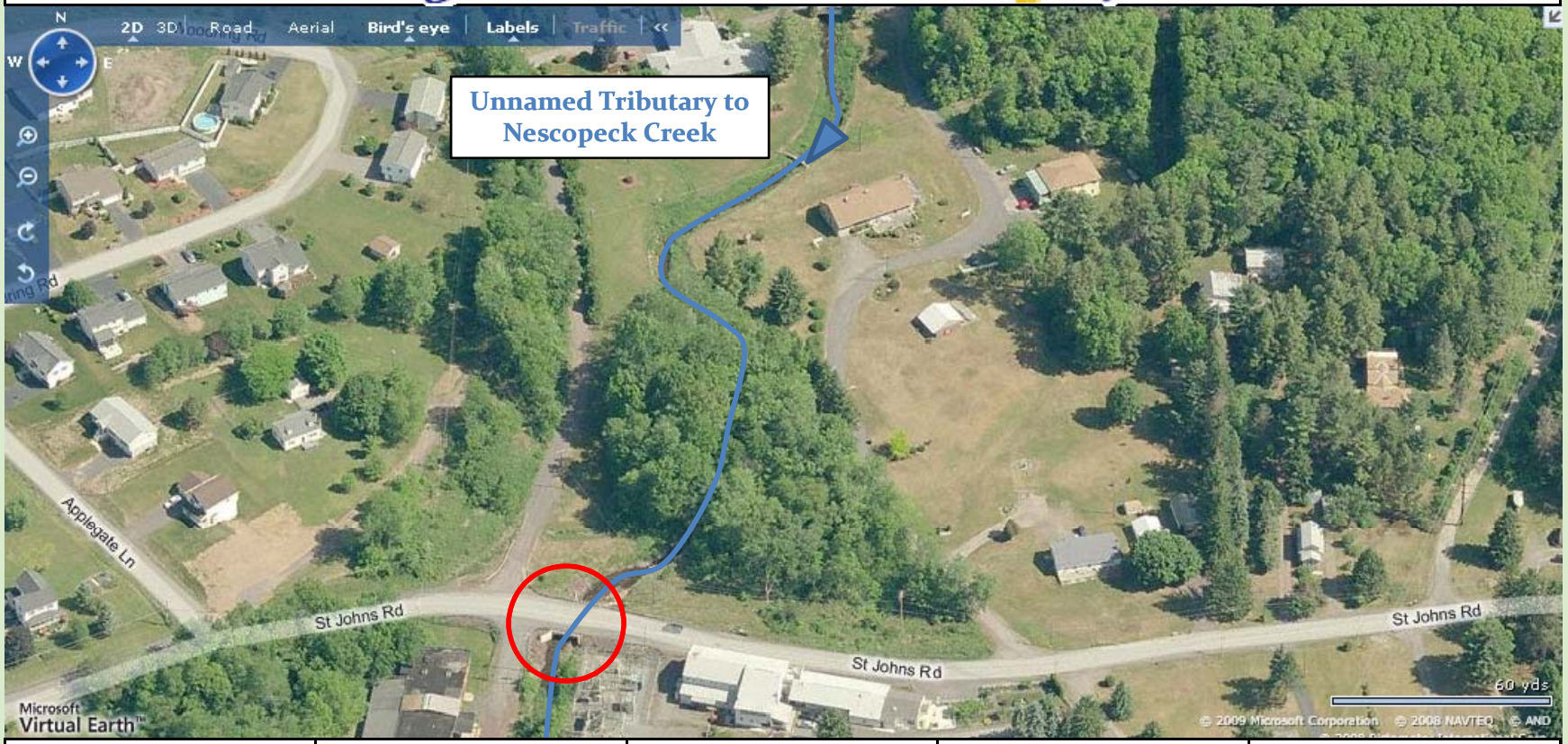

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
BUT004	Butler Twp	Nescopeck	Trib to Nescopeck Creek	Proposed Solution (B)

Explanation: The Conservation District reports that this problem extends from the culvert at St. Johns Road to Rumble Dam. Based on preliminary hydraulic calculations, the channel appears undersized to convey runoff from significant rainfall events. Options for correction include removal of debris from the stream channel and changing the stream configuration to allow more flow to be carried within the banks.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	BUT004	Inspected By/Date:	PAK 12/3/2008
Municipality:	Butler Township	Checked By/Date:	DEW 2/4/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to Nescopeck Creek		
Drainage Area (mi^2)	4.75		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	423	0.14
5	N/A	565	0.19
10	N/A	675	0.22
50	N/A	1,207	0.40
100	N/A	1,498	0.49
500	N/A	2,355	0.77

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Houses built along the tributary appear to be built within the floodplain. Bank erosion is present upstream of the culvert under St. Johns Road.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Repeated flooding at private residences north of St. Johns road along a tributary to Nescopeck Creek have been identified by the Conservation District. Based upon general field observ., this problem is believed to be caused by a structures constructed in the floodplain with floor elevation below the flood elevation, which has resulted in flood damage. Possible solutions to this problem are A) to remove debris from the stream channel, or B) changing the stream configuration to allow more flow to be carried within the banks.

Cost Estimates

Option	A	B	C
Cost Range	$5,000	$10,000-$30,000	N/A

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNB001	Conyngham Boro	Nescopeck	Trib to Little Nescopeck Creek	Proposed Solution (N/A)

Explanation: This is the same reach from Problem Areas CNB004, CNB005, CNB006, and CNB010. Due to development within the floodplain, a number of different problems have arisen. These include flooding, erosion, and water quality issues. Due to the complexity of the problem and the configuration of the existing conveyance, an in-depth analysis is required to see what the impact removal of the house, reestablishing the buffer, or altering the channel would have upon the tributary as a whole.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Problem Area ID:	CNB001	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/5/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to Little Nescopeck		
Drainage Area (mi^2)	0.6		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.16	121	0.32
5	3.91	192	0.50
10	4.57	270	0.70
50	6.53	339	0.88
100	7.63	419	1.09
500	10.98	652	1.70

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	At this location, the channel travels under a house, makes two 90 degree bends within 100 feet of one another, and is eroding. Due to its location, the structure is subject to regular flooding.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

A multitude of problems along the tributary that passes under S. Main St. have been identified by the Municipality. Based upon general field observations, these problems are believed to be caused by a structure constructed in FEMA floodplain with floor elevation below flood elevation. Possible implications are flooding, property damage, road closures, and eventual structure failure. Due to the complexity of the problem and configuration of existing conveyance, a more in-depth analysis of the problem area is required. Analysis should consider removal of the house with the culvert under it and reestablishment of the floodplain.

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNB002	Conyngham Boro	Nescopeck	Trib to Little Nescopeck Creek	Proposed Solution (A)

Explanation: This problem located along Route 93 appears to have recently been modified. A stone channel has been placed as well as new culverts leading to it. The culvert at CNB002 appears to be causing some erosion issues near the inlet. Options for correction involve stabilizing the banks as well as removing the silt fence.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	CNB002	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/5/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to the Little Nescopeck Creek		
Drainage Area (mi^2)	0.56		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.40	102	0.28
5	4.22	142	0.40
10	4.95	169	0.47
25	6.10	248	0.69
50	7.16	319	0.89
100	8.43	406	1.13

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Runoff is directed into a culvert system along SR 93. North of the intersection of SR 93 and Brookhill Road is a new culvert. Erosion is occurring on the west side of SR 93 and there are low points on the East side which result in ponding condition.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Erosion and flooding problems at this location has been identified by the Conservation District. Based upon general field observations, this problem is believed to be caused by unvegetated/stabilized areas and areas with little or no slope. Possible solutions to this problem are A) stabilization with seeding and erosion control blankets and grading of swales/depressions to promote positive drainage. Detailed topographic surveying would be needed to determine the feasibility of regrading.

Cost Estimates

Option	A	B	C
Cost Range	$5,000-$25,000	N/A	N/A

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNB003	Conyngham Boro	Nescopeck	Trib to Little Nescopeck Creek	Proposed Solution (A)

Explanation: Conyngham Boro reports flooding, drainage, and erosion problems on the western side of South Main Street. Based upon the map location and site observations, this area was deemed to be located off of Wolfe Lane which intersects South Main Street. A culvert system that had significant channel erosion upstream of the culvert was found. Downstream of the culvert was a large scour hole.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	CNB003	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/18/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to the Little Nescopeck Creek		
Drainage Area (mi^2)	0.09		
Calculation Method	Rational Method		
C (Tc)	0.28 (60 min)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	1.31	21	0.36
10	1.86	30	0.52
25	2.19	35	0.61
50	2.46	40	0.69
100	2.76	47	0.82
500	3.57	57	0.99

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	A 36" culvert is present under Wolfe Lane. The channel side slopes are beginning to erode upstream of the culvert and a scour hole is starting to form immediately downstream of the culvert.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Streambank erosion at Wolfe Lane off of S. Main Street, has been identified by the municipality. Based upon general field observations, this problem is believed to be caused by an undersized culvert that is producing high velocities and insufficient outlet protection. Possible implications are undercutting of the bank resulting in instability, loss of trees and vegetation, and downstream deposition of sediment. Possible solutions to this problem are A) stabilization of the stream bank and armoring banks or B) replacing structure.

Cost Estimates

Option	A	B	C
Cost Range	$2,000-$5,000	$20,000-$30,000	N/A

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNB004	Conyngham Boro	Nescopeck	Trib to Little Nescopeck Creek	Proposed Solution (A)

Explanation: This is the same reach from Problem Areas CNB004, CNB005, CNB006, and CNB010. Due to development within the floodplain a number of different problems have arisen. These include flooding, erosion, and water quality issues. Due to the complexity of the problem and the configuration of the existing conveyance, an in-depth analysis is required to see what impacts modification upstream would have as well as if the recreational area can be allowed to flood because no one will be using it during a storm.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	CNB004	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to the Little Nescopeck Creek		
Drainage Area (mi^2)	0.66		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.40	125	0.30
5	4.22	216	0.51
10	4.95	302	0.71
25	6.10	378	0.89
50	7.16	466	1.10
100	8.43	722	1.71

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Channel is located in a park near the outlet of the tributary. The natural stream channel may have been filled as part of the park construction which created channelization.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Flooding, erosion, and sedimentation problems along the tributary to Nescopeck Creek have been identified by the Municipality at Spring Willows Park. This is the same reach from Problem Areas CNB001, CNB005, CNB006, and CNB010. Options for solution could include restoring a more natural stream channel and floodplain. Based upon general field observations these problems are most likely due to development within the floodplain. Possible solutions include A) establishing a natural stream channel and vegetated buffer.

Cost Estimates

Option	A	B	C
Cost Range	$10,000-$20,000	N/A	N/A

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNB005 & CNB006	Conyngham Boro	Nescopeck	Trib to Little Nescopeck Creek	Proposed Solution (A)

Explanation: This is the same reach from Problem Areas CNB004, CNB005, CNB006, and CNB010. Due to development within the floodplain a number of different problems have arisen. These include flooding, erosion, and water quality issues. Due to the complexity of the problem and the configuration of the existing conveyance, an in-depth analysis is required to see what the impacts of widening the channel, replacing culverts, or removal of downstream obstructions would have on the stream as a whole.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	CNB005 & CNB006	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to the Little Nescopeck Creek		
Drainage Area (mi^2)	0.49		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	87	0.28
5	N/A	117	0.37
10	N/A	141	0.45
25	N/A	203	0.65
50	N/A	259	0.83
100	N/A	324	1.03

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Problem is assumed to be a channel that parallels Sugarloaf Ave. Channel dimensions are typ. 10 feet wide by 2 feet deep with steep sides. Stream cuts through a resid. area with private properties along both banks. Several roadways cross the tributary and there are several outfalls draining to the tributary.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Flooding, erosion, and sedimentation problems along the tributary to Nescopeck Creek, upstream of Smith Drive, have been identified by the Municipality. This is the same reach from Problem Areas CNB001, CNB004, and CNB010. Based upon general field observations these problems are most likely due to development within the floodplain. Possible solutions to these problems include A) reestablishing a natural stream channel and buffer throughout the reach. Agreements with property owners required.

Cost Estimates

Option	A	B	C
Cost Range	$20,000-$50,000	N/A	N/A

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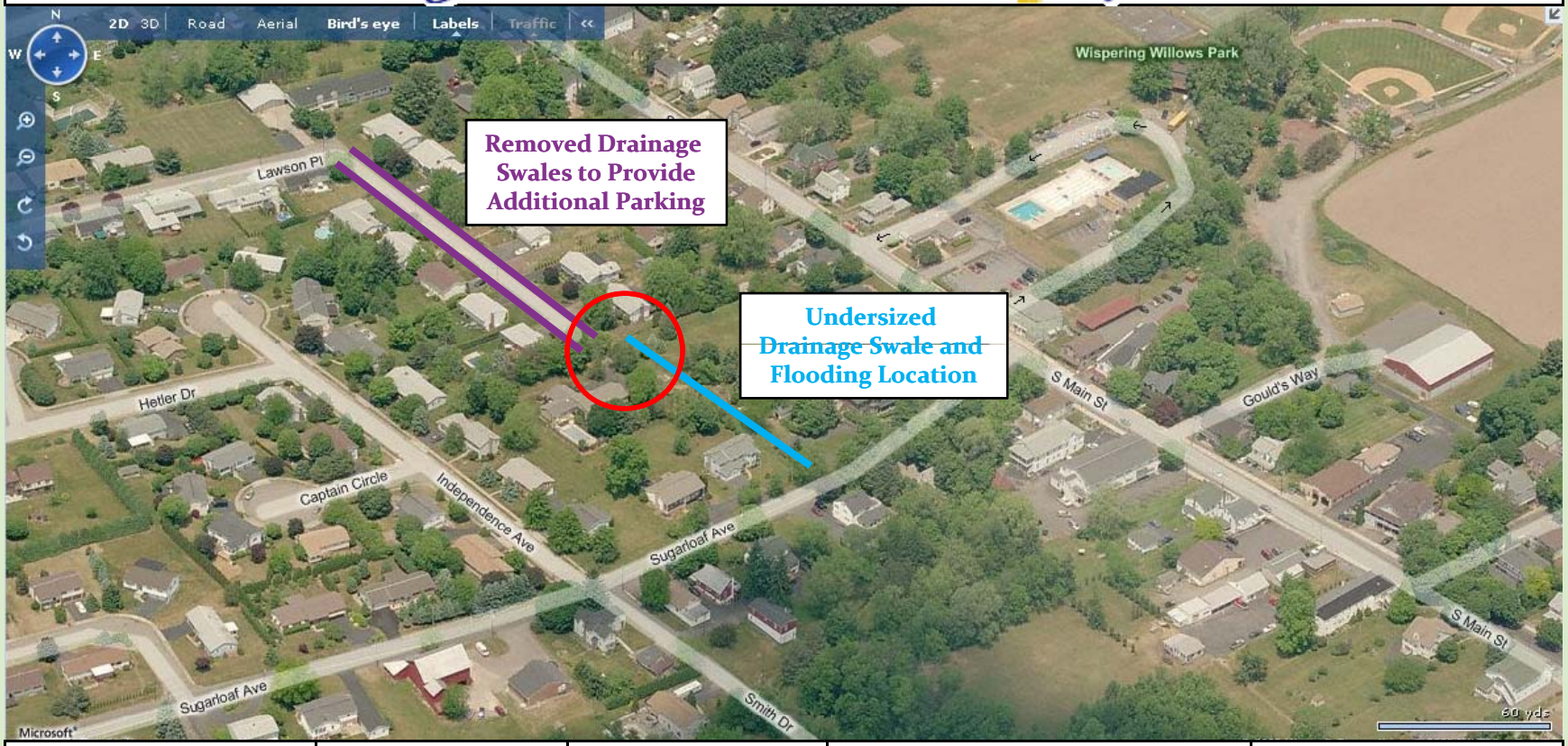

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNB007	Conyngham Boro	Nescopeck	Uncontrolled Drainage	Proposed Solution (N/A)

Explanation: At the termination of Lawson Place, uncontrolled runoff is leaving the site and traveling across multiple homes towards the church located on Sugarloaf Avenue and eventually joining with the tributary seen in CNB005 and CNB006. This problem was believed to be cause due to removal of drainage swales to provide additional parking. Options for correcting include increasing the drainage swales capacity and establishing rain gardens.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	CNB007	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Local Drainage		
Drainage Area (mi^2)	0.03		
Calculation Method	Rational Method		
C (Tc)	0.42 (30 min)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	1.07	16	0.83
10	1.46	21	1.09
25	1.69	24	1.25
50	1.87	27	1.41
100	2.06	30	1.56
500	2.58	37	1.93

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Drainage travels down on west side of Lawson Place until it crosses a private driveway at the end of the street. From there it enters a swale located between two homes. Local homeowner indicated that an existing roadside swale was removed to provide street parking.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Repeated flooding at Lawson Place has been identified by the municipality/ Conservation District. Based upon general field observations, this problem is believed to be caused by inadequate conveyance systems, which has resulted in flood damage. Possible solutions to this problem are to provide measures for runoff conveyance such as a vegetated roadside swale or a stormwater inlet and piping system. Further analysis including topographic and property surveys would be required to determine the feasibility of possible solutions.

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

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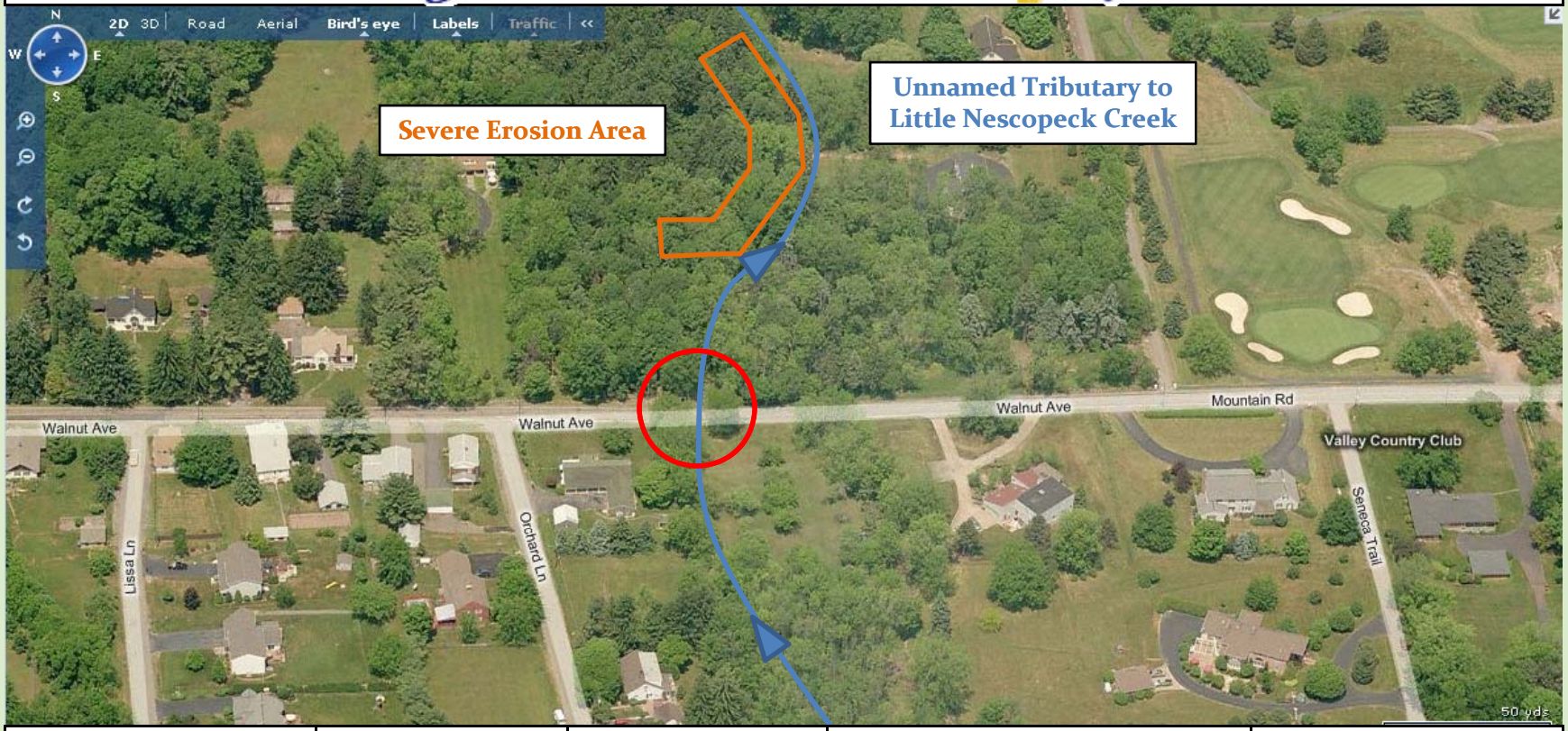

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNBoo8	Conyngham Boro	Nescopeck	Unnamed Trib to Little Nescopeck Creek	Proposed Solutions (A) & (B)

Explanation: A CMP culvert under Walnut Avenue appears to be the source of all the problems at this location. Upstream of the culvert houses are flooded, while downstream there is severe erosion which has caused multiple trees to collapse and block flow. Finally, the culvert itself looks like it is beginning to rust. Options for correction include replacement of the culvert, armoring the stream banks downstream, and modifying the channel upstream.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	CNB008	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Unnamed Trib to the Little Nescopeck		
Drainage Area (mi^2)	0.12		
Calculation Method	Rational Method		
C (Tc)	0.28 (30 min)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	1.07	47	0.61
10	1.46	64	0.83
25	1.69	74	0.96
50	1.87	81	1.05
100	2.06	90	1.17
500	2.58	113	1.47

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	An undersized CMP culvert under Walnut Ave appears to be the source of flooding at this location. Flooding is reported upstream of the culvert. In addition to being undersized, the culvert is also in a deteriorated condition due to rusting. Streambank erosion downstream of the culvert is also present.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Repeated flooding upstream of the culvert has been identified by the municipality/ Conservation District. Based upon general field observations, this problem is believed to be caused by insufficient capacity. Streambank erosion is also present downstream of the culvert which has undermined several trees. Possible solutions include (A) replacing the culvert under Walnut Ave and (B) stabilizing the downstream channel.

Cost Estimates

Option	A	B	C
Cost Range	$10,000-$20,000	$5,000	N/A

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNB009 & SUG003	Conyngham Boro	Nescopeck	Little Nescopeck Creek	Proposed Solution (N/A)

Explanation: This area adjacent to the Little Nescopeck Creek appears to be about the discharge points from multiple farms located up gradient. Additionally, acid mine drainage has been detected in the area. As such, this area is a major entry point for nonpoint source pollutions. Options for correction involve establishment of proper nutrient programs and agricultural methods for the farms, establishing buffers between the individual farms and increasing the buffer between the Little Nescopeck and the last farm.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	CNB009 & SUG003	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck		
Stream name:	Little Nescopeck		
Drainage Area (mi^2)	10.7		
Calculation Method	NSS StreamStats		
C (Tc)	N/A		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2.33	3.40	519	0.08
5	4.22	904	0.13
10	4.95	1210	0.18
25	6.10	2030	0.30
50	7.16	2440	0.36
100	8.43	3570	0.52

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Numerous reports have listed water quality problems in this area. Numerous farms and mines are located in this area which may be the cause of both stormwater and groundwater quality problems.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Possible solutions to the water quality problems would include establishing more effective vegetated buffers between the farm land and streams along with mine reclamation. Due to the extent and complexity of the problem, further investigation would be required to determine the most effective solution and associated costs.

