STORMWATER MANAGEMENT ORDINANCE

ORDINANCE NO. 0321 OF 2011

PER

LUZERNE COUNTY ACT 167 PHASE II

TOWNSHIP OF LEHMAN
LUZERNE COUNTY,
PENNSYLVANIA

ENACTED AT A PUBLIC MEETING HELD ON:

March 21, 2011

ARTICLE I - GENERAL PROVISIONS

Section 101. Short Title

This Ordinance shall be known and may be cited as the Lehman Township Stormwater Management Ordinance."

Section 102. Statement of Findings

The Township Board of Supervisors of Lehman Township finds that:

A. Inadequate management of accelerated runoff of stormwater resulting from development throughout a watershed increases flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of streams and storm sewers, greatly increases the cost of public facilities to carry and control stormwater, undermines flood plain management and flood control efforts in downstream communities, reduces groundwater recharge, threatens public health and safety, and increases nonpoint source pollution of water resources.

B. A comprehensive program of stormwater management, including reasonable regulation of development and activities causing accelerated runoff, is fundamental to the public health, safety, and welfare and the protection of people of the Commonwealth, their resources, and the environment.

C. Stormwater is an important water resource, which provides groundwater recharge for water supplies and base flow of streams, which also protects and maintains surface water quality.

D. Federal and state regulations require certain municipalities to implement a program of stormwater controls. These municipalities are required to obtain a permit for stormwater discharges from their separate storm sewer systems under the National Pollutant Discharge Elimination System (NPDES).

Section 103. Purpose

The purpose of this Ordinance is to promote health, safety, and welfare within Lehman Township and its watershed by minimizing the harms and maximizing the benefits described in Section 102 of this Ordinance, through provisions designed to:

A. Meet legal water quality requirements under state law, including regulations at 25 Pa. Code 93 to protect, maintain, reclaim, and restore the existing and designated uses of the waters of this Commonwealth.

B. Preserve the natural drainage systems as much as possible.

C. Manage stormwater runoff close to the source.

D. Provide procedures and performance standards for stormwater planning and management.

E. Maintain groundwater recharge to prevent degradation of surface and groundwater quality and to otherwise protect water resources.

F. Prevent scour and erosion of stream banks and streambeds.

G. Provide proper operation and maintenance of all permanent SWM BMPs that are implemented within Lehman Township.

H. Provide standards to meet NPDES permit requirements.

Section 104. Statutory Authority

A. Primary Authority:

Lehman Township is empowered to regulate these activities by the authority of the Act of October 4, 1978, P.L. 864 (Act 167), 32 P.S. Section 680.1, et seq., as amended, the "Storm Water Management Act" and Act of May 1, 1933, P.L. 103, No. 69, reenacted and amended November 9, 1995, P.L. 350, No. 60 as amended, known as the Second Class Township Code.

B. Secondary Authority:

Lehman Township also is empowered to regulate land use activities that affect runoff by the authority of the Act of July 31, 1968, P.L. 805, No. 247, The Pennsylvania Municipalities Planning Code, as amended.

Section 105. Applicability

All regulated activities and all activities that may affect stormwater runoff, including land development and earth disturbance activity, are subject to regulation by this Ordinance.

Section 106. Repealer

Any other ordinance provision(s) or regulation of the Lehman Township inconsistent with any of the provisions of this Ordinance is hereby repealed to the- extent of the inconsistency only.

Section 107. Severability

In the event that a court of competent jurisdiction declares any section or provision of this Ordinance invalid, such decision shall not affect the validity of any of the remaining provisions of this Ordinance.

Section 108. Compatibility with Other Requirements

Approvals issued and actions taken under this Ordinance do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other code, law, regulation, or ordinance.

ARTICLE II - DEFINITIONS

For the purposes of this Ordinance, certain terms and words used herein shall be interpreted as follows:

A. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.

B. The word "includes" or "including" shall not limit the term to the specific example but is intended to extend its meaning to all other instances of like kind and character.

C. The words "shall" and "must" are mandatory; the words "may" and "should" are permissive.

Agricultural Activity - Activities associated with agriculture such as agricultural cultivation, agricultural operation, and animal heavy use areas. This includes the work of producing crops including tillage, land clearing, plowing, disking, harrowing, planting, harvesting crops or pasturing and raising of livestock and installation of conservation measures. Construction of new buildings or impervious area is not considered an agricultural activity.

Applicant - A landowner, developer, or other person who has filed an application to Lehman Township for approval to engage in any regulated activity at a project site in Lehman Township.

Best Management Practice (BMP) - Activities, facilities, designs, measures, or procedures used to manage stormwater impacts from regulated activities, to meet state water quality requirements, to promote groundwater recharge, and to otherwise meet the purposes of this Ordinance. Stormwater BMPs are commonly grouped into one of two broad categories or measures: "structural" or "nonstructural." In this Ordinance, nonstructural BMPs or measures refer to operational and/or behavior-related practices that attempt to minimize the contact of pollutants with stormwater runoff whereas structural BMPs or measures are those that consist of a physical device or practice that is installed to capture and treat stormwater runoff. Structural BMPs include, but are not limited to, a wide variety of practices and devices, from large-scale retention pond sand constructed wetlands, to small-scale underground treatment systems, infiltration facilities, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, riparian or forested buffers, sand filters, detention basins, and manufactured devices. Structural stormwater BMPs are permanent appurtenances to the project site.

Capture - The process of collecting runoff to be managed by a stormwater BMP.

Conservation District - A conservation district, as defined in Section 3(c) of the Conservation District Law (3 P. S. § 851(c)) that has the authority under a

delegation agreement executed with DEP to administer and enforce all or a portion of the regulations promulgated under 25 Pa. Code 102; refers to the Luzerne Conservation District unless otherwise noted.

Design Storm - The magnitude and temporal distribution of precipitation from a storm event measured in probability of occurrence (e.g., a 5-year storm) and duration (e.g., 24 hours) used in the design and evaluation of stormwater management systems. Also see Return Period.

Detention Volume - The volume of runoff that is captured and released into the waters of this Commonwealth at a controlled rate.

DEP - The Pennsylvania Department of Environmental Protection.

Development, Land - Any human-induced change to improved or unimproved real estate, whether public or private, including, but not limited to, land development, construction, installation; or expansion of a building or other structure, land division, street construction, drilling, and site alteration such as embankments, dredging, grubbing, grading, paving, parking or storage facilities, excavation, filling, stockpiling, or clearing.

Development Site (Site) - See Project Site.

Disconnected Impervious Area (DIA) - An impervious or impermeable surface that is disconnected from any stormwater drainage or conveyance system and is redirected or directed to a pervious area, which allows for infiltration, filtration, and increased time of concentration as specified in Appendix B, Disconnected Impervious Area.

Disturbed Area - An unstabilized land area where an earth disturbance activity is occurring or has occurred.

Earth Disturbance Activity - A construction or other human activity which disturbs the surface of the land, including, but not limited to: clearing and grubbing; grading; excavations; embankments; road maintenance; building construction; and the moving, depositing, stockpiling, or storing of soil, rock, or earth materials.

Erosion - The natural process by which the surface of the land is worn away by water, wind, or chemical action.

Existing Condition - The dominant land cover during the 5-year period immediately preceding a proposed regulated activity.

FEMA - Federal Emergency Management Agency.

Floodplain - Any land area susceptible to inundation by water from any natural source or delineated by applicable FEMA maps and studies as being a special flood hazard area. Also includes areas that comprise Group 13 Soils, as listed in Appendix

A of the Pennsylvania DEP Technical Manual for Sewage Enforcement Officers (as amended or replaced from time to time by DEP).

Floodway - The channel of the watercourse and those portions of the adjoining floodplains that are reasonably required to carry and discharge the 100-year flood. Unless otherwise specified, the boundary of the floodway is as indicated on maps and flood insurance studies provided by FEMA. In an area where no FEMA maps or studies have defined the boundary of the 100-year floodway, it is assumed, absent evidence to the contrary, that the floodway extends from the stream to 50 feet from the top of the bank of the stream.

Forest Management/Timber Operations - Planning and activities necessary for the management of forestland. These include conducting a timber inventory, preparation of forest management plans, silvicultural treatment, cutting budgets, logging road design and construction, timber harvesting, site preparation, and reforestation.

Geotextile - A porous fabric manufactured from synthetic fiber that is used to provide separation between different types of media (i.e., between soil and stone).

Hotspot - Areas where land use or activities generate highly contaminated runoff, with concentrations of pollutants that are higher than those that are typically found in stormwater (e.g., vehicle salvage yards and recycling facilities, vehicle fueling stations, fleet storage areas, vehicle equipment and cleaning facilities, and vehicle service and maintenance facilities).

