

POLLUTANT REDUCTION PLAN SUMMARY

For:

SALISBURY TOWNSHIP

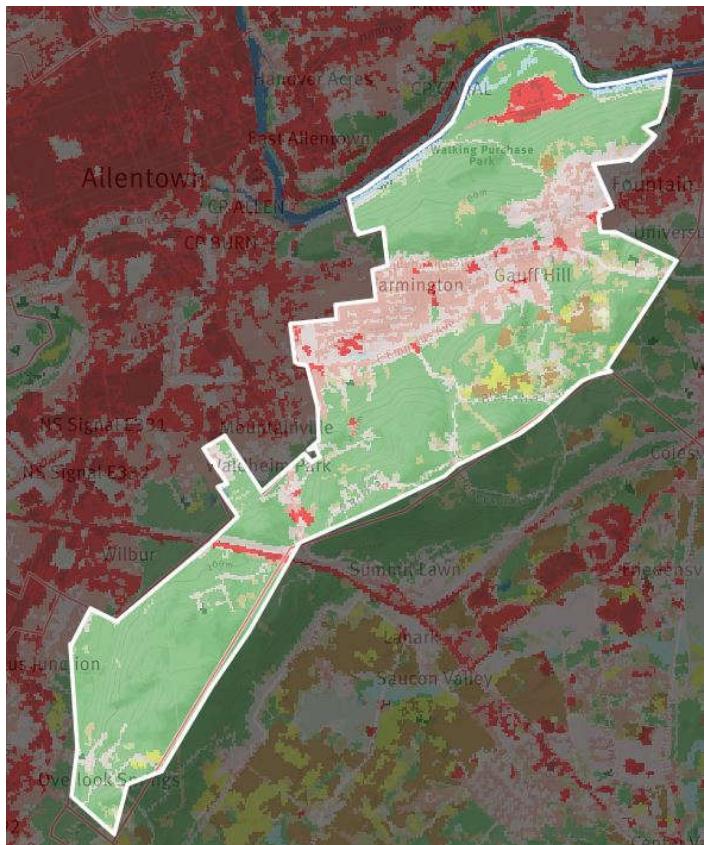
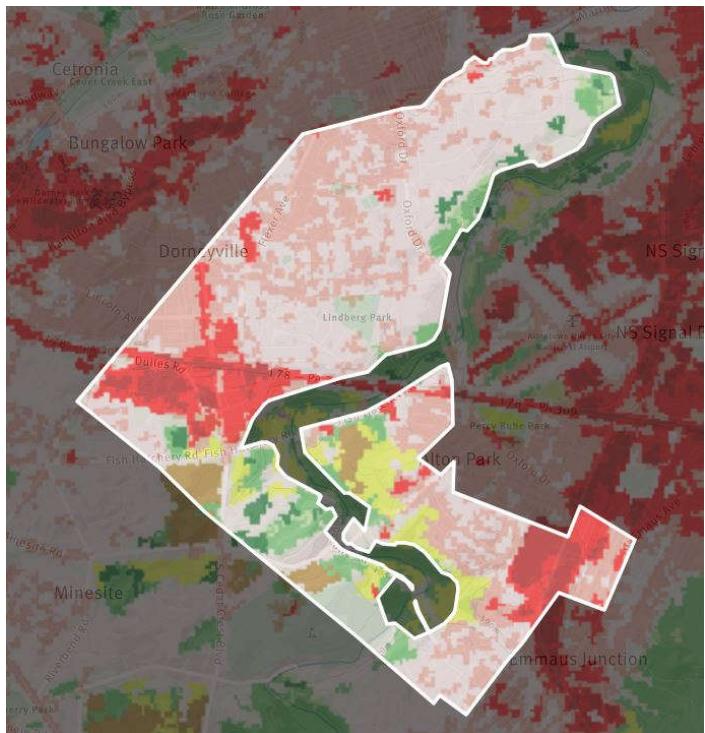
May 24, 2018

EXISTING LOADING METHODOLOGY

The Township's existing storm sewer infrastructure have been mapped using GPS survey equipment. From the mapped storm sewer inlets, pipes, swales, and outfalls, storm sewer shed tributaries to each regulated outfall have been mapped using LIDAR two foot (2') contours.

Existing sediment loading was then calculated using the online-based Wiki Watershed program, as developed by the Stroud Water Research Center. The PRP planning areas are the areas within each storm sewer shed that are tributary to a regulated outfall. The rights-of-way within PennDOT roadways have been excluded, or parsed, from our PRP planning area. Areas of non-concentrated flow that sheet flow into a receiving stream and are not conveyed by a defined outfall have also been parsed from the PRP planning area.