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

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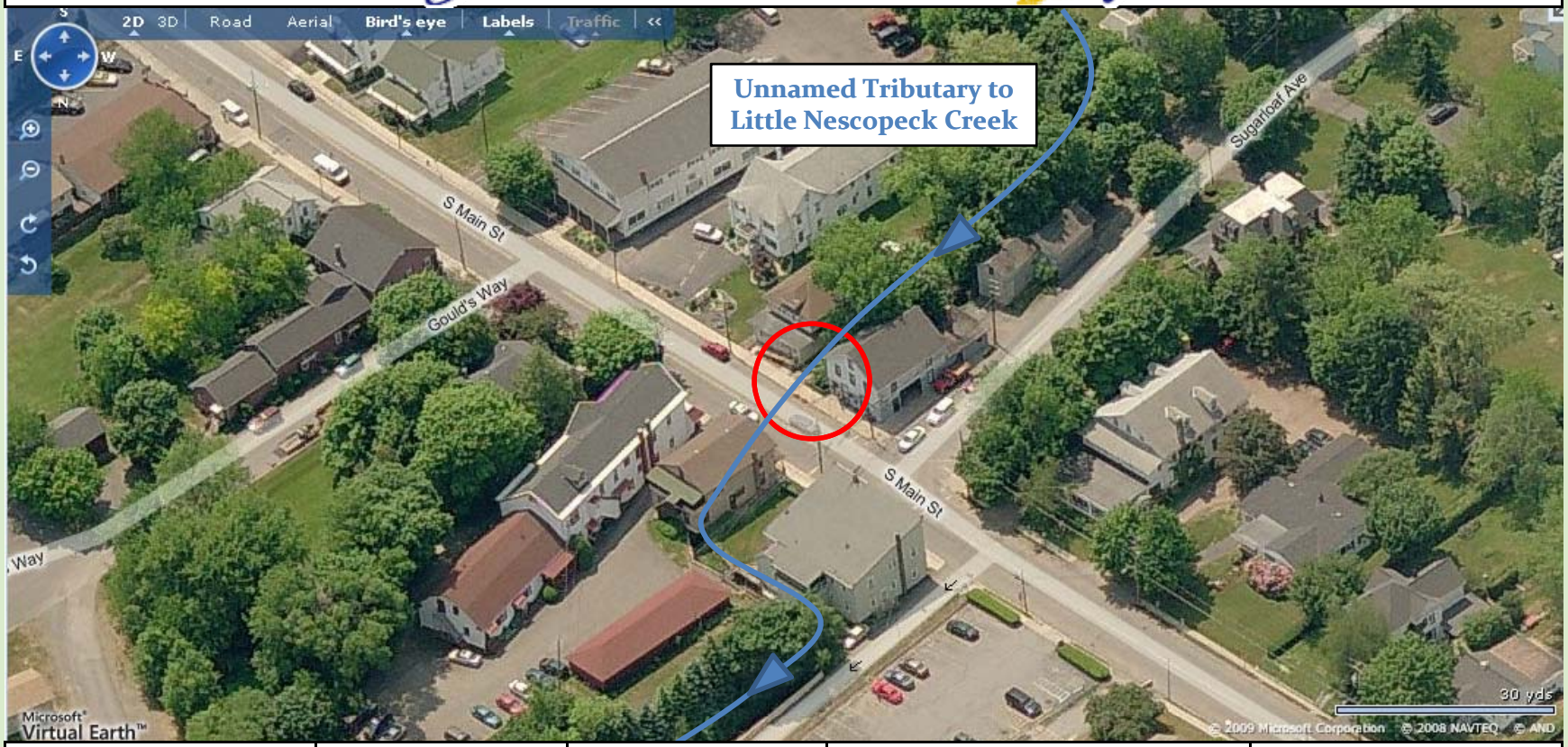

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNB010	Conyngham Boro	Nescopeck	Trib to Little Nescopeck Creek	Proposed Solution (N/A)

Explanation: This is the same reach from Problem Areas CNB004, CNB005, CNB006, and CNB010. Due to development within the floodplain, a number of different problems have arisen. These include flooding, erosion, and water quality issues. Due to the complexity of the problem and the configuration of the existing conveyance, an in-depth analysis is required to see what the impact removal of the house or reestablishing the buffer would have upon the tributary as a whole.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	CNB010	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to Little Nescopeck		
Drainage Area (mi^2)	0.6		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.16	121	0.32
5	3.91	192	0.50
10	4.57	270	0.70
50	6.53	339	0.88
100	7.63	419	1.09
500	10.98	652	1.70

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	This location is upstream from CNB001. Homes are located on the top of banks approximately 150 feet upstream of culvert under Main Street. Stream erosion is present.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Flooding, and water pollution problems along the tributary to Little Nescopeck Creek have been identified by the Municipality in the vacinity of South Main Street. This is the same reach from Problem Areas CNB001, CNB004, CNB005, and CNB006. Based upon general field observations these problems are most likely due to development within the floodplain. Due to the complexity of the problem and configuration of existing conveyance, a more in-depth analysis of the problem area is required. Solutions should consider reestablishment of the floodplain though the reach.

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

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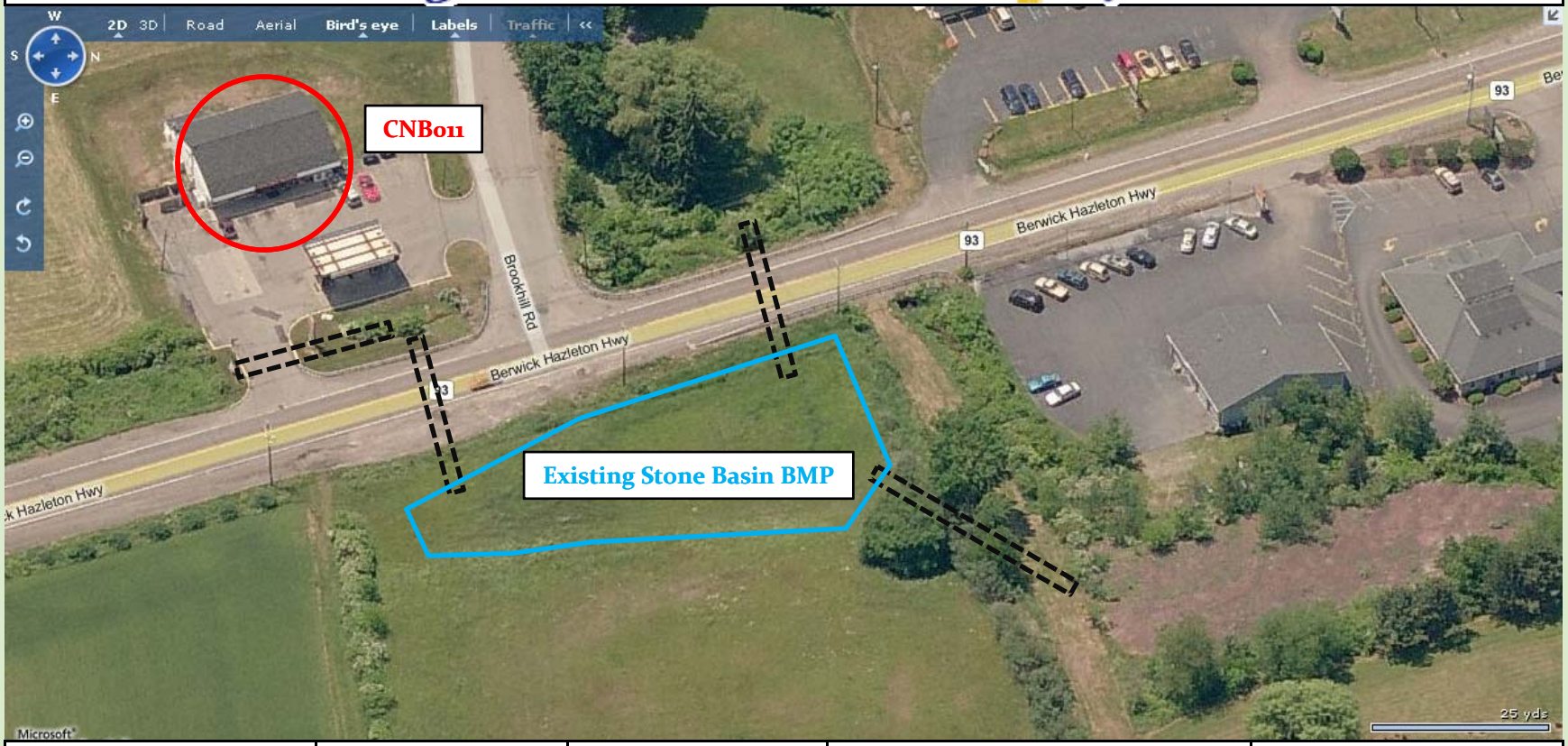

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNB011	Conyngham Boro	Nescopeck	Trib to Little Nescopeck Creek	Proposed Solution (A)

Explanation: This is the same reach from Problem Areas CNB002. The municipality writes that this is a location of water quality issues, and on the map pinpointed the gas station. While the Turkey Hill could be a point source of pollution, Route 93 is a principal arterial connection though the area and a possible nonpoint source pollutant. Options for correction include replacing the stone in the Turkey Hill bmp with natural vegetation and installing a water quality bmp along the road.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Problem Area ID:	CNB011	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to the Little Nescopeck Creek		
Drainage Area (mi^2)	0.56		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.40	102	0.28
5	4.22	142	0.40
10	4.95	169	0.47
25	6.10	248	0.69
50	7.16	319	0.89
100	8.43	406	1.13

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Potential sources of water quality problems at this location include runoff from the Turkey Hill gas station and roadside runoff.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Water quality problems have been identified by the Municipality at this location. Based upon general field observations, this problem is believed to be caused by a lack of pretreatment of the surface runoff from the Turkey Hill gas station and/or roadway. Solutions could include (A) installing a manufactured water quality device on the Turkey Hill property, (B) converting the rock lined basin into a vegetated BMP, and (C) establishing more effective vegetated BMPs along the roadway.

Cost Estimates

Option	A	B	C
Cost Range	$15,000	$5,000	requires further invest.

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
CNB012	Conyngham Boro	Nescopeck	Trib to Little Nescopeck Creek	Proposed Solution (N/A)

Explanation: Water quality issues have been reported by the municipality at this reach by Brookhill Road. Site observation noted that erosion has caused a channel of sort that allows stormwater runoff carrying nonpoint source pollution to drain directly into the stream. Additionally, no buffer is present and the grass is mowed up to the stream banks. Options for correction include fixing the erosion channel that allows for nonpoint source pollution direct entry to the stream and establishing a buffer along the stream.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Problem Area ID:	CNB012	Inspected By/Date:	PAK 11/26/2008
Municipality:	Conyngham Borough	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib A in Conyngham FIS		
Drainage Area (mi^2)	0.56		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.40	165	0.46
5	4.22	230	0.64
10	4.95	284	0.79
25	6.10	423	1.18
50	7.16	553	1.54
100	8.43	711	1.98

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Channel erosion along banks. Nonpoint source pollution from roadway runoff may also be present. Adjacent lawns are maintained to stream bank, no buffer present.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Water quality problems were reported near the culvert carrying Brookhill Road over a tributary to the little Nescopeck by the Municipality. This problem is believed to be caused by nonpoint source runoff from the roadway and adjacent residential properties. Stream bank erosion is also present. Possible solutions would include stream bank stabilization with proper vegetation or rock lining and or reestablishing a vegetated stream buffer. Further analysis will be required to determine optimal solutions(s) and associated costs.

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	DEN001	Comments
Municipality:	Dennision Township	Flooding problems were identified in the vicinity of 7th Street and Middleburg Road by Dennison Township. According to the municipal documentation, adequate drainage is not provided under nearby railroad tracks. Site observation revealed the apparent problem to be an undersized culvert and swale along 7th street that is conveyed under Middleburg Road. The railroad tracks appeared to be significantly downgradient and not a cause of flooding.
Subwatershed:	Lehigh River	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 1/21/20010	
Checked By/Date:	DEW 2/3/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Upstream face of culvert under Middleburg Road. Middleburg Road is presumed to be the state road identified as having a history of flooding. Based upon site observations this culvert is likely the cause of the flooding. Culvert is partially clogged and could be potentially undersized.

Description

Channel upstream of the culvert. The channel may not have capacity to handle large flows. Both banks have begun to erode due to the steep topography of the area which results in high water velocities.

Solution	6.4.8, 6.7.1, 6.A, 6.B, 6.C

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	DEN001	Comments
Municipality:	Dennision Township	Flooding problems were identified in the vicinity of Hazle Street and Chemung/Walnut Streets by Dennison Township. Based on site observations, problems at these locations are thought to be caused by local drainage issues.
Subwatershed:	Lehigh River	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 1/21/20010	
Checked By/Date:	DEW 2/3/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking at a roadside swale running along Hazle Street. The swale is paved and appears to have limited capacity based on size. Private driveway culverts may also cause obstructions to stormwater flow.

Description

Storm Sewer Inlet from swale. Although not indicated by the forms, erosion is another problem at this location. Part of the storm sewer inlet has eroded, and runoff enters directly into the sewer without passing through the grate.

Solution	5.7.1, 6.4.8, 6.4.4, 6.A, 6.B, 6.C

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
DEN002	Dennison Twp	Nescopeck	Trib to Creasy Creek	Proposed Solution (C)

Explanation: Water quality issues have been reported by the municipality at this reach by Tunnel Road. Site observation noted that erosion has occurred directly upstream of a 30-inch culvert. This is believed to be caused by inadequate drainage under the railroad tracks. According to a local resident, debris blocking the culvert under Tunnel Road is another problem. Options for correction include providing better conveyance under the railroad tracks, replacing the culvert under tunnel road, or performing regular maintenance.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	DEN002	Inspected By/Date:	PAK 2/20/2010
Municipality:	Dennison Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to Creasy Creek		
Drainage Area (mi^2)	0.08		
Calculation Method	Rational Equation		
C (Tc)	0.20(60)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	1.25	13	0.25
10	1.83	19	0.37
25	2.20	23	0.45
50	2.53	27	0.53
100	2.89	31	0.61
500	5.39	57	1.11

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Culvert under Tunnel Road was replaced after flooding in 2006 according to a local resident. Debris accumulation has been a documented problem. Severe erosion upstream of the culvert caused by flow diverting around the railroad tracks. Problem seems to have addressed to a degree through maintenance.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Repeated flooding by the railroad tracks near the intersection of Tunnel Road and Fawn Ridge Court, has been identified by the Municipality. Based upon general field observations, this problem is believed to be caused by inadequate drainage under railroad tracks, which results in flooding, erosion, property damage. Possible solutions to this problem are A) Increasing the conveyance under the railroad tracks, B) Increasing the size of the new 30 inch culvert, or C) Performing regular maintenance.

Cost Estimates

Option	A	B	C
Cost Range	further invest. req'd	$40,000-$80,000	$500/year

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	DOR001	Comments
Municipality:	Dorrance Township	Dorrance Township indicated that streambank flooding and streambank erosion were occurring at this location. It appears that the bank has been stabilized with an extended foundation wall and rip rap associated with recent bridge improvements.
Subwatershed:	Wapwallopen	
Stream name:	Little Wapwallopen	
Inspected By/Date:	PAK 6/12/2009	
Checked By/Date:	DEW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description
New bridge structure and recently placed rock.

Description
Looking downstream toward the bridge face.

Solution	NO ACTION REQUIRED

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	DOR002	Comments
Municipality:	Dorrance Township	Dorrance Township reported flooding and erosion problems at this site. The problems appear to be limited capacity of the existing stone arch bridge.
Subwatershed:	Wapwallopen	
Stream name:	Little Wapwallopen	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	DEW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Downstream face of stone arch bridge.

Description

Looking downstream of culvert. Erosion present along both banks, with exposed roots visible on the right bank.

Solution	5.4.2, 6.7.1, 6.A, 6.B, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	DOR003	Comments
Municipality:	Dorrance Township	Dorrance Township reported this problem which consists of a culvert and bridge located in close proximity to each other. The flow paths eventually converge at some point downstream of the road. The specific cause of the flooding could not be determined during field observations.
Subwatershed:	Wapwallopen	
Stream name:	Unnamed Trib	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	DEW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking at the upstream bridge face. There is minimal buffer on the right bank. Downstream of the bridge is a forest; however, a stone retaining wall forms a levee along the left bank.

Description

Upstream culvert face. Culvert is an HDPE pipe in good condition.

Solution	5.4.2, 6.7.1, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	DOR004	Comments
Municipality:	Dorrance Township	Dorrance Township reported flooding at this location. Hollow Road, unpaved, crosses an unnamed tributary by a stone arch bridge. Per conversation with an adjacent homeowner, flooding of open areas upstream of the bridge occur frequently.
Subwatershed:	Wapwallopen	
Stream name:	Little Wapwallopen	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	DEW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Upstream bridge face. The bridge opening is likely undersized and unable to pass larger storms.

Description

Looking downstream from the bridge.

Solution	5.4.2, 6.7.1, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

		Comments
Problem Area - Map ID:	DOR005	Dorrance Township reported flooding at Hollow Rd. Hollow Road is unpaved and is surrounded by woods. The exact flooding location could not be determined.
Municipality:	Dorrance Township	
Subwatershed:	Wapwallopen	
Stream name:	Little Wapwallopen	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	DEW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

General problem vicinity. Due to the dense vegetation, the exact location of the problem could not be determined.

Description

Solution	Futher clarification of problem area required to identify possible solution, 5.4.2, 6.7.1, 6.A

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	DOR006	Comments
Municipality:	Dorrance Township	Dorrance Township reported flooding, erosion and sedimentation as problems at this culvert under Sunset Drive.
Subwatershed:	Wapwallopen	
Stream name:	Bow Creek	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	DEW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Culvert outlet. 12" CMP culvert which is partially blocked with sedimenation and debris.

Description

Ponding water ponding upsteam of the culvert. Note that there was no rain for several days before this photo was taken

Solution	6.4.5, 6.4.8, 6.A, 6.B, 6.C, 6.D

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	DUR001	Comments
Municipality:	Duryea Borough	Duryea Borough reported this location as local drainage problem. In addition to the Mitchell Street area identified on the form, local drainage problems were also observed along the nearby Grove and Oak Streets.
Subwatershed:	Lackawanna River	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/18/2009	
Checked By/Date:	DEW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking south along the railroad tracks that run parallel to Oak Street. Note the railroad tracks are at a higher elevation than the road which may contribute to the drainage problems.

Description

Ponding water along Oak Street (looking south) several hours after a rain event. The Borough indicated that local drainage was a problem in this general area due to the absence of positive drainage or collection and conveyance systems.

Solution	6.B Storm Sewer

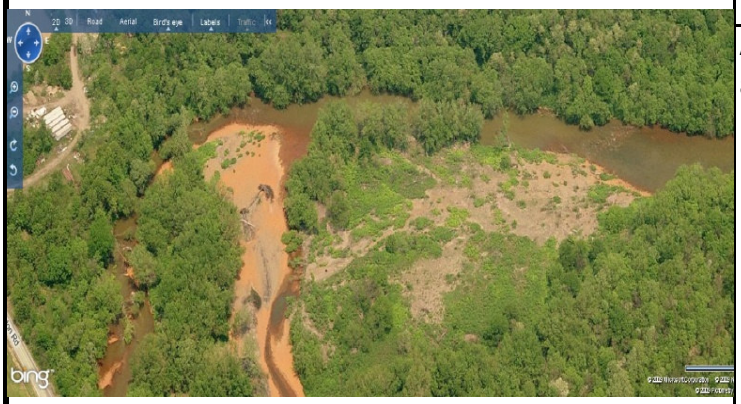
Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	DUR003	Comments
Municipality:	Duryea Borough	Duryea Borough reported this location as a flood problem area. The specific problem location could not be determined during field observation but is believed to be a large ponding area north of the River.
Subwatershed:	Lackawanna River	
Stream name:	Lackawanna River	
Inspected By/Date:	PAK 6/18/2009	
Checked By/Date:	DEW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Aerial photograph showing the northern portion of the problem area. Overflow from the Lackawanna River appears to pond in this area.



Description

Aerial photo showing the Lackawanna River adjacent to and south of the problem area.

Solution	5.4.2, 5.4.3, 6.6.2, 6.7.1, 6.7.4, 6.A

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	EXB036	Inspected By:	PAK
Municipality:	Exeter Borough	Date:	12/7/2009
Subwatershed:	Susquehanna River		
Stream name:	Susquehanna River		

*Type of Problem (circle all that apply):

1	Flooding
2	Local Drainage
3	Deficient bridge/culvert
4	Erosion
5	Sedimentation
6	Existing detention basin
7	Water Pollution
8	Other

Comments

This water quality problem area was reported by Exeter Borough. Forms indicated there are water quality issues here. Based on the surroundings water polution would probably be from agricultural uses. A local resident mentioned that this farmland, located next to the Susquehanna River, floods regularly.

Description

This photo shows an area of farmland adjacent to the Susquehanna River.

Description

This photo shows a depression area located between the Susquehanna River and the farmland area.

Solution	6.A

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	EXT001	Comments
Municipality:	Exeter Township	Exeter Township reported flooding and erosion problems at this location. Area includes a 24" culvert which crosses Dymond Road.
Subwatershed:	Susquehanna River	
Stream name:	Dymond Creek	
Inspected By/Date:	PAK 6/26/2009	
Checked By/Date:	DEW 1/13/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking at upstream end of 24" CMP, which runs beneath Dymond Road. Riprap is located along the left streambank.

Description

Private unpaved driveway off of Dymond Road, approximately 200 feet from the culvert. Erosion is present along both sides of the private drive.

Solution	6.4.4, 6.4.5, 6.4.8, 6.A, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	EXT002	Comments
Municipality:	Exeter Township	Exeter Township reported flooding and erosion issues at this location along Lockville Road. A series of storm sewer culverts for driveways were observed along the road.
Subwatershed:	Susquehanna River	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/26/2009	
Checked By/Date:	DEW 1/13/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description
An HDPE culvert under a private driveway along Lockville Road.

Description
CMP culvert under another private driveway along Lockville Road. Debris and sedimentation is noticable at the culvert inlet.

