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The Township of Upper St. Clair

Pollutant Reduction Plan
Lower Chartiers Creek HUC-12 Watershed

Municipal Separate Storm Sewer System

Jennifer J. Slagle; P.E., Project Manager

Latest Revision: July 31, 2017

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Chapter 1. Introduction

1.1 Purpose

Municipalities throughout the country are under a federal mandate requiring a stormwater management program for reducing pollution impacts from stormwater runoff. In 2003, the Township of Upper St. Clair was issued a Municipal Separate Storm Sewer System (MS4) Permit through the Pennsylvania Department of Environmental Protection (PADEP) and the Environmental Protection Agency. The Township is regulated under PADEP's General NPDES Permit (PAG-136270). Implemented through the Clean Water Act, the permit's numerous requirements are through six Minimum Control Measures (MCMs). In addition, PADEP is requiring MS4s that discharge to an impaired stream prepare a Pollutant Reduction Plan (PRP) for sediment, nitrogen, and/or phosphorus. The goal of the PRP is to reduce pollution caused by sediment and/or nutrients in impaired streams.

1.2 Lower Chartiers Creek Watershed Background

Lower Chartiers Creek Watershed is considered the Hydrologic Unit Code (HUC) 12 watershed. Within the Southwestern region of Pennsylvania, these HUC-12 watersheds are tributaries to either the Ohio, Monongahela, Allegheny, or Youghiogheny Rivers. For the Lower Chartiers Creek Watershed its tributary is the Ohio River. On a smaller scale, there are numerous smaller watersheds that are tributaries to Lower Chartiers Creek. These small watersheds include McLaughlin Run, Painters Run, and Graesers Run.

Once every two years, PADEP publishes a report entitled "Pennsylvania Integrated Water Quality Monitoring and Assessment Report" that summarizes the various water quality management programs including water quality standards. The PRP was assigned for each MS4 based on the 2014 report. If a stream was assigned as impaired from siltation, organic enrichment, low dissolved oxygen, or nutrients, a PRP is required. The Lower Chartiers Creek Watershed is impacted by metals, chlordane, PCBs, suspended solids, organic enrichment/low dissolved oxygen, and siltation. Within the Lower Chartiers Creek Watershed, there are several impaired streams that include Chartiers Creek, McLaughlin Run, and Painters Run.

Chapter 2. Outfall Sewersheds & Planning Areas

Before beginning the calculations of the pollutant loads, the outfall sewersheds are delineated and the PRP planning area is identified.

2.1 Delineation Procedures

As part of the PRP process, outfall sewersheds are required to be delineated. An outfall sewershed is an area of land in which stormwater flows into a storm sewer system and is discharged into a stream, lake, or waterway. Accurate outfall sewersheds were drawn based on topography (2006), aerial (2013), and stream layers in ESRI ArcMap. By following these layers and the storm sewer network, all outfalls were assigned a sewershed. Aside from being a requirement of the PRP, delineation of the outfall sewersheds is useful if any parsing is implemented.

2.2 Planning Area

The planning area is defined as the area used to calculate existing loads and plan load reductions. PADEP offered several options for how to define the planning area for each impaired water. The options vary from using a combination of the storm sewersheds to using watershed boundaries. The Township of Upper St. Clair plans to utilize the HUC-12 watershed boundary as its planning area with some additional parsing that is described in the next section.

2.3 Parsing

Once the preliminary planning area was defined; additional parsing within the area was performed to remove areas that either do not drain to the MS4's system or are land that is already covered by an NPDES permit for the control of stormwater. Parsing reduces the MS4's area of responsibility and therefore the pollutant loads. The Township of Upper St. Clair parsed out PennDOT owned roads that are within in the Township. Appendix A illustrates the final planning area for the MS4 by displaying the HUC-12 and small watershed boundaries, as well as the parsed-out areas.

Chapter 3. Existing Loading without BMPs

PADEP provides several suggested methods that are scientifically-supported for estimating the existing loads. The approved methods for calculating the loads include PADEP Simplified Method land use loading rates, MapShed, or other watershed models that reflect both overland flow and in-stream erosion components. For the purpose of this PRP, MapShed was chosen as the most appropriate method. The loads generated within this PRP were calculated in July 2017.

3.1 MapShed Modeling Overview

MapShed is a free and publicly available software developed by Pennsylvania State University that derives the loading rates from mathematical simulation of pollutant generation and hydrologic processes. The software takes into account hydrology, land cover, soils, weather, topography, and other environmental data to calculate sediment and nutrient loads. MapShed utilizes well known soil and hydrologic equations to model surface runoff and soil erosion.

For modeling surface runoff and streamflow, MapShed uses the National Resources Conservation Service Curve Number (NRCS-CN) combined with daily precipitation and temperature data. Evapotranspiration is calculated using the daily weather data and a land cover dependent factor. To model monthly erosion and sediment loss, the Universal Soil Loss Equation is applied. Nitrogen, phosphorus, and total suspended solids are modeled for each type of land cover using export coefficients for both the dissolved and solid phases. Overall, the software uses geographic data, land use runoff coefficients, daily weather, and the universal soil loss equations to calculate pollutant loads in terms of mass and concentration.

3.2 MapShed Modeling Methodology

In order for MapShed to perform these hydrologic calculations, initial data is needed beforehand. There are six required input sources and up to eleven optional sources in MapShed. The required data includes basins, weather stations, streams, soils, land use/cover, and surface elevation. The optional layers, which were included as part of this PRP, consist of urban areas, soil-phosphorus, physiographic provinces, and counties. Each data source is described below in more detail.

3.2.1 Basin Layer

The Basins layer in MapShed serves as the area modeled for the pollutant loads. The small watershed boundaries were used for this layer. The small watershed boundaries were obtained from Pennsylvania Spatial Data Access (PASDA) and are defined as catchment areas for named and unnamed streams. Utilizing the small watershed boundaries as the basin layer adequately accounts for downstream channel impacts.

3.2.2 Urban Area Layer

The Urban Area layer is considered optional in MapShed; however, it is required for the PRP to properly allocate the loads in which the MS4 is responsible. MapShed's urban area data that is available is considered the 2010 Urbanized Areas boundaries which are based on the U.S. Census Bureau's database. The Urban Area layer simulated loads that are area weighted for each based upon their land use/cover percent distribution within the basin. The urbanized area boundary was altered slightly depending on the amount of parsing incorporated into the PRP planning area.

3.2.3 Weather Stations Layer

With MapShed, weather data for the Generalized Watershed Loading Functions-Enhanced (GWLF-E) input file are automatically prepared using daily climate data contained in "csv-formatted" Excel files. These Excel files are connected to a weather station shapefile through the use of a unique station ID number. A statewide weather database contains temperature and precipitation from 78 weather stations around the state between 1975 and 1998.

3.2.4 Streams Layer

In order to better estimate erosion, a streams layer is required within the model. The stream segments are derived from the National Hydrography Datasets at a 1:24,000 scale or better. The length of a stream within a basin affects many things such as streambank erosion.

3.2.5 Soils Layer

The soils layer holds information pertaining to various soil properties such as the available water-holding capacity, soil erodibility factor and the dominant hydrologic soil group. These properties are crucial when calculating the loads generated within a basin. Within the Lower Chartiers Creek Watershed, the Township of Upper St. Clair has soils mostly comprised of Group C.

3.2.6 Land Use Layer

The Land Use layer is one of the most critical layers used by MapShed since pollutant loads generated within a watershed are largely influenced by land surface conditions. These surface conditions are correlated to runoff, surface erosion, and infiltration, which are directly associated with vegetative cover. MapShed's land use data is obtained from the 2011 National Land Cover Database. There are 16 land use classes that each generate different loading rates.

3.2.7 Surface Elevation Layer

This particular grid layer is used to calculate land slope-related data for use within the model. The 30-meter digital elevation model used is considered a higher resolution grid cell data.

3.2.8 County Boundaries Layer

Having the boundary for each Pennsylvania county loaded into Mapshed will represent geographically estimates of the cropping management and erosion control practice factors for hay/pasture, row crops, and wooded land covers.

3.2.9 Physiographic Province Layer

The physiographic province layer covers geographically and seasonally based estimates for the groundwater recession rate and erosivity coefficient values. The Township of Upper St. Clair is located within the Appalachian Plateaus Province, which has a groundwater recession rate of 0.1, a cool rain factor of 0.08, and a warm rain factor of 0.26.

