

# Indian Creek Watershed Existing Sediment Loads Stakeholder Meeting

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U.S. Environmental Protection Agency  
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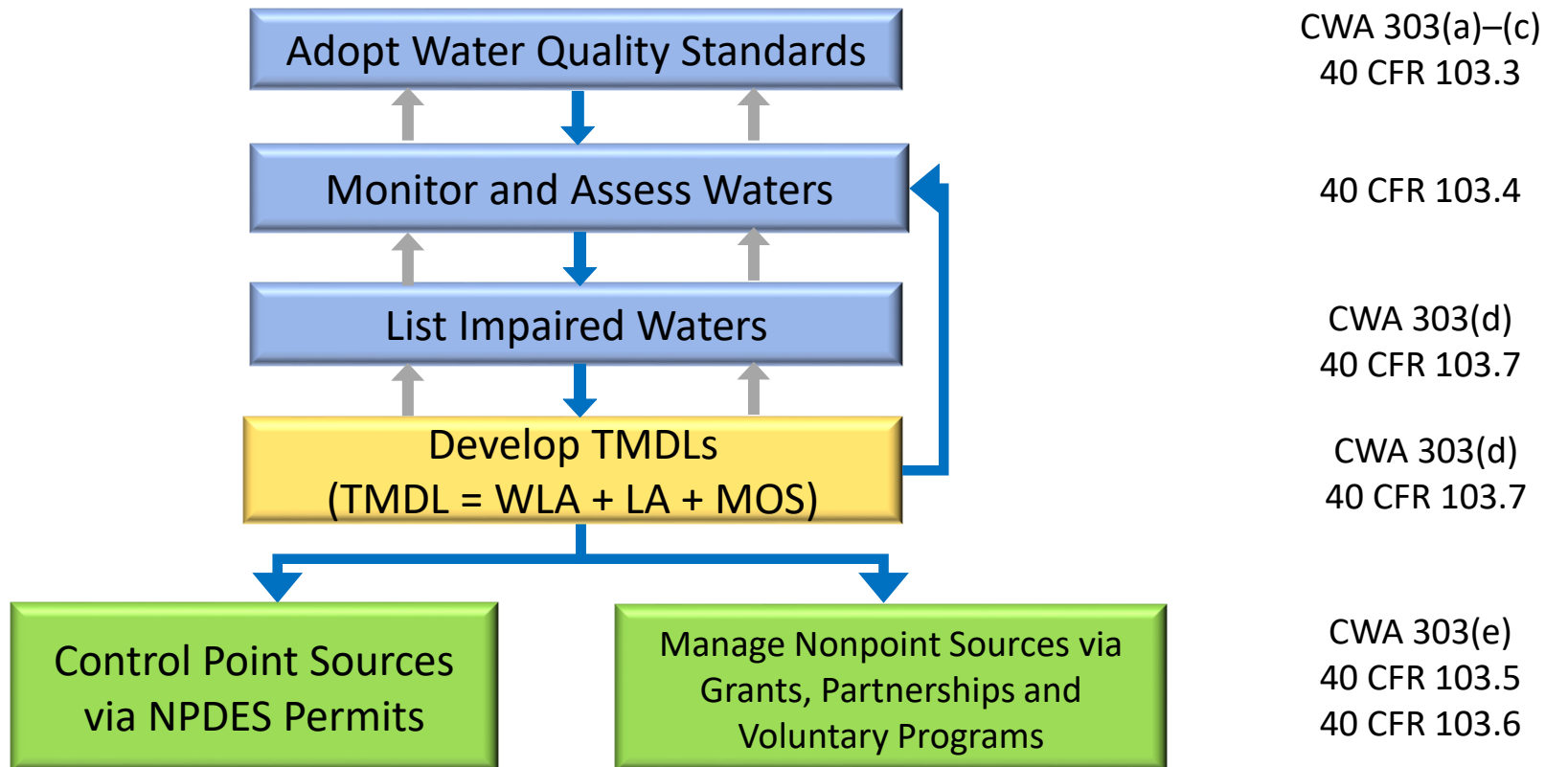


# Overview

- Welcome
- Sediment TMDL Development
- Existing Loads
- Initiate Discussion on Allocation Scenarios
- Feedback and Questions?



# Steps in the Water Quality-based Approach of the Clean Water Act



# A TMDL is defined as...

The greatest amount of loading of a particular pollutant that a waterbody can receive without violating water quality standards.

$$\text{TMDL} = \sum \text{WLA} + \sum \text{LA} + \text{MOS}$$

WLA = wasteload allocation (*point source loads*)

LA = load allocation (*nonpoint source and background loads*)

MOS = margin of safety (explicit or implicit)

