

**POLLUTANT REDUCTION PLAN
FOR IMPAIRED WATERS OF THE COMMONWEALTH
AND THE CHESAPEAKE BAY,
AND
TOTAL MAXIMUM DAILY LOAD (TMDL) PLAN
FOR UNT TO MILL CREEK
UPPER LEACOCK TOWNSHIP, LANCASTER COUNTY, PA**

Upper Leacock Township
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NPDES MS4 Permit PAG 133681
September 15, 2017
REVISED July 01, 2019

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SUMMARY

Note: Revisions made on July 1, 2019 per PA DEP second review dated April 9, 2019 are shown in blue text.

Upper Leacock Township has prepared this Pollutant Reduction Plan (PRP) for stormwater discharges of nutrients and sediment to surface waters in the Chesapeake Bay Watershed and to local surface waters impaired for nutrients and/or sediment to meet the requirements set forth by Pennsylvania's Department of Environmental Protection (PA DEP). This document also includes a Total Maximum Daily Load (TMDL) Plan for an unnamed tributary (UNT) to Mill Creek that receives stormwater discharges from Upper Leacock Township's MS4 area. The EPA-approved TMDL report was prepared by the PA DEP in August 2004 and has identified specific waste-load allocations (WLAs) for sediment and phosphorus.

As an MS4 community with locally impaired streams, Upper Leacock Township must comply with Appendix D and Appendix E of the PAG-13 General Permit and must attach this PRP and TMDL to the Notice of Intent (NOI) for Individual Permit Coverage. Upper Leacock Township has invited public participation in the planning process by making this PRP and TMDL Plan available for a 30-day public review and comment period. A copy of all written comments received and the record of consideration of each one is included in Section A of this document.

This PRP calculates the existing loading of stormwater pollutants within the urbanized area in the Conestoga River Watershed, in lbs/year; calculates the minimum required reduction in loading, in lbs/year; selects best management practices (BMPs) to reduce the loading rates; and demonstrates that the selected BMPs will achieve the minimum reductions. The pollutants of concern and associated required reductions for the Chesapeake Bay and locally impaired streams in Upper Leacock Township are sediment (10%), phosphorus (5%), and nitrogen (3%). PA DEP allows using a presumptive approach in which it is assumed that a 10% reduction in sediment will accomplish a 5% reduction in phosphorus and a 3% reduction in nitrogen.

The UNT to Mill Creek TMDL Plan was prepared in 2004 and established a wasteload allocation attributed to Upper Leacock Township's MS4 area. However, this TMDL re-calculates the existing pollutant loads with more accurate data to determine the pollutant loads for the urbanized areas within the Township.

PA DEP allows municipalities to calculate loads and pollutant reductions based on sediment, under the assumption that achieving the reductions for sediment will also achieve the reductions for phosphorus. The calculated existing pollutant loading rates and required reductions for this 5-year permit term are identified as follows:

Watershed	Baseline Pollutant Loads (lbs/year)			Required Reductions (lbs/year)		
	Sediment	Phosphorus	Nitrogen	Sediment (10%)	Phosphorus (5%)	Nitrogen (3%)
Conestoga River	685,911	2,700	28,389	68,591	135	852
UNT Mill Creek TMDL	311,908	1,398	14,746	31,191	70	442

To improve water quality and meet the required pollutant reductions for both the Conestoga River and Mill Creek Watersheds, Upper Leacock Township proposes to stabilize 900 linear feet of the UNT to Mill Creek streambank. Planned improvements may include re-grading the streambank to eliminate the existing steep banks and planting a 35' minimum width riparian buffer of native trees, shrubs, and perennial grasses to provide permanent stabilization. The expected benefits of this project include minimizing excessive erosion and sedimentation that occurs within the stream channel during storm events. Because the UNT to Mill Creek is tributary to the Conestoga River and the proposed streambank stabilization project provides sediment reductions that achieve the total required minimum 10% sediment reductions, Upper Leacock Township plans to implement this single project during the five-year BMP implementation term. In subsequent permit terms, the Township will look for opportunities to implement stormwater BMPs in both the Conestoga River Watershed and the Mill Creek Watershed.

Upper Leacock Township will prepare and submit updates on the progress of implementing this PRP / TMDL Plan with the MS4 Annual Report due each year to PA DEP by September 30th. Although the new 2018 - 2023 permit became effective on March 16, 2018, the new reporting period will run on an annual basis from July 1 through June 30.

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SECTION A - PUBLIC PARTICIPATION

Upper Leacock Township has promoted public participation and involvement in water quality decisions by making the PRP and TMDL available for public review and comment as required. A complete copy of the PRP was made available for public review on July 20, 2017, 58 days prior to the submission deadline on September 16, 2017. This meets the PA DEP requirement that the PRP be published at least 45 days prior to the submission deadline. A public notice was posted in LNP containing a description of the Plan, where it may be reviewed by the public, and the length of time made available for the receipt of comments. The municipality accepted both written and verbal comments from the public until August 19, 30 days after the public notice was posted.

The municipality did not receive any written or verbal comments during the 30-day public review and comment period.

Attachment

A1: A copy of the public notice

A2: A copy of the July 20, 2017 Board of Supervisors Meeting Agenda and Meeting Minutes

SECTION B - MAPS

Upper Leacock Township has completed a series of maps that show the location of the municipal boundary, impaired and non-impaired streams, the 2010 urbanized area, stormwater system facilities, aerial imagery to identify land use and associated impervious and pervious areas, the storm sewershed area associated with each regulated MS4 outfall, and the location of proposed structural BMPs that will be implemented to achieve the required pollutant load reductions. Please note that some streams identified on the maps as impaired, may be impaired for reasons that do not need to be addressed by this PRP. This PRP addresses only those impairments that require Appendix D and/or Appendix E (see Section C for specific information on applicable impairments).

Attachments

- B1: Hydrology Map
- B2: Storm Sewershed Map
- B3: Stormwater System Map
- B4: Proposed Stormwater BMP Map

SECTION C - POLLUTANTS OF CONCERN

The following pollutants of concern for each impaired stream are based on the impairment listing provided in the MS4 Requirements Table provided by PA DEP:

- Chesapeake Bay (Appendix D): Nutrients and Siltation
- UNT Mill Creek (TMDL): Nutrients, Siltation, Suspended Solids
- UNT Conestoga River (Appendix E): Nutrients
- Mill Creek (Appendix E): Nutrients and Siltation
- Conestoga River (Appendix E): Organic Enrichment/Low D.O. and Siltation

For the PRPs, if the impairment listed above is based on siltation only, a minimum 10% sediment reduction is required. If the impairment is based on nutrients (including Excessive Algal Growth and Organic Enrichment/Low D.O.), a minimum 5% Total Phosphorus (TP) reduction is required. If the impairment is due to both siltation and nutrients, both a 10% sediment reduction and 5% phosphorus reduction is required. PA DEP allows using a presumptive approach in which it is assumed that a 10% reduction in sediment will accomplish a 5% reduction in phosphorus and a 3% reduction in nitrogen; Upper Leacock Township will rely on the presumptive approach to meet the required 5% reduction in phosphorous and 3% reduction in nitrogen.

Upper Leacock Township must achieve the required pollutant reductions identified in the PRP over the 5-year period following PA DEP's approval of coverage. Please note that there are no regulated outfalls in the MS4 that discharge to the Mill Creek outside of the UNT Mill Creek Watershed.

The PA DEP TMDL report for the UNT to Mill Creek, dated August 2004, identifies excessive nutrients and sediment as the cause of current stream impairments. Table 3 on page 12 of this report identifies the current sediment and phosphorus loads (lbs/year) for the entire watershed as follows:

Existing Phosphorus and Sediment Loads for UNT Mill Creek		
Acreage	Phosphorus	Sediment
2,149	1,776.65	1,243,807.40

Please note that the TMDL report saved from PA DEP's MS4 website and included in Attachment C1 was approved by the EPA on October 8, 2004; the attached document is stamped "DRAFT".

Attachment

C1: Total Maximum Daily Load (TMDL) Unnamed Tributary to Mill Creek

SECTION D - DETERMINE EXISTING LOADING FOR POLLUTANTS OF CONCERN

A. Base Pollutant Load Calculation – Conestoga River and Mill Creek Watersheds

Upper Leacock Township calculated the existing pollutant loading rates (lbs/year) for sediment, phosphorus, and nitrogen generated within their regulated/planning area in the summer of 2019. The process used to perform this task is as follows:

1. Use the Stroud Water Research Center Model My Watershed Tool (<https://wikiwatershed.org>) to delineate each watershed; the Wiki tool identifies the land use category breakdown within each watershed.
2. Use the Stroud Water Research Center Wiki Watershed Tool to delineate the PA urbanized areas located in each watershed, within the municipal boundary.
3. Run the Model My Watershed program to obtain total pollutant loads for the PA urbanized areas located in the Conestoga River and UNT to Mill Creek Watersheds .
4. Combine the pollutant loads calculated for each Urbanized Area in the Conestoga River and UNT to Mill Creek Watershed to identify the existing pollutant loads for each watershed.

Using the method described above, Upper Leacock Township has identified the existing pollutant loads for the Conestoga River, and Mill Creek Watersheds as shown in the chart below.