3.2.10 Soil Phosphorus Layer

The soil phosphorus layer is used to estimate the phosphorus concentrations in sediment transported to nearby streams. For the purpose of the PRP, the layer is depicted as Soil Test P. The Soil Test P is an estimate of available soil phosphorus that was measured by standard lab tests.

3.3 MapShed Modeling Results

Each small watershed was analyzed separately in MapShed and the results can be found in Appendix B. The results from MapShed for the existing loads without BMPs are captured as screenshots of the Urban Area Viewer.

3.3.1 McLaughlin Run 7335 Small Watershed Results

The McLaughlin Run 7335 Watershed is about 3485 acres in size, with only 2437.4 of those total acres being located within the Township of Upper St. Clair. However, after parsing, the total watershed area within the MS4 boundary is 2414 acres. Table 3-1 identifies the amount of sediment and phosphorus pollution from land cover and stream bank erosion. The McLaughlin Run 7335 Watershed is mostly comprised of medium density residential, contributing a total of 57,022.2 lbs of sediment and 132.3 lbs of phosphorus.

Table 3-1: Existing Pollutant Load Results without BMPs

SOURCE	SEDIMENT (lbs/yr)	PHOSPHORUS (lbs/yr)
Land Cover	158,519.49	195.6
Stream Bank	828,013.01	51.5
Total	**986,532.5**	**247.1**

3.3.2 Painters Run 7264 Small Watershed Results

The Painters Run 7264 Watershed is about 2837 acres in size, with only 743.2 of those total acres being located within the Township of Upper St. Clair. However, after parsing, the total watershed area within the MS4 boundary is 732 acres. Table 3-2 shows the amount of sediment and phosphorus pollution from land cover and stream bank erosion. The Painters Run 7264 Watershed is mostly comprised of medium density residential contributing a total of 17,289 lbs of sediment and 40.70 lbs of phosphorus.

Table 3-2: Existing Pollutant Load Results without BMPs

SOURCE	SEDIMENT (lbs/yr)	PHOSPHORUS (lbs/yr)
Land Cover	53,341.06	64.6
Stream Bank	260,523.54	15.1
Total	**313,864.6**	**79.7**

3.3.3 Graesers Run 7407 Small Watershed Results

The Graesers Run 7407 Watershed is about 989 acres in size, with only 93.9 of those total acres being located within the Township of Upper St. Clair. However, after parsing, the total watershed area within the MS4 boundary is 93 acres. Table 3-3 shows the amount of sediment and phosphorus pollution from land cover and stream bank erosion. The Graesers Run 7407 Watershed is mostly comprised of low density residential contributing a total of 529.2 lbs of sediment and 1.60 lbs of phosphorus.

Table 3-3: Existing Pollutant Load Results without BMPs

SOURCE	SEDIMENT (lbs/yr)	PHOSPHORUS (lbs/yr)
Land Cover	3,322.18	3.6
Stream Bank	10,871.72	0.6
Total	**14,193.90**	**4.2**

3.3.4 Lower Chartiers Creek HUC-12 Watershed Results

The PRP comprised in this report is focused on load reductions on a HUC-12 watershed basis. The small watersheds analyzed are part of the HUC-12 watershed and are thus collectively summed together to obtain the existing load within the Township of Upper St. Clair. Table 3-4 shows the amount of sediment and phosphorus pollution from land cover and stream bank erosion.

Table 3-4: HUC-12 Existing Pollutant Load Results without BMPs

SOURCE	SEDIMENT (lbs/yr)	PHOSPHORUS (lbs/yr)
Land Cover	215,182.73	263.8
Stream Bank	1,099,408.27	67.2
Total	**1,314,591.00**	**331.0**

Chapter 4. Existing Structural BMPs

The existing loads calculated in Chapter 3 do not account for any reductions of existing stormwater BMPs. PADEP is allowing communities to reduce their existing load by taking credit for only Chapter 102 permitted stormwater BMPs. The locations of the existing permitted BMPs are located on the Planning Area Map in Appendix A.

4.1 BMP Performance Calculation Overview

PADEP provides several suggested methods that are scientifically-supported for estimating the pollution reduction potential of BMPs. These methods include the Expert Panel New Development Performance Standards Report and DEP's BMP Effectiveness Values Table. The method chosen for this report is the DEP's BMP Effectiveness Values Table.

For calculating the pollutant loads generated within the BMP's drainage area, the more detailed approach of analyzing the existing BMPs individually in MapShed was used. The approach is taken by using MapShed to analyze the land cover within a BMP's drainage area using its Land Cover Distribution Tool. If the BMP's drainage area overlaps with a parsed area, before the land cover is analyzed in MapShed, these parsed areas within each drainage area are clipped out in order to prevent load analysis on the parsed areas. Once the amount of land cover in the drainage area is computed, the values will be entered into the applicable spreadsheet depending on which small watershed the BMP is located in. Each small watershed produces its own specific loading rate (lbs/acre) for each land cover for sediment and phosphorus. These loading rates are applied to the BMP's drainage area land cover and the existing load for each is calculated. The streambank component of MapShed does not produce a loading rate as it is primarily generated based on the amount of developed land in the watershed. Since this is the case, a simplified approach of calculating the amount of streambank erosion in a BMP's drainage area is taken. This simplified approach involves determining the fraction of the drainage area's developed land (i.e. residential and mixed) within the watershed. This percentage is then applied to the watershed's total streambank erosion load for sediment and phosphorus through multiplication. The spreadsheet that determines the amount of existing load for each BMP's drainage area is located in Appendix C. Appendix D is an overall table detailing the existing loads, the percent removals, and the load reductions of each existing BMP.

4.2 Existing Loadings from Stormwater BMPs

For the Lower Chartiers Creek Watershed, 6 existing permitted BMPs were utilized to reduce the existing load. All permitted BMPs that were used as credit to reduce the existing loading estimates continue to function as they were originally designed. The BMPs will be frequently inspected by the Township's Engineer or the property owner to ensure appropriate operation and maintenance is being implemented. Each BMP has its own operation and maintenance plan that closely follows the applicable structural BMP located in the PADEP Stormwater BMP Manual. Information on the type of BMP, permit number, geographic location, and the installation date can be found in Appendix D-2.

4.3 Final Existing Loading and Required Reductions

After incorporating all the permitted existing BMPs, the final existing load for sediment and phosphorus within the PRP planning area was determined and is illustrated in Table 4-1. The required reduction is based on a 10% reduction for sediment and 5% for phosphorus. The MS4 plans to take a presumption approach that a 10% reduction of sediment will also accomplish a 5% phosphorus reduction.

Table 4-1 Final Existing Loads and Required Reductions

POLLUTANT	FINAL EXISTING LOAD (lbs/yr)	REQUIRED REDUCTION (lbs/yr)
Sediment	1,294,564.75	129,456.75
Phosphorus	329.37	16.47

Chapter 5. Achieving Load Reductions

Based on the PRP requirements, the final existing load calculated in Chapter 4 needs to be reduced by implementing proposed structural and non-structural BMPs. PADEP has required that the MS4 present how they will plan to reduce the required pollution reduction. However, their proposed structural BMPs must be developed to the point that they can be located on a map and estimate their specific load reductions. The MS4 may briefly describe other BMPs that cannot yet be located as a possibility, but may not count them as planned load reductions. As a result, these BMPs are only proposed at a planning level. Once additional analysis based on engineering design and cost feasibility is performed, the BMPs may be altered or eliminated. PADEP has indicated that the MS4's can update their PRPs between March 2018 and March 2023 to account for these changes in proposed BMPs.

One such opportunity that the Township of Upper St. Clair cannot account for in this September 2017 submission is taking credit for its stricter stormwater management ordinance. The Township of Upper St. Clair's stormwater ordinance goes above and beyond the Chapter 102 NPDES permit requirements for stormwater associated with construction activities. As a result, the MS4 can take credit for those pollution reductions that will occur from exceeding PADEP regulatory requirements.

The Township of Upper St. Clair may also update this plan in the future based on opportunities with various conservation and environmental groups. These types of organizations are dedicated to reducing pollution through outreach and small BMP installation to accomplish their goals. The Township recognizes these opportunities and will continue to promote outreach to such organizations.