TMDL = total maximum daily load

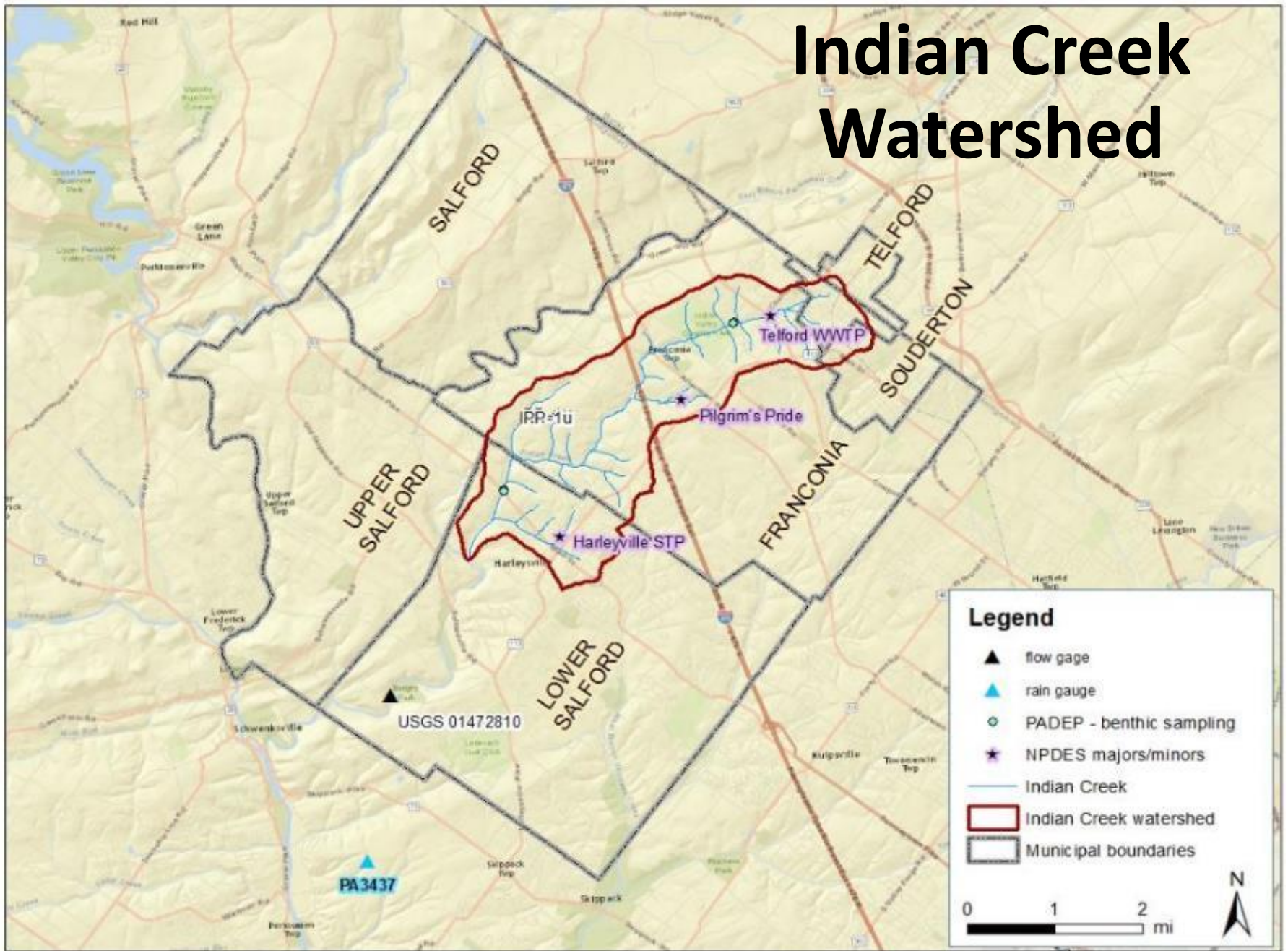
# A TMDL is important because...

- Critical for achieving water quality standards
- Analytic underpinning for watershed decisions
- Can integrate solutions
- Opportunity for innovations

# Indian Creek Sediment TMDL

- June 30, 2008 – EPA established Indian Creek TMDL for nutrients and sediment
- March 21, 2014 – EPA reconsideration decision regarding the Indian Creek Sediment TMDL
  - Confirmed concerns that the reference watershed approach and sediment loading rates should be revisited.
- April 3, 2014 – Voluntary remand granted for Indian Creek Sediment TMDL
- Sediment TMDL Revision
  - Stakeholder group formed
  - Data calls held in 2014 and 2016

# Indian Creek Watershed



# Indian Creek is impaired for sediment

- All data to date support PADEP's identification of siltation (sediment) impairment in Indian Creek
- Since Pennsylvania does not currently have numeric criteria for sediment, EPA interpreted Pennsylvania's existing narrative standard at 25 PA Code Section 93.6(a) & (b):

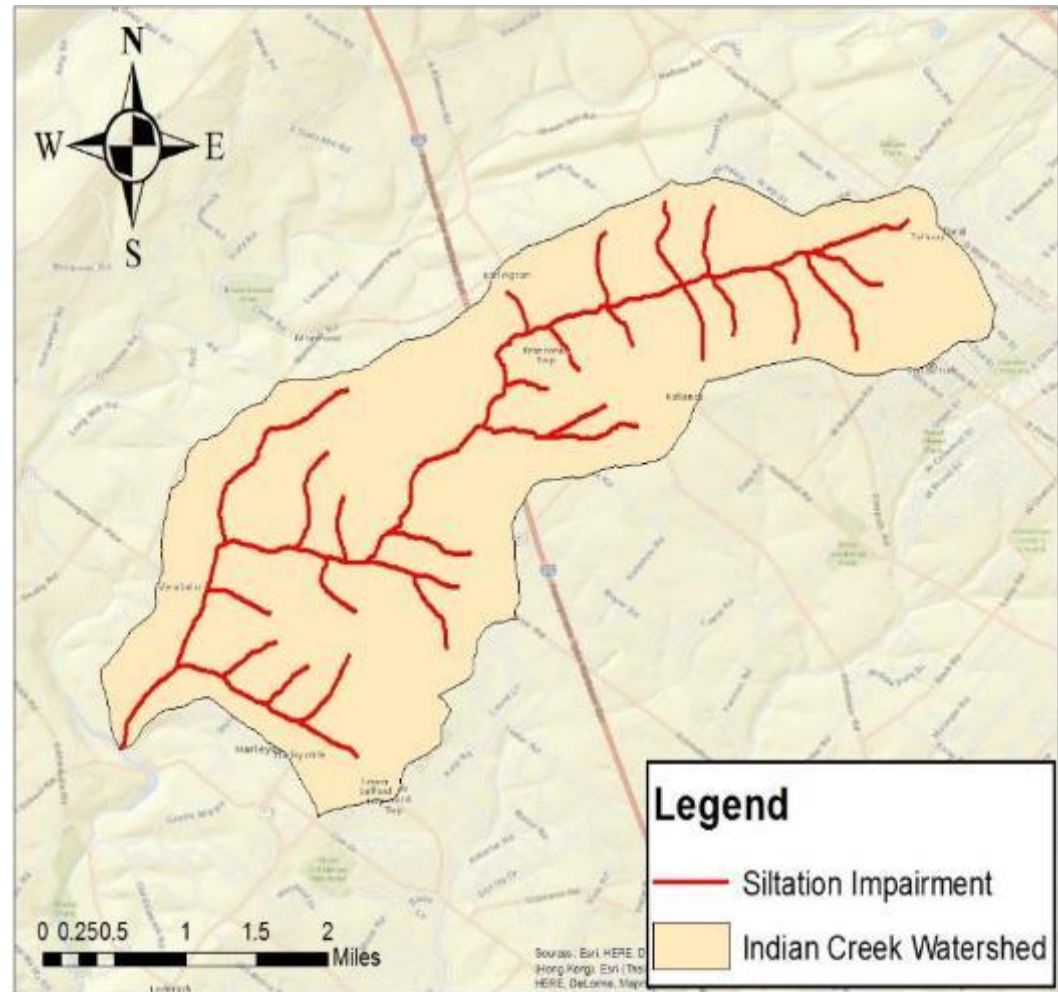
*Water may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life; and In addition to other substances listed within or addressed by this chapter, specific substances to be controlled include, but are not limited to, floating materials, oil, grease, scum and substances which produce color, tastes, odors, turbidity or settle to form deposits.*