Watershed	Existing Sediment Load (lbs/year)	Existing Phosphorus Load (lbs/year)	Existing Nitrogen Load (lbs/year)
Conestoga River	685,911	2,700	28,389
Mill Creek	311,908	1,398	14,746
Total	997,819	4,098	43,135

Attachments

D1: Watershed and Pollutant Loads Summary (Revised)

D2: Pollutant Load Calculations: Conestoga River

D3: Pollutant Load Calculations: UNT Mill Creek

D4: PA DEP BMP Effectiveness Values

D5: Developed Land Loading Rates for PA Counties

SECTION E - WASTELOAD ALLOCATIONS

The UNT to Mill Creek TMDL was prepared by PA DEP in August 2004 and identifies the wasteload allocations (WLA) attributed to the MS4 area in Part 4, Section C: Waste Load Allocations. This report calculated the MS4 area to consist of 511.40 acres or approximately 26 percent of the watershed area (A complete copy of the TMDL report is provided in Attachment C1). However, based on current GIS mapping, the Township has calculated the MS4 area to consist of 567.40 acres, an increase of 56 acres. The following table identifies three land use classifications within the MS4 area as identified in the 2004 TMDL and the breakdown of land uses calculated for this 2019 TMDL:

Land Use	MS4 Acres (2004 TMDL)	MS4 Acres (2019 TMDL)
Hay/Pasture	61.80	38.09
Cropland	158.10	97.96
Developed	291.50	431.35
Total	511.40	567.40

To calculate the 2019 MS4 area WLA, the 2019 MS4 area acreage for each land use classification was multiplied by the corresponding pollutant loading rate as identified in Table 6, Page 14 of the 2004 TMDL Report. The table below identifies the current and allowable loading rates for phosphorus and sediment and the corresponding pollutant loads for phosphorus and sediment:

Pollutant Source	Acres	Unit Area Loading Rate (lbs/ac/yr)		Pollutant Loading (lbs/yr)	
		Current	Allowable	Current	Allowable (WLA)
Phosphorus					
Hay/Pasture	38.09	0.46	0.3	17.52	11.43
Cropland	97.96	1.18	0.77	115.59	75.43
Developed	431.35	0.17	0.04	73.33	17.25
Total	567.40			206.44	104.11

Sediment					
Hay/Pasture	38.09	195.09	28.3	7,430.98	1,077.95
Cropland	97.96	758.07	346.35	74,260.54	33,928.45
Developed	431.35	148.5	84.93	64,055.48	36,634.56
Total	567.40			145,746.99	71,640.95

SECTION F - ANALYSIS OF TMDL OBJECTIVES

The MS4 designated area within the UNT to Mill Creek has a WLA for sediment of 71,641 lbs/year and a WLA for phosphorus of 104 lbs/year. Based on the existing TMDL plan, to achieve water quality goals, Upper Leacock Township must implement stormwater BMPs that will reduce sediment by 74,106 lbs/year (145,747 lbs/year – 71,641 lbs/year) and will reduce phosphorus by 102 lbs/year (206 lbs/year - 104 lbs/year). This results in a required sediment reduction of 50.8% and phosphorus reduction of 49.6%.

For the Mill Creek and Conestoga River watersheds, Upper Leacock Township wants to use the same process to calculate the existing pollutant loads, and as such, the Township has re-calculated the existing pollutant loads for this TMDL by using the Wiki Watershed Model My Watershed Tool. This continuous simulation model accounts for overland flow as well as downstream channel and bank erosion. Based on this model, the existing pollutant loads and required pollutant reductions are identified as follows:

Pollutant	Existing Pollutant Load (lbs/year)	Required Reduction TMDL	Reduction Required to Achieve TMDL (lbs/year)
Sediment	311,908	50.8%	158,449
Phosphorus	1,398	49.6%	693

Upper Leacock Township plans to achieve these pollutant reductions in the short-term by reducing the existing sediment load by at least 10% and the existing phosphorus load by at least 5% within five years following PA DEP's approval of this PRP/TMDL Plan. This requires reducing the sediment load by 31,191 lbs/year and reducing the phosphorus load by 70 lbs/year.

In the long-term, the Township plans to continue implementing stormwater BMPs to achieve the remaining 127,258 lbs/year sediment reduction and the remaining 623 lbs/year phosphorus reduction. If PA DEPs current minimum pollutant reductions for sediment (10%) and phosphorus (5%) are extended to future MS4 permit terms, the Township will achieve the required sediment reductions over the next four (4) 5-year MS4 permit terms and achieve the required phosphorus reductions over the next nine (9) 5-year MS4 permit terms.

SECTION G - SELECT BMPs TO ACHIEVE THE MINIMUM REQUIRED REDUCTIONS IN POLLUTANT LOADING

Upper Leacock Township has identified the minimum required reductions in pollutant loading for each watershed identified below:

Watershed	Required 10% Sediment Reduction (lbs/year)	Required 5% Phosphorus Reduction (lbs/year)	Required 3% Nitrogen Reduction (lbs/year)
Conestoga River	68,591	135	852
Mill Creek	31,191	70	442
Total	99,782	205	1294

The UNT to Mill Creek includes three distinctive impaired stream segments that form a fork-like pattern before merging upstream of the main stem of the Mill Creek. The headwaters of this stream begin south of Leola, outside of the urbanized area. The existing land use is primarily agriculture, and the Township will work directly with the Mill Creek Preservation Association (MCPA) to identify property owners who are supportive of a streambank restoration project. The MCPA has been very successful in working with the local agriculture community to restore and stabilize significant sections of the Mill Creek, and this project will be a continuation of those efforts.

For the first 5-year permit term, Upper Leacock Township is proposing to implement a single stream restoration project that achieves the combined pollutant reduction requirements for both the Conestoga River and Mill Creek Watersheds. Because the existing pollutant loads have been calculated using the Wiki Watershed Model My Watershed program, which is based on the GWLF-E model, the credit for sediment reductions is 115 lbs per linear foot. The required reductions may be achieved by implementing a 900 linear foot stream restoration project.

Proposed BMP	Watershed	Calculated Sediment Reduction (lbs/year)	Presumed Phosphorus Reduction (lbs/year)	Presumed Nitrogen Reduction (lbs/year)
900 LF Stream Restoration - UNT Mill Creek	UNT Mill Creek	103,500	205*	1,294*
*Upper Leacock Township will rely on PA DEP's presumptive approach which allows if the required sediment reduction is achieved, then the required nutrient reductions are achieved.				

Once the streambank project has been implemented, the total sediment reduction of [103,500 lbs/year](#) will exceed the required sediment reductions of [99,782 lbs/year](#) by [3,718 lbs/year](#). Upper Leacock Township will use the presumptive approach to assumes the nitrogen reduction have been achieved if the sediment reduction has been achieved. Because Upper Leacock Township is located entirely within the Chesapeake Bay Watershed, the calculated reductions shown above will meet the pollutant reduction requirements of the Chesapeake Bay PRP.

Attachment

G1: Urban Stream Restoration Fact Sheet

SECTION H - IDENTIFY FUNDING MECHANISM

Upper Leacock Township plans to consider many sources of funding to implement the proposed stormwater BMP identified in this Plan.

Upper Leacock Township General Fund: The Township may plan to budget sufficient funds each year of the five-year permit term (2018-2023) to fully fund the implementation of all stormwater BMPs to meet the required pollutant reductions.

PENNVEST: The Pennsylvania Infrastructure Investment Authority (PENNVEST) provides funding for urban stormwater and agricultural BMPs.

Growing Greener Grants: Growing Greener provides state funds to address environmental concerns, including the negative effects of stormwater pollution on water quality. These grants vary in availability and total funding dollars.

PA DEP's Urban Stormwater BMP Grants: As part of the Local Stormwater BMP Implementation Program, PA DEP has provided grants to communities located in the Chesapeake Bay Watershed to reduce stormwater runoff to local waterways. These grants vary in availability and total funding dollars.

Collaboration: Upper Leacock Township will continue to look for other funding opportunities to implement stormwater BMPs by collaborating with other environmental organizations including, but not limited to: The Mill Creek Preservation Association, Lancaster County Clean Water Consortium, and the Lancaster County Conservation District.

SECTION I - IDENTIFY RESPONSIBLE PARTIES FOR OPERATION AND MAINTENANCE (O&M) OF BMPs

All the identified stormwater BMPs must be maintained on a regular basis, after fully implemented, to ensure they continue to provide water quality benefits as designed.

Parties Responsible for ongoing O&M: Upper Leacock Township will work with property owners to develop a mutually agreed upon Operation & Maintenance Agreement to ensure that the implemented BMPs function as designed to minimize the sediment and nutrient loading rates to local surface streams.