The outputs from Wiki Watershed provide the land cover areas from within each PRP sewershed area. The land cover types defined in the Township are represented in the following maps:



NLCD Land Cover Classification Legend

- 11 Open Water
- 12 Perennial Ice/ Snow
- 21 Developed, Open Space
- 22 Developed, Low Intensity
- 23 Developed, Medium Intensity
- 24 Developed, High Intensity
- 31 Barren Land (Rock/Sand/Clay)
- 41 Deciduous Forest
- 42 Evergreen Forest
- 43 Mixed Forest
- 51 Dwarf Scrub*
- 52 Shrub/Scrub
- 71 Grassland/Herbaceous
- 72 Sedge/Herbaceous*
- 73 Lichens*
- 74 Moss*
- 81 Pasture/Hay
- 82 Cultivated Crops
- 90 Woody Wetlands
- 95 Emergent Herbaceous Wetlands

* Alaska only

Calculations then convert these land cover areas from square meters to acres. Based on these areas, the following assumptions, in accordance with the 2011 National Land Cover Database (NLCD 2011), are made to calculate the amount of impervious and pervious areas within each study area:

- Developed, Open Space: 19% Impervious
- Developed, Low Intensity: 49% Impervious
- Developed, Medium Intensity: 79% Impervious
- Developed, High Intensity: 100% Impervious

For Lehigh County, per Attachment B (Developed Land Loading Rates for PA Counties) in the Pennsylvania Department of Environmental Protection's PRP Instructions, the Total Sediment (TSS) loading is calculated by multiplying the Developed Impervious rate by 1,839 lbs./acre/yr.; by multiplying the Developed Pervious rate by 264.96 lbs./acre/yr.; and by multiplying the Undeveloped rate by 234.6 lbs./acre/yr.

A total sediment loading, in lbs. per year, was calculated for each storm sewer shed. These totals were then added together to generate the existing sediment loading for the Township.

EXISTING LOADING CALCULATIONS

The total existing sediment load within the Pollutant Reduction Plan planning area is 1,983,546.15 lbs./year. The Township is required to reduce the existing sediment load by 10%. Therefore, the **required sediment load reduction is 198,354.61 lbs./year.**

The planning areas are delineated as tributaries to each MS4 outfall or areas discharging into another entities MS4 planning area. It is noted that the Cedar Creek watershed is not impaired for sediment and is not subject to sediment pollution reduction.

SALISBURY TOWNSHIP - REQUIRED SEDIMENT LOAD CALCULATIONS**EXISTING SEDIMENT LOAD****1983546.15 LBS/YR****EXISTING BEST MANAGEMENT PRACTICE (BMP) REDUCTIONS:****EXISTING SEDIMENT LOAD WITH EXISTING BMP BENEFITS: 1983546.15 LBS/YR**

(EXISTING SEDIMENT LOAD - EXISTING BEST MANAGEMENT PRACTICE REDUCTIONS)

REQUIRED SEDIMENT LOAD REDUCTION: 198354.61 LBS/YR

(10% OF EXISTING SEDIMENT LOAD WITH EXISTING BMP BENEFITS)

PROPOSED BMP OPTIONS

The following best management practices (BMP's) are proposed to reduce the required sediment loading from within the Pollutant Reduction Plan planning area:

Streambank Restoration

Eroding streambanks can be stabilized to reduce the potential for erosion. Existing native vegetation would be preserved and supplemented to stabilize streambanks. Grading can also be done to provide additional flood storage beyond the embankments. Sediment reductions are credited at a rate of 44.88 lbs/yr per linear foot of streambank restoration. Two proposed streambank restoration areas are identified as follows:

STREAMBANK RESTORATION (DEVONSHIRE PARK):

Approximately 1,255 linear feet (highlighted below) of streambank within Devonshire Park can be regraded and improved to stabilize eroded streambanks and potentially creating a longer flow path and increased flood storage.



Proposed Sediment Load Reduction: 56,324.40 lbs/yr

Existing site conditions:



STREAMBANK RESTORATION (HARRY S. TRUMAN ELEMENTARY SCHOOL):

Approximately 350 linear feet (highlighted below) of streambank within Devonshire Park can be stabilized with vegetative means to stabilize eroded streambanks. Severely eroded embankments can be graded and stabilized with coir logs combined with deciduous plant material to prevent further streambank erosion.