# Indian Creek Sediment Impairments

## Sources:

- Agriculture
- Urban Runoff/Storm Sewers
- Small Residential Runoff



# Sediment TMDL Development Plan

- Generalized Watershed Loading Function (GWLF) model
- Reference watershed approach
- Use local data (as available)
- Seek feedback on approach/assumptions with stakeholders

# Key Areas for Consideration

- Accounting for stream bank erosion
- Determining an appropriate reference stream
- Updating land use data
- Refinement of MS4 allocations

# Gather Local Data

- GIS Information
- Maps
- Livestock Numbers
- Permit Information
- Aerial Photos/Photos
- Monitoring Data
- Watershed Plans
- BMPs Completed
- Conservation Tillage Data
- Stream Depth Surveys
- Agriculture Management Practice Factors

Chester Co.

Chester Co. Cons. District

Conservation Tech. Info. Center

Franconia Township

Lower Salford Township

Montgomery Co. Cons. District

PADEP

PennDOT

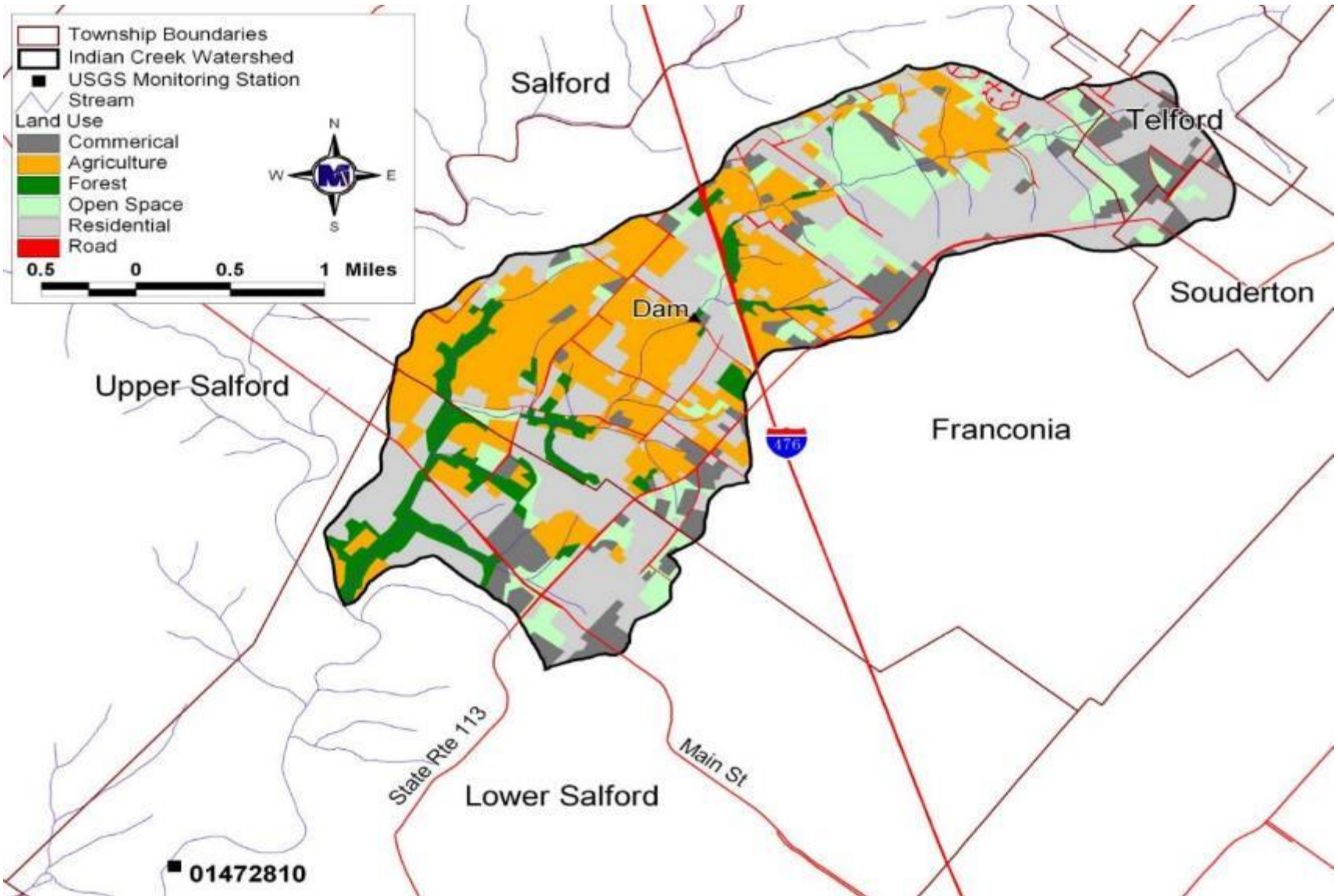