The Township of Upper St. Clair encompasses two HUC-12 watershed boundaries; Lower Chartiers Creek and Middle Chartiers Creek that share the same impairments. The Township intends to coordinate with PADEP on combining the two watersheds into one PRP planning area. Combining the two separate PRPs will allow for flexibility in choosing the best project locations to reduce the amount of sediment and phosphorus pollution in Chartiers Creek.

At the time of this submission, the Township of Upper St. Clair is proposing structural BMPs that include new retrofit BMPs and stream restoration throughout the PRP planning area. Appendix E entails maps of the proposed BMP locations and associated drainage areas. There are various methods used to determine the removal rates of each type of BMP. These approved methods are discussed in further detail below.

The Township of Upper St. Clair is planning to propose load reductions through existing BMP retrofits. There are three types of retrofits that can be performed; enhancement, restoration or conversion. The type of retrofit being done to the BMP determines if a full or an incremental percent removal is utilized. BMP enhancement utilizes the original stormwater treatment

mechanism but improves removal by increasing storage volume or hydraulic residence time. Enhanced BMPs will utilize an incremental removal rate. BMP conversions involve retrofit of older existing stormwater ponds, such as converting a dry pond into a constructed wetland or a wet pond. Restoration of a BMP applies to major maintenance upgrades to BMPs which have either failed or lost their original stormwater treatment capacity. Typical major maintenance items include dredging ponds, replanting all vegetation, replacing contaminated soil, or complete rehabilitation. For restoration of existing BMPs, the full percent removal can be credited for the PRP. These approved methods for calculating the reductions are the PADEP BMP Effectiveness Values Table and the Expert Panel Removal Rates for Urban Stormwater Retrofit Projects. The Township of Upper St. Clair plans to calculate the efficiency of the existing BMP retrofits through the PADEP'S BMP Effectiveness Values Table.

For calculating the pollutant loads generated within the BMP's drainage area, the same method that was used in Chapter 4 of the report was utilized. Appendix F is the existing load calculation spreadsheets for existing BMP retrofit projects. Appendix G is an overall table detailing the existing loads, the percent removals, and the load reductions of each proposed BMP.

Though stream restoration projects are classified as structural BMPs, the method used to calculate their reduction efficiency is slightly different then the previously discussed methods. For simplicity purposes, a default effectiveness rate of 115 lb/ft/yr for sediment load will be used for each proposed stream restoration project. To obtain the phosphorus loading rate, a default value of 1.05 pounds of phosphorus per ton of sediment is used.

5.1 Structural BMPs

Dominion Wet Pond (PR7264-01P)

- *Location*: N40° 21' 09.4032", W80° 05' 04.5737"
- *Description*: The Township's existing detention basin will be converted to a wet pond retrofit. The treated drainage area is 69.19 acres and includes primarily medium density residential.
- *Estimated Reductions:* The potential project can reduce 19,076.86 lbs/year of sediment and 3.68 lbs/year of phosphorus from McLaughlin Run 7335.
- *Operation & Maintenance*: Operation and maintenance of the stormwater facility will be performed by the Township of Upper St. Clair in accordance with the PA Stormwater BMP Manual for the applicable type of BMP.
- *Funding*: Township's Capital Budget, grant opportunities, and other watershed based funding opportunities.

Tara Estates Wet Pond (PR7264-01P)

- *Location*: N40° 21' 38.7016", W80° 04' 26.2979"
- *Description*: The Township's existing detention pond will be converted to the wet pond retrofit. The treated drainage area is 3.79 acres and includes primarily medium density residential.
- *Estimated Reductions:* The potential project can reduce 1,043.02 lbs/year of sediment and 0.21 lbs/year of phosphorus from Painters Run 7264.
- *Operation & Maintenance*: Operation and maintenance of the stormwater facility will be performed by the Township of Upper St. Clair in accordance with the PA Stormwater BMP Manual for the applicable type of BMP.
- *Funding*: Township's Capital Budget, grant opportunities, and other watershed based funding opportunities.

Painters Run Stream Restoration (PR7264-02P)

- *Location*: Start: N40° 21' 13.9255", W80° 03' 35.5844"
  End: N40° 21' 23.5139", W80° 03' 37.4760"
- *Description*: Approximately 1,000 LF of Tributary 36809 to Painters Run may be rehabilitated. The actual start and end of the stream segment may be changed depending on the condition of the stream banks during field analysis. Streams that have highly eroded banks will be given priority for streambank restoration.
- *Estimated Reductions:* The potential project can reduce 115,000 lbs/year of sediment and 60.38 lbs/year of phosphorus.
- *Operation & Maintenance*: Operation and maintenance of the restored stream may be performed by the Township of Upper St. Clair in accordance with the approved permit.
- *Funding*: Township's Capital Budget, EPA Growing Greener Grant, and other watershed based funding opportunities.

5.2 Summary of Proposed BMPs

After incorporating all the proposed BMPs, the existing and final pollutant loads for sediment and phosphorus within the PRP planning area were determined and are illustrated in Table 5-1. The MS4 has achieved its load reduction requirement for the HUC-12 watershed through the implementation of proposed BMPs.

Table 5-1: Expected Load Reductions from Proposed BMPs

POLLUTANT	EXISTING LOAD (lbs/yr)	REQUIRED REDUCTION (lbs/yr)	PROPOSED REDUCTION (lbs/yr)	FINAL LOAD w/ BMPS (lbs/yr)
Sediment	1,294,564.75	129,456.75	135,119.88	**1,159,444.87**
Phosphorus	329.37	16.47	64.27	**265.1**

Chapter 6. PRP 5 Year Plan

The Township of Upper St. Clair proposes the following plan to comply with the proposed NPDES permit to be issued by the DEP for the MS4 program.

6.1 Year 1 Plan Overview

- Develop specific BMP technology concepts for each delineated Proposed BMP drainage area
- Determine segments of stream restoration based on property ownership, ease of access, damage mitigation, exposed pipeline locations, stream banks conditions, etc.

6.2 Year 2 Plan Overview

- Feasibility study for each of the proposed BMPs based on property ownership, ease of access, slope, soils, utilities, permitting, cost, etc.
- Engineering analysis and preliminary design development for stream restoration projects

6.3 Year 3 Plan Overview

- If feasible, begin engineering analysis and preliminary design development of the proposed BMP concepts.
- Begin permitting and design of stream restoration projects

6.4 Year 4 Plan Overview

- Develop final design and bid documents for implementation of design BMP projects
- Complete permitting and design and bid stream restoration projects

6.5 Year 5 Plan Overview

- Construction oversite and completion of proposed BMPs.
- Construction, oversite and completion of stream restoration projects.

Appendix A – Planning Area Map

BEDNER FARMS POND 1 (PR7264-01)

BEDNER FARMS POND 2 (PR7264-02)

FOX CHASE 4 (MR7335-03)

FT. COUCH SCHOOL (PR7264-03)

SIENNA (MR7335-01)

SUNRISE ASSISTED LIVING (MR7335-02)

CHARTIERS CREEK

PAINTERS RUN

MCLAUGHLIN RUN

GRAESERS RUN

BRUSH RUN

PINEY FORK

Lower Chartiers Creek

Middle Chartiers Creek

Piney Fork-Peters Creek

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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Job No: C-85374-2017
Date July 24, 2017

Scale
0 350 700 1,400 Feet
1 inch = 700 feet

Township of Upper St. Clair

Lower Chartiers Creek Planning Area Map

- Storm Sewer Discharge Point
- Storm Sewer Inlet
- Storm Sewer Manhole
- Storm Sewer Junction
- Storm Sewer Headwall
- Storm Sewer Pipes
- Parsed Areas
- Existing BMP Sheds
- Road Pavement
- Streams
- HUC 12 Watersheds
- ERRI Small Watersheds 2014
- Municipal Boundary
- Parcels