Proposed Sediment Load Reduction: 15,708.00 lbs/yr

Constructed Wetlands

Constructed wetlands are proposed to be incorporated into the existing Laubach Park landscape. By intercepting stormwater flows from Lehigh Avenue and the upstream tributary, graded wetlands can be constructed to various depths up to maximum four (4) foot depths, to filter sediment prior to discharging to the existing Laubach Park pond. A conceptual layout is proposed within the below shown area on the Constructed Wetland Conceptual Plan.

CONSTRUCTED WETLAND (LAUBACH PARK):



Proposed Sediment Load Reduction: 20,337.71 lbs/yr

Detention Basin Retrofits

Conventional detention basins can be retrofitted to improve sediment capture. A proposed strategy includes constructing sediment forebays and baffles utilizing gabion baskets (similar to the below image) or earthen berms of 24" in height. Forebays will allow temporary impoundment of stormwater at pipe or swale inflows to settle and filter through the gabion baskets. A baffle system will increase the flow length of stormwater in a basin to allow settlement of sediment. Proposed basin retrofit areas are outlined in the proceeding pages.



Figure 3. A barrier of gabion baskets spreads stormwater runoff in the basin (*Photo Credit: Craig McGee, Camden County Soil Conservation District*).

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IMPROVING DRY DETENTION BASINS IN NEW JERSEY TO SUPPORT
GREEN INFRASTRUCTURE GOALS

Photo Credit: _____

DETENTION BASIN RETROFIT # 1:

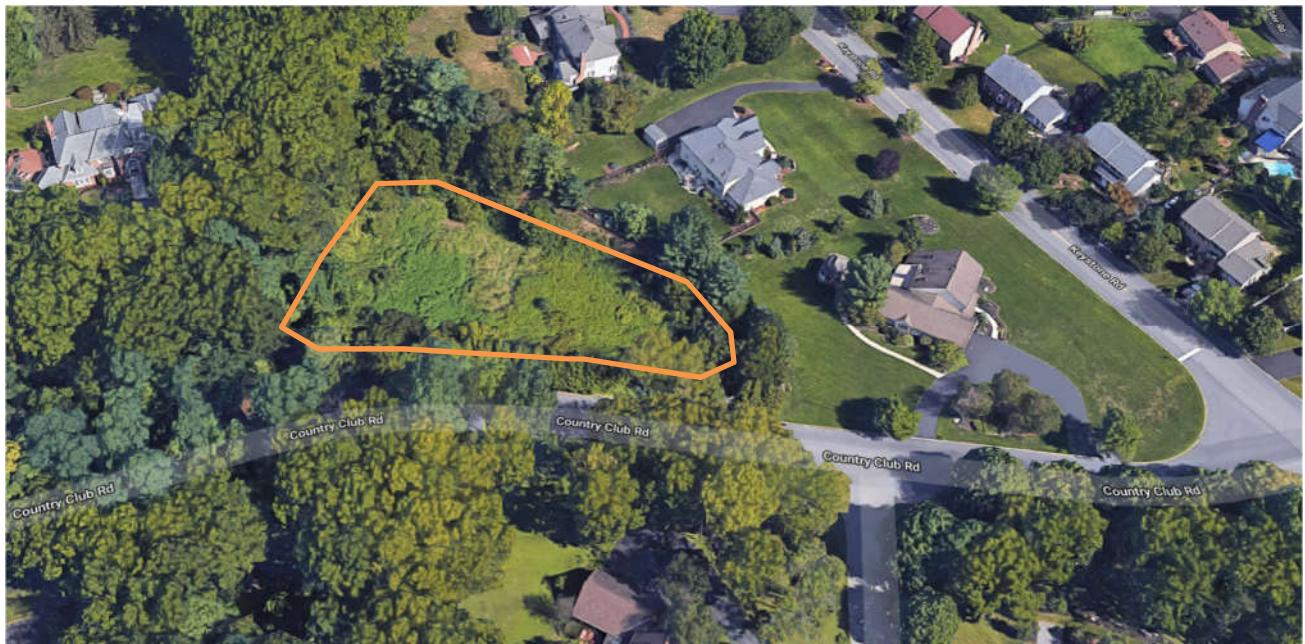
A sediment forebay and baffle system can be utilized in this existing grass-lined basin along Lindberg Avenue.



Proposed Sediment Load Reduction: 39,645.35 lbs/yr

DETENTION BASIN RETROFIT # 2:

A sediment forebay and baffle system can be utilized in this existing overgrown basin along Country Club Road. Any trees and/or shrubs in the basin should be removed to allow future access and sediment removal.