PA Turnpike Commission

Telford Borough Authority

USEPA, Region III

USGS

# Indian Creek Land-Use



# Sources of Sediment

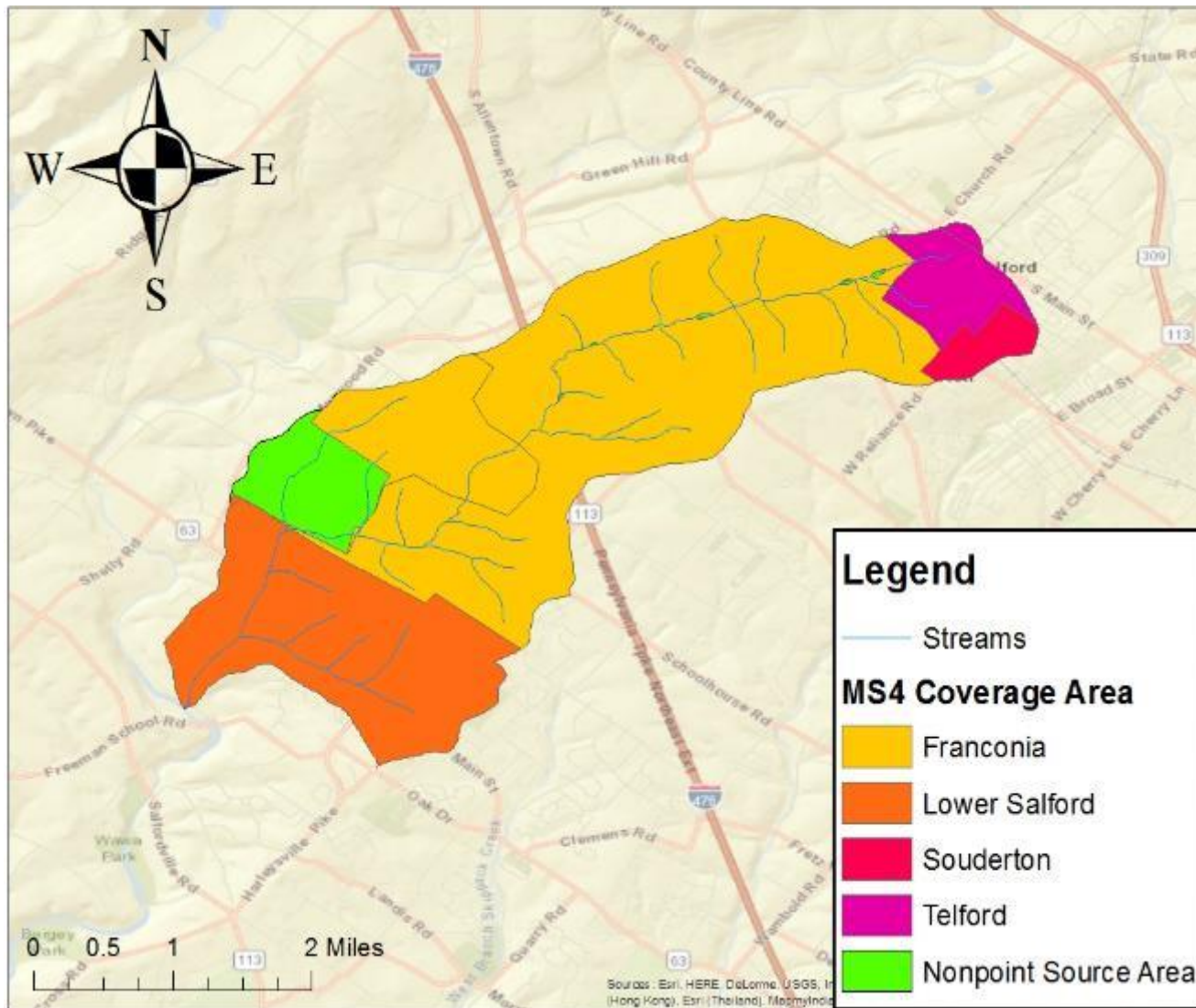
- MS4s
- WWTPs
- General Stormwater Permits
- Illicit Discharges
- Surface Runoff
- Channel and Streambank Erosion
- Natural Background



# Permittees

Permit Number	Permit Name	Design Flow (MGD)	Permitted Area (ac)	TSS Limit (mg/L)
<b>General/Stormwater</b>				
General Permits	Aggregate Loads	NA	NA	NA
<b>Individual</b>				
PA0024422	Harleysville Sewage Treatment Plant	0.7	NA	30
PA0036978	Telford Borough Authority WWTP	1.1	NA	30
PA0054950	Pilgrim's Pride Facility (Franconia)	0.3	NA	10
<b>MS4</b>				
PAG130147	Franconia MS4	NA	TBD	NA
PAG130133	Telford MS4	NA	TBD	NA
PAG130132	Souderton MS4	NA	TBD	NA
PAG130131	Lower Salford MS4	NA	TBD	NA
PAI-1315-00-06-0001	Pennsylvania Turnpike Commission	NA	TBD	NA
PAI-1315-00-05-0001	Pennsylvania Department of Transportation	NA	TBD	NA

