Borough of Forest Hills MS4 Pollution Reduction Plan

UNT to Turtle Creek Sediment Impairment

August 2017

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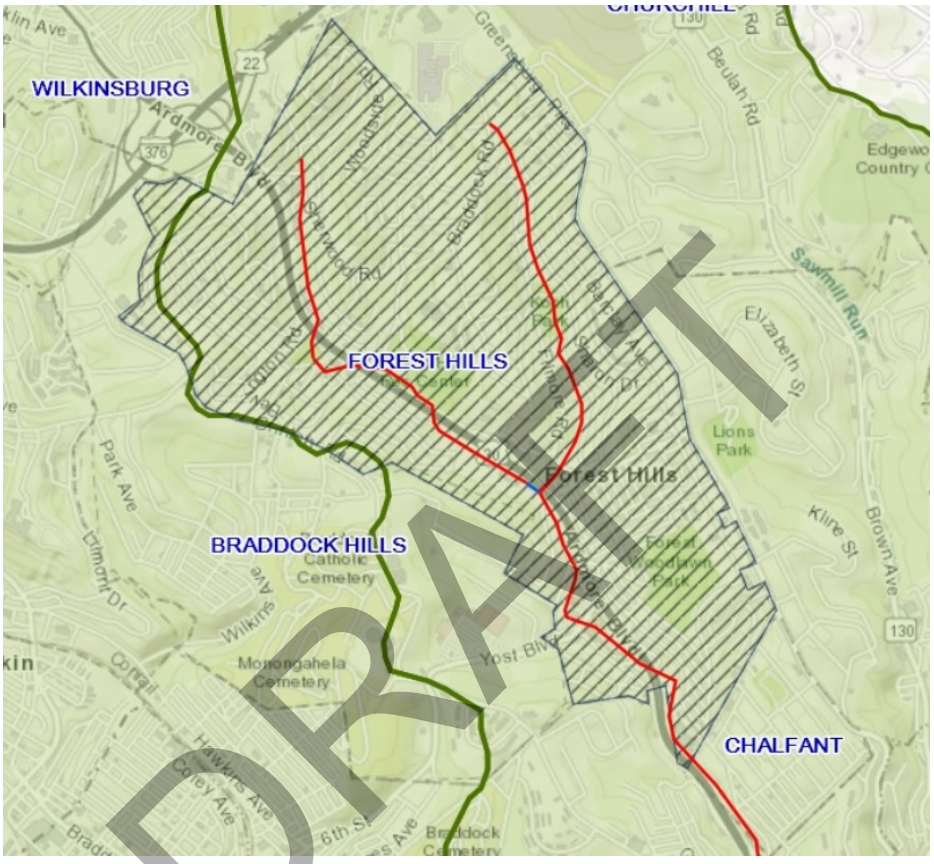
The Borough of Forest Hills PRP Preface

Following this document is the Pollution Reduction Plan that we have developed for Forest Hills Borough. The PRP was constructed with the criteria given on the DEP website. The following two figures are the main references used in creation of this report:

DEP's MS4 Requirements Map



DEP's MS4 Requirements Table

MS4 HUC12 Report
Sawmill Run-Turtle Creek (050200050704)

HUC 12 NAMES	IMPAIRED DOWNSTREAM WATERS	REQUIREMENTS
Sawmill Run-Turtle Creek	Turtle Creek	Appendix E-Siltation

MS4 Urban Area Report
FOREST HILLS BORO, Allegheny County

INDIVIDUAL PERMIT REQUIRED: No	**REASON:** n/a	**NPDES ID:** PAG136239
IMPAIRED DOWNSTREAM WATERS	**REQUIREMENTS**	**OTHER CAUSES OF IMPAIRMENT**
Unnamed Tributaries to Turtle Creek		Other Habitat Alterations (4c)
Monongahela River	Appendix C-PCB (4a) Appendix B-Pathogens (5)	
Turtle Creek	Appendix E-Siltation (5)	

Borough of Forest Hills MS4 Pollution Reduction Plan
UNT to Turtle Creek Sediment Impairment

August 2017

Section A - Public Participation

This section of the Pollution Reduction Plan identifies and documents the Public Participation requirements of the plan. Each MS4 Pollution Reduction Plan must provide for the following public interactions:

- The MS4 entity shall make the Pollution Reduction Plan (PRP) available for public review. In response to this requirement the Borough will produce a copy for the public to review on their website. A copy will also be kept at the Borough office for persons wanting to review it there. A letter from the Borough advising the PADEP that this was accomplished, is provided as Appendix 1 – Public Availability Letter of Proof, which describes how and when these items were completed.
- The MS4 entity shall publish in a newspaper of general circulation, a public notice, containing a description of the Pollution Reduction Plan (PRP), identifying where or how it can be reviewed, and the length of time it will be available for review and comment. A copy of the advertisement will be inserted as Appendix 2 – Public Advertisement, which will show the advertisement used.
- The MS4 entity shall accept written comment on the Pollution Reduction Plan (PRP) for a minimum of 30 days from the date of the public notice. The comments will be accepted at a scheduled public meeting. A copy of the comments will be included in the Pollution Reduction Plan (PRP) within Appendix 3 – Public Comments Received, when available.
- The MS4 entity shall consider and make a record of considerations made to the timely public comments. Any changes made to the plan as a result of these considerations will be identified in this section. The considerations, replies, or changes noted to the plan will be contained in Appendix 4 – Reply Consideration and Changes.

