Little Pipe Creek Watershed Assessment

NRCS National Water Quality Planning Phase

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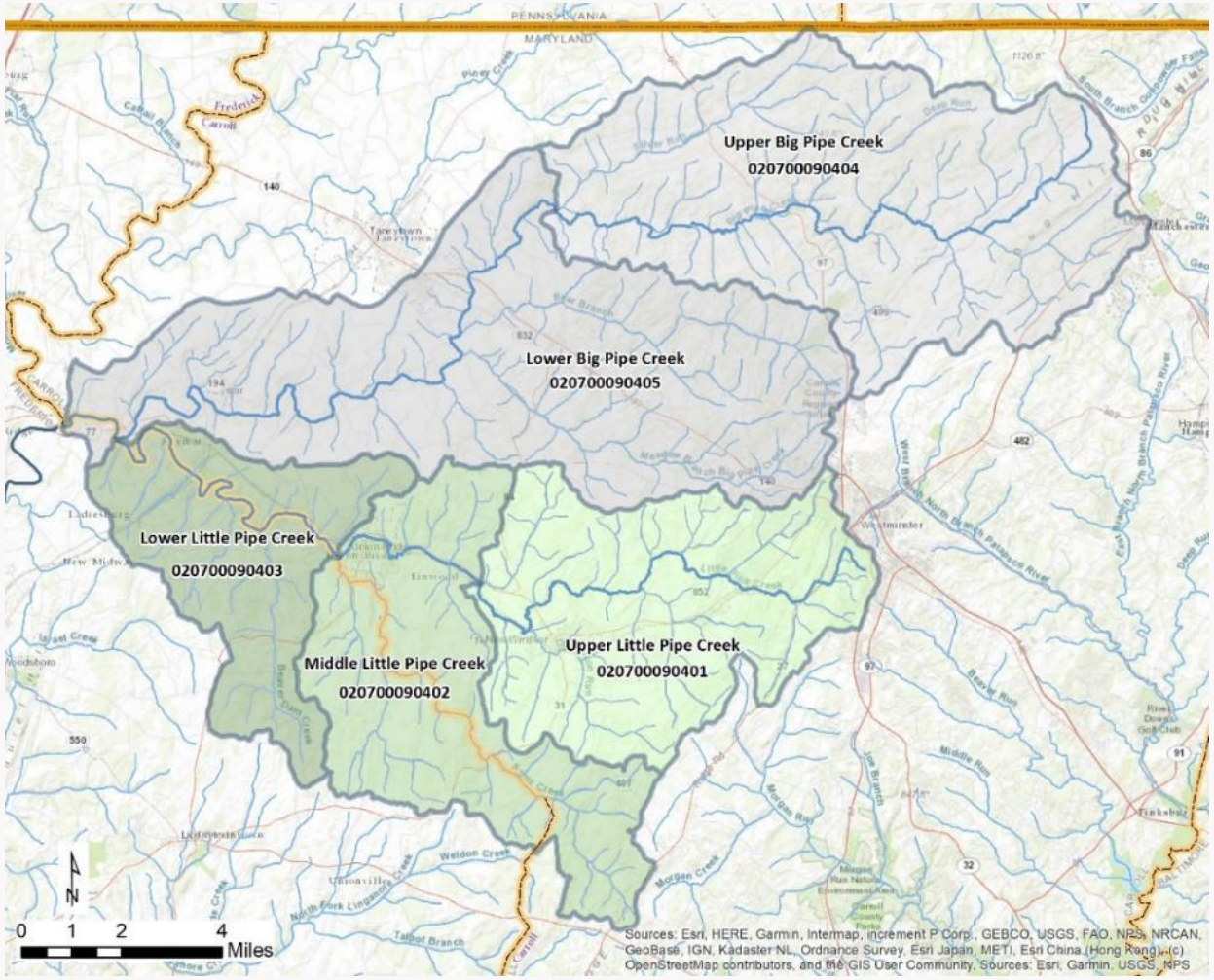
NWQI Planning Phase Tasks

1. Background & Purpose
2. Watershed Characterization
3. Hydrologic & Water Quality Characterization
4. Resource Analysis/Source Assessment
5. Summary & Recommendations
6. Outreach Plan

Overview



- Upper, Middle, & Lower Little Pipe Creek
- Located in Carroll Co. & Frederick Co., MD
- Little Pipe Creek joins Big Pipe Creek to form the Double Pipe Creek
  - A major tributary of the Monocacy River
- Piedmont Uplands & Triassic Lowlands Ecoregion

Upper Little Pipe Creek

HUC12 - 020700090401

- 33.1 square miles
- Located in Carroll County, MD
  - Town of New Windsor
  - Part of Westminster
- Land use is:
  - 60% Agriculture
  - 19% Forest
  - 19% Developed
  - 2% Other

Middle Little Pipe Creek

HUC12 – 020700090402

- 29.5 square miles
- Located in Frederick & Carroll County, MD
  - Most of the town of Union Bridge
- Major tributary in MLCP is Sam's Creek
- Land use is:
  - 70% Agriculture
  - 18% Forest
  - 10% Developed
  - 2% Other

Lower Little Pipe Creek

HUC12 – 020700090403

- 20.7 square miles
- Located in Frederick & Carroll Co., MD
  - Contains a small part of the town of Union Bridge
- Major tributary in LLPC is Beaver Dam Creek
- Land use is:
  - 74% Agriculture
  - 17% Forest
  - 8% Developed
  - 1% Other

TMDLs in Little Pipe Creek

	TMDL Type	Baseline Load	TMDL	Reduction (%)
TMDL Segment 2 (Little Pipe Creek)	**Sediment**	18,400.4 (tons/year)	9,328.1 (tons/year)	49.3
LPC0091 (Little Pipe Creek)	**Fecal Bacteria**	1,772,638 (Billion MPN/year)	116,559 (Billion MPN/year)	93.4
SAM0001 (Sam's Creek)	**Fecal Bacteria**	1,679,690 (Billion MPN/year)	17,734 (Billion MPN/year)	98.9
LPC0032sub (Little Pipe Creek)	**Fecal Bacteria**	5,010,752 (Billion MPN/year)	57,983 (Billion MPN/year)	98.8
Double Pipe Creek (Nonpoint Source)	**Phosphorus**	164,842 (lbs/year)	112,555 (lbs/year)	32
Double Pipe Creek (Point Source)	**Phosphorus**	37,074 (lbs/year)	15,772 (lbs/year)	57