Activity involved with O&M for each BMP and the frequency at which O&M activities occur:

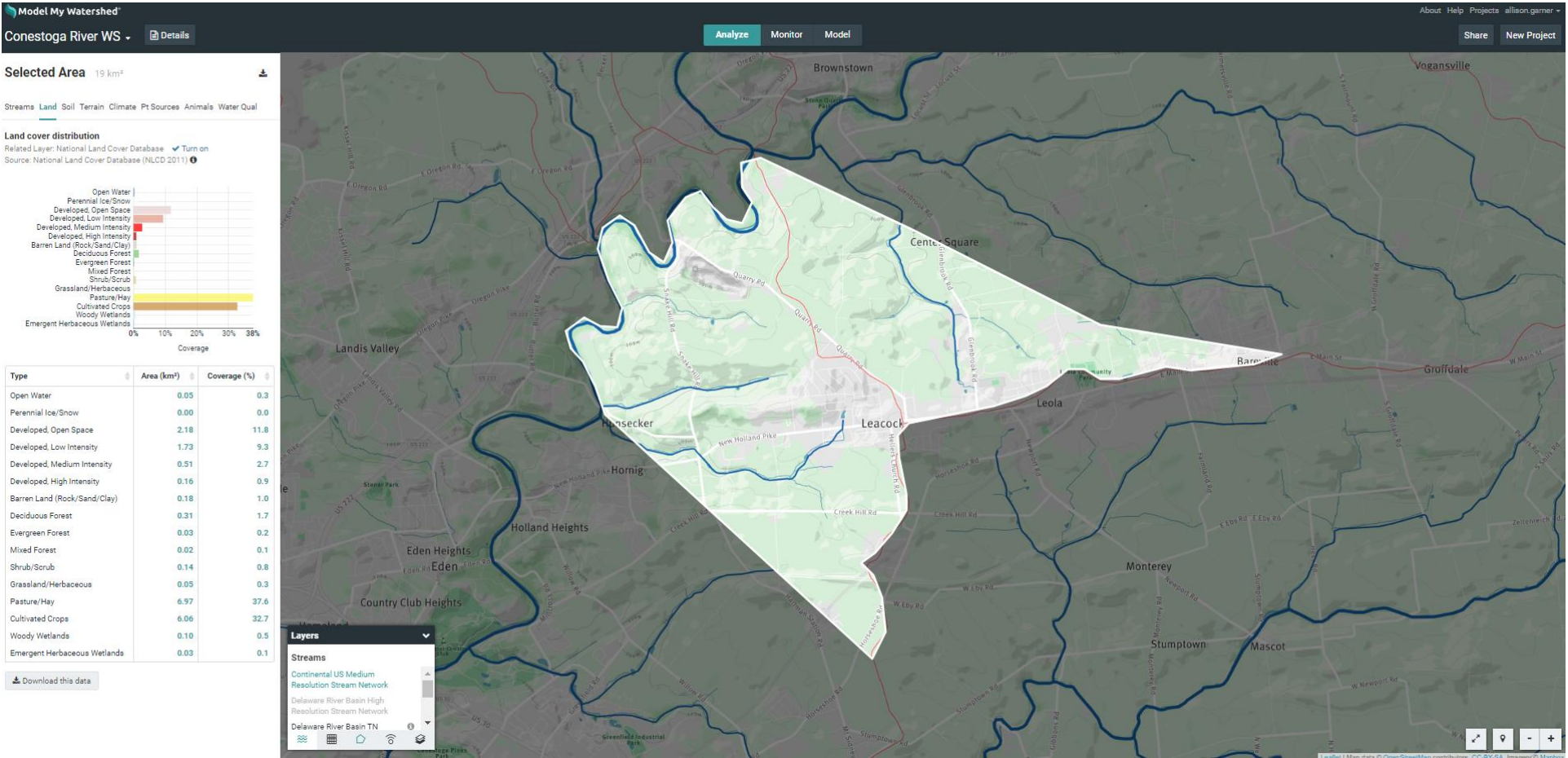
Streambank stabilization: Once the streambanks have been restored and stabilized, regular inspection and maintenance activities will occur as follows:

- Since vegetation establishment is a critical component of the long-term stability of the streambank, monthly inspections should occur for the first year after the project is complete. A minimum 85% plant survival rate should be achieved and documented.
- Weeds and invasive plants threaten the survival of native plants, and should be aggressively controlled by herbicides, mowing, and/or weed mats for the first four years after implementation.
 - Applying herbicides for the first two to three years may be necessary to control weeds. This activity is regulated by the PA Department of Agriculture and proper care should be taken in a streamside setting.
 - Mowing grasses should occur twice each growing season with a mower height set to eight to twelve inches.
 - Weed mats suppress weed growth around newly planted vegetation and should be removed once trees have developed a canopy sufficient to shade out the weeds.
- Once the vegetation has been established, regular maintenance should be minimal.

WATERSHED POLLUTANT LOAD SUMMARY						
Watershed	Baseline Pollutant Loads (lbs/year)			Required Reductions (lbs/year)		
	Sediment	Phosphorus	Nitrogen	Sediment (10%)	Phosphorus (5%)	Nitrogen (3%)
Conestoga River	685,911	2,700	28,389	68,591	135	852
UNT Mill Creek TMDL	311,908	1,398	14,746	31,191	70	442
Total	997,819	4,098	43,135	99,782	205	1,294

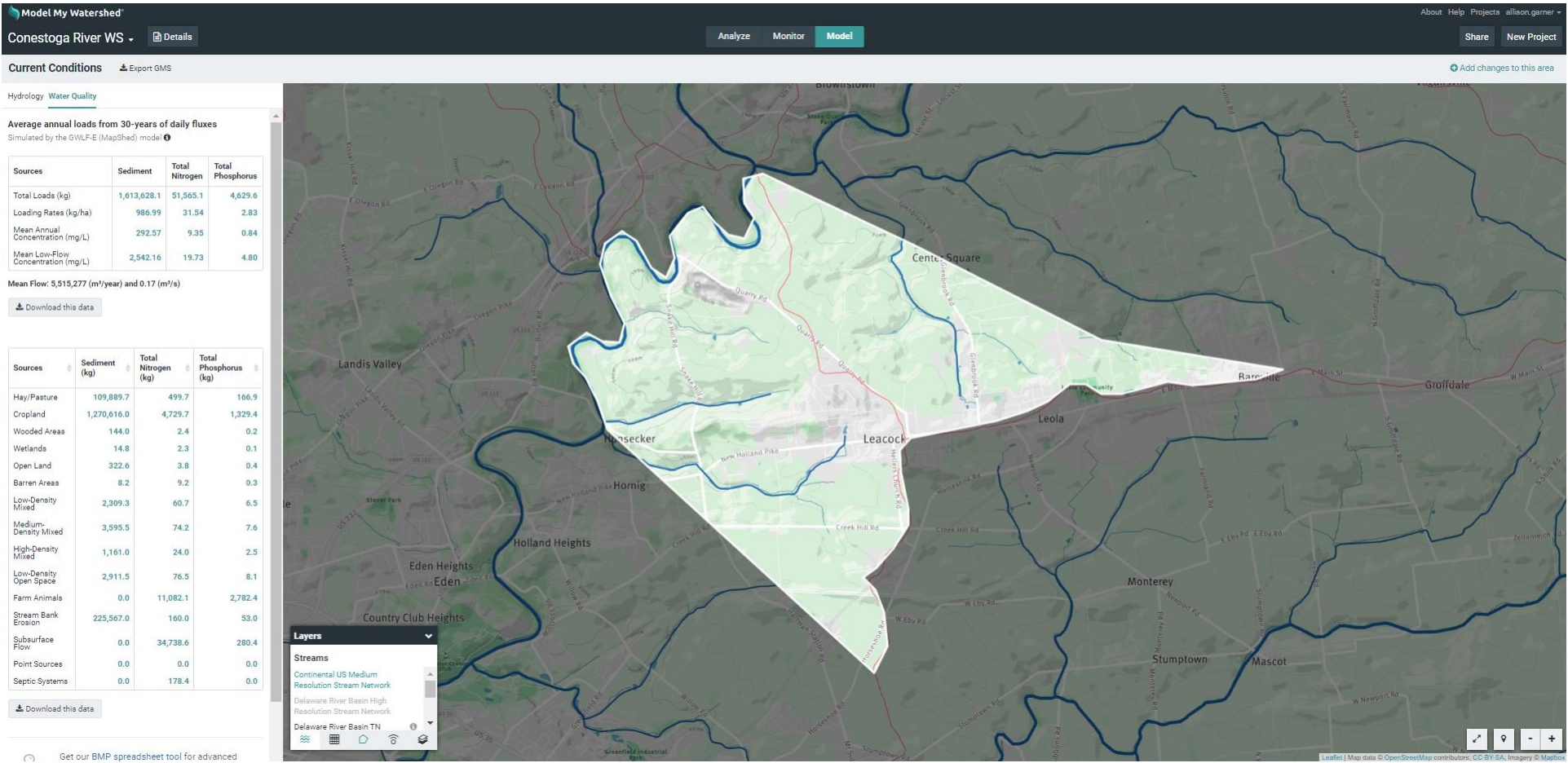
Upper Leacock Township
Pollutant Reduction Plan
July 1, 2019