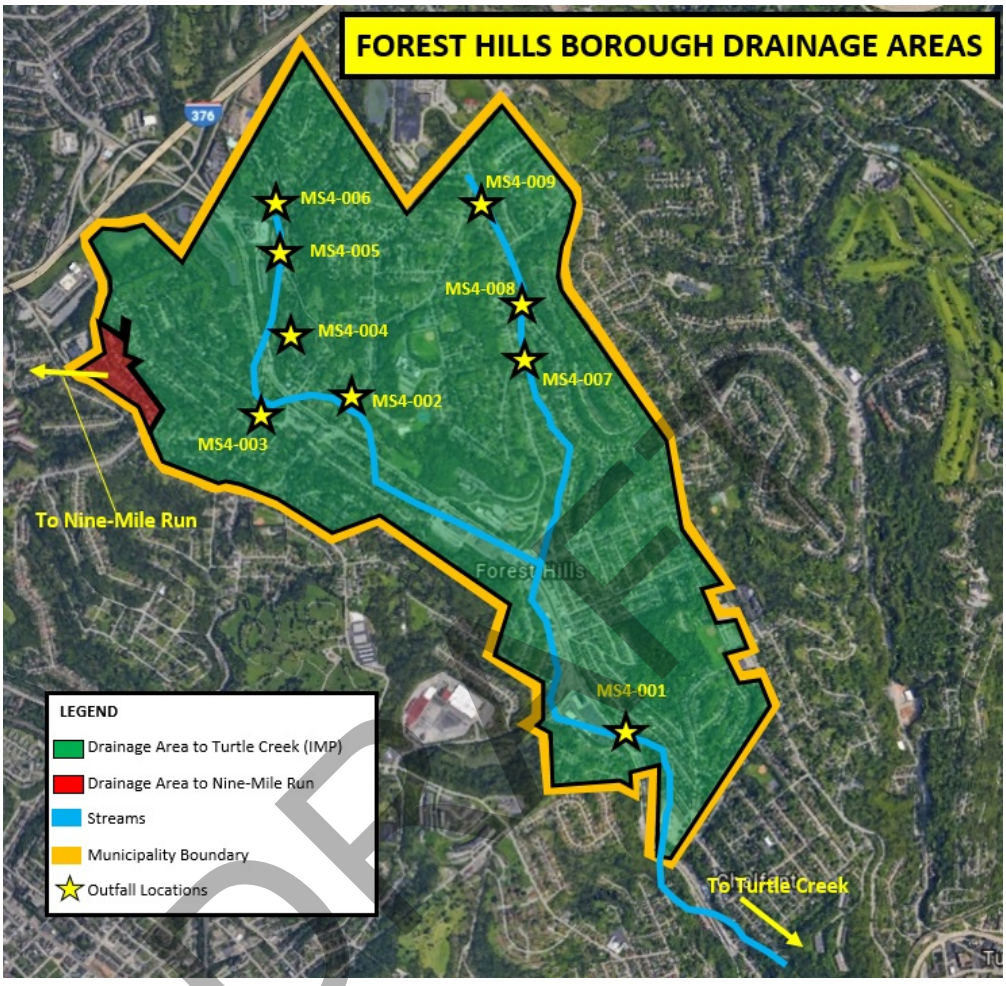
Section B - Maps

The Map(s) provided in Appendix 5 provides a plan layout of the storm sewershed boundary, and the impervious versus pervious extents of the surfaces associated with each MS4 outfall that discharges to an impaired surface water.

The maps identify any proposed locations of structural BMP's (Best Management Practices) that will be proposed to achieve the necessary pollutant load reductions. The planning area is clearly outlined on the maps. The intended BMP's are shown on the map for their importance to the appropriate sewershed that is intended for the pollutant reductions.

The map below shows a general representation of the area of Forest Hills Borough.

Figure 1 – Drainage Basin Breakdown



Section C – Pollutants of Concern in an Impaired Watershed

A Pollution Reduction Plan (PRP) developed for a watershed with impairment under Appendix E of the General Permit, must identify the "pollutants" based on the impairment listing in the PADEP "MS4 Requirements Table". If the impairment is based solely on siltation (sediment) a minimum of 10% sediment reduction is required. If the impairment is based on nutrients only a minimum of 5% of Total Phosphorous reduction is required. If both pollutants are impairments, then both removal rates must be addressed. In later sections of this Pollution Reduction Plan (PRP) the MS4 entity will provide calculations for these reductions, and provide the BMPs that will be used to achieve the reductions.

Table 1 - MS4 Impaired Waterways and Pollutants of Concern

MS4 Entity	Impaired Waterway	Impairment Pollutants
Forest Hills Borough	UNT to Turtle Creek	***Appendix E-Siltation***
Forest Hills Borough	Monongahela River	Appendix C-PCB Appendix B - Pathogens

Section D – Existing Loading for Pollutants of Concern

Forest Hills Borough has to prepare a PRP for sediment impairment to Turtle Creek. The Monongahela River has no load reduction requirements in this PRP. Due to the impairment for sediment in Turtle Creek, Forest Hills Borough must follow Appendix E of the General Permit.

The date of this existing loading determination is June 2017, and this PRP is not considering reductions to loading from any previously installed BMP's. The expected loading rates for Allegheny County are tabled below and will be used in these initial calculations of expected loading rates for the Borough.

Table 2 - MS4 Impaired Waterways Pollutants Loading

Category	Estimated Sediment Loading Rates (lbs./acre/year)
Impervious Developed Areas	1,839
Pervious Developed Areas	265
Undeveloped Areas	234.6

The areas of Forest Hills Borough that contribute to the impaired watershed were evaluated using aerial imaging to determine the Impervious Developed, Pervious Developed, and Undeveloped aerial extents. Roadways were estimated by total miles of roadway within the borough and converted to acreage using the one curb lane mile rule of thumb. Forest Hills Borough has 1001.5 acres within the municipality lines, however the PRP focuses on just the acreage in the impaired drainage area. In this case, the section highlighted in green above is the area in which this PRP focuses due to its sediment impairment to Turtle Creek. Data used to produce Table 4 is based on Figure 2 and Table 3 – Area Conversion Table.

Figure 2 – Impaired Area Acreage Breakdown

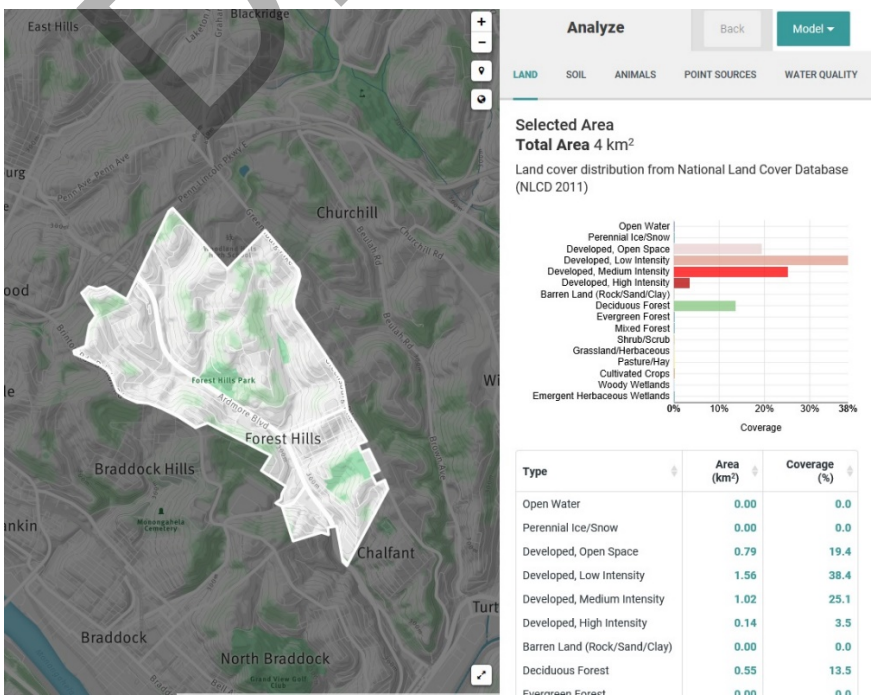


Table 3 – Area Conversion Table

Land Use	Area (m^2)	Area (acres)	% Impervious	Impervious Area (acres)	Pervious Area (acres)
Developed, Open Space	790000	195.22	19%	37.09	158.13
Developed, Low Intensity	1560000	385.49	49%	188.89	196.60
Developed, Medium Intensity	1030000	254.52	79%	201.07	53.45
Developed, High Intensity	550000	135.91	100%	135.91	0.00
Undeveloped Land	69981	**17**			
Totals	3999981	**991**		**564**	**410**

Calculation template is from NLCD 2011 Land Use Designation to Impervious and Pervious Acres.