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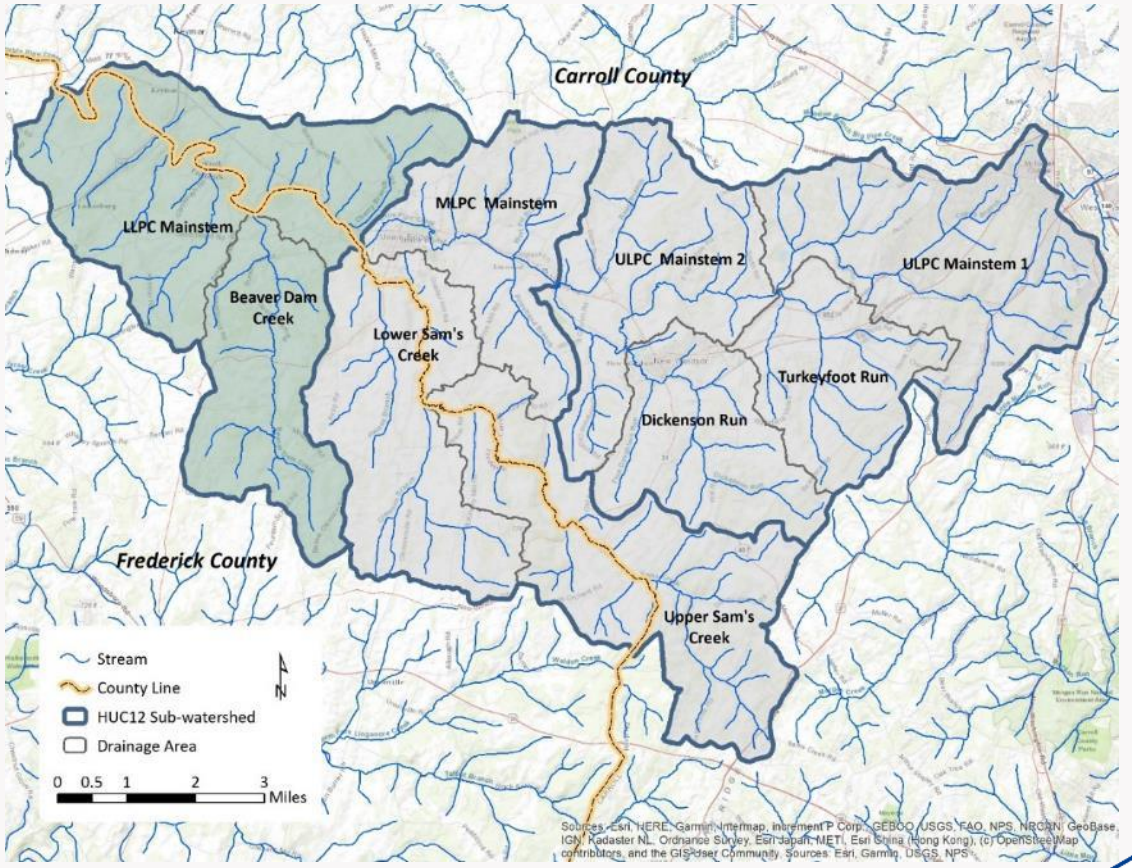
Watershed Characterization

Sub-Watershed (HUC12 Code)	Drainage Area Name
Upper Little Pipe Creek (020700090401)	ULPC Mainstem1 Turkeyfoot Run Dickenson Run ULPC Mainstem 2
Middle Little Pipe Creek (020700090402)	MLPC Mainstem Upper Sam's Creek Lower Sam's Creek
Lower Little Pipe Creek (020700090493)	Beaver Dam Creek LLPC Mainstem



Watershed Characterization

Sub-Watershed	Drainage Area	Main Slope Category	Main Hydrologic Soil Group	Population by Area (acre/person)	People of Color (%)
Upper Little Pipe Creek	ULPC Mainstem 1	Strongly Sloping (8-16%)	B	3.80	11.31
	Turkeyfoot Run	Gently Sloping (3-8%)	B	0.46	20.93
	Dickenson Run	Gently Sloping (3-8%)	C	3.09	10.96
	ULPC Mainstem 2	Gently/Strongly Sloping (3-8 %/8-16%)	B	4.69	8.60
Middle Little Pipe Creek	MLPC Mainstem	Gently Sloping (3-8%)	C	3.92	10.87
	Upper Sam's Creek	Gently Sloping (3-8%)	C	3.80	8.67
	Lower Sam's Creek	Strongly Sloping (8-16%)	C	6.41	9.84
Lower Little Pipe Creek	Beaver Dam Creek	Gently Sloping (3-8%)	C	8.02	8.38
	LLPC Mainstem	Gently Sloping (3-8%)	B	6.28	10.81

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Hydrology & Water Quality

Sub-Watershed	Drainage Area	USGS Gage Stations (Years w/data)	# Water Quality Sampling Sites	Main BIBI Rating
Upper Little Pipe Creek	ULPC Mainstem 1	--	35	Very Poor
	Turkeyfoot Run	--	11	Very Poor
	Dickenson Run	--	8	Very Poor
	ULPC Mainstem 2	1640000 (1947-1994) 1639980 (No Data)	3	Very Poor
Middle Little Pipe Creek	MLPC Mainstem	1640150 (1956-1966, 2002) 1640100 (1956-1966, 2002)	10	Very Poor
	Upper Sam's Creek	--	30	Very Poor
	Lower Sam's Creek	1640155 (1994)	20	Very Poor
Lower Little Pipe Creek	Beaver Dam Creek	1640160 (1977-1982, 2002)	19	Very Poor
	LLPC Mainstem	1640200 (1982-1983, 2002)	29	Poor/Very Poor

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Resource Assessment/Source Analysis

- Existing watershed conditions obtained from Chesapeake Bay Program CAST tool
  - 2020 zoning
  - BMPs functioning at the end of 2020

Sub-Watershed	Conservation or High Res. Tillage	Cover Crop	Pasture Mgmt.	Animal Waste Mgmt.	Forest Harvesting Practices	Stormwater Mgmt. Practices
Upper Little Pipe Creek	69%	41%	41%	61%	47%	26%
Middle Little Pipe Creek	62%	30%	45%	53%	49%	19%
Lower Little Pipe Creek	56%	31%	47%	48%	45%	11%

Resource Assessment/Source Analysis

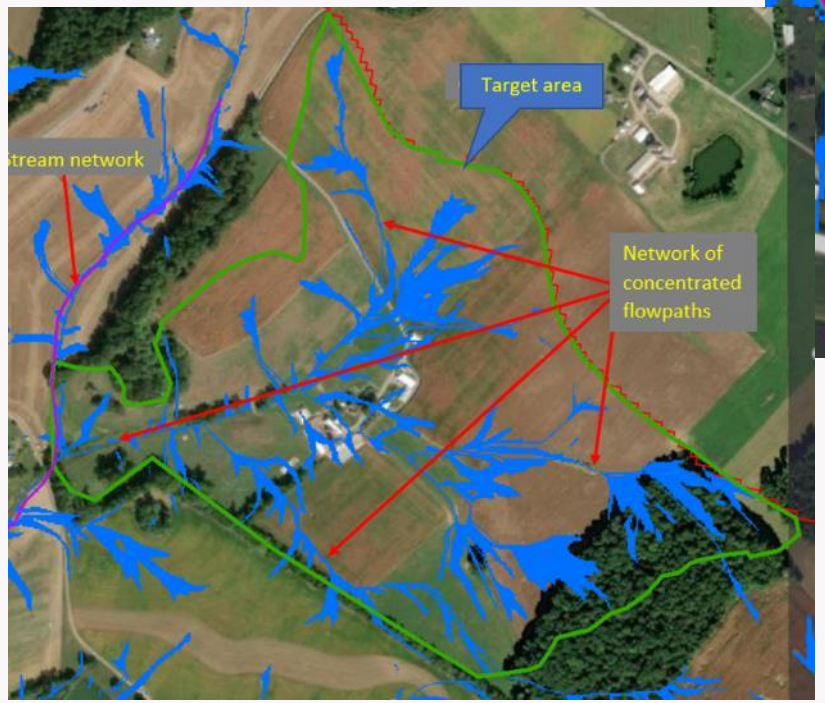
Goal:
Determine what BMPs to recommend for implementation and where to focus installation.

