

Engineering

Environmental

Surveying

**POLLUTION REDUCTION PLAN
(PRP)**

MS4 INDIVIDUAL PERMIT

For

STROUD TOWNSHIP

**Stroud Township
Monroe County, Pennsylvania**

September 16, 2024

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INTRODUCTION

The following PRP is an updated version of the original Stroud Township PRP last revised 7/15/19. It has been augmented with additional projects and more detailed mapping.

Based on the 2020 Census conducted by the U.S. Census Bureau, 15.93 Square Miles of Stroud Township lies within an urbanized area (UA). The Pennsylvania Department of Environmental Protection advised the Township that stormwater discharges from the Municipal Separate Storm Sewer System (MS4) within the urbanized area are regulated under the U.S. Environmental Protection Agency's (EPA) regulations in 40 CFR Section 122.32(a)(1) and require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. Since the majority of the streams in the Township are special protection waters (High Quality Value), an individual NPDES permit is required.

Utilizing the 2024 Water Quality Integrated Report, it has been determined that stormwater runoff from the urbanized area is contributing to the impairment of nine (9) streams in Stroud Township. Three streams, including Sambo Creek, Flagler Run, and Little Pocono Creek are identified as being impaired due to siltation. One stream, an unnamed tributary to the Brodhead Creek, is impaired for Total Suspended Solids and Organic Enrichment due to a treatment plant. The Pocono Creek, Big Meadow Run, McMichael Creek, and Brodhead Creek are listed as impaired due to pathogens. The Delaware River does not flow through Stroud Township but is included on the Stroud Township list as an impaired downstream water with an impairment due to Mercury.

The Pollution Reduction Plan (PRP) focuses on the four streams with sediment impairments. The goal of the plan is to develop Best Management Practices (BMP's) to achieve a 10% minimum reduction in sediment loading of these impaired streams. The reductions are to be achieved in each watershed planning area through the implementation of Best Managements Practices, or within 1 mile of the planning area in the same HUC 12 watershed. Pollutant load reductions must be achieved within 5 years of the issuance of the NPDES permit. Each of the four (4) streams impaired due to sediment are addressed in separate sections in this report. Several BMP options to achieve the required pollutant load reductions have been identified in each of the four impaired watershed areas. Final selection of BMP's will take place after additional field inspection, soils testing and/or negotiations with private property owners, when necessary, have taken place. Additional discussion regarding potential BMP's is included in the narrative for the individual drainage areas, below.

The Township has acquired lands along the Brodhead Creek and McMichael's Creek for the enjoyment of the residents and the public and is committed to preservation of the high-quality streams in the Township. The Townships approach in achieving the pollutant load reductions will be to try to treat the problem at its source(s) and to add supplemental BMP's where necessary. As part of this approach, the township has purchased a street sweeper and been conducting street sweeping to remove sediment from the MS4. This approach requires careful examination of the contributory drainage areas to each of the streams to identify problem areas and sources of pollution.

Water quality specialists with the PADEP Bureau of Clean Water were consulted and sampling data was reviewed to get a better understanding of the reason for the classification of the streams

as “impaired”. This knowledge is important to determine how the Township should focus its efforts. A copy of the sampling reports used in the classification of the streams as “impaired” is included in Appendix G.

The Township will work with the Monroe County Conservation District and PADEP regarding stabilization of earth disturbances on private properties that may be contributing to sediment loads in the streams. Township Ordinances will also be reviewed to determine if there are any violations of the Township Ordinances relating to land use, for which enforcement may have an impact regarding site stabilization and sediment reduction.

PUBLIC PARTICIPATION

The PRP was made available to the public for review and comment as required by PADEP. Public notice of the PRP was published in the Pocono Record on September 12, 2024. A copy of the notice is included in Appendix A of this plan. The public notice was also posted at the Township Building between September 12, 2024 and September 19, 2024. The public was given the opportunity to comment on the PRP plan at a regular meeting of the Township Board of Supervisors on September 19, 2024. Written comments on the PRP were received by the Township and are included in Appendix B. The Township’s consideration of the comments presented in writing and at the public meeting is documented in Appendix C.

MAP

PRP maps for the of the Sambo Creek, Flagler Run, Little Pocono Creek and Tributary to the Brodhead Creek are included in Appendix D. Aerial imagery from 2022 is used as the base. Existing storm water collection and conveyance facilities and BMP’s were located and plotted on the GIS by Stroud Township based on field location and observation, using maps on record with the Township and examining aerial photographs and LIDR topography. Storm sewersheds for each MS4 outfall were plotted based on topographic mapping and field confirmation and are shown on the map as required per the PRP instructions. A “storm sewershed” is defined on PADEP Form 3800-PM-BCW01000d as “the land area that drains to an individual MS4 outfall”. There are large portions of the watersheds for the impaired streams that do not drain to an MS4 outfall and are therefore located outside of the plotted storm sewersheds. Those areas include areas that drain to and along state highways; areas in private residential, commercial and industrial developments; private roads; and areas that drain directly to tributary streams and channels. Where runoff from any these areas mixes in with water to an MS4 outfall, mapped storm sewersheds include the areas. Locations of existing and potential BMP’s are shown on the maps.

SAMBO CREEK

INITIAL IMPAIRMENT DATE AND CAUSE

1998, Construction

DRAINAGE BASIN CHARACTERISTICS

The Sambo Creek drainage basin is about 10.1 square miles in area, and includes land area in Stroud Township, East Stroudsburg Borough, Smithfield Township and Middle Smithfield Township, with the majority located in Smithfield Township. The designated stream use is CWF (cold water fishery). It is listed as supporting for recreation and fish consumption and impaired for aquatic life. Sambo Creek is a Natural Trout Reproduction stream, a PA Scenic River and a

PA Historic Stream. The impaired section of the stream is the lower reach that passes through Stroud Township and East Stroudsburg Borough between the confluence with the Brodhead Creek and extending upstream for about 2 miles to the confluence with Unnamed Tributary 001 to the Sambo Creek. The Blue Mountain Lake Sewage Treatment Plant discharges to the unimpaired section of the Sambo Creek in Stroud Township. The lower, impaired, reach of the stream passes through an area of the Township and East Stroudsburg Borough that has commercial and industrial development.

The majority of the Stroud Township portion of the drainage basin is comprised of private residential developments served by private roads and private lands that drain to state roads or drain directly to the creek or to other tributary streams. There are approximately 2.75 miles of private roads, 1.75 miles of state roads and 2.8 miles of Township roads in the Stroud Township portion of the drainage basin. The developments with private roads include Blue Mountain Lake Estates, Cornerstone Conservancy, Mountain Hollow Estates, Walnut Grove Townhouses and Katie Lane Apartments. Only very small portions of those developments where stormwater mixes with the channelized flow along Township roads were included in the storm sewershed mapping.

There is an intermittent/ephemeral stream that is tributary to the Sambo Creek that discharges to the impaired section of the Sambo Creek during larger storm events. The intermittent stream passes through the Mountain Hollow residential development and the 84 Lumber property. It then flows under Brushy Mountain Road through a culvert. Below the culvert, the stream flows in a man-made ditch along Route 447 and is better defined as an ephemeral stream, only having flow during periods of surface runoff. It flows into a retention basin at the intersection of Learn Lane and Route 447 which discharges to gently sloping, well drained fields in the Learn Lane/Cobble Road area, and during larger, less frequent storms, overflows to the Sambo Creek. During the less intense, more frequent rainfall events, water from the stream is infiltrated in the basin and the well-drained fields adjacent to the Sambo Creek and does not discharge directly to the Sambo Creek. This stream originally flowed under Route 447 and the railroad to the Brodhead Creek, as is shown on the 1977 SCS Soils Survey Map for Monroe County. In the 1960's the flow to the Brodhead Creek was cut off by industrial development. Based on historic aerial photos, two buildings were erected in the area where the intermittent stream once flowed at some time between 1963 and 1969. This stream alteration has resulted in flooding problems during larger storm events near the intersection of Route 447 and Brushy Mountain Road and in the Learn Lane area, where there is no defined channel. Based on Township records, the Township has been exploring possible remedies since the mid to late 1970's. On December 31, 1996, PADEP issued Permit #E45-284A to 84 Lumber for further alteration to the alignment of the natural intermittent stream.

POLLUTANT OF CONCERN

Siltation

EXISTING POLLUTANT LOADINGS

Existing pollutant loading calculations are included in Table 1a in Appendix E. The PennDOT rights-of-way (Rt. 447 and Mill Creek Road) were parsed out. Land area located upstream of MS4 conveyances that are not contributory to the MS4's were also parsed out. There are three properties that have existing BMP's, as set forth in Table 2a in Appendix E. The maximum potential load reductions that may be achieved was calculated, however the reductions were not

considered in calculating the existing loads in Table 1a. Loading rates for impervious developed areas and pervious developed areas were taken from the “Developed Land Loading Rates for PA Counties” included as Attachment B to the PADEP PRP Instructions.

PROPOSED BMP’S

Table 3a in Appendix F lists several BMP options that the Township may implement to reduce sediment loads and includes sediment load reduction calculations that are anticipated for each BMP. The BMP’s are listed in order of priority with the BMP’s to be considered first at the top of the list. The BMP’s being considered are described below.

Streambank Stabilization: The intermittent stream channel that parallels Route 447 has been eroding and is in an unstable condition. Periodic flooding along Route 447 in this area occurs. It would be beneficial to the Township and PennDOT to be partners on this project. The Township has initiated discussions with PennDOT. Some funding from impact fees from an upstream developer may be available for this project. The Township is also exploring PennVest funding for this project.

There is also a section of the unnamed intermittent stream on the 84 Lumber property in the section of stream that was realigned according to a PADEP permit that is eroding.

Planting Trees/Reforest Stream Buffer: This BMP is not a selected BMP at this time since the locations are located outside of the storm sewershed areas. Potential locations for forested buffer restoration along Sambo Creek are plotted on the map and are listed in Table 3a as potential future BMP’s should PADEP change the location criteria for these BMP’s since riparian buffers are recognized as a useful BMP in “providing natural, long-term sustainability for aquatic resource protection and water quality enhancement.”¹

Stroud Township would have to contact landowners with properties adjacent to the Sambo Creek to determine if there is an opportunity to partner with them to restore a wooded buffer area along the stream. The properties on which there may be an opportunity to establish a wooded buffer include the Oiler property, the Halterman property and the Flek property.

Retrofit of Existing BMP’s: Potential locations for retrofits of existing BMP’s are plotted on the map and are listed in Table 3a as potential future BMP’s. Calculations for TSS removal will be provided in the future if those BMP’s are selected for implementation. Local property owners that have existing dry detention basins at the Tobyhanna Credit Union property and the Blue Mountain Lake Club would have to be contacted to determine whether there are opportunities to retrofit the basins. There may also be an opportunity to retrofit the swales in front of the Hayward Labs property. The detention basin adjacent to Rt. 447 in the Learn Lane area on the Giambalvo property may also be examined to determine if retrofits are possible.

Bioretention/Raingardens: There is a sizable area mapped as soils with good infiltrative capacity (HSG A), however these areas are on privately owned property. Bioretention/Raingardens will be

¹ PA Bulletin, Vol. 40, No. 34, August 21, 2010, Rules and Regulations, Title 25 – Environmental Protection [25 PA CODE Ch. 102]

designed and constructed in accordance with the Pennsylvania Stormwater Best Management Practices Manual.

Street Sweeping: The township has obtained a street sweeper and is proposing to utilize to reduce a portion of the required sediment reduction. The potential streets for sweeping are listed in Appendix F.

Storm Sewer System Solids Removal: The township has obtained a street sweeper and is proposing to utilize it to perform storm sewer sediment removal of inlets, pipes, and outlets to reduce a portion of the required sediment reduction. The potential streets for solids removal are listed in Appendix F.

Inspection & Maintenance of Existing BMP's: Some existing stormwater detention basins, drywells and subsurface infiltration systems have been identified and shown on the map. A program for regular inspection and follow up with property owner's to ensure they are being properly maintained would be beneficial.

Specific BMP's will be selected from the list after further study by the Township. Load reduction calculations for each BMP listed are included in Appendix F.

FLAGLER RUN

INITIAL IMPAIRMENT DATE AND CAUSE

2002, Urban Runoff/Storm Sewers

DRAINAGE BASIN CHARACTERISTICS

The Flagler Run drainage basin is about 1.89 square miles in area and is entirely located within Stroud Township. The entire drainage basin is located within Stroud Township. The designated stream use is HQ-CWF (High Quality, Cold Water Fishery). It is listed as supporting for recreational use and impaired for aquatic life. Approximately 1650 feet of the stream through the Stroud Mall property was enclosed in a pipe in the late 1970's, when the mall was built. The impaired reach of the Flagler Run coincides with that piped section of stream and a short segment (about 100 feet) between the discharge end of the pipe and the confluence with the Pocono Creek. The majority of Flagler Run, located upstream of the stream enclosure, is not impaired. All but one of the identified MS4 storm sewersheds discharge to the upper, unimpaired reach of the stream in the residentially developed areas. Stormwater from the Stroud Mall, Route 611 and many of the commercially developed properties in the Flagler Run drainage basin discharge directly to the impaired section of the stream. These are areas that not located in a Township MS4 storm sewershed. There are about 3 miles of state roads in the drainage basin, including Route 611, Chipperfield Drive, Clearview Drive, Cranberry Road and Wigwam Park Road. There are many areas in the drainage basin that are wooded and that discharge directly to the stream or its natural tributaries. There are also some portions of Township roads from which water flows as sheet flow to the streams and wetlands.