Conestoga River Watershed - Land Cover Distribution for Upper Leacock Township



Upper Leacock Township
Pollutant Reduction Plan
July 1, 2019

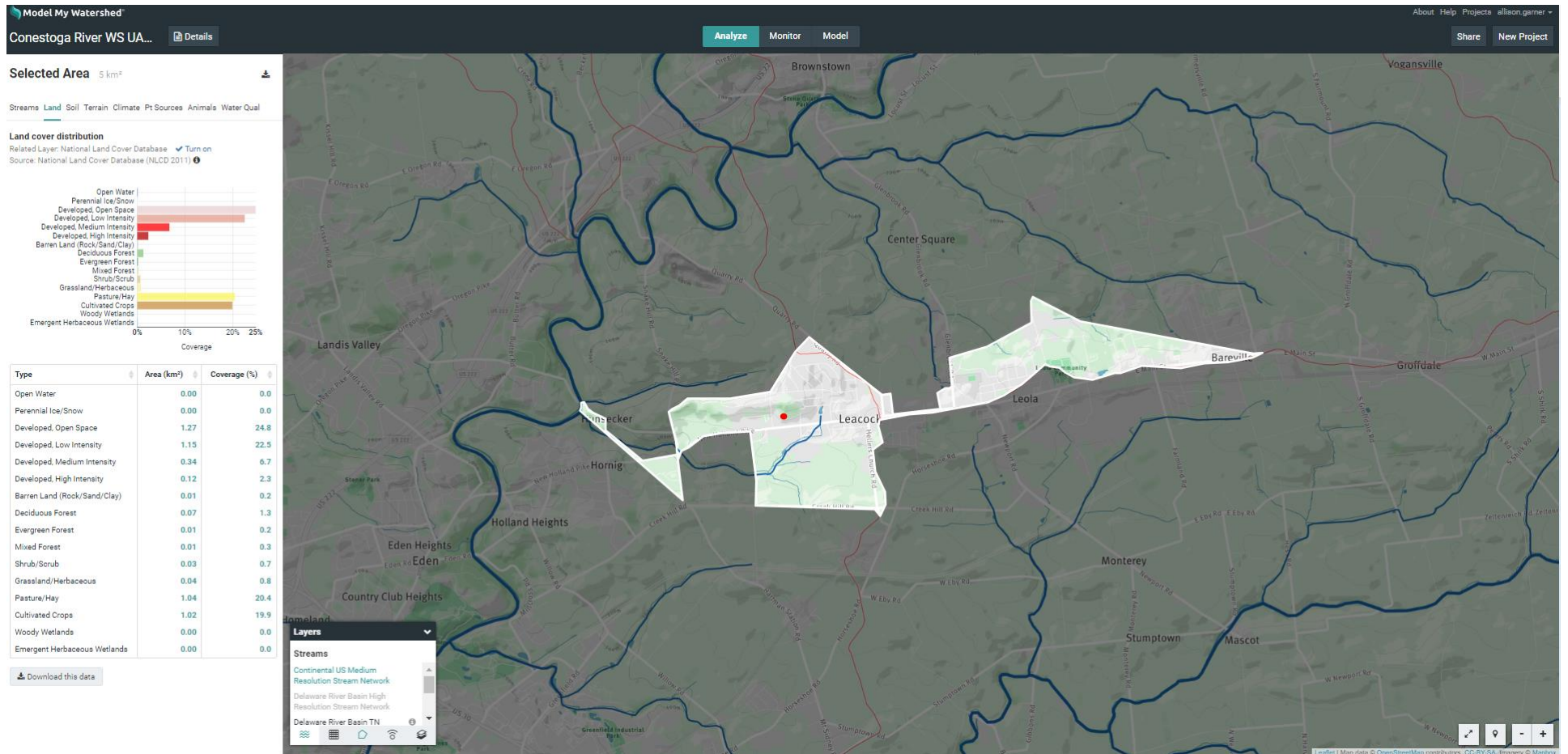
Conestoga River Watershed – Pollutant Loads for Upper Leacock Township



Conestoga River Urbanized Area #1 - Land Use Distribution and Pollutant Loads			
Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	18,236.00	79.8	26.8
Cropland	241,353.10	873.4	250.8
Wooded Areas	38.2	0.6	0.1
Wetlands	0	0	0
Open Land	249.6	2.9	0.3
Barren Areas	1.7	0.4	0
Low-Density Mixed	1,554.60	41.4	4.4
Medium-Density Mixed	2,437.60	50.8	5.2
High-Density Mixed	843.2	17.6	1.8
Low-Density Open Space	1,712.60	45.6	4.8
Farm Animals	0	3,041.70	763.9
Stream Bank Erosion	24,564.00	17	6
Subsurface Flow	0	6,815.40	58.7
Point Sources	0	0	0
Septic Systems	0	121	0
Total Loads (kg)	289,277.90	11,062.00	1,118.10
Convert kilograms to pounds (kg to lbs)	Sediment (lbs)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
	637,857.77	24,391.71	2,465.41
Loading Rates (kg/ha)	751.37	28.73	2.9
Mean Annual Concentration (mg/L)	220.96	8.45	0.85
Mean Low-Flow Concentration (mg/L)	1,557.17	15.81	3.69

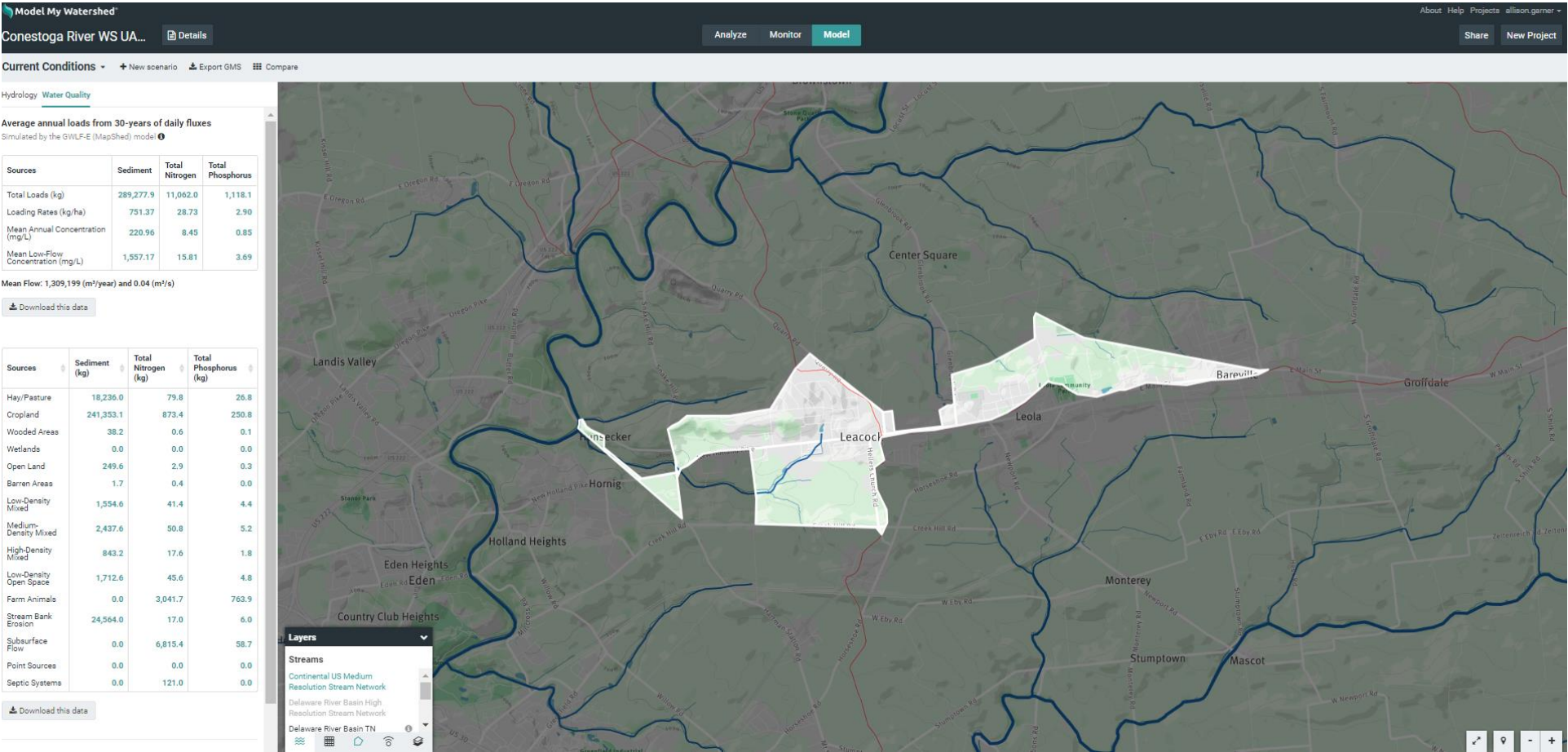
Upper Leacock Township Pollutant Reduction Plan July 1, 2019

Urbanized Area #1 - Conestoga River Watershed - Land Use Distribution



Upper Leacock Township
Pollutant Reduction Plan
July 1, 2019

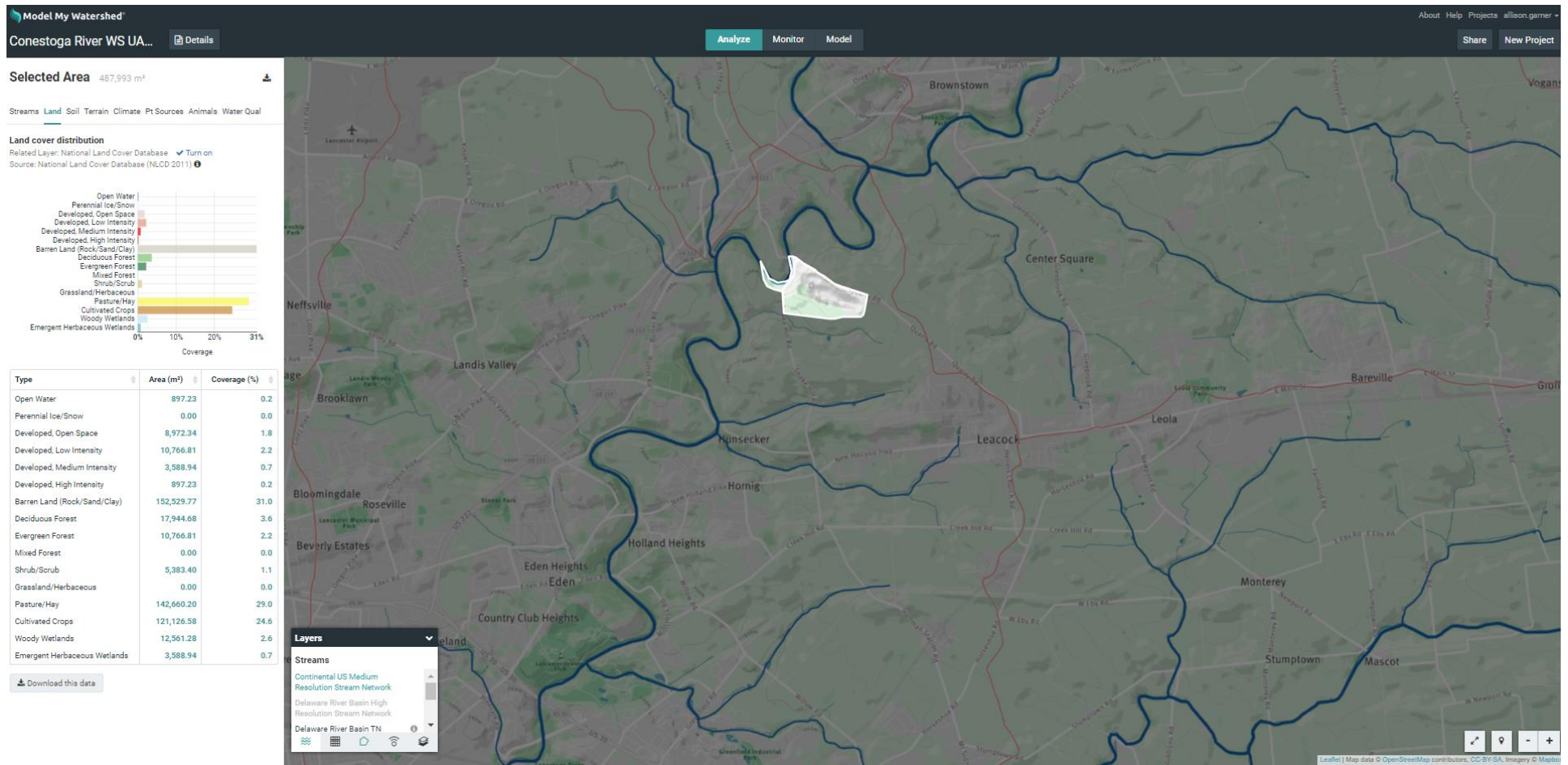
Urbanized Area #1 - Conestoga River Watershed - Pollutant Loads