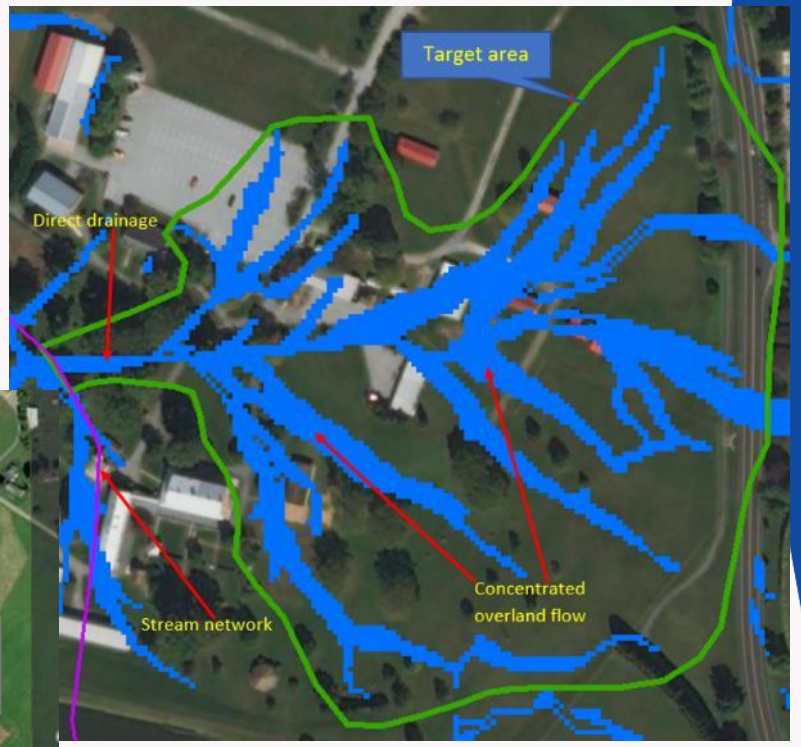
- What BMPs are producers most willing to implement?
- What BMPs have the greatest reduction for the cost?
- Where will BMP implementation lead to the greatest reductions?

Resource Assessment/Source Analysis

Target Area derived from LiDAR and Topography

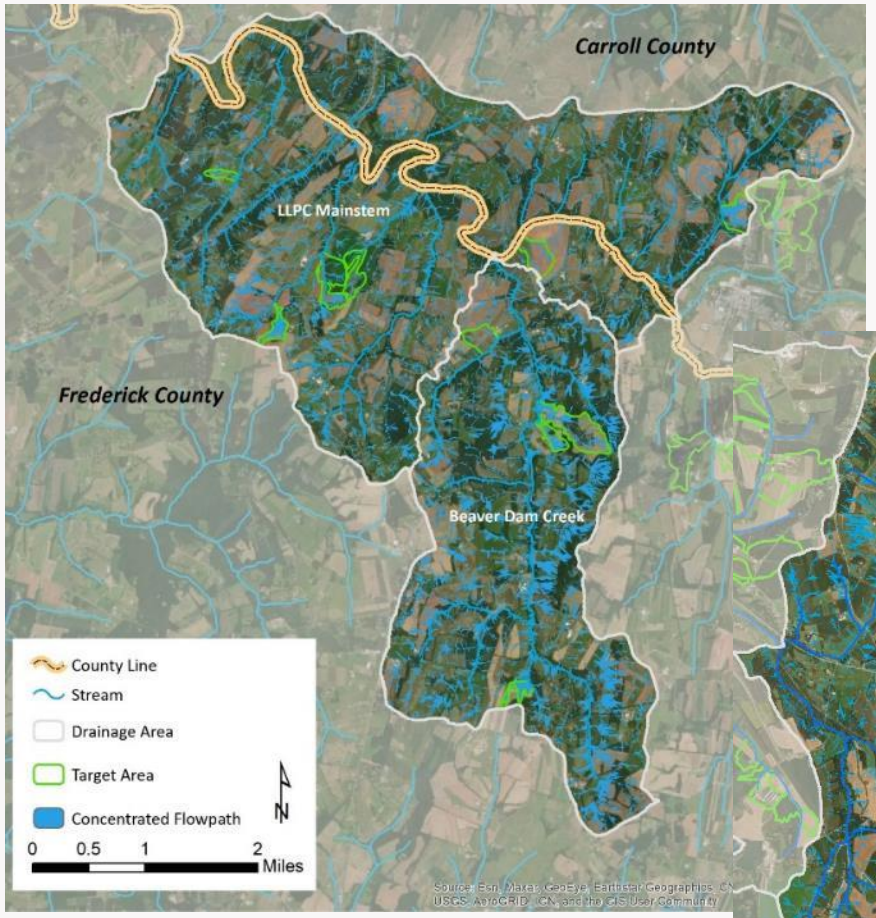
- Areas more susceptible to sediment and nutrient loss
  - LiDAR imagery-based DEM
  - Flow Accumulation
  - Topographic Openness
  - Topographic Wetness Index