The majority of the residential areas utilize on-lot sewage disposal systems. The commercial area and limited residential areas in the Route 611 corridor are served by the Township's central sewage system.

POLLUTANTS OF CONCERN

Siltation, Flow Alterations, Other Habitat Alterations, Unknown Toxicity

EXISTING POLLUTANT LOADINGS

Existing pollutant loading calculations are included Table 1b in Appendix E. PennDOT rights-of-way were parsed out of three (3) of the storm sewersheds. There is an existing subsurface infiltration trench on the Berean Bible Church property as set forth in Table 2b in Appendix E. The maximum potential load reduction from this BMP was calculated, however the reduction was not considered in calculating the existing loads in Table 1b. Loading rates for impervious developed areas and pervious developed areas were taken from the “Developed Land Loading Rates for PA Counties” included as Attachment B to the PADEP PRP Instructions. Based on the calculations, a TSS reduction of 15,521.26 lbs/yr is required for the watershed.

PROPOSED BMP’S

Table 3b in Appendix lists several BMP options that the Township may implement to reduce sediment loads and includes sediment load reduction calculations that are anticipated for each BMP. The BMP’s being considered are described below.

Reduction in Impervious Surfaces: The Township will be reaching out to owners of the commercial properties that are located in the MS4 storm sewershed to develop partnerships in the effort to reduce sediment pollution from this area. There appears to be opportunities for reduction in impervious surfaces that would not impact the use of the properties.

Vegetated Swales: There are several locations where vegetated swales may be a viable BMP along the more gently sloping portions of the roads. Areas that lack stable swales to convey concentrated flows along roads will be considered before other potential locations. Vegetated swales will be designed and constructed in accordance with the Pennsylvania Stormwater Best Management Practices Manual.

Bioretention/Raingardens: There appear to be opportunities to install raingardens, in some cases, in conjunction with the reductions of impervious surfaces, noted above. Bioretention/Raingardens will be designed and constructed in accordance with the Pennsylvania Stormwater Best Management Practices Manual.

Planting Trees: The majority of the MS4 storm sewersheds in this drainage basin are already wooded so potential use of this BMP is limited. There are some areas along the Township roads that lie within the MS4 storm sewersheds where street trees could be planted.

Street Sweeping: The township has obtained a street sweeper and is proposing to utilize to reduce a portion of the required sediment reduction. The potential streets for sweeping are listed in Appendix F.

Storm Sewer System Solids Removal: The township has obtained a street sweeper and is proposing to utilize it to perform storm sewer sediment removal of inlets, pipes, and outlets to reduce a portion of the required sediment reduction. The potential streets for solids removal are listed in Appendix F.

LITTLE POCONO CREEK

INITIAL IMPAIRMENT DATE AND CAUSE

2014, Highway/Road/Bridge Runoff, Urban Runoff/Storm Sewers

DRAINAGE BASIN CHARACTERISTICS

The Little Pocono Creek drainage basin is about 1.53 square miles in area. The designated stream use is HQ-CWF (High Quality-Cold Water Fishery). Little Pocono Creek is a Natural Trout Reproduction stream, a PA Scenic River and a PA Historic Stream. The majority of the drainage basin is located in Stroud Township with a small portion at the headwaters located in Hamilton Township and a small portion near the confluence with Pocono Creek located in Stroudsburg Borough. The upper reach of the Little Pocono Creek meanders along and crosses State Route 209. The creek also crosses Interstate 80 and the Exit 305 ramp from Route 80. The drainage area is developed primarily with residential subdivisions with lot sizes ranging from about 0.25 to 1.5 acres. There are also areas of commercial and industrial development and old farm lands. Two of the older areas of residential development are located in relatively flat areas that underlain by very well drained soils. Stormwater runoff from those areas is collected in existing drywells or in depressions and infiltrates into the soil, so there is no concentrated discharge to the creek.

The Butler Park commercial/industrial subdivision and some of the commercial area along West Main Street and residential areas at the westerly end (upper reaches) of the drainage basin utilize on-lot sewage disposal systems. Other developed areas in the drainage basin are served by the central sewer system.

POLLUTANTS OF CONCERN

Siltation

EXISTING POLLUTANT LOADINGS

Existing pollutant loading calculations are included in Table 1c in Appendix E. Existing BMP's in the drainage basin are shown on the map. The PennDOT rights-of-way (Highway 209 and Business Rt. 209) were parsed out. Maximum sediment load reductions from existing drywells and an existing infiltration trench were calculated and are presented in Table 3c in Appendix E, however the reduction was not considered in calculating the existing loads in Table 1c. Loading rates for impervious developed areas and pervious developed areas were taken from the "Developed Land Loading Rates for PA Counties" included as Attachment B to the PADEP PRP Instructions. Based on the calculations, a TSS reduction of 9395.99 lbs/yr is required for the watershed.

PROPOSED BMP'S

Table 3c lists several BMP options that the Township may implement to reduce sediment loads and includes sediment load reduction calculations that are anticipated for each BMP. The BMP's are listed in order of priority with the BMP's to be considered first at the top of the list. The BMP's being considered are described below.

A portion of the Little Pocono Creek drainage basin is in the area that is part of the PennDOT Interstate 80 reconstruction project, however that work should not impact the location of proposed BMP's since very little of the MS4 storm sewersheds are located in the I-80 work area.

Streambank Stabilization: The Pocono Creek is within 1 mile of the sewershed in both Flagler Run and Little Pocono Creek and is in the same HUC 12 watershed. A portion of the Pocono Creek banks have eroded and sediment deposited. The township owns the property along a 2,100 foot stretch of the stream. Stream restoration of this section would provide a significant reduction in sediment directly to the stream. The stream restoration would be designed to meet PA DEP MS4 Stream Restoration Eligibility checklist.

Vegetated Swales: There are several locations where vegetated swales may be a viable BMP along the more gently sloping portions of the road. Some of the areas identified in Table 3c are in areas with well drained soils which would promote infiltration. Areas that lack stable swales to convey concentrated flows along roads will be considered before other potential locations. Vegetated swales will be designed and constructed in accordance with the Pennsylvania Stormwater Best Management Practices Manual. The PADEP Water Quality Specialist thought that decreasing stream energy may be beneficial in this drainage basin. The use of vegetated swales, coupled with some energy dissipaters may help to decrease energy of flows entering the stream.

Forest Buffers: Riparian buffers are recognized as a useful BMP in “providing natural, long-term sustainability for aquatic resource protection and water quality enhancement.”² Two areas along the Little Pocono Creek along which there is no forested stream buffer. The PADEP Water Quality Specialist stated that some of the field measurements reported in the sampling data are indicative of an open landscape and farming activity so this may be a BMP that would be beneficial in this watershed. This BMP is not a selected BMP at this time since the locations are located outside of the storm sewershed areas and do not meet PADEP’s criteria for use as a TSS reduction BMP. Potential locations for forested buffer restoration along Little Pocono Creek are plotted on the map and are listed in Table 3c as potential future BMP’s should PADEP change the location criteria. The Township would have to try to get cooperation from private property owners.

Planting Trees: The majority of the MS4 storm sewersheds in this drainage basin are already wooded so potential use of this BMP is very limited. There are some areas along the Township roads that lie within the MS4 storm sewersheds where street trees could be planted.

Street Sweeping: The township has obtained a street sweeper and is proposing to utilize to reduce a portion of the required sediment reduction. The potential streets for sweeping are listed in Appendix F.

Storm Sewer System Solids Removal: The township has obtained a street sweeper and is proposing to utilize it to perform storm sewer sediment removal of inlets, pipes, and outlets to reduce a portion of the required sediment reduction. The potential streets for solids removal are listed in Appendix F.

² PA Bulletin, Vol. 40, No. 34, August 21, 2010, Rules and Regulations, Title 25 – Environmental Protection [25 PA CODE Ch. 102]

UNNAMED TRIBUTARY (UNT 6) TO BRODHEAD CREEK

INITIAL IMPAIRMENT DATE AND CAUSE

2002, Package Plant or Other Permitted Small Flows Discharges

DRAINAGE BASIN CHARACTERISTICS

The drainage basin of unnamed tributary to the Brodhead Creek (known locally as Cranberry Run) is about 3.1 square miles in area. The designated stream use is HQ-CWF (High Quality-Cold Water Fishery). It is listed as supporting for recreation and fish consumption and impaired for aquatic life. It is a Natural Trout Reproduction stream, a PA Scenic River and a PA Historic Stream. The impaired section of the stream begins at the Penn Estates treatment plant discharge. The Penn Estates private development accounts for about 40% of the drainage area to the stream. The lower reach of the stream primarily runs along the edge of the Urbanized Area near Hallet Road, with a portion of the stream located outside the Urbanized Area. With the exception of the Penn Estates development, the land in the contributory drainage area to this stream is relatively rural and wooded. Sewage from properties in Penn Estates is treated at the Penn Estates Sewage Treatment Plant, which discharges to the stream just upstream of Hallet Road. Properties outside of Penn Estates utilize on-lot sewage systems.

POLLUTANTS OF CONCERN

Siltation and Organic Enrichment/Low D.O.

During the course of my field work to identify and locate stormwater outfalls, collection and conveyance systems and BMP's, a layer of silt was previously observed covering the stream bed. The silt was observed in the stream on the upstream side of the Hallet Road culverts located near the intersection of Penn Estates Drive, just downstream of the sewage treatment plant that serves Penn Estates. The silt was also observed at downstream points. This condition was not observed in tributaries to the stream in question. In reviewing the sample data for this stream, the PADEP Water Quality Specialist thought that the reason for the classification of the stream as impaired was due to the flow violations by the Penn Estates Utilities sewage treatment plant. He said that the assessment was made in the 1990's while Penn Estates Utilities was under court order to upgrade the plant and that the stream hasn't been reassessed since that time.

EXISTING POLLUTANT LOADINGS

Existing pollutant loading calculations are included in Table 1d in Appendix E. An area located downstream of the urbanized area was parsed out of one of the storm sewersheds. Loading rates for impervious developed areas and pervious developed areas were taken from the "Developed Land Loading Rates for PA Counties" included as Attachment B to the PADEP PRP Instructions. Based on the calculations, a TSS reduction of 299.42 lbs/yr is required for the watershed.

Stormwater runoff from the roads and areas within the Penn Estates subdivision may be contributing to the stream impairment. There is also a power line and power line access roads that traverse some steep grades in the contributory drainage area of the stream that are not located in the Township MS4 that may be a source of sediment pollution. Since these areas are not located in Township MS4 storm sewersheds, they are not being addressed in this PRP.

PROPOSED BMP'S AND PLAN OF ACTION

Table 3d lists several BMP options that the Township may implement to reduce sediment loads and includes sediment load reduction calculations that are anticipated for each BMP. The BMP's are listed in order of priority with the BMP's to be considered first at the top of the list. The BMP's being considered are described below.

Vegetated Swales: Vegetated swales may be a viable BMP along the more gently sloping portions of the road. Two areas along Hallet Road have been identified in the table as potential sites for vegetated swales. The use of a vegetated swale below the Township culvert that discharges onto private property is included on the list of proposed BMP's. An alternate option the Township may explore is the construction of a level spreader to allow sheet flow across the existing meadow to the stream. Vegetated swales will be designed and constructed in accordance with the Pennsylvania Stormwater Best Management Practices Manual.

Rain Garden: Construction of a defined, stable swale along Beacon Hill Road and rain garden at the intersection of Beacon Hill Road and Hallet Road is a BMP option that the Township will be exploring.

Forested Buffers: There is one private property along an intermittent stream that is tributary to the impaired stream that does not have a forested stream buffer. It is identified in the Proposed BMP Table as one of the potential BMP options.

Planting Trees: The majority of the MS4 storm sewersheds in this drainage basin are already wooded so potential use of this BMP is very limited.

Street Sweeping: The township has obtained a street sweeper and is proposing to utilize to reduce a portion of the required sediment reduction. The potential streets for sweeping are listed in Appendix F.

Storm Sewer System Solids Removal: The township has obtained a street sweeper and is proposing to utilize it to perform storm sewer sediment removal of inlets, pipes, and outlets to reduce a portion of the required sediment reduction. The potential streets for solids removal are listed in Appendix F.

FUNDING SOURCES

At this time there are no Federal or State funding programs for design and installation of BMP's required for compliance with the MS4 program. As such, funding is the responsibility of the Township. The Township will explore several funding options, including:

- Applying for grants when available
- Developing partnerships with other groups such as the Brodhead Creek Watershed Association, DRBC and The Nature Conservancy in obtaining grants
- Partnering with private property owners in implementing preventative measures and installation and maintenance of BMP's
- Partnering with adjacent municipalities
- Partnering with PennDOT
- Developing a program for stormwater user fees
- Budgeting Township funds for the program.

Final selection of BMP's may depend on available funding sources, including grants.

OPERATION AND MAINTENANCE OF BMP'S

Operation and maintenance of proposed BMP's shall be the Responsibility Township and/or its partners according to written agreements. Operation and maintenance requirements for each type of BMP are described below.

Streambank Stabilization: Inspect biannually and after major storm events (> 1 inch of rainfall) for the first two years. Inspect annually after the first two years. Repair any eroded sections, as needed.