Conestoga River Urbanized Area #2 - Land Use Distribution and Pollutant Loads			
Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	2,203.80	10	3.3
Cropland	19,062.80	76.2	20.4
Wooded Areas	50.5	0.3	0.1
Wetlands	3.1	0.5	0
Open Land	0	0	0
Barren Areas	26	7.8	0.3
Low-Density Mixed	15.4	0.4	0
Medium-Density Mixed	31.3	0.5	0.1
High-Density Mixed	4.8	0.2	0
Low-Density Open Space	12.6	0.3	0
Farm Animals	0	282.1	70.8
Stream Bank Erosion	395	0	0
Subsurface Flow	0	1,433.20	11.5
Point Sources	0	0	0
Septic Systems	0	1.6	0
Total Loads (kg)	21,792.70	1,812.90	106.5
Convert kilograms to pounds (kg to lbs)	Sediment (lbs)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
	48,052.90	3,997.44	234.83
Loading Rates (kg/ha)	455.91	37.93	2.23
Mean Annual Concentration (mg/L)	89.12	7.41	0.44
Mean Low-Flow Concentration (mg/L)	432.64	9	1.44

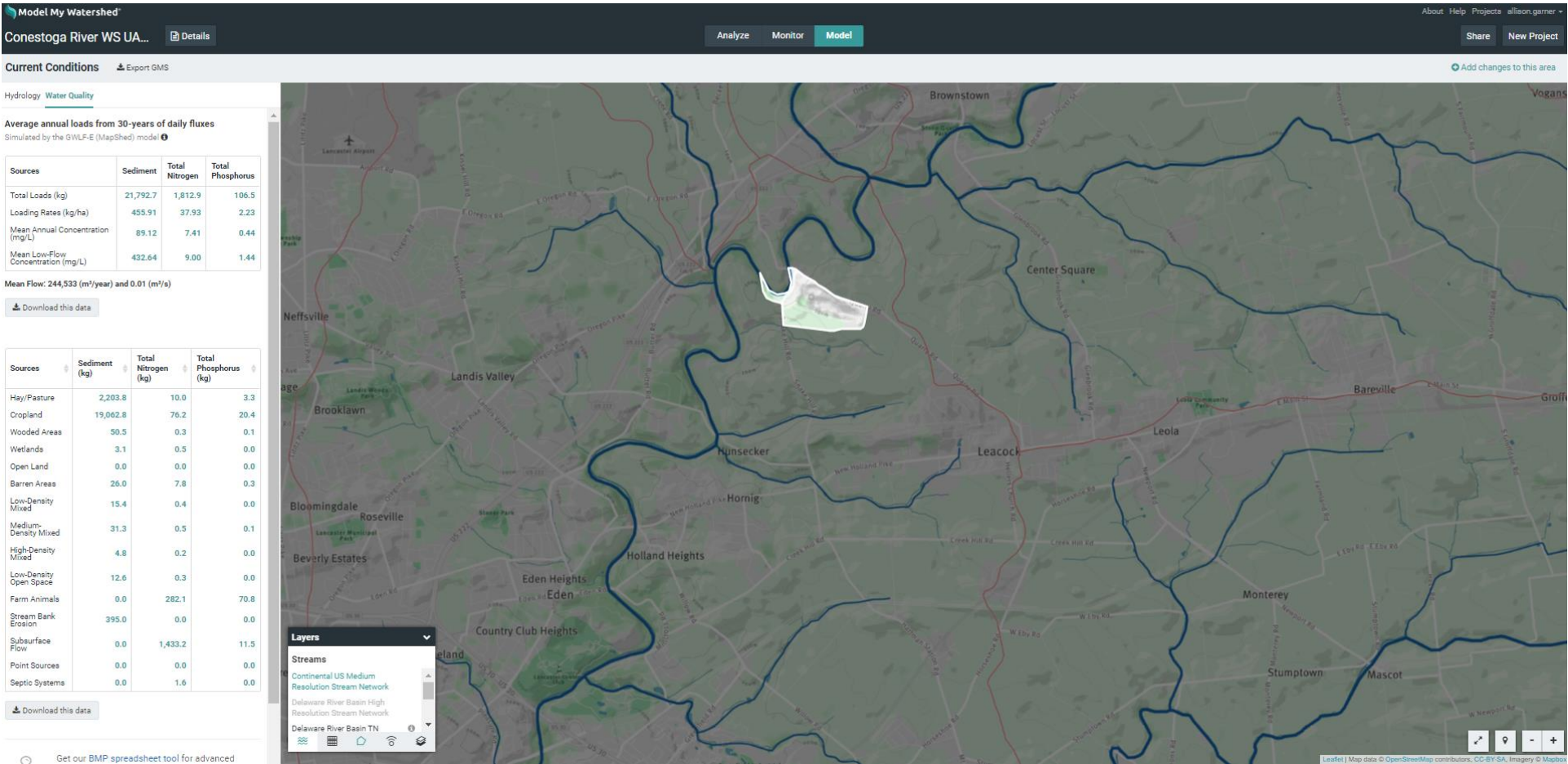
Upper Leacock Township Pollutant Reduction Plan July 1, 2019

Urbanized Area #2 - Conestoga River Watershed - Land Use Distribution



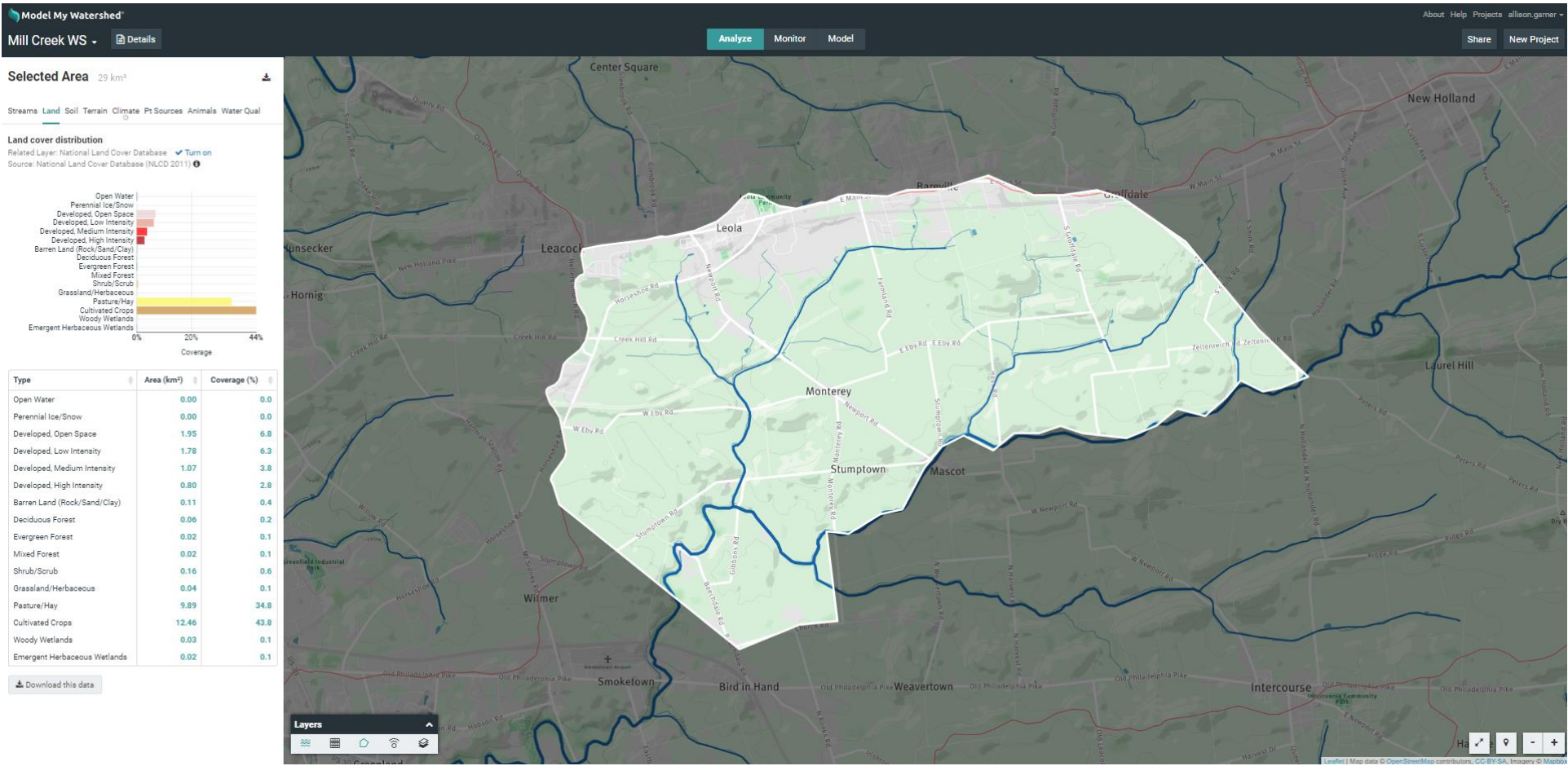
Upper Leacock Township
Pollutant Reduction Plan
July 1, 2019

