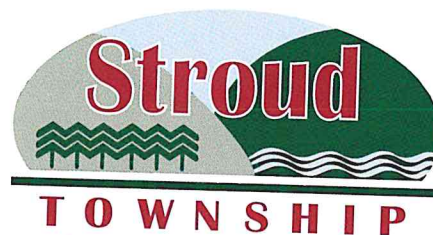


STROUD TOWNSHIP

MS4 Individual Permit Pollution Reduction Plan (PRP)

March 22, 2019



Stroud Township Municipal Center
1211 North Fifth Street • Stroudsburg, PA 18360-2646

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INTRODUCTION

Based on the 2010 Census conducted by the U.S. Census Bureau, 12,311 Acres (19.23 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.

The PADEP has determined that stormwater runoff from the urbanized area is contributing to the impairment of seven (7) streams in Stroud Township. Four streams, including Sambo Creek, Flagler Run, Little Pocono Creek and an unnamed tributary to the Brodhead Creek are identified as being impaired due to siltation. The unnamed tributary to the Brodhead Creek is also impaired due to organic enrichment/Low D.O. The Brodhead Creek and McMichael 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/nutrient 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, and a 5% minimum reduction in nutrient loading in the unnamed tributary to the Brodhead Creek, as mandated. The reductions are to be achieved in each watershed planning area through the implementation of Best Managements Practices. 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.

Stroud Township has been proactive in the past several years regarding the preservation of lands and natural resources. 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. 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 April 2, 2019. A copy of the notice is included in Appendix A of this plan. The public notice was also posted at the Township Building between April 2, 2019 and May 3, 2019. The public was given the opportunity to comment on the PRP plan at a regular meeting of the Township Board of Supervisors on April 23, 2019. 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. The mapping was prepared in conjunction with the Monroe County Planning Commission. Aerial imagery from 2015 is used as the base to show impervious and pervious surfaces. Existing storm water collection and conveyance facilities and BMP's were located and plotted by Stroud Township based on field location and observation and using maps on record with the Township. Storm sewershed boundaries were plotted based on topographic mapping and field confirmation. Locations of potential BMP's are shown on the maps.

SAMBO CREEK

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 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.

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) and area included in two NPDES permitted sites (Mountain Hollow and Katie Lane Apartments) were parsed out. Land area located upstream of MS4 conveyances that are not contributory to the MS4's were also parsed out. Load reductions from existing BMP's on three different properties were considered in the calculations. Calculations are provided in Table 2a in Appendix E. 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 8016.56 lbs/yr is required for the watershed.

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. BMP effectiveness values were taken from the PADEP chart, a copy of which is included in Appendix F. 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 eroded and is in an unstable condition. Periodic flooding along Route 447 in this area occurs. This project depends on a partnership with PennDOT. The Township will be discussing this with PennDOT. Some funding from impact fees from an upstream developer may be available 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: Stroud Township will 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: The Township will be contacting local property owners that have existing dry detention basins at the Tobyhanna Credit Union property and the Blue Mountain Lake Club to determine whether there are opportunities to retrofit the basins and Hayward Labs to determine if there is an opportunity to retrofit the swales in front of their property. The detention basin adjacent to Rt. 447 in the Learn Lane area on the Giambalvo property will 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 designed and constructed in accordance with the Pennsylvania Stormwater Best Management Practices Manual.

Street Sweeping: Brushy Mountain Road and Fawn Road are the two main Township roads located in the MS4 storm sewersheds which may be included in a street sweeping program. The Township does not currently have a routine street sweeping program. Street sweeping is only done on occasion when a special need arises to clean a road. The Township has not used antiskid on the roads for several years. Salt is the only de-icing agent used on Township roads and other Township properties. Therefore, a sweeping program for Township streets may not be as beneficial for sediment reduction as other BMP's and is included at the bottom of the list of BMP options.

Inspection & Maintenance of Existing BMP's: Some existing stormwater detention basins, drywells and subsurface infiltration systems have been identified and shown on the map. The

Township will develop a program for regular inspection and follow up with property owner's to ensure they are being properly maintained.

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

Drainage Basin Characteristics: The Flagler Run drainage basin is about 1.89 square miles in area. 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 to the impaired section of the stream. These are areas that not located in a Township MS4 storm sewershed. 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. An existing subsurface infiltration trench on the Berean Bible Church property was considered in the calculation of sediment loads (TSS). See Table 2b in Appendix E. 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 15,479.33 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. BMP effectiveness values were taken from the PADEP chart, a copy of which is included in Appendix F. 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 does not have a routine street sweeping program. Street sweeping is only done on occasion when a special need arises to clean a road. The Township has not used antiskid on the roads for several years. Salt is the only de-icing agent used on Township roads and other Township properties. In addition the Township roads that lie within the MS4 storm sewersheds in this basin are mainly local roads in residential areas without heavy traffic. Therefore, a sweeping program for Township streets may not be as beneficial for sediment reduction as other BMP's and is included at the bottom of the list of BMP options.

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

Township efforts in achieving the required MS4 load reductions in the MS4 storm sewersheds are not likely to have much of an impact with respect to water quality in the impaired reach of the stream since the primary reason for the impairment is the enclosure of the stream and the direct discharge of untreated stormwater from Route 611, the Stroud Mall and other densely developed commercial properties to the piped section of the stream which are not located in the Township MS4 areas. Rather than focusing efforts on BMP's in the Township MS4 areas that are primarily located along the upper, unimpaired reach of the stream, public funds and resources would be more wisely used to achieve the water quality goals for this stream by working with PADEP, PennDOT and private property owners to develop a plan that addresses the real problem areas in the commercially developed Stroud Mall area.

LITTLE POCONO CREEK

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 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. The Butler Park 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.

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 Mill Brooke Farms residential development, an NPDES permitted site was parsed out. The PennDOT rights-of-way (Highway 209 and Business Rt. 209) were also parsed out. Sediment load reductions from the existing drywells and infiltration trench were considered in the calculations. See Table 3c in Appendix E. 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 8064.68 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. BMP effectiveness values were taken from the PADEP chart, a copy of which is included in Appendix F. 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.

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: 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 should be pursued. 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 does not have a routine street sweeping program. Street sweeping is only done on occasion when a special need arises to clean a road. The Township has not used antiskid on the roads for several years. Salt is the only de-icing agent used on Township roads and other Township properties. With the exceptions of Rockdale Lane and the segment of Schaffer's Schoolhouse Road between Business Route 209 and Highway 209, the Township roads that lie within the MS4 storm sewersheds in this basin are mainly local roads in residential areas without heavy traffic. Therefore, a sweeping program for Township streets may not be as beneficial as other BMP's and is included at the bottom of the list of BMP options.

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

UNNAMED TRIBUTARY (UNT) 6 TO BRODHEAD CREEK

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 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 Penn Estates, a large private community in the Township. The Penn Estates 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, I observed a layer of silt 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. BMP effectiveness values were taken from the PADEP chart, a copy of which is included in Appendix F. 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: Just under 1 mile of Hallet Road is located within a Township MS4 storm sewershed. The Township does not have a routine street sweeping program. Street sweeping is only done on occasion when a special need arises to clean a road. The Township has not used antiskid on the roads for several years. Salt is the only de-icing agent used on Township roads and other Township properties. Given the limited length of road in the MS4 area, a sweeping program for Township streets may not be as beneficial as other BMP's and is included at the bottom of the list of BMP options.

Specific BMP's will be selected from the list after further study by the Township. Load reduction calculations for each BMP and typical design details for some of the BMP's listed are included 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

Public Notice

Notice is hereby given that the **Stroud Township Board of Supervisors** will be accepting public comments regarding the Pollution Reduction Plan (PRP) associated with the Township's National Pollutant Discharge Elimination System (NPDES) Individual Permit from Small Separate Storm Sewer Systems (MS4s) required by the Pennsylvania Department of Environmental Protection. The PRP addresses the Township's 5-year plan for the reduction of sediment and loads in the Sambo Creek, Flagler Run, Little Pocono Creek and an unnamed tributary to the Brodhead Creek locally referred to as Cranberry Run.

The PRP will be available for public review between 9:00 am and 4:00 pm Monday through Friday, excluding holidays, at the municipal building at 1211 North 5th Street, Stroudsburg, PA 18360 and on the Township website, stroudtownship.org. Written comments will be accepted through 4 pm on May 3, 2019 and may be mailed or delivered to Donna Alker at the Stroud Township municipal building or sent via email to stroudpa@ptd.net. The Township will also accept comments at the regular meeting of the Board of Supervisors on April 23, 2019.

Appendix B

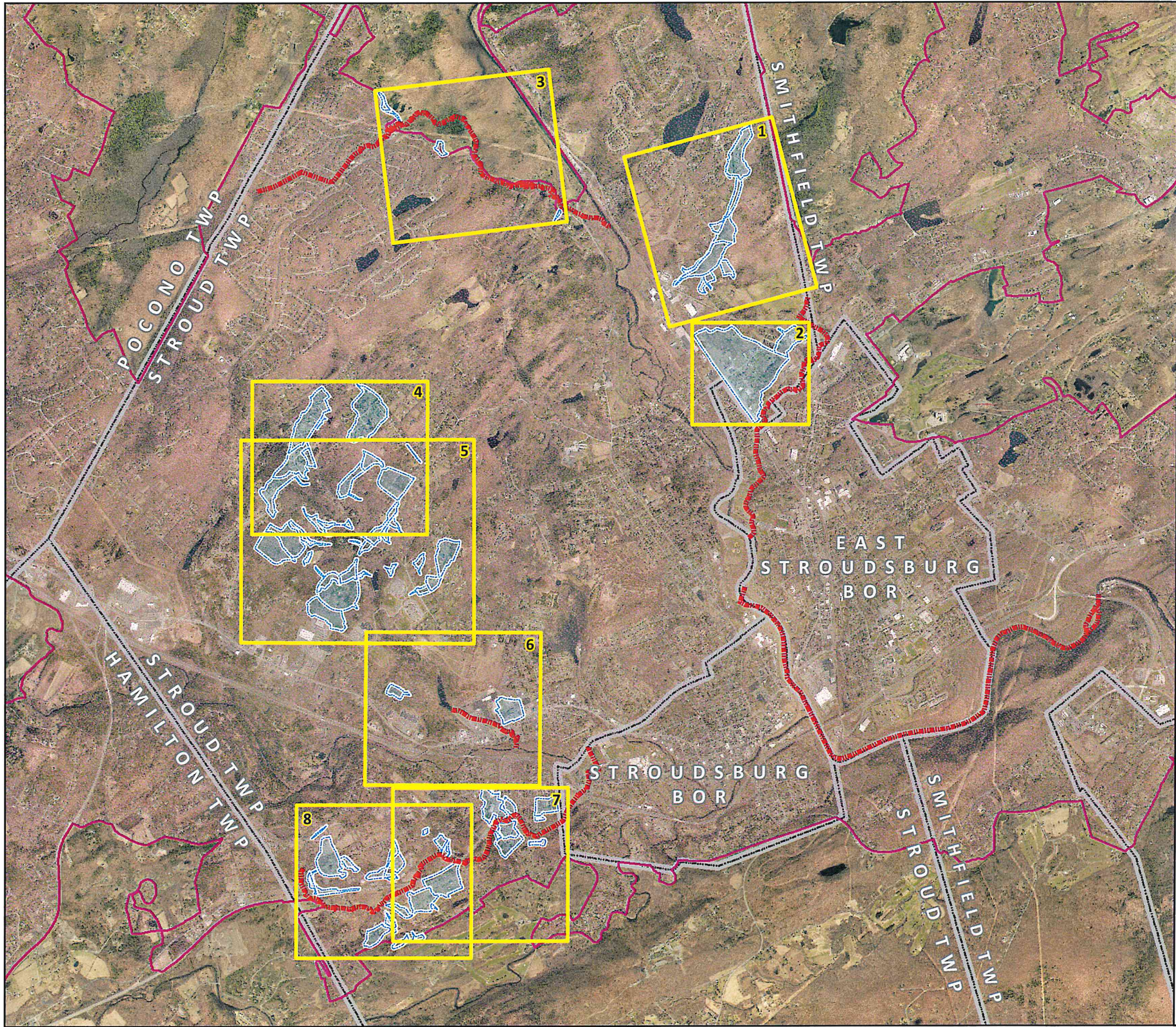
Public Comments

Appendix C

Record of Consideration of Public Comments

Appendix D

Maps



MS4 POLLUTION REDUCTION PLAN

MAP KEY
STROUD TOWNSHIP
MONROE COUNTY, PENNSYLVANIA

Legend

- Map Extent
- Impaired Stream
- Storm-Sewershed
- East Stroudsburg UZA
- Municipal Boundary



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November 2018



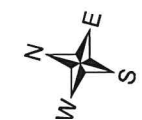
MS4 POLLUTION REDUCTION PLAN

MAP 1 STROUD TOWNSHIP MONROE COUNTY, PENNSYLVANIA

Legend

- Existing BMP
- Proposed BMP
- Non-MS4 Outfall
- MS4 Outfall
- Intermittent Stream
- Stream
- Parsed Area
- Storm-Sewershed
- Impervious Surface
- East Stroudsburg UZA
- Municipal Boundary

250 0 250 500
Feet
1:3,600



Intermittent Stream Data was derived from 1 meter Digital Elevation Model (DEM) by utilizing the HydrologyToolset, within the Spatial Analyst Toolbox, within ESRI's ArcMap 10.2.1. The intermittent stream data was then verified based on topographic mapping and/or visual field observation by Township staff. There may be additional intermittent streams that are not shown on this map.