Vegetated Swales: Inspect annually and within 48 hours after every major storm event (> 1 inch of rainfall) and perform required maintenance, as follows:

- Inspect and correct erosion problems, damage to vegetation, sediment accumulation > 3", and debris accumulation.
- Inspect vegetation on side slopes for erosion and formation of rills or gullies and repair and stabilize as needed.
- Inspect for pools of standing water. If needed, dewater and discharge to an approved location and restore swale to design grade.
- Inspect for litter. Remove litter before mowing.
- Mow and trim vegetation to ensure safety, aesthetics, and proper swale operation and to suppress weeds and invasive vegetation. Dispose of cuttings in a local composting facility. Mowing shall only occur when swale is dry to avoid rutting.
- Inspect for uniformity in cross-section and longitudinal slope and correct as needed.
- Inspect swale inlets (curb cuts, pipes, etc.) and swale outlet for signs of erosion or blockage and correct as needed.

Additional maintenance items, as needed

- Reseed bare areas and install appropriate erosion control measures when soil is exposed or erosion channels are forming.
- Replant alternative grass species in the event of unsuccessful establishment.
- Rototill and replant swale if ponded water draw down time is more than 48 hours.
- Inspect and correct check dams when signs of altered water flow (channelization, obstructions, erosion, etc.) are observed.
- Water during dry periods as necessary to maintain vegetative cover.

Bioretention/Rain Gardens: Inspect at least twice a year and perform maintenance, as follows:

- Inspect and correct erosion problems, damage to vegetation, sediment accumulation and debris accumulation.
- Protect vegetation from wildlife foraging, replace plantings as needed and remove detritus each year.
- Remove weeds and invasive species.
- Water as needed to establish vegetation and during periods of drought
- Replenish mulch when erosion is evident and as needed. The entire area may need mulch replacement once every two (2) to three (3) years.

- Monitor after rainfall events to ensure water is draining in the prescribed amount of time. If water fails to drain properly, enlist the services of an engineer to evaluate and make recommendations for repair.

Forested Buffers & Tree Planting: Planting shall occur in the fall. The following inspection and maintenance is required the first three (3) to five (5) years:

- Water as necessary.
- Mulching - Maintain a 2-4 inch layer of mulch around the plantings. Organic mulch consisting of woodchips, leaves, and twigs that are stockpiled for 6 months to a year.
- Weed/ Invasive Species Control - Mow annually to control invasive species; Apply a carefully selected herbicide around tree shelters/tubes, as necessary and use selective cutting and manual methods of removal, as necessary.
- Protect plantings from wildlife foraging and replace plantings, as needed.
- Inspect and repair tree shelters, as necessary, including, repair of broken stakes, tightening of stake lines, straightening leaning tubes; cleaning debris from tubes; removal of netting as tree grows; and removal when tree is approximately 2” wide.

After three (3) years, conditions should be assessed to determine if annual maintenance still be required to establish tree growth and a tree canopy that will naturally inhibit weed growth. Once the tree canopy is established, intermittent inspection is required to determine if tree replacement is needed.

Street Sweeping: Sweeping shall occur a minimum of 25 times per year. Develop and maintain a schedule for sweeping based on the expected pollutants loads which will vary based on traffic, potential for wash-on of sediment from upslope pervious surfaces and winter road applications. Adjustments to the schedule may be necessary if any of those factors changes.

Dry Extended Detention Basins (Retrofit): Inspect basin annually and within 48 hours after every major storm event (> 1 inch of rainfall) and perform necessary maintenance activities, as follows:

- Inspect basin structures including the basin bottom and side slopes, outlet structures, trash rack, riprap structures, gabion structures
- Remove accumulated sediment when the basin is completely dry and immediately revegetate and stabilize disturbed area. Sediment shall be properly disposed of.
- Vegetated areas shall be inspected for erosion, unwanted growth of exotic/invasive species. Unwanted species shall be removed and replaced with alternate vegetation. Eroded areas shall be repaired and revegetated.
- Maintain a vegetative cover of 95%. Reestablish vegetative cover when needed.

Water Quality Filters and Hydrodynamic Devices: Manufacturer’s guidelines shall be followed, taking into account the expected pollutant loads and site conditions. The devices and inlets shall be inspected after major storm events (> 1 inch of rainfall) and cleaned at least twice a year or when over half full of sediment and/or trash. The removed sediment and debris shall be properly disposed of.

APPENDIX A

PUBLIC NOTICE

APPENDIX B

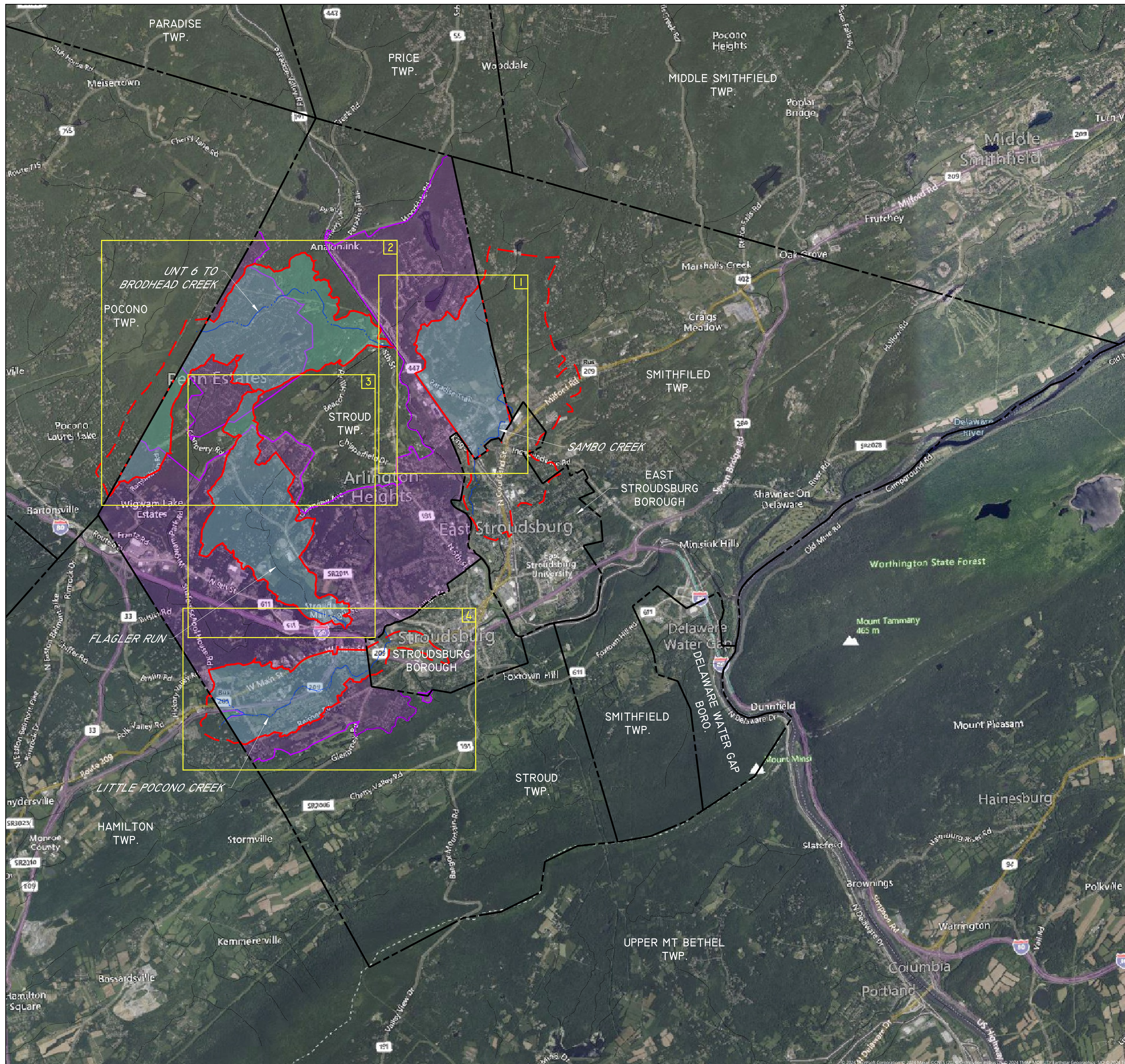
PUBLIC COMMENTS

APPENDIX C

RECORD OF CONSIDERATION OF COMMENTS

APPENDIX D

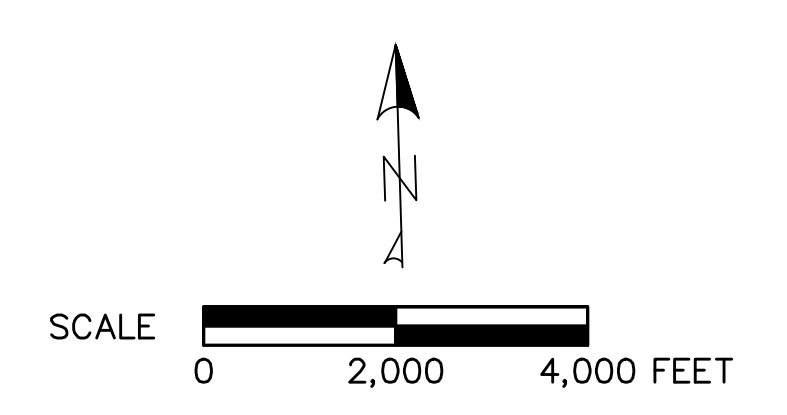
MAPS



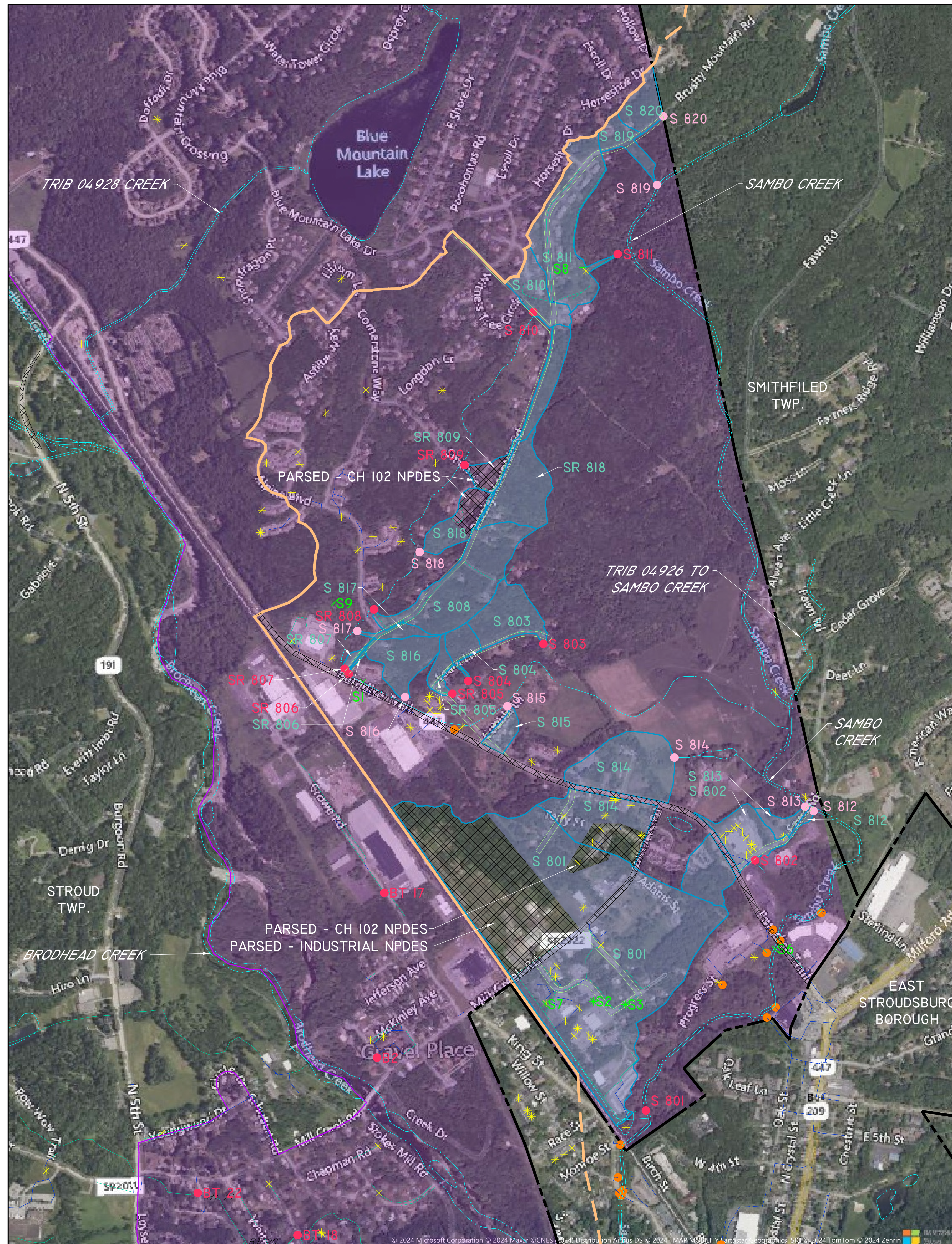
LEGEND

- MAP EXTENT
- IMPAIRED STREAM
- STREAM WATERSHED
- EAST STROUDSBURG 2020 UZA
- STREAM
- MUNICIPAL BOUNDARY

- NOTES:**
1. DRAINAGE BOUNDARIES HAVE BEEN DEVELOPED UTILIZING LIDAR TOPOGRAPHY AT 2' CONTOUR INTERVALS AND FROM FIELD VISITS.
 2. ALL PRP MS4 SEWERSHEDS HAVE BEEN DELINEATED, WHICH WERE IDENTIFIED AS OUTFALLS TO AN IMPAIRED STREAM WITHIN AN URBAN AREA THAT INCLUDED A STORM SYSTEM, GUTTER, AND SWALE ALONG MUNICIPALLY OWNED ROADS/PROPERTY.
 3. STATE ROADS, PRIVATE DEVELOPMENTS, AND SCHOOL PROPERTIES WITHIN A PRP SEWERSHED HAVE BEEN PARSED.
 4. SAMBO CREEK AND UNT 6 TO BRODHEAD CREEK ARE WITHIN THE HUC 12: LOWER BRODHEAD CREEK WATERSHED (020401040905). FLAGLER RUN AND LITTLE POCONO CREEK ARE WITHIN THE HUC 12: LOWER POCONO CREEK WATERSHED (020401040804).
 5. STREAMS MAPPED UTILIZING PA DEP EMAP, LIDAR TOPOGRAPHY, USGS STREAM STATS, AND AERIAL IMAGERY.