Proposed Sediment Load Reduction: 11,257.46 lbs/yr

DETENTION BASIN RETROFIT # 3:

A sediment forebay and baffle system can be utilized in this existing overgrown basin between Box Elder Road and Devonshire Park. Any trees and/or shrubs in the basin should be removed to allow future access and sediment removal.



Proposed Sediment Load Reduction: 18,285.40 lbs/yr

DETENTION BASIN RETROFIT # 4:

A sediment forebay and baffle system can be utilized in this existing overgrown basin adjacent to Devonshire Park. Any trees and/or shrubs in the basin should be removed to allow future access and sediment removal.



Proposed Sediment Load Reduction: 39,375.46 lbs/yr

SALISBURY TOWNSHIP - PROPOSED BMP REDUCTION CALCULATIONS

STORM SEWER SHED NUMBER	PROPOSED BMP	PROPOSED SEDIMENT REDUCTION (A*B) (LBS/YR)
054B	Detention Basin Retrofit # 1	39645.35
031	Streambank Restoration (Harry S Truman)	15708.00
042	Constructed Wetland (Laubach Park)	20337.71
064	Detention Basin Retrofit # 4	39375.46
070	Detention Basin Retrofit # 2	11257.46
071	Detention Basin Retrofit # 3	18285.40
066	Streambank Restoration (Devonshire Park)	56324.40
TOTALS		200,933.79