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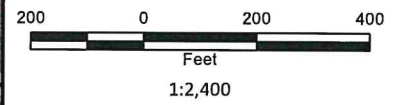
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MS4 POLLUTION
REDUCTION PLAN
MAP 2
STROUD TOWNSHIP
MONROE COUNTY, PENNSYLVANIA

Legend

- Existing BMP
- Proposed BMP
- Non-MS4 Outfall
- MS4 Outfall
- Impaired Stream
- Intermittent Stream
- Stream
- Parsed Area
- Storm-Sewershed
- Impervious Surface
- East Stroudsburg UZA
- Municipal Boundary



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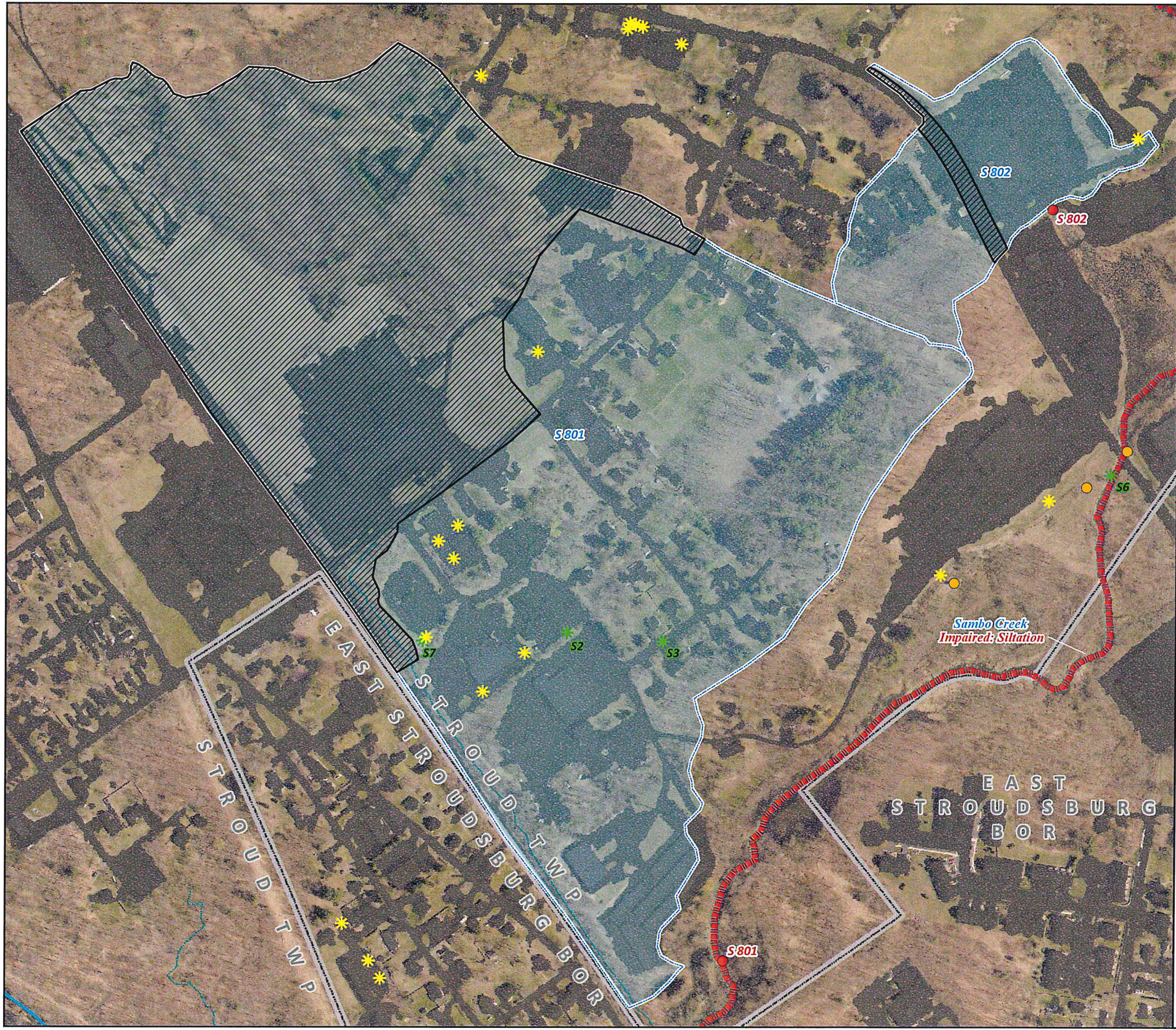
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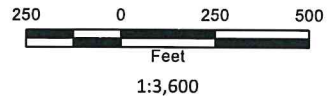
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December 2018



MS4 POLLUTION
REDUCTION PLAN
MAP 3
STROUD TOWNSHIP
MONROE COUNTY, PENNSYLVANIA

Legend

- Existing BMP
- Proposed BMP
- Non-MS4 Outfall
- MS4 Outfall
- Impaired Stream
- Intermittent Stream
- Stream
- Parsed Area
- Storm-Sewershed
- Impervious Surface
- East Stroudsburg UZA



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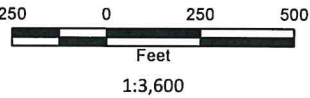
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December 2018



MS4 POLLUTION
REDUCTION PLAN
MAP 4
STROUD TOWNSHIP
MONROE COUNTY, PENNSYLVANIA

Legend

- Existing BMP
- Proposed BMP
- Non-MS4 Outfall
- MS4 Outfall
- Intermittent Stream
- Stream
- Parsed Area
- Storm-Sewershed
- Impervious Surface
- East Stroudsburg UZA



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December 2018



MS4 POLLUTION REDUCTION PLAN

MAP 5

STROUD TOWNSHIP

MONROE COUNTY, PENNSYLVANIA

- Legend**
- Existing BMP
 - Proposed BMP
 - Non-MS4 Outfall
 - MS4 Outfall
 - Intermittent Stream
 - Stream
 - Parsed Area
 - Storm-Sewershed
 - Impervious Surface
 - East Stroudsburg UZA

250 0 250 500
Feet
1:4,800



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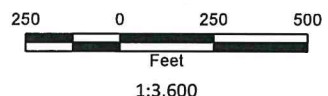
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MS4 POLLUTION
REDUCTION PLAN
MAP 6
STROUD TOWNSHIP
MONROE COUNTY, PENNSYLVANIA

Legend

- Existing BMP
- Proposed BMP
- Non-MS4 Outfall
- MS4 Outfall
- Impaired Stream
- Intermittent Stream
- Stream
- Parsed Area
- Storm-Sewershed
- Impervious Surface
- East Stroudsburg UZA



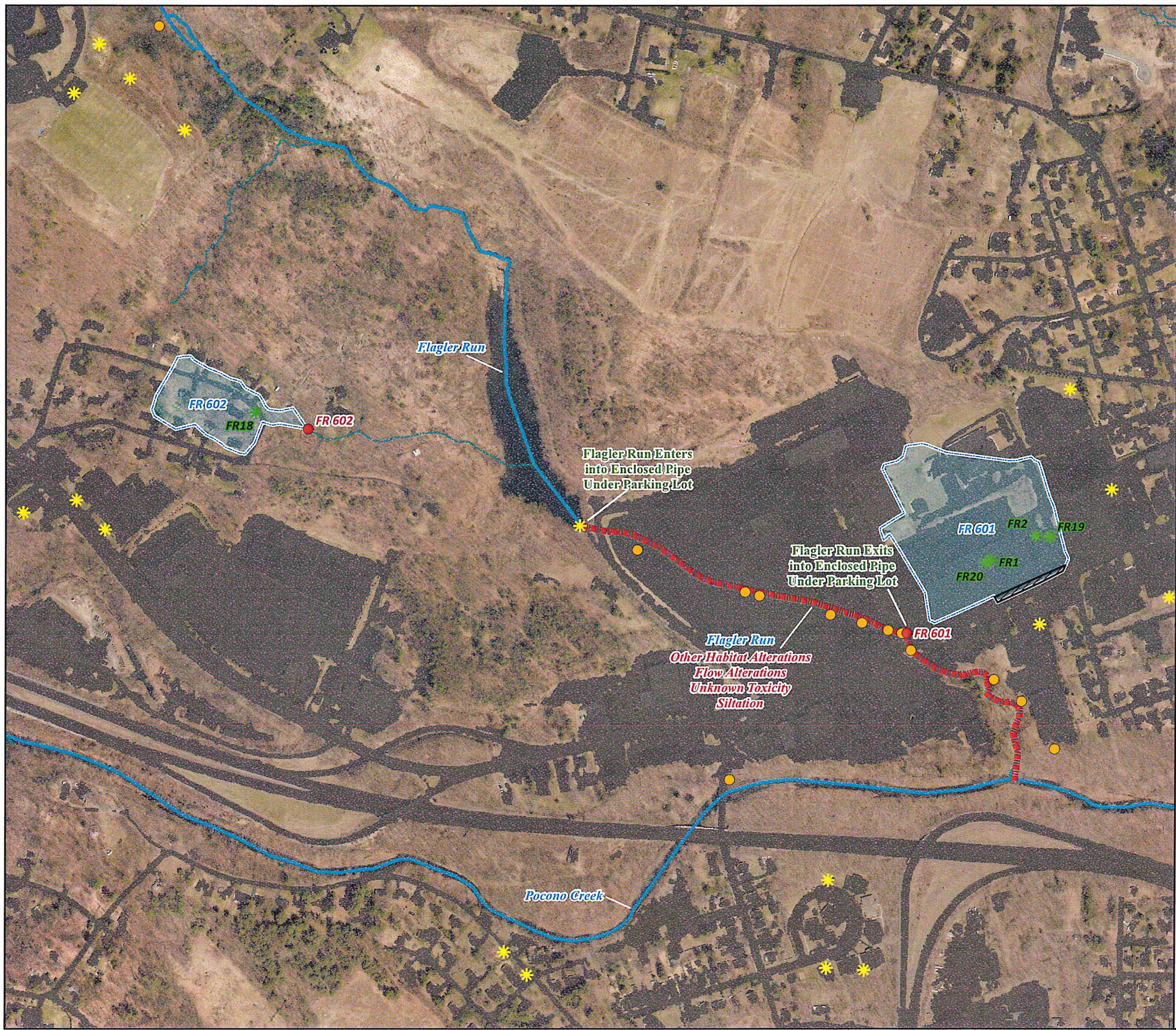
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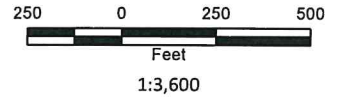


MS4 POLLUTION REDUCTION PLAN

MAP 7 STROUD TOWNSHIP MONROE COUNTY, PENNSYLVANIA

Legend

- ▲ Observation Point
- ★ Existing BMP
- ✱ Proposed BMP
- Non-MS4 Outfall
- MS4 Outfall
- ▬ Impaired Stream
- ▬ Intermittent Stream
- ▬ Stream
- ▭ Parsed Area
- ▭ Storm-Sewershed
- ▭ Impervious Surface
- ▭ East Stroudsburg UZA
- ▭ Municipal Boundary



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MS4 POLLUTION REDUCTION PLAN