STROUD TOWNSHIP		Drawn By: EJ
MS4 POLLUTION REDUCTION PLAN		Checked By: JPS
STROUD TOWNSHIP, MONROE COUNTY PENNSYLVANIA		Approved By: JPS
MAP KEY		Date: 3/2024
		Scale: 1" = 2,000' Project No: 10001.65
		411 Main Street Stroudsburg, PA 18360 Tel: 570.421.7320 Fax: 570.421.7290 www.reillyengineering.com

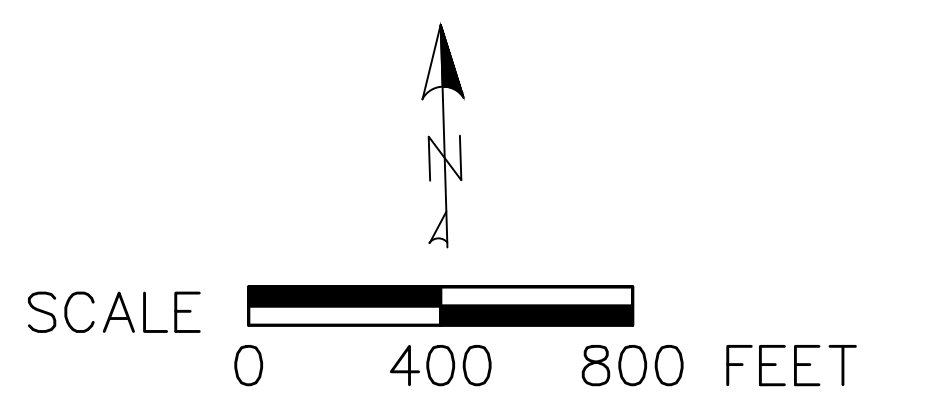


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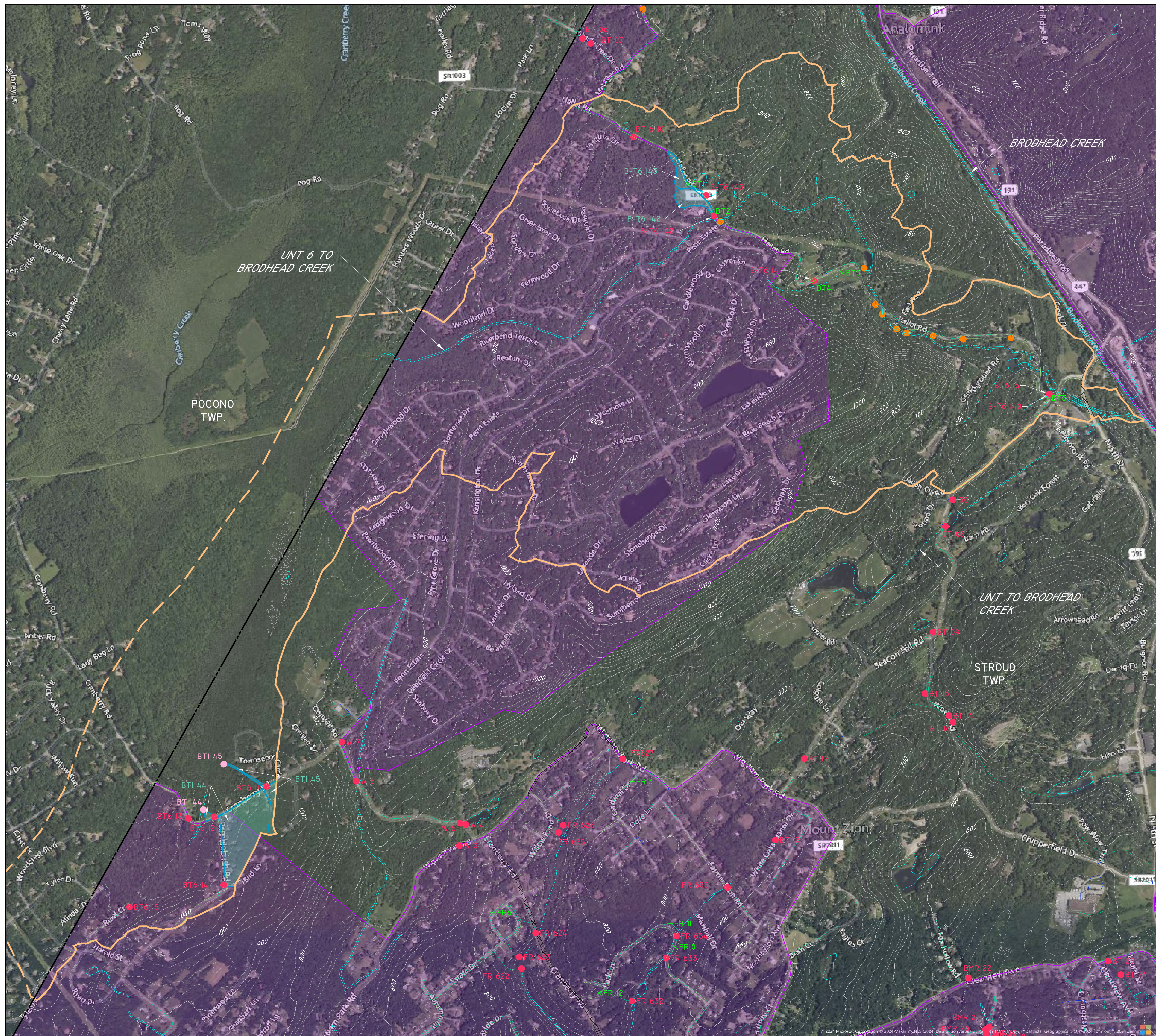
- * EXISTING BMP
- * PROPOSED BMP
- NON-MS4 OUTFALL
- MS4 OUTFALL
- NEW OUTFALL
- INTERMITTENT STREAM
- STREAM
- CULVERT / STORM PIPE
- TOWNSHIP ROAD
- CONTOUR
- OVERALL DRAINAGE AREA
- MUNICIPAL BOUNDARY
- PARSED AREA
- PRP MS4 WATERSHED
- EAST STROUDSBURG 2020 UZA

NOTES:

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4. SAMBO CREEK AND UNT 6 TO BRODHEAD CREEK ARE WITHIN THE HUC 12: LOWER BRODHEAD CREEK WATERSHED (020401040905). FLAGLER RUN AND LITTLE POCONO CREEK ARE WITHIN THE HUC 12: LOWER POCONO CREEK WATERSHED (020401040804).
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STROUD TOWNSHIP		Drawn By: Ev
MS4 POLLUTION REDUCTION PLAN		Checked By: JPS
STROUD TOWNSHIP, MONROE COUNTY PENNSYLVANIA		Approved By: JPS
MAP 1		Date: 9/2024
		Scale: 1" = 400' Project No: 10001.65
411 Main Street Stroudsburg, PA 18360 Tel: 570.421.7320 Fax: 570.421.7290 www.reillyengineering.com		

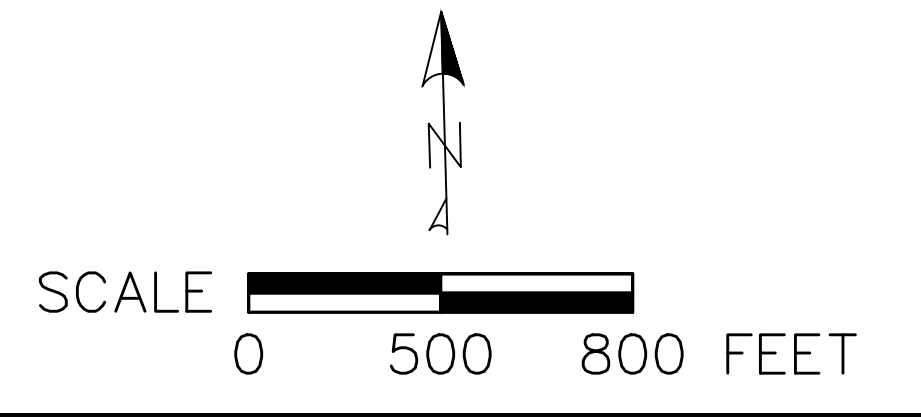


LEGEND

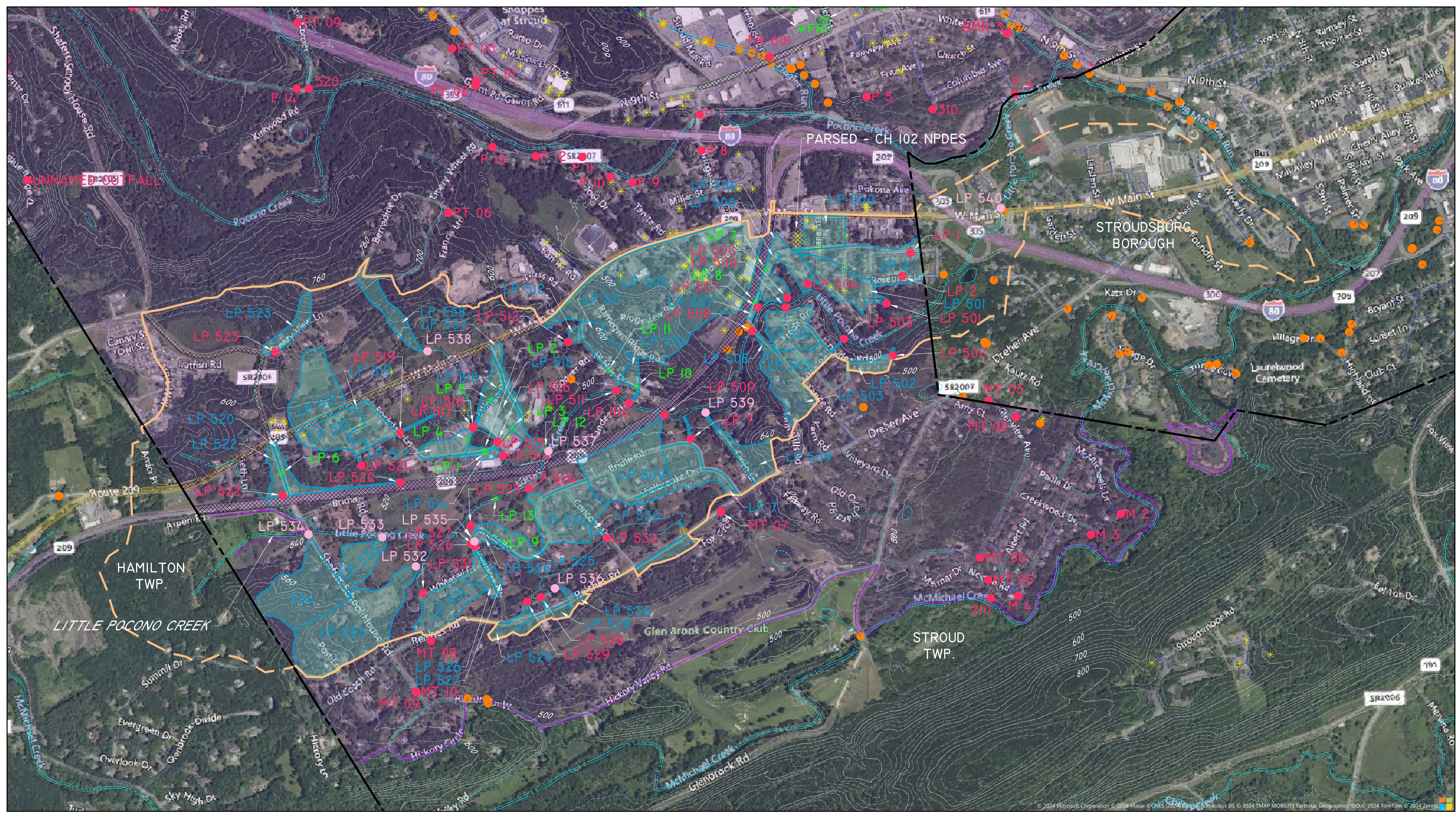
- * EXISTING BMP
- * PROPOSED BMP
- NON-MS4 OUTFALL
- MS4 OUTFALL
- NEW OUTFALL
- INTERMITTENT STREAM
- STREAM
- CULVERT / STORM PIPE
- TOWNSHIP ROAD
- CONTOUR
- MUNICIPAL BOUNDARY
- OVERALL DRAINAGE AREA
- PARSED AREA
- PRP MS4 WATERSHED
- EAST STROUDSBURG 2020 UZA

NOTES:

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3. STATE ROADS, PRIVATE DEVELOPMENTS, AND SCHOOL PROPERTIES WITHIN A PRP SEWERSHED HAVE BEEN PARSED.
4. SAMBO CREEK AND UNT 6 TO BRODHEAD CREEK ARE WITHIN THE HUC 12: LOWER BRODHEAD CREEK WATERSHED (020401040905). FLAGLER RUN AND LITTLE POCONO CREEK ARE WITHIN THE HUC 12: LOWER POCONO CREEK WATERSHED (020401040804).
5. STREAMS MAPPED UTILIZING PA DEP EMAP, LIDAR TOPOGRAPHY, USGS STREAM STATS, AND AERIAL IMAGERY.