# MS4 Coverage: Based on Urban Areas (2010 Census)





# Other Water Quality Factors

- Dam at Keller Creamery Road in Franconia Township
  - Low level dam with small reservoir and minimal trapping capacity during high flows
  - PA Turnpike Commission indicated dam will be removed in fall 2017



# Watershed Modeling

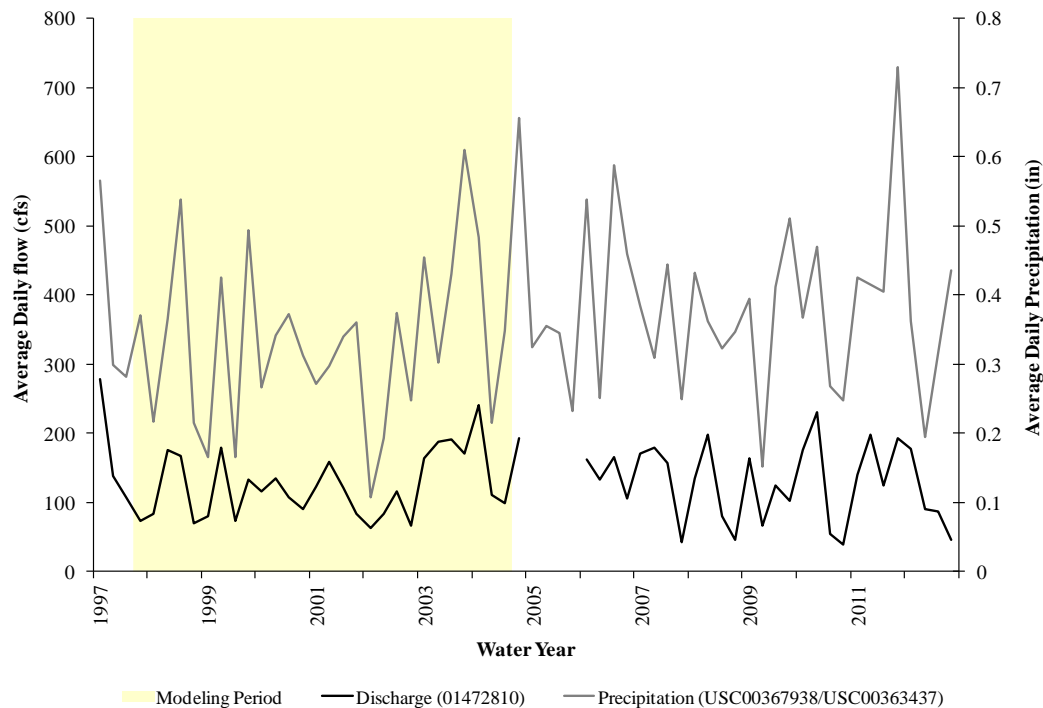


# The GWLF Model

- Widely accepted model for sediment loads in streams
- Capable of modeling streambank erosion
- Continuous-simulation
- Spatially-lumped
- Daily time step for water balance
  - Calibrated to monitored data
- Monthly time step for pollutant loading
- Consistency in modeling the target and reference watersheds is vitally important
- Inputs
  - Rainfall, Hydrologic Parameters, Sediment Model Parameters

# Rainfall Record for Modeling

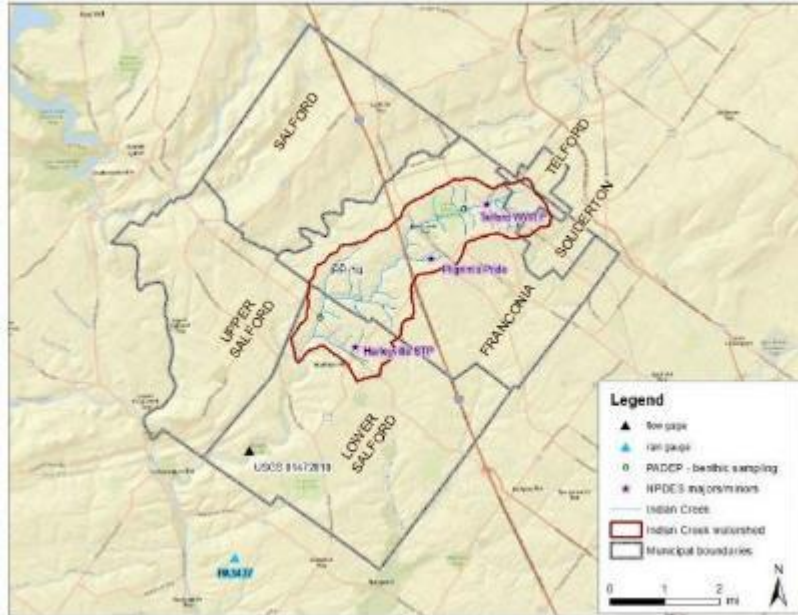
- 10/1/1997 to 9/30/2004
- Consistent with previous modeling
- Representative of long-term records and more recent data