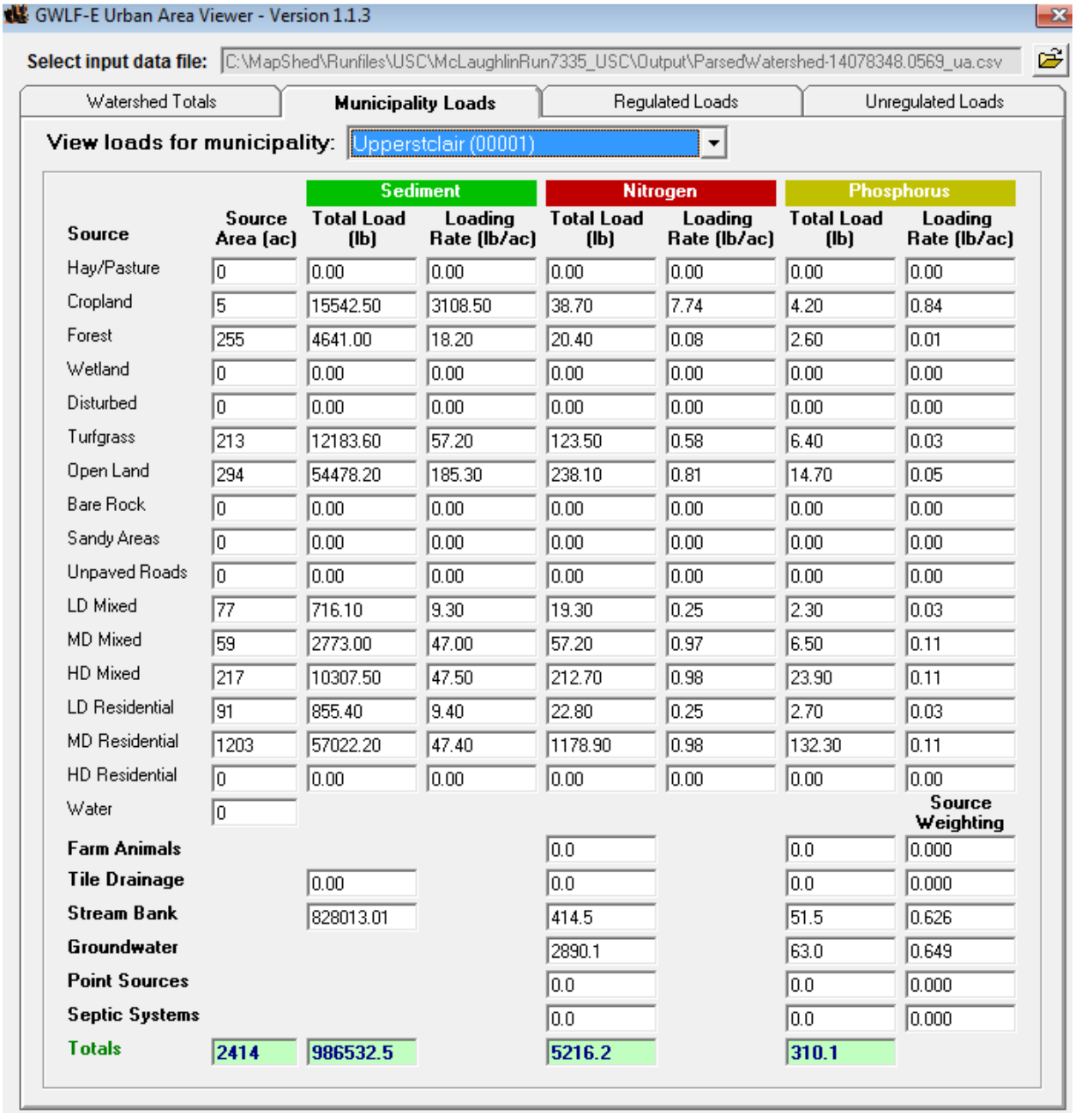
N W E S

Date: July 24, 2017

File Path: G:\Projects\85000 Upper St Clair\85374 MS4 & TMDL\2017 MS4\GIS\Planning_Area_Maps\Lower_Chartiers_Ck_Planning_Area_Map.mxd

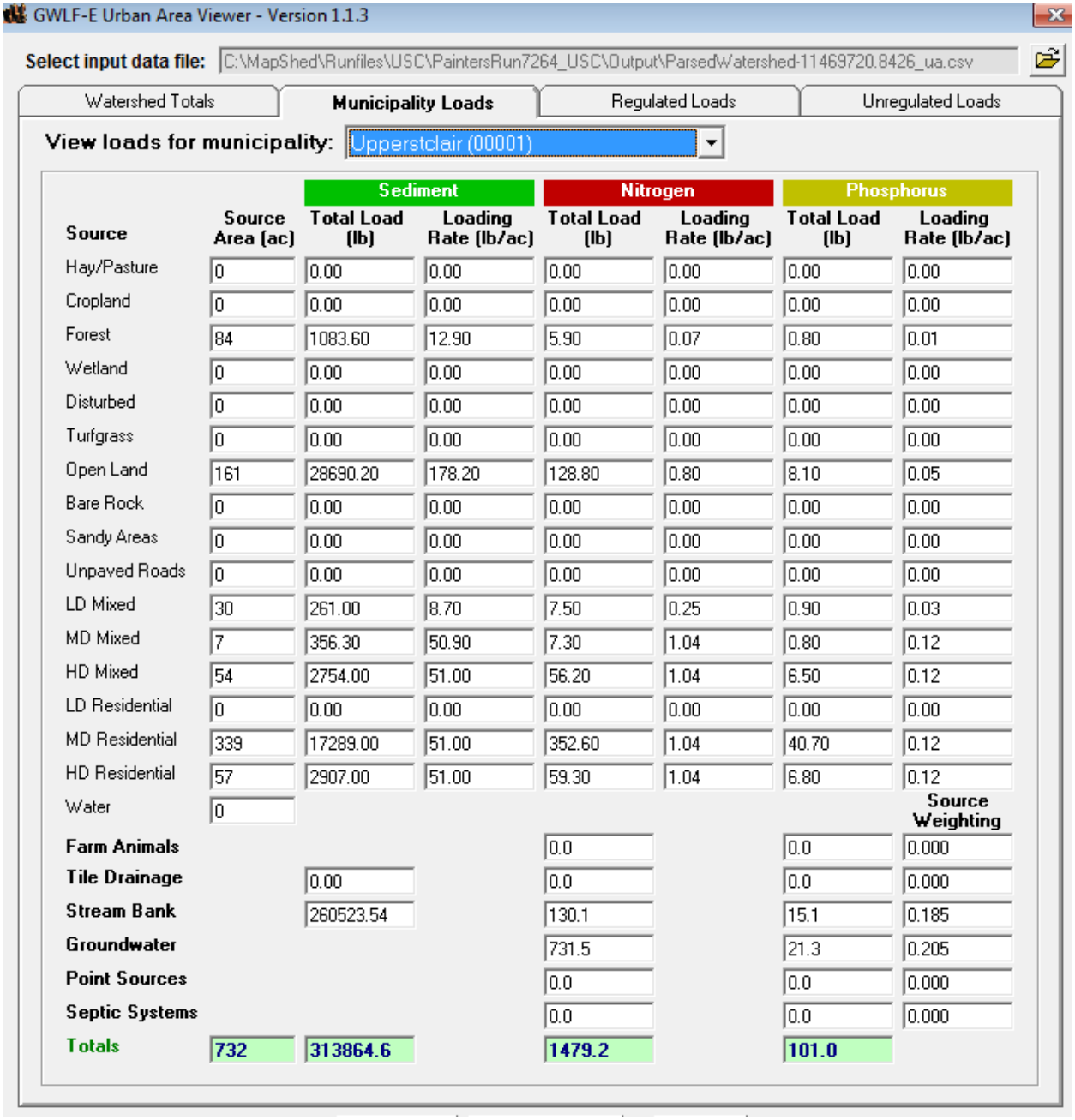
Appendix B – Existing Loads without BMPs