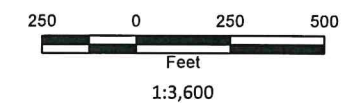
MAP 8

STROUD TOWNSHIP

MONROE COUNTY, PENNSYLVANIA

Legend

- Existing BMP
- Proposed BMP
- Non-MS4 Outfall
- MS4 Outfall
- Impaired Stream
- Intermittent Stream
- Stream
- Parsed Area
- Storm-Sewershed
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December 2018



Appendix E

Loading Calculations

Table 1a
Existing Sediment Load and Required Load Reduction
Sambo Creek

DA#	Location Info	Imperv (Acres)	Pervious (Acres)	DA (Acres)	Parsed Area (Acres)	Parsed Imperv (Acres)	Parsed Pervious (Acres)	Reason for Parsing	Net Imperv (Acres)	Net Perv (Acres)	TSS - Imp (lb/Ac/yr)	TSS- Perv (lb/Ac/yr)	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	30.63	72.44	103.07	45.20	13.56	31.64	US area not to MS4 PennDOT R/W - Mill Creek Rd	17.07	40.8	1839.00	264.96	31391.73	10810.37	42202.10	Infiltration Trench at 28 Mill Creek Drywells/Inf Trench at 67 Mill Creek Detention at 110 Progress Drywells at 134 Progress	1302.43	40899.668	4089.97
S 802	Fawn	6.55	5.39	11.94	0.68	0.51	0.17	Rt 447	6.04	5.22	1839.00	264.96	11107.56	1383.09	12490.65			12490.651	1249.07
S 803	Learn	0.12	3.57	3.69	0.00	0.00	0.00		0.12	3.57	1839.00	264.96	220.68	945.91	1166.59			1166.5872	116.66
S 804	Learn	0.07	2.25	2.32	0.00	0.00	0.00		0.07	2.25	1839.00	264.96	128.73	596.16	724.89			724.89	72.49
S 805	Learn	0.22	1.55	1.77	0.00	0.00	0.00		0.22	1.55	1839.00	264.96	404.58	410.69	815.27			815.268	81.53
	Brushy Mt/Rt																		
S 806	447	1.94	13.29	15.23	0.00	0.00	0.00		1.94	13.29	1839.00	264.96	3567.66	3521.32	7088.98			7088.9784	708.90
	Brushy Mt/Rt																		
S 807	447	0.11	0.38	0.49	0.00	0.00	0.00		0.11	0.38	1839.00	264.96	202.29	100.68	302.97			302.9748	30.30
S 808	Alpine	1.50	9.59	11.09	0.82	0.08	0.74	NPDES PAID24506006R Mountain Hollow	1.42	8.85	1839.00	264.96	2611.38	2344.90	4956.28			4956.276	495.63
S 809	White Blossum	2.18	5.03	7.21	0.00	0.00	0.00		2.18	5.03	1839.00	264.96	4009.02	1332.75	5341.77			5341.7688	534.18
S 810	Pocohantas	0.10	0.08	0.18	0.00	0.00	0.00		0.1	0.08	1839.00	264.96	183.90	21.20	205.10			205.0968	20.51
S 811	Brushy Mt	5.49	12.66	18.15	8.93	3.12	5.81	US area not to MS4	2.37	6.85	1839.00	264.96	4358.43	1814.98	6173.41	Detention Basin		6173.406	617.34
															81468.00				8016.56

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

DA#	Location Info	Imperv (Acre)	Pervious (Acre)	DA (Acres)	Parsed Area (Acres)	Parsed Imperv (Acres)	Parsed Pervious (Acres)	Reason for Parsing	Net Imperv (Acres)	Net Pervious (Acres)	TSS - Imperv (lb/Ac/yr)	TSS - Pervious (lb/Ac/yr)	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 TSS 10% Reduction (lb/yr)
								PennDOT R/W Rt											
FR 601	Flagler St	9.90	3.15	13.05	0.20	0.20	0.00	611	9.7	3.15	1839	264.96	17838.30	834.62	18672.92			18672.92	1867.29
FR 602	Skinner Hill	0.81	3.29	4.10	0.00	0.00	0.00		0.81	3.29	1839	264.96	1489.59	871.72	2361.31			2361.308	236.13
FR 603	Jr. High Drive	0.74	1.62	2.36	0.00	0.00	0.00		0.74	1.62	1839	264.96	1360.86	429.24	1790.10			1790.095	179.01
FR 604	Linwood/Colvin	0.82	3.00	3.82	0.00	0.00	0.00		0.82	3	1839	264.96	1507.98	794.88	2302.86			2302.86	230.29
FR 605	Stroudwood Cir	0.36	1.94	2.30	0.00	0.00	0.00		0.36	1.94	1839	264.96	662.04	514.02	1176.06			1176.062	117.61
																Infiltration at Berean Bible Church (Detention basin not considered)			
FR 606	Tara View	2.59	10.76	13.35	0.00	0.00	0.00		2.59	10.76	1839	264.96	4763.01	2850.97	7613.98		419.29	7194.689	719.47
FR 607	Olde Mill Run	3.26	21.23	24.49	0.00	0.00	0.00		3.26	21.23	1839	264.96	5995.14	5625.10	11620.24			11620.24	1162.02
FR 608	Bee Balm	1.27	15.00	16.27	0.00	0.00	0.00		1.27	15	1839	264.96	2335.53	3974.40	6309.93			6309.93	630.99
FR 609	Lakeview Ln	0.36	0.47	0.83	0.00	0.00	0.00		0.36	0.47	1839	264.96	662.04	124.53	786.57			786.5712	78.66
FR 610	Triland Terrace	0.30	0.87	1.17	0.00	0.00	0.00		0.3	0.87	1839	264.96	551.70	230.52	782.22			782.2152	78.22
FR 611	Elderberry Ct	0.46	1.48	1.94	0.00	0.00	0.00		0.46	1.48	1839	264.96	845.94	392.14	1238.08			1238.080	123.81
FR 612	Weiss Farm Rd	0.44	1.41	1.85	0.00	0.00	0.00		0.44	1.41	1839	264.96	809.16	373.59	1182.75			1182.753	118.28
FR 613	Cranberry	0.66	4.41	5.07	0.00	0.00	0.00		0.66	4.41	1839	264.96	1213.74	1168.47	2382.21			2382.213	238.22
FR 614	Wildflower Cir	1.02	4.62	5.64	0.00	0.00	0.00		1.02	4.62	1839	264.96	1875.78	1224.12	3099.90			3099.895	309.99
FR 615	Big Pine Park	0.00	1.15	1.15	0.00	0.00	0.00		0	1.15	1839	264.96	0.00	304.70	304.70			304.704	30.47
FR 616	Skypine	0.11	16.96	17.07	0.00	0.00	0.00		0.11	16.96	1839	264.96	202.29	4493.72	4696.01			4696.011	469.60
FR 617	Skypine	0.75	15.43	16.18	0.00	0.00	0.00		0.75	15.43	1839	264.96	1379.25	4088.33	5467.58			5467.582	546.76
FR 618	Woodside	0.67	3.72	4.39	0.00	0.00	0.00		0.67	3.72	1839	264.96	1232.13	985.65	2217.78			2217.781	221.78
	Skypine & Woodside																		
FR 619	Woodside	0.90	2.43	3.33	0.00	0.00	0.00		0.9	2.43	1839	264.96	1655.10	643.85	2298.95			2298.952	229.90
FR 620	Skypine	0.62	1.03	1.65	0.00	0.00	0.00		0.62	1.03	1839	264.96	1140.18	272.91	1413.09			1413.088	141.31
FR 621	Skypine	0.18	0.67	0.85	0.00	0.00	0.00		0.18	0.67	1839	264.96	331.02	177.52	508.54			508.5432	50.85
FR 622	Estate Dr	5.31	8.10	13.41	0.00	0.00	0.00		5.31	8.1	1839	264.96	9765.09	2146.18	11911.27			11911.26	1191.13
FR 623	Estate Dr	3.76	12.55	16.31	0.00	0.00	0.00	PennDOT R/W Cranberry	3.76	12.55	1839	264.96	6914.64	3325.25	10239.89			10239.88	1023.99
FR 624	Estate Dr/Canter	1.06	2.01	3.07	0.24	0.15	0.09	PennDOT R/W Cranberry	0.91	1.92	1839	264.96	1673.49	508.72	2182.21			2182.213	218.22
FR 625	Willow Pond	0.31	0.55	0.86	0.00	0.00	0.00		0.31	0.55	1839	264.96	570.09	145.73	715.82			715.818	71.58
FR 626	Willow Pond/Wis	4.66	21.44	26.10	0.44	0.27	0.17	PennDOT R/W Cranberry	4.39	21.27	1839	264.96	8073.21	5635.70	13708.91			13708.90	1370.89
FR 627	Wigwam	5.80	26.83	32.63	0.00	0.00	0.00		5.8	26.83	1839	264.96	10666.20	7108.88	17775.08			17775.07	1777.51
FR 628	Olde Mill Run	0.39	1.86	2.25	0.00	0.00	0.00		0.39	1.8577	1839	264.96	717.21	492.22	1209.43			1209.426	120.94
FR 629	Owl's Nest	0.07	0.15	0.22	0.00	0.00	0.00		0.07	0.15	1839	264.96	128.73	39.74	168.47			168.474	16.85

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

FR 630	Owl's Nest	0.07	0.18	0.25	0.00	0.00	0.00	0.00	0.00	0.07	0.18	1839	264.96	128.73	47.69	176.42	176.4228	17.64
FR 631	Cranberry	1.49	6.11	7.60	0.00	0.00	0.00	0.00	0.00	1.49	6.11	1839	264.96	2740.11	1618.91	4359.02	4359.015	435.90
FR 632	Parker/James	1.56	6.96	8.52	0.00	0.00	0.00	0.00	0.00	1.56	6.96	1839	264.96	2868.84	1844.12	4712.96	4712.961	471.30
FR 633	Parker	1.63	15.87	17.50	0.00	0.00	0.00	0.00	0.00	1.63	15.87	1839	264.96	2997.57	4204.92	7202.49	7202.485	720.25
FR 634	Parker	0.60	4.72	5.32	0.00	0.00	0.00	0.00	0.00	0.6	4.72	1839	264.96	1103.40	1250.61	2354.01	2354.011	235.40
FR 635	Farmer Bush	0.13	0.12	0.25	0.00	0.00	0.00	0.00	0.00	0.13	0.12	1839	264.96	239.07	31.80	270.87	270.8652	27.09
																155212.63		15479.33