Solution	6.4.4, 6.4.5, 6.4.8, 6.A, 6,B, 6.C, 6.D

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	EXT003	Comments
Municipality:	Exeter Township	Exeter Township indicated flooding and erosion problems at this site. The problem area is located behind private houses and access was not available for field observation.
Subwatershed:	Susquehanna River	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/26/2009	
Checked By/Date:	DEW 1/13/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

	Description

	Description

Solution	Perform further investigation

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	EXT004	Comments
Municipality:	Exeter Township	Exeter Township reported flooding and sedimentation problems at this location, however, no evidence of these problems were detected during the field observation.
Subwatershed:	Susquehanna River	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/26/2009	
Checked By/Date:	DEW 1/13/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

This photo shows one of the lawns along Wilson Avenue.

Description

Solution	Perform Further Investigation

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	EXT005	Comments
Municipality:	Exeter Township	Exeter Township reported erosion, sedimentation, and a landslide at the existing culvert along Miller Rd, north of Sutton Creek Rd. Forms also indicated a waterway obstruction, however this could not be located during the field observation.
Subwatershed:	Susquehanna River	
Stream name:	Sutton Creek	
Inspected By/Date:	PAK 6/26/2009	
Checked By/Date:	DEW 1/13/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Downstream face of culvert. The culvert is poorly aligned to the Creek.

Description

Grouted riprap downstream of the bridge. A gabion wall (not shown) is located between the riprap and the culvert.

Solution	5.4.2, 6.7.1, 6.A, 6.B, 6.C, 6.D

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	EXT006	Comments
Municipality:	Exeter Township	Exeter Township reported erosion at this location along Bodle Road.
Subwatershed:	Susquehanna River	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/26/2009	
Checked By/Date:	DEW 1/18/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking at upstream end of an HDPE culvert inlet under a gravel driveway which is part of a swale that runs along Bodle Road.

Description

Bank erosion along the roadside swale. During a field visit, up to 4 feet of erosion was observed in some locations.

Solution	5.6.3, 6.4.4, 6.4.8, 6.B, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	EXT007 and EXT008	Comments
Municipality:	Exeter Township	Exeter Township reported erosion at this site. During field observations, two new culverts and rock rip rap were observed, which indicates that the problem has been addressed. Additionally, a local resident stated that construction was performed during the summer of 2009 which corrected the erosion problem.
Subwatershed:	Susquehanna River	
Stream name:	Tributary to Sutton Creek	
Inspected By/Date:	PAK 6/26/2009	
Checked By/Date:	DEW 1/18/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

New 18" CMP culvert and rock lined swale along Lewis Road.

Description

Outlet of new culvert crossing Lewis Road.

Solution	5.4.1, 5.4.2, 5.6.1

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	EXT009	Comments
Municipality:	Exeter Township	Exeter Township reported flooding problems at culvert on Appletree Road which crosses Lewis Creek. Approximately 200 feet downstream of the culvert, Lewis Creek discharges into the Susquehanna River.
Subwatershed:	Susquehanna River	
Stream name:	Lewis Creek	
Inspected By/Date:	PAK 6/26/2009	
Checked By/Date:	DEW 1/15/10	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Upstream face of the culvert.

Description

Looking downstream towards the Susquehanna River.

Solution	5.4.2, 6.7.1, 6.7.4, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	FAI001	Comments
Municipality:	Fairmont Township	Fairmount Township reported flooding and erosion problems at this site. However, during a field observation, the problem area was not able to be located.
Subwatershed:	Susquehanna River	
Stream name:	Lewis Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

	Description

	Description

Solution	Perform further investigation

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	FAI002	Comments
Municipality:	Fairmount Township	Fairmount Township reported flooding and erosion problems at this bridge crossing of Huntington Creek. Although the submitted form did not indicate a suspected cause, it is likely to be the bridge.
Subwatershed:	Huntington Creek	
Stream name:	Huntington Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Downstream face of the stone arch bridge.

Description

Looking downstream from the bridge. Shallow channel may overtop during heavier rains.

Solution	5.4.1, 5.4.2, 6.7.1, 5.6.3, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	FAI003	Comments
Municipality:	Fairmount Township	Fairmount Township reported flooding and erosion problems at this location. These conditions could not be located during field observations.
Subwatershed:	Huntington Creek	
Stream name:	Huntington Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

	Description

	Description

Solution	Perform further investigation

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	FAI004	Comments
Municipality:	Fairmount Township	Fairmount Township reported flooding and erosion problems at this site. However, permission to access the site was not granted during field observation and the problem areas could not be located.
Subwatershed:	Huntington Creek	
Stream name:	Huntington Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

	Description

	Description

Solution	Perform further investigation

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	FAI005 & FAI006	Comments
Municipality:	Fairmount Township	The Conservation District reported flooding and erosion problems at sites FAI005 and FAI006, which are located in close proximity to each other. However, these problems could not be located during field observation.
Subwatershed:	Huntington Creek	
Stream name:	Huntington Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

	Description

	Description

Solution	Perform further investigation

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	FAI007 and FAI008	Comments
Municipality:	Fairmount Township	The Conservation District indicated a walking bridge and rock wall were washed away. Evidence of the remainder of these features could not be located.
Subwatershed:	Huntington Creek	
Stream name:	Kitchen Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	DEW 5/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking downstream, streambank erosion is present throughout the area. Streambanks under cut, which resulted in trees being undermined.

Description

Solution	5.4.2, 6.A, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	FAI009	Comments
Municipality:	Fairmount Township	The Conservation District reported stream bank erosion at this location along Huntington Road.
Subwatershed:	Huntington Creek	
Stream name:	Huntington Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Information provided by the forms indicate that erosion was present along the right streambank within one foot of the garage. Access to the property for closer observation could not be obtained.

Description

Picture of the house along Huntington Road. The house is in close proximity to the Creek.

Solution	5.4.2, 6.7.4, 6.A, 6.C

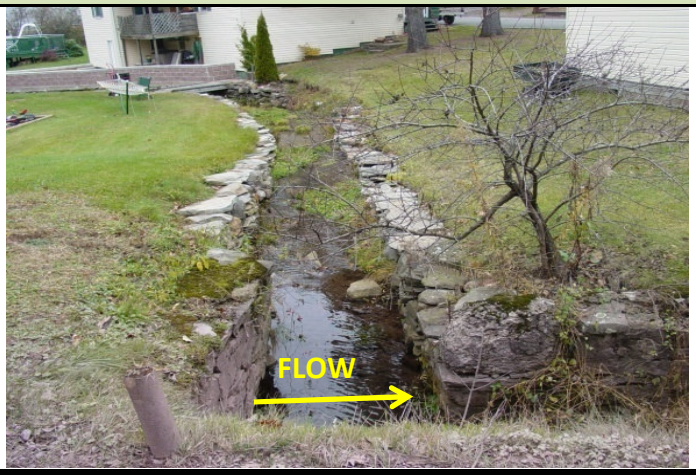
Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	FRV001	Comments
Municipality:	Fairview Township	Fairmount Township reported flooding and eroision problems at this location. Conditions include a manmade channel with beam crossings and a sharp bend, each of which could contribute to flooding problems.
Subwatershed:	Solomon's Creek	
Stream name:	Unnamed Tributary	
Inspected By/Date:	PAD 11/12/2008	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking upstream at channel.



Description

Upstreamof the bend showing house in close proximity to channel.

Solution	5.4.2, 6.7.1, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HAN001
Municipality:	Hanover Township
Subwatershed:	Solomon Creek
Stream name:	Local Drainage
Inspected By/Date:	PAK 4/3/2009
Checked By/Date:	MJW 1/8/2010

Type of Problem (Highlighted):

1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

This problem area was reported by Hanover Township. Located near Kniffen/Delaney Streets, this area is subject to both flooding and washouts since the 1970's. Based upon the site visit, this area looks like it is supposed to pond during flash storms and then is pumped out by the nearby pump station.

Description

Looking down at a basin located near the Susquehanna River levee system. There is a building believed to be a pump station located next to the basin. The pump station conveys flows through the levee system during high water events on the Susquehanna River. Malfunctioning of the pump station would result in extended flooding.

Description

A culvert system connecting two basins. Multiple culverts connect several impounding areas. None appear to be clogged and all are in relatively good shape.

Solution	Pump Station Upgrades/Maintenance

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HAN002	Comments
Municipality:	Hanover Township	Hanover Township reported flooding at this location. No evidence of flooding could be identified at this location at the time of the observation.
Subwatershed:	Solomon Creek	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/25/2009	
Checked By/Date:	MJW 1/8/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

This photo shows a storm sewer located on David Street. It is unknown whether the conveyance sytem is adequately sized.

Description

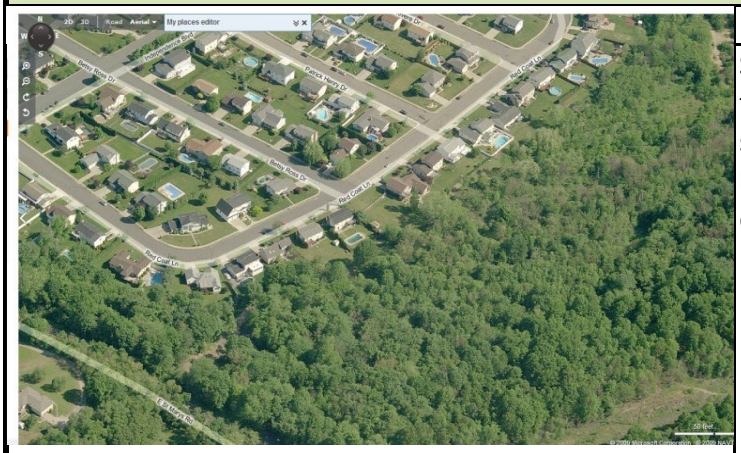
In some instances, storm inlets along David Road appear to be at improper locations or not ideally set to capture runoff.

Solution	6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HAN003	Comments
Municipality:	Hanover Township	Hanover Township reported flooding and erosion at the Liberty Hills residential development.
Subwatershed:	Solomon Creek	
Stream name:	Drainage to Solomon Creek	
Inspected By/Date:	PAK 6/25/2009	
Checked By/Date:	DEW 1/19/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	



Description

Solomon Creek flows in the wooded area south of the Liberty Hills development. It is believed high stream velocities have caused erosion along the banks. Access to this location could not be obtained to confirm the problem or cause.

Description

The forms mentioned flooding at this location; however, flooding problems could not be located in the housing development during the field observation.

Solution	5.4.1, 5.4.2, 5.8.2, 6.A, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HAN004	Comments
Municipality:	Hanover Township	Forms received by Hanover Township indicate that there are flooding problems in this area due to a water obstruction. Based on field observations, this is believed to be occurring at the South Main Street bridge over Solomon Creek. Downstream bridges and masonry U-channel restrict flow and cause backwater condition at this location.
Subwatershed:	Solomon Creek	
Stream name:	Solomon Creek	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	MJW 1/8/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Downstream of bridge looking downstream. The channel narrows and the streambanks are steep. The U-channel channel section begins behind the building shown on the right.

Description

View of upstream bridge face looking downstream.

Solution	5.4.2, 6.7.1, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HAN005	Comments
Municipality:	Hanover Township	Hanover Village reported flooding and erosion problems in this apartment complex. Information provided by the municipality indicated that several problems have been occuring annually since the 1970's.
Subwatershed:	Solomon Creek	
Stream name:	Drainage to Solomon Creek	
Inspected By/Date:	PAK 6/25/2009	
Checked By/Date:	DEW 1/19/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Aerial photo of Hanover Village. No detention basin was visible. Based on the information provided by the municipality, flooding and erosion are most likely attributable to uncontrolled runoff from the property.

Description

The area to the northeast of Hanover Village has historically had problems with flooding according to municipal documentation. Flooding in this area has entered into the sewer system and flooded homes. Based on the elevation of Hanover Village, runoff generated on the property flowing to this location could contribute to this problem.

Solution	5.8.2, 6.4.5, 6.5.2, 6.A

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HAN006 & HAN007	Comments
Municipality:	Hanover Township	These problem areas were reported by Hanover Township. Problems indicated by the Township included flooding and groundwater pollution. Based upon field observations, additional problems may also include erosion, sedimentation, deficient bridges/ culverts, and water pollution.
Subwatershed:	Solomon Creek	
Stream name:	Solomon Creek	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	MJW 1/8/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking upstream from Oxford St. Bridge over Solomon Creek. There is debris in segments upstream. The bridge at this location is undersized based on previous studies. The channel in this area is also essentially flat due to dredging and past filling of large size wetlands in this area.

Description

Looking downstream from Oxford St. bridge towards problem area HAN007. Banks are eroded, revealing root systems of trees and impairing tree stability. These trees could potentially be future obstructions to flow if bank erosion continues.

Solution	5.4.2, 6.7.1, 6.A, 6.B, 6.E

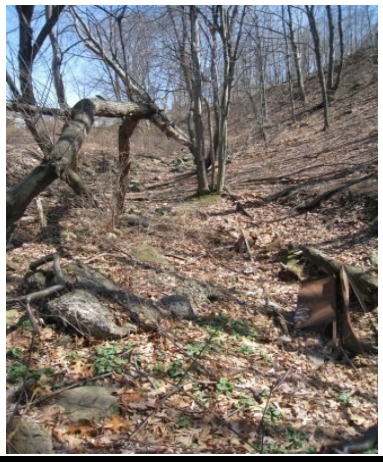
Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HAN008	Comments
Municipality:	Hanover Township	This problem area was reported by Hanover Township. Stormwater runoff is documented as flooding the playground and local homes near the intersections of Sans Souci Parkway with High and Willow Streets. The likely cause of this is the lack of a conveyance system.
Subwatershed:	Hunlock Creek	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	MJW 1/8/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Photo at playground indicates a steep grade with homes located above the playground.



Description

No manmade stormwater conveyance system could be located in this area. This photo shows the probable flow path to the playground area. The form states that the flooding is caused by stormwater volume, velocity, and direction. There does not appear to be stormwater management controls in the development above the playground.

Solution	6.4.5, 6.4.8, 6.4.10, 6.6.2, 6.A

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HAN009	Comments
Municipality:	Hanover Township	Hanover Township reported flooding at this Prince Street location. During site observations, no evidence of flooding could be detected.
Subwatershed:	Solomon Creek	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 6/25/2009	
Checked By/Date:	DEW 1/18/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking downstradient on Prince Street. A storm sewer system inlet is present. No evidence of flooding was observed.

Description

Solution	5.4.1, 5.9.1, 6.A

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HAN010	Comments
Municipality:	Hanover Township	Hanover Township reported this site as a flooding/backwater problem area. Inadequate culvert openings appear to be present at both these sites.
Subwatershed:	Newport/Nanticoke Creek	
Stream name:	Warrior Creek	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	MJW 1/8/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Culvert at South Street over Warrior Run. The culvert is most likely undersized and would create backwater flooding during storm events. The alignment of South Street with Warrior Run is poor, which would contribute to debris clogging of the opening. The adjacent area to the right of the stream appears to be lower that the stream elevation.

Description

Culvert system in Warrior Run upstream from South Street culvert. These culverts appear undersized and may clog from debris during larger storm events.

Solution	5.4.2, 6.7.1, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HAN011	Comments
Municipality:	Hanover Township	This problem area was reported by Hanover Township. The Municipality documents this portion of Nanticoke Creek as a significant regional flooding site. Private houses located along Loomis Park Road flood during large storms. Although not listed in the municipality documentation, severe water quality problems are present in this portion of the Nanticoke Creek.
Subwatershed:	Newport/Nanticoke Creek	
Stream name:	Warrior Creek	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	MJW 1/8/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Nanticoke Creek looking downstream. Although the channel is well defined, medium to larger storms would likely overflow the streambanks.

Description

Looking along Nanticoke Creek. Water flowing in Nanticoke Creek is an orange color indicative of acid mine drainage discharge. This site is downstream of a past anthracite mining borehole.

Solution	5.4.2, 6.7.1, 6.A, 6.E

Luzerne County
PENNSYLVANIA

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
HAZ001	Hazle Township	Nescopeck	Unnamed Trib to Black Creek	Proposed Solution (B)

Explanation: According to preliminary analysis, an undersized culvert does not pass the design storm. Furthermore, reports state that it often becomes clogged with debris. Due to a lack of development in the area, the culvert may not need to be replaced; however, options for correction include regular maintenance as well as replacing the culvert.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	HAZ001	Inspected By/Date:	PAD 11/22/2008
Municipality:	Hazle Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Trib to Black Creek		
Drainage Area (mi^2)	0.88		
Calculation Method	USGS 4189		
C (Tc)	N/A		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.40	92	0.16
5	4.22	129	0.23
10	4.95	158	0.28
25	6.10	235	0.42
50	7.16	307	0.55
100	8.43	394	0.70

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Culvert under Weston Road is a cause of flooding in the area. Culvert is subject to frequent clogging with debris and may be undersized.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

The culvert under Weston road has been identified as a problem area by the Conservation District due to a history of road overtopping and upstream flooding. Based upon general field observations, this problem is believed to be caused by clogging and or the culvert being undersized. Possible solutions to this problem include A) performing regular maintenance of the culvert to keep free of debris and B) replacing the existing culvert with a larger structure.

Cost Estimates

Option	A	B	C
Cost Range	$500/year	$10,000-$20,000	N/A

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HOL001	Inspected By:	PAD
Municipality:	Hollenback Township	Date:	11/12/2008
Subwatershed:	Wapwallopen	Comments	
Stream name:	Big Wapwallopen Creek	This problem area, reported by the Conservation District, has experienced severe channel erosion along the left streambank, which has caused a loss of property. In addition, the flow has been impeded and caused an access road to flood.	

*Type of Problem (circle all that apply):

1	Flooding
2	Local Drainage
3	Deficient bridge/culvert
4	Erosion
5	Sedimentation
6	Existing detention basin
7	Water Pollution
8	Other

Description

Looking downstream. The left bank has severe erosion. The source of these problems is believed to be the steep slope of the bank, which does not have sufficient erosion protection. The eroded bank has undermined trees, which have fallen and caused blockages to stream flow.

Description

Looking upstream at the erosed stream bank.

Solution	5.4.1, 5.4.2, 5.6.3, 6.7.1, 6.A, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN001	Comments
Municipality:	Hunlock Township	Flooding was reported in this vicinity by Hunlock Township. The Wilkes-Barre area has levees to protect the City from flooding from the Susquehanna River. Hunlock Township is located downstream of the levee system.
Subwatershed:	Susquehanna River	
Stream name:	Susquehanna River	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	MJW 1/11/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking at the Susquehanna River from the North Bank.

Description

This is the floodplain from the nearby hauling site located along Garden Drive.

Solution	5.4.1, 5.4.2, 6.7.1, 6.7.4, 6.A

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN002	Comments
Municipality:	Hunlock Township	This problem area was reported by Hunlock Township. Concentrated runoff from upslope wooded areas and an adjacent paved driveway is causing localized erosion problems and flooding.
Subwatershed:	Hunlock Creek	
Stream name:	Trib. To Hunlock Creek	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	MJW 1/11/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

This photo shows a drainage swale at 59 Indian Cave Road draining into a culvert beneath the road. A series of culverts appear along Indian Cave Road and capture stormwater coming down from the mountainous areas upslope. According to a local homeowner, the culverts are inadequate in size and the road frequently overtops.

Description

This is the floodplain from the nearby hauling site located along Garden Drive.

Solution	5.4.1, 5.4.2, 6.4.4, 6.4.8, 6.7.1, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN003	Comments
Municipality:	Hunlock Township	Hunlock Township reported erosion at this location. Field observations showed that fallen trees have also caused a blockage to the stream flow and that there is a possibility of flooding occuring at this location.
Subwatershed:	Hunlock Creek	
Stream name:	Trib. To Hunlock Creek	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	DEW 1/21/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking upstream towards obstruction. This obstruction is approximately 500 feet downstream of Old Tavern Road Bridge. Debris/ downed trees are depicted at the bottom of steep banks. Debris and sediment bars are noticeable as well.

Description

This photo was taken on Old Tavern Road Bridge looking downstream. The left bank is noticeably steep consisting of an approximately 20% grade.

Solution	5.4.1, 5.4.2, 5.6.3, 6.7.1, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN004	Comments
Municipality:	Hunlock Township	This problem area was reported by Hunlock Township. Stormwater is conveyed across Swamp Road by multiple culverts. The swale located on the eastern side of the road collects runoff from the adjacent steep and wooded areas. Runoff is conveyed from the west side of Swamp Road to Hunlock Creek through a series of drainage swales. According to a local resident, the conveyance system is unable to handle the volume of runoff.
Subwatershed:	Hunlock Creek	
Stream name:	Drainage to Hunlock Creek	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	MJW 1/11/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

This photo shows a drainage pipe which is directing flow from the east side of Swamp Road to the west side. According to the local homeowner, flooding begins on this side of Swamp Road, likely due to an insufficient culvert size.

Description

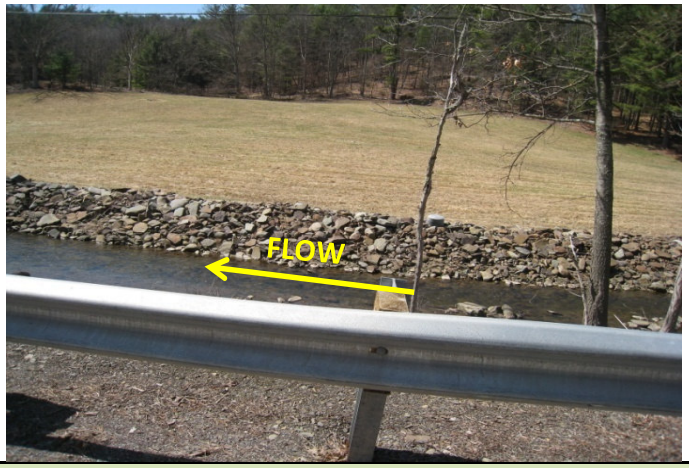
This photo shows the discharge swale from the western side of Swamp Road draining toward Hunlock Creek. Multiple swales similar to this swale are present in the area.

Solution	5.4.1, 5.4.2, 6.4.4, 6.4.5, 6.4.8, 6.7.1, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN005	Comments
Municipality:	Hunlock Township	Hunlock Township indicated erosion problems at this location. The problem area is believed to be a small stream along Main Road. Rock riprap appears to have been placed along the channel length, which should address the erosion problems.
Subwatershed:	Hunlock Creek	
Stream name:	Trib. To Hunlock Creek	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	DEW 5/19/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	



Description

Looking at the tributary to Hunlock Creek from Main Rd. near the intersection with Tavern Road.

Description

Looking downstream along the tributary to Hunlock Creek. Both banks have been armored with rock riprap.

Solution	5.4.2, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN006	Comments
Municipality:	Hunlock Township	Accelerated erosion was reported by Hunlock Township at this site. The forms indicate that this problem recently occurred in 2006 following a large storm event.
Subwatershed:	Hunlock Creek	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	MJW 1/11/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

This photo shows a culvert under Pike Valley Drive. According to a local homeowner, drainage problems are associated with large storms only at this location.