Table 4 - MS4 Surface Use Characterization of Impaired Drainage Area

Category	**Estimated Coverage of Impaired Drainage Area (Acres)**
Impervious Developed Areas	520
Impervious Roadway Areas	44
Pervious Developed Areas	410
Undeveloped Land	17
Totals	991

Impervious Roadway Area is calculated by using PennDOT's roadway map of Forest Hills Borough and converting miles of roadway within the impaired drainage area to areas. The borough has 22 miles of impervious roadway. Reference Appendix 5 for PennDOT's road map. The result is subtracted from Impervious Developed Areas.

$$(1\ impervious\ acre) = (1\ curb\ lane\ mile)$$
$$impervious\ acres\ of\ \ roadway = (22\ curb\ lane\ mile)(2\ lanes)$$
$$impervious\ roadway = 44\ acres$$

The existing "Sediment" loading using the DEP's simplified method is calculated as follows:

$$(520\ acres + 44\ acres)(1{,}839\ \frac{lbs}{\frac{acre}{yr}}) + (410\ acres)(265\ \frac{lbs}{\frac{acre}{yr}}) + (17\ acres)(234.6\ \frac{lbs}{\frac{acre}{yr}}) = 1{,}149{,}834\ \frac{lbs}{yr}$$

Section E – Selection of Best Management Practices (BMP) to Achieve the Minimum Required Reductions in Pollutant Loading

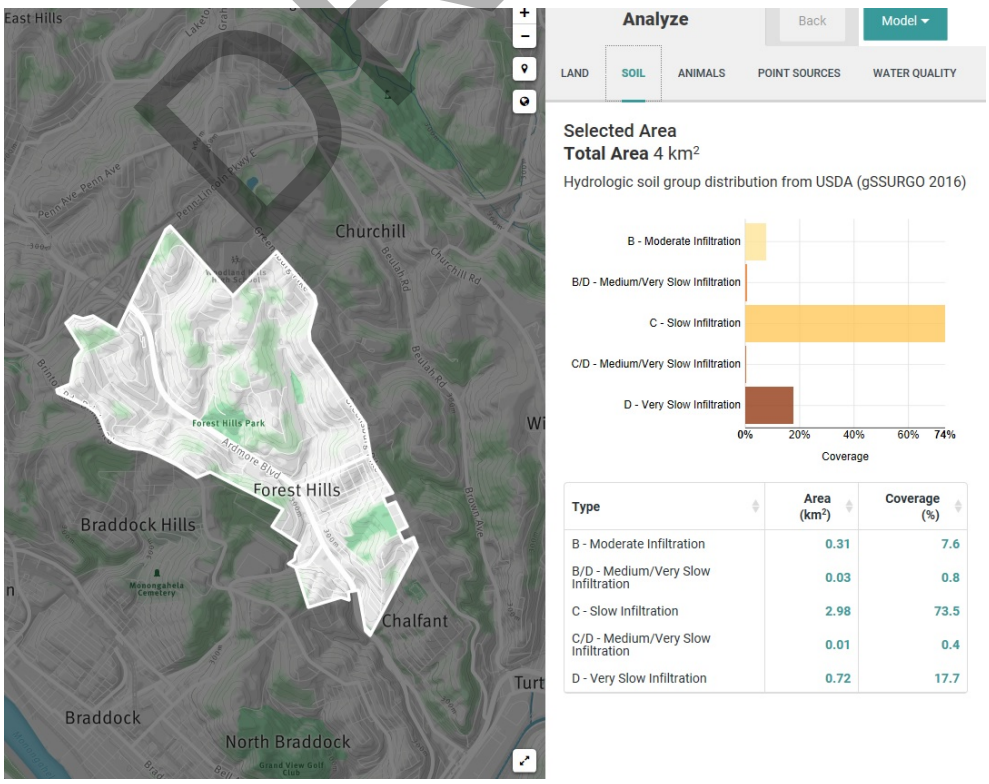
The Borough needs to determine the minimum sediment loading (lbs./year) that must be reduced from the present loading, to be done within the 5-year period following DEP's approval of Permit coverage. The minimum percent reduction according to Appendix E of the permit is 10% for sediment reduction.

Therefore, the minimum sediment reduction required can be calculated as follows:

$$(1{,}149{,}834\frac{lbs.}{yr})(10\%) = 114{,}983\frac{lbs.}{yr}$$

Selection of the best BMP's is dependent on primary factors of available resources including costs or available funding, equipment, manpower, or volunteer assistance, and in some cases available land. There are several options to consider when deciding which BMPs (Best Management Practices) to put into place for Turtle Creek's sediment impairment. The DEP provides a list of BMPs for the borough to choose from as long as the required 10% reduction in the sediment load is achieved. In this case, Turtle Creek must have a sediment reduction of 114,983 lbs./year. Illustrated in the next portion of this section are the possible BMP options to satisfy the necessary load reduction along with their effectiveness values for reducing the sediment load. Following are the plans that we have generated that we believe will satisfy Turtle Creek's pollution reduction needs in the most efficient manner. Forest Hills's drainage area used for this PRP is 73.5% Soil type C and 17.7% type D according to wikiwatershed. BMPs categorize C and D soils together therefor 91.2% of the soil within the impaired drainage area is C or D soil. Since this percentage is so high, only BMPs affiliated with C and D class soil will be considered in this PRP.

Figure 3 - Forest Hills Borough's Soil Type Coverage



BMP SECTION 1: STREAM RESTORATION

Sediment efficiency of reduction: 44.88 lbs/ft/yr

Description*:* An annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that otherwise would be delivered downstream from an actively enlarging or incising urban stream. Applies to 0 to 3rd order streams that are not tidally influenced. If one of the protocols is cited and pounds are reported, then the mass reduction is received for the protocol.