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

DA#	Location Info	Imperv (Acre)	Pervious (Acre)	DA (Acres)	Parsed Area (Acre)	Parsed Impervious (Acres)	Parsed Pervious (Acres)	Reason for Parsing	Net Imperv (Acres)	Net Perv (Acres)	TSS - Imperv (lb/Ac/yr)	TSS - Pervious (lb/Ac/yr)	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 500	Observe Pt	3.72	4.84	8.56	0	0	0	0	3.72	4.84	1839	264.96	6841.08	1282.41	8123.49			8123.4864	812.34864
LP 501	Sweetfern	0.37	0.48	0.85	0	0	0.00	NPDES #PAS105070R	0.37	0.48	1839	264.96	680.43	127.18	807.61			807.6108	80.76108
LP 502	Dryden	1.06	0.53	1.59	1.59	1.06	0.53	Mill Brook Farms	0	0	1839	264.96	0.00	0.00	0.00			0	0
LP 503	Arlen	2.33	6.03	8.36	3.69	0.92	2.77	Mill Brook Farms	1.41	3.26	1839	264.96	2592.99	863.77	3456.76			3456.7596	345.67596
LP 504	King David	1.18	2.34	3.52	0	0	0.00		1.18	2.34	1839	264.96	2170.02	620.01	2790.03	4 Drywells at 114 Tanite		2790.0264	279.00264
LP 505	Dominic Cir	7.19	6.44	13.63	2.4	1.44	0.96	Rt 209 & BR 209	5.75	5.48	1839	264.96	10574.25	1451.98	12026.23	Drywell & Inf Trench at 102 Tanite Drywell on Howard	2087.87	9938.3608	993.83608
LP 506	Dryden	3.20	3.46	6.66	6.61	3.15	3.46	Mill Brook Farms	0.05000000		1839	264.96	91.95	0.00	91.95			91.9500000	9.195
LP 507	Arlington	0.65	0.33	0.98	0.45	0.30	0.15	Rt 209	0.35	0.18	1839	264.96	643.65	47.69	691.34			691.3428	69.13428
LP 508	Arlington	0.20	0.56	0.76	0	0	0.00		0.2	0.56	1839	264.96	367.80	148.38	516.18			516.1776	51.61776
LP 509	Rt 209	5.57	13.79	19.36	1.76	1.18	0.58	209	4.39	13.21	1839	264.96	8073.21	3500.12	11573.33		0	11573.3316	1157.3332
LP 510	Sandee	0.22	0.46	0.68	0	0	0.00		0.22	0.46	1839	264.96	404.58	121.88	526.46			526.4616	52.64616
LP 511	West Hills	0.46	2.11	2.57	0	0	0.00		0.46	2.11	1839	264.96	845.94	559.07	1405.01			1405.0056	140.50056
LP 512	Stringdale	0.12	0.42	0.54	0	0	0.00		0.12	0.42	1839	264.96	220.68	111.28	331.96			331.9632	33.19632
LP 513	No LP 513	0.00	0.00	0.00	0	0	0.00		0	0	1839	264.96	0.00	0.00	0.00			0	0
LP 514	Rockdale	0.41	0.35	0.76	0	0	0.00		0.41	0.35	1839	264.96	753.99	92.74	846.73			846.726	84.6726
LP 515	Rockdale	0.21	0.33	0.54	0	0	0.00		0.21	0.33	1839	264.96	386.19	87.44	473.63			473.6268	47.36268
LP 516	Rockdale	3.07	1.74	4.81	0	0	0.00		3.07	1.74	1839	264.96	5645.73	461.03	6106.76			6106.7604	610.67604
LP 517	Edinger	0.52	2.81	3.33	0	0	0.00		0.52	2.81	1839	264.96	956.28	744.54	1700.82			1700.8176	170.08176
LP 518	Edinger	0.83	1.69	2.52	0	0	0.00		0.83	1.69	1839	264.96	1526.37	447.78	1974.15			1974.1524	197.41524
LP 519	Rockdale	0.76	1.98	2.74	0.11	0.06	0.05	209	0.7	1.93	1839	264.96	1287.30	511.37	1798.67			1798.6728	179.86728
LP 520	Rt 209	2.03	2.38	4.41	2.75	1.93	0.82	209	0.09999999	1.56	1839	264.96	183.90	413.34	597.24			597.2376	59.72376
LP 521	Manorfield	2.09	12.18	14.27	0.88	0.46	0.42	209	1.63	11.76	1839	264.96	2997.57	3115.93	6113.50			6113.4996	611.34996
LP 522	Schaffer Schoolhouse	0.40	1.14	1.54	0	0	0		0.4	1.14	1839	264.96	735.60	302.05	1037.65			1037.6544	103.76544

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

LP 523	Breezy View	0.17	0.31	0.48	0	0	0.00	0.17	0.31	1839	264.96	312.63	82.14	394.77	394.7676	39.47676
LP 524	Bridle	2.93	9.61	12.54	0	0	0.00	2.93	9.61	1839	264.96	5388.27	2546.27	7934.54	7934.5356	793.45356
LP 525	Bridle	0.84	2.70	3.54	0	0	0.00	0.84	2.7	1839	264.96	1544.76	715.39	2260.15	2260.152	226.0152
LP 526	Broadacre	0.65	1.07	1.72	0	0	0.00	0.65	1.07	1839	264.96	1195.35	283.51	1478.86	1478.8572	147.88572
LP 527	Broadacre	0.12	0.66	0.78	0	0	0.00	0.12	0.66	1839	264.96	220.68	174.87	395.55	395.5536	39.55536
LP 528	Reish	0.27	1.09	1.36	0	0	0.00	0.27	1.09	1839	264.96	496.53	288.81	785.34	785.3364	78.53364
LP 529	Reish	0.27	1.81	2.08	0	0	0.00	0.27	1.81	1839	264.96	496.53	479.58	976.11	976.1076	97.61076
LP 530	Concord	0.19	0.22	0.41	0	0	0.00	0.19	0.22	1839	264.96	349.41	58.29	407.70	407.7012	40.77012
LP 531	Whitetail	1.95	5.76	7.71	0	0	0.00	1.95	5.76	1839	264.96	3586.05	1526.17	5112.22	5112.2196	511.22196
														82734.72	8064.6855	

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

DA#	Location In	Imperv (Acres)	Pervious (Acres)	DA (Acres)	Parsed Area (Acres)	Parsed Imperv (Acres)	Parsed Pervious (Acres)	Reason for Parsing	Net Imperv (Acres)	Net Pervious (Acres)	TSS - Impervious (lb/Ac/yr)	TSS- Pervious (lb/Ac/yr)	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 140	Hallet	0.15	0.32	0.47	0.00	0.00	0.00	0	0.15	0.32	1839.00	264.96	275.85	84.79	360.64			360.6372	36.06
B-T6 141	Hallet	0.38	1.92	2.30	0.00	0.00	0.00	0.00	0.38	1.92	1839.00	264.96	698.82	508.72	1207.54			1207.5432	120.75
	Hallet at Penn																		
B-T6 142	Estates Dr	0.33	0.67	1.00	0.17	0.14	0.03	Area DS of UA	0.19	0.64	1839.00	264.96	349.41	169.57	518.98			518.9844	51.90
B-T6 143	Hallet	0.28	1.48	1.76	0.00	0.00	0.00	0.00	0.28	1.48	1839.00	264.96	514.92	392.14	907.06			907.0608	90.71
															2994.23				299.42

Table 2a
Existing BMP Load Reductions
Sambo Creek

DA#	Location Info	Description of Existing BMP	Impervious Area to BMP (Acres)	Pervious Area to BMP (Acres)	DA to BMP (Acres)	TSS - Imperv (lb/Ac/yr)	TSS- Perv (lb/Ac/yr)	BMP Sediment Removal Efficiency (%)	Imperv TSS Reduction from BMP (lb/yr)	Pervious TSS Reduction from BMP (lb/yr)	TSS Removed by BMP (lb/yr)
S 801	RR	Infiltration Trench at 28 Mill Creek Heat Treating)	0.19	0.00	0.19	1839.00	264.96	95	331.94	0.00	331.94
S 801	RR	Drywells/Inf Trench at 67 Mill Creek (Marques)	0.47	0.09	0.56	1839.00	264.96	95	821.11	22.65	843.77
S 801	RR	Detention at 110 Progress (Tobyhanna Credit Union)	0.63	0.41	1.04	1839.00	264.96	10	115.86	10.86	126.72
S 801	RR	Two Drywells at 114 Progress			0.00	1839.00	264.96		0.00	0.00	0.00

Table 2b
Existing BMP Load Reductions
Flagler Run

DA#	Location Info	Description of Existing BMP	Impervious Area to BMP (Acres)	Pervious Area to BMP (Acres)	DA to BMP (Acres)	TSS - Imperv (lb/Ac/yr)	TSS- Perv (lb/Ac/yr)	BMP Sediment Removal Efficiency (%)	Imperv TSS Reduction from BMP (lb/yr)	Pervious TSS Reduction from BMP (lb/yr)	TSS Removed by BMP (lb/yr)
			0.24	0.00	0.24	1839.00	264.96	95	419.29	0.00	419.29
FR 606	Tara View	Infiltration at Berean Bible Church (Detention basin not considered)									

Table 2c
Existing BMP Load Reductions
Little Pocono Creek

DA#	Location Info	Description of Existing BMP	Impervious Area to BMP (Acres)	Pervious Area to BMP (Acres)	DA to BMP (Acres)	TSS - Imperv (lb/Ac/yr)	TSS- Perv (lb/Ac/yr)	BMP Sediment Removal Efficiency (%)	Imperv TSS Reduction from BMP (lb/yr)	Pervious TSS Reduction from BMP (lb/yr)	TSS Removed by BMP (lb/yr)
LP 505	Dominic Cir	4 Drywells at 114 Tanite	0.72	0.00	0.72	1839.00	264.96	95	1249.14	0.00	1249.14
		Drywell & Inf Trench at 102									
LP 505	Dominic Cir	Tanite	0.47	0.07	0.54	1839.00	264.96	95	821.11	17.62	838.73

EXIST CONDITIONS

GRP A SOILS

DA = 1.2 Ac C; GRASS 0.53 Ac C = 0.20 *
WOODS 0.26 Ac C = 0.15 *
GRAVEL 0.35 Ac C = 0.57
IMPERVIOUS 0.06 Ac C = 0.99
1.20 Ac C_w = 0.34