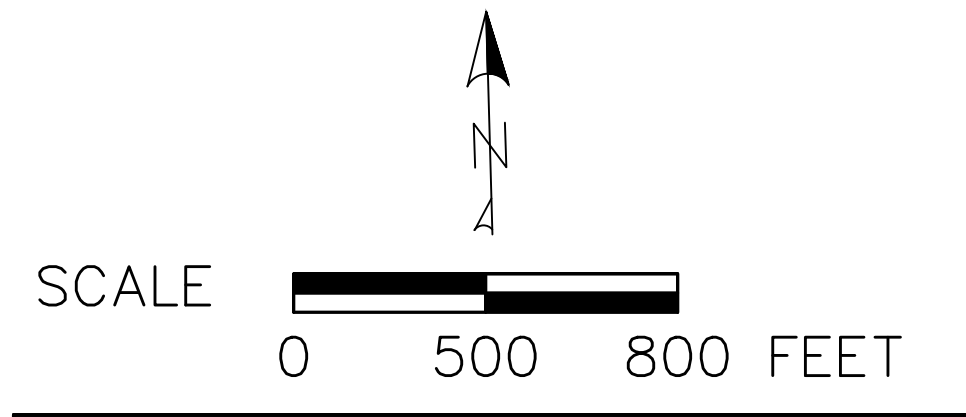
STROUD TOWNSHIP		Drawn By:	JPS
MS4 POLLUTION REDUCTION PLAN		Checked By:	JPS
STROUD TOWNSHIP, MONROE COUNTY PENNSYLVANIA		Approved By:	JPS
MAP 2		Date:	3/2024
		Scale:	1" = 500' Project No: 10001.65
		411 Main Street Stroudsburg, PA 18360 Tel: 610.421.7320 Fax: 610.421.7325 www.reillyengineering.com	



LEGEND

- ★ EXISTING BMP
- ★ PROPOSED BMP
- NON-MS4 OUTFALL
- MS4 OUTFALL
- NEW OUTFALL
- INTERMITTENT STREAM
- STREAM
- CULVERT / STORM PIPE
- TOWNSHIP ROAD
- CONTOUR
- MUNICIPAL BOUNDARY
- OVERALL DRAINAGE AREA
- PARSED AREA
- PRP MS4 WATERSHED
- EAST STROUDSBURG 2020 UZA

- NOTES:**
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 3. STATE ROADS, PRIVATE DEVELOPMENTS, AND SCHOOL PROPERTIES WITHIN A PRP SEWERSHED HAVE BEEN PARSED.
 4. SAMBO CREEK AND UNT 6 TO BRODHEAD CREEK ARE WITHIN THE HUC I2: LOWER BRODHEAD CREEK WATERSHED (020401040905). FLAGLER RUN AND LITTLE POCONO CREEK ARE WITHIN THE HUC I2: LOWER POCONO CREEK WATERSHED (020401040804).
 5. STREAMS MAPPED UTILIZING PA DEP EMAP, LIDAR TOPOGRAPHY, USGS STREAM STATS, AND AERIAL IMAGERY.



STROUD TOWNSHIP		Drawn By: EJ
MS4 POLLUTION REDUCTION PLAN		Checked By: JPS
STROUD TOWNSHIP, MONROE COUNTY PENNSYLVANIA		Approved By: JPS
MAP 4		Date: 9/2024
		Scale: 1" = 500' Project No: 10001.65
411 Main Street Stroudsburg, PA 18360 Tel: 570.421.7320 Fax: 570.421.7290 www.reillyengineering.com		

APPENDIX E

LOADING CALCULATIONS

Table 1b
Existing Sediment Load and Required Load Reduction
Flagler Run

DA#	Location Info	Imperv (Acre)	Pervious (Acre)	DA (Acres)	Imperv Sediment (lb/yr)	Pervious Sediment (lb/yr)	TSS without BMP (lb/yr)	Description of Existing BMPs	TSS Removed by BMP (lb/yr)	Final TSS Loading (lb/yr)	Required 10 % TSS Reduction (lb/yr)
FR 601	Flagler St	0.60	0.10	0.70	1103.40	26.50	1129.90			1129.90	112.99
FR 602	Skinner Hill	0.79	3.32	4.11	1452.81	879.67	2332.48			2332.48	233.25
FR 603	Jr. High Drive	0.88	2.75	3.63	1618.32	728.64	2346.96			2346.96	234.70
FR 605	Stroudwood Cir	0.27	2.03	2.30	496.53	537.87	1034.40			1034.40	103.44
FR 606	Tara View	2.80	12.00	14.80	5149.20	3179.52	8328.72	Infiltration at Berean Bible Church (Detention basin not considered)	0	8328.72	832.87
FR 607	Olde Mill Run	3.33	21.15	24.48	6123.87	5603.90	11727.77			11727.77	1172.78
FR 608	Bee Balm	1.10	15.11	16.21	2022.90	4003.55	6026.45			6026.45	602.64
FR 609	Lakeview Ln	0.30	0.63	0.93	551.70	166.92	718.62			718.62	71.86
FR 610	Triland Terrace	1.10	2.42	3.52	2022.90	641.20	2664.10			2664.10	266.41
FR 611	Elderberry Ct	0.47	1.45	1.92	864.33	384.19	1248.52			1248.52	124.85
FR 612	Weiss Farm Rd	0.62	2.06	2.68	1140.18	545.82	1686.00			1686.00	168.60
FR 613	Cranberry	0.64	4.97	5.61	1176.96	1316.85	2493.81			2493.81	249.38
FR 614	Wildflower Cir	1.07	4.52	5.59	1967.73	1197.62	3165.35			3165.35	316.53
FR 615	Big Pine Park	0.36	0.70	1.06	662.04	185.47	847.51			847.51	84.75
FR 616	Skypine	0.15	16.99	17.14	275.85	4501.67	4777.52			4777.52	477.75
FR 617	Skypine	0.83	15.87	16.70	1526.37	4204.92	5731.29			5731.29	573.13
FR 618	Skypine & Woodside	0.63	4.52	5.15	1158.57	1197.62	2356.19			2356.19	235.62
FR 619	Skypine & Woodside	1.03	2.52	3.55	1894.17	667.70	2561.87			2561.87	256.19
FR 620	Skypine	0.80	1.22	2.02	1471.20	323.25	1794.45			1794.45	179.45
FR621	Skypine	0.10	0.55	0.65	183.90	145.73	329.63			329.63	32.96
FR 622	Estate Dr	3.59	9.80	13.39	6602.01	2596.61	9198.62			9198.62	919.86
FR 623	Estate Dr	3.21	12.84	16.05	5903.19	3402.09	9305.28			9305.28	930.53
FR 624	Estate Dr/Canter	0.62	1.29	1.91	1140.18	341.80	1481.98			1481.98	148.20
FR 625	Willow Pond	0.26	0.39	0.65	478.14	103.33	581.47			581.47	58.15
FR 626	Willow Pond/Wis	3.47	18.08	21.55	6381.33	4790.48	11171.81			11171.81	1117.18
FR 628	Olde Mill Run	0.26	1.80	2.06	478.14	476.93	955.07			955.07	95.51
FR 629	Owl's Nest	0.08	0.11	0.19	147.12	29.15	176.27			176.27	17.63
FR 630	Owl's Nest	0.16	0.59	0.75	294.24	156.33	450.57			450.57	45.06
FR 631	Cranberry	1.25	6.10	7.35	2298.75	1616.26	3915.01			3915.01	391.50
FR 632	Parker/James	1.70	7.26	8.96	3126.30	1923.61	5049.91			5049.91	504.99
FR 633	Parker	1.55	16.25	17.80	2850.45	4305.60	7156.05			7156.05	715.61
FR 634	Parker	0.67	4.67	5.34	1232.13	1237.36	2469.49			2469.49	246.95
FR 635	Farmer Bush	0.54	1.58	2.12	993.06	418.64	1411.70			1411.70	141.17
FR 636	School	2.30	9.43	11.73	4229.70	2498.57	6728.27			6728.27	672.83
FR 637	School	0.25	4.83	5.08	459.75	1279.76	1739.51			1739.51	173.95

Table 1b (cont)
Existing Sediment Load and Required Load Reduction
Flagler Run

FR 638	Valley View	0.07	0.23	0.30	128.73	60.94	189.67			189.67	18.97
FR 639	Old Mill Run	0.07	1.12	1.19	128.73	296.76	425.49			425.49	42.55
FR 640	Wildflower Cir	0.45	2.07	2.52	827.55	548.47	1376.02			1376.02	137.60
FR 641	Old Mill Run	0.10	1.08	1.18	183.90	286.16	470.06			470.06	47.01
FR 642	Big Pines Ln	0.12	0.37	0.49	220.68	98.04	318.72			318.72	31.87
FR 643	Big Pines Ln	0.40	1.39	1.79	735.60	368.29	1103.89			1103.89	110.39
FR 644		0.51	1.39	1.90	937.89	368.29	1306.18			1306.18	130.62
FR 645		0.45	1.71	2.16	827.55	453.08	1280.63			1280.63	128.06
				259.21			128976.36				13156.32

Table 1d
Existing Sediment Load and Required Load Reduction
UNT 6 to Brodhead Creek

DA#	Location	Imperv (Acres)	Pervious (Acres)	DA (Acres)	Imperv Sediment (lb/yr)	Pervious Sediment (lb/yr)	TSS without BMP (lb/yr)	Description of Existing BMPs	TSS Removed by BMP (lb/yr)	Final TSS Loading (lb/yr)	Required 10 % TSS Reduction (lb/yr)
B-T6 142	Hallet at Penn Estates Dr	0.28	2.73	3.01	514.92	723.34	1238.26			1238.26	123.83
B-T6 143	Hallet	0.23	1.50	1.73	422.97	397.44	820.41			820.41	82.04
B-T6 144	Ramblebus	2.01	15.40	17.41	3696.39	4080.38	7776.77			7776.77	777.68
B-T6 145	Cranberry	0.39	2.06	2.45	717.21	545.82	1263.03			1263.03	126.30
				24.60			11098.47				1109.85

Table 1c (cont)
Existing Sediment Load and Required Load Reduction
Little Pocono Creek

DA#	Location Info	Imperv (Acre)	Pervious (Acre)	DA (Acres)	Imperv Sediment (lb/yr)	Pervious Sediment (lb/yr)	TSS without BMP (lb/yr)	Description of Exist BMPs	TSS Removed by BMP (lb/yr)	Final TSS Loading (lb/yr)	Required 10% TSS Reduction (lb/yr)
LP 1	Rosebriar Ln	4.2	7.71	11.91	7723.80	2042.84	9766.64			9766.64	976.66
LP 501	Sweetfern	2.39	5.14	7.53	4395.21	1361.89	5757.10			5757.10	575.71
LP 502	Dryden	0.82	1.29	2.11	1507.98	341.80	1849.78			1849.78	184.98
LP 503	Arlen	2.66	8.70	11.36	4891.74	2305.15	7196.89			7196.89	719.69
LP 504	King David	1.18	2.38	3.56	2170.02	630.60	2800.62			2800.62	280.06
LP 505	Dominic Cir	16.50	46.60	63.10	30343.50	12347.14	42690.64	4 Drywells at 114 Tanite Drywell & Inf Trench at 102 Tanite Drywell on Howard not included	0.00	42690.636	4269.06
LP 506	Dryden	2.56	4.14	6.70	4707.84	1096.93	5804.77			5804.77	580.48
LP 507	Arlington	0.18	0.34	0.52	331.02	90.09	421.11			421.11	42.11
LP 508	Arlington	0.11	0.47	0.58	202.29	124.53	326.82			326.82	32.68
LP 509	Rt 209	4.25	13.25	17.50	7815.75	3510.72	11326.47			11326.47	1132.65
LP 510	Sandee	0.41	1.07	1.48	753.99	283.51	1037.50			1037.50	103.75
LP 511	West Hills	0.89	4.52	5.41	1636.71	1197.62	2834.33			2834.33	283.43
LP 512	Sringdale	0.07	0.55	0.62	128.73	145.73	274.46			274.46	27.45
LP 514	Rockdale	0.33	0.52	0.85	606.87	137.78	744.65			744.65	74.46
LP 515	Rockdale	0.20	0.34	0.54	367.80	90.09	457.89			457.89	45.79
LP 516	Rockdale	2.95	1.81	4.76	5425.05	479.58	5904.63			5904.63	590.46
LP 517	Edinger	2.80	0.52	3.32	5149.20	137.78	5286.98			5286.98	528.70
LP 518	Edinger	0.47	2.04	2.51	864.33	540.52	1404.85			1404.85	140.48
LP 519	Rockdale	0.93	3.76	4.69	1710.27	996.25	2706.52			2706.52	270.65
LP 520	Rt 209	0.40	2.10	2.50	735.60	556.42	1292.02			1292.02	129.20
LP 521	Manorfield	1.95	15.34	17.29	3586.05	4064.49	7650.54			7650.54	765.05
LP 522	Schaffer Schoolhous	0.33	2.07	2.40	606.87	548.47	1155.34			1155.34	115.53
LP 523	Breezy View	0.45	3.03	3.48	827.55	802.83	1630.38			1630.38	163.04
LP 524	Bridle	2.69	9.81	12.50	4946.91	2599.26	7546.17			7546.17	754.62
LP 525	Bridle	0.89	2.71	3.60	1636.71	718.04	2354.75			2354.75	235.48
LP 526	Broadacre	0.63	1.63	2.26	1158.57	431.88	1590.45			1590.45	159.05
LP 527	Broadacre	0.30	0.85	1.15	551.70	225.22	776.92			776.92	77.69
LP 528	Reish	0.35	1.98	2.33	643.65	524.62	1168.27			1168.27	116.83
LP 529	Reish	0.22	1.82	2.04	404.58	482.23	886.81			886.81	88.68
LP 530	Concord	0.15	0.24	0.39	275.85	63.59	339.44			339.44	33.94
LP 531	Whitetail	1.79	5.93	7.72	3291.81	1571.21	4863.02			4863.02	486.30
LP 532	Shafers Scho	1.67	22.19	23.86	3071.13	5879.46	8950.59			8950.59	895.06
LP 533	Shafers Scho	0.50	5.07	5.57	919.50	1343.35	2262.85			2262.85	226.28