Forest Hills Borough:

If only this BMP was selected; the total length of stream restoration would be calculated as follows:

$$\left(\frac{114{,}983 \frac{lbs}{yr}}{44.88 \frac{lbs}{\frac{ft.}{yr}}} \right) = 2{,}562 \ ft$$

The Borough of Forest Hills has a total of 6740 feet of stream eligible for stream restoration within municipality lines. 1,640 feet is owned by the Borough, 2,102 feet is considered common ground, and 2,998 feet is privately owned. If Forest Hills wanted to achieve all sediment loading reduction requirements with stream restoration alone it would be possible only building on borough owned property and common ground.

$$(2{,}562 \ ft) \left(44.88 \frac{lbs}{\frac{ft}{yr}} \right) = 114{,}983 \frac{lbs}{yr}$$

As seen below, this is sufficient to meet the total reduction requirements.

$$114{,}983 \frac{lbs}{yr} - 114{,}983 \frac{lbs}{yr} = 0 \frac{lbs}{yr} \text{ Required reduction remaining}$$

Forest Hills Borough could achieve 100% of the required sediment loading reduction with stream restoration alone.

BMP SECTION 2: FILTERING PRACTICES

Inlet Filter Bags - Sediment efficiency of reduction: 80%

Description: Practices that capture and temporarily store runoff and pass it through a filter bed of either sand or an organic media. There are various sand filter designs, such as above ground, below ground, perimeter, etc. An organic media filter uses another medium besides sand to enhance pollutant removal for many compounds due to the increased cation exchange capacity achieved by increasing the organic matter. These systems require yearly inspection and maintenance to receive pollutant reduction credit. Filters for inlets are required to be replaced twice per year.

Forest Hills Borough:

The Borough of Forest Hills has a total of 867 inlets throughout municipality lines as well as 44 acres of impervious roadway drainage area. The amount of drainage per inlet can be calculated as follows:

$$\left(\frac{44\ acres}{867\ inlets}\right) = 0.05\frac{acres}{inlet}$$

Using this ratio, sample calculations can be completed to demonstrate the amount of sediment reduction that will be achieved using this BMP.

25% of total inlets

$$(217\ inlets)\left(\frac{0.05\ acres}{inlet}\right)\left(1{,}839\frac{lbs}{\frac{acre}{yr}}\right)(80\%) = 15{,}963\frac{lbs}{yr}$$

50% of total inlets

$$(434\ inlets)\left(\frac{0.05\ acres}{inlet}\right)\left(1{,}839\frac{lbs}{\frac{acre}{yr}}\right)(80\%) = 31{,}925\frac{lbs}{yr}$$

100% of total inlets

$$(867\ inlets)\left(\frac{0.05\ acres}{inlet}\right)\left(1{,}839\frac{lbs}{\frac{acre}{yr}}\right)(80\%) = 63{,}777\frac{lbs}{yr}$$

Forest Hills Borough could only achieve 55% of the required sediment loading with filter bags for inlets alone.

BMP SECTION 3: VEGETATED AREA STRUCTURES

Bioswale – Sediment efficiency of reduction: 80%

Description*:* With a Bioswale, the load is reduced because, unlike other open channel designs, there is no treatment through the soil. A Bioswale is designed to function as a bioretention area.

Bioretention – Raingarden (C/D soils) – Sediment efficiency of reduction: 55%

Description*:* An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. There are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has an underdrain and is in C or D soils. This BMP can be constructed with or without an underdrain to achieve some efficiency of reduction.

Vegetated Open Channels (C/D Soils) – Sediment efficiency of reduction: 50%

Description*:* Open channels are practices that convey stormwater runoff and provide treatment as the water is conveyed, includes Bioswales. Runoff passes through either vegetation in the channel, subsoil matrix, and/or is infiltrated into the underlying soils. This BMP has no underdrain and is in C or D soils.

Filter Strip Runoff Reduction – Sediment efficiency of reduction: 56%

Description*:* Urban filter strips are stable areas with vegetated cover on flat or gently sloping land. Runoff entering the filter strip must be in the form of sheet-flow and must enter at a non-erosive rate for the site specific.

Filter Strip Stormwater Treatment – Sediment efficiency of reduction: 22%

Description*:* Urban filter strips are stable areas with vegetated cover on flat or gently sloping land. Runoff entering the filter strip must be in the form of sheet-flow and must enter at a non-erosion rate for the site-specific soil conditions. A 0.2 design ratio of filter strip length to impervious flow length is recommended for stormwater treatment urban filter strips.

These types of BMPs are calculated similarly. The sediment reduction is based on the amount of acreage that contributes runoff to the structure and the respective reduction value. Bioswales are usually smaller structures which explains their high effectiveness value. Sizing of the selected BMPs is based on the amount of runoff used in the sediment reduction calculation. The size of the structure will determine the cost for construction. Reference the pricing estimates guide we have generated for estimated prices. The formula below can be used to calculate sediment reduction for these BMPs:

Using the most efficient BMP from this section (Bioswale) the number of acres needed for required sediment reduction is as follows:

$$\left(Number\ of\ \ Drainage\ Acres\right)\left(265\frac{lbs}{\frac{acre}{yr}}\right)\left(80\%\right)=114{,}983\frac{lbs}{yr}$$

$$\left(Number\ of\ \ Drainage\ Acres\right)=\left(\frac{114{,}983\frac{lbs}{yr}}{\left(265\frac{lbs}{\frac{acre}{yr}}\right)\left(80\%\right)}\right)=542\ acres$$

542 acres of Forest Hills Borough's 991 acres of impaired drainage area would have to contribute to Bioswales to meet sediment reduction requirements using Bioswales alone. The borough has only 410 acres of pervious grassland/forest and 17 acres of undeveloped land within its border.

BMP SECTION 4: PERMEABLE PAVEMENT

Permeable Pavement (C/D Soils w/ underdrain) – Sediment efficiency of reduction: 55%

Description*:* Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, has sand and/or vegetation and is in C or D soil. This BMP can be constructed with or without sand/vegetation to achieve the same efficiency of reduction.