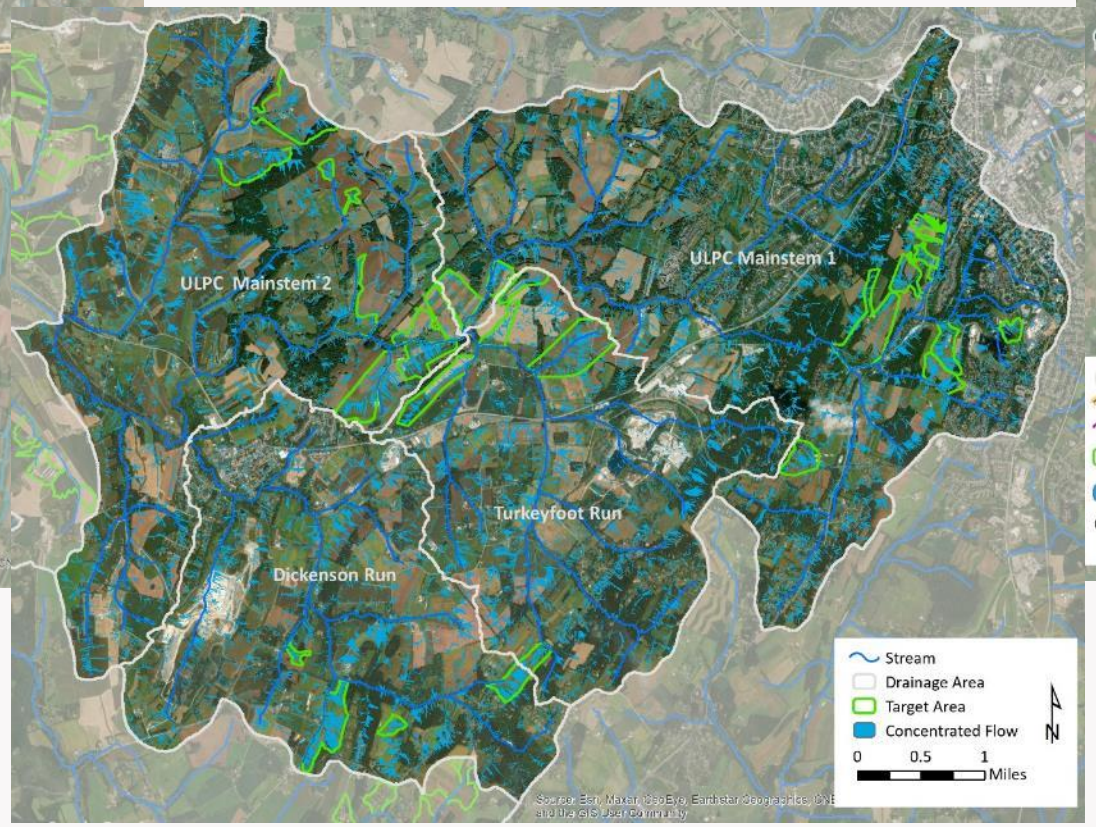
Target Areas

Lower Little Pipe Creek

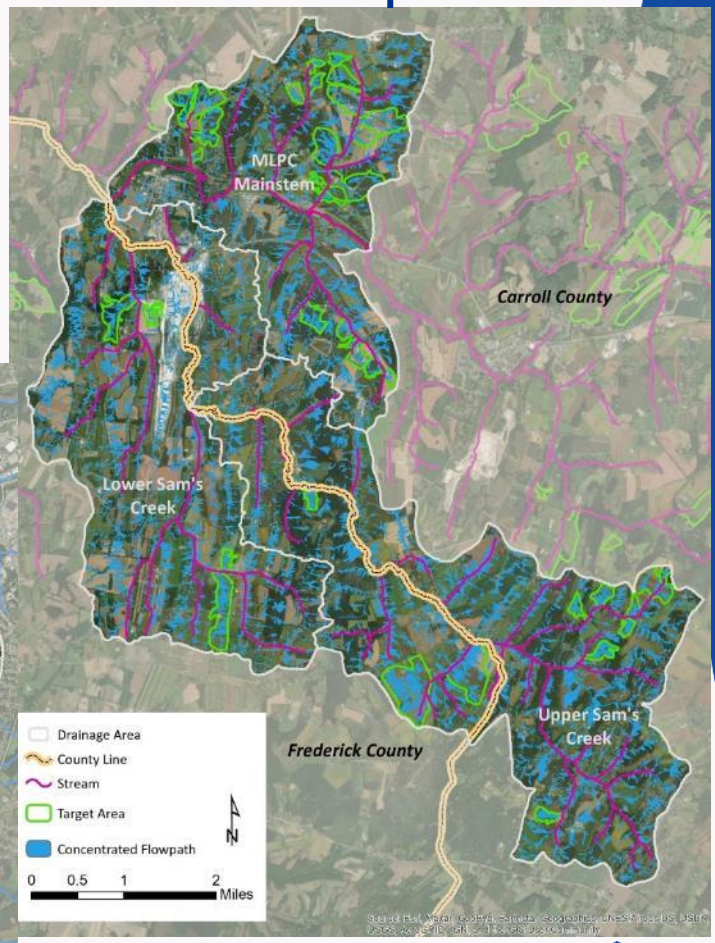


78 Target Areas

Upper Little Pipe Creek



Middle Little Pipe Creek



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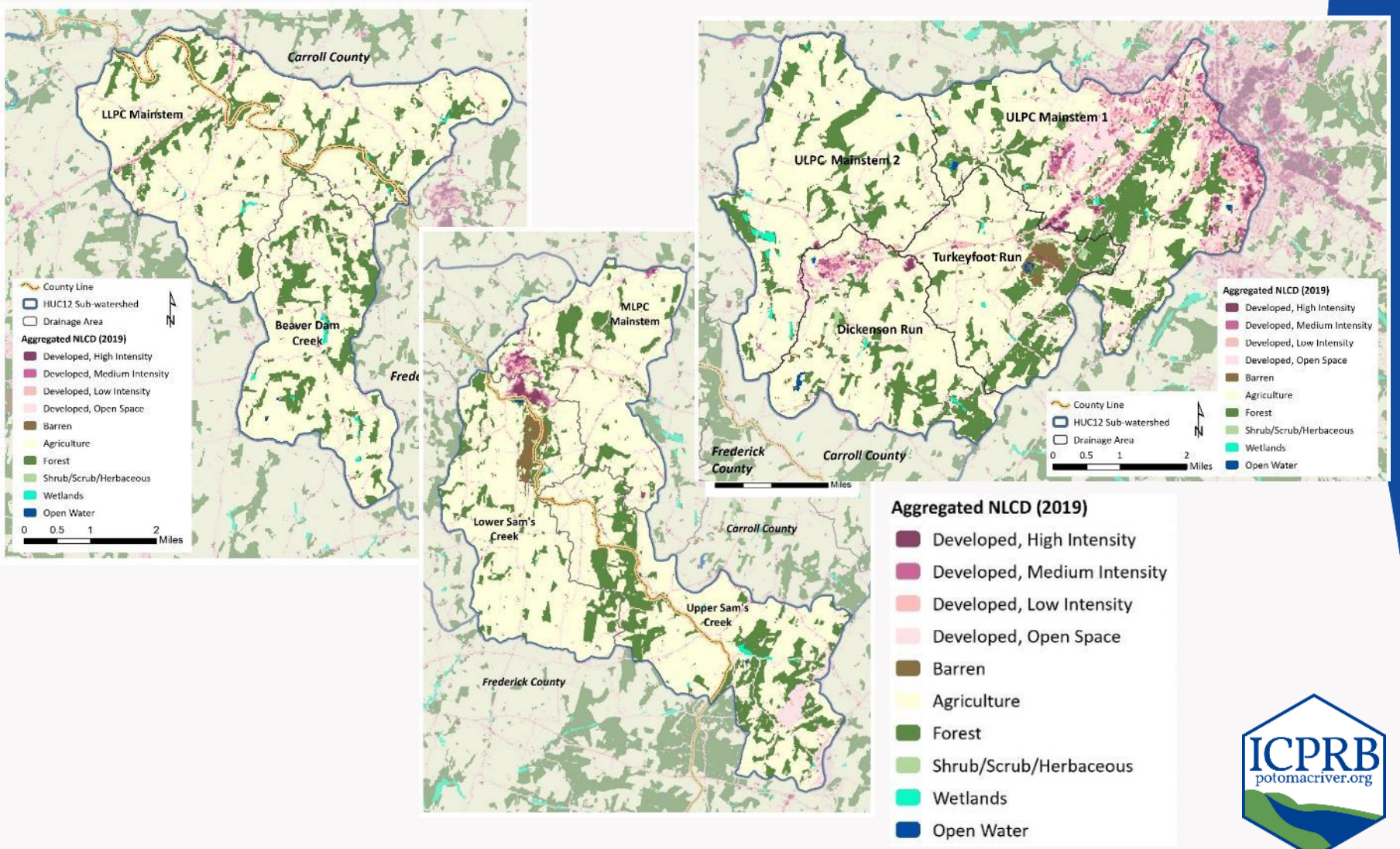
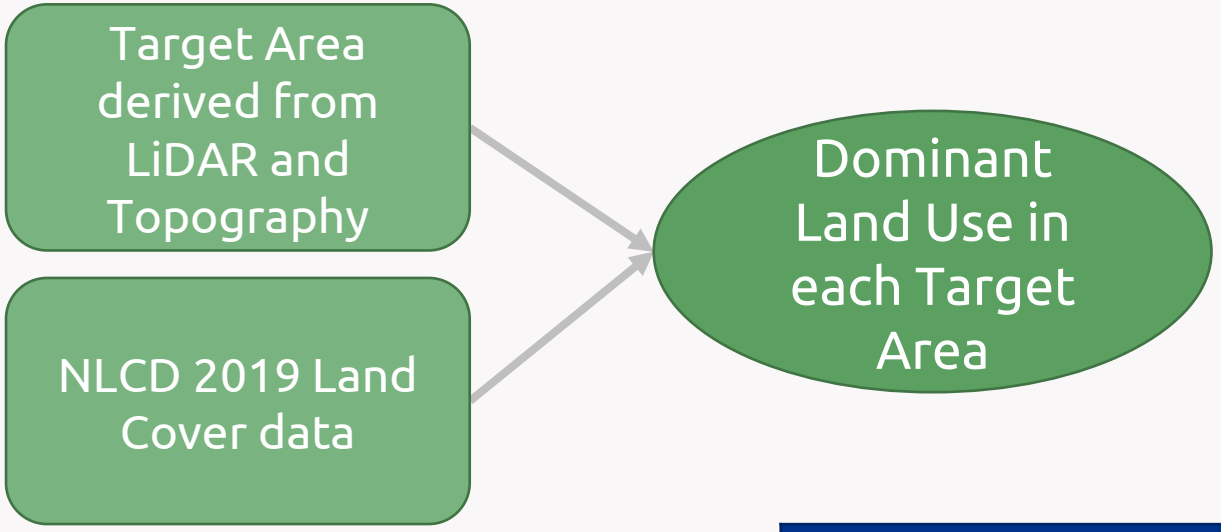
Resource Assessment/Source Analysis