T_c = 16 min (see attached) L₂ = 3.54 L₂₅ = 6.06 L₅₀ = 6.71

Q₂ = 1.20 cfs Q₂₅ = 2.47 cfs Q₅₀ = 2.74 cfs

* SEE PENNSTATE RUNOFF COEF CHART - COEFFICIENTS NOT LISTED ON CHART FROM BRODHEAD CREEK STUDY

POST-DEVELOPMENT - BYPASS

DA = 0.64 Ac C; IMPERVIOUS 0.02 Ac C = 0.99
WOODS 0.26 Ac C = 0.15
GRASS 0.36 Ac C = 0.20
0.64 Ac C_w = 0.20

T_c = 5 min

L₂ = 5.32 L₂₅ = 8.47 L₅₀ = 9.25

Q₂ = 0.68 cfs Q₂₅ = 1.08 cfs Q₅₀ = 1.18 cfs

ALLOWABLE BASIN OUTFLOW = EXIST Q - Q_{BYPASS}

Q₂ = 1.20 - 0.68 = 0.52 cfs

Q₂₅ = 2.47 - 1.08 = 1.39 cfs

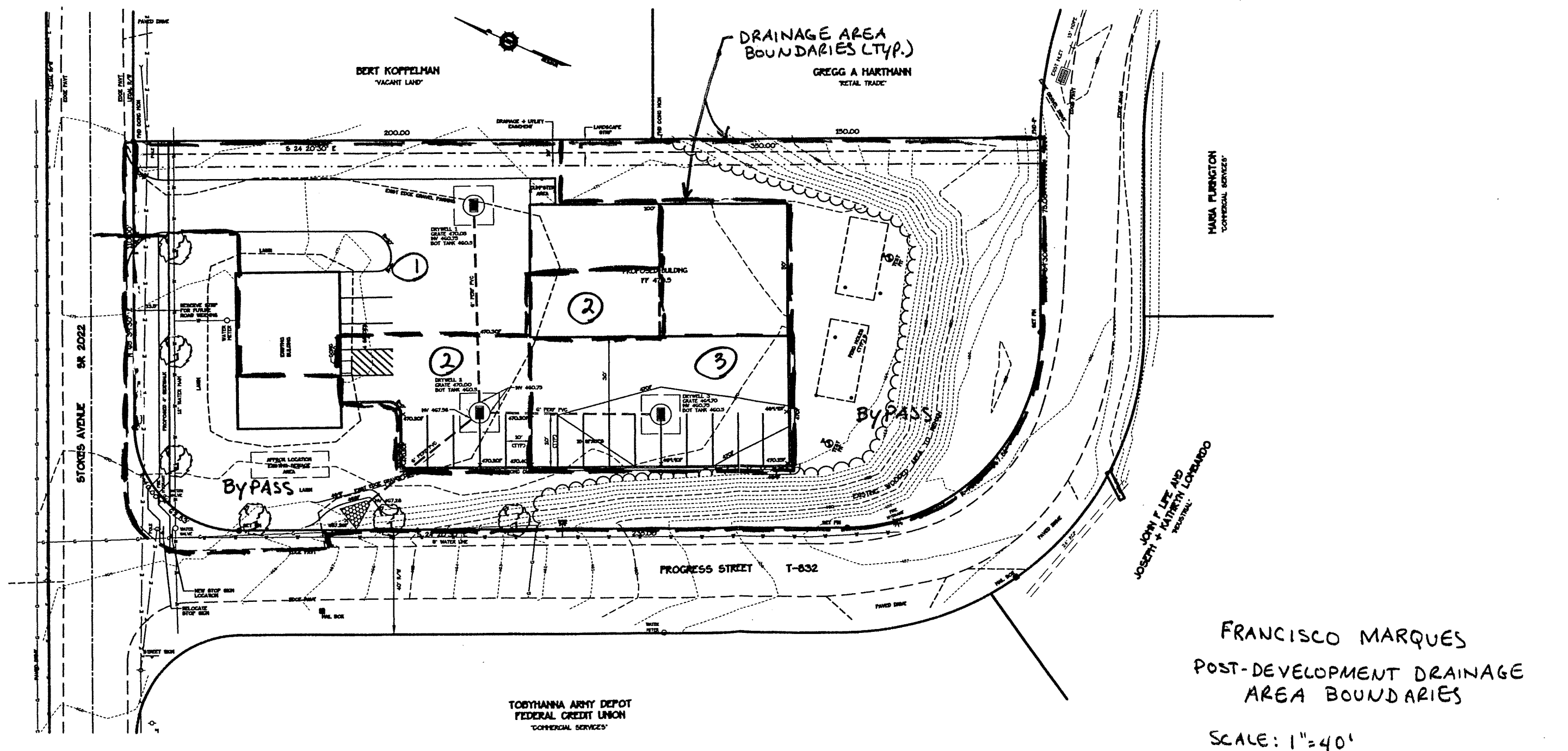
Q₅₀ = 2.74 - 1.18 = 1.56 cfs

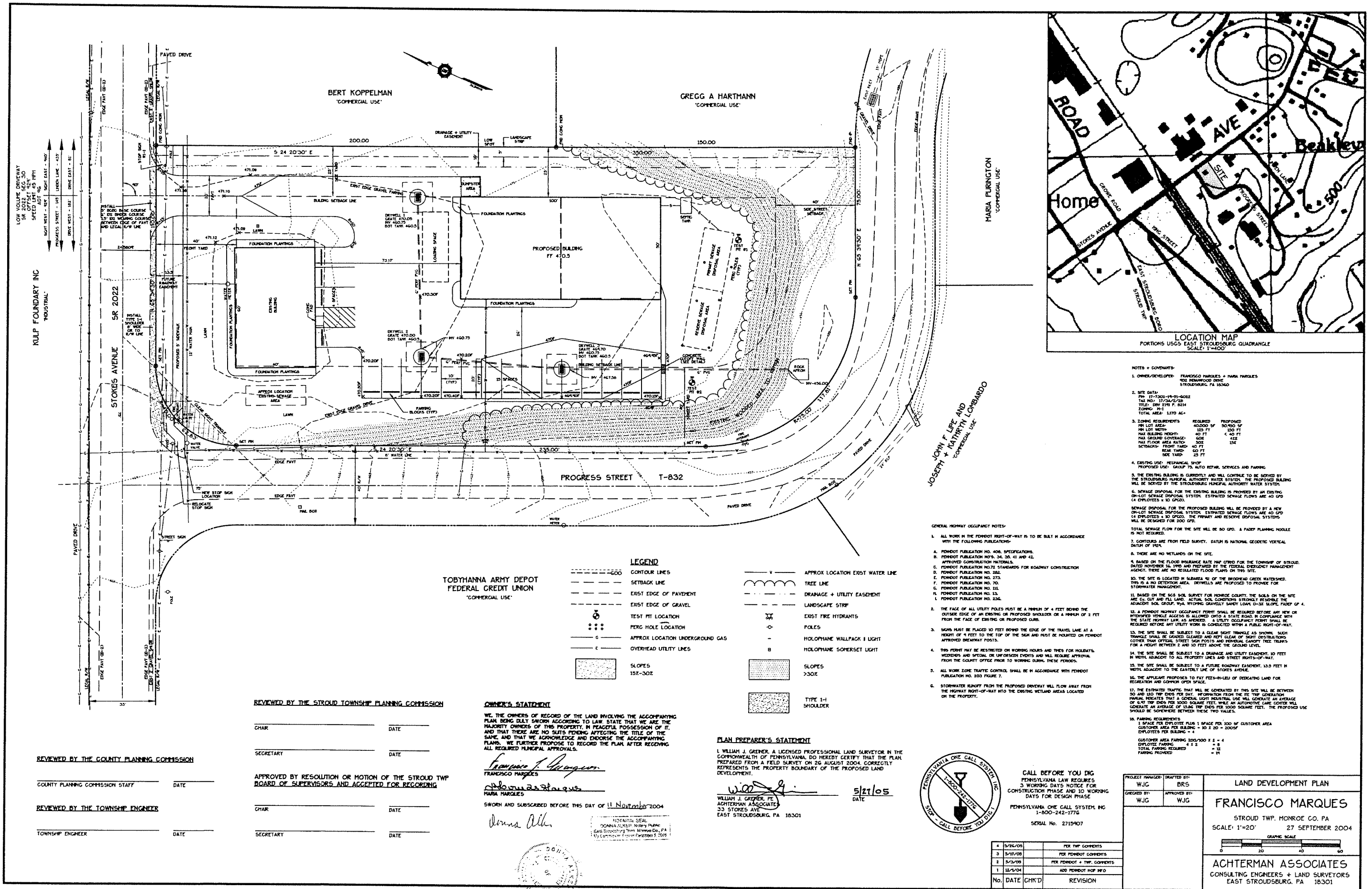
POST-DEVELOPMENT - TO DRYWELLS

DA = 0.56 Ac C; IMPERVIOUS 0.47 Ac C = 0.99
GRASS 0.09 Ac C = 0.20
0.56 Ac C_w = 0.86

T_c = 5 min

S-301 DRYWELLS & INF TRENCH AT 67 MILL CREEK





Type.... Runoff CN-Area
Name.... POST-SITE

Page 1.01

File.... .\sample\TOBYHANN.PPK
Title... Post-developed site conditions - flow area into
detention system

RUNOFF CURVE NUMBER DATA

.....

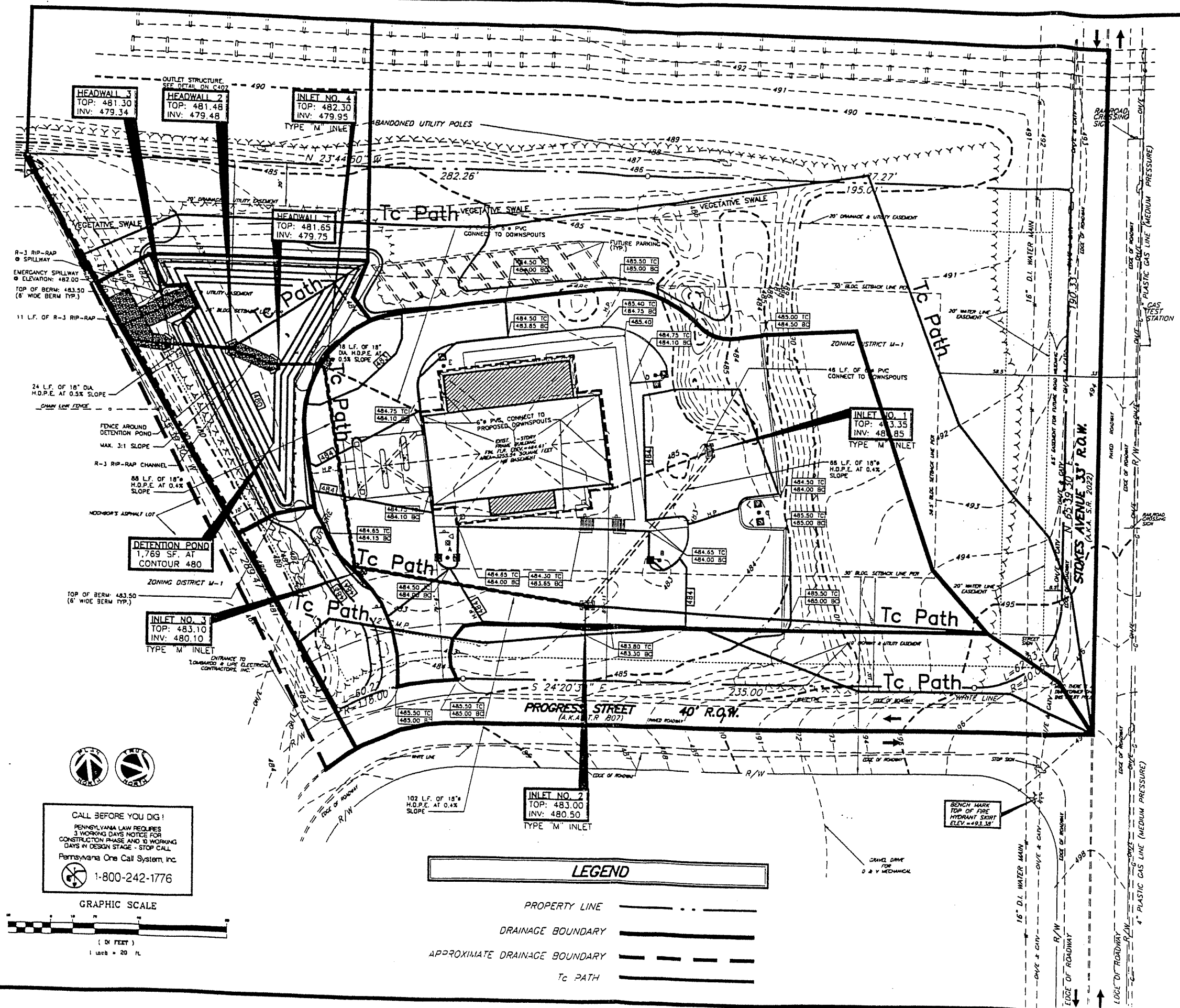
Post-developed site conditions - flow area into detention system

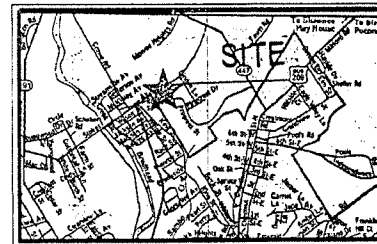
Soil/Surface Description	CN	Area acres	Impervious Adjustment %C %UC	Adjusted CN
Building	98	.140		98.00
Sidewalk	98	.001		98.00
Sidewalk	98	.030		98.00
Pavement	98	.460		98.00
Wooded area	79	.160		79.00
Landscaping	82	.050		82.00
Landscaping	82	.006		82.00
Landscaping	82	.026		82.00
Landscaping	82	.020		82.00
Landscaping	82	.001		82.00
Landscaping	82	.002		82.00
Landscaping	82	.001		82.00
Gravel	98	.003		98.00
Landscaping	82	.140		82.00

COMPOSITE AREA & WEIGHTED CN ---> 1.040 91.29 (91)

.....

PROPOSED STAFF PLANT

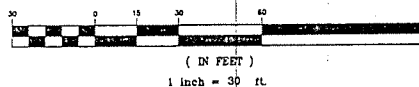




VICINITY MAP
SCALE: 1"=2000'

CALL BEFORE YOU DIG!
PENNSYLVANIA LAW REQUIRES
3 WORKING DAYS NOTICE FOR
CONSTRUCTION PHASE AND 10 WORKING
DAYS IN DESIGN STAGE - STOP CALL
Pennsylvania One Call System, Inc.
1-800-242-1776

GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft



LOT CONSOLIDATION

IT IS THE INTENTION OF THE LANDOWNER TO CONSOLIDATE LOTS
101-1 AND 101-2, IN ACCORDANCE WITH THE REQUIREMENTS OF
TOWNSHIP SUB-DIVISION AND LAND DEVELOPMENT ORDINANCES.

LANDSCAPE REQUIREMENTS

AS REQUIRED BY SECTION 8.305 OF THE STROUD TOWNSHIP ZONING ORDINANCE, ANY
LANDSCAPING MATERIAL REQUIRED BY ORDINANCE AND SHOWN ON THE LANDSCAPE PLAN
SHALL BE REPLACED BY THE LANDOWNER IN THE EVENT IT DIES WITHIN ONE (1) YEAR
OF INITIAL PLANTING.

OWNER

Tobyhanna Army Depot FCU
David Dixon

David Dixon (570)346-6555
Operations Manager (570)346-6563 Fax
Tobyhanna Army Depot FCU
300 Mulberry Street
Scranton, PA 18503

FLOOD ZONE INFORMATION

BY GRAPHIC PLOTTING THIS SITE IS LOCATED IN ZONE X OF
THE FLOOD INSURANCE RATE MAP, COMMUNITY PANEL NO. 420693 0010 B & 420693 0020 B
AND IS NOT IN A SPECIAL FLOOD HAZARD AREA. BY TELEPHONE
CALL DATED 02/09/00 TO THE FLOOD INSURANCE PROGRAM
(800) 635-6520 WE HAVE LEARNED THAT THIS COMMUNITY DOES
CURRENTLY PARTICIPATE IN THE PROGRAM.