MCLAUGHLIN RUN 7335 SMALL WATERSHED



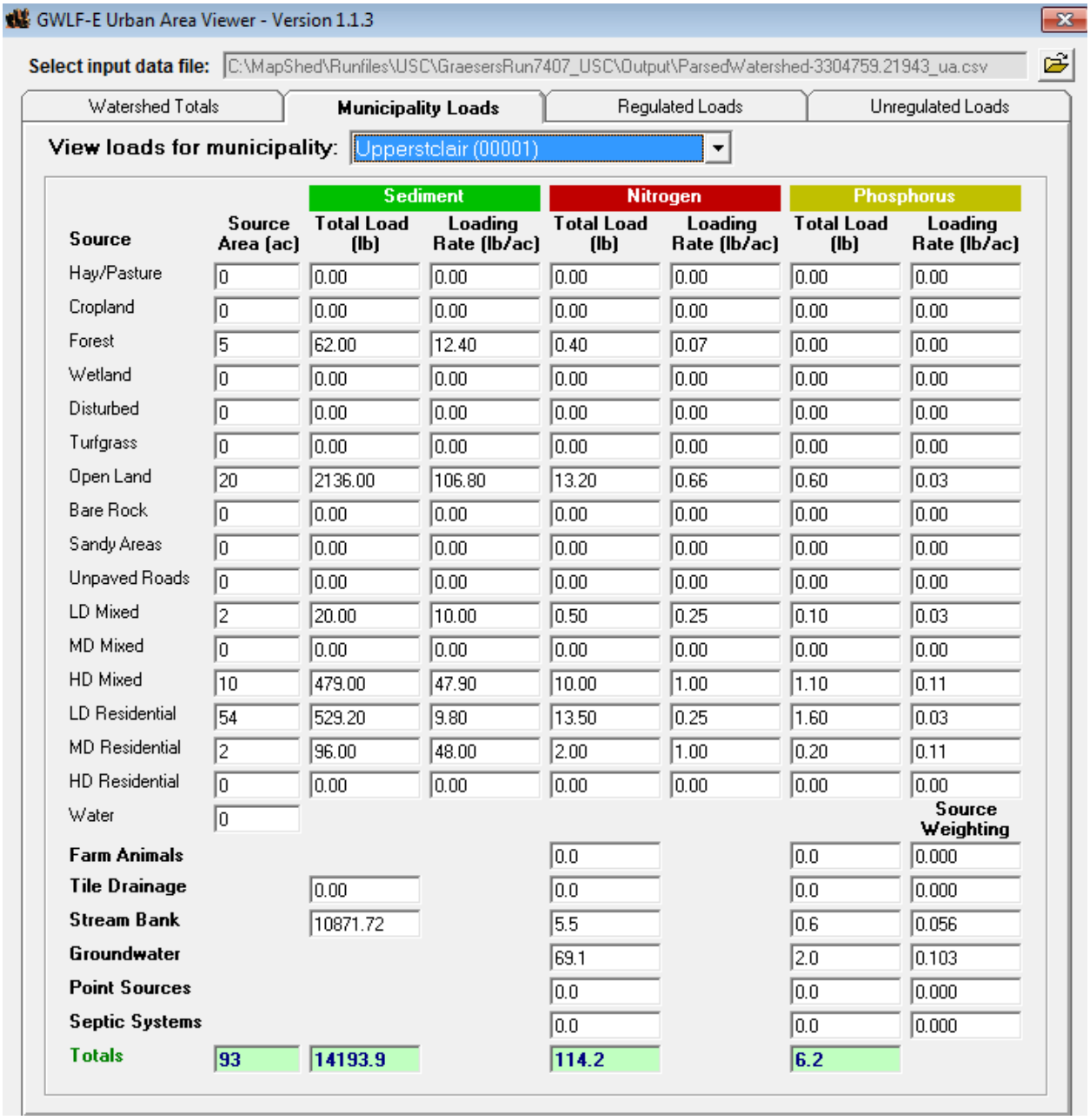
Source	Source Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	0	0.00	0.00	0.00	0.00	0.00	0.00
Cropland	5	15542.50	3108.50	38.70	7.74	4.20	0.84
Forest	255	4641.00	18.20	20.40	0.08	2.60	0.01
Wetland	0	0.00	0.00	0.00	0.00	0.00	0.00
Disturbed	0	0.00	0.00	0.00	0.00	0.00	0.00
Turfgrass	213	12183.60	57.20	123.50	0.58	6.40	0.03
Open Land	294	54478.20	185.30	238.10	0.81	14.70	0.05
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	77	716.10	9.30	19.30	0.25	2.30	0.03
MD Mixed	59	2773.00	47.00	57.20	0.97	6.50	0.11
HD Mixed	217	10307.50	47.50	212.70	0.98	23.90	0.11
LD Residential	91	855.40	9.40	22.80	0.25	2.70	0.03
MD Residential	1203	57022.20	47.40	1178.90	0.98	132.30	0.11
HD Residential	0	0.00	0.00	0.00	0.00	0.00	0.00
Water	0						
							Source Weighting
Farm Animals				0.0		0.0	0.000
Tile Drainage		0.00		0.0		0.0	0.000
Stream Bank		828013.01		414.5		51.5	0.626
Groundwater				2890.1		63.0	0.649
Point Sources				0.0		0.0	0.000
Septic Systems				0.0		0.0	0.000
Totals	**2414**	**986532.5**		**5216.2**		**310.1**	

PAINTERS RUN 7264 SMALL WATERSHED



Source	Source Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	0	0.00	0.00	0.00	0.00	0.00	0.00
Cropland	0	0.00	0.00	0.00	0.00	0.00	0.00
Forest	84	1083.60	12.90	5.90	0.07	0.80	0.01
Wetland	0	0.00	0.00	0.00	0.00	0.00	0.00
Disturbed	0	0.00	0.00	0.00	0.00	0.00	0.00
Turfgrass	0	0.00	0.00	0.00	0.00	0.00	0.00
Open Land	161	28690.20	178.20	128.80	0.80	8.10	0.05
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	30	261.00	8.70	7.50	0.25	0.90	0.03
MD Mixed	7	356.30	50.90	7.30	1.04	0.80	0.12
HD Mixed	54	2754.00	51.00	56.20	1.04	6.50	0.12
LD Residential	0	0.00	0.00	0.00	0.00	0.00	0.00
MD Residential	339	17289.00	51.00	352.60	1.04	40.70	0.12
HD Residential	57	2907.00	51.00	59.30	1.04	6.80	0.12
Water	0						
							Source Weighting
Farm Animals				0.0		0.0	0.000
Tile Drainage		0.00		0.0		0.0	0.000
Stream Bank		260523.54		130.1		15.1	0.185
Groundwater				731.5		21.3	0.205
Point Sources				0.0		0.0	0.000
Septic Systems				0.0		0.0	0.000
Totals	732	313864.6		1479.2		101.0	

GRAESERS RUN 7407 RUN SMALL WATERSHED



Source	Source Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	0	0.00	0.00	0.00	0.00	0.00	0.00
Cropland	0	0.00	0.00	0.00	0.00	0.00	0.00
Forest	5	62.00	12.40	0.40	0.07	0.00	0.00
Wetland	0	0.00	0.00	0.00	0.00	0.00	0.00
Disturbed	0	0.00	0.00	0.00	0.00	0.00	0.00
Turfgrass	0	0.00	0.00	0.00	0.00	0.00	0.00
Open Land	20	2136.00	106.80	13.20	0.66	0.60	0.03
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	2	20.00	10.00	0.50	0.25	0.10	0.03
MD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
HD Mixed	10	479.00	47.90	10.00	1.00	1.10	0.11
LD Residential	54	529.20	9.80	13.50	0.25	1.60	0.03
MD Residential	2	96.00	48.00	2.00	1.00	0.20	0.11
HD Residential	0	0.00	0.00	0.00	0.00	0.00	0.00
Water	0						
							Source Weighting
Farm Animals				0.0		0.0	0.000
Tile Drainage		0.00		0.0		0.0	0.000
Stream Bank		10871.72		5.5		0.6	0.056
Groundwater				69.1		2.0	0.103
Point Sources				0.0		0.0	0.000
Septic Systems				0.0		0.0	0.000
Totals	93	14193.9		114.2		6.2	

Appendix C – Existing BMPs Load Calculations

Bedner Farms Pond 1

Land Cover	BMP Drainage Area (Hectares)	Watershed Area (acres)	BMP Drainage Area (acres)	
Hay/Pasture	0	0	0.00	
Cropland	0	0	0.00	
Forest	0	166	0.00	
Wetland	0	0	0.00	
Disturbed	0	0	0.00	
Turfgrass	0	0	0.00	
Open Land	11.4	292	28.17	
Bare Rock	0	0	0.00	
Sandy Areas	0	0	0.00	
Unpaved Roads	0	0	0.00	
LD Residential	0	0	0.00	
MD Residential	0.1	1282	0.25	
HD Residential	0	628	0.00	
LD Mixed	1.1	96	2.72	
MD Mixed	0	84	0.00	
HD Mixed	0	289	0.00	
Total	**12.60**	**2837.00**	**31.14**	
				Percent Difference
Stream Bank	1.2	2379	2.965260	**0.124643%**