Target Area derived from LiDAR and Topography

NLCD 2019 Land Cover data

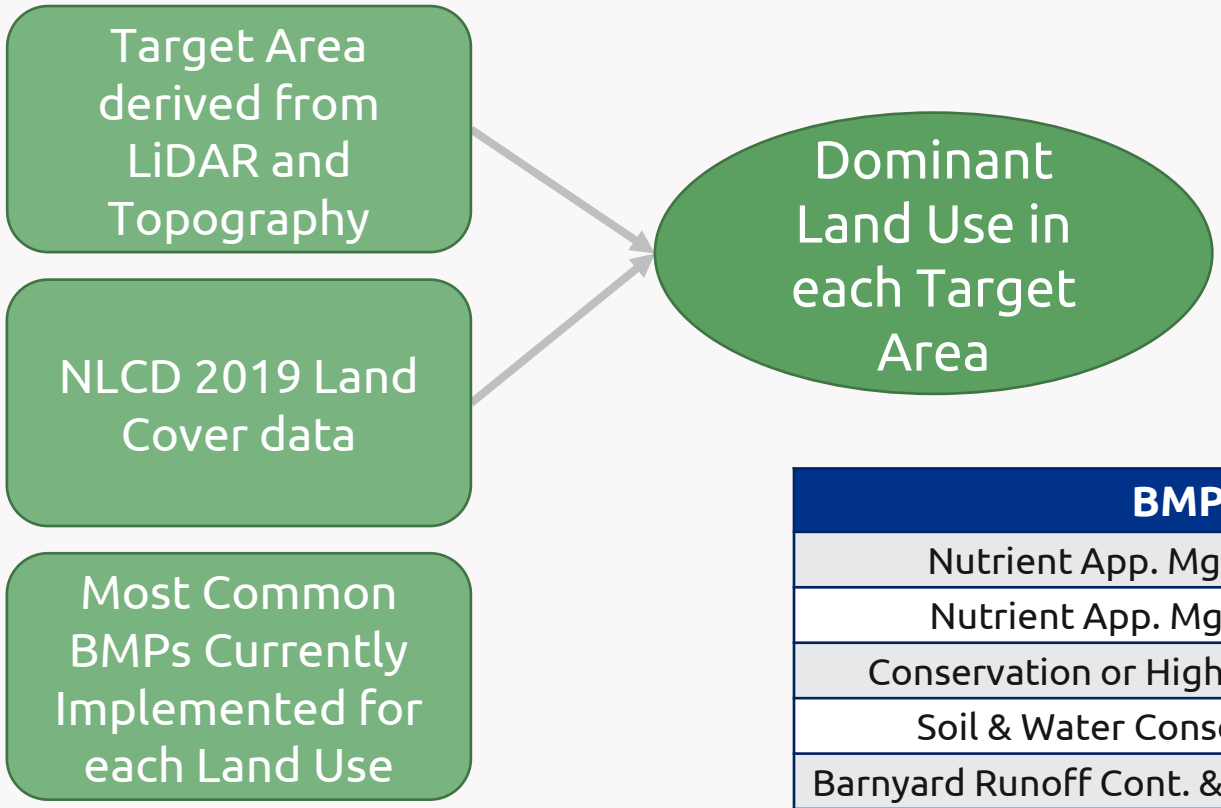


Resource Assessment/Source Analysis



Dominant Land Use	# of Target Areas
Cultivated Crops	51
Hay/Pasture	27
Developed	**Used 2nd most dominant

Resource Assessment/Source Analysis



% Implement.	Willingness
50-100%	Likely
25-49%	Somewhat Likely
0-24%	Unlikely

BMP	Willingness
Nutrient App. Mgmt. – Core N	Likely
Nutrient App. Mgmt. – Core P	Likely
Conservation or High Residue Tillage	Likely
Soil & Water Conservation Plan	Likely
Barnyard Runoff Cont. & Loafing Lot Mgmt.	Likely
Livestock & Poultry Waste Mgmt. System	Likely
Cover Crop	Somewhat Likely
Pasture Alternative Watering	Somewhat Likely
Pasture Mgmt. Composite	Somewhat Likely