SITE DATA

TOTAL ACREAGE OF DEVELOPMENT 2.20 ACRES
TYPE OF WATER SUPPLY PUBLIC (LINE LOCATED ALONG STOKES AVE.)
TYPE OF SEWAGE DISPOSAL SYSTEM PRIVATE
NUMBER OF LOTS 101-1 & 101-2
PIN NUMBER 17-7302-19-50-3975
TAX NUMBER 17/119005
PIN NUMBER 17-7302-19-50-4769
TAX NUMBER 17/3A/2/37
SOURCE OF TITLE D.B.V. 2081, PG. 2285-2289 INCLUSIVE
ZONING DISTRICT M-1

*-OWNER WISHES TO COMBINE LOTS 101-1 & 101-2 INTO ONE
SINGLE LOT.

Land Development Plan

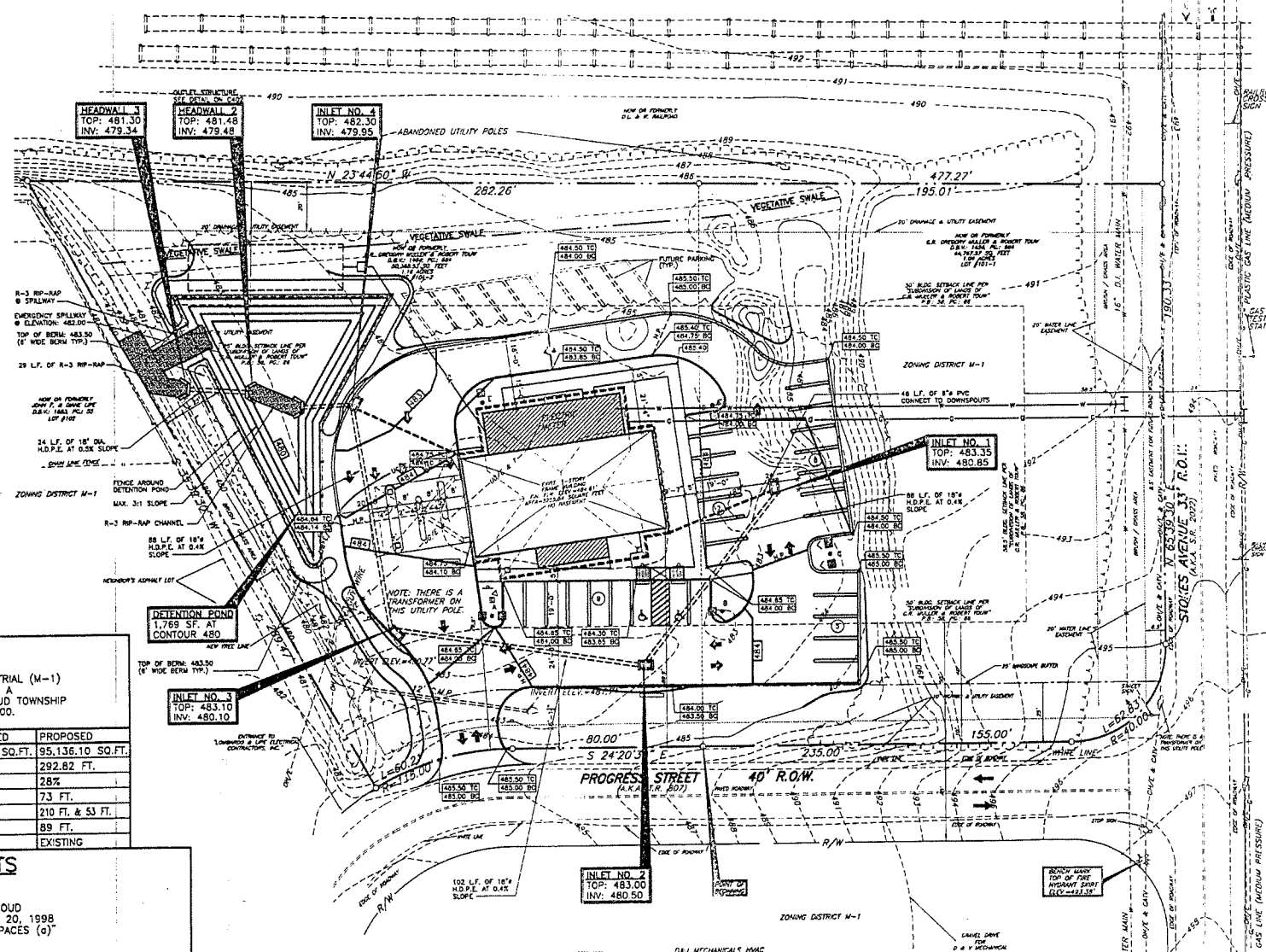
for
Tobyhanna Army Depot
Federal Credit Union

Stroud Township, Monroe County, Pennsylvania

Plans prepared by:

Craig D. DeBise
Professional Engineer
McIlvried, DiDona, & Mox, LLC
8851 Kind Drive
Pittsburgh, PA 15237
Ph.: (724) 934-2810 Fax: (724) 934-2811

40



ZONING INFORMATION

THIS SITE IS LOCATED IN THE LIMITED INDUSTRIAL (M-1)
ZONING DISTRICT. A FINANCIAL INSTITUTION IS A
PERMITTED USE IN THIS DISTRICT, PER STROUD TOWNSHIP
ORDINANCE NO. 10-2000, DATED JULY 26, 2000.

CATEGORY	REQUIRED	PROPOSED
MIN. LOT AREA	40,000 SQ.FT.	95,136.10 SQ.FT.
MIN. LOT WIDTH	125 FT.	292.82 FT.
MAX. LOT COVERAGE	60%	28%
BUILDING FRONT YARD SETBACK	40 FT.	73 FT.
BUILDING SIDE YARD SETBACK	25 FT.	210 FT. & 53 FT.
BUILDING REAR YARD SETBACK	60 FT.	89 FT.
MAX. PERMITTED HEIGHT	40 FT.	EXISTING

PARKING REQUIREMENTS

REQUIRED NUMBER OF SPACES

PER ARTICLE VIII, SCHEDULE VI OF THE STROUD
TOWNSHIP ZONING ORDINANCE, DATED: JULY 20, 1998
"REGULATIONS FOR OFF-STREET PARKING SPACES (a)"

NO. 7 COMMERCIAL

BANKS AND FINANCIAL INSTITUTIONS: (1) FOR EVERY 200 GROSS SQ. FT. PLUS
(1) FOR EACH 100 GROSS SQ. FT. USED
TO SERVE CUSTOMERS.

GROSS FLOOR AREA - 4566.33 + 200 = 22.83 (23)
TELLER SERVICE AREA - 541.26 - 100 = 5.41 (6)
TOTAL 29

TOTAL NUMBER OF SPACES REQUIRED: 29

TOTAL NUMBER OF SPACES PROVIDED: 29

REQUIRED PARKING LOT DIMENSIONS

PER ARTICLE VIII, SECTION 8.123, OF THE STROUD
TOWNSHIP ZONING ORDINANCE, DATED: JULY 20, 1998
"PARKING LOT DIMENSIONS"

ANGLE OF PARKING	PARKING WIDTH (AT CURB LINE)	STALL DEPTH* (CURB TO AISLE)	MINIMUM AISLE WIDTH ONE-WAY	TWO-WAY
90°	9.00'	19.0'	22'	24'
60°	10.40'	21.0'	18'	22'
45°	12.75'	19.8'	15'	20'
30°	18.00'	17.3'	12'	20'
PARALLEL	20.00'	9.0'	12'	20'

* - THE STALL DEPTH SHALL BE MEASURED PERPENDICULAR OR
RADIAL TO THE AISLE.



LAND DEVELOPMENT PLAN

1" = 30'-0"

APPROVAL RECOMMENDATION

STROUD TOWNSHIP PLANNING COMMISSION
MONROE COUNTY, PENNSYLVANIA

DATE: 9/27/2000
Chairman

APPROVED

STROUD TOWNSHIP
MONROE COUNTY, PENNSYLVANIA

DATE: 11/30/2000

BOARD OF COMMISSIONERS: 3/4/01

Chairman: 3/4/01

Secretary: 2/26/01

ENGINEER'S CERTIFICATE

I HEREBY CERTIFY THAT THESE PLANS ARE IN CONFORMANCE
WITH ENGINEERING, ZONING, BUILDING, SANITATION AND OTHER
APPLICABLE TOWNSHIP ORDINANCES OR AS NOTED.

Craig D. DeBise
ENGINEER'S SIGNATURE



PIERCE DESIGN
ARCHITECTURE & PLANNING



MCILVRIED
DIDONA &
MOX, LLC
Site Planners - Engineers - Surveyors
8851 Kind Drive
Pittsburgh, PA 15237
(724) 934-2810 Fax: (724) 934-2811

TOBYHANNA ARMY DEPOT
FEDERAL CREDIT UNION

STROUD TOWNSHIP, MONROE COUNTY, PA.

Title: Land Development Plan

Revision Number	Date	Drawn By	Checked By
1	9-12-00	JCG	CADD
2	10-2-00	MJP	CADD
3	10-25-00	JLG	CADD
4	11-1-00	JLG	CADD

Drawn by: WAG
Checked by: CADD
Date: 8/7/00
Date Issued: 8/7/00
Date Plotted: 8/7/00

Project No.: 99063

LD101

© 2000, Pierce Design, Inc.

109 ZETA DRIVE
PITTSBURGH, PA 15238
TEL: (412) 967-9696
FAX: (412) 967-9436

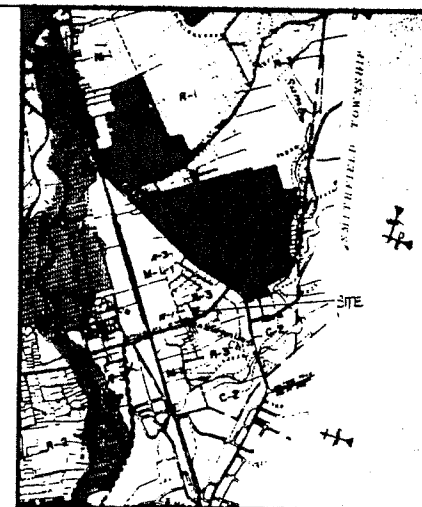
SOILS LEGEND

SOIL TYPE	PA PER SOL GROUP
DdD DENSON-ROCK OUTCROP COMPLEX	0 TO 8% SLOPES
DdG DENSON-ROCK OUTCROP COMPLEX	0 TO 25% SLOPES
CdD CHEWAND GRVELLY LOAM	0 TO 8% SLOPES
WYA WYOMING GRVELLY SAND LOAM	0 TO 3% SLOPES

SOIL TYPE SYMBOL AS SHOWN ON PLAN (TYPICAL)

NOTE - ROOF GUTTERS AND ROOF LEADERS SHALL BE INSTALLED ON THE NEW BUILDING. THE ROOF LEADERS SHALL BE 4" ADS FLEXIBLE PIPING AND SHALL TIE INTO THE PROPOSED INFILTRATION SYSTEM. LOCATION OF THE ROOF LEADER SHALL BE DETERMINED IN THE FIELD BY THE BUILDING CONTRACTOR.

- THE GENERAL OUTLINE OF CONSTRUCTION SEQUENCE SHALL BE AS FOLLOWS
1. INSTALL CONSTRUCTION ENTRANCE WITH FILTER FABRIC FENCE ON BOTH SIDES OF THE ENTRANCE AS INDICATED ON THE PLAN.
 2. INSTALL FILTER FABRIC FENCES TO ALL AREAS AS INDICATED ON THE PLAN.
 3. REMOVE GARAGE, DRIVEWAY, AND TENNIS COURT. REMOVE DEBRIS AS PER DEP SPECIFICATIONS.
 4. COMPLETE ROUGH GRADING TO PROPOSED GRADE AS INDICATED ON THE PLAN. USE STOCKPILE AREA INDICATED ON THE PLAN. PAVEMENT BASE MATERIAL SHALL BE INSTALLED WITHIN 10 DAYS AFTER THE SITE IS ROUGH GRADED.
 5. INSTALL PROPOSED INFILTRATION SYSTEM AS PER PLAN. INSTALL INLET PROTECTION AS PER PLAN AFTER THE INFILTRATION SYSTEM IS BUILT.
 6. INSTALL PARKING LOT BASE MATERIAL AND CONSTRUCT PROPOSED BUILDING.
 7. MAINTAIN EROSION CONTROL MEASURES ON THE O-W CORP. PROPERTY AS INDICATED ON THE PLAN.
 8. COMPLETE FINAL STABILIZATION, GRADING AND PAVING OF ALL AREAS.