Hydrologic Soil Group (HSG) - Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSGs (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting. The NRCS defines the four groups and provides a list of most of the soils in the United States and their group classification. The soils in the area of the development site may be identified from a soil survey report that can be obtained from local NRCS offices or conservation district offices. Soils become less pervious as the HSG varies from A to D (NRCS [3,4])

Impervious Surface (Impervious Area) - A surface that prevents the infiltration of water into the ground. Impervious surfaces (or areas) shall include, but not be limited to: roofs; additional indoor living spaces, patios, garages, storage sheds and similar structures; and any new streets or sidewalks. Decks, parking areas, and driveway areas are not counted as impervious areas if they do not prevent infiltration.

Infiltration - Movement of surface water into the soil, where it is absorbed by plant roots,
evaporated into the atmosphere, or percolated downward to recharge groundwater.

Karst - A type of topography or landscape characterized by surface depressions, sinkholes, rock pinnacles/uneven bedrock surface, underground drainage, and caves. Karst is formed on carbonate rocks, such as limestone or dolomite.

Land Development (Development) - Inclusive of any or all of the following meanings

(1) The improvement of one lot or two or more contiguous lots, tracts or parcels of land for any purpose involving:

(a) a group of two or more residential or nonresidential buildings, whether proposed initially or cumulatively, or a single nonresidential building on a lot or lots regardless of the number of occupants or tenure; or

(b) the division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups or other features.

(2) A subdivision of land.

(3) Development in accordance with section 503(1.1) of the Pennsylvania Municipalities Code, Act 247, as amended.

Low Impact Development - A land development and construction approach that uses various land planning, design practices, and technologies to simultaneously conserve and protect natural resource systems, while allowing for necessary infrastructure improvements associated with land development.

Municipality - Lehman Township, Luzerne County, Pennsylvania.

NRCS - USDA Natural Resources Conservation Service (previously SCS).

Peak Discharge - The maximum rate of stormwater runoff from a specific storm event.

Pervious Area - Any area not defined as impervious.

Project Site - The specific area of land where any regulated activities in Lehman Township are planned, conducted, or maintained.

Qualified Professional - Any person licensed by the Pennsylvania Department of State or otherwise qualified by law to perform the work required by the Ordinance.

Redevelopment - Any development that requires demolition or removal of existing structures or impervious surfaces at a site and replacement with new impervious surfaces. Maintenance activities such as top-layer grinding and re-paving are not considered to be redevelopment. Interior remodeling projects and tenant improvements are also not considered to be redevelopment.

Regulated Activities - Any earth disturbance activities or any activities that

involve the alteration or development of land in a manner that may affect stormwater runoff.

Regulated Earth Disturbance Activity - Activity involving earth disturbance subject to regulation under 25 Pa. Code 92, 25 Pa. Code 102, or the Clean Streams Law.

Retention Volume/Removed Runoff - The volume of runoff that is captured and not released directly into the surface waters of this Commonwealth during or after a stone event.

Return Period - The average interval, in years, within which a storm event of a given magnitude can be expected to occur one time. For example, the 25-year return period rainfall would be expected to occur on average once every 25 years; or stated in another way, the probability of a 25-year storm occurring in any one year is 0.04 (i.e., a 4% chance).

Runoff - Any part of precipitation that flows over the land.

Sediment - Soils or other materials transported by surface water as a product of erosion.

State Water Quality Requirements - The regulatory requirements to protect, maintain, reclaim, and restore water quality under Title 25 of the Pennsylvania Code and the Clean Streams Law.

Stormwater - Drainage runoff from the surface of the land resulting from precipitation or snow or ice melt.

Stormwater Management Facility - Any structure, natural or man-made, that, due to its condition, design, or construction, conveys, stores, or otherwise affects stormwater runoff. Typical stormwater management facilities include, but are not limited to: detention and retention basins; open channels; storm sewers; pipes; and infiltration facilities.

Stormwater Management Plan - The Luzerne County Stormwater Management Plan for managing stormwater runoff adopted by the County of Luzerne as required by the Act of October 4, 1978, P.L. 864, (Act 167), as amended, and known as the "Storm Water Management Act."

Stormwater Management Best Management Practices - Is abbreviated as **BMPs** or SWM **BMPs** throughout this Ordinance.

Stormwater Management Site Plan - The plan prepared by the developer or his representative indicating how stormwater runoff will be managed at the development site in accordance with this Ordinance. **Stormwater Management Site Plan** will be designated as SWM **Site Plan** throughout this Ordinance.

Subdivision - As defined in The Pennsylvania Municipalities Planning Code, Act of

July 31, 1968, P.L. 805, No. 247, as amended.

USDA - United States Department of Agriculture.

Void Ratio - The ratio of the volume of void space to the total volume of the BMP material (void space plus solid material / media providing structural support to create the storage area).

Waters of this Commonwealth - Any and all rivers, streams, creeks, rivulets, impoundments, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and all other bodies or channels of conveyance of surface and underground water, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth.

Watershed - Region or area drained by a river, watercourse, or other surface water of this Commonwealth.

Wetland - Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas.

ARTICLE III - STORMWATER MANAGEMENT STANDARDS

Section 301. General Requirements

A. For all regulated activities, submission of the Stormwater Management Permit Application shall be required and usage of the appropriate form contained in Appendix B shall also be required.

B. For all regulated activities, unless preparation of a SWM Site Plan is specifically exempted in Section 302:

1. Preparation and implementation of an approved SWM Site Plan is required.

2. No regulated activities shall commence until Lehman Township issues written approval of a SWM Site Plan, which demonstrates compliance with the requirements of this Ordinance.

C. SWM Site Plans approved by Lehman Township, in accordance with Section 406, shall be on site throughout the duration of the regulated activity.

D. Lehman Township may, after consultation with DEP, approve measures for meeting the state water quality requirements other than those in this Ordinance, provided that they meet the minimum requirements of, and do not conflict with, state law including, but not limited to, the Clean Streams Law.

E. For all regulated earth disturbance activities, erosion and sediment control BMPs shall be designed, implemented, operated, and maintained during the regulated earth disturbance activities (e.g., during construction) to meet the purposes and requirements of this Ordinance and to meet all requirements under Title 25 of the Pennsylvania Code and the Clean Streams Law. Various BMPs and their design standards are listed in the *Erosion and Sediment Pollution Control Program Manual* (E&S Manual)[2], No. 363-2134-008 (April 15, 2000), as amended and updated.

F. For all regulated activities, implementation of the volume controls in Section 303 is required, unless otherwise exempted by Section 302.

G. Impervious areas:

1. The measurement of impervious areas shall include all of the impervious areas in the total proposed development even if development is to take place in stages.

2. For development taking place in stages, the entire development plan must be used in determining conformance with this Ordinance.

3. For projects that add impervious area to a parcel, only the proposed impervious area on the parcel must be considered and summed to determine the plan preparation and approval requirements of this Ordinance.

4. For redevelopment projects in which the existing site is disturbed, the entire proposed site is subject to the plan preparation and approval requirements of this Ordinance. Existing conditions are considered to be the existing site prior to disturbance, and 20% of the existing impervious area must be considered as meadow in good condition for all stormwater calculations. For redevelopment projects in which the existing site is already controlled by a stormwater management facility, the requirement to consider 20% of existing impervious area as meadow is waived, provided the existing facility meets the water quality, volume, and peak rate standards and criteria of this Ordinance.

H. Stormwater flows onto adjacent property shall not be created, increased, decreased, relocated, or otherwise altered without written notification of the adjacent property owner(s). Such stormwater flows shall be subject to the requirements of this Ordinance.

I. All regulated activities shall include measures to:

1. Protect health, safety, and property;

2. Meet the water quality goals of this Ordinance by implementing measures outlined in the *Pennsylvania Stormwater Best Management Practices Manual* (BMP Manual)[1] to:

a. Minimize disturbance to floodplains, wetlands, and wooded areas.

b. Maintain or extend riparian buffers.

c. Avoid erosive flow conditions in natural flow pathways.

d. Minimize thermal impacts to waters of this Commonwealth.

e. Disconnect impervious surfaces by directing runoff to pervious
areas, wherever possible.

3. To the maximum extent practicable, incorporate the techniques for Low Impact Development Practices described in the BMP Manual [1].

J. The design of all facilities over karst and mined areas shall include an evaluation of measures to minimize adverse effects.

K. Infiltration BMPs should be spread out, made as shallow as practicable, and located to maximize use of natural on-site infiltration features while still meeting the other requirements of this Ordinance.

L. Storage facilities, to the greatest extent possible and at the discretion of the Municipal Engineer, shall completely drain both the volume control and rate control capacities over a period of time not less than 24 hours and not more than 72 hours from the end of the design storm.

M. Storage facilities shall incorporate features to maximize the length of the flow path and increase the travel time through the facility.