# Hydrologic Parameters

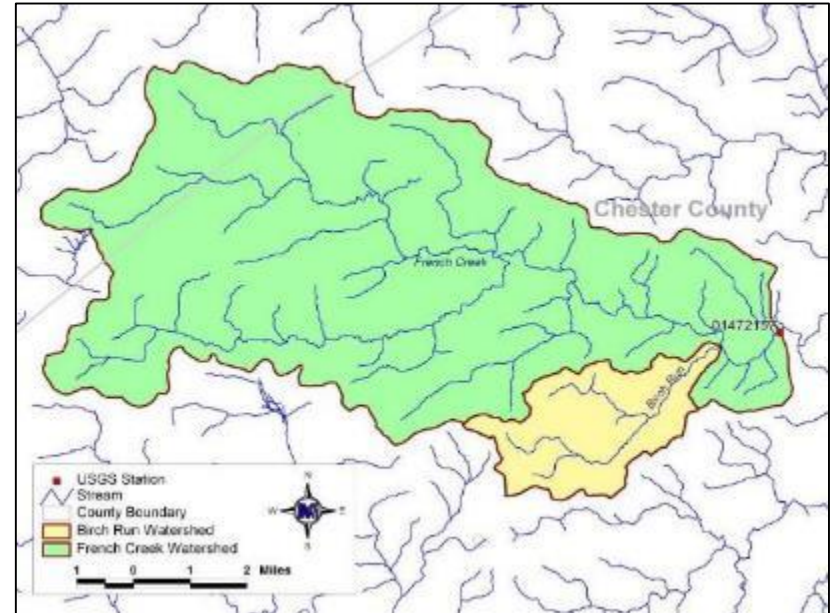
- Curve Number
- Unsaturated Water Capacity
- Evapotranspiration Cover Coefficient
- Seepage Coefficient
- Recession Coefficient

# Hydrologic Model Calibration



## Indian Creek

USGS 01472810 located on East Branch Perkiomen Creek was used for hydrology calibration

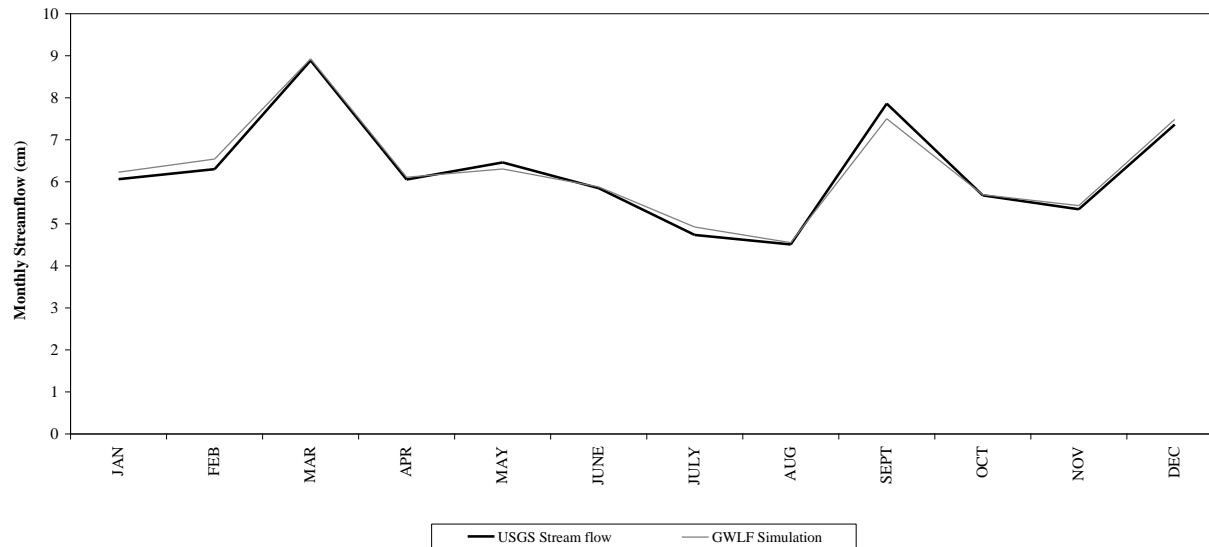
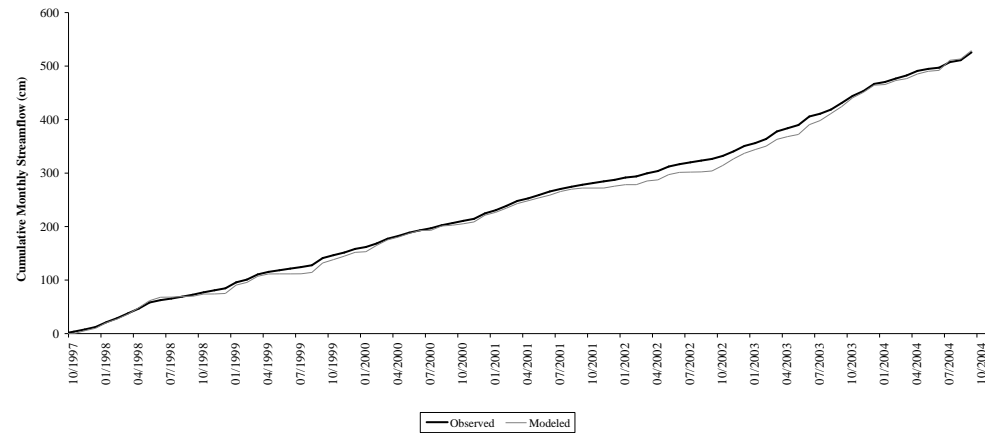


## Birch Run

USGS 01472157 located on French Creek was used for hydrology calibration

# Hydrologic Model Calibration

- Successful Hydrologic Calibration in both watersheds



# Sediment Model Parameters

- Land Use, Topography, and Soils Related
  - Erodibility Factor (K)
  - Length/Slope Factor (LS)
  - Cover Crop Factor (C)
  - Practice Factor (P)
  - Buildup and Loss on Impervious Surfaces
  - Sediment Delivery Ratio



# Sediment Model Parameters

- Streambank Erosion Related
  - Average Watershed Curve Number
  - Average Watershed Erodibility
  - Total Length of Natural Stream Channel
  - Mean Stream Channel Depth
  - Average Watershed Slope
  - Animal Density
  - Fraction of Developed Land