The sediment reduction is based on the amount of acreage that contributes runoff to the structure and the respective reduction value. Sizing of the selected BMPs is based on the amount of runoff used in the sediment reduction calculation. The size of the structure will determine the cost for construction. Reference the pricing estimates guide we have generated for estimated prices. The formula below can be used to calculate sediment reduction for these BMPs:

Meeting load reduction requirements using this BMP alone, the acres of roadway needed would be calculated as follows:

$$\left(Number\ of\ \ Drainage\ Acres\right)\left(1{,}839\,\frac{lbs}{\frac{acre}{yr}}\right)\left(55\%\right)=114{,}983\,\frac{lbs}{yr}$$

$$\left(Number\ of\ \ Drainage\ Acres\right)=\left(\frac{114{,}983\,\frac{lbs}{yr}}{\left(1{,}839\,\frac{lbs}{\frac{acre}{yr}}\right)\left(55\%\right)}\right)=114\ acres$$

Forest Hills Borough has only 44 acres of impervious roadway within the impaired drainage area. As seen above 114 acres need to be converted into permeable pavement to achieve minimum sediment reduction. Even if all 44 acres were converted to permeable pavement, Forest Hills Borough would still need approximately 70,000 lbs./year additional reduction to meet requirements.

BMP SECTION 5: PONDS AND BASINS

Wet Ponds and Wetlands – Sediment efficiency of reduction: 60%

Description*:* A water impoundment structure that intercepts stormwater runoff then releases it to an open water system at a specified flow rate. These structures retain a permanent pool and usually have retention times sufficient to allow settlement of some port of the intercepted sediments and attached nutrients/toxics. Until recently, these practices were designed specifically to meet water quantity, not water quality objectives. There is little or no vegetation living within the pooled area nor are outfalls directed through vegetated areas prior to open water release.

Dry Extended Detention Basins – Sediment efficiency of reduction: 60%

Description*:* Dry extended detention (ED) basins are depressions created by excavation or berm construction that temporarily store runoff and release it slowing via surface flow or groundwater infiltration following storms. Dry ED basins are designed to dry out between storm events, in contrast with wet ponds, which contain standing water permanently. As such, they are similar in construction and function to dry detention basins, except that the duration of detention of stormwater is designed to be longer. Theoretically improving treatment effectiveness.

Dry Detention Basins and Hydrodynamic Structures – Sediment efficiency of reduction: 10%

Description*:* Dry Detention Ponds are depressions or basins created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow or groundwater infiltration following storms. Hydrodynamic Structures are devices designed to improve quality of stormwater using features such as swirl concentrators, grit chambers, oil barriers, baffles, micropools, and absorbent pads that are designed to remove sediments, nutrients, metals organic chemicals, or oil and grease from urban runoff.

The sediment reduction is based on the amount of acreage that contributes runoff to the structure and the respective reduction value. Sizing of the selected BMPs is based on the amount of runoff used in the sediment reduction calculation. The size of the structure will determine the cost for construction. Reference the pricing estimates guide we have generated for estimated prices. The formula below can be used to calculate sediment reduction for these BMPs:

Using the most efficient BMP from this section (Wet Ponds and Wetlands) the number of acres needed for required sediment reduction is as follows:

$$\left(Number\ of\ \ Drainage\ Acres\right)\left(265\frac{lbs}{\frac{acre}{yr}}\right)\left(60\%\right)=114{,}983\frac{lbs}{yr}$$

$$\left(Number\ of\ \ Drainage\ Acres\right)=\left(\frac{114{,}983\frac{lbs}{yr}}{\left(265\frac{lbs}{\frac{acre}{yr}}\right)\left(60\%\right)}\right)=723\,acres$$

723 acres of Forest Hills Borough's 991 acres of land would have to contribute to a wet pond or wetland BMP to meet sediment reduction requirements.

BMP SECTION 6: MISCELLANEOUS OPTIONS

Forest Buffers – Sediment efficiency of reduction: 50%

Description*:* An area of tress at least 35 feet wide on one side of a stream, usually accompanied by trees, shrubs, and other vegetation that is adjacent to a body of water. The riparian area is managed to maintain the integrity of stream channels and shorelines, to reduce the impacts of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals. (Note – The value represents pollutant load reductions from stormwater draining through buffers.)

Forest Hills Borough:

The Borough of Forest Hills has 493 feet of stream eligible for Forest Buffers. This report will only be considering the runoff within the actual buffer area. More research would have to be done to determine any additional runoff passing through the buffers.

Tree Planting – Sediment efficiency of reduction: 20%

Description*:* The BMP effectiveness values for tree planting are estimated by DEP. DEP estimates the 100 fully mature trees of mixed species (both deciduous and non-deciduous) provide pollutant load reductions for the equivalent of one acre (i.e. one mature tree = 0.01 acre). The BMP effectiveness values given are based on immature trees (seedlings or saplings); the effectiveness values are expected to increase as the trees mature.

To determine the amount of pollutant load reduction that can be credited for tree planting efforts: 1) multiply the number of trees planted by 0.01; 2.) multiply the acreage determined in step 1 by the pollutant loading rate for the land prior to the planting trees (in lbs./acre/year; and 3.) multiply the result of step 2 by the BMP effectiveness values given.

Street Sweeping – Sediment efficiency of reduction: 9%

Description*:* Street sweeping must be conducted 25 times annually. Only count those streets that have been swept at least 25 times in a year. The acres associated with all streets that have been swept at least 25 times in a year would be eligible for pollutant reductions consistent with the given BMP effectiveness values.

$$(44\ Roadway\ Acres)\left(1{,}839\frac{lbs}{\frac{acre}{yr}}\right)(9\%) = 7{,}282\frac{lbs}{yr}$$

BMP PLAN FOR TURTLE CREEK'S SEDIMENT LOAD REDUCTION REQUIREMENTS

Figure 4 - Target Area for BMP Options

The Borough of Forest Hills has a local pond which receives approximately 85% of the total storm sewershed. This fact makes this area the most efficient location to implement BMPs for pollution reduction. A year-long study is proposed to figure out the activity and concentration of the water flowing to this pond. There are two options available to reduce pollutants in this area such as:

- Wet Ponds
- Dry Extended Detention Basins

The sewershed information that drains to this pond is tabulated below:

Land Use	Area (m^2)	Area (acres)	% Impervious	Impervious Area (acres)	Pervious Area (acres)
Developed, Open Space	750,000	185.33	19%	35.21	150.12
Developed, Low Intensity	1,490,000	368.19	49%	180.42	187.78
Developed, Medium Intensity	940,000	232.28	79%	183.50	48.78
Developed, High Intensity	130,000	32.12	100%	32.12	0
Undeveloped Land	490,000	18.00			
Total	3,800,000	**835.93**		**431.26**	**386.68**

Wet Ponds and Dry Extended Detention Basins

Wet ponds are stormwater basins that include a substantial permanent pool for water quality treatment and additional capacity above the permanent pool for temporary runoff storage. Wet ponds should include one or more forebays that trap course sediment, prevent short-circuiting, and facilitate maintenance. The pond perimeter should generally be covered by a dense stand of emergent wetland vegetation.