N. The design storm volumes to be used in the analysis of peak: rates of discharge should be obtained from the Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 2, Version 3.0, U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Hydrometeorological Design Studies Center, Silver Spring, Maryland. NOAA's Atlas 14 can be accessed at: http://hdsc.nws.noaa.gov/hdsc/pfds/. [5]

O. For all regulated activities, SWM BMPs shall be designed, implemented, operated, and maintained to meet the purposes and requirements of this Ordinance and to meet all requirements under Title 25 of the Pennsylvania Code, the Clean Streams Law, and the Storm Water Management Act.

P. Various BMPs and their design standards are listed in the BMP Manual[1].

Section 302. Exemptions

A. Regulated activities that create impervious areas or earth disturbance shall adhere to Table III.1 to meet the requirements of this Ordinance. The larger of the two areas determines the applicable requirements of this Ordinance. (i.e. if only 500 sq. ft. of impervious area is proposed, but 15,000 sq. ft. of earth disturbance, the requirements follow row 3 of Table III.1).

Table III Stormwater Management Requirements and Exemptions

Proposed Impervious Area (sq. ft.)	Proposed Total Earth Disturbance (sq. ft.)	Ordinance Exemptions	Stormwater Management Requirements	What is required to submit to Municipality?*
< 1,000	< 5,000	Section 303, Section 304 and Article IV of this Ord.	Ensure Section 301 General Requirements are met	N/A
1,000 to 5,000	5,000 to 10,000	Section 303, Section304 and Article IV of this Ordinance	Disconnected Impervious Area (DIA) as in Ord. Appendix C.1	Ord. Appendix C.1 Worksheet and Sketch(or equivalent
			or	or
			Capture and control first 1 inch of runoff over proposed impervious areas as in Ord. Appendix E	Ord. Appendix E Worksheet and Sketch (or equivalent
5,000 to 10,000	10,000 to 20,000	Section 304 and Article IV of this Ordinance	Capture and permanently remove the two 2 inches of runoff over proposed impervious areas as in Section 303 B. of this Ordinance	Ord. Appendix D Worksheet and Sketch (or equivalent
> 10,000	> 20,000	None	All requirements of this Ordinance	All requirements of this Ordinance

*In addition to the Stormwater Management Permit Application provided in Ordinance Appendix B

B. Agricultural activity is exempt from the rate control and SWM Site Plan preparation requirements of this Ordinance provided the activities are performed according to the requirements of 25 Pa. Code 102.

C. Forest management and timber operations are exempt from the rate control and SWM Site Plan preparation requirements of this Ordinance provided the activities are performed according to the requirements of 25 Pa. Code 102.

D. Exemptions from any provisions of this Ordinance shall not relieve the applicant from the requirements in Sections 301.A. through P.

Section 303. Volume Controls

The low impact development practices provided in the BMP Manual [1] shall be utilized for all regulated activities to the maximum extent practicable. Water volume controls shall be implemented using the *Design Storm Method* in Subsection A or the *Simplified Method* in Subsection B below. For all regulated activities defined by Section 302, Subsection D, both the *Design Storm Method* and the *Simplified Method* shall be calculated; the larger control volume based on the two calculations shall be controlled. Subsection C below provides requirements for

mined, karst, or other geologically limiting areas where infiltration shall not occur.

A. The *Design Storm Method* (CG-1 in the BMP Manual) is applicable to any size of regulated activity. This method requires detailed modeling based on site conditions.

1. Do not increase the post-development total runoff volume for all storms equal to or less than the 2-year 24-hour duration precipitation.

2. For modeling purposes:

a. Existing (predevelopment) non-forested pervious areas must be considered meadow or its equivalent.

b. 20% of existing impervious area, when present, shall be considered meadow in the model for existing conditions.

B. When *Design Storm* Method CG-1 guidelines are not used, the *Simplified Method (CG-2* in the BMP Manual) has been modified to accommodate *2"* of permanently removed runoff volume. This method (provided below) is independent of site conditions and should be used if the *Design Storm Method is* not followed. For new impervious surfaces:

1. The first 2 inches of runoff from new impervious surfaces shall be permanently removed from the runoff flow (i.e., it shall not be released to the surface waters of this Commonwealth). Removal options include reuse, evaporation, transpiration, and infiltration.

2. Wherever possible, infiltration facilities should be designed to accommodate infiltration of the entire permanently removed runoff; however, in all cases at least the first 0.5 inch of the permanently removed runoff should be infiltrated.

3. Facilities shall be designed to drain the permanently removed runoff volume in a period no less than 24 hours and no greater than 72 hours.

4. Runoff volume in excess of 2 inches shall be safely conveyed to existing stormwater collection systems or streams, in the direction of the existing drainage course.

5. This method is exempt from the requirements of Section 304, Rate Controls.

C. Before infiltration is proposed on a site, site conditions shall be evaluated by a qualified design professional through subsurface investigation and testing to determine if site conditions are suitable to support proposed infiltration facilities to manage runoff. If it is determined that infiltration is not feasible due to physical constraints of the site, or will adversely impact the environment as demonstrated by the presence of acid mine drainage, sinkhole formation, or other serious environmental issues, then the above volume controls must be achieved through surface BMP mitigation. Reference the BMP Manual[1] for alternative mitigation measures that do not require infiltration.

Section 304. Rate Controls

A. Areas not covered by a Stormwater Management District Map contained in Appendix F.1 of the Ordinance:

Post-development discharge rates shall not exceed the predevelopment discharge rates for the 1- through 100-year, 24-hour storms. If it is shown that the peak rates of discharge indicated by the post-development analysis are less than or equal to the peak rates of discharge indicated by the predevelopment analysis for - 1- through 100-year, 24-hour storms, then the requirements of this section have been met. Otherwise, the applicant shall provide additional controls as necessary to satisfy the peak rate of discharge requirement.

B. Areas not covered by a Stormwater Management District Map contained in Appendix F.1 of the Ordinance:

For the 1- through 100-year storms, the post-development peak discharge rates will follow the applicable approved Stormwater Management District Maps. For any areas not shown on the Stormwater Management District Maps, the post-development discharge rates shall not exceed the predevelopment discharge rates.

ARTICLE IV - STORMW ATER MANAGEMENT (SWM) SITE PLAN REQUIREMENTS

Section 401. Plan Requirements

The following items shall be included in the SWM Site Plan:

A. Appropriate sections from the municipal's Subdivision and Land Development Ordinance, and other applicable local ordinances, shall be followed in preparing the SWM Site Plans. In instances where Lehman Township lacks Subdivision and Land Development regulations, the content of SWM Site Plans shall follow the county's Subdivision and Land Development Ordinance.

B. Lehman Township shall not approve any SWM Site Plan that is deficient in meeting the requirements of this Ordinance. At its sole discretion and in accordance with this Article, when a SWM Site Plan is found to be deficient, Lehman Township may either disapprove the submission and require a resubmission, or in the case of minor deficiencies, Lehman Township may accept submission of modifications.

C. Provisions for permanent access or maintenance easements for all physical SWM BMPs, such as ponds and infiltration structures, as necessary to implement the Operation and Maintenance (O&M) Plan discussed in Item E.9 below.

D. The following signature block for Lehman Township:

"(Lehman Township official or designee), on this date (date of signature), has reviewed and hereby certifies that the SWM Site Plan is in compliance with the Municipal Ordinance No. (number assigned to the Ordinance)."

E. The SWM Site Plan shall provide the following information:

1. The overall stormwater management concept for the project.

2. A determination of site conditions in accordance with the BMP Manual [1]. A detailed site evaluation shall be completed for projects proposed in areas of carbonate geology or karst topography, mined areas, and other environmentally sensitive areas, such as brownfields; depending on site conditions, more stringent standards than those in this Ordinance may be imposed at the discretion of the municipal engineer.

3. Stormwater runoff design computations, and documentation as specified in this Ordinance, or as otherwise necessary to demonstrate that the maximum practicable measures have been taken to meet the requirements of this Ordinance, including the recommendations and general requirements in Section 301; computations are required for all proposed stormwater management facilities.

4. Expected project time schedule.

5. A soil erosion and sediment control plan, where applicable, as prepared for and submitted to the approval authority, and in conformance with 25 Pa. Code 102.

6. The effect of the project (in terms of runoff volumes, water quality, and peak flows) on surrounding properties and aquatic features and on any existing stormwater conveyance system that may be affected by the project.

7. Plan and profile drawings of all SWM BMPs, including drainage structures, pipes, open channels, and swales.

8. SWM Site Plan shall show the locations of existing and proposed on-lot wastewater facilities and water supply wells.

9. The SWM Site Plan shall include an O&M Plan for all existing and proposed physical stormwater management facilities. This plan shall address long-term ownership and responsibilities for O&M as well as schedules and costs for O&M activities.