Urbanized Area #2 - Conestoga River Watershed - Pollutant Loads



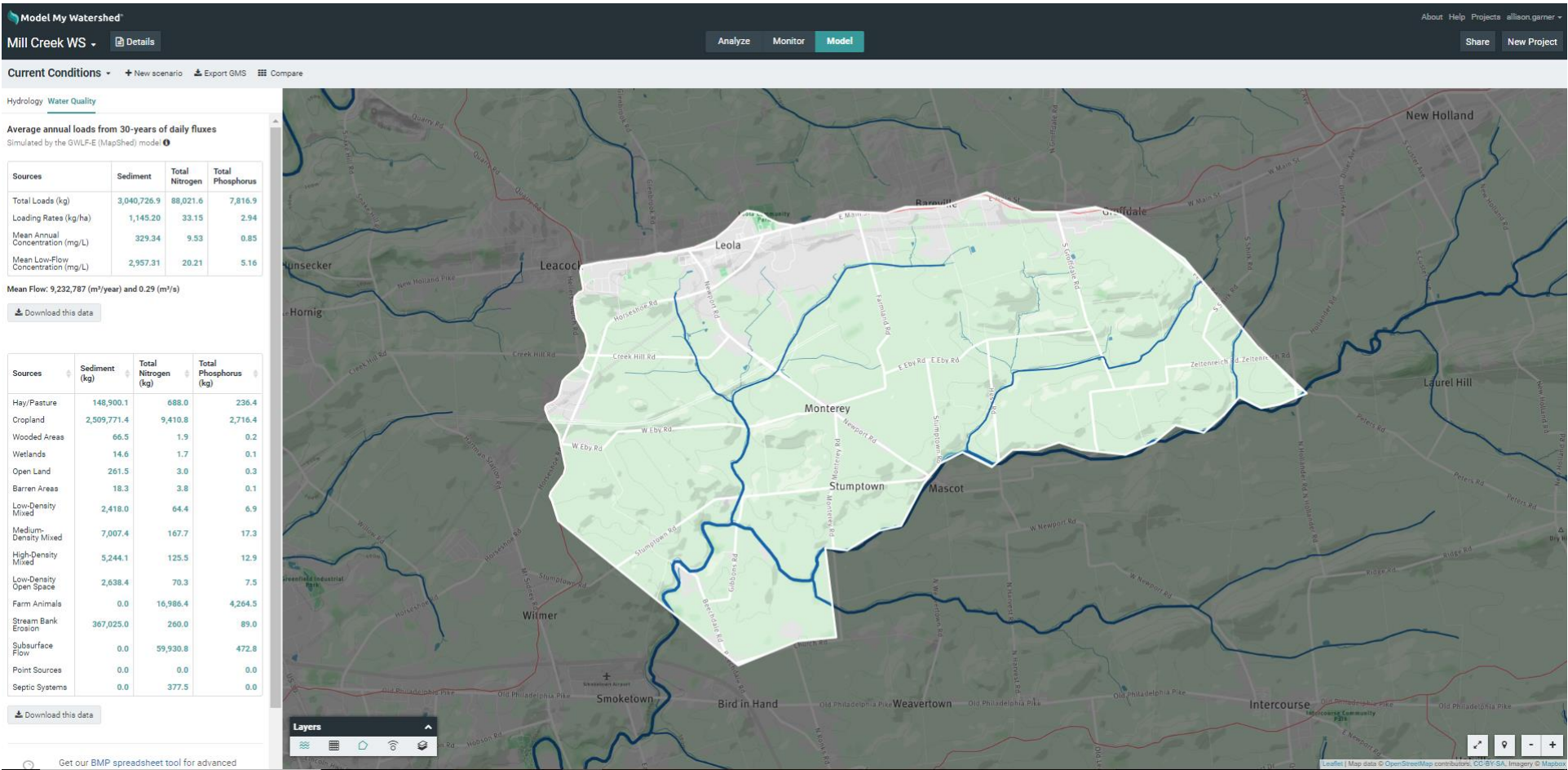
Upper Leacock Township
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Mill Creek Watershed – Land Cover Distribution for Upper Leacock Township



Upper Leacock Township
Pollutant Reduction Plan
July 1, 2019

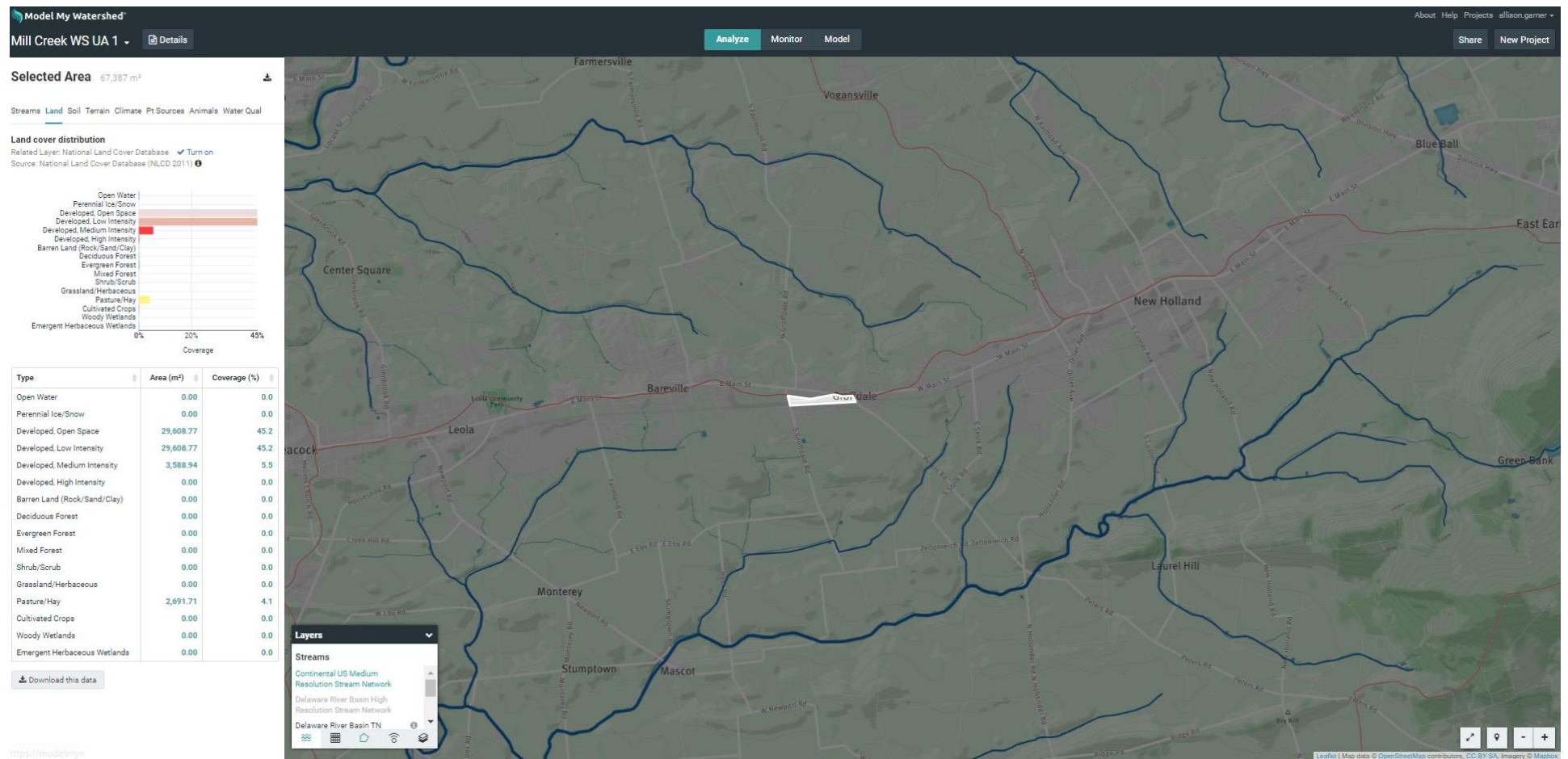
Mill Creek Watershed – Pollutant Loads for Upper Leacock Township