Description

This photo shows an area adjacent to Pike Valley Drive and surrounding area. Forest is being removed and graded in this area, which can result in greater stormwater runoff, erosion and sediment deposit into the drainage system.

Solution	5.4.2, 5.6.3, 6.7.2, 6.A, 6.B, 6.C, 6.D

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN007 & HUN008
Municipality:	Hunlock Township
Subwatershed:	Hunlock Creek
Stream name:	Hunlock Creek
Inspected By/Date:	PAK 4/3/2009
Checked By/Date:	MJW 1/11/2010

Type of Problem (Highlighted):

1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

The Main Street Bridge over Hunlock Creek near the intersection with Hartman Road was reported as a problem area by the Conservation District. Based upon visual observation, the bridge appears to be in poor condition. Sediment is deposited under the eastern span, and the banks are armored to resist erosion.

Description

Looking at downstream bridge face. Flow is concentrated under the span to the left. Sedimentation is visible under the right span. The rock retaining wall along the left span appears to be failing due to undermining.

Description

Looking upstream of the bridge, both banks are protected with rock riprap. Water within the creek appeared to be moving at a high velocity and the creek likely has a large sediment load capacity. Based on site observations, it appears that the bridge interrupts the sediment transport, resulting in the sediment deposit under the span. Once downstream of the bridge, the sediment transport likely resumes to normal levels.

Solution	5.4.1, 5.4.2, 5.6.3, 6.7.1, 6.A, 6.B, 6.C, 6.D

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN009	Comments
Municipality:	Hunlock Township	Forms provided by the Conservation District indicate that the Cragle Hill Road bridge is partially washed out and there is erosion along the left bank near an existing garage. Based upon visual observations, the problems described by the conservation district have likely been addressed. No evidence of a washed out bridge was detected and new riprap had been placed along the left bank.
Subwatershed:	Hunlock Creek	
Stream name:	Hunlock Creek	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	MJW 1/11/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Upstream of bridge looking at upstream face. Riprap is present on left bank and there is light to medium erosion on the right bank. Pier is clear of debris.

Description

View from bridge looking downstream. Riprap has been placed along the left bank for stabilization.

Solution	5.4.1, 5.4.2, 6.7.1

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN010	Comments
Municipality:	Hunlock Township	The Conservation District reported that an existing gabion retaining wall that collapsed along the right streambank allowed erosion to occur.
Subwatershed:	Hunlock Creek	
Stream name:	Hunlock Creek	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	DEW 1/19/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking downstream approximately ~~from the~~ Main Road Bridge. The collapsed gabion wall has been replaced along with additional riprap.

Description

Downstream face of Main Road bridge. Sedimentation is visible under the bridge which is most likely caused by upstream erosion at problem area HUN012.

Solution	5.4.2, 5.6.3, 6.7.1, 6.A, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN011	Comments
Municipality:	Hunlock Township	The Conservation District reported that streambank erosion occurs downstream of a private bridge. The site observation indicates that the private bridge may be undersized, interrupting the sediment transport capacity of the waterway. Sedimentation would occur upstream of the bridge and erosion downstream. Flooding may also occur at this potentially undersized bridge.
Subwatershed:	Hunlock Creek	
Stream name:	Trib. To Hunlock Creek	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	MJW 1/11/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

This photo was taken looking downstream of the private bridge. A buffer is present along the stream's steep left bank. The right bank contains erosion. Root systems are partially exposed, and trees are tilting towards the stream. A collapsed tree is visible in the stream. The collapsed tree is an obstruction to flow.

Description

Looking upstream at downstream face of Old Tavern Road Bridge. Flow is concentrated under the right span. The bridge is likely undersized, which could potentially cause flooding.

Solution	5.4.1, 5.4.2, 5.6.3, 6.7.1, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN012
Municipality:	Hunlock Township
Subwatershed:	Hunlock Creek
Stream name:	Hunlock Creek
Inspected By/Date:	PAK 4/17/2009
Checked By/Date:	MJW 1/11/2010

Type of Problem (Highlighted):

1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

The Conservation District reported erosion on both the left and right streambanks. A gas pipeline runs through the creek, creating an obstruction to flow. The concrete encasement over the gas pipeline has been eroded leaving the pipe exposed. A large flow could potentially damage the pipe causing a gas leak.

Description

This photo, taken from Main Road Bridge looking upstream, shows the gas pipeline that runs through the creek. Riprap has been placed at the bend on the left bank just downstream of the pipe in an attempt to stabilize the channel and pipe.

Description

This photo, also taken from Main Road Bridge looking upstream, shows streambank erosion along the creek. Erosion is most prevalent along the left bank looking downstream. The private residence is located adjacent the eroding bank.

Solution	5.4.1, 5.4.2, 5.6.3, 6.7.1, 6.A, 6.E

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN013	Comments
Municipality:	Hunlock Township	Flooding, erosion, and sedimentation is documented at this location by the Conservation District. Problems at this area appear to have been addressed. Streambanks have been stabilized.
Subwatershed:	Hunlock Creek	
Stream name:	Hunlock Creek	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	MJW 1/11/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking Downstream at left (eastern) bank. This bank is heavily armored to protect the house. This was done to prevent bank erosion and the house from settling. Both the riprap and the gabion wall appear new, which suggests recent work.

Description

Looking Downstream along right (western) bank at buffer. Although not visible in the photograph, some sediment deposition is present under the western bridge span.

Solution	5.4.1, 5.4.2

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN014	Comments
Municipality:	Hunlock Township	The Conservation District reported that the bridge at this site is washed out and that erosion is visible upstream and downstream of the bridge. Field observation concluded that a new box culvert has been installed in place of the bridge, therefore correcting the problem.
Subwatershed:	Hunlock Creek	
Stream name:	Hunlock Creek	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	MJW 1/11/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

This photo, looking upstream, shows the downstream face of the new Oakdale Drive box culvert. Grouted riprap has been placed both upstream and downstream of the culvert.

Description

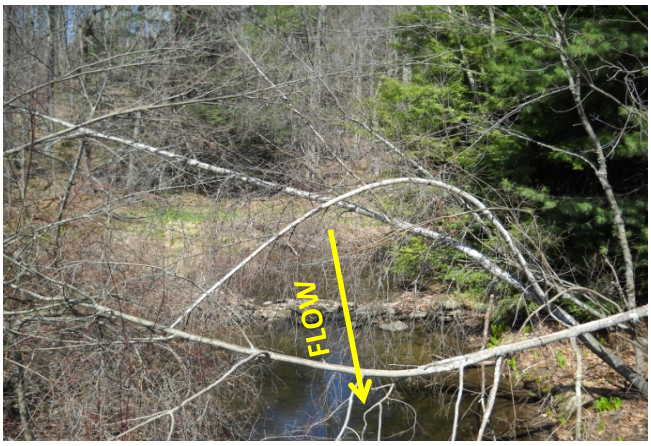
View from Oakdale Drive culvert looking downstream. Buffer is present and geosynthetic netting has been placed on the left bank in an attempt to stabilize bank erosion. Problem area HUN012 is located approximately 500 feet downstream of this location.

Solution	5.4.2, 6.7.1

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HUN015 & HUN016	Comments
Municipality:	Hunlock Township	Streambank erosion and stream crossing damage were reported by the Conservation District at the site near Golf Course Road (HUN016).
Subwatershed:	Hunlock Creek	
Stream name:	Trib. To Roaring Brook	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	MJW 1/11/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	



Description

This photo of site HUN015 was taken from the private road bridge off of Golf Course Road looking upstream. There are several downed trees and sediment deposits in this area. The banks have begun to erode.

Description

This photo was taken looking at the downstream face of the private bridge. The bridge appears to be an old stone bridge that was retofitted with steel beams and abutments.

Solution	5.4.2, 5.6.3, 6.7.1, 6.B, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HNT001 & NCB001	Comments
Municipality:	Huntington Twp, New Columbus Boro	The Conservation District reported flooding at two (2) locations along Pine Creek. Streambank erosion is also present along Pine Creek. The erosion has resulted in tree collapse into the creek, creating an obstruction (NCB001). This obstruction is the likely the cause of upstream flooding at a private residence (HNT001).
Subwatershed:	Huntington Creek	
Stream name:	Pine Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	MJW 1/11/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking downstream at trees that have fallen across Pine Creek (NCB001). From visual observations, it appears this obstruction has existed for some time, as evidenced by the debris which has accumulated along the left bank.

Description

Downstream of obstruction at NCB001. The creek has acceptable buffers on both sides.

Solution	5.4.2, 6.A

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	HNT002	Comments
Municipality:	Huntington Twp	The Conservation District reported streambank erosion along Huntington Creek behind 915, 917, and 919 Waterton Road.
Subwatershed:	Huntington Creek	
Stream name:	Huntington Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

View of Huntington Creek from Waterton Road. Due to "No Trespassing" signage, the condition of the streambank could not be observed.

Description

Photo showing residential lawn extending to streambank.

Solution	5.4.2, 6.7.2, 6.A

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	JAC002	Comments
Municipality:	JacksonTownship	The Conservation District reported flooding at this location. However, the location on the provided map did not match the description provided in the form and the problem area could not be located during field observations.
Subwatershed:	Huntsville	
Stream name:	Huntsville Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	DEW 1/27/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

	Description

	Description

Solution	Perform further investigation

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	KNB003, KNB004,KNB006	Comments
Municipality:	Kingston Borough	Kingston Borough indicated flooding problems residential area. These problems could not be located during field observations.
Subwatershed:	Susquehanna River	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking toward KNB003, no problems observed.

Description

Looking at the intersection of Hoyt St. and Welles Ave. Storm sewers are present, flooding problems not observed. Problem area KNB006 was located in a school playground that was currently in use, preventing access.

Solution	5.7.1, 5.7.2, 5.9.1, 6.4.5, 6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	KNB007	Comments
Municipality:	Kingston Borough	Kingston Borough indicated that flooding occurs at this municipal office which is located adjacent to the levee. An office employee indicated that flooding occurs only when water comes over the levee.
Subwatershed:	Susquehanna River	
Stream name:	Susquehanna River	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Picture of the levee and the municipal office parking lot.

Description

Solution	5.4.1, 6.A

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	KNB008	Comments
Municipality:	Kingston Borough	Kingston Borough reported flooding in this area. Cause of the flooding appears to be accumulation of debris which is blocking an existing culvert.
Subwatershed:	Susquehanna River	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	DEW 1/15/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking toward the existing culvert.

Description

Looking at upslope end of culvert. Culvert discharge could not be located.

Solution	6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	LAK001	Comments
Municipality:	Lake Township	Lake Township reported flooding problems at this site; however, the problem was not able to be located during field observation.
Subwatershed:	Harvey Creek	
Stream name:	Unknown	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	DEW 1/27/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

	Description

	Description

Solution	Perform further investigation

Luzerne County
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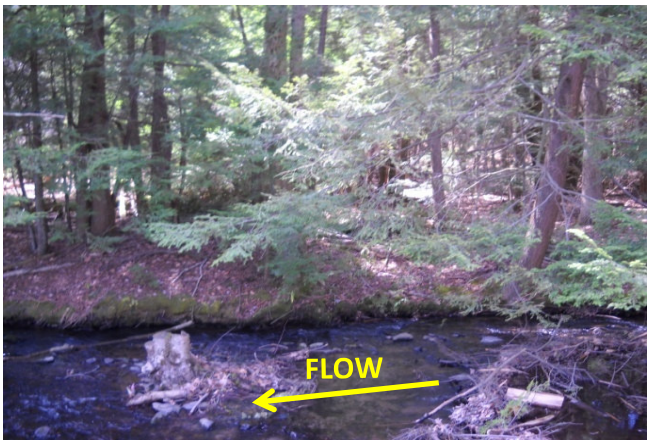
Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	LAK002	Comments
Municipality:	Lake Township	Lake Township reported flooding at this location. Based on field observations, it appears that large storm events may cause flooding of Gordon Road and a nearby house.
Subwatershed:	Harvey Creek	
Stream name:	Fades Creek	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	DEW 1/27/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking upstream of Fades Creek, which runs parallel to Gordon Road.



Description

Right bank the channel. Accumulated debris and branches in the channel shown in this photo may cause an obstruction to the stream flow.

Solution	5.4.2, 6.7.1, 6.A

Luzerne County
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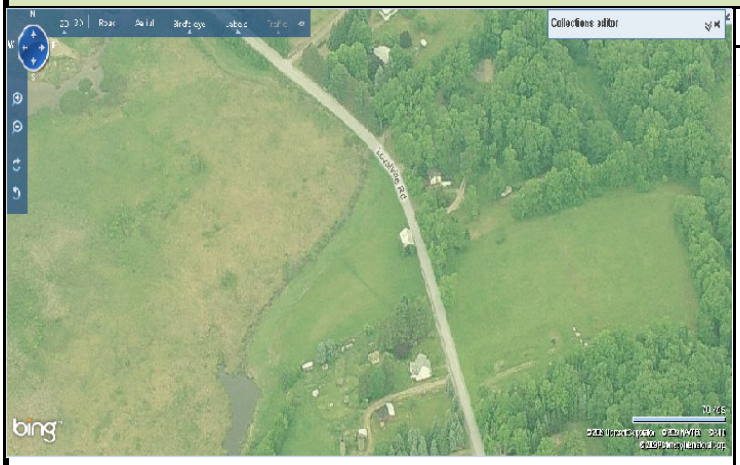
Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	LAK003	Comments
Municipality:	Lake Township	The Conservation District reported flooding at this location; however, the problem was not able to be located during field observation. After review of submitted documentation, it was determined that an incorrect location was provided on the form.
Subwatershed:	Harvey Creek	
Stream name:	Tributary to Harvey Creek	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	DEW 1/27/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	



Description

Aerial photograph showing the property address provided on the form. No flooding problems observed.

Description

Solution	Perform Further Investigation

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	LAK004	Comments
Municipality:	Lake Township	The Conservation District reported several problems including flooding, deficient culvert, and erosion at this location.
Subwatershed:	Bowmans Creek	
Stream name:	Trib. To Beaver Run	
Inspected By/Date:	PAK 4/17/2009	
Checked By/Date:	DEW 1/27/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Culvert failure along East Sorber Mountain Rd. Embankment erosion has resulted in the undermining failure of this culvert. A local landowner indicated that half of the culvert was repaired; however, the other half of the culvert remains in disrepair. Accumulated debris was found at the opening of the culvert.

Description

Foot bridge over the tributary. A local homeowner indicated this area was completely flooded during the 2006 storm.

Solution	5.4.2, 5.6.3, 6.7.1, 6.A, 6.B

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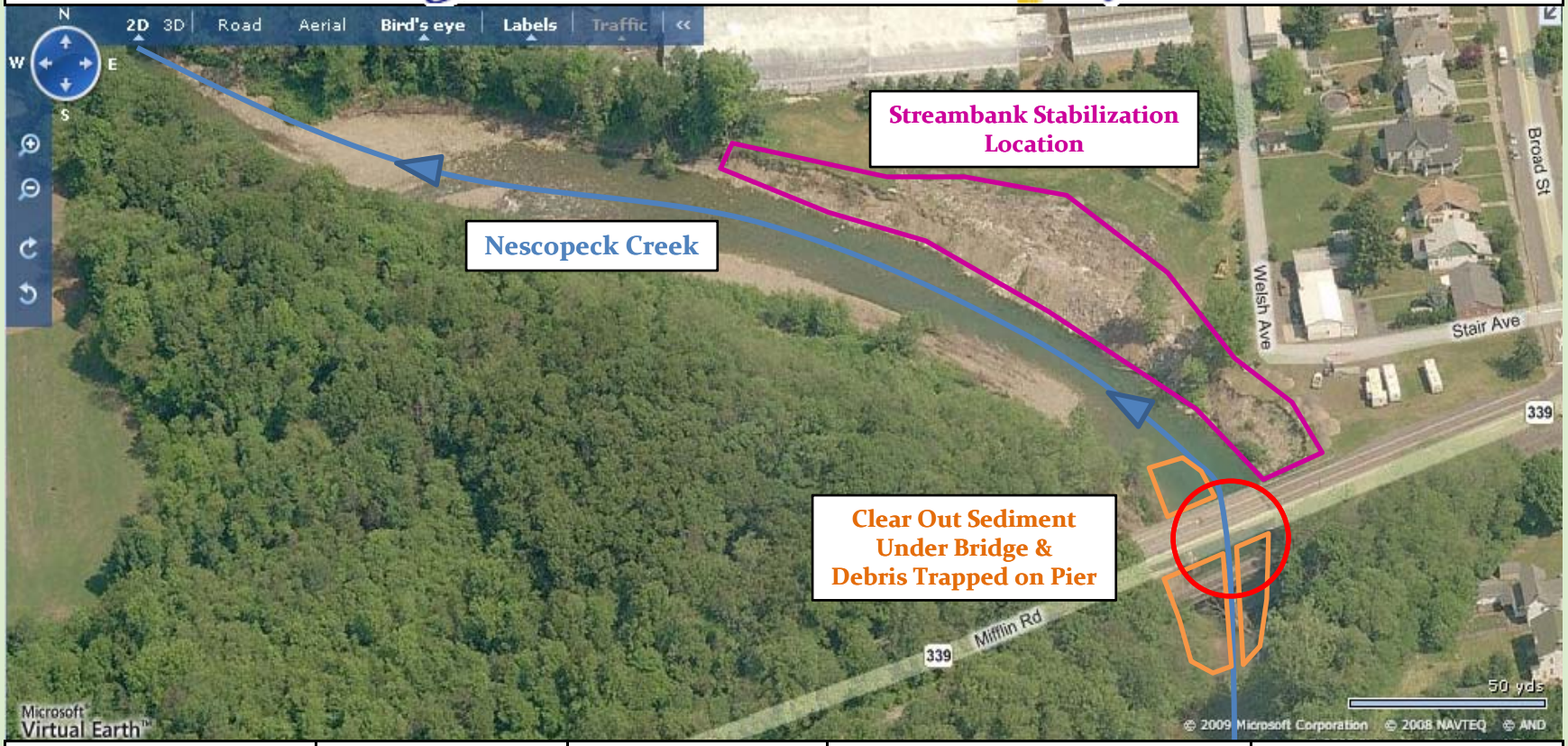

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
NSB001	Nescopeck Borough	Nescopeck	Nescopeck Creek	Proposed Solution (A)

Explanation: 339 Bridge and the accompanying Railroad Bridge have caused sediment to be deposited under the western spans of the bridges. Because sediment was being trapped here, the northeastern stream bank began to erode causing undercutting along Welsh Ave. Upon site observations, the stream has been stabilized with riprap in the eroded area. Options for correction involve regular maintenance to make sure that the sediment and debris caught under the bridges is removed.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	NSB001	Inspected By/Date:	PAD 11/12/2008
Municipality:	Nescopeck Borough	Checked By/Date:	DEW 2/26/2010
Sub watershed:	Nescopeck Watershed		
Stream name:	Nescopeck Creek		
Drainage Area (mi^2)	172		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.16	5,490	0.05
5	3.91	8,970	0.08
10	4.57	11,700	0.11
50	6.53	19,100	0.17
100	7.63	22,800	0.21
500	10.98	32,800	0.30

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Two problems are present at this location. One is collection of sediment and debris under the western opening of adjacent roadway and railroad bridges and the second is stream bank erosion downstream of the bridges. The erosion appears to be close to undermining the adjacent Welsh Ave.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

The adjacent railroad and SR 339 bridges have been identified as a problem area by the conservation district due to a history of debris accumulation, sedimentation under the bridges, and significant erosion downstream of the bridges. Based upon general field observations, this problem looks to have been addressed. To prevent future problems, possible actions are to A) perform regular debris and sediment removal at the bridge.

Cost Estimates

Option	A	B	C
Cost Range	$1,000 per year	N/A	N/A

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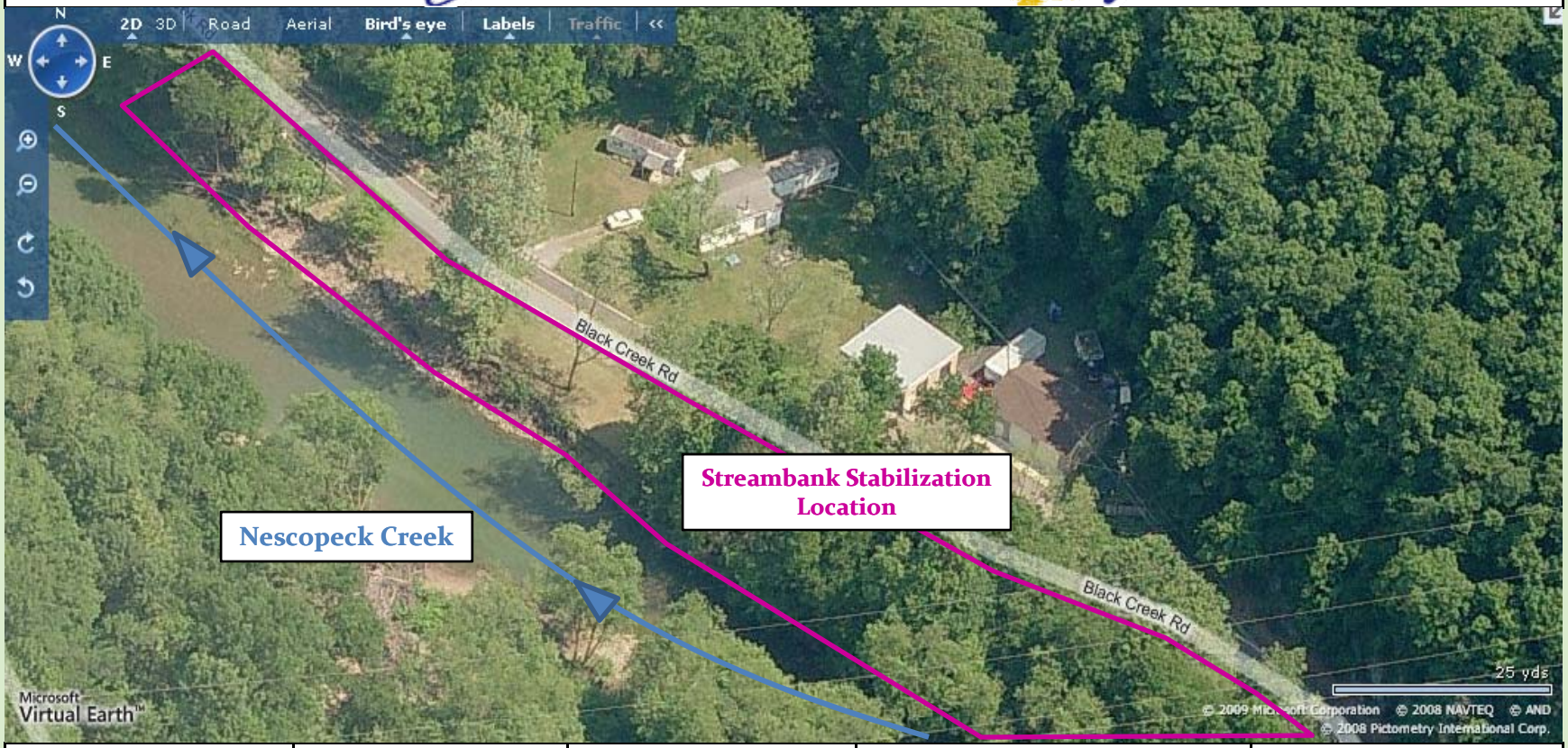

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
NST001	Nescopeck Township	Nescopeck	Nescopeck Creek	Proposed Solution (N/A)

Explanation: Nescopeck Creek has caused severe channel erosion and undercutting along a 1 mile stretch of land alongside Black Creek Rd. Documention notes that the entire area has flooded with 3-4 inches of flowing water. Options for correction include stabilizing the banks, floodproofing the houses, or providing upstream impounding to reduce the flow in the channel.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	NST001	Inspected By/Date:	PAD 11/12/2008
Municipality:	Nescopeck Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Nescopeck Creek		
Drainage Area (mi^2)	172		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	3.16	5,480	0.05
5	3.91	8,950	0.08
10	4.57	11,700	0.11
50	6.53	19,000	0.17
100	7.63	22,700	0.21
500	10.98	32,800	0.30

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Significant stream bank erosion along this steam reach causing undercutting and tree undermining. Significant flooding of adjacent Black Creek Rd and homes are reported.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Stream bank erosion and flooding at Black Creek Road has been identified by the Conservation District. Based upon general field observations, these problems are believed to be caused by a combination of bends in the stream channel and insufficient channel capacity. Possible solutions to these problems include bank stabilization with rock riprap or appropriate vegetation and flood proofing of adjacent homes. Due to the complexity of the problems, further analysis would be required to develop costs for these solutions.