10. The SWM Site Plan shall include the following additional elements:

    a. Construction details of all proposed stormwater management facilities.
    b. A stormwater facility design narrative.
    c. A signature block containing the name, address, and phone number of the individual responsible for the operation and maintenance plan.
    d. A drainage area map with time of concentration paths shown.
    e. Existing contour intervals of two feet.
    f. All existing features on the property and within 50 feet of property.
    g. Floodplain and floodway limits.
    h. Proposed structures and proposed grades.
    i. Soil boundary lines and descriptions.
    j. Date of submission, north arrow, graphic scale, call before you dig noted reference number, location map, name of development, name and address of property owner, and individual preparing the SWM Site Plan.
    k. Existing and proposed easements.
    l. Statement signed by landowner stating that they cannot alter any stormwater management facility without prior permission of Lehman Township.

Section 402. Plan Submission

A. 6 copies of the SWM Site Plan shall be submitted as follows:

    1. 3 copies to Lehman Township Planning Commission.

    2. 1 copy to the municipal engineer (when applicable).

    3. 1 copy to the County Conservation District.

4. 1 copy to the County Planning Commission/Office.

B. Additional copies shall be submitted as requested by Lehman Township or DEP.

Section 403. Plan Review

A. The SWM Site Plan shall be reviewed by a qualified professional for Lehman Township for consistency with the provisions of this Ordinance: After review, the qualified professional shall provide a written recommendation for the municipality to approve or disapprove the SWM Site Plan. If it is recommended to disapprove the SWM Site Plan, the qualified professional shall state the reasons for the disapproval in writing. The qualified professional also may recommend approval of the SWM Site Plan with conditions and, if so, shall provide the acceptable conditions for approval in writing. The SWM Site Plan review and recommendations shall be completed within the time allowed by the Municipalities Planning Code for reviewing subdivision plans.

B. Lehman Township shall notify the applicant in writing within 45 days whether the SWM Site Plan is approved or disapproved. If the SWM Site Plan involves a Subdivision and Land Development Plan, the notification period is 90 days. If a longer notification period is provided by other statute, regulation, or ordinance, the applicant will be so notified by Lehman Township. If Lehman Township disapproves the SWM Site Plan, Lehman Township shall cite the reasons for disapproval in writing.

Section 404. Modification of Plans

A modification to a submitted SWM Site Plan that involves a change in SWM BMPs or techniques, or that involves the relocation or redesign of SWM BMPs, or that is necessary because soil or other conditions are not as stated on the SWM Site Plan as determined by Lehman Township shall require a resubmission of the modified SWM Site Plan in accordance with this Article.

Section 405. Resubmission of Disapproved SWM Site Plans

A disapproved SWM Site Plan may be resubmitted, with the revisions addressing Lehman Township's concerns, to Lehman Township in accordance with this Article. The applicable review fee must accompany a resubmission of a disapproved SWM Site Plan.

Section 406. Authorization to Construct and Term of Validity

Lehman Township's approval of an SWM Site Plan authorizes the regulated activities contained in the SWM Site Plan for a maximum term of validity of 5 years following the date of approval. Lehman Township may specify a term of validity shorter than 5 years in the approval for any specific SWM Site Plan. Terms of validity shall commence on the date Lehman Township signs the approval for an SWM Site Plan. If an approved SWM Site Plan is not completed according to Section 407 within the tetra of validity, then Lehman Township may consider the SWM Site Plan disapproved and may revoke any and all permits. SWM Site Plans that are considered disapproved by Lehman Township shall be resubmitted in accordance with Section 405 of this Ordinance.

Section 407. As-Built Plans, Completion Certificate, and Final Inspection

A. The developer shall be responsible for providing as-built plans of all SWM BMPs included in the approved SWM Site Plan. The as-built plans and an explanation of any discrepancies with the construction plans shall be submitted to the municipality.

B. The as-built submission shall include a certification of completion signed by a qualified professional verifying that all permanent SWM BMPs have been constructed according to the approved plans and specifications. If any licensed qualified professionals contributed to the construction plans, then a licensed qualified professional must sign the completion certificate.

C. After the completion certification is received by Lehman Township, Lehman Township or its official designee may conduct a final inspection.

ARTICLE V - OPERATION AND MAINTENANCE

Section 501. Responsibilities of Developers and Landowners

A. Lehman Township shall make the final determination on the continuing maintenance responsibilities prior to final approval of the SWM Site Plan. Lehman Township may require a dedication of such facilities as part of the requirements for approval of the SWM Site Plan. Such a requirement is not an indication that Lehman Township will accept the facilities Lehman Township reserves the right to accept or reject the ownership and operating responsibility for any portion of the stormwater management controls. If the facility is rejected by Lehman Township, provisions shall be made to identify the legal owner.

B. Three options exist for perpetual ownership and responsibility of stormwater management facilities:

1. The developer retains ownership;

2. A Homeowners Association assumes ownership and responsibility;

3. The facility is dedicated to, and accepted by, Lehman Township

C. Facilities, areas, or structures used as Stormwater Management BMPs shall be numerated as permanent real estate appurtenances and recorded as deed restrictions or conservation easements that run with the land.

D. The O&M Plan shall be recorded as a restrictive deed covenant that runs with the land.

E. Lehman Township may take enforcement actions against an owner for any failure to satisfy the provisions of this Article.

Section 502. O&M Agreements

The owner is responsible for O&M of the SWM BMPs. If the owner fails to adhere to the O&M Agreement, Lehman Township may perform the services required and charge the owner appropriate fees. Nonpayment of fees may result in a lien against the property.

ARTICLE VI - FEES AND EXPENSES

Section 601. General

Lehman Township shall include all costs incurred in the review fee charged to an applicant. The application fee and review fee may include, but not be limited to, costs for the following:

A. Administrative/clerical processing.

B. Review of the SWM Site Plan.

C. Attendance at meetings.

D. Inspections

The applicant shall within thirty (30) days from receipt of written notification of costs incurred by Lehman Township, make payment in full to Lehman Township.

ARTICLE VII – PROHIBITIONS

Section 701. Prohibited Discharges and Connections

A. Any drain or conveyance, whether on the surface or subsurface, that allows any non-stormwater discharge including sewage, process wastewater, and wash water to enter the waters of this Commonwealth is prohibited.

B. No person shall allow, or cause to allow, discharges into surface waters of this Commonwealth which are not composed entirely of stormwater, except (1) as provided in Subsection C below and (2) discharges allowed under a state or federal permit.

C. The following discharges are authorized unless they are determined to be significant contributors to pollution to the waters of this Commonwealth:

Discharges from firefighting activities	Flows from riparian habitats and wetlands
Potable water sources including water line flushing	Uncontaminated water from foundations or from footing drains
Irrigation drainage	Lawn watering
Air conditioning condensate	Dechlorinated swimming pool discharges
Springs	Uncontaminated groundwater
Water from crawl space pumps	Water from individual residential car washing
Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spill material has been removed) and where detergents are not used	Routine external building wash down (which does not use detergents or other compounds)

D. In the event that Lehman Township or DEP determines that any of the discharges identified in Subsection C significantly contribute to pollution of the waters of this Commonwealth, Lehman Township or DEP will notify the responsible person(s) to cease the discharge.

Section 702. Roof Drains

Roof drains and sump pumps shall discharge to infiltration or vegetative BMPs and to the maximum extent practicable satisfy the criteria for DIAs consistent with Appendix C.I. of this Ordinance.

Section 703 Alteration of SWM BMPs

No person shall modify, remove, fill, landscape, or alter any SWM BMPs facilities, areas, or structures without the written approval of Lehman Township.

ARTICLE VIII - ENFORCEMENT AND PENALTIES

Section 801. Right-of-Entry

Upon presentation of proper credentials, Lehman Township and/or its designee may enter at reasonable times upon any property within Lehman Township to inspect the condition of the stormwater structures and facilities in regard to any aspect regulated by this Ordinance.

Section 802. Inspection

SWM BMPs should be inspected by the landowner, or the landowner's designee (including Lehman Township for dedicated and owned facilities).

A. Such inspections should be made or performed according to the following list of minimum frequencies;

1. Annually for the first 5 years.

2. Once every 3 years thereafter.

3. Immediately after every 10-year storm event.

Section 803. Enforcement

A. It shall be unlawful for a person to undertake any regulated activity except as provided in an approved SWM Site Plan, unless specifically exempted in Section 302 of this Ordinance.

B. It shall be unlawful to violate Section 703 of this Ordinance.

C. Inspections regarding compliance with the SWM Site Plan and all aspects of the application(s) and/or permits are the responsibility of the municipality.

Section 804. Suspension and Revocation

A. Any approval or permit issued by Lehman Township pursuant to this Ordinance may be suspended or revoked for:

1. Non-compliance with or failure to implement any provision of the approved SWM Site Plan or O&M Agreement.

2. A violation of any provision of this Ordinance or any other applicable law, ordinance, rule, or regulation relating to the regulated activity.