Resource Assessment/Source Analysis

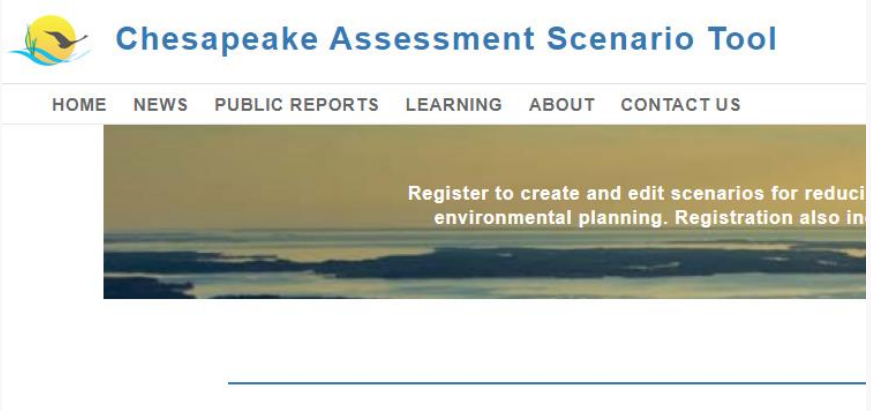
Target Area derived from LiDAR and Topography

NLCD 2019 Land Cover data

Dominant Land Use in each Target Area

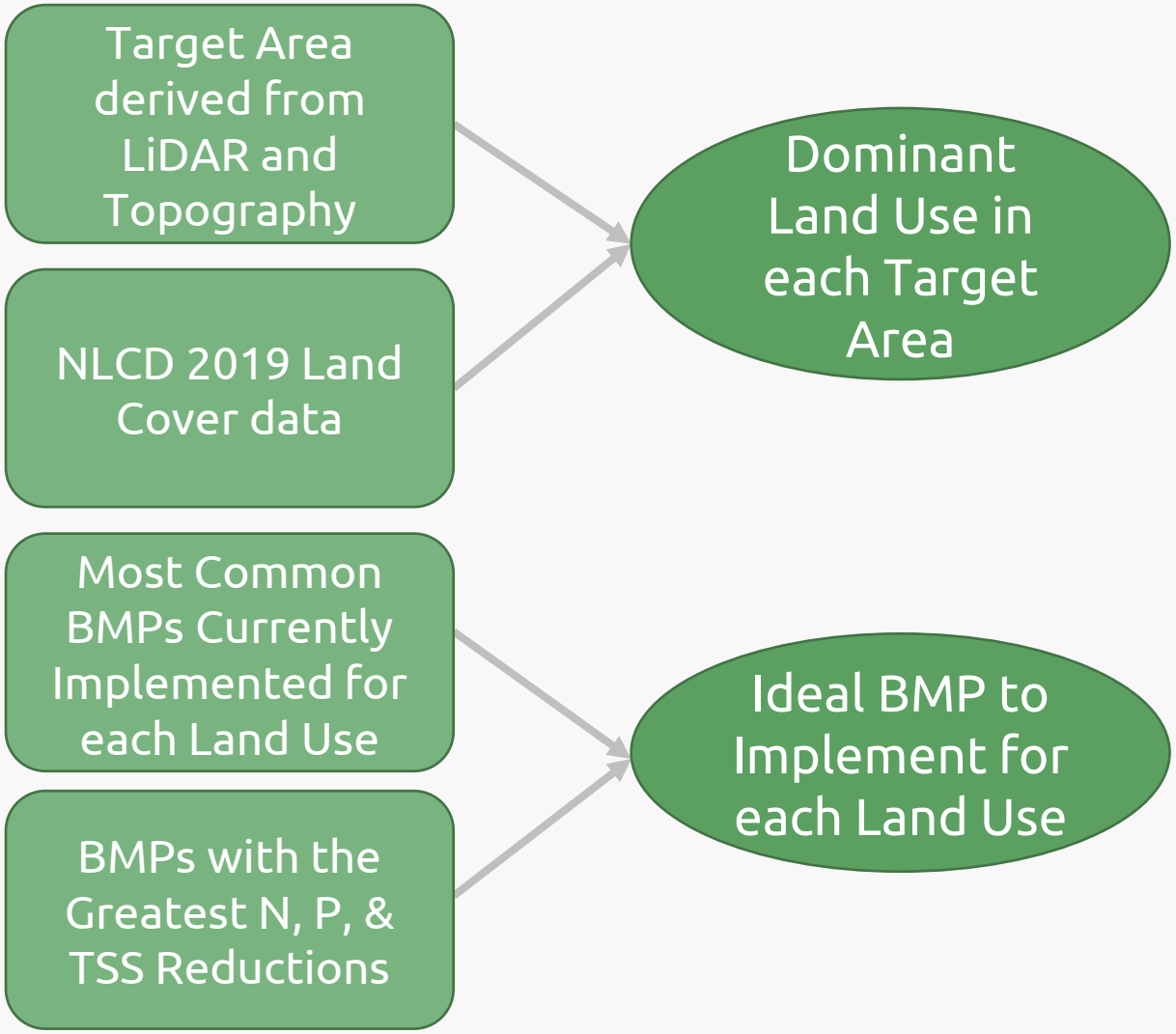
Most Common BMPs Currently Implemented for each Land Use

BMPs with the Greatest N, P, & TSS Reductions



- Data from CBP CAST model
  - Estimated reductions for TN, TP, & TSS for Frederick & Carroll Co.