Table 1c
Existing Sediment Load and Required Load Reduction
Little Pocono Creek

LP 534	Shafers Scho	0.52	15.02	15.54	956.28	3979.70	4935.98		4935.98	493.60
LP 535	Broadacre Dr	0.35	0.46	0.81	643.65	121.88	765.53		765.53	76.55
LP 536	Reishes Rd	0.26	0.71	0.97	478.14	188.12	666.26		666.26	66.63
LP 537	Edinger Dr	0.80	1.85	2.65	1471.20	490.18	1961.38		1961.38	196.14
LP 538	W Main St	0.23	4.75	4.98	422.97	1258.56	1681.53		1681.53	168.15
LP 539	Orien Lane	0.72	4.36	5.08	1324.08	1155.23	2479.31		2479.31	247.93
LP 540	Leafy Green	1.80	3.28	5.08	3310.20	869.07	4179.27		4179.27	417.93
				271.25			167729.44			16772.94

DA#	Location Info	Imperv (Acres)	Pervious (Acres)	DA (Acres)	Imperv Sediment (lb/yr)	Pervious Sediment (lb/yr)	TSS without BMP (lb/yr)	Description of Existing BMPs	TSS Removed (lb/yr)	Final TSS Loading (lb/yr)	Required 10 % TSS Reduction (lb/yr)
S 801	RR	37.13	35.10	72.23	68282.07	9300.10	77582.17	Storage Facility Detention Basin (60% Removal)	46549.30	31032.87	3103.29
S 802	Fawn	6.10	5.17	11.27	11217.90	1369.84	12587.74			12587.74	1258.77
S 803	Learn	0.40	6.56	6.96	735.60	1738.14	2473.74	Learn Infil Basin Practice (95% Sed Removal)	2350.05	123.69	12.37
S 804	Learn	0.07	2.24	2.31	128.73	593.51	722.24	Learn Infil Basin Practice (95% Sed Removal)	686.13	36.11	3.61
S 805	Learn	0.22	1.60	1.82	404.58	423.94	828.52	Learn Infil Basin Practice (95% Sed Removal)	787.09	41.43	4.14
S 806	Brushy Mt/Rt 447	0.09	0.05	0.14	165.51	13.25	178.76	Learn Infil Basin Practice (95% Sed Removal)	169.82	8.94	0.89
S 807	Brushy Mt/Rt 447	0.06	0.36	0.42	110.34	95.39	205.73	Learn Infil Basin Practice (95% Sed Removal)	195.44	10.29	1.03
S 808	Alpine	2.10	13.60	15.70	3861.90	3603.46	7465.36	Learn Infil Basin Practice (95% Sed Removal)	7092.09	373.27	37.33
S 809	White Blossum	1.54	4.99	6.53	2832.06	1322.15	4154.21	Learn Infil Basin Practice (95% Sed Removal)	3946.50	207.71	20.77
S 810	Pocohantas	0.93	4.04	4.97	1710.27	1070.44	2780.71	Learn Infil Basin Practice (95% Sed Removal)	2641.67	139.04	13.90
S 811	Brushy Mt	4.23	12.02	16.25	7778.97	3184.82	10963.79	Private Detention Basin (60% Sed Removal)	6578.27	4385.52	438.55
S 812	Fawn Rd	0.10	0.28	0.38	183.90	74.19	258.09			258.09	25.81
S 813	Fawn Rd	0.64	1.10	1.74	1176.96	291.46	1468.42			1468.42	146.84
S 814	447/Wicks Ln	1.13	11.02	12.15	2078.07	2919.86	4997.93			4997.93	499.79
S 815	Cobble Ln	0.46	1.48	1.94	845.94	392.14	1238.08			1238.08	123.81
S 816	447	0.37	5.72	6.09	680.43	1515.57	2196.00	Learn Infil Basin Practice (95% Sed Removal)	2086.20	109.80	10.98
S 817	Brushy Mt	0.19	1.26	1.45	349.41	333.85	683.26	Learn Infil Basin Practice (95% Sed Removal)	649.10	34.16	3.42
S 818	Brushy Mt	0.59	10.78	11.37	1085.01	2856.27	3941.28	Learn Infil Basin Practice (95% Sed Removal)	3744.21	197.06	19.71
S 819	Brushy Mt	0.32	2.81	3.13	588.48	744.54	1333.02			1333.02	133.30
S 820	Brushy Mt	0.40	3.42	3.82	735.60	906.16	1641.76			1641.76	164.18
				180.67			137700.79				6022.49

APPENDIX F

BMP CALCULATIONS

Table 3b
Proposed BMP Load Reductions
Flagler Run

ID#	DA#	Location Info	Description of Potential BMP	DA to BMP (Acres)	DA TSS	% of DA to BMP	Adjusted TSS (lbs/yr)	BMP Effectiveness (%)	TSS Removed by BMP (lb/yr)	Notes
FR1	FR 601	Raymour & Flanigan Property	Convert excess pavement to Landscape/Raingarden with Infiltration	2.50	4597.00	100%	4597.00	70%	3217.90	Estimated TSS Reduction (assumed C/D soils) Private Property
FR2	FR 601	First National Bank Property	Convert excess pavement to Landscape/Raingarden with Infiltration	0.66	1206.00	100%	1206.00	70%	844.20	Estimated TSS Reduction (assumed C/D soils) Private Property
FR3	FR 615	Big Pine Park	Vegetated Swale & Raingarden along edge of parking/ Vegetated Filter Strip	1.15	304.00	100%	304.00	50%	152.00	
FR4	FR 610	Trilland	Vegetated Swale - C Soils	0.88	782.00	70%	547.40	50%	273.70	
FR5	FR 605	Stroudwood	Vegetated Swale - C Soils	1.73	1176.00	75%	882.00	50%	441.00	
FR6	FR 623	Canterbury Main from Estate Dr to Cranberry & Estate Dr to Canterbury Main	Vegetated Swale - C Soils	1.63	10240.00	10%	1024.00	50%	512.00	
FR7	FR 607	Olde Mill Run	Vegetated Swale/Rain Garden w/underdrain	24.49	11620.00	100%	11620.00	50%	5810.00	
FR8	FR 631	North side Cranberry from start of DA beyond Cranberry Hieghts to stream	Vegetated Swale - C Soils	7.60	4359.00	100%	4359.00	50%	2179.50	
FR9	FR 611	North side Elderberry along 3224 lot	Vegetated Swale - C Soils	0.78	1238.00	40%	495.20	50%	247.60	
FR10	FR 633	East side Parker Lane	Vegetated Swale - C Soils	17.50	7207.00	100%	7207.00	50%	3603.50	
FR11	FR 634	Parker Lane top of curve	Vegetated Swale - C Soils	5.32	2354.00	100%	2354.00	50%	1177.00	
FR12	FR 632	Parker Lane - North side between Cranberry & James Ct	Vegetated Swale - C Soils	0.85	4712.00	10%	471.20	50%	235.60	
FR13	FR 627	Cardinal Drive	Vegetated Swale - C Soils	3.26	17775.00	10%	1777.50	50%	888.75	
FR14	FR 627	Wigwam between Dove & stream	Vegetated Swale - C Soils	19.57	17775.00	60%	10665.00	50%	5332.50	In PennDOT R/W & maybe Private Property
FR15	FR 617	Skypine Way	Vegetated Swale - C Soils	8.09	5467.00	50%	2733.50	50%	1366.75	
FR16	FR 616	Skypine Way	Vegetated Swale - C Soils	8.53	4696.00	50%	2348.00	50%	1174.00	
FR17	FR 620	Skypine Way - North side just US of stream	Vegetated Swale - C Soils	1.65	1413.00	100%	1413.00	50%	706.50	
FR18	FR 602	Skinner Hill Rd - on curve	Vegetated Swale - C Soils	2.05	2361.00	50%	1180.50	50%	590.25	
FR19	FR 601	Westerly side of Flagler St	Tree Planting - 5 Street Trees	0.05	13.25	100%	13.25	20%	2.65	ROW & maybe Private Property
		To be determined	Tree Planting				0.00	20%	0.00	*TSS reduction is based on planting 100 trees
FR20	FR 601	Raymour & Flanigan Property	Parking Lot Sweeping	3.80	6991.00	100%	6991.00	9%	629.19	Private Property (DA TSS= 3.8 Ac of pavement x 1839)
	N/A	Storm Sewer System Solids Removal*	Inlet, Pipe, & Outlet Cleaning for Municipal Roads							Amounts to be determined, may not take credit for more than 50% of overall TSS requirement
	N/A	Twp Roads within 1 Mile of PRP Sewershed*, 7.76 miles	Street Sweeping 25 times per year	16.93	31135.00	100%	31135.00	9%	2802.15	DA only includes road, not upslope area draining onto roadway

Table 3d
Proposed BMP Load Reductions
Tributary 6 to Brodhead Creek

ID#	DA #	Location Info	Description of Potential BMP	DA to BMP (Acres)	DA TSS	% of DA to BMP	Adjusted TSS (lbs/yr)	BMP Effectiveness (%)	TSS Removed by BMP (lb/yr)	Notes
BT1	B-T6 142	Hallet Road	Vegetated Swale	0.70	518.98	70%	363.29	50%	181.64	
BT2	B-T6 143	Hallet Road	Vegetated Swale	1.40	907.06	80%	725.65	50%	362.82	
BT3	B-T6 140	Hallet & Beacon Hill	Rain Garden at inlet	0.47	360.64	100%	360.64	55%	198.35	In ROW & Private Property
BT4	B-T6 141	667 Hallet Road	Level Spreader or Vegetated Swale below culvert	2.30	1207.00	100%	1207.00	50%	603.50	Private Property
BT5	N/A	667 Hallet Road	475 lf Stream Buffer Reforestation 35' each side of stream	N/A			0.00	50%	0.00	Not in the MS4 DA Note: Credit is only given for the runoff that flows through the buffer area
	N/A	Storm Sewer System Solids Removal*	Inlet, Pipe, & Outlet Cleaning for Municipal Roads							Amounts to be determined, may not take credit for more than 50% of overall TSS requirement
	N/A	Twp Roads within 1 Mile of PRP Sewershed*, 3.68 miles	Street Sweeping 25 times per year	8.02	14765.00	100%	14765.00	9%	1328.85	DA only includes road, not upslope area draining onto roadway
									2675.17	Possible TSS Reduction using listed BMPs

*The following roads are included in the street sweeping/storm sewer system solids removal: Pinebrook Rd, Beacon Hill Rd, Hallet Rd, Metzgar Road, Cranberry Rd, Ramblebush Rd, Rural Ct.