3. The creation of any condition or the commission of any act during the regulated activity which constitutes or creates a hazard, nuisance,

pollution, or endangers the life or property of others.

B. A suspended approval may be reinstated by Lehman Township when:

1. Lehman Township has inspected and approved the corrections to the violations that caused the suspension.

2. Lehman Township is satisfied that the violation has been corrected.

C. An approval that has been revoked by Lehman Township cannot be reinstated. The applicant may apply for a new approval under the provisions of this Ordinance.

D. If a violation causes no immediate danger to life, public health, or property, at its sole discretion, the municipality may provide a limited time period for the owner to correct the violation. In these cases, the municipality will provide the owner, or the owner's designee, with a written notice of the violation and the time period allowed for the owner to correct the violation. If the owner does not correct the violation within the allowed time period, the municipality may revoke or suspend any, or all, applicable approvals and permits pertaining to any provision of this Ordinance.

Section 805. Penalties

A. Anyone violating the provisions of this Ordinance shall be guilty of a summary offense, and upon conviction, shall be subject to a fine of not more than ($500.00) for each violation, recoverable with costs, including but not limited to, Court costs and attorney fees. Each day that the violation continues shall be a separate offense and penalties shall be cumulative.

B. In addition, Lehman Township may institute injunctive, mandamus, or any other appropriate action or proceeding at law or in equity for the enforcement of this Ordinance. Any Court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus, or other appropriate forms of remedy or relief.

Section 806. Appeals

A. Any person aggrieved by any action of Lehman Township or its designee, relevant to the provisions of this Ordinance, may appeal to Lehman Township within 30 days of that action. The appeal will be heard and decided by the Township Board of Supervisors with recommendation from the Township's Engineer.

B. Any person aggrieved by any decision of Lehman Township, relevant to the provisions of this Ordinance, may appeal to the Luzerne County Court of Common Pleas in the within 30 days of the decision.

Section 807. Municipal Policy and Limitations regarding Inspection(s)

This statement of policy sets forth the policy of the municipality regarding its performance of any and all inspections under the Lehman Township "Stormwater Management Ordinance."

A. Inspections are conducted to administer, implement, enforce and determine compliance with the Lehman Township Stormwater Management Ordinance. As used in the said Stormwater Management Ordinance and when referring to those performed by the municipality, the term "inspections", shall specifically include, but not be limited to, those performed under Sections 801 and 802 of the said Ordinance.

B. Whenever inspections by the municipality are mentioned or referred to in the Stormwater Management Ordinance, such inspections shall be deemed to be governed by and subject to this statement of policy.

C. The provisions of this statement of policy, and the performance of any and all inspections by the municipality under the Stormwater Management Ordinance, are subject to the availability of personnel and financial resources. This statement of policy and the provisions of the said Ordinance regarding inspections by the municipality do not create a duty or obligation upon the municipality to conduct any inspection(s), any minimum or maximum number of inspections, or any such inspection(s) per year or during a certain time period

ARTICLE IX - REFERENCES

1. Pennsylvania Department of Environmental Protection. No. 363-0300-002 (December 2006), as amended and updated. *Pennsylvania Stormwater Best Management Practices Manual.* Harrisburg, PA.

2. Pennsylvania Department of Environmental Protection. No. 363-2134-008 (April 15, 2000), as amended and updated. *Erosion and Sediment Pollution Control Program Manual.* Harrisburg, PA.

3. U.S. Department of Agriculture, National Resources Conservation Service (NRCS). *National Engineering Handbook.* Part 630: Hydrology, 1969-2001. Originally published as the *National Engineering Handbook*, Section 4: Hydrology. Available from the NRCS online at: http://www.nrcs.usda.gov/.

4. U.S. Department of Agriculture, Natural Resources Conservation Service. 1986. *Technical Release 55: Urban Hydrology for Small Watersheds*, 2nd Edition. Washington, D.C.

5. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Hydrometeorological Design Studies Center. 2004-2006. *Precipitation-Frequency Atlas of the United States, Atlas 14*, Volume 2, Version 3.0, Silver Spring, Maryland. Internet address: http://hdsc.nws.noaa.gov/hdsc/pfds/.

THE LEHMAN TOWNSHIP STORMWATER MANAGEMENT ORDINANCE

APPROVED AND ENACTED BY THE TOWNSHIP BOARD OF SUPERVISORS OF THE TOWNSHIP OF LEHMAN ON THIS 21st DAY OF MARCH, 2011.

THIS ORDINANCE SHALL TAKE EFFECT IMMEDIATELY UPON ITS ENACTMENT.

CHAIRMAN

VICE-CHAIRMAN

SUPERVISOR

ATTEST:

TOWNSHIP SECRETARY

APPENDIX A

OPERATION AND MAINTENANCE (O&M) AGREEMENT STORMWATER MANAGEMENT BEST MANAGEMENT PRACTICES (SWM BMPs)

THIS AGREEMENT, made and entered into this _____ day of _____, 20___, by and between _____, (hereinafter the "Landowner"), and the Township of Lehman, Luzerne County, Pennsylvania;

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of Luzerne County, Pennsylvania, Deed Book _____ at page _____, (hereinafter "Property").

WHEREAS, the Landowner is proceeding to build and develop the Property; and

WHEREAS, the SWM BMP O&M Plan approved by Lehman Township (hereinafter referred to as the "Plan") for the property identified herein, which is attached hereto as Appendix A and made part hereof, as approved by Lehman Township, provides for management of stormwater within the confines of the Property through the use of BMPs; and

WHEREAS, Lehman Township, and the Landowner, his successors and assigns, agree that the health, safety, and welfare of the residents of Lehman Township and the protection and maintenance of water quality require that on-site SWM BMPs be constructed and maintained on the Property; and

WHEREAS, Lehman Township requires, through the implementation of the SWM Site Plan, that SWM BMPs as required by said Plan and the Municipal Stormwater Management Ordinance be constructed and adequately operated and maintained by the Landowner, successors, and assigns.

NOW, THEREFORE, in consideration of the foregoing promises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The Landowner shall construct the BMPs in accordance with the plans and specifications identified in the SWM Site Plan.

2. The Landowner shall operate and maintain the BMPs as shown on the Plan in good working order in accordance with the specific maintenance requirements noted on the approved SWM Site Plan.

3. The Landowner hereby grants permission to Lehman Township, its authorized agents and employees, to enter upon the property, at reasonable times and upon presentation of proper credentials, to inspect the BMPs whenever necessary. Lehman Township shall notify the Landowner prior to entering the property.

4. In the event the Landowner fails to operate and maintain the BMPs per paragraph 2, Lehman Township or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s). It is expressly understood and agreed that Lehman Township is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on Lehman Township.

5. In the event Lehman Township, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse Lehman Township for all expenses (direct and indirect) incurred within 10 days of receipt of invoice from Lehman Township.

6. The intent and purpose of this Agreement is to ensure the proper maintenance of the onsite BMPs by the Landowner; provided, however, that this Agreement shall not be deemed to create or effect any additional liability of any party for damage alleged to result from or be caused by stormwater runoff.

7. The Landowner, its executors, administrators, assigns, and other successors in interests, shall release Lehman Township from all damages, accidents, casualties, occurrences, or claims which might arise or be asserted against said employees and representatives from the construction, presence, existence, or maintenance of the BMP(s) by the Landowner or Municipality.

8. Lehman Township shall inspect the BMPs at a minimum of once every three years to ensure their continued functioning.

This Agreement shall be recorded at the Office of the Recorder of Deeds of Luzerne County, Pennsylvania, and shall constitute a covenant running with the Property and/or equitable servitude, and shall be binding on the Landowner, his administrators, executors, assigns, heirs, and any other successors in interests, in perpetuity.

ATTEST:

WITNESS the following signatures and seals:

(SEAL)

For Lehman Township:

_____

For the Landowner:

_____

ATTEST:

_____ (Lehman Township)

County of Luzerne, Pennsylvania

I, _____, a Notary Public in and for the county and state aforesaid, whose commission expires on the _____ day of _____, 20_____, do hereby certify that _____ whose name(s) is/are signed to the foregoing Agreement bearing date of the _____ day of _____, 20_____, has acknowledged the same before me in my said county and state.

GIVEN UNDER MY HAND THIS _____ day of _____, 20_____.

_____ _____

NOTARY PUBLIC **(SEAL)**

APPENDIX C.1

DISCONNECTED IMPERVIOUS AREA (DIA) AND WORKSHEET

When a regulated activity creates impervious areas between 1,000 sq. ft. and 5,000 sq. ft., or total earth disturbance between 5,000 and 10,000 sq. ft., the stormwater management requirements follow Appendix C.1 – Disconnected Impervious Areas (DIAs), of this Ordinance. If site conditions prevent the requirements of Appendix C.1 from being met, then the first 1 inch of runoff shall be captured and controlled in a manner consistent with Appendix E – Stormwater Management for Small Projects, of this Ordinance.