**Note: Stream Restoration is calculated by the length of the reach of stream to be restored by 44.88 lbs/yr.

APPENDIX A- EXISTING LOADING CALCULATIONS

		SALISBURY TOWNSHIP - EXISTING SEDIMENT LOADING (LEHIGH RIVER WATERSHED)																											
		STORM SEWER SHED NUMBER	DEVELOPED, OPEN SPACE (SQ. METERS)	DEVELOPED, OPEN SPACE (ACRES)	DEVELOPED, OPEN SPACE (IMPERVIOUS SURFACES) (19% OF TOTAL AREA) (A)	DEVELOPED, OPEN SPACE (PERVIOUS SURFACES) (31% OF TOTAL AREA) (B)	DEVELOPED, OPEN SPACE (IMPERVIOUS SURFACE - SEDIMENT LOADING)(A*1893 LBS/ACRE/YR) (LBS/YR)	DEVELOPED, OPEN SPACE (PERVIOUS SURFACE - SEDIMENT LOADING) (B*264.96 LBS/ACRE/YR) (LBS/YR)	DEVELOPED, LOW INTENSITY (SQ. METERS)	DEVELOPED, LOW INTENSITY (ACRES)	DEVELOPED, LOW INTENSITY (IMPERVIOUS SURFACES) (49% OF TOTAL AREA) (C)	DEVELOPED, LOW INTENSITY (PERVIOUS SURFACES) (51% OF TOTAL AREA) (D)	DEVELOPED, LOW INTENSITY (IMPERVIOUS SURFACE - SEDIMENT LOADING) (C*1893 LBS/ACRE/YR) (LBS/YR)	DEVELOPED, LOW INTENSITY (PERVIOUS SURFACE - SEDIMENT LOADING) (D*264.96 LBS/ACRE/YR) (LBS/YR)	DEVELOPED, MEDIUM INTENSITY (SQ. METERS)	DEVELOPED, MEDIUM INTENSITY (ACRES)	DEVELOPED, MEDIUM INTENSITY (IMPERVIOUS SURFACES) (79% OF TOTAL AREA) (E)	DEVELOPED, MEDIUM INTENSITY (PERVIOUS SURFACES) (21% OF TOTAL AREA) (F)	DEVELOPED, MEDIUM INTENSITY (IMPERVIOUS SURFACE - SEDIMENT LOADING) (E*1893 LBS/ACRE/YR) (LBS/YR)	DEVELOPED, MEDIUM INTENSITY (PERVIOUS SURFACE - SEDIMENT LOADING) (F*264.96 LBS/ACRE/YR) (LBS/YR)	DEVELOPED, HIGH INTENSITY (SQ. METERS)	DEVELOPED, HIGH INTENSITY (ACRES)	DEVELOPED, HIGH INTENSITY (IMPERVIOUS SURFACES) (100% OF TOTAL AREA) (G)	DEVELOPED, HIGH INTENSITY (IMPERVIOUS SURFACE - SEDIMENT LOADING) (G*1893 LBS/ACRE/YR) (LBS/YR)	UNDEVELOPED LANDS (SQ. METERS)	UNDEVELOPED LANDS (ACRES) (H)	UNDEVELOPED LANDS - SEDIMENT LOADING (H*234.6 LBS/ACRE/YR) (LBS/YR)	TOTAL SEDIMENT LOADING (LBS/YR)	TOTAL STORM SEWERSHED AREA (ACRES)
001	7177.32	1.77	0.34	1.44	619.70	380.63	1794.33	0.44	0.22	0.23	399.54	59.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4485.83	1.11	260.05	1719.83	3.33				
002	26017.79	6.43	1.22	5.21	2246.40	1379.80	11663.15	2.88	1.41	1.47	2597.01	389.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8074.49	2.00	468.08	7080.74	11.31				
003	10765.98	2.66	0.51	2.15	929.54	570.95	16148.98	3.99	1.96	2.04	3595.86	539.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5635.59	1.44	0.00	5635.59	6.65				
004	39475.28	9.75	1.85	7.90	3408.33	2093.49	36783.79	9.09	4.45	4.64	8190.58	1228.25	897.17	0.22	0.18	0.05	322.08	12.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15255.07	19.07	
005	94202.44	23.28	4.42	18.86	8133.51	4995.83	66390.29	16.41	8.04	8.37	14783.01	2216.85	2691.50	0.67	0.53	0.14	966.24	37.01	0.00	0.00	0.00	0.00	7177.33	1.77	416.07	31548.52	42.12		
006	5383.00	1.33	0.25	1.08	464.77	285.48	12560.33	3.10	1.52	1.58	2796.79	419.40	897.17	0.22	0.18	0.05	322.08	12.34	0.00	0.00	0.00	0.00	8971.66	2.22	520.09	4820.95	6.87		
007	3588.67	0.89	0.17	0.72	309.85	190.32	8971.66	2.22	1.09	1.13	1997.70	299.57	1794.33	0.44	0.35	0.09	644.16	24.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3466.27	3.55	
008		0.00	0.00	0.00	0.00	0.00	13457.49	3.33	1.63	1.70	2996.56	449.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3445.92	3.33		
009		0.00	0.00	0.00	0.00	0.00	8971.66	2.22	1.09	1.13	1997.70	299.57	2691.50	0.67	0.53	0.14	966.24	37.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3300.52	2.88	
A	74464.68	18.40	3.50	14.90	6429.34	3949.08	2691.49	0.67	0.33	0.34	599.31	89.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	85230.67	21.06	4940.88	16008.48	40.13				
B	4485.83	1.11	0.21	0.90	387.31	237.90	897.17	0.22	0.11	0.11	199.77	29.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	854.94	1.33		
C	4485.83	1.11	0.21	0.90	387.31	237.90	1794.33	0.44	0.22	0.23	399.54	59.91	1794.33	0.44	0.35	0.09	644.16	24.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1753.49	2.00	
D	132780.54	32.81	6.23	26.58	11464.37	7041.74	51138.45	12.64	6.19	6.44	11386.91	1707.57	5382.99	1.33	1.05	0.28	1932.47	74.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33607.08	46.78	
E-1	18840.50	4.66	0.88	3.77	1626.70	999.17	26915.00	6.65	3.26	3.39	5993.12	898.72	8971.67	2.22	1.75	0.47	3220.79	123.35	0.00	0.00	0.00	0.00	173153.14	42.79	10037.81	22899.66	56.31		
E-2	6280.17	1.55	0.29	1.26	542.23	333.06	897.17	0.22	0.11	0.11	199.77	29.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64596.02	15.96	3744.68	4849.70	17.74				
F		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4485.83	1.11	260.05	260.05	1.11				