Table 3c
Proposed BMP Load Reductions
Little Pocono Creek

ID#	DA#	Location Info	Description of Potential BMP	DA to BMP (Acres)	DA TSS (lsb/yr)	% of DA to BMP	Adjusted TSS (lbs/yr)	BMP Effectiveness (%)	TSS Removed by BMP (lb/yr)	Notes
LP1	LP 514	Rockdale Lane	Vegetated Swale - C/D Soils	0.76	846.73	100%	846.73	50%	423.37	
LP2	LP 515	Rockdale Lane	Vegetated Swale - C/D Soils	0.54	473.63	100%	473.63	50%	236.82	
LP3	LP 516	Rockdale Lane	Vegetated Swale - C/D Soils	4.81	6106.76	100%	6106.76	50%	3053.38	
LP4	LP 517	Edinger Drive	Vegetated Swale - C/D Soils	3.33	1700.82	100%	1700.82	50%	850.41	
LP5	LP 518	Edinger Drive	Vegetated Swale - C/D Soils	2.52	1974.15	100%	1974.15	50%	987.08	
LP6	LP 522	Schaffer's School House Road	Vegetated Swale - A & C Soils	1.54	1037.00	100%	1037.00	60%	622.20	
LP7	LP 505	Arlington	Vegetated Swale - C Soils	6.81	12026.23	50%	6013.12	50%	3006.56	
LP8	LP 507	Arlington	Vegetated Swale - C Soils	0.57	779.00	60%	467.40	50%	233.70	
LP9	LP 525	Bridle	Vegetated Swale - C Soils	3.54	7934.00	100%	7934.00	50%	3967.00	
LP10	LP 510	West Hills & Sandee	Vegetated Swale - A Soils	0.68	526.00	100%	526.00	70%	368.20	
LP11	LP 511	West Hills & Sandee	Vegetated Swale - A Soils	2.57	1405.00	100%	1405.00	70%	983.50	
LP12	N/A	Romeo Property at end of Sandee Lane	Forested Stream Buffer Restoration	N/A			0.00	50%	0.00	Private Property Not in MS4 Area
LP13	N/A	5531, 5557 & 5561 Bridle Rd	Forested Stream Buffer Restoration	N/A			0.00	50%	0.00	Private Properties Not in MS4 Area
	N/A	Pocono Creek near Stroudsburg High School	Stream Restoration - Up to 2,100 Feet	N/A					94080.00	(2100 ft x 44.8 lb/ft/yr TSS removal) Stream segment is below MS4 but within Little Pocono and Flagler HUC 12 watershed.
	N/A	Storm Sewer System Solids Removal*	Inlet, Pipe, & Outlet Cleaning for Municipal Roads							Amounts to be determined, may not take credit for more than 50% of overall TSS requirement
	N/A	Twp Roads within 1 Mile of PRP Sewershed*, 8.0 miles	Street Sweeping 25 times per year	17.45	32098.00	100%	32098.00	9%	2888.82	DA only includes road, not upslope area draining onto roadway
									111701.02	Possible TSS Reduction using listed BMPs

*The following roads are included in the street sweeping/storm sewer system solids removal: Honeysuckle Ln, Rosebriar Ln, Sweetfern Rd, Douglass Ave, Larry Greene St, Arlington Ave, Jane St, King David Rd, Northpark Estate, Freda Dr, Dryden Rd, Serena Dr, Tanite Rd, Howard St, Evergreen Cr, Ridgeview Rd, Ramegwo Ridge Rd, West Hills Dr, Rockdale Ln, Manorfield Ln, Atwood Ln, Meadow, Ln, Willow Ln, Shafer Schoolhouse Rd, Aspen Rd, Bridge Rd, Reishes Rd, Orien Ln, Shelbrooke Dr, Bridel Rd, Broadacre Dr, Whitetail Dr.

Table 3a
Proposed BMP Load Reductions
Sambo Creek

ID #	DA #	Location Info	Description of Potential BMP	DA to BMP (Acres)	DA TSS	% of DA to BMP	Adjusted TSS (lbs/yr)	BMP Effectiveness (%)	TSS Removed by BMP (lb/yr)	Notes
S1	N/A	Rt. 447	Streambank Restoration - 1025 ft from Brushy Mt Rd to Basin						45920.00	(1025 ft x 44.8 lb/ft/yr TSS removal) This provides more reduction that required and would be a benefit to both the Township and PennDOT Stream segment is below MS4 area
S2	S 801	along 124 & 134 Progress Street	Vegetated Swales - A/B soils	0.22	404.58	75%	303.44	70%	212.40	
S4	N/A	Flek Property - 543 Fawn Road	150 lf Forested Stream Buffer - 35' wide	N/A			0.00	50%	0.00	This is not a selected BMP at this time - It is not in the MS4 DA and is on private property
S5	N/A	Oiler Property - 109 Wicks Lane	600 lf & 250 lf Forested Stream Buffer - 35' wide	N/A			0.00	50%	0.00	This is not a selected BMP at this time - It is not in the MS4 DA and is on private property
S6	N/A	Halterman Property - 1741 Paradise Trail	200 lf Forested Stream Buffer - 35' wide	N/A			0.00	50%	0.00	This is not a selected BMP at this time - It is not in the MS4 DA and is on private property
S7	S 801	Tobyhanna Credit Union	Basin Retrofit	N/A			0.00	60%	0.00	*60% is the maximum BMP effectiveness value. Adjustments will need to be made to discount the effectiveness value for the existing BMP
S8	S 811	Blue Mt Lake	Basin Retrofit	N/A			0.00	60%	0.00	*60% is the maximum BMP effectiveness value. Adjustments will need to be made to discount the effectiveness value for the existing BMP
S9	N/A	84 Lumber Property	Stream Restoration - Realigned section of channel. See PADEP permit to 84 Lumber	N/A			0.00		0.00	Not a selected BMP at this time - Field inspection to determine extent of bank stabilization would be required
	S 801	To be determined - Private properties on Mill Creek Rd & Progress St	Bioretention/Raingarden - A/B Soils	N/A			0.00	90%	0.00	This is not a selected BMP at this time - It is not in the MS4 DA and is on private property
	N/A	Storm Sewer System Solids Removal*	Inlet, Pipe, & Outlet Cleaning for Municipal Roads							Amounts to be determined, may not take credit for more than 50% of overall TSS requirement
	N/A	Twp Roads within 1 Mile of PRP Sewershed*, 2.88 miles	Street Sweeping 25 times per year	6.28	11555.00	100%	11555.00	9%	1039.95	DA only includes road, not upslope area draining onto roadway
									47172.35	Possible TSS Reduction using listed BMPs

*The following roads are included in the street sweeping/storm sewer system solids removal: Vanvliet Rd, Pinecrest Dr, Progress St, Fawn Rd, Monroe Heights Rd, Cobble Ln, Learn Ln, Brushy Mountain Rd, Pocohantas Rd.

APPENDIX G

WATER QUALITY SAMPLING DATE

Benthic macroinvertebrate sample summary

Station ID 19980211-1110-SRW

Stream Name Sambo Creek (01186890)

Stream Code 4925

Strahler 3

Survey ID 41476

Sample Method Kick Screen: Statewide Surface Water Assessment Program

Collection Date

Collection Time

Latitude 41.01464592 Longitude -75.1897996

HUC8 02040104

Middle Delaware-Mongaup-Brodhead

Station Location Comments

Sambo Creek- King St. bridge.

Biology / Physical Habitat Comments

No mayflies in either kick.

Sample may be dominated by Prosimulium blackfly larvae.

Land Use Comments

Behind abandoned boiler plant, along street.

Impairment Status Comments

Taxa List

Taxa Name	Abundance Category	Abundance Range	PTV	FFG
Gomphidae	Present	3-9	4	PR
Taeniopterygidae	Common	10-24	2	SH
Capniidae	Common	10-24	3	SH
Perlidae	Rare	<3	3	PR
Nigronia	Present	3-9	2	PR
Philopotamidae	Abundant	25-100	3	FC
Psychomyiidae	Rare	<3	2	CG
Hydropsychidae	Common	10-24	5	FC
Chironomidae(other)	Common	10-24	6	
Ceratopogonidae	Rare	<3	6	PR
Tipulidae	Present	3-9	4	SH
Simuliidae	Very Abundant	>100	6	FC
Hirudinea	Rare	<3	8	PR
Oligochaeta	Present	3-9	10	CG

SSWAP metrics and IBI

	Raw Metric Value	Standardized Metric Value
Total Richness	14	63.6
EPT Richness (PTV 0 - 4)	5	45.5
Beck's Index (version 3)	3	21.4
Hilsenhoff Biotic Index	5.05	66.7
Shannon Diversity	1.62	61.4
	SSWAP IBI	51.7

Benthic macroinvertebrate sample summary

Station ID 19980211-1110-SRW
 Stream Name Sambo Creek (01186890) Stream Code 4925 Strahler 3
 Survey ID 41476 Sample Method Kick Screen: Statewide Surface Water Assessment Program
 Collection Date Collection Time Latitude 41.01464592 Longitude -75.1897996
 HUC8 02040104 Middle Delaware-Mongaup-Brodhead

1. Abundance obviously low		N
2. Seven or fewer families		N
3. Three or fewer mayfly individuals (exclude Baetidae, Caenidae, Siphonuridae)		Y
4. Stoneflies collectively present	Y	
5. Mayflies and caddisflies collectively abundant (exclude Baetidae, Caenidae, Siphonuridae, Hydropsychidae, Polycentropidae)	N	
6. Jul - Sep: at least four EPT families with tolerance value of 4 or less Nov - May: at least six EPT families with tolerance value of 4 or less	N	
7. Four or more families with tolerance value of 3 or less	Y	
8. Six or more families with tolerance value of 4 or less	Y	
9. Dominant family with tolerance value of 4 or less	N	
10. Dominant family with tolerance value greater than 5 (criteria 7 and 8 negate this criterion)		Y
11. Seven or more families with tolerance value of 6 or more (criteria 7 and 8 negate this criterion)		N
12. Sample dominated by families with a mean tolerance value of 5 or less	N	
13. Sample dominated by families with a mean tolerance value of 6 or more		Y
14. Embeddedness (or substrate character for pool/glide) + sediment deposition = 24 or less (20 or less for warmwater, low gradient streams)		N
15. Condition of banks + bank vegetation = 24 or less (20 or less for warmwater, low gradient streams)		N
16. Total habitat score 140 or less for forested, coldwater, high gradient streams (120 or less for warmwater, low gradient streams)		N
17a. Special conditions (attaining)	N	
17b. Special conditions (impaired)		N
17c. Special conditons description		

Not impaired N Biology impaired Y Habitat impaired N Insufficient data N
 Rock pick influenced assessment N Impact is localized N Re-evaluate designated use N

Physical Habitat Assessment				Pool/Glide Assessment	
Instream Cover	16	Substrate / Cover	0	Frequency of Riffles	16
Epifaunal Substrate	14	Velocity/Depth Regimes	16	Contition of Banks	13
Embeddedness	15	Pool Variability	0	Channel Sinuosity	16
Pool Substrate	0	Sediment Deposition	15	Channel Flow Status	17
				Disruptive Pressure	13
				Riparian Zone	10
Instream Score 60		Riparian Score 38		Total Score 175	

Field Measurements		Lab samples	
Temperature (°C)		Dissolved Oxygen (mg/L)	
pH	6.6	Alkalinity (mg/L as CaCO3)	
		Flow (CFS)	0
		Conductivity	

Use Assessment Status for Stream Reach	Designated Use	Existing Use
Aquatic Life	Impaired (980212-1524-SRW)	
	Construction - Siltation, On site Wastewater - Cause Unknown, Urban Runoff/Storm Sewers - Cause Unknown	

Fish Consumption

Potable Water Supply

Recreation

TMDL Information (if any)

Begin Date Meeting Date Draft Date End Date Final Date

Benthic macroinvertebrate sample summary

Station ID 19980211-0900-SRW
 Stream Name Flagler Run (01174880) Stream Code 4783 Strahler 1
 Survey ID 41474 Sample Method Kick Screen: Statewide Surface Water Assessment Program
 Collection Date Collection Time Latitude 40.98655903 Longitude -75.2202071
 HUC8 02040104 Middle Delaware-Mongaup-Brodhead

Station Location Comments

10-20 yds upstream of mouth of Flagler Run.
 Downstream of SR 611 and Stroud Mall.

Biology / Physical Habitat Comments

Land Use Comments

Strip malls and 4-lane highway to north- Rt. 80 across Brodhead Creek.

Impairment Status Comments

Stormwater from malls, highway, and parking lots.

Taxa List

Taxa Name	Abundance Category	Abundance Range	PTV	FFG
Baetidae	Rare	<3	6	CG
Hydropsychidae	Present	3-9	5	FC
Rhyacophilidae	Rare	<3	1	SC
Chironomidae(other)	Common	10-24	6	
Physidae	Rare	<3	8	SC
Oligochaeta	Present	3-9	10	CG
Gammaridae	Rare	<3	4	CG
Asellidae	Present	3-9	8	CG

SSWAP metrics and IBI

	Raw Metric Value	Standardized Metric Value
Total Richness	8	36.4
EPT Richness (PTV 0 - 4)	1	9.1
Beck's Index (version 3)	2	14.3
Hilsenhoff Biotic Index	6.43	48.1
Shannon Diversity	1.70	64.6
	SSWAP IBI	34.5

Benthic macroinvertebrate sample summary

Station ID 19980211-0900-SRW
 Stream Name Flagler Run (01174880) Stream Code 4783 Strahler 1
 Survey ID 41474 Sample Method Kick Screen: Statewide Surface Water Assessment Program
 Collection Date Collection Time Latitude 40.98655903 Longitude -75.2202071
 HUC8 02040104 Middle Delaware-Mongaup-Brodhead

1. Abundance obviously low		Y
2. Seven or fewer families		N
3. Three or fewer mayfly individuals (exclude Baetidae, Caenidae, Siphonuridae)		Y
4. Stoneflies collectively present		
5. Mayflies and caddisflies collectively abundant (exclude Baetidae, Caenidae, Siphonuridae, Hydropsychidae, Polycentropidae)	N	
6. Jul - Sep: at least four EPT families with tolerance value of 4 or less	N	
Nov - May: at least six EPT families with tolerance value of 4 or less	N	
7. Four or more families with tolerance value of 3 or less		
8. Six or more families with tolerance value of 4 or less	N	
9. Dominant family with tolerance value of 4 or less	N	
10. Dominant family with tolerance value greater than 5 (criteria 7 and 8 negate this criterion)	N	
11. Seven or more families with tolerance value of 6 or more (criteria 7 and 8 negate this criterion)		Y
12. Sample dominated by families with a mean tolerance value of 5 or less		N
13. Sample dominated by families with a mean tolerance value of 6 or more	N	
14. Embeddedness (or substrate character for pool/glide) + sediment deposition = 24 or less (20 or less for warmwater, low gradient streams)		Y
15. Condition of banks + bank vegetation = 24 or less (20 or less for warmwater, low gradient streams)		N
16. Total habitat score 140 or less for forested, coldwater, high gradient streams (120 or less for warmwater, low gradient streams)		N
17a. Special conditions (attaining)		
17b. Special conditions (impaired)	N	
17c. Special conditons description		N