When rooftop or pavement runoff is directed to a pervious area that allows for infiltration, filtration, and increased time of concentration, the contributing rooftop or pavement area may qualify as a Disconnected Impervious Area (DIA). A rooftop or pavement area is considered to be a DIA if it meets the requirements listed below:

- The soil, in proximity of the discharge area, is not designated as hydrologic soil group "D" or equivalent (see Appendix F.2. Hydrologic Soil Group Map);
- The overland flow path (pervious area serving as BMP) from discharge area has a positive slope of 10% or less;
- The length of overland flow path (pervious area serving as BMP) is greater than or equal to the contributing rooftop or pavement length;
- The length of overland flow path (pervious area serving as BMP) is greater than 25 feet.

If the discharge is concentrated at one or more discrete points, no more than 1,000 square feet of impervious area may discharge to any one point. In addition, a gravel strip or other spreading device is required for concentrated discharges. For non-concentrated discharges along the edge of the pavement, this requirement is waived; however, there must be a provision for the establishment of vegetation along the pavement edge and temporary stabilization of the area until vegetation becomes stabilized.

If rainspouts are discharged underground to provide infiltration, the portion of the impervious area draining to those rainspouts is waived from the DIA discharge requirements. Rainspouts discharged underground which are directly connected to a storm sewer system are not waived from the DIA requirements.

Computations for DIA as a BMP must be submitted to Lehman Township. This worksheet is provided as an example, or may be used for the computations.

<table>
<tr><td>Applicant Address:</td><td colspan="5">Brief Description of Project:</td></tr>
<tr><td>Nearest waterbody:</td><td colspan="5">No more than 1,000 sq. ft. can discharge to one point on the surface.

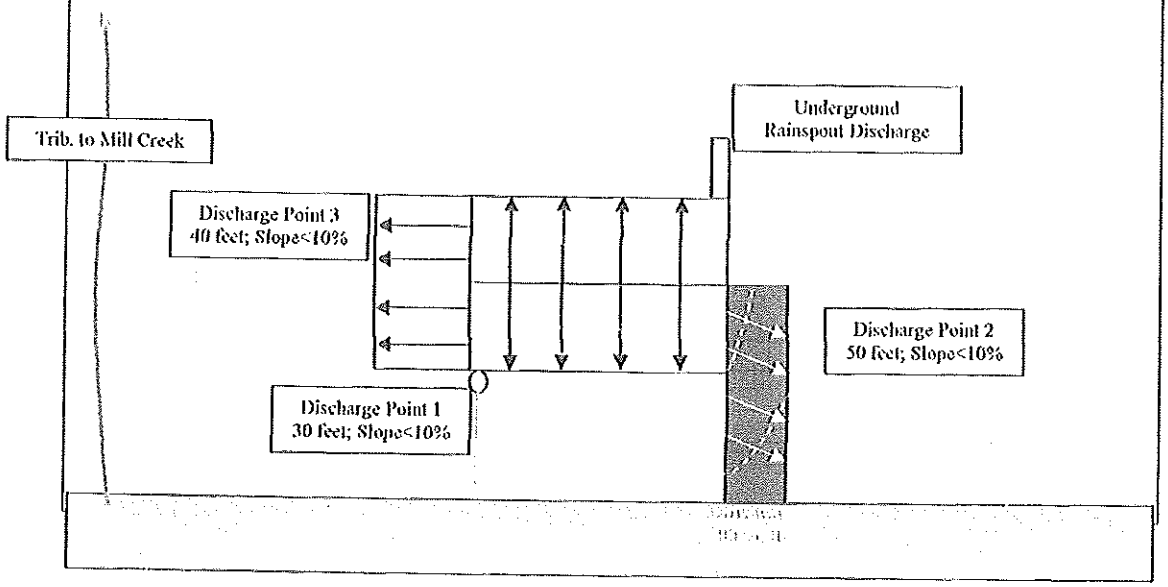
Number of discharge points required:</td></tr>
<tr><td rowspan="2">Total Proposed Impervious Area (A):

Total Earth Disturbance:</td><td>Discharge Point 1</td><td>Discharge Point 2</td><td>Discharge Point 3</td><td>Discharge Point 4</td><td>Discharge Point 5</td></tr>
<tr><td>Area:</td><td>Area:</td><td>Area:</td><td>Area:</td><td>Area:</td></tr>
<tr><td rowspan="2">Are rainspouts discharged underground? (Y/N)

If yes, contributing impervious area (B):</td><td>Impervious Path Length:</td><td>Impervious Path Length:</td><td>Impervious Path Length:</td><td>Impervious Path Length:</td><td>Impervious Path Length:</td></tr>
<tr><td>Pervious Path Length:</td><td>Pervious Path Length:</td><td>Pervious Path Length:</td><td>Pervious Path Length:</td><td>Pervious Path Length:</td></tr>
<tr><td>Total Impervious Area Discharged on Surface (A) – (B):</td><td>Pervious Path Slope <10%? (Y/N)</td><td>Pervious Path Slope <10%? (Y/N)</td><td>Pervious Path Slope <10%? (Y/N)</td><td>Pervious Path Slope <10%? (Y/N)</td><td>Pervious Path Slope <10%? (Y/N)</td></tr>
<tr><td colspan="6">HSG Soil Group from Appendix F.2 Hydrologic Soils Group Map (Cannot be "D" Soils):</td></tr>
<tr><td colspan="6">Project sketch:</td></tr>
</table>

EXAMPLE:

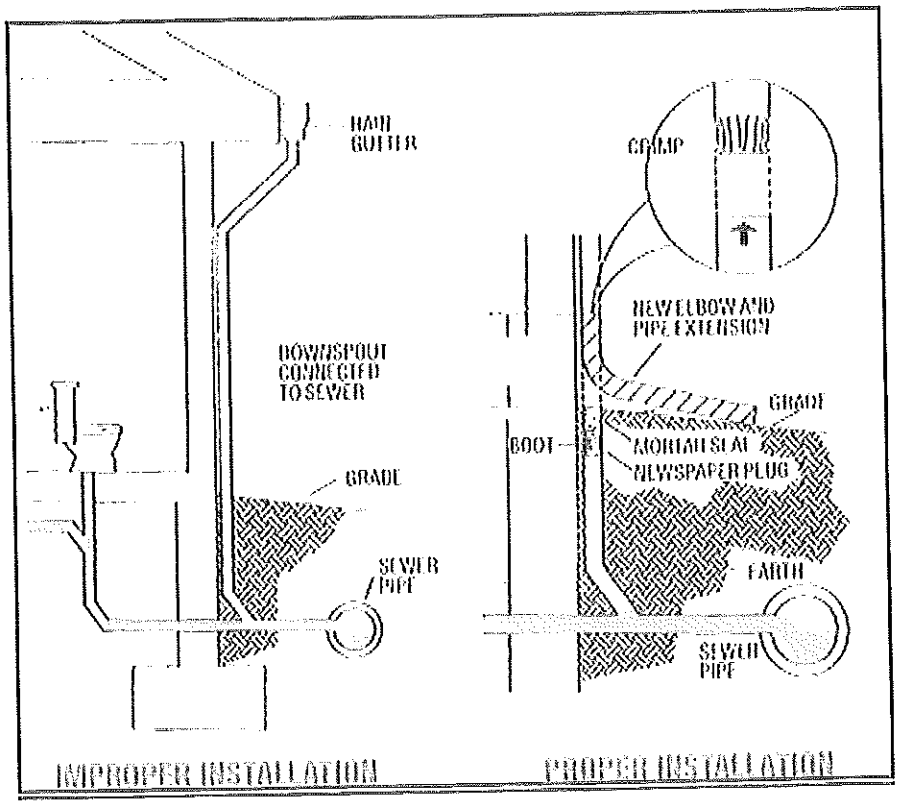
Example: Joe Homeowner would like to build a single-family home, with a driveway and backyard stone patio. The home is 2,000 sq. ft., the stone patio is 800 sq. ft., and the asphalt driveway is 500 square feet.