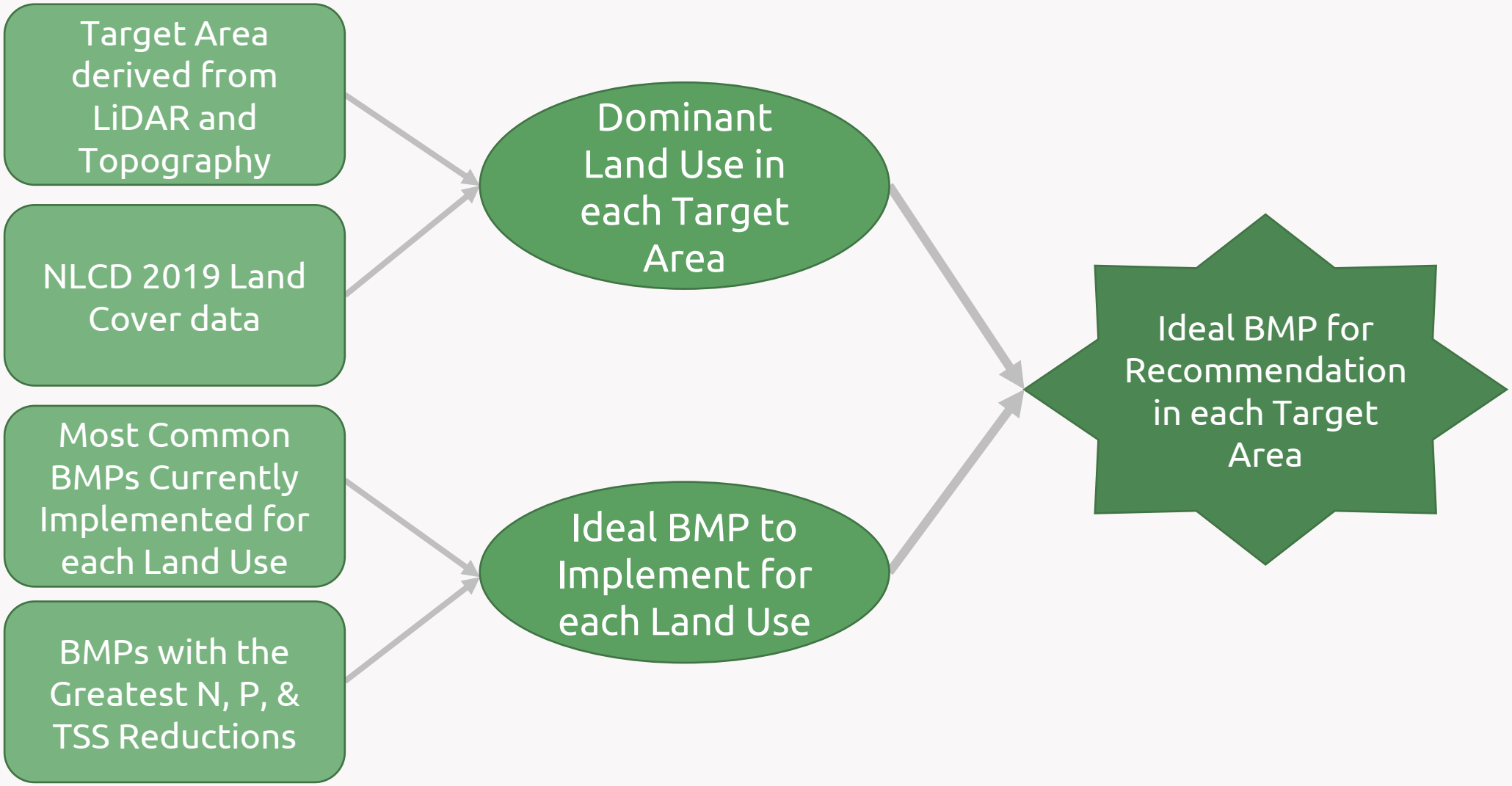
Resource Assessment/Source Analysis



Precision Intensive Rotational/Prescribed Grazing		
Hay/Pasture – Somewhat Likely		
TN Reduction (lb/acre)	**TP Reduction (lb/acre)**	**TSS Reduction (lb/acre)**
0.81 – 1.09	0.13 – 0.23	1.97 – 2.09

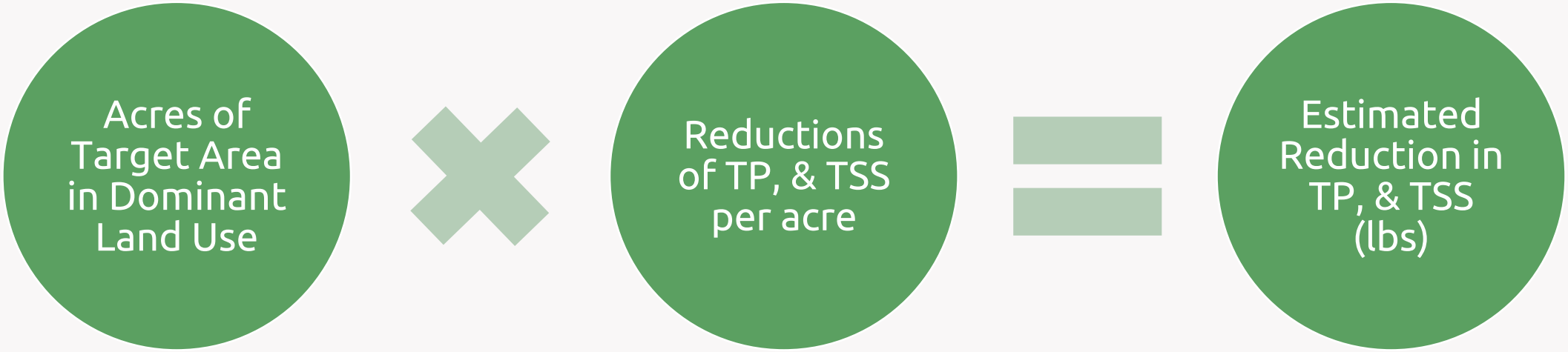
Conservation or High Residue Tillage		
Cultivated Crops - Likely		
TN Reduction (lb/acre)	**TP Reduction (lb/acre)**	**TSS Reduction (lb/acre)**
1.83 - 3.78	0.17 - 0.27	524.78 - 1328.07

Resource Assessment/Source Analysis



Resource Assessment/Source Analysis

- Calculated reduction estimates if implementing BMPs in the target areas using:



Resource Assessment/Source Analysis

Sub-Watershed	TP Reduction Estimate (low; high)		Sediment Reduction Estimates (low; high)
	Conservation or High Residue Tillage	*Precision Intensive Rotational/Prescribed Grazing*	
Upper Little Pipe Creek	99.90lbs/year; 158.66 lbs/year	29.37lbs/year; 51.97 lbs/year	308,816.35 lbs/year; 781,055.75 lbs/year
Middle Little Pipe Creek	113.51 lbs/year; 180.28 lbs/year	22.89 lbs/year; 40.49 lbs/year	350,742.42 lbs/year; 887,262.88 lbs/year
Lower Little Pipe Creek	28.13 lbs/year; 38.06 lbs/year	12.55 lbs/year; 22.21 lbs/year	516.20 lbs/year; 759.89 lbs/year

Summary & Recommendations

- Combine resource assessment/source analysis & TMDL goals to produce recommendations for the 3 LPC sub-watersheds

Calculate needed reductions from LPC sub-watersheds to reach Double Pipe Creek TMDL Goals

Compare to reductions estimated for ideal BMPs applied to Target Areas

Compare goals to reductions estimated for ideal BMPs applied to all available lands every 25% of implementation beyond current level of application

Compare goals to reductions estimated by implementing the most efficient BMP applied to all available lands every 25% of implementation

Summary & Recommendations

Calculate needed reductions from LPC sub-watersheds to reach Double Pipe Creek TMDL Goals

Sub-watershed	TP Reductions Needs – Pasture/Hay (lbs/year)	TP Reductions Needs – Crops (lbs/year)	Sediment Reduction Needs (lbs/year)
Upper Little Pipe Creek	1365.01	5523.38	7,218,602.78
Middle Little Pipe Creek	1312.27	6184.01	6,418,941.97
Lower Little Pipe Creek	961.27	4591.82	4,507,055.25

Summary & Recommendations

Compare to reductions estimated for ideal BMPs applied to Target Areas

Sub-watershed	Hay/Pasture TP Reductions Est. *(Needs)* [lbs/year]	Crop TP Reductions Est. *(Needs)* [lbs/year]	Sediment Reductions Est. *(Needs)* [lbs/year]
Upper Little Pipe Creek	158.66 *(1365.01)*	51.97 *(5523.38)*	781,055.75 *(7,218,602.78)*
Middle Little Pipe Creek	180.28 *(1312.27)*	40.49 *(6184.01)*	887,262.88 *(6,418,941.97)*
Lower Little Pipe Creek	38.06 *(961.27)*	22.21 *(4591.82)*	759.89 *(4,507,055.25)*