LOCATION MAP

PORTION OF EAST STRADSBURG TOWNSHIP, PA
SCALE: 1"=1000'

APPROX LOCATION OF ADSORPTION FIELD (THE OUTLINE IS INTENDED TO INDICATE THE APPROXIMATE LOCATION OF THE ADSORPTION FIELD AND DOES NOT REPRESENT THE ACTUAL FIELD DIMENSIONS). IF AND/OR WHEN THE EXISTING SEPTIC SYSTEM IS MODIFIED A DRY CAPPED SEWER LINE SHALL BE INSTALLED IN ACCORDANCE WITH STRAD TOWNSHIP ORDINANCE NO. 180.

EXISTING TWO FAMILY HOUSE TO BE CONVERTED TO OFFICE SPACE 9280 ± SF.

GRAPHIC SCALE

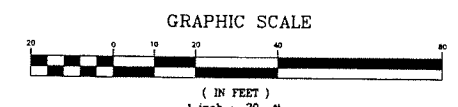
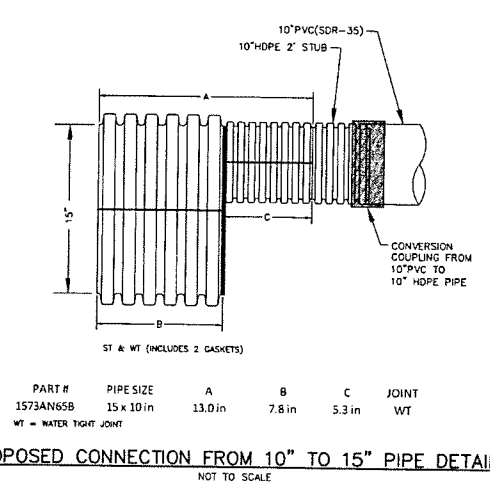
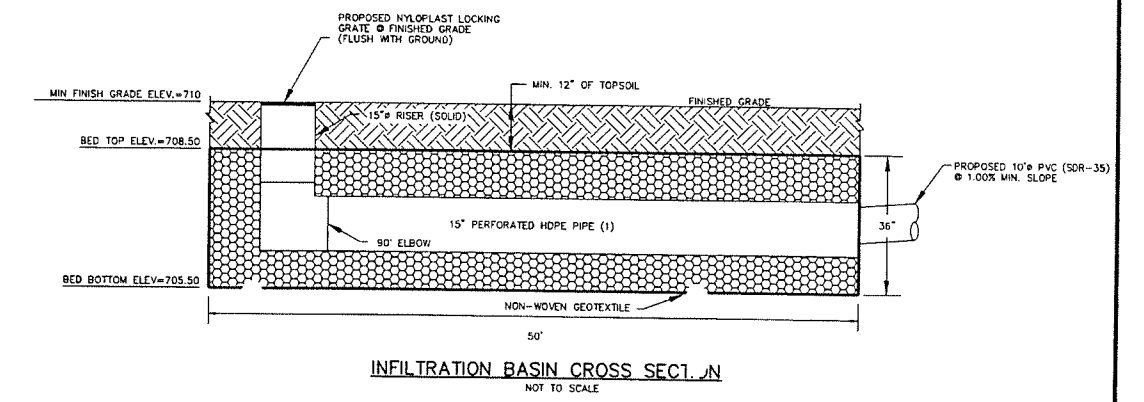
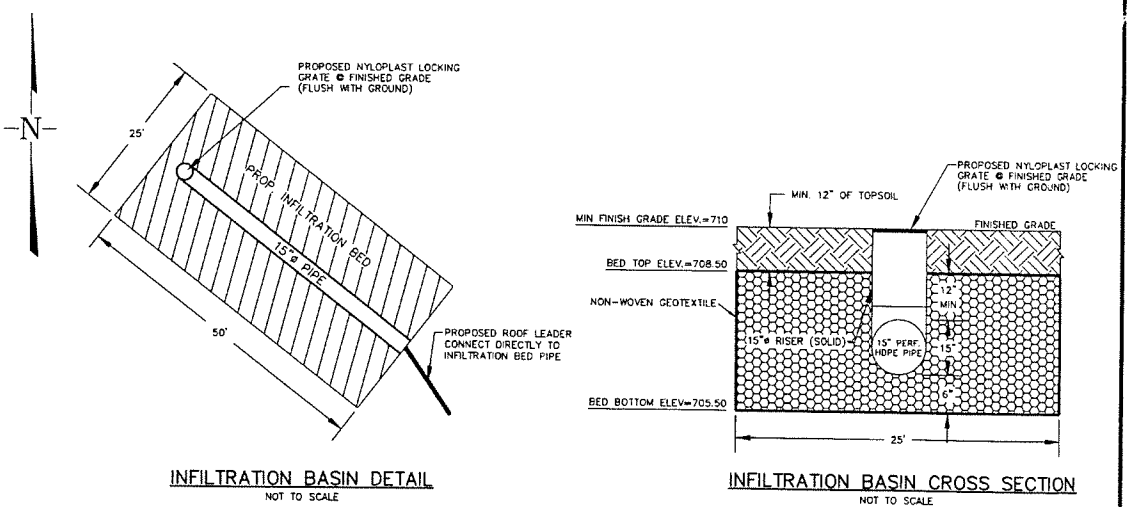
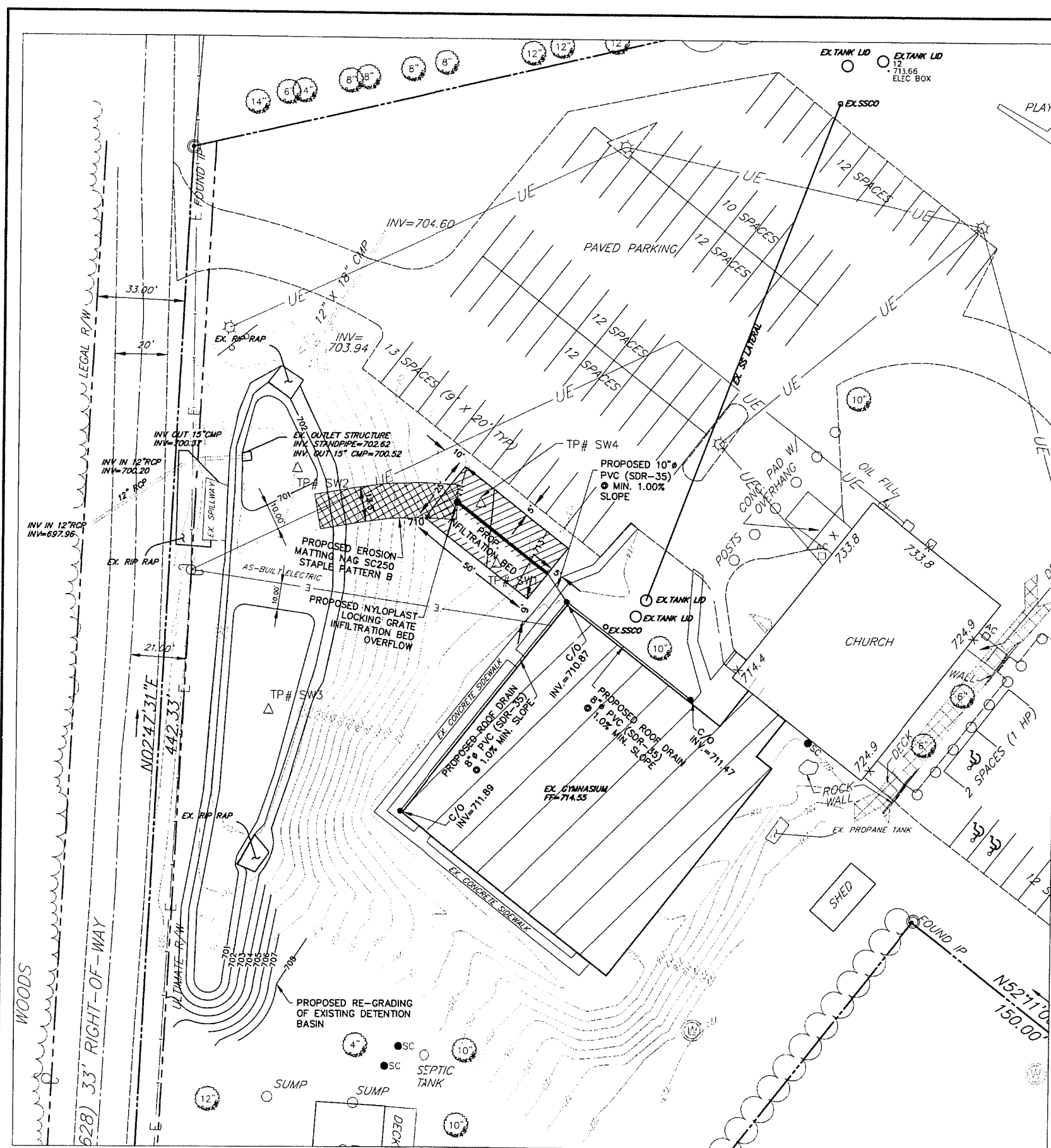
(IN FEET)
1 inch = 30 ft

E & S, DRAINAGE/GRADING PLAN

PROJECT NO.	DESIGNER	LAND DEVELOPMENT PLAN	REVISIONS
101	JPH	PROPOSED INDUSTRIAL FACILITIES	1 6/26/1996
DRAWN BY	CHECKED BY		2 6/20/1996
NLP			3 5/20/1996
			4 5/20/1996
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I:\SOSK\PRCA\PA-1003 BEREAN BIBLE CHURCH\Drawn\Survey\ PA-1003AB-BASE.dwg Sep 13,2010 - 1:00pm



REVISED STORMWATER MANAGEMENT FACILITIES			
BEREAN BIBLE FELLOWSHIP CHURCH			
STROUD TOWNSHIP MONROE COUNTY PENNSYLVANIA		PROJECT NO. PA-1003(AB)	
DATE 08/02/2010		CHECKED BY AB	SHEET NO. 1 OF 1
SCALE 1" = 20'		RR 3, Box 3089, Suite 1 Stroudsburg, PA 18360-9321 570.688.9550 Fax 570.688.9768	
NO. REVISIONS DATE		1 REVISED PER TOWNSHIP ENGINEER COMMENTS 09/13/2010	

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Appendix F

BMP Calculations

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 Effective ness (%)	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 than required and would be a benefit to both the Township and PennDOT Stream segment below MS4 area
S2	S 801	Progress Street (along 124 & 134)	Vegetated Swales - A/B soils				205.00	70	143.50	
S3	S 801	Pinecrest Dr & VanVliet Rd	Vegetated Swales - A/B soils					70		
S4	N/A	Flek Property - 543 Fawn Road	150 lf Forested Stream Buffer - 35' wide					50		Not in the MS4 DA
S5	N/A	Oiler Property - 109 Wicks Lane	600 lf & 250 lf Forested Stream Buffer - 35' wide					50		Private Property Not in the MS4 DA
S6	N/A	Halterman Property - 1741 Paradise Trail	200 lf Forested Stream Buffer - 35' wide					50		Not in the MS4 DA On an NPDES Permitted Site
S7	S 801	Tobyhanna Credit Union	Basin Retrofit					60		
S8	S 811	Blue Mt Lake	Basin Retrofit					60		
S9	N/A	84 Lumber Property	Stream Restoration - Realigned section of channel. See PADEP permit to 84 Lumber							Private Property Not in the MS4 DA
	S 801	To be determined - Private properties on Mill Creek Rd & Progress St	Bioretention/Raingarden - A/B Soils					90		Private Property
	N/A	Fawn Road	Street Sweeping 25 times per year					9	40.00	TSS Reduction of about 400 lb/mile of rd/yr
	N/A	Brushy Mountain Road	Street Sweeping 25 times per year					9	440.00	TSS Reduction of about 400 lb/mile of rd/yr
									46543.50	Possible TSS Reduction using listed BMPs