# Mean Channel Depth Survey

Average measurements

**Indian Creek – 1.5m**

**Birch Run – 0.6m**

**Regional Curve – 0.27 m**

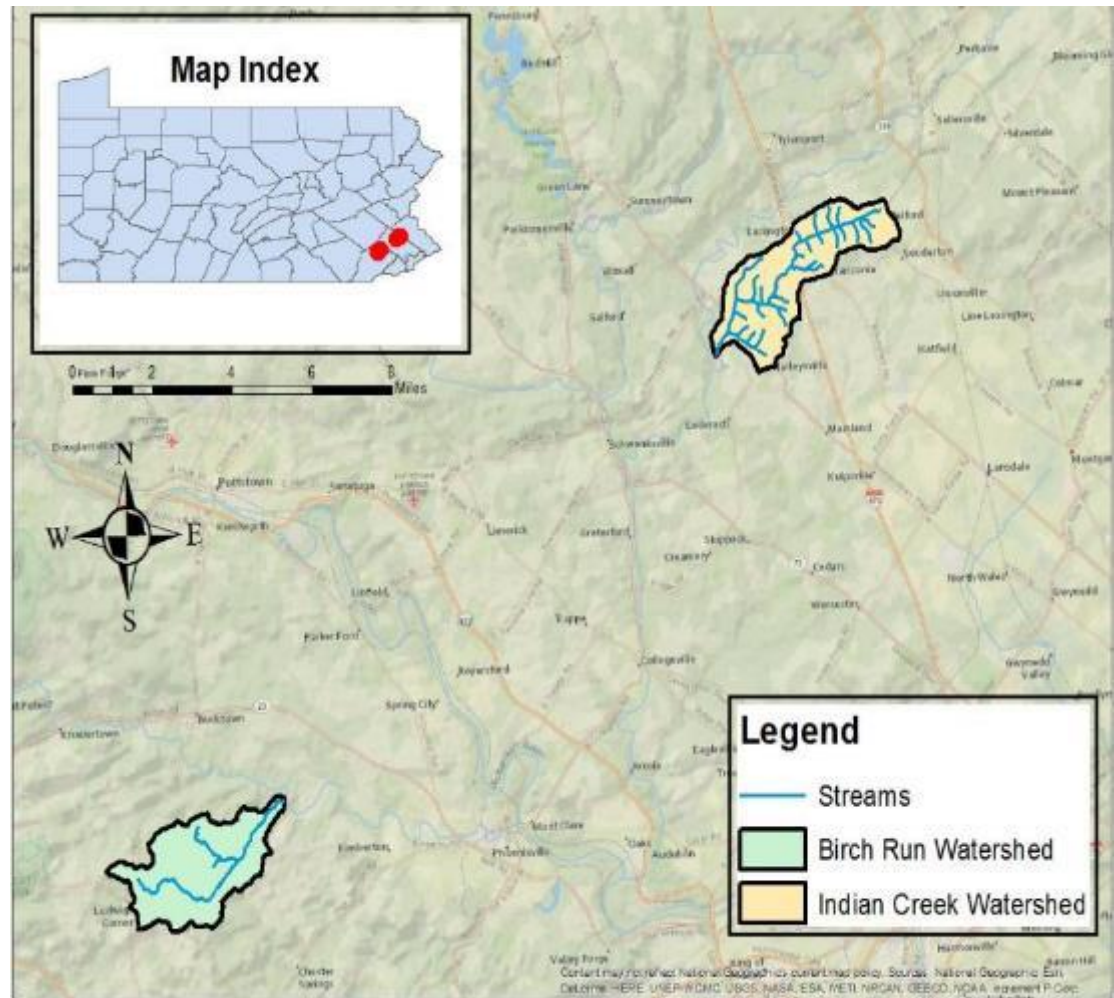
**Streambank Sediment Load =**

lateral erosion rate x stream length x soil  
bulk density x **mean channel depth**