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	NEW001	Comments
Municipality:	Newport Township	The Conservation District reported numerous problems at this location. According to local homeowners, the channel was constructed as part of a stream realignment for mining operations. A combination of sedimentation from mine runoff and backwater from bridges results in frequent flooding of the area.
Subwatershed:	Newport/Nanticoke Creek	
Stream name:	S. Branch Newport Creek	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	DEW 1/27/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Series of privately owned bridges along W. Kirmar Ave. In addition to these two privately owned bridges there are PADOT bridges that carry Kirmar Ave over Newport Creek nearby.

Description

Former location of Newport Creek. The creek was realigned approximately 100 years ago and the bed has dried up since. Reminants of the streambed are still visible in this location.

Solution	5.4.2, 5.6.3, 6.7.1, 6.A, 6.B, 6.C

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	NUA001	Comments
Municipality:	Nuangola Borough	Flooding was documented at this location by Nuangola Borough. A culvert conveys stormwater under North End Road to a drainage swale, which discharges to Nuangola Lake. The culvert size appears to be insufficient to convey larger flows.
Subwatershed:	Wapwallopen	
Stream name:	Nuangola Lake	
Inspected By/Date:	PAK12/3/2008	
Checked By/Date:	MJW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking upstream at culvert outlet. The culvert outlet is partially obstructed and debris is present .

Description

Looking downstream from the culvert. A small winding channel is noted through the trees. A buffer is maintained; however, the channel is not very deep and probably floods often. The forms indicate that the duration of flooding can last for weeks. The recommended solution is to raise the elevation of North End Road and construct new culverts.

Solution	5.4.2, 5.4.3, 6.7.1, 6.A, 6.B

Luzerne County
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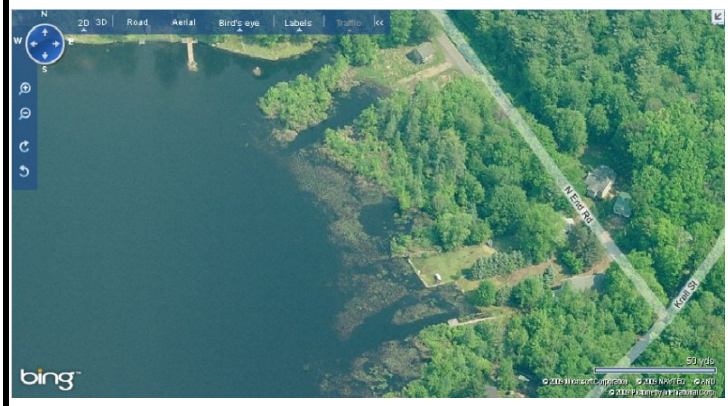
Luzerne Co. Act 167 Problem Area Inventory

		Comments
Problem Area - Map ID:	NUA002	Nuangola Borough reported flooding and erosion problems at this location. While conducting field observations, no evidence of the flooding and erosion problems were evident.
Municipality:	Nuangola Borough	
Subwatershed:	Wapwallopen	
Stream name:	Nuangola Lake	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	MJW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	



Description

Aerial photograph of problem area reported by Nuangola Borough. During the time of the field observation, it appeared that inadequate storm sewer systems cannot convey fast moving runoff from the steep roadways.

Description

Solution	6.B

Luzerne County
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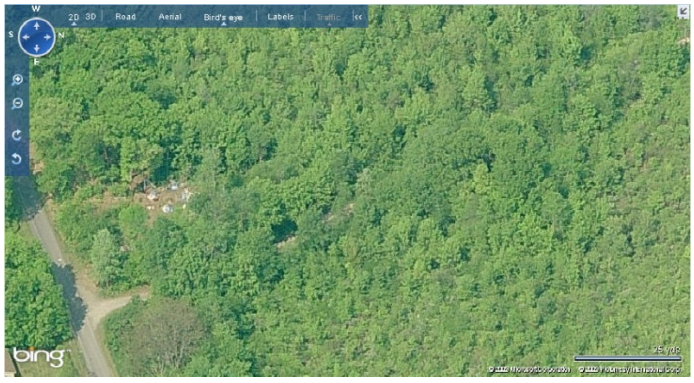
Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	NUA003	Comments
Municipality:	Nuangola Borough	This problem area was reported by Nuangola Borough near the intersection of Ridge Street and End Street. The municipality reported problems with flooding and drainage. During field observations, a trailer home was located off End Street. End Street was at a noticeably higher elevation than the trailer home and the surrounding area. Stormwater runoff is believed to pond in the area surrounding the trailer home.
Subwatershed:	Wapwallopen	
Stream name:	Nuangola Lake	
Inspected By/Date:	PAK 12/3/2008	
Checked By/Date:	MJW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking at the woods surrounding the trailer. End Street appears to be at a higher elevation than the adjacent area.



Description

Trailer is located in a large wooded buffer area adjacent to Nuangola Lake. Nuangola Lake is located towards the upper right hand corner of the picture.

Solution	5.4.2, 6.A, 6.B

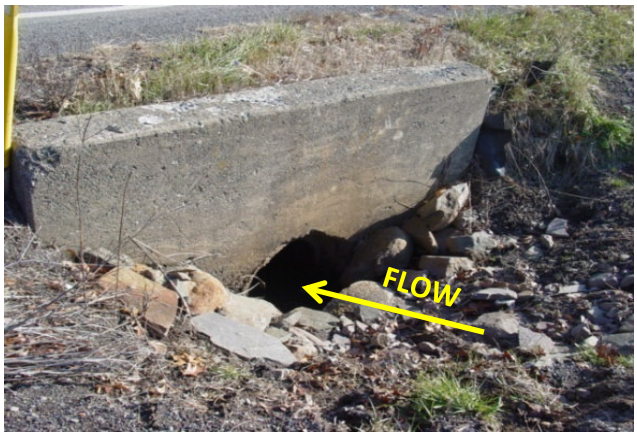
Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	NUA004	Comments
Municipality:	Nuangola Borough	This problem area was reported by Nuangola Borough. Two culverts are located in a series under two parallel roads. There is an approximately one-foot open swale area between both culverts. Based upon site observation, both culverts could potentially be undersized and incapable of handling substantial storm events, causing overtopping of the roadways.
Subwatershed:	Wapwallopen	
Stream name:	Nuangola Lake	
Inspected By/Date:	PAK 12/3/2008	
Checked By/Date:	MJW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Outlet of downstream culvert under Nuangola Road. The culvert opening is almost completely submerged, indicating a shallow downstream gradient.



Description

Inlet to upper culvert under Storm Street. There is debris near the culvert opening, restricting the flow of stormwater.

Solution	5.4.2, 6.7.1, 6.4.8, 6.A, 6.B

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	NUA005,NUA010,NUA011 & NUA012
Municipality:	Nuangola Borough
Subwatershed:	Wapwallopen
Stream name:	Nuangola Lake
Inspected By/Date:	PAK 12/3/2008
Checked By/Date:	MJW 1/12/2010
Type of Problem (Highlighted):	
1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

These four areas (NUA005, NUA010, NUA011, and NUA012), reported by Nuangola Borough, were all the same type of problem. Officials at Nuangola Borough indicated that these areas were prone to erosion. Additionally, at locations where culverts were located, sedimentation and flooding has occurred.

Description

Looking towards Nuangola Lake. Swales are located along both sides of the roads. Due to the steep grade towards the lake, soil erosion is a possibility.

Description

Looking uphill at drainage swales and sewer system. Further uphill a culvert is in place. Local residents informed us that the swales were recently widened and that flooding has not been a problem since the renovations. Prior to the renovations, flooding occured upstream of culvert and storm sewer inlets. Note the elvation of the inlet rim in the foreground. Runoff may bypass this inlet.

Solution	5.9.1, 6.4.5, 6.4.8, 6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	NUA006	Comments
Municipality:	Nuangola Borough	Flooding, erosion, and sedimentation were reported at this problem area by Nuangola Borough. This area is located at the intersection of Willow Grove Street and Nuangola Road. One culvert flows under each road.
Subwatershed:	Wapwallopen	
Stream name:	Nuangola Lake	
Inspected By/Date:	PAK 12/3/2008	
Checked By/Date:	MJW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

The older RCP culvert on the left is under Willow Grove Street. The newer HDPE culvert on the right passes under Nuangola Road. Leaves, debris, and sediment appear to block the culverts. Water flows left to right.

Description

Solution	6.4.8, 6.A, 6.B

Luzerne County
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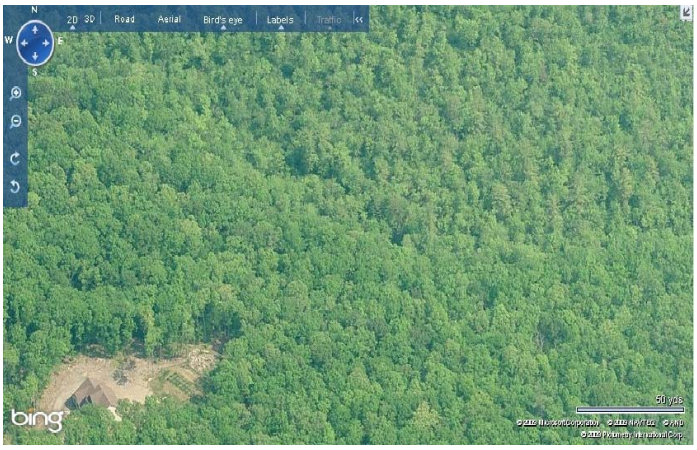
Luzerne Co. Act 167 Problem Area Inventory

		Comments
Problem Area - Map ID:	NUA007	Flooding, drainage, erosion and sedimentation problems were reported by Nuangola Borough at this location. Observation at this site was not possible and evaluation is based upon aerial photography.
Municipality:	Nuangola Borough	
Subwatershed:	Wapwallopen	
Stream name:	Nuangola Lake	
Inspected By/Date:	PAK 12/3/2008	
Checked By/Date:	MJW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	



Description

This site was located in the middle of the woods off a private driveway. Numerous private property signs were noted and no field observations were completed for this site. Based on the aerial photography, only one structure is in the vicinity of the problem area.

Description

Solution	5.4.2

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	NUA008	Comments
Municipality:	Nuangola Borough	Nuangola Borough indicated that at this location there was stormwater flooding and erosion/ sedimentation problems. The site observation resulted in no visible signs of significant erosion or sedimentation. Accumulation of debris along culverts and storm sewer inlets was noted.
Subwatershed:	Wapwallopen	
Stream name:	Nuangola Lake	
Inspected By/Date:	PAK 12/3/2008	
Checked By/Date:	MJW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Roadside swales had a slight buildup of leaves but seemed to be running clean. No significant problems could be located.

Description

This photo indicates that the inlet looks like it has the potential to become clogged with debris.

Solution	6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	NUA009	Comments
Municipality:	Nuangola Borough	Nuangola Borough reported flooding and sedimentation problems along Nuangola Avenue in the vicinity of Nuangola Drive.
Subwatershed:	Wapwallopen	
Stream name:	Nuangola Lake	
Inspected By/Date:	PAK 12/3/2008	
Checked By/Date:	MJW 1/12/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description
This photo was taken looking at Nuangola Lake from stated problem area. Overland flow to the lake may be occuring, causing the noted flooding.

Description
Looking uphill from problem area. There does not appear to be any stormwater conveyance facilties in this area.

Solution	5.4.3, 5.6.3, 6.4.4, 6.4.5, 6.4.8, 6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	NUA013	Comments
Municipality:	Nuangola Borough	Nuangola Borough reported sedimentation problems at the intersection of Red Rock Road & Nuangola Ave.
Subwatershed:	Wapwallopen	
Stream name:	Nuangola Lake	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:		
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Large retaining wall along low side of Nuangola Ave. The top of the wall is lower than the grade of Nuangola Ave. It is believed that stormwater carrying sediment across the road would be deposited in the area at the base of the wall.

Description

Runoff and sediment from undisturbed areas uphill of the wall would be conveyed through this area.

Solution	5.6.3, 6.4.8, 6.A

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	RIC001	Comments
Municipality:	Rice Township	This problem area, reported by Rice Township, is located in a residential community surrounding a small unnamed lake. The form indicates that the problem is caused due to runoff from Interstate 81. No obvious problems were identified during the field observation. A local resident indicated that he was unaware of any potential problems in the area.
Subwatershed:	Wapwallopen	
Stream name:	N/A	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	MJW 1/14/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

The problem area was noted near the intersection of Oakmont Lane and Lakeview Drive. No definitive causes of flooding could be located during the field investigation.

Description

Solution	5.4.2, 5.4.3, 6.4.4, 6.4.5, 6.4.8, 6.A

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

		Comments
Problem Area - Map ID:	RIC002	Flooding was reported by Rice Township in the vicinity of Blytheburn Road. A bridge on Blytheburn Road spans Wapwallopen Creek. Approximately 200 feet upstream of the bridge is a dam. Downstream of the bridge, a trailer park is located adjacent to the right bank of the creek. The forms indicate that the trailer park floods on storm events.
Municipality:	Rice Township	
Subwatershed:	Wapwallopen	
Stream name:	Wapwallopen	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	MJW 1/14/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking upstream at the dam from the bridge on Blytheburn Road.

Description

Wapwallopen Creek looking downstream of bridge along the trailer park. No buffer is present along the right bank. High streamflows will leave the bank towards the trailer park due to the steeper left bank.

Solution	5.4.1, 5.4.2, 5.6.3, 6.7.1, 6.A, 6.C

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	RIC003	Comments
Municipality:	Rice Township	This problem, reported by Rice Township, occurs in a depression area that drains to Ice Lake. Rice Township described this area as a swamp. Based upon the description provided by Rice Township, flooding is a regular occurrance at this location.
Subwatershed:	Wapwallopen	
Stream name:	Drainage to Ice Lake	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	MJW 1/14/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Culvert inlet under Henry Drive. Ponding is significant on both sides of the road. Three culverts are located in succession.

Description

The road grade is only slightly above the floodplain. As such, the road probably floods during high rainfall events.

Solution	5.4.2, 6.7.1, 6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

		Comments
Problem Area - Map ID:	RIC004	This problem, reported by Rice Township, occurs in a depression area along Nuangola Road that drains to Ice Lake. Rice Township described this area as a swamp.
Municipality:	Rice Township	
Subwatershed:	Wapwallopen	
Stream name:	Ice Lake	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	MJW 1/14/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking upstream at culvert outlet to Ice Lake. The culvert drains directly to Ice Lake High water levels in the lake will reduce the conveyance capacity of this culvert.

Description

Looking downstream at culvert inlet under Nuangola Road. Evidence of surface water ponding is noted in this location.

Solution	5.4.2, 6.7.1, 6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	RIC005	Comments
Municipality:	Rice Township	This problem area was reported by Rice Township. A house located in a private development experiences flooding. The driveway to the home crosses a drainage channel with a steep gradient.
Subwatershed:	Wapwallopen	
Stream name:	Unnamed Tributary	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	MJW 1/14/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking downstream. The home experiencing flooding is in the right foreground. The channel is relatively small yet is well defined. Dimensions are approximately 1 foot deep and 3 feet wide. The upstream residential development drains to this channel. No stormwater basins were noted in the upstream development.

Description

Outlet of culverts underneath private drive. The channel turns sharply below the culvert, with sedimentation deposits on the inside of the bend. The culvert appears undersized since a secondary culvert appears to have been added to increase capacity.

Solution	5.4.2, 5.6.3, 6.4.5, 6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	RIC007	Comments
Municipality:	Rice Township	This problem area was reported by Rice Township. Two sequential bridges spanning an unnamed tributary seem to be the source of flooding in this area. The downstream bridge has a smaller waterway opening and low chord elevation.
Subwatershed:	Wapwallopen	
Stream name:	Unnamed Tributary	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	MJW 1/14/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description
Looking upstream at the bridge under Church Road. Channel is clean and well defined. Buffer is present on both sides of the channel.

Description
Downstream bridge to private resident. Waterway opening is smaller and low chord lower. Concrete beam/curb has recently been added to existing abutments. High storm events most likely cause backwater and overtopping of the bridge.

Solution	5.4.2, 6.7.1, 6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	ROS001	Comments
Municipality:	Ross Township	The Conservation District reported streambank erosion at the Old State Rd. bridge crossing of Huntington Creek.
Subwatershed:	Huntington Creek	
Stream name:	Huntington Creek	
Inspected By/Date:	PAK4/17/2009	
Checked By/Date:	DEW 1/27/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking downstream at upstream face of Old State Road bridge. Bridge low chords are approximately 3 feet above the bottom of the channel. Sedimentation along both banks at the upstream face is visible.

Description

Looking upstream toward Old State Road bridge showing significant erosion along both banks. A sediment bar is also forming in the middle of the channel.

Solution	5.4.2, 5.6.3, 6.7.1, 6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	ROS002	Comments
Municipality:	Ross Township	The Conservation District reported this stone arch bridge as a waterway obstruction. Additionally, streambank erosion and sedimentation were reported for this area.
Subwatershed:	Huntington Creek	
Stream name:	Huntington Creek	
Inspected By/Date:	PAK4/17/2009	
Checked By/Date:	DEW 1/27/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking downstream of bridge, minor streambank erosion shown.

Description

Downstream face of the Green Valley Road stone arch bridge.

Solution	5.4.2, 6.7.1, 6.A, 6.B

Luzerne County
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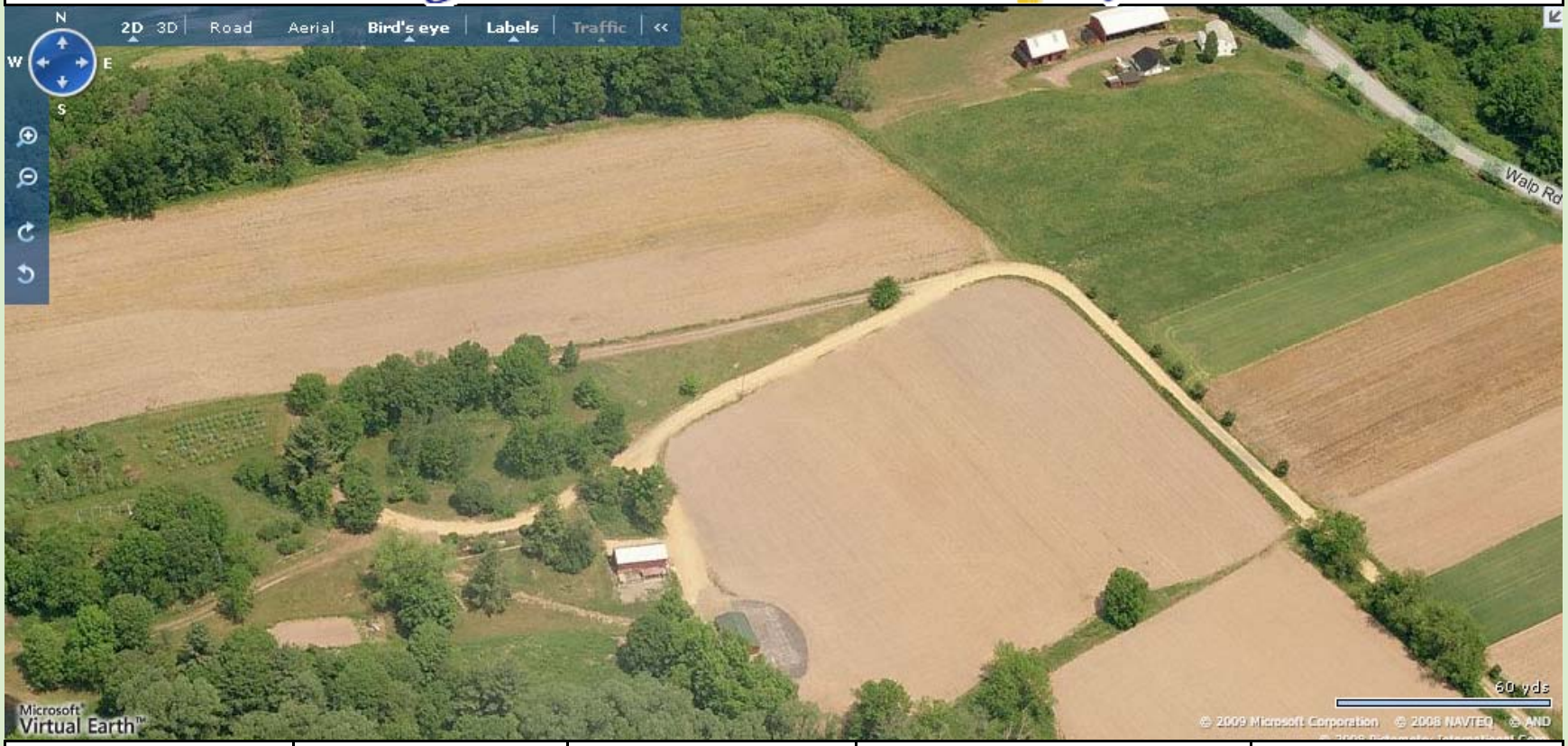

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SUG001	Sugarloaf Township	Nescopeck	(N/A)	(N/A)
Explanation: A problem at this location could not be determined.				
Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.				