A dry extended detention basin is an earthen structure constructed either by impoundment of a natural depression or excavation of existing soil, that provides temporary storage of runoff and functions hydraulically to attenuate stormwater runoff peaks. The basin outlet structure must be designed to detain runoff from the stormwater quality design storm for extended periods. Some volume reduction is also achieved in a dry basin through initial saturation of the soil mantle and some evaporation takes place during detention.

Forest Hills Borough has a drainage area leading to the potential wet pond or dry extended detention basin of 836 acres, 421 acres impervious, 387 acres pervious, and 18 acres undeveloped. The amount of sediment loading reduction is calculated as follows:

$$\left[(421\ acres)\left(1{,}839\frac{lbs}{\frac{acre}{yr}}\right)+(387\ acres)\left(265\frac{lbs}{\frac{acre}{yr}}\right)+(18\ acres)\left(234.6\frac{lbs}{\frac{acre}{yr}}\right)\right](60\%)=528{,}598\frac{\text{lbs}}{\text{yr}}$$

Further research and testing will need to be conducted to determine the feasibility of getting this amount of reduction. Chapter 6 of the Pennsylvania Stormwater Best Management Practices Manual has certain design criteria that must be followed in order to achieve this loading amount.

Section F – Identification of Funding Mechanisms

Prior to approving coverage DEP will evaluate the feasibility of implementations of an applicant's PRP. Part of this analysis includes a review of the applicants proposed method(s) by which BMPs will be funded. Applicants must identify all project sponsors and partners and probable funding sources for each BMP.

Possible Funding Possibilities:

- CDBG (Community Development Block Grant)
- CITF (Construction Industry Trust Fund)
- GTRP (Greenways, Trails and Recreation Program)
- PA State (PADEP) Growing Greener (Section 319) Funds for Stream Bank Restoration, Surface Mining Conservation and Reclamation Act and AMD Set-Aside Grant Programs, as well as
- DCNR Stream Bank and Riparian Buffer Restoration Grant Funding
- PADEP Environmental Stewardship and Watershed Protection Act Grants
- NOAA Habitat Conservation Program Grants

Section G – Identification of Responsible Parties for Operation and Maintenance of BMP's.

Once implemented the BMPs must be maintained in order to continue producing the expected pollutant reductions. Applicants must identify the following for each selected BMP:

- The party(ies) responsible for ongoing O&M.
- The activities involved with O&M for each BMP; and
- The frequency at which O&M activities will occur.

Wet Ponds

- During the first growing season vegetation should be inspected every 2 to 3 weeks.
- Wet ponds should be inspected 4 times per year and after major storms.
- Wet pond and buffer vegetation may need support (watering, weeding, mulching, replanting etc.) during the first 3 years.
- Annual harvesting of vegetation may increase the nutrient removal.
- Sediment should be removed from the forebay before it occupies 50% of the forebay, typically every 5 to 10 years.

Dry Extended Detention Basins

- All basin structures expected to receive and/or trap debris and sediment should be inspected for clogging and excessive debris and sediment accumulation at least four times per year, as well as after every storm greater than 1 inch.
- Vegetation should be maintained as necessary.

APPENDIX 1

Public Availability Letter of Proof

The documents for “Appendix 1 - Public Availability Letter of Proof” will be inserted before inclusion of this plan with the Notice of Intent for Permit Renewal, and when the items become available.

APPENDIX 2

Public Advertisement

The documents for “Appendix 2 - Public Advertisement” will be inserted before inclusion of this plan with the Notice of Intent for Permit Renewal, and when the items become available.

APPENDIX 3

Public Comments Received

The documents for “Appendix 3 - Public Comments Received” will be inserted before inclusion of this plan with the Notice of Intent for Permit Renewal, and when the items become available.

APPENDIX 4

Reply Consideration and Changes

The documents for “Appendix 4 - Reply Consideration and Changes” will be inserted before inclusion of this plan with the Notice of Intent for Permit Renewal, and when the items become available.