MapShed Modeling

Land Cover	Watershed Sediment Loading Rate (lbs/acre)	Watershed TP Loading Rate (lbs/acre)	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Hay/Pasture	0	0	0	0
Cropland	0	0	0	0
Forest	12.9	0.01	0	0
Wetland	0	0	0	0
Disturbed	0	0	0	0
Turfgrass	0	0	0	0
Open Land	178.2	0.05	5019.888654	1.4084985
Bare Rock	0	0	0	0
Sandy Areas	0	0	0	0
Unpaved Roads	0	0	0	0
LD Mixed	8.7	0.03	23.6479485	0.08154465
MD Mixed	50.9	0.12	0	0
HD Mixed	51	0.12	0	0
LD Residential	0	0	0	0
MD Residential	51	0.12	12.602355	0.0296526
HD Residential	51	0.12	0	0
Total	***403.70***	***0.57***	***5,056.14***	***1.52***

Source	Watershed Sediment (lbs)	Watershed TP (lbs)	BMP DA Percent	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Stream Bank	1,138,837.50	66.1	0.12464%	1,419.48	0.08

Total Existing Loads

Sediment	**6,475.62**	**lbs/yr**
Phosphorus	**1.60**	**lbs/yr**

Bedner Farms Pond 2

Land Cover	BMP Drainage Area (Hectares)	Watershed Area (acres)	BMP Drainage Area (acres)	
Hay/Pasture	0	0	0.00	
Cropland	0	0	0.00	
Forest	0	166	0.00	
Wetland	0	0	0.00	
Disturbed	0	0	0.00	
Turfgrass	0	0	0.00	
Open Land	6.8	292	16.80	
Bare Rock	0	0	0.00	
Sandy Areas	0	0	0.00	
Unpaved Roads	0	0	0.00	
LD Residential	0	0	0.00	
MD Residential	1.8	1282	4.45	
HD Residential	0	628	0.00	
LD Mixed	2.7	96	6.67	
MD Mixed	0	84	0.00	
HD Mixed	0	289	0.00	
Total	**11.30**	**2837.00**	**27.92**	
				Percent Difference
Stream Bank	4.5	2379	11.119725	**0.467412%**

MapShed Modeling

Land Cover	Watershed Sediment Loading Rate (lbs/acre)	Watershed TP Loading Rate (lbs/acre)	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Hay/Pasture	0	0	0	0
Cropland	0	0	0	0
Forest	12.9	0.01	0	0
Wetland	0	0	0	0
Disturbed	0	0	0	0
Turfgrass	0	0	0	0
Open Land	178.2	0.05	2994.319548	0.840157
Bare Rock	0	0	0	0
Sandy Areas	0	0	0	0
Unpaved Roads	0	0	0	0
LD Mixed	8.7	0.03	58.0449645	0.20015505
MD Mixed	50.9	0.12	0	0
HD Mixed	51	0.12	0	0
LD Residential	0	0	0	0
MD Residential	51	0.12	226.84239	0.5337468
HD Residential	51	0.12	0	0
Total	***403.70***	***0.57***	***3,279.21***	***1.57***

Source	Watershed Sediment (lbs)	Watershed TP (lbs)	BMP DA Percent	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Stream Bank	1,138,837.50	66.1	0.46741%	5,323.06	0.31

Total Existing Loads

Sediment	**8,602.27**	**lbs/yr**
Phosphorus	**1.88**	**lbs/yr**

Ft. Couch School

Land Cover	BMP Drainage Area (Hectares)	Watershed Area (acres)	BMP Drainage Area (acres)
Hay/Pasture	0	0	0.00
Cropland	0	0	0.00
Forest	0.9	166	2.22
Wetland	0	0	0.00
Disturbed	0	0	0.00
Turfgrass	0	0	0.00
Open Land	0.5	292	1.24
Bare Rock	0	0	0.00
Sandy Areas	0	0	0.00
Unpaved Roads	0	0	0.00
LD Residential	0	0	0.00
MD Residential	2.8	1282	6.92
HD Residential	0	628	0.00
LD Mixed	0.3	96	0.74
MD Mixed	0.3	84	0.74
HD Mixed	0	289	0.00
Total	**4.80**	**2837.00**	**11.86**

				Percent Difference
Stream Bank	3.4	2379	8.401570	**0.353156%**

MapShed Modeling

Land Cover	Watershed Sediment Loading Rate (lbs/acre)	Watershed TP Loading Rate (lbs/acre)	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Hay/Pasture	0	0	0	0
Cropland	0	0	0	0
Forest	12.9	0.01	28.6888905	0.02223945
Wetland	0	0	0	0
Disturbed	0	0	0	0
Turfgrass	0	0	0	0
Open Land	178.2	0.05	220.170555	0.06177625
Bare Rock	0	0	0	0
Sandy Areas	0	0	0	0
Unpaved Roads	0	0	0	0
LD Mixed	8.7	0.03	6.4494405	0.02223945
MD Mixed	50.9	0.12	37.7329335	0.0889578
HD Mixed	51	0.12	0	0
LD Residential	0	0	0	0
MD Residential	51	0.12	352.86594	0.8302728
HD Residential	51	0.12	0	0
Total	***403.70***	***0.57***	***645.91***	***1.03***

Source	Watershed Sediment (lbs)	Watershed TP (lbs)	BMP DA Percent	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Stream Bank	1,138,837.50	66.1	0.35316%	4,021.87	0.23

Total Existing Loads

Sediment	**4,667.78**	**lbs/yr**
Phosphorus	**1.26**	**lbs/yr**

Sienna

Land Cover	BMP Drainage Area (Hectares)	Watershed Area (acres)	BMP Drainage Area (acres)
Hay/Pasture	0	0	0.00
Cropland	0	5	0.00
Forest	0	334	0.00
Wetland	0	0	0.00
Disturbed	0	0	0.00
Turfgrass	0	213	0.00
Open Land	4.6	390	11.37
Bare Rock	0	0	0.00
Sandy Areas	0	0	0.00
Unpaved Roads	0	0	0.00
LD Residential	0	106	0.00
MD Residential	1	1804	2.47
HD Residential	0	0	0.00
LD Mixed	0.7	119	1.73
MD Mixed	0	82	0.00
HD Mixed	3	432	7.41
Total	**9.30**	**3485.00**	**22.98**

				Percent Difference
Stream Bank	4.7	2543	11.61394	**0.456702%**

MapShed Modeling

Land Cover	Watershed Sediment Loading Rate (lbs/acre)	Watershed TP Loading Rate (lbs/acre)	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Hay/Pasture	0	0	0	0
Cropland	3108.5	0.84	0	0
Forest	18.2	0.01	0	0
Wetland	0	0	0	0
Disturbed	0	0	0	0
Turfgrass	57.2	0.03	0	0
Open Land	185.3	0.05	2106.273599	0.5683415
Bare Rock	0	0	0	0
Sandy Areas	0	0	0	0
Unpaved Roads	0	0	0	0
LD Mixed	9.3	0.03	16.0865355	0.05189205
MD Mixed	47	0.11	0	0
HD Mixed	47.5	0.11	352.124625	0.8154465
LD Residential	9.4	0.03	0	0
MD Residential	47.4	0.11	117.12777	0.2718155
HD Residential	0	0	0	0
Total	***3,529.80***	***1.32***	***2,591.61***	***1.71***

Source	Watershed Sediment (lbs)	Watershed TP (lbs)	BMP DA Percent	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Stream Bank	1,241,901.40	77.2	0.45670%	5,671.79	0.35

Total Existing Loads

Sediment	**8,263.40**	**lbs/yr**
Phosphorus	**2.06**	**lbs/yr**

Sunrise Assisted Living

Land Cover	BMP Drainage Area (Hectares)	Watershed Area (acres)	BMP Drainage Area (acres)
Hay/Pasture	0	0	0.00
Cropland	0	5	0.00
Forest	0	334	0.00
Wetland	0	0	0.00
Disturbed	0	0	0.00
Turfgrass	0	213	0.00
Open Land	0.1	390	0.25
Bare Rock	0	0	0.00
Sandy Areas	0	0	0.00
Unpaved Roads	0	0	0.00
LD Residential	0	106	0.00
MD Residential	0	1804	0.00
HD Residential	0	0	0.00
LD Mixed	0.1	119	0.25
MD Mixed	0	82	0.00
HD Mixed	0.5	432	1.24
Total	**0.70**	**3485.00**	**1.73**