Applicant Address: Joe Homeowner 123 Site Street Anytown, PA 12345	**Brief Description of Project:** Construction of 2,000 sq. ft. (40' x 50') single-family home with 500 sq. ft. driveway (10' x 50') and 800 sq. ft. stone patio (20' x 40'). The back half of the house discharges to rainspouts underground.				
Nearest waterbody: Tributary to Mill Creek	**No more than 1,000 sq. ft. can discharge to one point on the surface.** **Number of surface discharge points required:** 3				
Total Proposed Impervious Area (A): 3,300 sq. ft. **Total Earth Disturbance:** 6,000 sq. ft.	**Discharge Point 1:** Front of Home	**Discharge Point 2:** Driveway	**Discharge Point 3:** Patio	**Discharge Point 4:** N/A	**Discharge Point 5:** N/A
	Area: 1,000 sq. ft.	**Area:** 500 sq. ft.	**Area:** 800 sq. ft.	**Area:** N/A	**Area:** N/A
Are rainspouts discharged underground? (Y/N) Yes **If yes, contributing impervious area (B):** 1,000 sq. ft.	**Impervious Path Length:** 20 ft	**Impervious Path Length:** 10 ft	**Impervious Path Length:** 20 ft	**Impervious Path Length:** N/A	**Impervious Path Length:** N/A
	Pervious Path Length: 30 ft	**Pervious Path Length:** 50 ft	**Pervious Path Length:** 40 ft	**Pervious Path Length:** N/A	**Pervious Path Length:** N/A
Total Impervious Area Discharged on Surface (A) – (B): 3,300 – 1,000 = 2,300 sq. ft.	**Pervious Path Slope <10%? (Y/N)** Yes	**Pervious Path Slope <10%? (Y/N)** Yes	**Pervious Path Slope <10%? (Y/N)** Yes	**Pervious Path Slope <10%? (Y/N)** N/A	**Pervious Path Slope <10%? (Y/N)** N/A
HSG Soil Group from Appendix F.2 Hydrologic Soils Group Map (Cannot be "D" Soils): HSG "C"					
Project sketch: 					

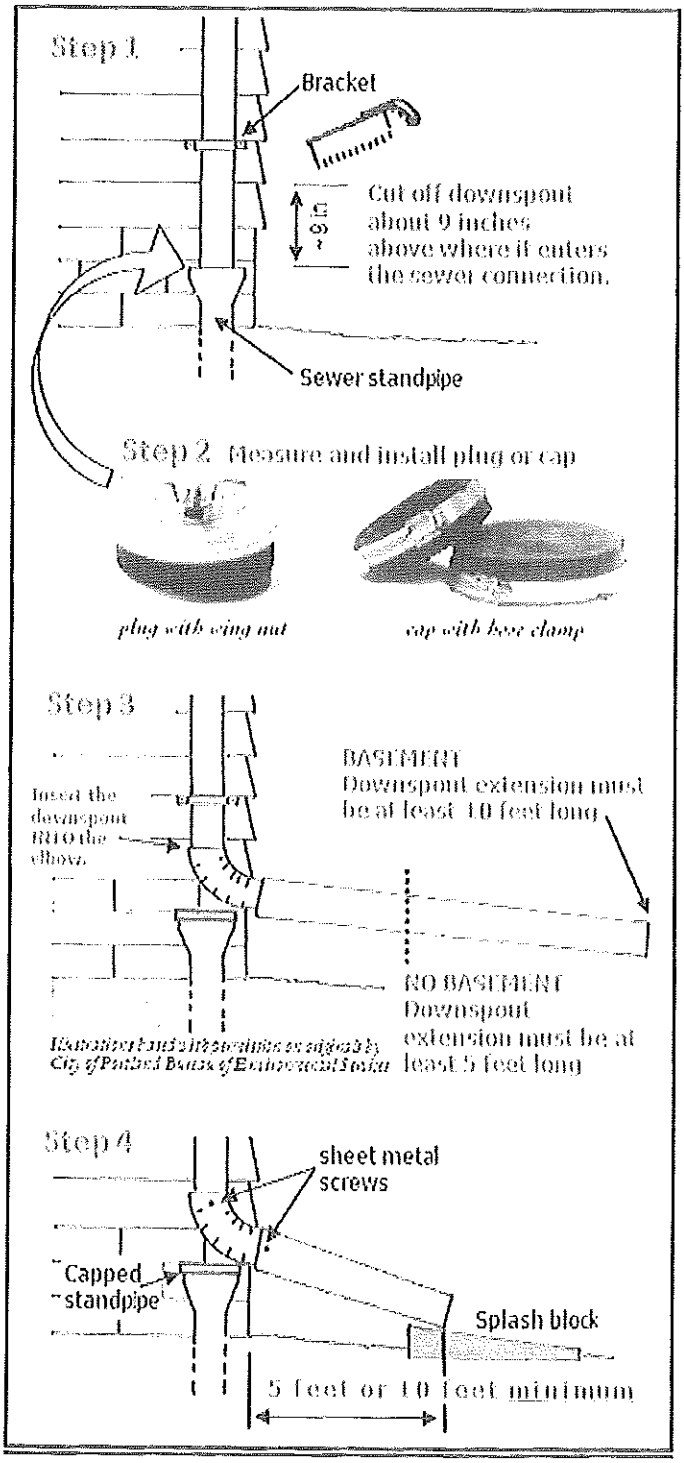
APPENDIX C.2

RAINSPOUT DISCONNECTION FROM SANITARY SEWER SYSTEMS

When roofs are being replaced, rainspouts must be disconnected from sanitary sewer systems. The following guidance is provided to enforce this requirement as part of this Ordinance, and is subject to the municipal engineer's discretion. When rainspouts are disconnected from sanitary sewer systems, it must be shown that adverse stormwater impacts are not created downstream.



Source of image: www.munciesanitary.org/stormwater-managment



Source of image: rainwise.seattle.gov/solution_brochures

APPENDIX D

PROJECTS MEETING REQUIREMENTS IN SECTION 303 SUBSECTION B

When a regulated activity creates impervious areas between 5,000 sq. ft. and 10,000 sq. ft., or total earth disturbance between 10,000 and 20,000 sq. ft., the stormwater management requirements follow Section 303 Subsection B of this Ordinance.

Section 303 Subsection B is duplicated below:

B. When CG-1 guidelines are not used, the *Simplified Method* (CG-2 in the BMP Manual[1]) has been modified to accommodate 2" of permanently removed runoff volume. This method (provided below) is independent of site conditions and should be used if the *Design Storm Method* is not followed. For new impervious surfaces:

1. The first 2 inches of runoff from new impervious surfaces shall be permanently removed from the runoff flow (i.e., it shall not be released into the surface waters of this Commonwealth). Removal options include reuse, evaporation, transpiration, and infiltration.

2. Wherever possible, infiltration facilities should be designed to accommodate infiltration of the entire permanently removed runoff; however, in all cases at least the first 0.5 inch of the permanently removed runoff should be infiltrated.

1. Facilities, to the greatest extent possible and subject to the Municipal Engineer's discretion, shall be designed to drain the permanently removed runoff volume in a period no less than 24 hours and no greater than 72 hours.

2. Runoff volume in excess of 2 inches shall be safely conveyed to existing stormwater collection systems or streams, in the direction of the existing drainage course.

5. This method is exempt from the requirements of Section 304, Rate Controls.

LEVEL 3 & 4 COMPUTATIONS FOR ALL STORMWATER FACILITIES

Computations for all stormwater facilities must be submitted to Lehman Township. This worksheet is provided as an example, or may be used for the computations.

<table>
<tr><td>Applicant Address:</td><td colspan="3">Brief Description of Project:</td></tr>
<tr><td>Nearest waterbody:</td><td colspan="3">Permanently Removed Volume = (2 inches / 12) x (Impervious Area)
=</td></tr>
<tr><td>Total Proposed Impervious Area:</td><td colspan="3">A Factor of Safety of 2 is applied to the Tested Infiltration Rate.
Design Infiltration Rate = Tested Infiltration Rate / 2
=</td></tr>
<tr><td>Total Earth Disturbance:</td><td colspan="3">Components of the project may be directed to multiple facilities.
Number of facilities used:</td></tr>
<tr><td>Soil Testing Method:</td><td>Facility #1</td><td>Facility #2</td><td>Facility #3</td></tr>
<tr><td rowspan="2"></td><td>Component of Project:
Volume Collected:</td><td>Component of Project:
Volume Collected:</td><td>Component of Project:
Volume Collected:</td></tr>
<tr><td>Tested Infiltration Rate (in/hr):</td><td>Type of Facility:
Volume of Facility*:
Area of Facility:
Depth of Facility:</td><td>Type of Facility:
Volume of Facility*:
Area of Facility:
Depth of Facility:</td><td>Type of Facility:
Volume of Facility*:
Area of Facility:
Depth of Facility:</td></tr>
<tr><td rowspan="4">Additional Calcs/Notes:</td><td>Drawdown Time = Depth of Facility / Design Infiltration Rate =</td><td>Drawdown Time = Depth of Facility / Design Infiltration Rate =</td><td>Drawdown Time = Depth of Facility / Design Infiltration Rate =</td></tr>
<tr><td>Loading Ratio = Impervious Area Controlled : Area of Facility =</td><td>Loading Ratio = Impervious Area Controlled : Area of Facility =</td><td>Loading Ratio = Impervious Area Controlled : Area of Facility =</td></tr>
<tr><td>Existing Discharge Point (Inlet/Sewer/Stream):</td><td>Existing Discharge Point (Inlet/Sewer/Stream):</td><td>Existing Discharge Point (Inlet/Sewer/Stream):</td></tr>
<tr><td>Discharge Method for Runoff in Excess of 2":
Capacity**:</td><td>Discharge Method for Runoff in Excess of 2":
Capacity**:</td><td>Discharge Method for Runoff in Excess of 2":
Capacity**:</td></tr>
<tr><td colspan="4">*Infiltration facilities with stone beds: 40% void space, multiply volume in stone portion by 0.4. Calculations:</td></tr>
<tr><td colspan="4">**If a grass spillway is used: Capacity (cfs) = 2.5 x Length x Freeboard$^{1.5}$
**If an orifice structure is used: Capacity (cfs) = 0.6 x Orifice Area x (2 x 32.2 x Flow Depth Above Orifice)$^{0.5}$
Capacity Calculations:</td></tr>
</table>