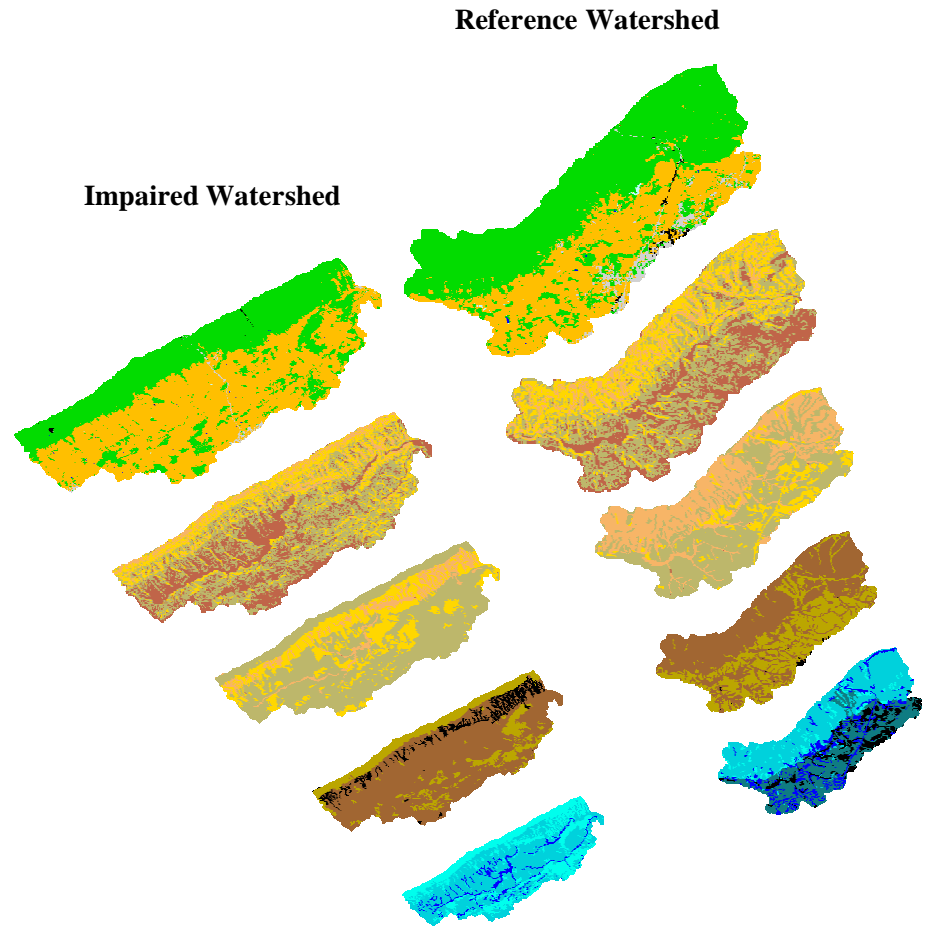
# Reference Watershed Approach

- Develop a Sediment TMDL endpoint based on the existing sediment loads in an unimpaired watershed.
- Birch Run (Chester County) represents an unimpaired and suitable reference watershed for Indian Creek.



# Reference Watershed

- Non-impaired with similar characteristics
  - Land use
  - Watershed size
  - Soils
  - Topography
  - Stream order
  - Ecoregion
- Land use represents human impacts
- Other factors affect aquatic life potential



# Indian Creek & Birch Run Watershed Characteristics

Watershed Properties	Indian Creek	Birch Run
County	Montgomery	Chester
HUC (8-digit)	02040203	02040203
Discharges to Watershed	East Branch Perkiomen	French Creek
Square Miles	7	6.5
Benthic IBI Score	30.3	74.6
IBI Date	9/6/2013	4/26/2012
Designated Uses	TSF, MF	EV-TSF, MF
Watershed Characteristics		
Stream Order	3	3
Slope (percent)	5.93	5.58
Aspect (degrees)	200.69	192.6
Soil Characteristics		
Hydrologic Group (avg)	2.75591	2.177083
Erodibility Kf factor	0.30033	0.426898
Available Water Capacity	0.116595	0.131346
Level 3 EcoRegion		
Northern Piedmont	100%	100%
Level 4 EcoRegion		
Triassic Lowlands	100%	1%
Piedmont Lowlands		99%

# Indian Creek & Birch Run Land-Use

Sediment Source	Indian Creek	Birch Run
	Percentage (%)	Percentage (%)
Commercial	10.1	0.3
Crop	22.6	4.5
Forest	6.9	39.0
Hay	2.5	22.1
Open	13.3	4.3
Pasture	1.9	5.5
Residential	39.6	22.9
Road	3.0	0.6
Water	0.0	0.9

# Existing Loads

Sediment Source		Indian Creek			Reference Watershed Area-Adjusted Birch Run		
		t/yr	% of Total	t/ha/yr	t/yr	% of Total	t/ha/yr
<b>Pervious:</b>	Forest	5	< 1	0.04	71	5	0.10
	Open	176	4	0.73	101	7	1.30
	Residential	105	2	0.21	184	13	0.52
	Crop	2,394	56	5.84	380	26	4.69
	Commercial	19	< 1	0.26	< 1	< 1	0.24
	Road	7	< 1	0.61	4	< 1	< 1
	Pasture	45	1	1.27	325	23	3.24
	Hay	8	< 1	0.18	167	12	0.42
<b>Impervious:</b>	Residential	81	2	0.45	28	2	0.45
	Commercial	50	1	0.45	1	< 1	0.45
	Road	20	< 1	0.45	4	< 1	0.45
<b>Direct:</b>	Streambank Erosion	1,283	30		173	12	
	Straight Pipes	< 1	< 1		<1	< 1	
<b>Permitted:</b>	Individual Permits	79	2		0	0	
	General Stormwater Permits	2	< 1		0	0	
<b>Watershed Total</b>		<b>4,275</b>	<b>100</b>	<b>2.35</b>	<b>1,439</b>	<b>100</b>	<b>0.79</b>

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**-66%**



# Possible Allocation Strategies

- Equal Reduction Across All Sources – ~66%
- Focus on Problem Sources of Sediment\*\*\*
  - Require higher reductions to address sediment from Agriculture and Stream Bank Erosion Sources (i.e. Nonpoint Sources & MS4s)
  - Permittees with technology limits continue to discharge at current permit limits
- Wissahickon Sediment TMDL example
  - MS4 WLAs subdivided into streambank erosion WLAs and overland load WLAs
- Other proposed scenarios?

# TMDL Considerations

- Margin of Safety
- Future Growth
- Nonpoint Source LAs
- MS4 WLAs
- WWTP WLAs
- General Stormwater Permits

# Questions for Stakeholders

- Current BMPs in the Watershed
- Detailed MS4 Sewershed maps
  - Without further refinement of MS4 sewershed boundaries, EPA cannot distinguish between MS4 areas and nonpoint source areas within UA boundaries.
- Reasonable Assurance (RA)
  - Are there grants, partnerships, community program policies, etc. that would assist in providing RA?
- Meeting Location Suggestions
- Other feedback?

# Next Steps

- Request Comments on Indian Creek Existing Sediment Loads Report by 8/28/2017
- Develop Draft Allocations
- Present Draft Allocations to Stakeholders in a Meeting in late September 2017
- Request Comments on Draft Allocations by mid-October 2017
- Release Draft TMDL for Public Comment in November-December 2017
- Public Meeting in early December 2017
- Establish TMDLs by March 2018 after responding to comments



# Questions/Comments?



# Contact Information

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