				Percent Difference
Stream Bank	0.6	2543	1.48263	**0.058302%**

MapShed Modeling

Land Cover	Watershed Sediment Loading Rate (lbs/acre)	Watershed TP Loading Rate (lbs/acre)	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Hay/Pasture	0	0	0	0
Cropland	3108.5	0.84	0	0
Forest	18.2	0.01	0	0
Wetland	0	0	0	0
Disturbed	0	0	0	0
Turfgrass	57.2	0.03	0	0
Open Land	185.3	0.05	45.7885565	0.01235525
Bare Rock	0	0	0	0
Sandy Areas	0	0	0	0
Unpaved Roads	0	0	0	0
LD Mixed	9.3	0.03	2.2980765	0.00741315
MD Mixed	47	0.11	0	0
HD Mixed	47.5	0.11	58.6874375	0.13590775
LD Residential	9.4	0.03	0	0
MD Residential	47.4	0.11	0	0
HD Residential	0	0	0	0
Total	***3,529.80***	***1.32***	***106.77***	***0.16***

Source	Watershed Sediment (lbs)	Watershed TP (lbs)	BMP DA Percent	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Stream Bank	1,241,901.40	77.2	0.05830%	724.06	0.05

Total Existing Loads

Sediment	**830.83**	**lbs/yr**
Phosphorus	**0.20**	**lbs/yr**

Fox Chase 4

Land Cover	BMP Drainage Area (Hectares)	Watershed Area (acres)	BMP Drainage Area (acres)
Hay/Pasture	0	0	0.00
Cropland	0	5	0.00
Forest	0	334	0.00
Wetland	0	0	0.00
Disturbed	0	0	0.00
Turfgrass	0	213	0.00
Open Land	1.3	390	3.21
Bare Rock	0	0	0.00
Sandy Areas	0	0	0.00
Unpaved Roads	0	0	0.00
LD Residential	0	106	0.00
MD Residential	0.8	1804	1.98
HD Residential	0	0	0.00
LD Mixed	0.3	119	0.74
MD Mixed	1.6	82	3.95
HD Mixed	0.3	432	0.74
Total	**4.30**	**3485.00**	**10.63**

				Percent Difference
Stream Bank	3	2543	7.41315	**0.291512%**

MapShed Modeling

Land Cover	Watershed Sediment Loading Rate (lbs/acre)	Watershed TP Loading Rate (lbs/acre)	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Hay/Pasture	0	0	0	0
Cropland	3108.5	0.84	0	0
Forest	18.2	0.01	0	0
Wetland	0	0	0	0
Disturbed	0	0	0	0
Turfgrass	57.2	0.03	0	0
Open Land	185.3	0.05	595.2512345	0.16061825
Bare Rock	0	0	0	0
Sandy Areas	0	0	0	0
Unpaved Roads	0	0	0	0
LD Mixed	9.3	0.03	6.8942295	0.02223945
MD Mixed	47	0.11	185.82296	0.4349048
HD Mixed	47.5	0.11	35.2124625	0.08154465
LD Residential	9.4	0.03	0	0
MD Residential	47.4	0.11	93.702216	0.2174524
HD Residential	0	0	0	0
Total	***3,529.80***	***1.32***	***916.88***	***0.92***

Source	Watershed Sediment (lbs)	Watershed TP (lbs)	BMP DA Percent	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Stream Bank	1,241,901.40	77.2	0.29151%	3,620.29	0.23

Total Existing Loads

Sediment	**4,537.17**	**lbs/yr**
Phosphorus	**1.14**	**lbs/yr**

Appendix D – Existing BMPs Load Reduction Table

Lower Chartiers Creek Existing BMPs Load Reduction Table

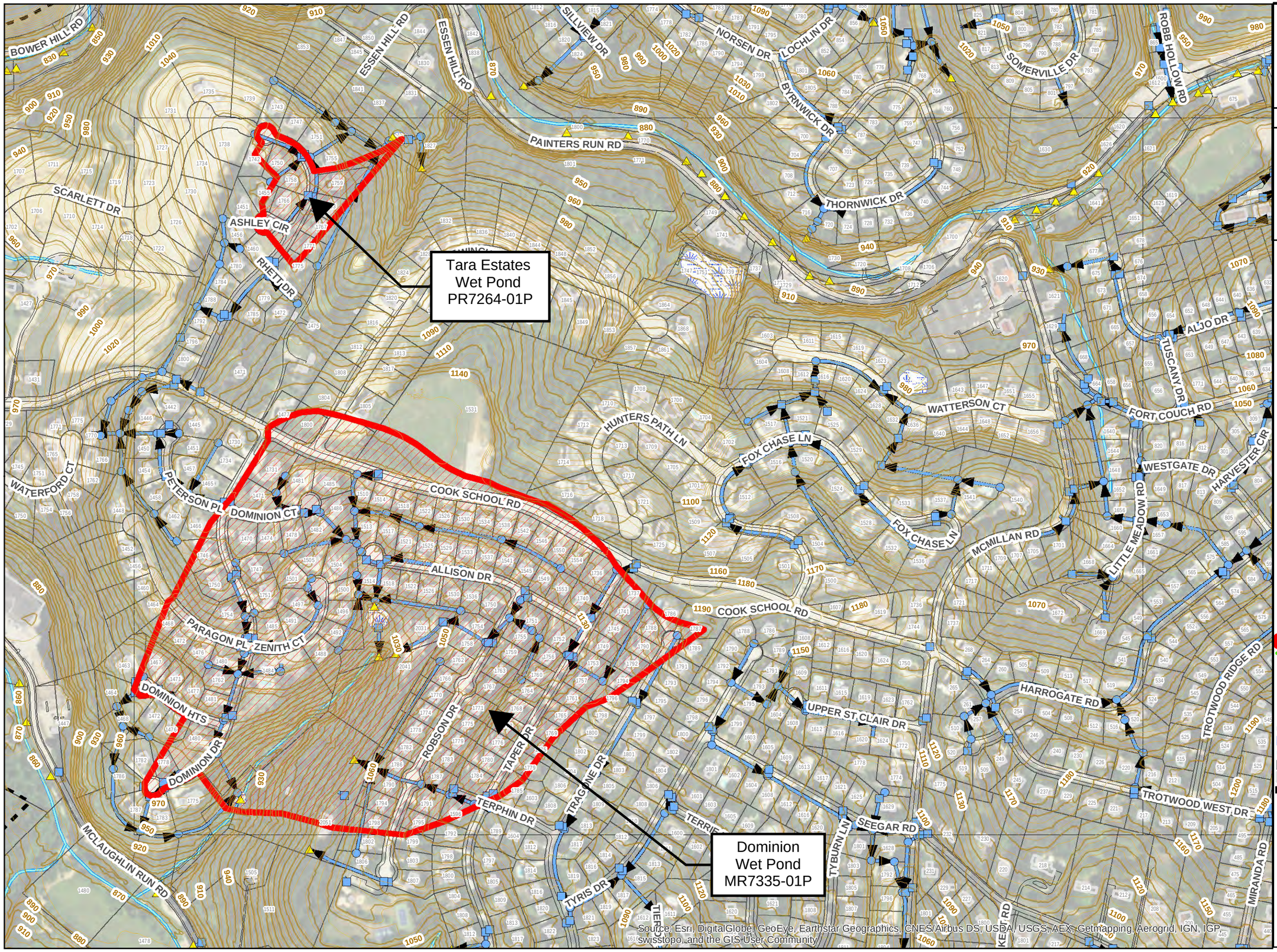
BMP ID	BMP Type	Removal Efficiency Determination Method	Existing Sediment Load (lb/yr)	Existing TP Load (lb/yr)	Sediment Removal Efficiency	TP Removal Efficiency	Sediment Load Reduction (lb/yr)	TP Load Reduction (lb/yr)
PR7264-01	Bedner Farms Pond 1 - Dry ED	BMP Effectiveness Tables	6,475.62	1.60	60%	20%	3,885.37	0.32
PR7264-02	Bedner Farms Pond 2 - Dry ED	BMP Effectiveness Tables	8,602.28	1.88	60%	20%	5,161.37	0.38
PR7264-03	Ft. Couch School	BMP Effectiveness Tables	4,667.78	1.26	60%	20%	2,800.67	0.25
MR7335-01	Sienna- Dry ED	BMP Effectiveness Tables	8,263.40	2.06	60%	20%	4,958.04	0.41
MR7335-02	Sunrise Assisted Living	BMP Effectiveness Tables	830.83	0.20	60%	20%	498.50	0.04
MR7335-03	Fox Chase 4	BMP Effectiveness Tables	4,537.17	1.14	60%	20%	2,722.30	0.23
Total							**20,026.25**	**1.63**