APPENDIX 5

Maps Included throughout PRP

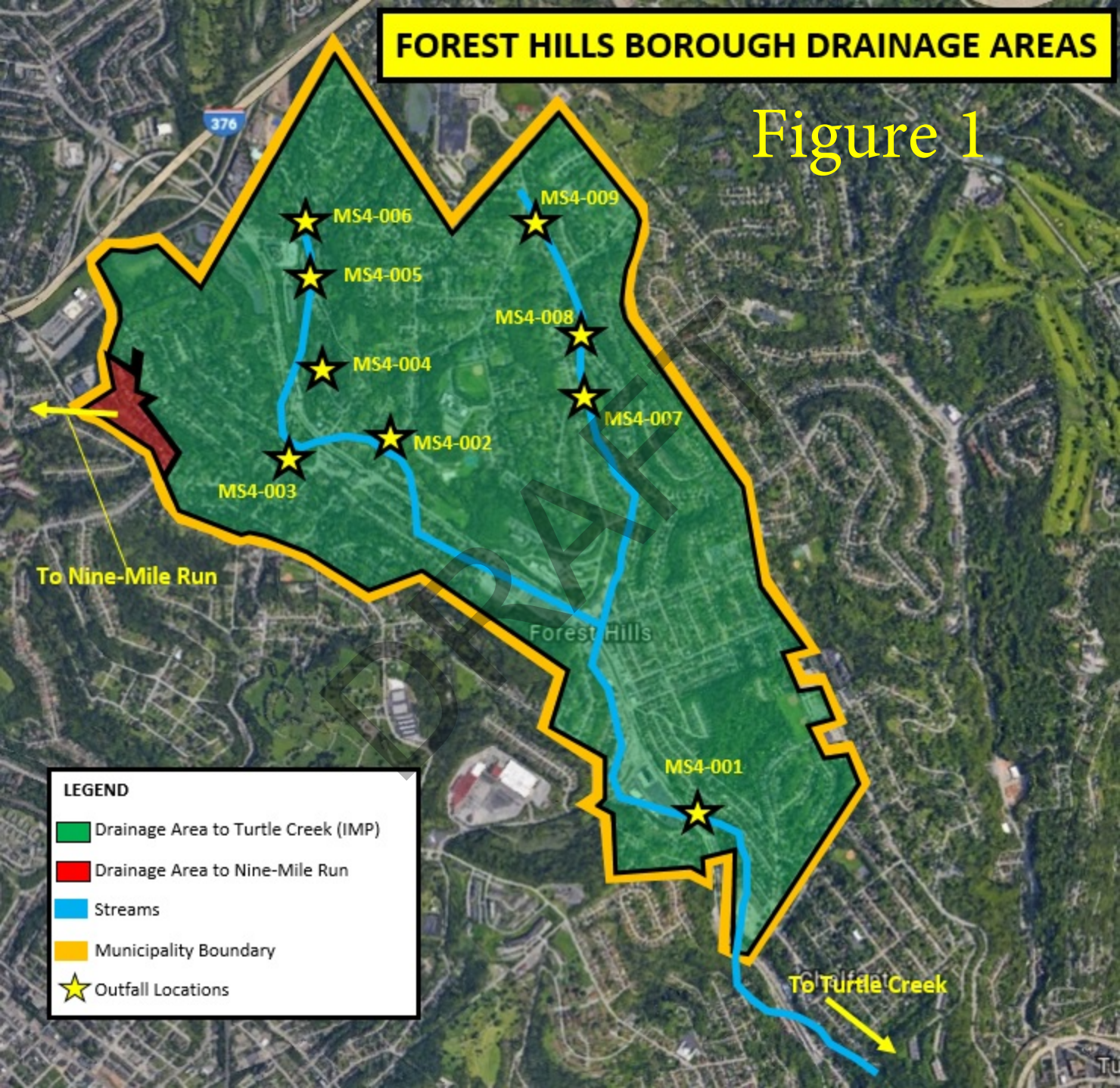

FOREST HILLS BOROUGH DRAINAGE AREAS
Figure 1
376
MS4-006
MS4-009
MS4-005
MS4-008
MS4-004
MS4-007
MS4-002
MS4-003
To Nine-Mile Run
Forest Hills
MS4-001
To Turtle Creek
LEGEND
Drainage Area to Turtle Creek (IMP)
Drainage Area to Nine-Mile Run
Streams
Municipality Boundary
Outfall Locations
DRAFT

Figure 2

Analyze

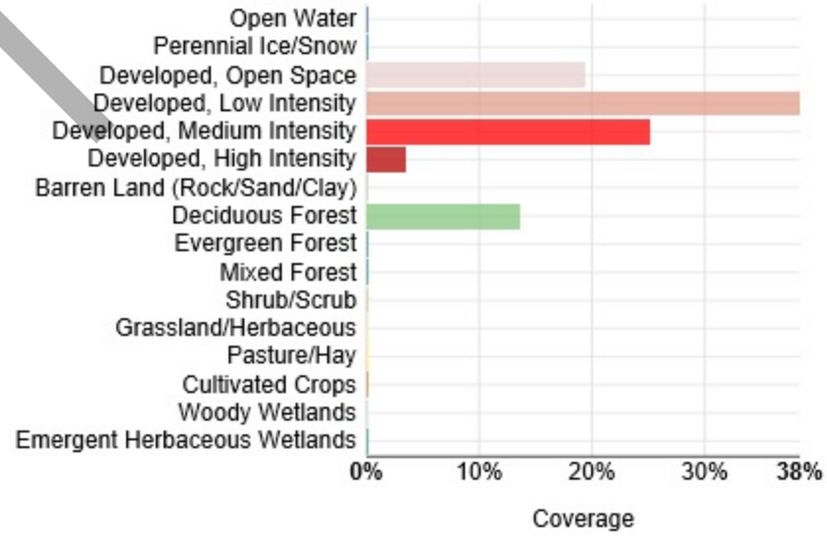
Back | Model

LAND | SOIL | ANIMALS | POINT SOURCES | WATER QUALITY

Selected Area

Total Area 4 km²

Land cover distribution from National Land Cover Database (NLCD 2011)



Type	Area (km²)	Coverage (%)
Open Water	0.00	0.0
Perennial Ice/Snow	0.00	0.0
Developed, Open Space	0.79	19.4
Developed, Low Intensity	1.56	38.4
Developed, Medium Intensity	1.02	25.1
Developed, High Intensity	0.14	3.5
Barren Land (Rock/Sand/Clay)	0.00	0.0
Deciduous Forest	0.55	13.5
Evergreen Forest	0.00	0.0

Figure 3

Analyze

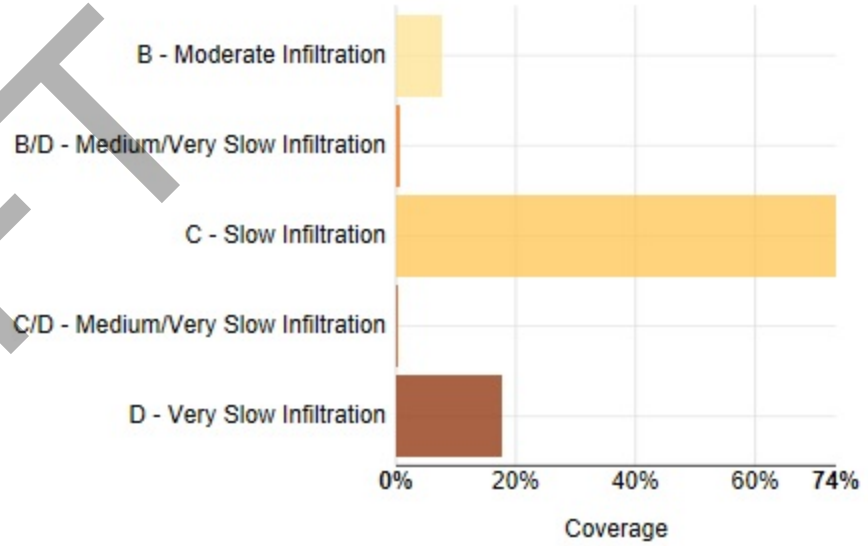
Back | Model

LAND | SOIL | ANIMALS | POINT SOURCES | WATER QUALITY

Selected Area

Total Area 4 km²

Hydrologic soil group distribution from USDA (gSSURGO 2016)



Type	Area (km²)	Coverage (%)
B - Moderate Infiltration	0.31	7.6
B/D - Medium/Very Slow Infiltration	0.03	0.8
C - Slow Infiltration	2.98	73.5
C/D - Medium/Very Slow Infiltration	0.01	0.4
D - Very Slow Infiltration	0.72	17.7