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SUG001	Inspected By/Date:	PAK 11/26/2008
Municipality:	Sugarloaf Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed	Photograph not available	
Stream name:	N/A		
Drainage Area (mi^2)	N/A		
Calculation Method	N/A		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	N/A	N/A
5	N/A	N/A	N/A
10	N/A	N/A	N/A
50	N/A	N/A	N/A
100	N/A	N/A	N/A
500	N/A	N/A	N/A

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	A flooding problem was documented by Sugarloaf township. Based upon the location provided in the map, flooding problems could not be identified. This matter was discussed local resident who was unaware of flooding problems at this location.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

N/A

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

Luzerne County
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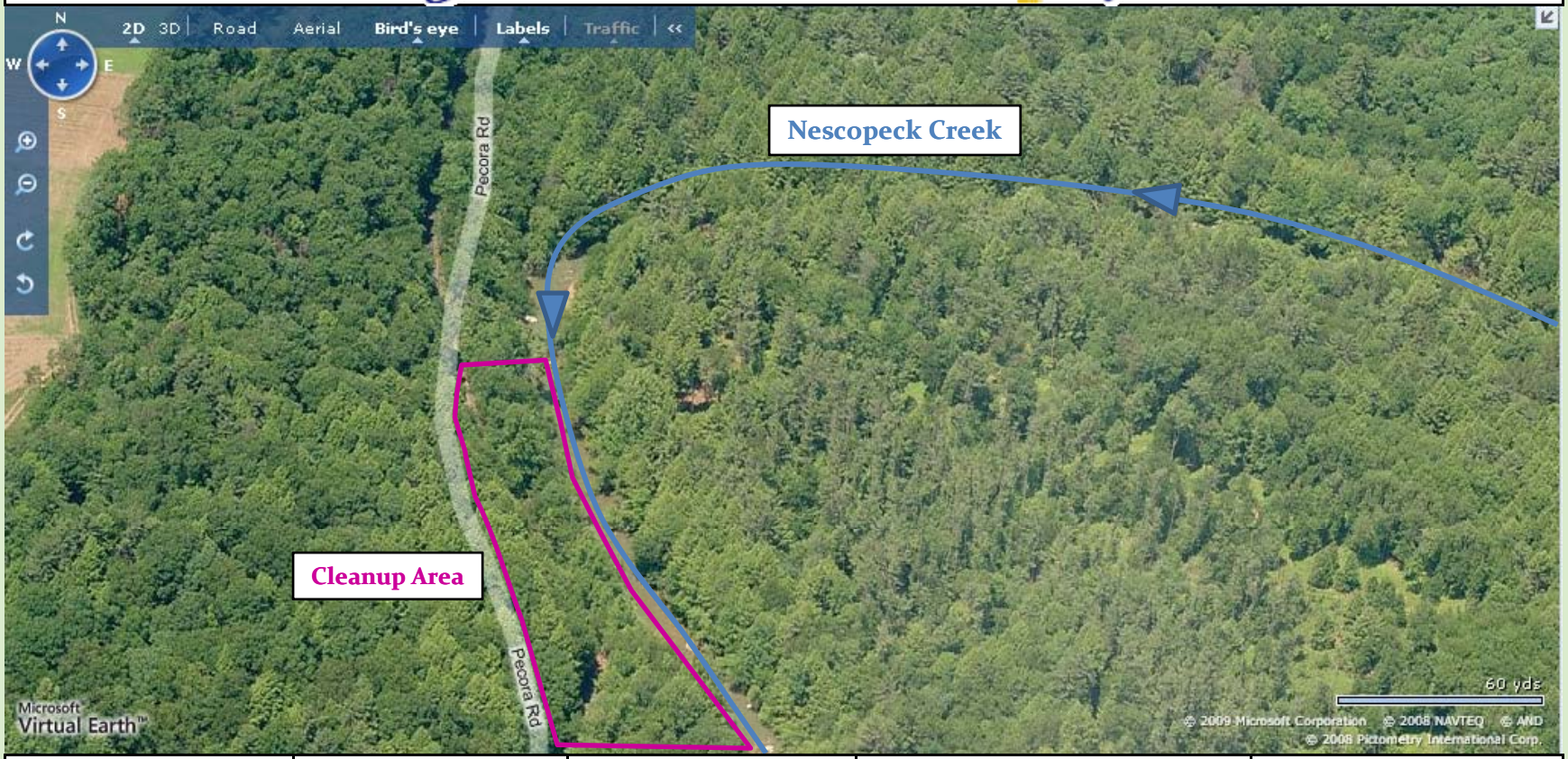

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SUG002	Sugarloaf Twp	Nescopeck	Nescopeck Creek	Proposed Solutions (A) & (B)

Explanation: Roadside dumping of trash has been confirmed along Pecora Rd. Options for correction involve cleanup by hand due to the steep embankment. Additional options involve the establishing of alternate methods for trash removal for township inhabitants.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SUG002	Inspected By/Date:	PAK 11/26/2008
Municipality:	Sugarloaf Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Nescopeck Creek		
Drainage Area (mi^2)	82.7		
Calculation Method	StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	2,840	0.05
5	N/A	4,720	0.09
10	N/A	6,220	0.12
50	N/A	10,200	0.19
100	N/A	12,200	0.23
500	N/A	17,800	0.34

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Significant amounts of trash have been dumped along the stream bank at this location along Pecora Road. A "No Dumping $100 Fine" sign is present.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Water pollution in the Nescopeck Creek along Pecora Road has been identified as a problem area by the Conservation District due to a history garbage dumping. Based upon general field observations, this problem is believed to be people disposing of garbage along the stream bank. Possible solutions to this problem are A) removing the waste by a work crew (possibly volunteer) and disposing of properly, B) increasing and enforcing no dumping fines.

Cost Estimates

Option	A	B	C
Cost Range	$2,000-$10,000	$500	N/A

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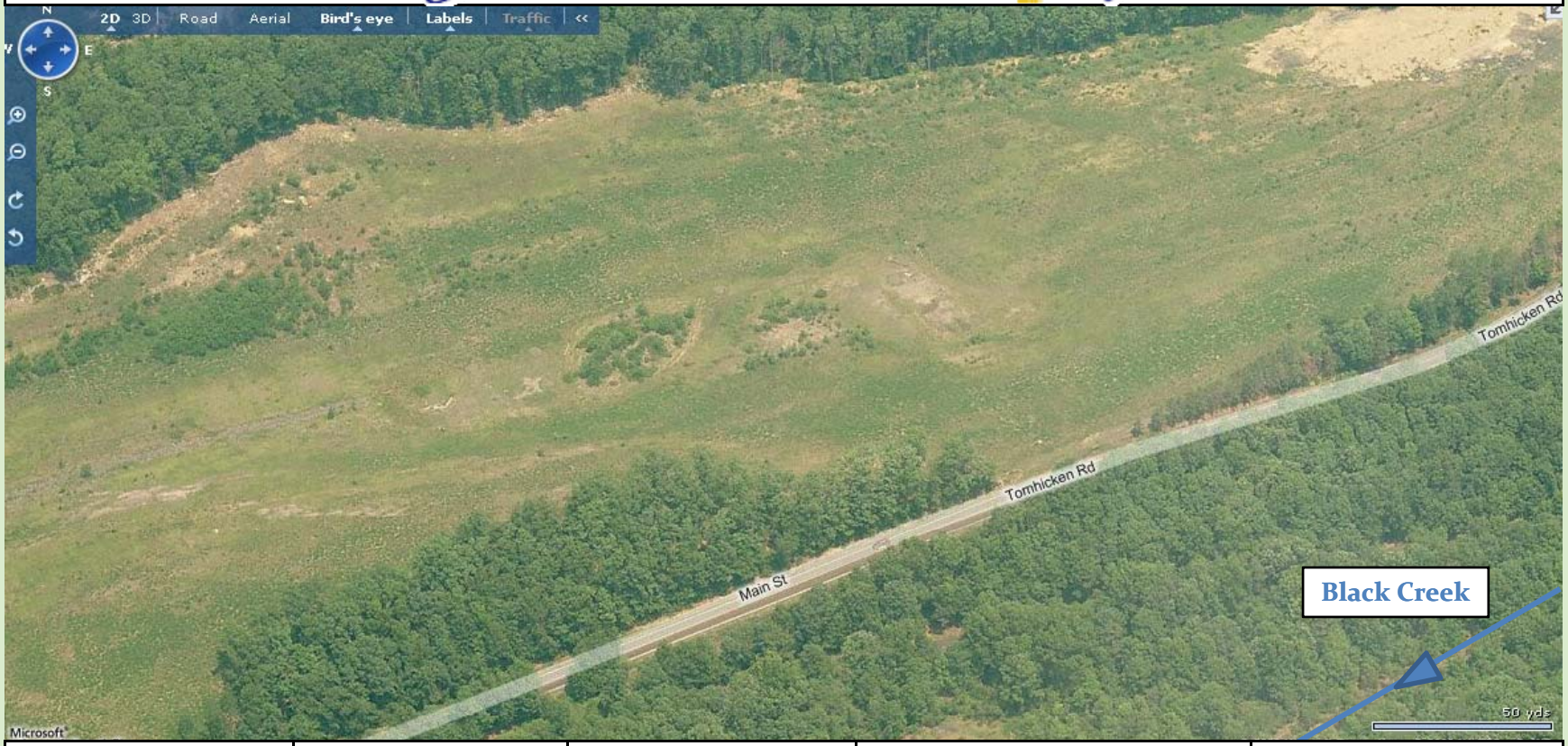

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SUG004	Sugarloaf Twp	Nescopeck	Nescopeck Creek	Proposed Solution (N/A)

Explanation: This is a low area that collects and holds runoff and stays wet for extended periods. It has become a water quality issue due to acid mine drainage and sedimentation from a mine to the northeast. Options for correction include planting vegetation to act as a water quality bmp or reclamation of the mine.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SUG004	Inspected By/Date:	PAK 11/12/2008
Municipality:	Sugarloaf Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Uncontrolled Runoff		
Drainage Area (mi^2)	0.57		
Calculation Method	StreamStats		
C (Tc)	0.37 (30 min)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	1.31	73	0.20
10	1.86	100	0.27
25	2.19	116	0.32
50	2.46	128	0.35
100	2.76	141	0.39
500	3.57	177	0.49

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Ponding area shown on several maps as a water body. It is believed that acid mine drainage from a mine to the northeast contaminates the water quality at this site.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

The water pollution at the ponding area along Tomhicken Road has been identified as a problem area by the Municipality due to a history water quality issues. Based upon general field observations, this problem is believed to be storm runoff carrying acid mine drainage down gradient and ponding in a topographically low area. Possible solutions to this problem are A) planting appropriate vegetation in the low area to act as a filter/buffer or B) reclaim the mine. Further analysis would be required to analyze possible costs associated with these options.

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SUG005	Sugarloaf Twp	Nescopeck	Nescopeck Creek	Proposed Solution (N/A)

Explanation: Mill Hill Road Bridge is an old steel truss bridge that overtops on storm events due to the grade of the road. Currently a replacement bridge is in the final design stages.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SUG005	Inspected By/Date:	PAK 11/26/2008
Municipality:	Sugarloaf Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Nescopeck Creek		
Drainage Area (mi^2)	82.7		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	350	0.01
5	N/A	477	0.01
10	N/A	578	0.01
50	N/A	1,069	0.02
100	N/A	1,346	0.03
500	N/A	2,184	0.04

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Bridge carrying Mill Hill Road over Nescopeck Creek is an old steel overhead truss with a wooden deck. Due to the grade of the approach roadway, overtopping of the road occurs before the bridge deck.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

The Mill Hill Rd. bridge has been identified as a problem area by the Conservation District due to a history of overtopping. This problem is due to the grade of the approach roadway being lower than the elevation of the deck. A bridge replacement project is in the final design phases. No further action required at this time.

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SUG006	Sugarloaf Twp	Nescopeck	Nescopeck Creek	Proposed Solution (B)

Explanation: A steel beam bridge carries Kisenwether Rd. over an unnamed tributary to Nescopeck Creek. The bridge is very low and tends to trap sediment as well as overtop on most storm events. Options for correction include removal of the debris as well as replacement of the bridge.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SUG006	Inspected By/Date:	PAK 11/26/2008
Municipality:	Sugarloaf Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Nescopeck Creek		
Drainage Area (mi^2)	3.64		
Calculation Method	USGS 2000-4189		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	350	0.15
5	N/A	477	0.20
10	N/A	578	0.25
50	N/A	1,069	0.46
100	N/A	1,346	0.58
500	N/A	2,184	0.94

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Bridge has limited clearance to low chord which is believed to cause upstream flooding. Additionally, sediment accumulation is occurring on right side of channel which further restricts hydraulic opening.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

The Kisenwether Rd. bridge has been identified as a problem area by the Conservation District due to a history of debris accumulation, downstream erosion, and upstream flooding. Based upon general field observations, this problem is believed to be caused by too small a hydraulic opening caused by the bridge low chords and accumulation of sediment and debris within the channel. Possible solutions to this problem are A) replacing the existing bridge to provide a higher low chord, B) removing sediment blocking the hydraulic opening.

Cost Estimates

Option	A	B	C
Cost Range	$50,000-$200,000	$5,000	N/A

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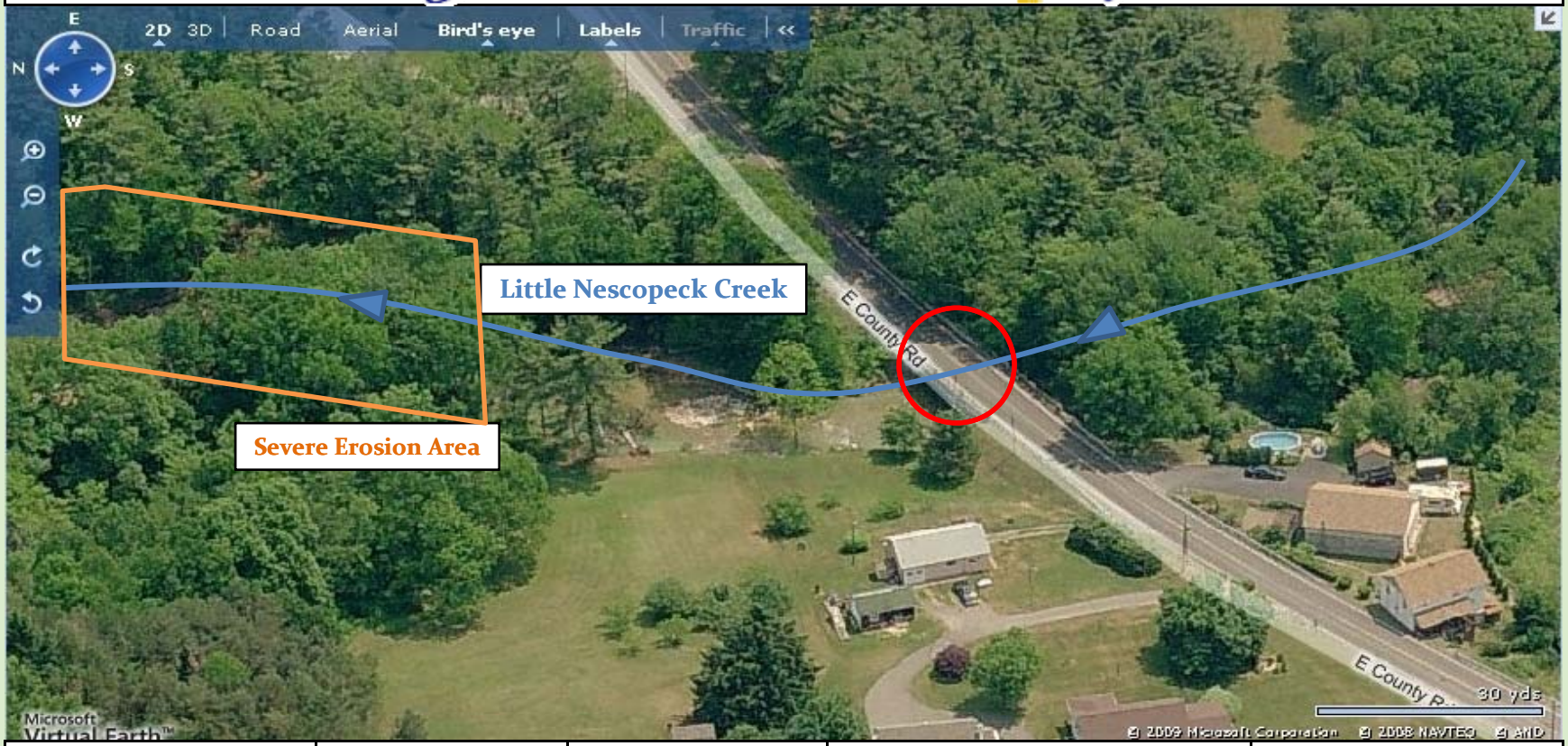

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SUG007 & SUG008	Sugarloaf Twp	Nescopeck	Nescopeck Creek	Proposed Solutions (A) & (B)

Explanation: Explanation: South of E. Country Road the stream is constricted and has a poor alignment. As a result, flooding could potentially occur on both the east and west banks. Water velocity appears extremely high. Severe downstream erosion has caused trees to collapse and debris to catch blocking the channel. Options for correction include removal of fallen trees and debris as well as bank stabilization.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SUG007 & SUG008	Inspected By/Date:	PAK 11/26/2008
Municipality:	Sugarloaf Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Nescopeck Creek		
Drainage Area (mi^2)	13.8		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	650	0.07
5	N/A	1,130	0.13
10	N/A	1,510	0.17
50	N/A	2,510	0.28
100	N/A	3,020	0.34
500	N/A	4,410	0.50

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Severe erosion downstream of the E. County Rd bridge and accumulation of debris/fallen trees obstructing flow. Erosion is believe to be caused by the Creek passing through a bend and high velocities exiting the constricted bridge opening.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Streambank erosion downstream of the East Country Rd. Bridge has been identified by the Conservation District. Based upon general field observations, this problem is believed to be caused by an accumulation of sediment and debris at the bridge and a bend in the Creek. Possible implications are steep and hazardous stream banks, undercutting of the bank resulting in instability and loss of trees and vegetation, and downstream deposition of sediment . Possible solutions to this problem are A) restoring and armoring the stream banks through the bend, and B) removing accumulated debris and sediment at the bridge.

Cost Estimates

Option	A	B	C
Cost Range	$10,000-$20,000	$5,000	N/A

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Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SUG009	Sugarloaf Twp	Nescopeck	Nescopeck Creek	Proposed Solution (N/A)

Explanation: This house is located just upstream of the confluence of Nescopeck Creek with an unnamed tributary, and is within the 100-year floodplains from both streams. Options to correct this problem are limited but include installing floodproofing measures around the house.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SUG009	Inspected By/Date:	PAK 11/26/2008
Municipality:	Sugarloaf Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Nescopeck Creek		
Drainage Area (mi^2)	60.1		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	2100	0.05
5	N/A	3510	0.09
10	N/A	4640	0.12
50	N/A	7680	0.20
100	N/A	9210	0.24
500	N/A	13400	0.35

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	A recently constructed home appears to be located in the Nescopeck Creek floodplain. Flooding and ponding have occurred at the property. Stream bank stabilization measures were noticed along the Nescopeck Creek.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Repeated flooding at a home located off of Kisenwether Road has been identified by the Conservation District. Based upon general field observations, this problem is believed to be caused by a structures location in the FEMA floodplain with a floor elevation below flood elevation. Possible solutions to this problem are A) apply flooding proof measure to structures or B) constructing a flood wall or levee. Due to the complexity of this problem, further investigation would be required to determine probable costs for these solutions.

Cost Estimates

Option	A	B	C
Cost Range	N/A	N/A	N/A

Luzerne County
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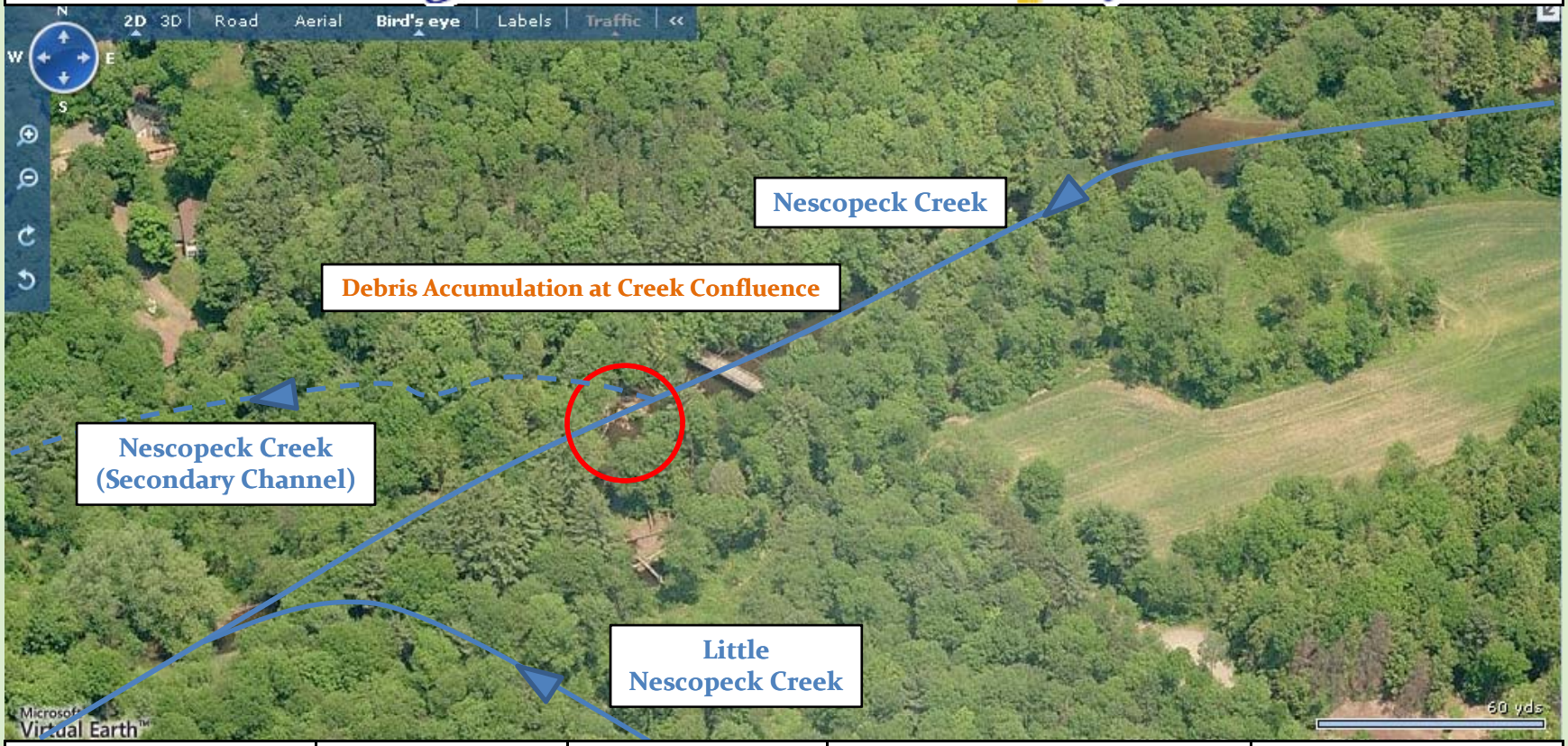

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SUG010	Sugarloaf Twp	Nescopeck	Nescopeck Creek	Proposed Solution (A)

Explanation: Red Bridge Lane Bridge is an old steel truss bride that is closed to the public. Directly downstream of this bridge are fallen trees and other debris accumulation near the split between the main and secondary channels.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SUG010	Inspected By/Date:	PAK 11/26/2008
Municipality:	Sugarloaf Township	Checked By/Date:	DEW 2/26/2010
Subwatershed:	Nescopeck Watershed		
Stream name:	Nescopeck Creek		
Drainage Area (mi^2)	64.6		
Calculation Method	NSS StreamStats		
C (Tc)	N/A (N/A)		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Unit Discharge (cfs/Ac)
2	N/A	2,250	0.05
5	N/A	3,760	0.09
10	N/A	4,970	0.12
50	N/A	8,210	0.20
100	N/A	9,840	0.24
500	N/A	14,300	0.35

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Fallen trees and sediment accumulation downstream of bridge are causing a flow obstruction.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Sediment and debris accumulation downstream of the Red Bridge Lane bridge over Nescopeck Creek has been identified as a problem area by the Conservation District. Based upon general field observations, this problem is believed to be caused by the flow confluence of the Nescopeck Creek and the Little Nescopeck Creek. A possible solution to this problem is to A) conduct regular maintenance to remove debris and sediment.