Appendix D-2 – Existing BMPs Table

Lower Chartiers Creek Existing BMPs Table

BMP ID	BMP Type	Latitude	Longitude	Permit Number	Installation Year
PR7264-01	Bedner Farms Pond 1- Dry ED	N 40° 21' 33.62"	W 80° 05' 34.42"	PAG02000213027-1	2017
PR7264-02	Bedner Farms Pond 2- Dry ED	N 40° 21' 33.85"	W 80° 05' 11.53"	PAG020002130272	2017
PR7264-03	Ft. Couch School	N 40° 21' 14.57674315"	W 80° 03' 56.56182704"	PAG2000209023	2010
MR7335-01	Sienna-Dry ED	N 40° 20' 54.39054270"	W 80° 03' 33.79734510"	PAG02000314001	2017
MR7335-02	Sunrise Assisted Living	N 40° 20' 30.26343256"	W 80° 03' 39.25414123"	PAG2000203047	2004
MR7335-03	Fox Chase 4	N 40° 21' 25.88095731"	W 80° 04' 41.27002236"	PAG02000214025	2006

Appendix E – Proposed Structural BMPs Maps



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W E
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Date: 7/24/2017
Scale: 1" = 400'

Township of Upper St. Clair
Lower Chartiers Creek Watershed

Potential Structural BMP
Drainage Area Locations

Project Number: C-85374-2017

Proposed BMP Drainage Area
USC Lower Stream Restoration
Storm Discharge Point
Storm Sewer Inlet
Storm Sewer Manhole
Storm Sewer Structure
Storm Sewer Clean Out
Storm Sewer Pipes
Existing BMPs
Streams
Parcels
Building Footprints
Boundary

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100 McMorris Road
Pittsburgh, PA 15205
Phone: 412-921-4030
Fax 412-921-9960

GATEWAY

Path: G:\Projects\85000 Upper St Clair\85374 MS4 & TMDL\2017 MS4\PRP\GIS\Potential BMP Mapbook\KL_Charters_CK_BMP_Mapbook_11x17.mxd

Township of Upper St. Clair
Lower Chartiers Creek Watershed

Potential Structural BMP
Drainage Area Locations

Project Number: C-85374-2017

N
W E
S

Date: 7/24/2017
Scale: 1" = 400'

- Proposed BMP Drainage Area
- USC Lower Stream Restoration
- Storm Discharge Point
- Storm Sewer Inlet
- Storm Sewer Manhole
- Storm Sewer Structure
- Storm Sewer Clean Out
- Storm Sewer Pipes
- Existing BMPs
- Streams
- Parcels
- Building Footprints
- Boundary

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100 McMorris Road
Pittsburgh, PA 15205
Phone: 412-921-4030
Fax 412-921-9960
GATEWAY

Path: G:\Projects\85000 Upper St Clair\85374 MS4 & TMDL\2017 MS4\PRP\GIS\Potential BMP Mapbook\ALL_Chartiers_CK_BMP_Mapbook_11x17.mxd

Appendix F – Proposed Existing BMP Retrofits Load Calculations

Dominion

Land Cover	BMP Drainage Area (Hectares)	Watershed Area (acres)	BMP Drainage Area (acres)
Hay/Pasture	0	0	0.00
Cropland	0	5	0.00
Forest	0.8	334	1.98
Wetland	0	0	0.00
Disturbed	0	0	0.00
Turfgrass	0	213	0.00
Open Land	4.8	390	11.86
Bare Rock	0	0	0.00
Sandy Areas	0	0	0.00
Unpaved Roads	0	0	0.00
LD Residential	0	106	0.00
MD Residential	21.3	1804	52.63
HD Residential	0	0	0.00
LD Mixed	1	119	2.47
MD Mixed	0.1	82	0.25
HD Mixed	0	432	0.00
Total	**28.00**	**3485.00**	**69.19**

				Percent Difference
Stream Bank	22.4	2543	55.35152	**2.176623%**

MapShed Modeling

Land Cover	Watershed Sediment Loading Rate (lbs/acre)	Watershed TP Loading Rate (lbs/acre)	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Hay/Pasture	0	0	0	0
Cropland	3108.5	0.84	0	0
Forest	18.2	0.01	35.978488	0.0197684
Wetland	0	0	0	0
Disturbed	0	0	0	0
Turfgrass	57.2	0.03	0	0
Open Land	185.3	0.05	2197.850712	0.593052
Bare Rock	0	0	0	0
Sandy Areas	0	0	0	0
Unpaved Roads	0	0	0	0
LD Mixed	9.3	0.03	22.980765	0.0741315
MD Mixed	47	0.11	11.613935	0.02718155
HD Mixed	47.5	0.11	0	0
LD Residential	9.4	0.03	0	0
MD Residential	47.4	0.11	2494.821501	5.78967015
HD Residential	0	0	0	0
Total	***3,529.80***	***1.32***	***4,763.25***	***6.50***

Source	Watershed Sediment (lbs)	Watershed TP (lbs)	BMP DA Percent	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Stream Bank	1,241,901.40	77.2	2.17662%	27,031.51	1.68

Total Existing Loads

Sediment	**31,794.76**	**lbs/yr**
Phosphorus	**8.18**	**lbs/yr**

Tara Estates

Land Cover	BMP Drainage Area (Hectares)	Watershed Area (acres)	BMP Drainage Area (acres)
Hay/Pasture	0	0	0.00
Cropland	0	0	0.00
Forest	0.1	166	0.25
Wetland	0	0	0.00
Disturbed	0	0	0.00
Turfgrass	0	0	0.00
Open Land	0.1	292	0.25
Bare Rock	0	0	0.00
Sandy Areas	0	0	0.00
Unpaved Roads	0	0	0.00
LD Residential	0	0	0.00
MD Residential	1.2	1282	2.97
HD Residential	0	628	0.00
LD Mixed	0.1	96	0.25
MD Mixed	0	84	0.00
HD Mixed	0	289	0.00
Total	**1.50**	**2837.00**	**3.71**

				Percent Difference
Stream Bank	1.3	2379	3.212365	**0.135030%**

MapShed Modeling

Land Cover	Watershed Sediment Loading Rate (lbs/acre)	Watershed TP Loading Rate (lbs/acre)	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Hay/Pasture	0	0	0	0
Cropland	0	0	0	0
Forest	12.9	0.01	3.1876545	0.00247105
Wetland	0	0	0	0
Disturbed	0	0	0	0
Turfgrass	0	0	0	0
Open Land	178.2	0.05	44.034111	0.01235525
Bare Rock	0	0	0	0
Sandy Areas	0	0	0	0
Unpaved Roads	0	0	0	0
LD Mixed	8.7	0.03	2.1498135	0.00741315
MD Mixed	50.9	0.12	0	0
HD Mixed	51	0.12	0	0
LD Residential	0	0	0	0
MD Residential	51	0.12	151.22826	0.3558312
HD Residential	51	0.12	0	0
Total	***403.70***	***0.57***	***200.60***	***0.38***

Source	Watershed Sediment (lbs)	Watershed TP (lbs)	BMP DA Percent	BMP DA Sediment (lbs)	BMP DA TP (lbs)
Stream Bank	1,138,837.50	66.1	0.13503%	1,537.77	0.09

Total Existing Loads

Sediment	**1,738.37**	**lbs/yr**
Phosphorus	**0.47**	**lbs/yr**

Appendix G – Proposed BMPs Load Reduction Table

Lower Chartiers Creek Proposed BMPs Load Reduction Table

BMP ID	BMP Type	Removal Efficiency Determination Method	Existing Sediment Load (lb/yr)	Existing TP Load (lb/yr)	Sediment Removal Efficiency	TP Removal Efficiency	Sediment Load Reduction (lb/yr)	TP Load Reduction (lb/yr)
MR7335-01P	Dominion - Wet Pond	BMP Effectiveness Table	31,794.76	8.18	60%	45%	19,076.86	3.68
PR7264-01P	Tara Estates - Wet Pond	BMP Effectiveness Table	1,738.37	0.47	60%	45%	1,043.02	0.21
PR7264-02P	Stream Restoration	BMP Effectiveness Table	115,000.00	60.38	100%	100%	115,000.00	60.38
Total							**135,119.88**	**64.27**