Summary & Recommendations

Compare goals to reductions estimated for ideal BMPs applied to all available lands every 25% of implementation beyond current level of application

Sub-watershed	Nutrient/ Land Use	Current Level of Application	50% Application [lbs/year]	75% Application [lbs/year]	100% Application [lbs/year]	Needed Reductions [lbs/year]
Upper Little Pipe Creek	TP - Crops	69.20%	--	96.85	514.29	*1,365.01*
	TP - Pasture/Hay	40.60%	142.50	521.49	900.48	*5,523.38*
	Sediments	Combined	--	482,943.48	2,541,033.22	*7,218,602.78*
Middle Little Pipe Creek	TP - Crops	61.80%	--	246.77	714.14	*1,312.27*
	TP - Pasture/Hay	44.50%	80.16	444.50	808.85	*6,184.01*
	Sediments	Combined	--	1,219,423.41	3,522,916.59	*6,418,941.97*
Lower Little Pipe Creek	TP - Crops	55.90%	--	265.14	612.18	*961.27*
	TP - Pasture/Hay	46.80%	34.16	301.05	567.95	*4591.82*
	Sediments	Combined	--	1,307,949.17	3,018,321.23	*4,507,055.25*

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Summary & Recommendations

Compare goals to reductions estimated by implementing the most efficient BMP applied to all available lands every 25% of implementation

- The most efficient BMP for TP and Sediment reductions is Grassed Buffers
  - 35-foot Grassed Buffer for crop lands
    - 2,021.50 - 2,375.30 lbs/acre reduction in sediments
  - 100-foot Grassed Buffers for crop lands
    - 0.26-0.29 lbs/acre reduction in TP
  - 35-foot Grassed Buffers with exclusion fencing for hay/pasture lands
    - 53.92 lbs/acre reduction in TP
    - 24,817.50 - 34,653.47 lbs/acre reduction in sediments

Summary & Recommendations

Compare goals to reductions estimated by implementing the most efficient BMP (grassed buffers) applied to all available lands every 25% of implementation

Sub-watershed	Nutrient/ Land Use	25% Application [lbs/year]	50% Application [lbs/year]	75% Application [lbs/year]	100% Application [lbs/year]	Needed Reductions [lbs/year]
Upper Little Pipe Creek	TP - Crops	9.36	18.72	28.08	37.44	*1,365.01*
	TP - Pasture/Hay	1,638.80	3,277.61	4,916.41	6,555.21	*5,523.38*
	Sediments	1,079,767.32	2,159,534.64	3,239,301.96	4,319,069.28	*7,218,602.78*
Middle Little Pipe Creek	TP - Crops	9.64	19.27	28.91	38.55	*1,312.27*
	TP - Pasture/Hay	1,495.15	2,990.30	4,485.45	5,980.60	*6,184.01*
	Sediments	988,229.17	1,976,458.34	2,964,687.51	3,952,916.67	*6,418,941.97*
Lower Little Pipe Creek	TP - Crops	4.06	8.12	12.19	16.25	*961.27*
	TP - Pasture/Hay	738.58	1,477.17	2,215.75	2,954.34	*4,591.82*
	Sediments	486,192.44	972,384.86	1,458,577.30	1,944,769.74	*4,507,055.25*

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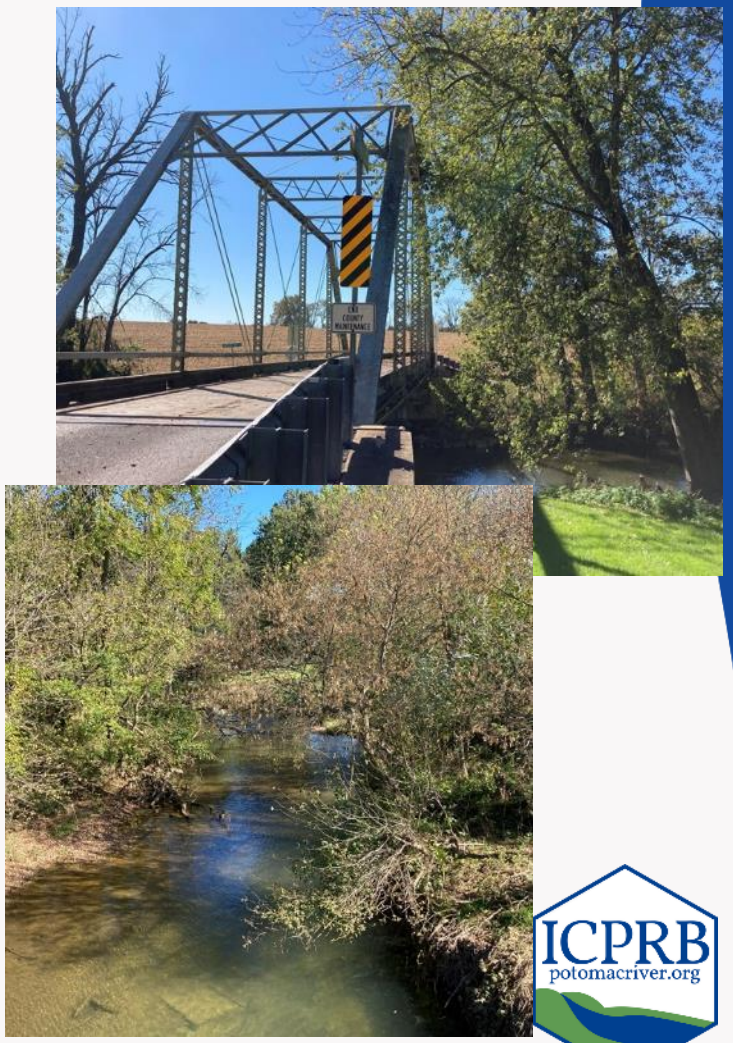
Summary & Recommendations

- For Phosphorus TMDL reduction goals, BMP additions would need almost 100% implementation of:
    - Conservation or high residue tillage
    - Precision intensive rotational/prescribed grazing
    - Grassed Buffers (with & without exclusion fencing)
- For Sediment TMDL reduction goals, BMP additions would need at least 75% implementation of:
    - Conservation or high residue tillage
    - Precision intensive rotational/prescribed grazing
    - Grassed Buffers (with & without exclusion fencing)



Outreach Plan

Strategy	Connect	Engage	Educate	Assist
Direct mail	✓			
Targeted social media ads	✓	✓		
Sponsored creek clean-up days with community groups	✓	✓		
Outreach booths at community gatherings such as school events, agricultural fairs, retail or commerce events, and other community events	✓	✓	✓	
Peer-to-peer outreach by producers that have worked with NRCS through pre-recorded video, webinars, in-person presentations, or on-farm tours	✓	✓	✓	
“Farm Day” tours of installed conservation practices	✓	✓	✓	
Citizen science water quality monitoring programs	✓	✓	✓	
NRCS “Open House” or “Town Hall” events	✓	✓	✓	✓
“Ask a Conservationist” NRCS office hours available in person, by phone, or internet-based chat	✓	✓	✓	✓

Questions?