Cost Estimates

Option	A	B	C
Cost Range	$5,000/year	N/A	N/A

Luzerne County
PENNSYLVANIA

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SWO001	Swoyersville Borough	Abrahams Creek	N/A	Proposed Solutions (A) and (B)

Explanation: Swoyersville Borough reported flooding near the intersection of Brook Street and Main Street. Facing north a small drainage swale is located along the left side of Brook Street. Stormwater leaves the swale through a 36 inch culvert. The culvert is over 100 feet long and discharges to a channelized drainage system of the other side of Main Street.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SWO001	Inspected By/Date:	SDB 3/19/2009
Municipality:	Swoyersville Borough	Checked By/Date:	DEW 3/9/2010
Subwatershed:	Abrahams Creek		
Stream name:	N/A		
Drainage Area (mi^2)	0.0791		
Calculation Method	SCS		
Curve Number; Lag	77.26; 27.35 min		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Volume (AC-FT)
2	2.53	32	3.08
5	3.14	52	4.79
10	3.68	63	6.08
25	4.54	81	8.58
50	5.34	99	11.02
100	6.28	117	13.63

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Swoyersville Borough reported flooding near the intersection of Brook Street and Main Street. Facing north a small drainage swale is located along the left side of Brook Street. Stormwater leaves the swale through a 36 inch culvert. The culvert is over 100 feet long and discharges to a channelized drainage system of the other side of Main Street.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Flooding at the intersection of Brook Street and Main Street have been identified by the Municipality. Based upon general field observations these problems are most likely due to the existing stormwater conveyance system inadequacy, and debris accumulating in the upstream channel, thus reducing the capacity of the channel over time. Possible solutions to these problems include A) replacing the culvert with a larger structure; B) restore and regrade channel to increase capacity;

Cost Estimates

Option	A	B	C
Cost Range	$50,000-$250,000	$50,000-$200,000	N/A

Luzerne County
PENNSYLVANIA

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SWO002	Swoyersville Borough	Abrahams Creek	N/A	Proposed Solution (A)

Explanation: Swoyersville Borough reported flooding near the intersections of Owen Street with Main Street. Runoff from the mountain appears to collect in a low lying area at the intersection of Owen Street and Main Street.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SWO002	Inspected By/Date:	SDB 3/19/2009
Municipality:	Swoyersville Borough	Checked By/Date:	DEW 3/9/2010
Subwatershed:	Abrahams Creek		
Stream name:	N/A		
Drainage Area (mi^2)	0.1052		
Calculation Method	SCS		
Curve Number; Lag	71.06; 27.35 min		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Volume (AC-FT)
2	2.53	22	2.60
5	3.14	44	4.44
10	3.68	54	5.71
25	4.54	74	8.44
50	5.34	94	11.16
100	6.28	112	13.94

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Swoyersville Borough reported flooding near the intersections of Owen Street with Main Street. Runoff from the mountain appears to collect in a low lying area at this location.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Runoff from the mountain appears to collect in a low lying area near the intersection. A drainage ditch is located upstream of the low lying area, however, no outlet could be located to effectively convey runoff to the downstream conveyance system. Possible solutions to this problem include: A) design and construct an engineered channel to route runoff around the low lying area; B) install a stormwater collection system and route to Main Street to discharge the runoff downstream.

Cost Estimates

Option	A	B	C
Cost Range	$50,000 - $250,000	$50,000 - $250,000	N/A

Luzerne County
PENNSYLVANIA

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
SWO003	Swoyersville Borough	Abrahams Creek	N/A	Proposed Solution (A)

Explanation: Swoyersville Borough reported flooding near the intersection of Warsaw Street and Main Street. Swoyersville Borough Department of Public Works noted that this area is prone to flooding during heavy storms. Warsaw Street appears to be very steep and curbing was not visible in all locations.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	SWO003	Inspected By/Date:	SDB 3/19/2009
Municipality:	Swoyersville Borough	Checked By/Date:	DEW 3/9/2010
Subwatershed:	Abrahams Creek		
Stream name:	N/A		
Drainage Area (mi^2)	0.1277		
Calculation Method	N/A		
Curve Number; Lag	73.91; 28.56 min		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Volume (AC-FT)
2	2.53	36	3.93
5	3.14	65	6.41
10	3.68	80	8.19
25	4.54	105	11.84
50	5.34	131	15.45
100	6.28	155	19.21

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Swoyersville Borough reported flooding near the intersection of Warsaw Street and Main Street. Swoyersville Borough Department of Public Works notest that this area is prone to flooding during heavy storms. Warsaw Street appears to be very steep and curbing was not visible in all locations.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Flooding problems near the intersection of Warsaw Street and Main Street have been identified by the Municipality. Based upon general field observations these problems are most likely due to inadequate stormwater conveyance methods. Possible solutions to these problems include A) installation of vegetative swales along warsaw street to impede water velocity; B) increase the capacity of existing stormwater conveyance systems.

Cost Estimates

Option	A	B	C
Cost Range	$50,000 - $150,000	$50,000 - $250,000	N/A

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	UNI001	Comments
Municipality:	Union Township	This problem area was reported by the Luzerne County Conservation District. Flooding, streambank erosion, dead fish, and a collapsed bridge were all reported at this site, which is located at the northwest corner of Shickshinny Lake. A property owner indicated that after the 2006 flood, 2 pipe culverts at this location were replaced with this bridge by FEMA. The property owner was unaware of any issues at this location since the replacement.
Subwatershed:	Susquehanna River	
Stream name:	Shickshinny Creek/ Lake	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	MJW 1/7/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking downstream at the upstream face of the new Main St. bridge that replaced the two older pipes.

Description

Looking downstream from the Main St. bridge

Solution	5.4.2, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	UNI002
Municipality:	Union Township
Subwatershed:	Susquehanna River
Stream name:	Shickshinny Creek
Inspected By/Date:	PAK 5/28/2009
Checked By/Date:	MJW 1/8/2010

Type of Problem (Highlighted):

1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

Forms provided by the Conservation District indicate that Cragle Hill Rd. bridge is partially washed out and erosion is occuring at the location near an adjacent garage. No evidence of a washed out bridge was visible during the field observation. Riprap was placed on the eroded area of the bank.

Description

View from McKendree Road bridge looking upstream. Structure to left of stream is supported by retaining wall along stream bank. The streambank on right side of photo is steep with an area of riprap. The garage along the right side streambank is not visible in this picture.

Description

View from McKendree Road bridge area looking downstream. Erosion is shown along both banks. Right side bank is steep with undercutting of existing trees occuring.

Solution	5.4.2, 6.7.1, 6.A, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

		Comments
Problem Area - Map ID:	UNI003	The Conservation District reported streambank erosion as well as problems with the hydraulic opening of the Mountain Road culvert, stream crossing issues and road problems. This area has historic significance and community recreation.
Municipality:	Union Township	
Subwatershed:	Susquehanna River	
Stream name:	Herron Creek	
Inspected By/Date:	PAK 5/28/2009	
Checked By/Date:	MJW 1/8/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking upstream from Mountain Road culvert. An outlet pipe is located on the right discharging from the top of a stone retaining wall. The bank to the left is fairly steep. The Mountain Road culvert is most likely under an inlet control condition due to the steep channel gradient. Increased velocities through the culvert and shallower gradient downstream are likely causing erosion.

Description

Looking downstream from Mountain Road culvert. The floodplain in this area appears to be very wide, with the grass mowed to the banks, resulting in minimal buffer area. Erosion seems to be more prevalent along the right bank.

Solution	5.4.1, 5.4.2, 5.6.3, 6.7.1, 6.A, 6.C

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRU001	Comments
Municipality:	Warrior Run Borough	Flooding was reported as a problem at this area by Warrior Run Borough. The storm sewer system in the area receives water from two sources; a roadside swale and a swale/culvert system located behind a private residence. The homeowner at this residence mentioned that during large storms the water overflows the system and floods the property behind his house.
Subwatershed:	Nanticoke/Newport Creek	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	MJW 1/7/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Swale behind property owner's home. This area reportedly floods during large storm events. The most recent event occurred in 2006. The culvert inlet at the end of this swale is believed to connect to the storm sewer in front of the house. According to the homeowner, the culvert has been recently replaced.

Description

Roadside swale along Beaumont Street. According to a homeowner, the swale flows into the culvert shown and into another swale before finally entering the storm sewer. During the field observation, neither the outlet to this culvert nor the downstream swale could be located.

Solution	5.4.2, 5.6.3, 6.4.4, 6.4.8, 6.A, 6.B

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRU002	Comments
Municipality:	Warrior Run Borough	Flooding was documented as occurring in this area by Warrior Run Borough. Based upon the description provided, flooding is most likely caused by a small swale and culvert system located along Chestnut Street.
Subwatershed:	Nanticoke/Newport Creek	
Stream name:	Local Drainage	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	MJW 1/7/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description
Photo of culvert outlet to drainage swale. The origin of the culvert shown could not be determined as the pipe originated from private property marked with no trespassing signs. Based on the size of the culvert inlet and swale size, it appears that the swale would be able to handle most storm events.

Description
Downstream end of swale shown in the previous photo. Based upon the size of the upstream swale, this culvert is likely undersized. Additionally, the culvert inlet is partially blocked by debris.

Solution	5.6.3, 6.4.4, 6.4.5, 6.4.8, 6.A, 6.B

Luzerne County
PENNSYLVANIA

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
WWBoo1	West Wyoming Borough	Abrahams Creek	Abrahams Creek	Proposed Solution (A)

Explanation: Inadequate conveyance and a high water table cause the low-lying property on Rich's Golf Center to become inundated during storm events. The area is flat, and the receiving channel has minimal grade. This causes ponded water to stagnate for extended periods after the rainfall events.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	WWB001	Inspected By/Date:	SDB 3/19/2009
Municipality:	West Wyoming Borough	Checked By/Date:	DEW 3/9/2010
Subwatershed:	Abrahams Creek		
Stream name:	Abrahams Creek		
Drainage Area (mi^2)	0.28		
Calculation Method	SCS		
Curve Number; Lag	64.77; 62 min		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Volume (AC-FT)
2	2.53	40	9.23
5	3.14	61	13.95
10	3.68	82	18.62
25	4.54	120	26.81
50	5.34	158	35.09
100	6.28	206	45.43

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Inadequate conveyance and a high water table cause the low-lying property on Rich's Golf Center to become inundated during storm events. The area is flat, and the receiving channel has minimal grade. This causes ponded water to stagnate for extended periods after the rainfall events.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Possible solutions to the ponding water on the Rich's Golf Center property include: A) construct a low berm around the edge of the property to prevent external runoff from entering, and pump water off of property; B) regrade downstream Abrahams Creek channel and construct feeder channels to remove water from property.

Cost Estimates

Option	A	B	C
Cost Range	$100,000 - $500,000	$100,000 - $500,000	N/A

Luzerne County
PENNSYLVANIA

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
WWB002	West Wyoming Borough	Abrahams Creek	N/A	Proposed Solutions A and B

Explanation: West Wyoming Borough reported flooding at the intersection of Oak Street and Stites Street. A channel was designed and constructed along Oak Street to convey runoff from the mountain and storm sewer system in the residential area. The channel flows to a 36" pipe, which constricts flow in high runoff events. Furthermore, the receiving channel downstream of the pipe is flat and discharges under the levee through a pipe with minimal slope.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
PENNSYLVANIA

Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	WWB002	Inspected By/Date:	SDB 3/19/2009
Municipality:	West Wyoming Borough	Checked By/Date:	DEW 3/9/2010
Subwatershed:	Abrahams Creek		
Stream name:	N/A		
Drainage Area (mi^2)	0.2606		
Calculation Method	SCS		
Curve Number; Lag	68; 29 min		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Volume (AC-FT)
2	2.53	34	4.92
5	3.14	77	8.90
10	3.68	95	11.52
25	4.54	137	17.47
50	5.34	181	23.50
100	6.28	213	29.43

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	West Wyoming Borough reported flooding at the intersection of Oak Street and Stites Street. A channel was designed and constructed along Oak Street to convey runoff from the mountain and storm sewer system in the residential area. The channel flows to a 36" pipe, which constricts flow in high runoff events. Furthermore, the receiving channel downstream of the pipe is flat and discharges under the levee through a pipe with minimal slope.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

It appears that flow is not properly conveyed along Oak Street, where ponding on the street has been cited, and that the undersized pipe under Stites Street and the downstream channel impede flow discharging the residential area. Possible solutions to this problem include: A) regrade channel between Stites Street and the Levee; B) replace pipe under Stites Street; C) regrade Oak Street to direct surface runoff towards channel and eliminate inlets.

Cost Estimates

Option	A	B	C
Cost Range	$50,000 - $250,000	$20,000 - $50,000	$100,000 - $300,000

Luzerne County
PENNSYLVANIA

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
WWB003	West Wyoming Borough	Abrahams Creek	N/A	Proposed Solution (A)

Explanation: West Wyoming Borough reported erosion and sedimentation occurring along Copper Hill Road and Shoemaker Avenue, which has resulted in flooding.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	WWB003	Inspected By/Date:	SDB 3/19/2009
Municipality:	West Wyoming Borough	Checked By/Date:	DEW 3/9/2010
Subwatershed:	Abrahams Creek		
Stream name:	N/A		
Drainage Area (mi^2)	0.1739		
Calculation Method	SCS		
Curve Number; Lag	68.93; 29.16 min		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Volume (AC-FT)
2	2.53	26	3.59
5	3.14	57	6.38
10	3.68	70	8.24
25	4.54	99	12.39
50	5.34	129	16.57
100	6.28	152	20.74

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	West Wyoming Borough reported erosion and sedimentation occuring along Copper Hill Road and Shoemaker Avenue, which has resulted in flooding.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

To address the the erosion of the channel, and reduce flooding, the possible solutions are A) stabilize channel; B) design and construct a secondary channel to improve flow conditions in the primary channel; C) upstream energy dissipation or storage facility.

Cost Estimates

Option	A	B	C
Cost Range	$25,000 - $150,000	$50,000 - $250,000	$50,000 - $250,000

Luzerne County
PENNSYLVANIA

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
WWB004	West Wyoming Borough	Abrahams Creek	N/A	Proposed Solution (A)

Explanation: The Moonlite Drive-In property is in a low lying area, and runoff from the mountain and Dimmick's Creek that enters the property cannot effectively be discharged. The abandoned railroad grade that bounds the property acts as a berm which keeps water confined to the property.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	WWB004	Inspected By/Date:	SDB 3/19/2009
Municipality:	West Wyoming Borough	Checked By/Date:	DEW 3/9/2010
Subwatershed:	Abrahams Creek		
Stream name:	Dimmick's Creek		
Drainage Area (mi^2)	0.9058		
Calculation Method	SCS		
Curve Number; Lag	72.83; 31.54 min		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Volume (AC-FT)
2	2.53	206	25.54
5	3.14	384	42.37
10	3.68	471	54.31
25	4.54	633	79.15
50	5.34	797	103.79
100	6.28	943	129.28

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	The Moonlite Drive-In property is in a low lying area, and runoff from the mountain and Dimmick's Creek that enters the property cannot be effectively discharged. The abandoned railroad grade that bounds the property acts as a berm which keeps water confined to the property.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Possible solutions to removing/preventing water from ponding on the Moonlite Drive-In property are: A) construct a storage area and channel network to direct runoff to the storage system; B) regrade the lower portion of the property and install new pipes under the railroad bed; C) install pumps and pump water to adjacent storage areas.

Cost Estimates

Option	A	B	C
Cost Range	$50,000 - $250,000	$100,000 - $300,000	$50,000 - $500,000

Luzerne County
PENNSYLVANIA

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
WWB005	West Wyoming Borough	Abrahams	Dimmick's Creek	Proposed Solution (A)

Explanation: Upstream of the culvert carrying Dimmick's Creek under Shoemaker Avenue, the stream channel is severely eroded and flooding has been noted during storm events..

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	WWB005	Inspected By/Date:	SDB 3/19/2009
Municipality:	West Wyoming Borough	Checked By/Date:	DEW 3/9/2010
Subwatershed:	Abrahams Creek		
Stream name:	Dimmick's Creek		
Drainage Area (mi^2)	0.8523		
Calculation Method	SCS		
Curve Number; Lag	72.83; 31.54 min		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Volume (AC-FT)
2	2.53	200	24.06
5	3.14	372	39.91
10	3.68	456	51.15
25	4.54	611	74.52
50	5.34	768	97.71
100	6.28	908	121.70

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Upstream of the culvert carrying Dimmick's Creek under Shoemaker Avenue, the stream channel is severely eroded and flooding has been noted during storm events. Structures located close to the manmade channel severely limit the possibility of restoring the creek to natural conditions.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Flooding and erosion have been reported upstream of the culvert carrying Dimmick's Creek under Shoemaker Avenue. Possible solutions to this problem are: A) increase the capacity of the channel and perform channel stabilization; B) construct an upstream storage facility to decrease flows in the channel.

Cost Estimates

Option	A	B	C
Cost Range	$100,000 - $250,000	$100,000 - $250,000	N/A

Luzerne County
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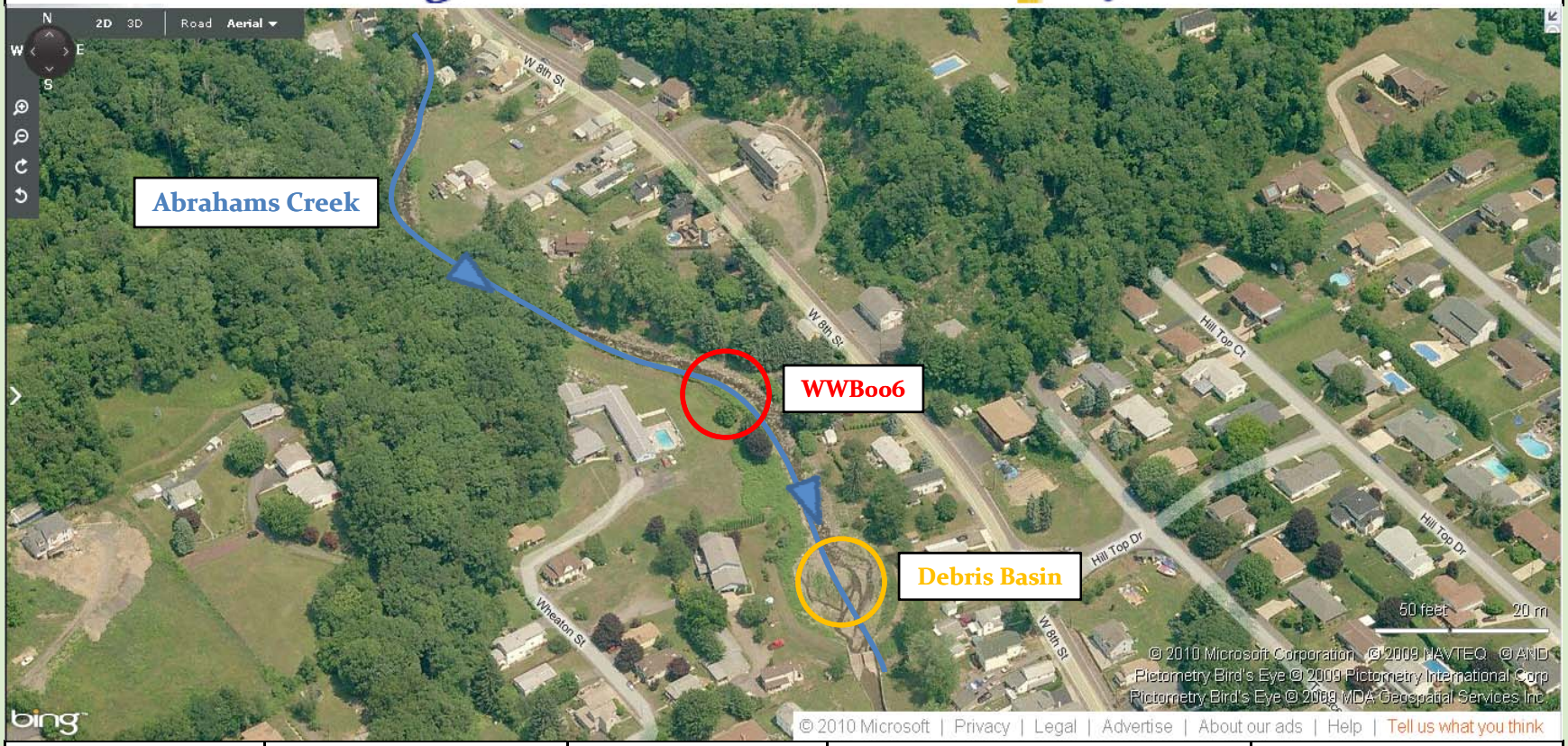

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
WWBoo6	West Wyoming Borough	Abrahams Creek	Abrahams Creek	Proposed Solutions (A), (B), and (C)

Explanation: Streambank erosion and destabilization during past storm events have washed material from the bank and has resulted in flooding along the Abrahams Creek stream reach between the Upper 8th Street bridge and the debris basin.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	WWB006	Inspected By/Date:	SDB 3/19/2009
Municipality:	West Wyoming Borough	Checked By/Date:	DEW 3/9/2010
Subwatershed:	Abrahams Creek		
Stream name:	Abrahams Creek		
Drainage Area (mi^2)	10.29		
Calculation Method	SCS		
Curve Number; Lag	Calibrated for mulitple subareas		

Storm Frequency (Yrs)	Rainfall (in)	Peak Discharge (cfs)	Stream Velocity (ft/s)
2	2.53	582	<15
5	3.14	1,040	~15
10	3.68	1,275	15-20
25	4.54	1,807	15-20
50	5.34	2,310	~20
100	6.28	2,750	>20

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	Streambank erosion and destabilization during past storm events have washed material from the bank and has resulted in flooding along the Abrahams Creek stream reach between the Upper 8th Street bridge and the debris basin.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Possible solutions to the stream degradation and flooding on the Abrahams Creek between the Upper 8th Street bridge and the debris basin include: A) channel realignment to restore the channel to its original course and capacity, including riparian buffer restoration; B) in-stream energy dissipation to decrease stream velocities; C) channel stabilization and bank protection.