Not impaired N Biology impaired Y Habitat impaired N Insufficient data N
 Rock pick influenced assessment N Impact is localized N Re-evaluate designated use N

Physical Habitat Assessment				Pool/Glide Assessment	
Instream Cover	17	Substrate / Cover	0	Frequency of Riffles	18
Epifaunal Substrate	17	Velocity/Depth Regimes	11	Contition of Banks	12
Embeddedness	15	Pool Variability	0	Channel Sinuosity	18
Pool Substrate	0	Sediment Deposition	12	Bank Vegetation	13
				Channel Flow Status	17
				Channel Alteration	11
				Disruptive Pressure	9
				Riparian Zone	9
Instream Score		Riparian Score		Total Score	
61		34		161	

Field Measurements			Lab samples		
Temperature (°C)		Dissolved Oxygen (mg/L)		Flow (CFS)	
pH		Alkalinity (mg/L as CaCO3)		Conductivity	

Use Assessment Status for Stream Reach	Designated Use	Existing Use
Aquatic Life	Impaired (990112-1000-SRW)	
	Hydromodification - Other Habitat Alterations, Road Runoff - Flow Alterations, Urban Runoff/Storm Sewers - Siltation, Urban Runoff/Storm Sewers - Unknown Toxicity	

Fish Consumption
 Potable Water Supply
 Recreation

TMDL Information (if any)

Begin Date Meeting Date Draft Date End Date Final Date

Benthic macroinvertebrate sample summary

Station ID 20130423-1425-tdaley Little Pocono Ck
 Stream Name Little Pocono Creek (01179643) Stream Code 4781 Strahler 2
 Survey ID 64357 Sample Method 6-Dframe Composite, 200 subsample
 Collection Date 20130423 Collection Time 1425 Latitude 40.97930301 Longitude -75.2227467
 HUC8 02040104 Middle Delaware-Mongaup-Brodhead

Station Location Comments

75 m dws of Arlington Rd.
 Stroud Twp. - Monroe Co. - Stroudsburg Quad

Biology / Habitat Comments

- small stream with gentle, shallow riffles
- conductivity, alk, pH elevated
- might have baseflow issues in summer

Land Use Comments

Station Impairment Status Comments

Taxa List # grids from first pan 4 # grids from second pan 10 Subsample Size 221

Taxa Name	Individuals	PTV	FFG	BCG Attribute		any EV indicator taxa names are highlighted
				(coldwater)	(warmwater)	
Corydalus	1	4	PR	4	4	
Chimarra	38	4	FC	4	4	
Cheumatopsyche	12	6	FC	5	5	
Hydropsyche	10	5	FC	5	5	
Psephenus	14	4	SC	4	4	
Optioservus	1	4	SC	4	4	
Stenelmis	22	5	SC	5	5	
Bezzia	29	6	PR	4	4	
Hemerodromia	1	6	PR	4	4	
Simulium	10	6	FC	5	5	
Chironomidae	31	6	CG	5	5	
Turbellaria	1	9	PR	5	5	
Oligochaeta	51	10	CG	5	5	

Benthic macroinvertebrate sample summary

Station ID 20130423-1425-tdaley Little Pocono Ck
 Stream Name Little Pocono Creek (01179643) Stream Code 4781 Strahler 2
 Survey ID 64357 Sample Method 6-Dframe Composite, 200 subsample
 Collection Date 20130423 Collection Time 1425 Latitude 40.97930301 Longitude -75.2227467
 HUC8 02040104 Middle Delaware-Mongaup-Brodhead

Metrics and IBI scores * Highlighted columns indicate the appropriate metrics and IBI score to use.

Metric Names	Raw Metric Values	Standardized Metric Values					
		Freestone Riffle-Run			2D100	Multihabitat Pool-Glide	Limestone 2009
		6D200					
2013 small	2013 large						
Total Richness	13	39.4	41.9		41.9	72.2	
Ephemeroptera Richness	0				0.0		
Trichoptera Richness	3				27.3		
EPT Richness	3			19.6	17.6	37.5	
Trichoptera Richness (PTV 0-4)	1			27.0			
EPT Richness (PTV 0-4)	1	5.3	6.3				
Beck's Index (version 3)	0	0.0	0.0				
Beck's Index (version 4)	4			29.1	18.2	33.3	
FC + PR + SH Richness	8			69.0			
Hilsenhoff Biotic Index	6.30	45.6	53.2	54.8		60.0	
% Intolerant Individuals (PTV 0-3)	0.0	0.0	0.0				
% Tolerant Individuals (PTV 7-10)	23.5					77.5	
Shannon Diversity	2.12	74.2	74.3		87.4	99.7	
IBI score		27.4	29.3	38.3	32.1	63.4	

% Ephemeroptera 0.0	% Ephemeroptera (PTV 0-4) 0.0	% Dominant Taxon 23.1	BCG Richness Ratio 0.00
% Plecoptera 0.0	Ephemeroptera Richness (PTV 0-4) 0	% Chironomidae 14.0	BCG Individuals Ratio 0.00
% Trichoptera 27.1	Plecoptera Richness 0	% Simuliidae 4.5	EV Indicator Taxa Richness 0

Not impaired N Biology impaired Y Habitat impaired N Insufficient data N
 Rock pick influenced assessment N Impact is localized N Re-evaluate designated use N

Physical Habitat Assessment

Physical Habitat Assessment			Pool-Glide Assessment? N		
Instream Cover 10	Substrate / Cover 0	Frequency of Riffles 15	Contition of Banks 12		
Epifaunal Substrate 13	Velocity/Depth Regimes 10	Channel Sinuosity 15	Bank Vegetation 16		
Embeddedness 15	Pool Variability 0	Channel Flow Status 14	Disruptive Pressure 12		
Pool Substrate 0	Sediment Deposition 14	Channel Alteration 15	Riparian Zone 10		
Instream Score 52	Riparian Score 38	Total Score 156			

Field Measurements

Field Measurements		Lab samples	
Temperature (°C) 11.7	Dissolved Oxygen (mg/L) 10.26	Flow (CFS) 0	
pH 7.99	Total Alkalinity (mg/L as CaCO3) 72	Conductivity (uS/cm) 308	

Use Assessment Status for Stream Reach

Designated Use	Existing Use
Aquatic Life Impaired (20131021-1713-tdaley) Road Runoff - Siltation, Urban Runoff/Storm Sewers - Siltation	

Fish Consumption

Potable Water Supply

Recreation

Source Unknown - Pathogens

TMDL Information (if any)

Begin Date	Meeting Date	End Date	Draft Date	Final Date

Benthic macroinvertebrate sample summary

Station ID 19980820-1115-MEW
 Stream Name Brodhead Creek (Unnamed Trib 26141298 To) Stream Code 4929 Strahler 1
 Survey ID 42683 Sample Method Kick Screen: Statewide Surface Water Assessment Program
 Collection Date Collection Time Latitude 41.03705185 Longitude -75.2154881
 HUC8 02040104 Middle Delaware-Mongaup-Brodhead

Station Location Comments

Unnamed tributary of Brodhead Creek; flows from Penn Estates to Pinebrook Conference Center

Biology / Physical Habitat Comments

barely enough water to sample

Land Use Comments

other=campground

Impairment Status Comments

Taxa List

Taxa Name	Abundance Category	Abundance Range	PTV	FFG
Baetidae	Rare	<3	6	CG
Heptageniidae	Present	3-9	3	SC
Ephemerelellidae	Rare	<3	2	CG
Gomphidae	Present	3-9	4	PR
Pteronarcyidae	Rare	<3	0	SH
Perlodidae	Rare	<3	2	PR
Sialidae	Rare	<3	6	PR
Nigronia	Present	3-9	2	PR
Philopotamidae	Common	10-24	3	FC
Psychomyiidae	Present	3-9	2	CG
Hydropsychidae	Present	3-9	5	FC
Limnephilidae	Rare	<3	4	SH
Psephenidae	Common	10-24	4	SC
Elmidae	Present	3-9	5	CG
Chironomidae(other)	Present	3-9	6	
Tipulidae	Rare	<3	4	SH
Simuliidae	Rare	<3	6	FC
Turbellaria	Common	10-24	9	
Ancylidae	Present	3-9	7	SC
Sphaeriidae	Rare	<3	8	FC
Annelida	Rare	<3	8	

SSWAP metrics and IBI

	Raw Metric Value	Standardized Metric Value
Total Richness	21	95.5
EPT Richness (PTV 0 - 4)	7	63.6
Beck's Index (version 3)	7	50.0
Hilsenhoff Biotic Index	4.81	70.0
Shannon Diversity	2.67	101.0
SSWAP IBI		75.8

Benthic macroinvertebrate sample summary

Station ID 19980820-1115-MEW

Stream Name Brodhead Creek (Unnamed Trib 26141298 To) Stream Code 4929 Strahler 1
 Survey ID 42683 Sample Method Kick Screen: Statewide Surface Water Assessment Program
 Collection Date Collection Time Latitude 41.03705185 Longitude -75.2154881
 HUC8 02040104 Middle Delaware-Mongaup-Brodhead

1. Abundance obviously low		N
2. Seven or fewer families		N
3. Three or fewer mayfly individuals (exclude Baetidae, Caenidae, Siphonuridae)		N
4. Stoneflies collectively present		N
5. Mayflies and caddisflies collectively abundant (exclude Baetidae, Caenidae, Siphonuridae, Hydropsychidae, Polycentropidae)		N
6. Jul - Sep: at least four EPT families with tolerance value of 4 or less Nov - May: at least six EPT families with tolerance value of 4 or less	Y	
7. Four or more families with tolerance value of 3 or less	Y	
8. Six or more families with tolerance value of 4 or less	Y	
9. Dominant family with tolerance value of 4 or less	Y	
10. Dominant family with tolerance value greater than 5 (criteria 7 and 8 negate this criterion)		N
11. Seven or more families with tolerance value of 6 or more (criteria 7 and 8 negate this criterion)		N
12. Sample dominated by families with a mean tolerance value of 5 or less	N	
13. Sample dominated by families with a mean tolerance value of 6 or more		N
14. Embeddedness (or substrate character for pool/glide) + sediment deposition = 24 or less (20 or less for warmwater, low gradient streams)		N
15. Condition of banks + bank vegetation = 24 or less (20 or less for warmwater, low gradient streams)		N
16. Total habitat score 140 or less for forested, coldwater, high gradient streams (120 or less for warmwater, low gradient streams)		N
17a. Special conditions (attaining)	N	
17b. Special conditions (impaired)		N
17c. Special conditons description		

Not impaired Y Biology impaired N Habitat impaired N Insufficient data N
 Rock pick influenced assessment N Impact is localized N Re-evaluate designated use N

Physical Habitat Assessment				Pool/Glide Assessment	
Instream Cover	13	Substrate / Cover	0	Frequency of Riffles	16
Epifaunal Substrate	13	Velocity/Depth Regimes	10	Channel Sinuosity	16
Embeddedness	10	Pool Variability	0	Channel Flow Status	7
Pool Substrate	0	Sediment Deposition	15	Channel Alteration	15
Instream Score 51		Riparian Score 36		Total Score 147	

Field Measurements		Lab samples	
Temperature (°C)		Dissolved Oxygen (mg/L)	
pH		Alkalinity (mg/L as CaCO3)	
		Flow (CFS)	
		Conductivity	

Use Assessment Status for Stream Reach	Designated Use	Existing Use
Aquatic Life	Impaired (990625-1130-SRW)	
	Package Plants - Organic Enrichment/Low D.O., Package Plants - Suspended Solids	
	Penn Estates/Utilities Inc. has a history of flow violations for the STP; they are under court order to upgrade.	

Fish Consumption
 Potable Water Supply
 Recreation

TMDL Information (if any)

Begin Date Meeting Date Draft Date End Date Final Date

LA

Streams in Stroud Township

UNT Brodhead Creek
 Assessment ID 10754
 990625-1130-SRW
 Package Plants-Suspended Solids
 Package Plants-Organic Enrichment/Low D.O.

Sambo Creek
 Assessment ID 8857
 980212-1524-SRW
 Construction-Siltation
 Urban Runoff/Storm Sewers-Cause Unknown
 On site Wastewater-Cause Unknown

Flagler Run
 Assessment ID 10072
 990112-1000-SRW
 Urban Runoff/Storm Sewers-Unknown Toxicity
 Urban Runoff/Storm Sewers-Siltation
 Hydromodification-Other Habitat Modifications
 Road Runoff-Flow Alterations

Station
 19980211-0900-SRW

Station
 20130423-1425-tdaley

Little Pocono Creek
 Assessment ID 17452
 20131021-1713-tdaley
 Urban Runoff/Storm Sewers-Siltation
 Road Runoff-Siltation

Station
 19980820-1115-MEW

Station
 19980211-1110-SRW

Legend

Monitoring Stations

Monitoring Station Type

- SSWAP
- Stream MI
- ▲ Stream RU/PWSU

Use, Attaining?

- Aquatic Life, Supporting
- Aquatic Life, Impaired
- ▭ Municipality Boundary