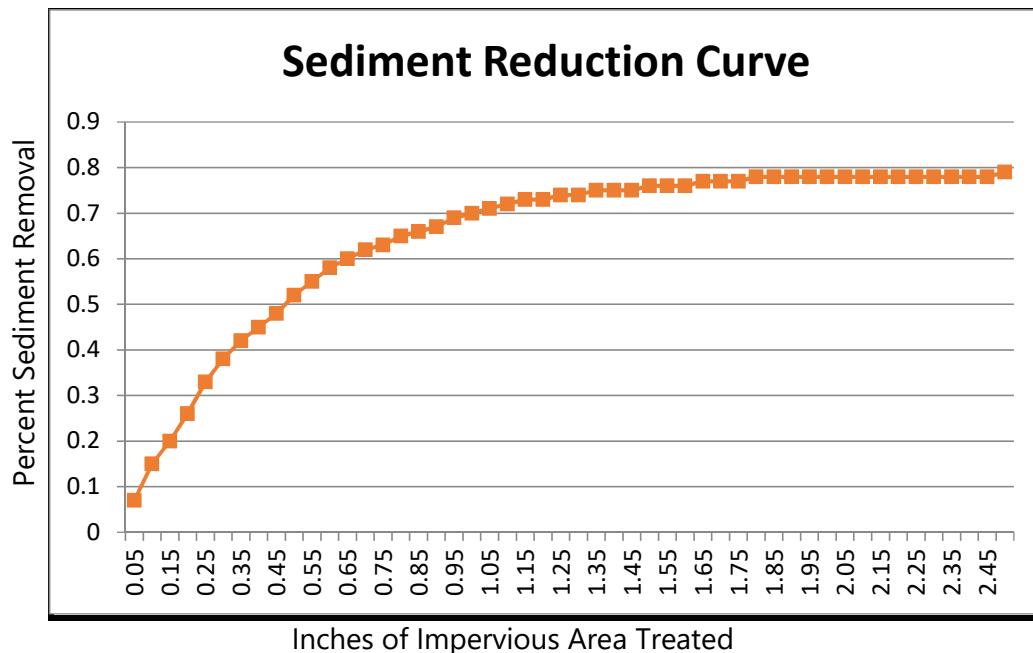
TOTAL EXISTING SEDIMENT LOAD 156506.78

264.48

APPENDIX B- PROPOSED BMP REDUCTION CALCULATIONS

SALISBURY TOWNSHIP - SEDIMENT LOADING TO PROPOSED BMP'S

BMP NAME: Constructed Wetland (Laubach Park)



TOTAL DRAINAGE AREA (Acres): 96.44

TOTAL IMPERVIOUS AREA (Acres): 11.45

BMP SEDIMENT LOAD (lbs/yr): 42,370.23

EXISTING SEDIMENT REMOVAL REDUCTIONS

PROPOSED SEDIMENT REMOVAL REDUCTIONS

Volume Treated (ac-ft.) 0.441

Inches of Impervious Area Treated: 0.46

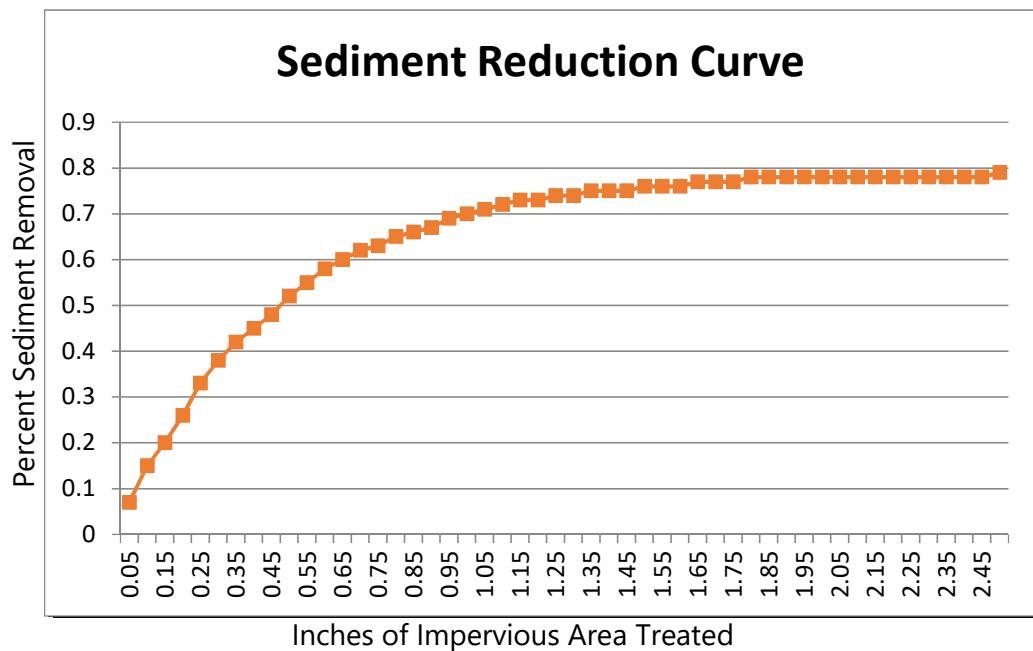
Percent Reduction: 48%

Removed Sediment: 20,337.71

SALISBURY TOWNSHIP - SEDIMENT LOADING TO PROPOSED BMP'S

BMP NAME:

Detention Basin Retrofit # 1



TOTAL DRAINAGE AREA (Acres): 79.81
TOTAL IMPERVIOUS AREA (Acres): 24.48

BMP SEDIMENT LOAD (lbs/yr): 60,992.85

EXISTING SEDIMENT REMOVAL REDUCTIONS

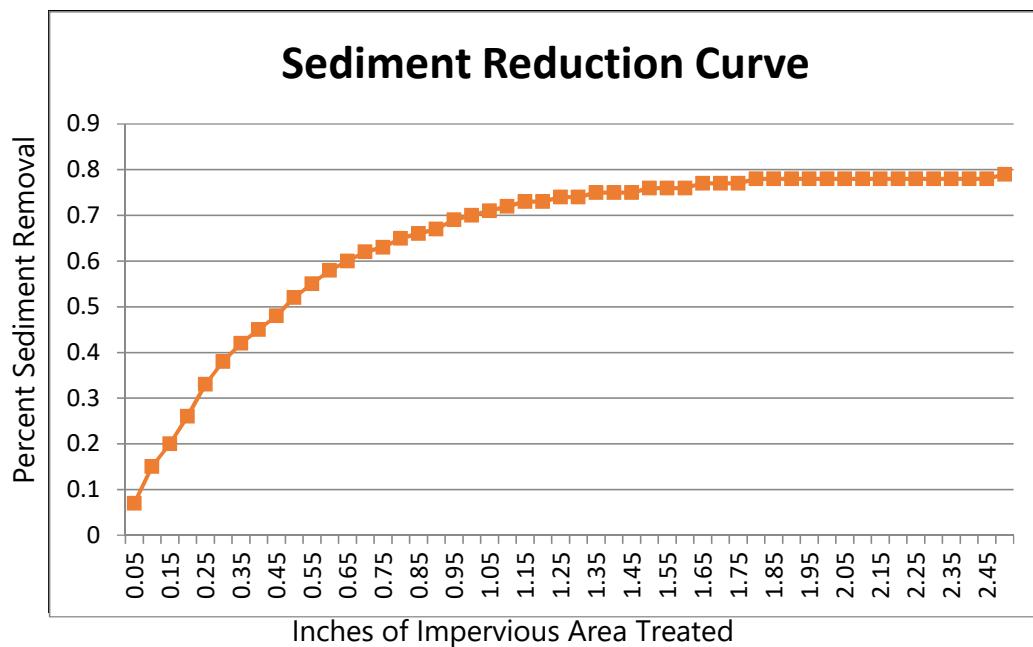
PROPOSED SEDIMENT REMOVAL REDUCTIONS

Volume Treated (ac-ft.)	1.687
Inches of Impervious Area Treated:	0.83
Percent Reduction:	65%
Removed Sediment:	39,645.35

SALISBURY TOWNSHIP - SEDIMENT LOADING TO PROPOSED BMP'S

BMP NAME:

Detention Basin Retrofit # 2



TOTAL DRAINAGE AREA (Acres): 23.50

TOTAL IMPERVIOUS AREA (Acres): 5.09

BMP SEDIMENT LOAD (lbs/yr): 14,432.64

EXISTING SEDIMENT REMOVAL REDUCTIONS

PROPOSED SEDIMENT REMOVAL REDUCTIONS

Volume Treated (ac-ft.) 0.941

Inches of Impervious Area Treated: 2.22

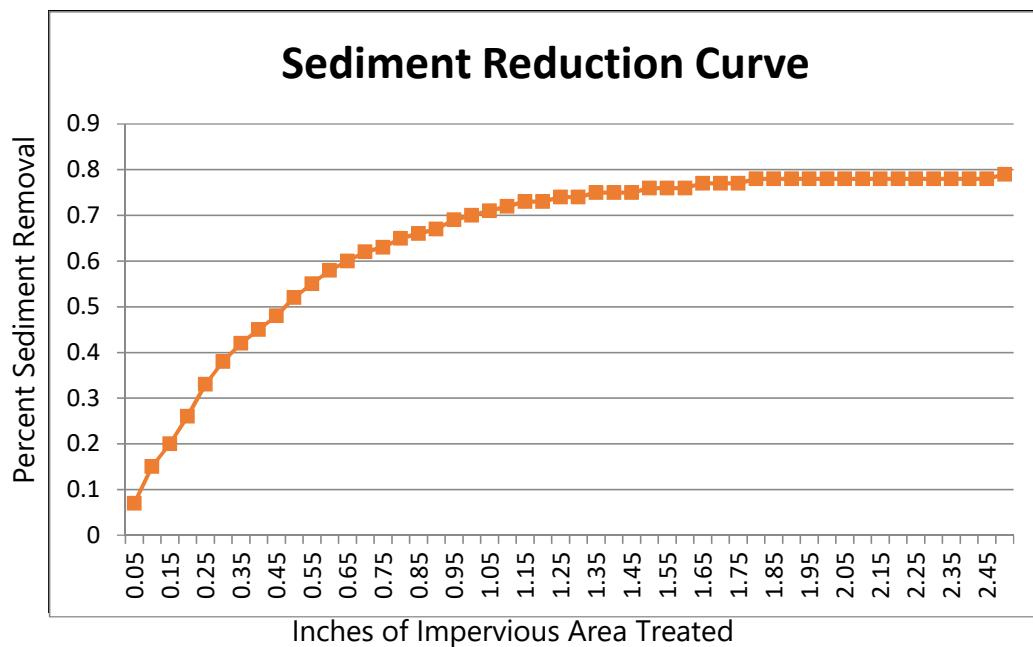
Percent Reduction: 78%

Removed Sediment: 11,257.46

SALISBURY TOWNSHIP - SEDIMENT LOADING TO PROPOSED BMP'S

BMP NAME:

Detention Basin Retrofit # 3



TOTAL DRAINAGE AREA (Acres): 29.04
TOTAL IMPERVIOUS AREA (Acres): 10.28

BMP SEDIMENT LOAD (lbs/yr): 24,380.54

EXISTING SEDIMENT REMOVAL REDUCTIONS

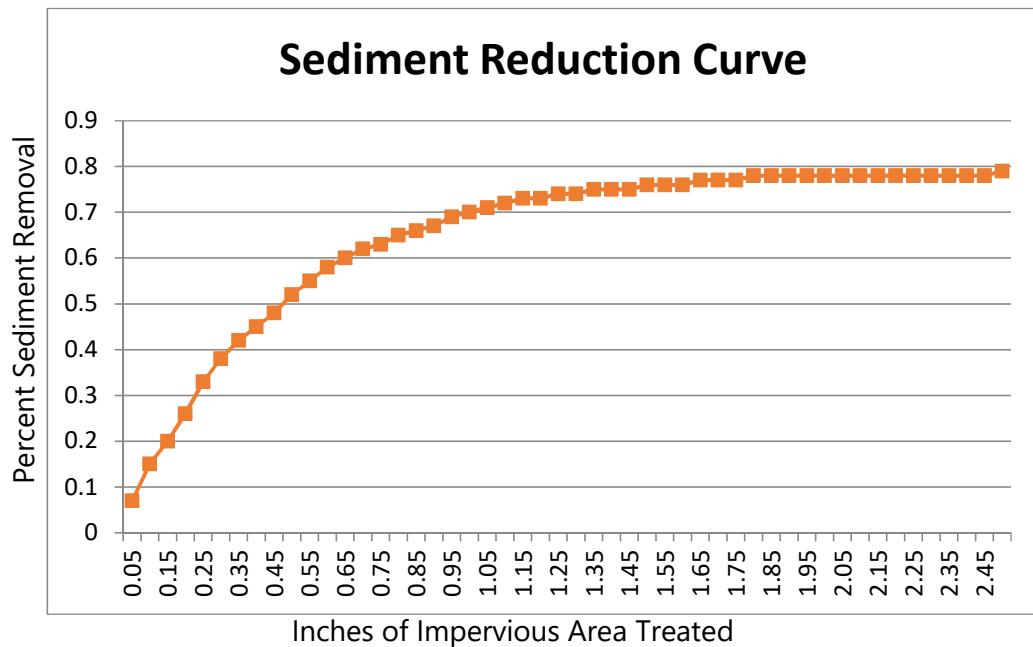
PROPOSED SEDIMENT REMOVAL REDUCTIONS

Volume Treated (ac-ft.) 1.157
Inches of Impervious Area Treated: 1.35
Percent Reduction: 75%
Removed Sediment: 18,285.40

SALISBURY TOWNSHIP - SEDIMENT LOADING TO PROPOSED BMP'S

BMP NAME:

Detention Basin Retrofit # 4



TOTAL DRAINAGE AREA (Acres): 79.81
TOTAL IMPERVIOUS AREA (Acres): 27.40

BMP SEDIMENT LOAD (lbs/yr): 65,625.77

EXISTING SEDIMENT REMOVAL REDUCTIONS

PROPOSED SEDIMENT REMOVAL REDUCTIONS

Volume Treated (ac-ft.) 1.563
Inches of Impervious Area Treated: 0.68
Percent Reduction: 60%
Removed Sediment: 39,375.46