Cost Estimates

Option	A	B	C
Cost Range	$100,000 - $300,000	$100,000 - $300,000	$50,000 - $300,000

Luzerne County
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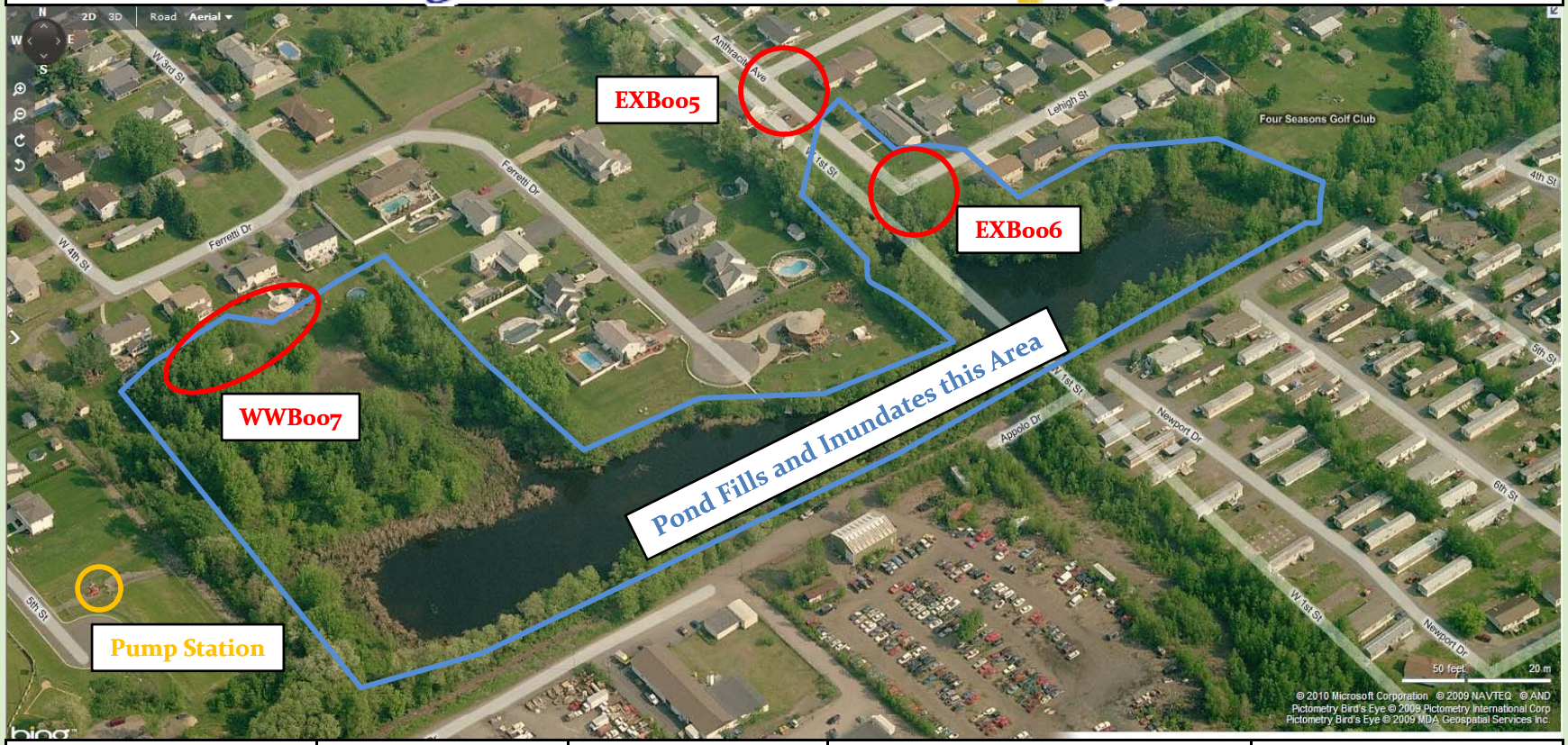

Problem Area	Municipality	Sub Watershed	Stream Name	Preferred Solution
EXB005, EXB006, and WWB007	Exeter Borough and West Wyoming Borough	Abrahams Creek	Ferretti Pond	Proposed Solution (A)

Explanation: The low-lying area between West Wyoming Borough and Exeter Borough known as Ferretti Pond backs up and inundates adjacent properties due to an ineffective discharge mechanism to the pump station at 5th Street.

Note: Due to the complexity of these problems and the limitations of this study, additional engineering analysis is required before implementing any solution to correct these problems.

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area ID:	WWB007	Inspected By/Date:	SDB 3/19/2009
Municipality:	West Wyoming Borough	Checked By/Date:	DEW 3/9/2010
Subwatershed:	Abrahams Creek		
Stream name:	Ferretti Pond		
Drainage Area (mi^2)	0.7832		
Calculation Method	SCS		
Curve Number; Lag	70; 37 min		

Storm Frequency (Yrs)	Rainfall (in)	Peak Inflow : Peak Outflow (cfs)	Volume (AC-FT)
2	2.53	0 : 103	17.64
5	3.14	10 : 212	30.70
10	3.68	21 : 260	39.56
25	4.54	65 : 361	58.90
50	5.34	142 : 465	78.31
100	6.28	218 : 548	97.85

*Type of Problem (Highlight all that apply):		Description
Flooding	Deficient Bridge/Culvert	The low-lying area between West Wyoming Borough and Exeter Borough known as Ferretti Pond backs up and inundates adjacent properties due to an ineffective discharge mechanism to the pump station at 5th Street.
Erosion	Sedimentation	
Water/Groundwater Pollution	Other	

Potential Solutions

Water in the Ferretti Pond is not effectively conveyed to the pump station at 5th Street which pumps water to the Abrahams Creek. Possible solutions to this problem include: A) construct a channel to convey water to the pump; B) construct berm to prevent water from inundating the adjacent properties; C) extend pump intake to operate in the pond at a set level.

Cost Estimates

Option	A	B	C
Cost Range	$100,000 - $200,000	$100,000 - $200,000	$100,000 - $300,000

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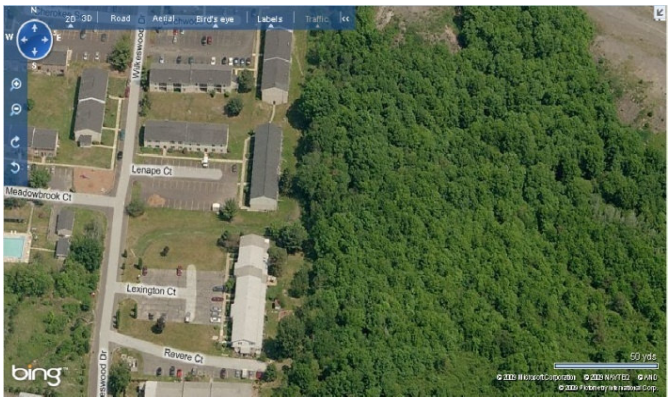
Luzerne Co. Act 167 Problem Area Inventory

		Comments
Problem Area - Map ID:	WBT001	Forms provided by Wilkes-Barre Township indicate that there are flooding and sedimentation problems in residential housing developments located off of Wilkeswood Drive. In particular, Lenape Court and Lexington Court have documented problems.
Municipality:	Wilkes-Barre Township	
Subwatershed:	Mill Creek	
Stream name:	Coal Brook	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	MJW 1/7/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	



Description

This aerial photograph depicts the parking lots in front of apartment complexes off of Lenape and Lexington Court. No stormwater management facilites were visible when driving through the housing development. Past mining activities in this area and upstream has resulted in significant alterations to the stream channel.

Description

This photo shows the area downstream of the housing development. Unprotected soil is visible surrounding the Wyoming Valley Sports Dome. Locations of stormwater ponding and erosion were visible.

Solution	5.4.2, 5.4.3, 5.6.3, 6.4.5, 6.6.2, 6.A Channel Construction

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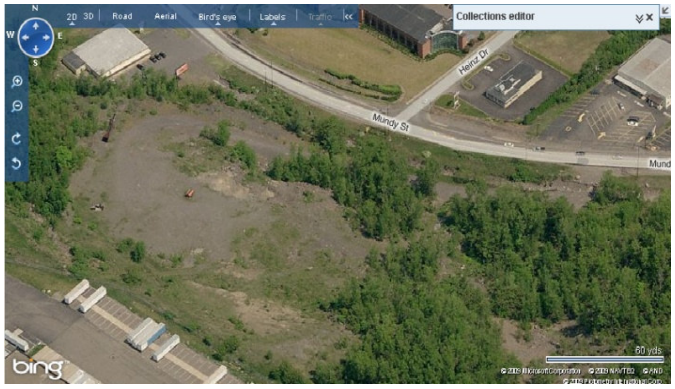
Luzerne Co. Act 167 Problem Area Inventory

		Comments
Problem Area - Map ID:	WBT002	Forms provided by Wilkes-Barre Township indicate that there are flooding, erosion, and sedimentation problems in this area that occur multiple times per year.
Municipality:	Wilkes-Barre Township	
Subwatershed:	Mill Creek	
Stream name:	Coal Brook	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	SDB 6/3/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	



Description

This aerial photograph shows the area off of Mundy Street that experiences a large amount of flooding and erosion problems. Past mining activities in this area and upstream has resulted in significant alterations to the stream channel.

Description

A pressure conduit/flood control system is proposed to convey flows through this area. The additional recommended solutions below are merely for augmentation with the system to accommodate local drainage issues not mitigated by the pressure conduit.

Solution	5.4.2, 5.4.3, 5.6.3, 6.4.5, 6.6.2

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WBT003	Comments
Municipality:	Wilkes-Barre Township	Forms provided by Wilkes-Barre Township indicate that there are flooding, erosion and sedimentation problems in this area behind the shopping center to the east of the Wachovia Arena. It appears that there is roadside runoff from Interstate 81. Past mining activities in this area and upstream has resulted in significant alterations to the area.
Subwatershed:	Mill Creek	
Stream name:	Coal Brook	
Inspected By/Date:	PAK 4/3/2009	
Checked By/Date:	SDB 6/3/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Photo of erosion area behind shopping center. The embankment is clearly not stabilized with vegetation and erosion is present.

Description

Heavy erosion behind other areas of the shopping center was also observed. The soil appeared saturated and the bank erosion more recent. Runoff from Interstate 81 appears to contribute to damage in this area. A small stormwater basin was constructed, but has been blown out in past events. The basin requires retrofitting to accomodate larger volumes of runoff.

Solution	5.4.3, 5.6.3, 6.A

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI001	Comments
Municipality:	Wright Township	This problem area was reported by Wright Township. Watering Run flows under Church Rd., then approximately 350 feet downstream under S. Main St. The close proximity of the bridges to one another as well as development within the floodplain is believed to be the cause of the problems. An evaluation of the adequacy of the bridge opening size could not be determined.
Subwatershed:	Wapwallopen	
Stream name:	Watering Run	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	MJW 1/6/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Downstream face of the Church Rd. (upstream) bridge is shown in this photo. Site observations indicate that this bridge appears to be interrupting the sediment transport capabilities of the channel, causing sedimentation upstream of this bridge and erosion downstream. Erosion and associated undermining of the stone retaining wall in the foreground was observed.

Description

Upstream face of the S. Main St. (downstream) bridge. It appears that recent construction has occurred based upon visual inspection of the guiderail, riprap, gabion baskets, wingwalls, and utility pipe. Stream stabilization to minimize streambank erosion is visable at this location.

Solution	5.4.2, 5.6.3, 6.7.1, 6.A, 6.C

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI002
Municipality:	Wright Township
Subwatershed:	Wapwallopen
Stream name:	Local Drainage
Inspected By/Date:	PAK 2/12/2009
Checked By/Date:	MJW 1/7/2010
Type of Problem (Highlighted):	
1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

The form prepared by Wright Township indicates flooding problems and flow outside of the drainage swales. The stormwater basin and the swales leading to the basin appear to be the source of these problems listed by the municipality.

Description

Looking north at the stormwater basin. Numerous trees are shown within the basin footprint and a defined swale leading to the outlet structure. The outlet structure did not include a trash rack and sediment was observed to be obstructing the outflow from the basin.

Description

Inflow swale to Basin. This swale passes through several residential backyards. The small structure in the photo is constructed within the swale area, which may cause the swale to be overtopped and runoff to flow through adjacent properties.

Solution	5.4.3, 5.6.3, 6.4.5, 6.A, 6.D

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI003	Comments
Municipality:	Wright Township	Flooding and sedimentation problems were reported at this location by Wright Township. Channel appears undersized and most likely floods during larger storm events. Obstructions were not present; therefore, local backwater does not appear to be a problem. Evidence of flooding was not found during the field observation.
Subwatershed:	Wapwallopen	
Stream name:	Wapwallopen Creek	
Inspected By/Date:	PAK 12/3/2008	
Checked By/Date:		
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking upstream from Oak Drive. *Private* driveway in photo extends from the end of Oak Drive to dwelling. Stream is located approximately 5 feet to left of drive. The opposite side of the stream is wooded.

Description

Looking downstream from the start of the private drive, the channel bends and meanders perpendicular to Oak Drive. The creek is shallow and there is a possiblity that larger storms may flood the private driveway or Oak Drive.

Solution	5.4.2, 5.6.3, 6.4.5, 6.7.1, 6.A, 6.D

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	RIC006 & WRI004	Comments
Municipality:	Rice and Wright Township	Flooding was reported by Rice Township and Wright Township at nearby locations. Big Wapwallopen Creek forms the boundary between these townships. According to a local resident, beaver dams in the creek cause significant backwater effects. Homes located at the intersection of Maple Drive and Terrance Drive are the structures most susceptible to flooding from Wapwallopen Creek.
Subwatershed:	Wapwallopen	
Stream name:	Wapwallopen Creek	
Inspected By/Date:	PAK 12/3/2008	
Checked By/Date:	MJW 1/7/10	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Photo of beaver dam resulting in significant obstruction to flow, causing rise in water levels. From discussion with a local homeowner, high water marks are present and can be seen 4 feet above the ground level.

Description

Photo looking downstream at the beaver dam.

Solution	5.4.1, 5.4.2, 5.6.3, 6.7.1, 6.A

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI005	Comments
Municipality:	Wright Township	Forms submitted by Wright Township indicate the intersection of SR 437 and Church/Tunnel Road is flooded at least once a year.
Subwatershed:	Wapwallopen	
Stream name:	Trib to Wapwallopen Crk	
Inspected By/Date:	PAK 12/3/2008	
Checked By/Date:	MJW 1/7/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Photo of culvert inlet crossing SR 437. Runoff crosses beneath Church/Tunnel Road, within swale to this culvert. Swale is not well defined and possible undersized culvert would cause ponding and eventual overtopping and flooding of SR 437.

Description

Culvert outlet under SR 437. It was observed that the outlet diameter of the culvert was larger than the inlet diameter.

Solution	5.4.2, 6.A, 6.B

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI006	Comments
Municipality:	Wright Township	Flooding problems were reported at this location by Wright Township. The bridge opening appears to be undersized. A steep channel grade is present and bank erosion was observed upstream of the bridge. A sizeable buffer exists along the left bank upstream of the bridge. The right bank, however, has a significantly smaller buffer.
Subwatershed:	Wapwallopen	
Stream name:	Trib to Wapwallopen Crk	
Inspected By/Date:	PAK 12/3/2008	
Checked By/Date:	MJW 1/7/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Upstream face of stone arch bridge. The bridge visually appears undersized. Water elevation from a rain event 10 hours prior to site visit is still relatively high. A large storm would likely overtop the road.

Description

Looking upstream from the bridge. The channel meanders in this section of the stream. Stream is flowing near bank full condition after a relatively minor storm event. The houses located adjacent to the stream could potentially experience flooding during a significant storm event.

Solution	5.4.2, 5.6.3, 6.7.1, 6.A, 6.B

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI007 & WRI009
Municipality:	Wright Township
Subwatershed:	Wapwallopen
Stream name:	Trib to Wapwallopen Crk
Inspected By/Date:	PAK 12/3/2008
Checked By/Date:	MJW 1/7/2010
Type of Problem (Highlighted):	
1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

These problem areas were reported by Wright Township. The culvert for Bow Creek under Main St. over Bow Creek appears to have been recently renovated (WRI009). On the inlet side of the culvert, multiple tree stumps were visible along with new riprap along the banks. Problem WRI007 was located upstream of the culvert. Location is on private property with no trespassing signs so this portion of the stream was not observed.

Description

Culvert outlet at WRI009. The hydraulic opening appears to be fairly large and void of debris. The opening looks visibly sufficient to meet the hydraulic requirements of the road.

Description

Looking upstream towards problem area WRI007 from Main St. The upstream portion of the channel has a well established buffer. Tree stumps with new riprap were visible on the left bank indicating maintenance was conducted in the area.

Solution	5.4.2, 5.6.3, 6.7.1, 6.A, 6.B

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Luzerne Co. Act 167 Problem Area Inventory

		Comments
Problem Area - Map ID:	WRI008	This problem area was reported by Wright Township. The drainage swale from South Main Road discharges to what appears to be an undersized culvert. Water is shown ponded from a rain event which occured 10 hours earlier.
Municipality:	Wright Township	
Subwatershed:	Wapwallopen	
Stream name:	Drainage Swale	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	MJW 1/7/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Downstream culvert appears to be undersized and subject to frequent clogging. The swale sideslope to the right appears to be unstabilized, causing erosion and downstream sedimentation. Utility pole installed in center of swale may be causing impediment to flow.

Description

Culvert inlet shown clogged with sediment and debris. No trash rack is provided at inlet to the culvert. Culvert appears relatively new yet may be undersized, thereby increasing sedimentation and debris issues at this location.

Solution	5.6.3, 6.4.8, 6.4.4, 6.B, 6.D

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI010
Municipality:	Wright Township
Subwatershed:	Wapwallopen
Stream name:	Local Drainage
Inspected By/Date:	PAK 2/12/2009
Checked By/Date:	MJW 1/7/2010
Type of Problem (Highlighted):	
1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

Flooding was reported at this location by Wright Township. No specific cause of the problem could be identified based upon the site visit. No water body was in the vicinity, and the residential area had a storm sewer system.

Description

Oak Drive looking towards S. Main Road. The sewer system is clearly visible from the road. The road is crowned and storm sewer inlets are found on both sides of the street. Runoff may be bypassing inlets as runoff travels down the street.

Description

Close up of the storm inlet. The road is crowned to direct water to the sides of the road and inlets. No curbing is provided to channel runoff to the inlets.

Solution	5.7.1, 6.4.4, 6.4.5, 6.B

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI011	Comments
Municipality:	Wright Township	Wright Township reported groundwater contamination at this location. According to the forms provided, groundwater has been contaminated by TCE from an industry in the area. According to a representative of the property owner, DEP it is aware of this issue and it is in the process of being resolved.
Subwatershed:	Wapwallopen	
Stream name:	groundwater	
Inspected By/Date:	PAK 3/26/2009	
Checked By/Date:	DEW 1/18/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

	Description

	Description

Solution	6.E

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI012	Comments
Municipality:	Wright Township	Wright Township reported groundwater contamination at this location. According to the forms provided, groundwater has been contaminated by TCE from an industry in the area. According to a representative of the property owner, DEP is aware of this issue and it is in the process of being resolved.
Subwatershed:	Wapwallopen	
Stream name:	groundwater	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	DEW 1/27/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Abandoned building located on the subject property.

Description

Solution	5.4.2, 6.E

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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI013
Municipality:	Wright Township
Subwatershed:	Wapwallopen
Stream name:	groundwater
Inspected By/Date:	PAK 2/12/2009
Checked By/Date:	DEW 1/18/2010

Type of Problem (Highlighted):

1	Flooding
2	Deficient bridge/culvert
3	Erosion
4	Sedimentation
5	Water/Groundwater Pollution
6	Other

Comments

Wright Township reported groundwater contamination at this location. According to the forms provided, groundwater has been contaminated by TCE from an industry in the area.

Description

From end of Brockhollow Road cul-de-sac showing industrial park through trees. It is unclear if this is the area of private residences with TCE contamination. Local newspaper articles report houses located off of S. Church St. have had groundwater contamination, but they are on the other side of the industrial park.

Description

Solution	5.4.2, 6.E

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI014	Comments
Municipality:	Wright Township	Wright Township reported a previous gasoline spill problem at this location near the intersection of South Main Road and Church Street. Evidence of this problem was not identified during our field observation.
Subwatershed:	Wapwallopen	
Stream name:	Watering Run	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	DEW 1/19/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

Description

Looking upstream from Church St. bridge adjacent to the gravel parking lot.

Description

Commercial buildings at the intersection of Church St. and South Main St.

Solution	5.4.2, 6.E

Luzerne County
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Luzerne Co. Act 167 Problem Area Inventory

Problem Area - Map ID:	WRI015	Comments
Municipality:	Wright Township	Wright Township reported groundwater contamination at this location in the vicinity of Albert Street. Specifically, high levels of fecal/coliform have been measured in the area. The problem could be caused by malfunctioning septic systems; however, none were visable during our field observation.
Subwatershed:	Wapwallopen	
Stream name:	groundwater	
Inspected By/Date:	PAK 2/12/2009	
Checked By/Date:	DEW 1/19/2010	
Type of Problem (Highlighted):		
1	Flooding	
2	Deficient bridge/culvert	
3	Erosion	
4	Sedimentation	
5	Water/Groundwater Pollution	
6	Other	

	Description
	We were informed by a resident that the Township extended public water to most properties along Albert Street. The Township should promote connection to the public water and ensure decommissioned wells are sealed. Inspection of existing septic systems to identify malfunctions is also recommended.

	Description

Solution	5.4.2, 6.E