Mill Creek Urbanized Area #1 - Land Use Distribution and Pollutant Loads			
Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	56.3	0.2	0.1
Cropland	0	0	0
Wooded Areas	0	0	0
Wetlands	0	0	0
Open Land	0	0	0
Barren Areas	0	0	0
Low-Density Mixed	41	1.1	0.1
Medium-Density Mixed	31.1	0.5	0.1
High-Density Mixed	0	0	0
Low-Density Open Space	41	1.1	0.1
Farm Animals	0	29.3	7.7
Stream Bank Erosion	21	0	0
Subsurface Flow	0	85.3	0.7
Point Sources	0	0	0
Septic Systems	0	1.6	0
Total Loads (kg)	149.4	118	8.7
Convert kilograms to pounds (kg to lbs)	Sediment (lbs)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
	329.43	260.19	19.18
Loading Rates (kg/ha)	40.39	31.9	2.35
Mean Annual Concentration (mg/L)	12.42	9.81	0.72
Mean Low-Flow Concentration (mg/L)	34.72	11.5	2.25

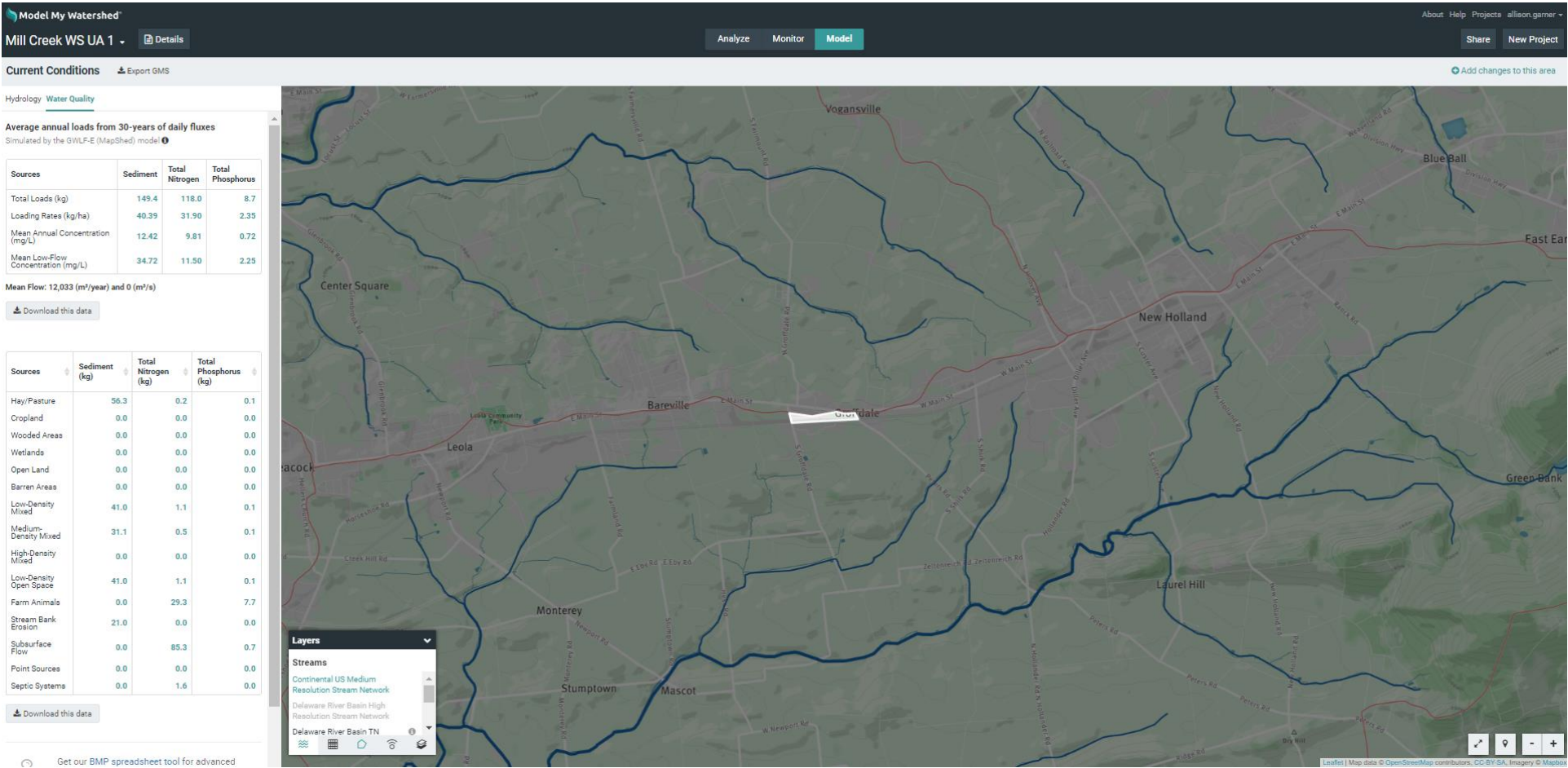
Upper Leacock Township Pollutant Reduction Plan July 1, 2019

Urbanized Area #1 - Mill Creek Watershed – Land Cover Distribution for Upper Leacock Township



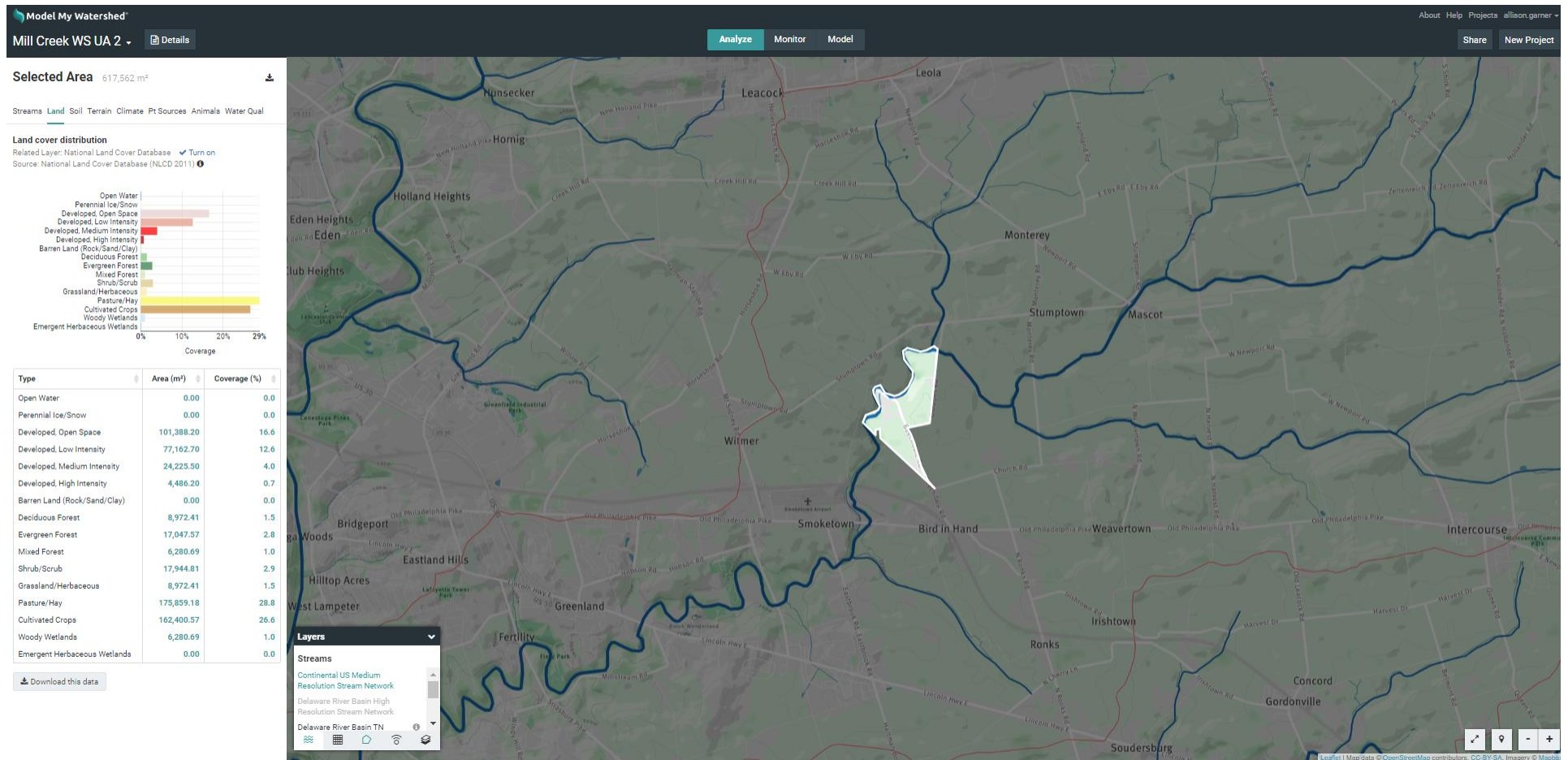
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Urbanized Area #1 - Mill Creek Watershed – Pollutant Loads