Figure 4

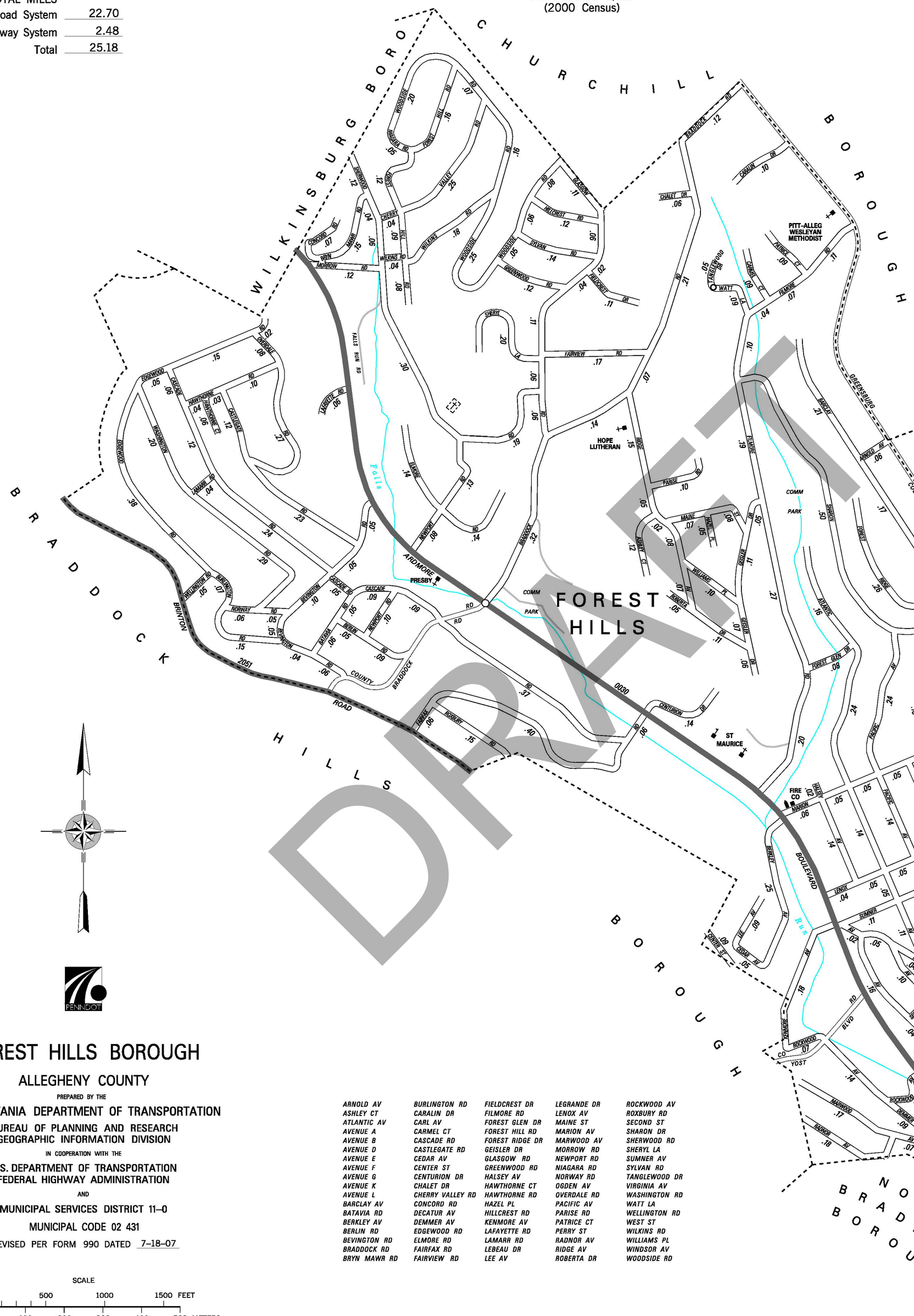
PennDOT Roadway Map for Forest Hills

POPULATION 6,831
(2000 Census)

TOTAL MILES	
Borough Road System	22.70
State Highway System	2.48
Total	25.18

LEGEND

- LIMITED ACCESS HIGHWAY
- 0944 — STATE ROUTE AND NUMBER
- 3019 — STATE MAINTAINED BRIDGE ON BOROUGH STREET
- OAK ST .15 — BOROUGH STREET NAME AND SEGMENT LENGTH IN MILES
- TURNBACK BOROUGH STREET
- BOROUGH ALLEY
- OTHER ROAD
- RAILROAD
- STATE BOUNDARY
- COUNTY BOUNDARY
- TOWNSHIP BOUNDARY
- CITY BOUNDARY
- BOROUGH BOUNDARY
- MUNICIPAL BUILDING
- .70 / 2 — SPLIT MILEAGE BETWEEN MUNICIPALITIES
- 1 — SCHOOL, COLLEGE OR UNIVERSITY
- POINT OF INTEREST



DRAFT

FOREST HILLS BOROUGH

ALLEGHENY COUNTY

PREPARED BY THE

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

BUREAU OF PLANNING AND RESEARCH
GEOGRAPHIC INFORMATION DIVISION

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

AND

MUNICIPAL SERVICES DISTRICT 11-0

MUNICIPAL CODE 02 431

REVISED PER FORM 990 DATED 7-18-07

SCALE

0 500 1000 1500 FEET
0 100 200 300 400 500 METERS

CREATED BY EFH III 12-29-05 REVISED 9-5-07

ARNOLD AV	BURLINGTON RD	FIELDCREST DR	LEGRANDE DR	ROCKWOOD AV
ASHLEY CT	CARALIN DR	FILMORE RD	LENOX AV	ROXBURY RD
ATLANTIC AV	CARL AV	FOREST GLEN DR	MAINE ST	SECOND ST
AVENUE A	CARMEL CT	FOREST HILL RD	MARION AV	SHARON DR
AVENUE B	CASCADE RD	FOREST RIDGE DR	MARWOOD AV	SHERWOOD RD
AVENUE D	CASTLEGATE RD	GEISLER DR	MORROW RD	SHERYL LA
AVENUE E	CEDAR AV	GLASGOW RD	NEWPORT RD	SUMNER AV
AVENUE F	CENTER ST	GREENWOOD RD	NIAGARA RD	SYLVAN RD
AVENUE G	CENTURION DR	HALSEY AV	NORWAY RD	TANGLEWOOD DR
AVENUE K	CHALET DR	HAWTHORNE CT	OGDEN AV	VIRGINIA AV
AVENUE L	CHERRY VALLEY RD	HAWTHORNE RD	OVERDALE RD	WASHINGTON RD
BARCLAY AV	CONCORD RD	HAZEL PL	PACIFIC AV	WATT LA
BATAVIA RD	DECATUR AV	HILLCREST RD	PARISE RD	WELLINGTON RD
BERKLEY AV	DEMMER AV	KENMORE AV	PATRICE CT	WEST ST
BERLIN RD	EDGEWOOD RD	LAFAYETTE RD	PERRY ST	WILKINS RD
BEVINGTON RD	ELMORE RD	LAMARR RD	RADNOR AV	WILLIAMS PL
BRADDOCK RD	FAIRFAX RD	LEBEAU DR	RIDGE AV	WINDSOR AV
BRYN MAWR RD	FAIRVIEW RD	LEE AV	ROBERTA DR	WOODSIDE RD

TYPE 5B MAP FOREST HILLS BOROUGH ALLEGHENY COUNTY PENNSYLVANIA