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	1.00	304.00	100	304.00	50	152.00	
FR4	FR 610	Trilland	Vegetated Swale - C Soils		782.00	70	547.40	50	273.70	
FR5	FR 605	Stroudwood	Vegetated Swale - C Soils		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		10240.00	10	1024.00	50	512.00	
FR7	FR 607	Olde Mill Run	Vegetated Swale/Rain Garden w/underdrain		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		4359.00	100	4359.00	50	2179.50	
FR9	FR 611	North side Elderberry along 3224 lot	Vegetated Swale - C Soils		1238.00	40	495.20	50	247.60	
FR10	FR 633	East side Parker Lane	Vegetated Swale - C Soils		7207.00	100	7207.00	50	3603.50	
FR11	FR 634	Parker Lane top of curve	Vegetated Swale - C Soils		2354.00	100	2354.00	50	1177.00	
FR12	FR 632	Parker Lane - North side between Cranberry & James Ct	Vegetated Swale - C Soils		4712.00	10	471.20	50	235.60	
FR13	FR 627	Cardinal Drive	Vegetated Swale - C Soils		17775.00	10	1777.50	50	888.75	
FR14	FR 627	Wigwam between Dove & stream	Vegetated Swale - C Soils		17775.00	60	10665.00	50	5332.50	In PennDOT R/W & maybe Private Property
FR15	FR 617	Skypine Way	Vegetated Swale - C Soils		5467.00	50	2733.50	50	1366.75	
FR16	FR 616	Skypine Way	Vegetated Swale - C Soils		4696.00	50	2348.00	50	1174.00	
FR17	FR 620	Skypine Way - North side just US of stream	Vegetated Swale - C Soils		1413.00	100	1413.00	50	706.50	
FR18	FR 602	Skinner Hill Rd - on curve	Vegetated Swale - C Soils		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	52.98	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)
		To be determined	Street Sweeping 25 times per year				0.00	9	0.00	TSS Reduction of about 400 lb/mile of rd/yr
									26219.67	Possible TSS Reduction using listed BMPs

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 Effective ness (%)	TSS Removed by BMP (lb/yr)	Notes
LP1	LP 514	Rockdale Lane	Vegetated Swale - C/D Soils		846.73	100	846.73	50	423.37	
LP2	LP 515	Rockdale Lane	Vegetated Swale - C/D Soils		473.63	100	473.63	50	236.82	
LP3	LP 516	Rockdale Lane	Vegetated Swale - C/D Soils		6106.76	100	6106.76	50	3053.38	
LP4	LP 517	Edinger Drive	Vegetated Swale - C/D Soils		1700.82	100	1700.82	50	850.41	
LP5	LP 518	Edinger Drive	Vegetated Swale - C/D Soils		1974.15	100	1974.15	50	987.08	
LP6	LP 522	Schaffer's School House Road	Vegetated Swale - A & C Soils		1037.00	100	1037.00	60	622.20	
LP7	LP 505	Arlington	Vegetated Swale - C Soils		13748.00	50	6874.00	50	3437.00	
LP8	LP 507	Arlington	Vegetated Swale - C Soils		779.00	60	467.40	50	233.70	
LP9	LP 525	Bridle	Vegetated Swale - C Soils		7934.00	100	7934.00	50	3967.00	
LP10	LP 510	West Hills & Sandee	Vegetated Swale - A Soils		526.00	100	526.00	70	368.20	
LP11	LP 511	West Hills & Sandee	Vegetated Swale - A Soils		1405.00	100	1405.00	70	983.50	
LP12	N/A	Romeo Property at end of Sandee Lane	Forested Stream Buffer Restoration					50		Private Property Not in MS4 Area
LP13	N/A	5531, 5557 & 5561 Bridle Rd	Forested Stream Buffer Restoration					50		Private Properties Not in MS4 Area
		To be determined	Street Sweeping 25 times per year					9		TSS Reduction of about 400 lb/mile of rd/yr
									15162.65	Possible TSS Reduction using listed BMPs

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 Effective ness (%)	TSS Removed by BMP (lb/yr)	Notes
BT1	B-T6 142	Hallet Road	Vegetated Swale		518.98	70	363.29	50	181.64	
BT2	B-T6 143	Hallet Road	Vegetated Swale		907.06	80	725.65	50	362.82	
BT3	B-T6 140	Hallet & Beacon Hill	Rain Garden at inlet	0.00	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		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				0.00	50	0.00	Not in the MS4 DA Note: Credit is only given for the runoff that flows through the buffer area
		Hallet Road	Street Sweeping 25 times per year	0.92	1691.88	100	1691.88	9	152.27	0.92 Ac of road in MS4 area (2006 lfx20' wide)
									1498.59	Possible TSS Reduction using listed BMPs



**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
STORMWATER DISCHARGES FROM
SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS
BMP EFFECTIVENESS VALUES**

This table of BMP effectiveness values (i.e., pollutant removal efficiencies) is intended for use by MS4s that are developing and implementing Pollutant Reduction Plans and TMDL Plans to comply with NPDES permit requirements. The values used in this table generally consider pollutant reductions from both overland flow and reduced downstream erosion, and are based primarily on average values within the Chesapeake Assessment Scenario Tool (CAST) (www.casttool.org). Design considerations, operation and maintenance, and construction sequences should be as outlined in the Pennsylvania Stormwater BMP Manual, Chesapeake Bay Program guidance, or other technical sources. The Department of Environmental Protection (DEP) will update the information contained in this table as new information becomes available. Interested parties may submit information to DEP for consideration in updating this table to DEP's MS4 resource account, RA-EPPAMS4@pa.gov. Where an MS4 proposes a BMP not identified in this document or in Chesapeake Bay Program expert panel reports, other technical resources may be consulted for BMP effectiveness values. Note – TN = Total Nitrogen and TP = Total Phosphorus.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Wet Ponds and Wetlands	20%	45%	60%	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 portion 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. Nitrogen reduction is minimal.
Dry Detention Basins and Hydrodynamic Structures	5%	10%	10%	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.
Dry Extended Detention Basins	20%	20%	60%	Dry extended detention (ED) basins are depressions created by excavation or berm construction that temporarily store runoff and release it slowly 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.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Infiltration Practices w/ Sand, Veg.	85%	85%	95%	A depression to form an infiltration basin where sediment is trapped and water infiltrates the soil. No underdrains are associated with infiltration basins and trenches, because by definition these systems provide complete infiltration. Design specifications require infiltration basins and trenches to be built in good soil, they are not constructed on poor soils, such as C and D soil types. Engineers are required to test the soil before approval to build is issued. To receive credit over the longer term, jurisdictions must conduct yearly inspections to determine if the basin or trench is still infiltrating runoff.
Filtering Practices	40%	60%	80%	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.
Filter Strip Runoff Reduction	20%	54%	56%	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 soil conditions. A 0.4 design ratio of filter strip length to impervious flow length is recommended for runoff reduction urban filter strips.
Filter Strip Stormwater Treatment	0%	0%	22%	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 soil conditions. A 0.2 design ratio of filter strip length to impervious flow length is recommended for stormwater treatment urban filter strips.
Bioretention – Raingarden (C/D soils w/ underdrain)	25%	45%	55%	An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These 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 soil.
Bioretention / Raingarden (A/B soils w/ underdrain)	70%	75%	80%	An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These 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 A or B soil.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Bioretention / Raingarden (A/B soils w/o underdrain)	80%	85%	90%	An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These 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 no underdrain and is in A or B soil.
Vegetated Open Channels (C/D Soils)	10%	10%	50%	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 soil.
Vegetated Open Channels (A/B Soils)	45%	45%	70%	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 A or B soil.
Bioswale	70%	75%	80%	With a bioswale, the load is reduced because, unlike other open channel designs, there is now treatment through the soil. A bioswale is designed to function as a bioretention area.
Permeable Pavement w/o Sand or Veg. (C/D Soils w/ underdrain)	10%	20%	55%	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 storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, no sand or vegetation and is in C or D soil.
Permeable Pavement w/o Sand or Veg. (A/B Soils w/ underdrain)	45%	50%	70%	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 storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, no sand or vegetation and is in A or B soil.
Permeable Pavement w/o Sand or Veg. (A/B Soils w/o underdrain)	75%	80%	85%	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 storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has no underdrain, no sand or vegetation and is in A or B soil.
Permeable Pavement w/ Sand or Veg. (A/B Soils w/ underdrain)	50%	50%	70%	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 storage 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 A or B soil.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Permeable Pavement w/ Sand or Veg. (A/B Soils w/o underdrain)	80%	80%	85%	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 storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has no underdrain, has sand and/or vegetation and is in A or B soil.
Permeable Pavement w/ Sand or Veg. (C/D Soils w/ underdrain)	20%	20%	55%	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 storage 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.
Stream Restoration	0.075 lbs/ft/yr	0.068 lbs/ft/yr	44.88 lbs/ft/yr	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 Buffers	25%	50%	50%	An area of trees 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 values represent pollutant load reductions from stormwater draining through buffers).
Tree Planting	10%	15%	20%	The BMP effectiveness values for tree planting are estimated by DEP. DEP estimates that 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 planting the trees (in lbs/acre/year); and 3) multiply the result of step 2 by the BMP effectiveness values given.
Street Sweeping	3%	3%	9%	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.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Storm Sewer System Solids Removal	0.0027 for sediment, 0.0111 for organic matter	0.0006 for sediment, 0.0012 for organic matter	1 – TN and TP concentrations	<p>This BMP (also referred to as "Storm Drain Cleaning") involves the collection or capture and proper disposal of solid material within the storm system to prevent discharge to surface waters. Examples include catch basins, stormwater inlet filter bags, end of pipe or outlet solids removal systems and related practices. Credit is authorized for this BMP only when proper maintenance practices are observed (i.e., inspection and removal of solids as recommended by the system manufacturer or other available guidelines). The entity using this BMP for pollutant removal credits must demonstrate that they have developed and are implementing a standard operating procedure for tracking the material removed from the sewer system. Locating such BMPs should consider the potential for backups onto roadways or other areas that can produce safety hazards.</p> <p>To determine pollutant reductions for this BMP, these steps must be taken:</p> <ol style="list-style-type: none"> 1) Measure the weight of solid/organic material collected (lbs). Sum the total weight of material collected for an annual period. Note – do not include refuse, debris and floatables in the determination of total mass collected. 2) Convert the annual wet weight captured into annual dry weight (lbs) by using site-specific measurements (i.e., dry a sample of the wet material to find its weight) or by using default factors of 0.7 (material that is predominantly wet sediment) or 0.2 (material that is predominantly wet organic matter, e.g., leaf litter). 3) Multiply the annual dry weight of material collected by default or site-specific pollutant concentration factors. The default concentrations are shown in the BMP Effectiveness Values columns. Alternatively, the material may be sampled (at least annually) to determine site-specific pollutant concentrations. <p>DEP will allow up to 50% of total pollutant reduction requirements to be met through this BMP. The drainage area treated by this BMP may be no greater than 0.5 acre unless it can be demonstrated that the specific system proposed is capable of treating stormwater from larger drainage areas. For planning purposes, the sediment removal efficiency specified by the manufacturer may be assumed, but no higher than 80%.</p>

Appendix G

Water Quality Sample Data

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 N

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

Field Measurements

Lab samples

Temperature (°C)		Dissolved Oxygen (mg/L)		Flow (CFS)	0
pH	6.6	Alkalinity (mg/L as CaCO3)		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	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	N	
7. Four or more families with tolerance value of 3 or less	N	
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)		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		N	
Instream Cover	17	Substrate / Cover	0	Frequency of Riffles	18	Contition of Banks	12
Epifaunal Substrate	17	Velocity/Depth Regimes	11	Channel Sinuosity	18	Bank Vegetation	13
Embeddedness	15	Pool Variability	0	Channel Flow Status	17	Disruptive Pressure	9
Pool Substrate	0	Sediment Deposition	12	Channel Alteration	11	Riparian Zone	9
Instream Score		61	Riparian Score		34	Total Score 161	

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 (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 colums indicate the appropriate metrics and IBI score to use.

Metric Names		Raw Metric Values	Standardized Metric Values				
			Freestone Riffle-Run			Multihabitat Pool-Glide	Limestone 2009
			6D200		2D100		
			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			27.8		
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			20.1	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						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		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
Ephemeroellidae	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
Contition of Banks	14	Bank Vegetation	14	Disruptive Pressure	12
Riparian Zone	8				
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
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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

Use, Attaining?

— Aquatic Life, Impaired

— Municipality Boundary