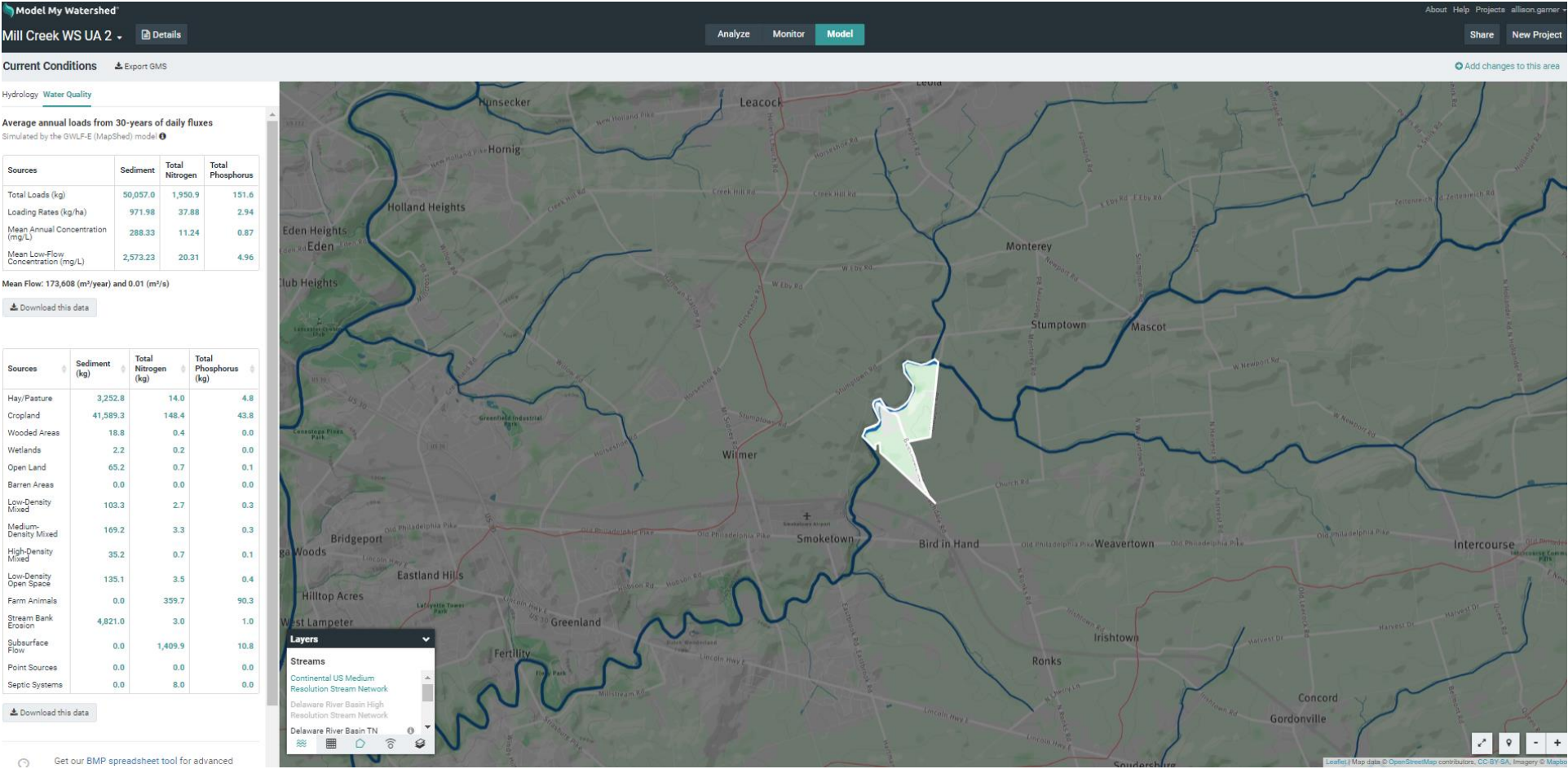
Mill Creek Urbanized Area #2 - Land Use Distribution and Pollutant Loads			
Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	3,252.80	14	4.8
Cropland	41,589.30	148.4	43.8
Wooded Areas	18.8	0.4	0
Wetlands	2.2	0.2	0
Open Land	65.2	0.7	0.1
Barren Areas	0	0	0
Low-Density Mixed	103.3	2.7	0.3
Medium-Density Mixed	169.2	3.3	0.3
High-Density Mixed	35.2	0.7	0.1
Low-Density Open Space	135.1	3.5	0.4
Farm Animals	0	359.7	90.3
Stream Bank Erosion	4821	3	1
Subsurface Flow	0	1,409.90	10.8
Point Sources	0	0	0
Septic Systems	0	8	0
Total Loads (kg)	50,057.00	1,950.90	151.6
Convert kilograms to pounds (kg to lbs)	Sediment (lbs)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
	110,375.69	4,301.73	334.28
Loading Rates (kg/ha)	971.98	37.88	2.94
Mean Annual Concentration (mg/L)	288.33	11.24	0.87
Mean Low-Flow Concentration (mg/L)	2573.23	20.31	4.96

Urbanized Area #2 - Mill Creek Watershed – Land Cover Distribution



Upper Leacock Township
Pollutant Reduction Plan
July 1, 2019

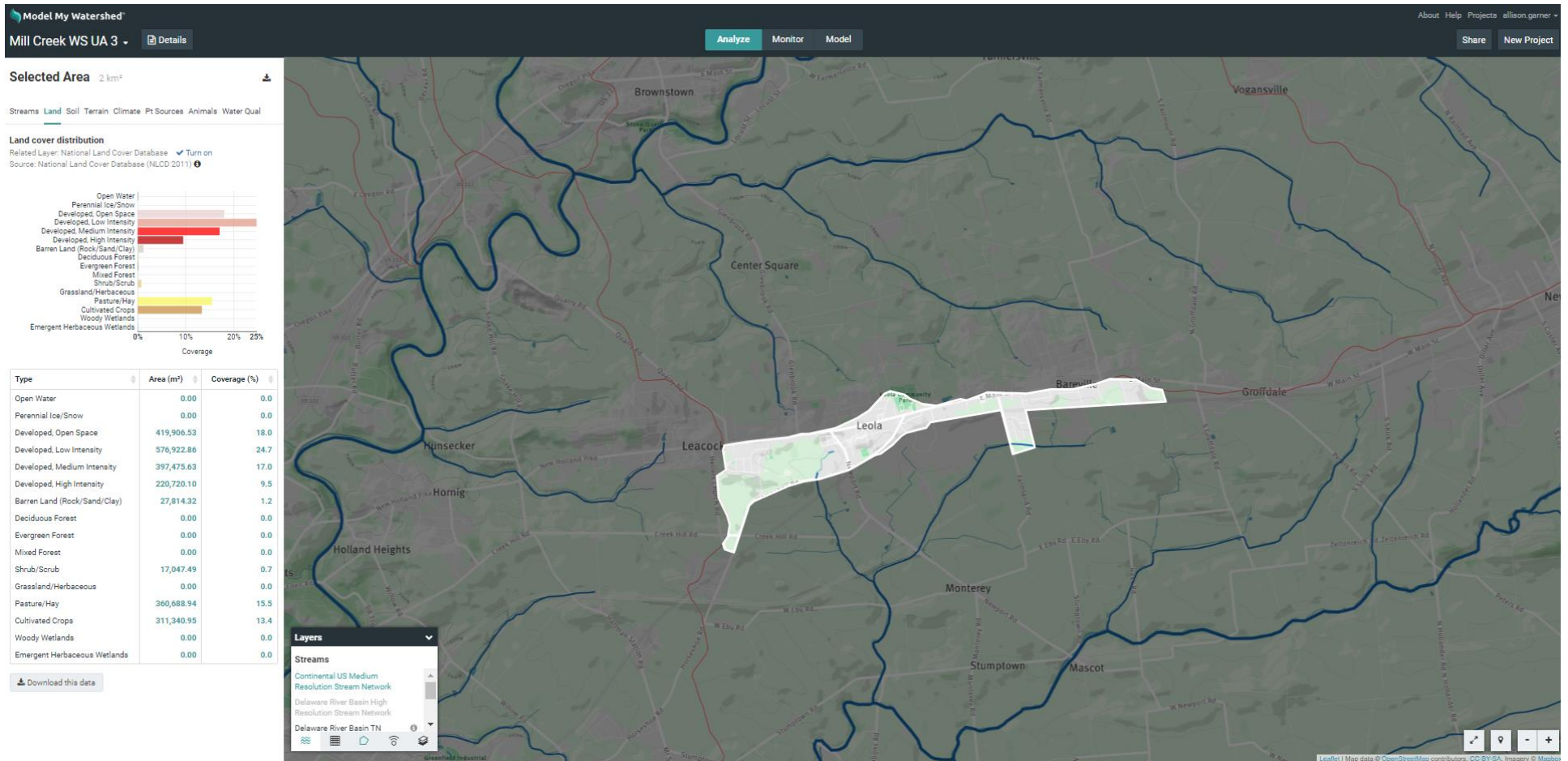
Urbanized Area #2 - Mill Creek Watershed – Pollutant Loads



Mill Creek Urbanized Area #3 - Land Use Distribution and Pollutant Loads			
Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	6,296.70	27.6	9.3
Cropland	74,502.10	269.3	78.1
Wooded Areas	4.3	0.1	0
Wetlands	0	0	0
Open Land	0	0	0
Barren Areas	4.6	0.9	0
Low-Density Mixed	822.3	22.7	2.4
Medium-Density Mixed	2706.5	61.2	6.3
High-Density Mixed	1502.1	33.9	3.5
Low-Density Open Space	598.3	16.6	1.8
Farm Animals	0	1393	349.5
Stream Bank Erosion	5410	4	1
Subsurface Flow	0	2,665.60	23.4
Point Sources	0	0	0
Septic Systems	0	140.2	0
Total Loads (kg)	91,248.60	4,618.50	473.6
Convert kilograms to pounds (kg to lbs)	Sediment (lbs)	Total Nitrogen (lbs)	Total Phosphorus (lbs)
	201,203.16	10,183.79	1,044.29
Loading Rates (kg/ha)	474.51	24.02	2.46
Mean Annual Concentration (mg/L)	130.95	6.63	0.68
Mean Low-Flow Concentration (mg/L)	649.47	10.15	2.12

Upper Leacock Township
Pollutant Reduction Plan
July 1, 2019

Urbanized Area #3 - Mill Creek Watershed – Land Cover Distribution



Upper Leacock Township
Pollutant Reduction Plan
July 1, 2019

Urbanized Area #3 - Mill Creek Watershed – Pollutant Loads