Example: A doctor's office is proposed for a site. The building is 5,000 sq. ft. and the parking lot is 3,000 sq. ft.

<table>
<tr><td>Applicant Address:
Dr. Office
123 Site Street
Anytown, PA 12345</td><td colspan="3">Brief Description of Project: A proposed doctor's office consisting of 5,000 sq. ft. building (50' x 100') and 3,000 sq. ft. parking lot (30' x 100'). The building drains to the back of the property to an infiltration facility, and the parking lot drains to an infiltration facility adjacent the parking lot.</td></tr>
<tr><td>Nearest waterbody:

Trib. to Mill Creek</td><td colspan="3">Permanently Removed Volume = (2 inches / 12) x (Impervious Area)
= (2 inches / 12) x (8,000 sq. ft.)
= 1,333 cu. ft.</td></tr>
<tr><td rowspan="2">Total Proposed Impervious Area:
8,000 sq. ft.

Total Earth Disturbance:
12,000 sq. ft.</td><td colspan="3">A Factor of Safety of 2 is applied to the Tested Infiltration Rate.
Design Infiltration Rate = Tested Infiltration Rate / 2
= 1 in/hr / 2
= 0.5 in/hr</td></tr>
<tr><td colspan="3">Components of the project may be directed to multiple facilities.

Number of facilities used: 2</td></tr>
<tr><td rowspan="5">Soil Testing Method:

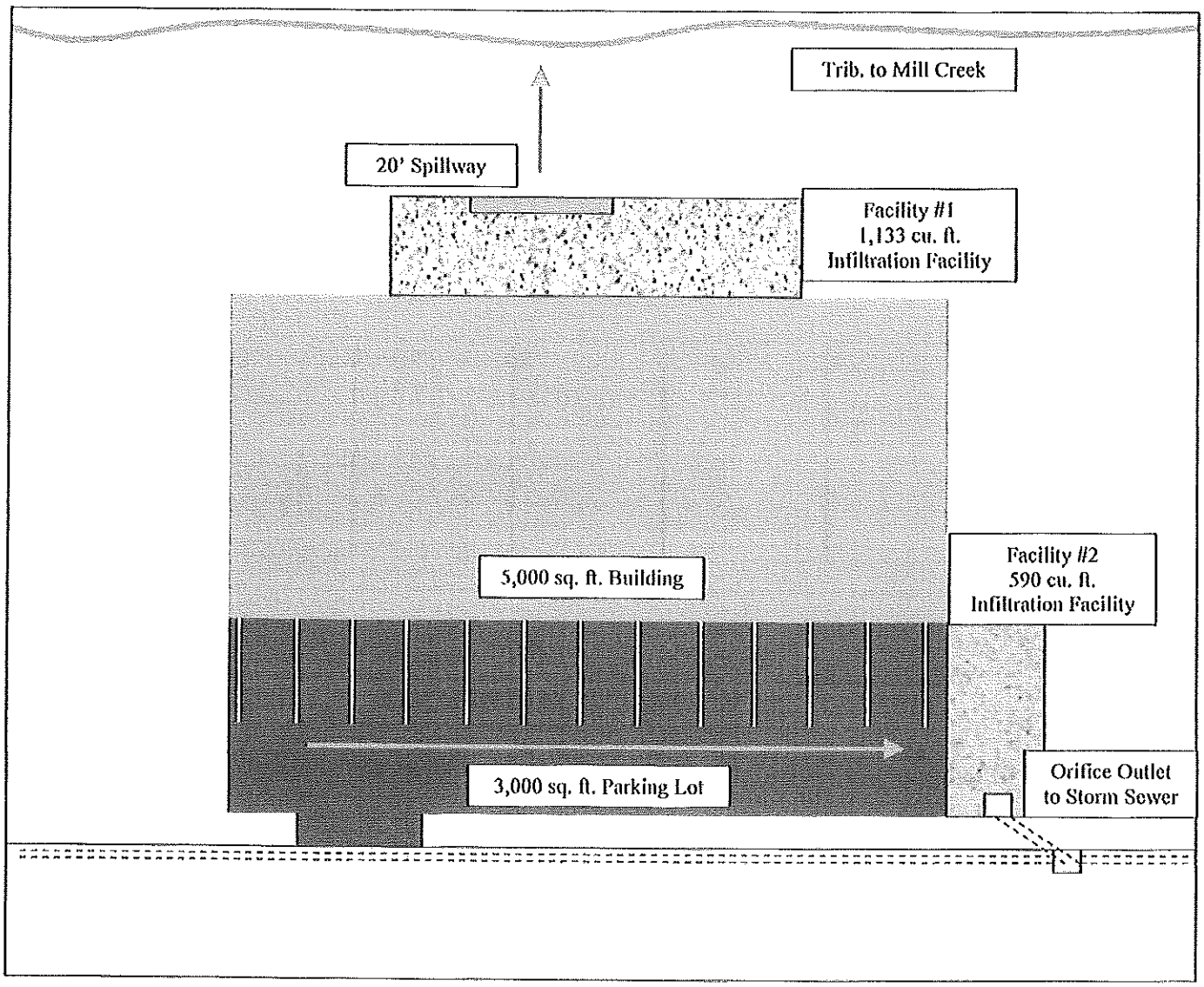
Percolation Test</td><td>Facility #1</td><td>Facility #2</td><td>Facility #3</td></tr>
<tr><td>Component of Project:
Building
Volume Collected:
5,000 x 2/12 = 833 cu. ft.</td><td>Component of Project:
Parking Lot
Volume Collected:
3,000 x 2/12 = 500 cu. ft.</td><td>Component of Project:
N/A
Volume Collected:
N/A</td></tr>
<tr><td>Tested Infiltration Rate (in/hr):

1 in/hr</td><td>Type of Facility:
Infiltration
Volume of Facility*:
1,133 cu. ft.
Area of Facility:
50' x 10' = 500 sq. ft.
Depth of Facility:
1 ft. stone + 1.3 ft. = 2.3 ft.</td><td>Type of Facility:
Infiltration
Volume of Facility*:
590 cu. ft.
Area of Facility:
30' x 10' = 300 sq. ft.
Depth of Facility:
½ ft. stone + 1.3 ft. = 1.8 ft.</td><td>Type of Facility:
N/A
Volume of Facility*:
N/A
Area of Facility:
N/A
Depth of Facility:
N/A</td></tr>
<tr><td rowspan="3">Additional Calcs/Notes:

Facilities have 2:1 horizontal :vertical side slopes. Therefore, actual volumes are greater which provides some additional storage for larger events.

Both facilities have 1 foot of freeboard. This volume is additional to the volume provided in the calculations.</td><td>Drawdown Time =
Depth of Facility / Design Infiltration Rate =
2.3 ft. x 12 in. / 0.5 in/hr = 55.2 hrs</td><td>Drawdown Time =
Depth of Facility / Design Infiltration Rate =
1.8 ft. x 12 in. / 0.5 in/hr = 43.2 hrs</td><td>Drawdown Time =
Depth of Facility / Design Infiltration Rate =
N/A</td></tr>
<tr><td>Loading Ratio =
Impervious Area Controlled : Area of Facility =
5,000 sq. ft. : 500 sq. ft. = 10:1</td><td>Loading Ratio =
Impervious Area Controlled : Area of Facility =
3,000 sq. ft. : 300 sq. ft. = 10:1</td><td>Loading Ratio =
Impervious Area Controlled : Area of Facility =
N/A</td></tr>
<tr><td>Existing Discharge Point (Inlet/Sewer/Stream):
Stream</td><td>Existing Discharge Point (Inlet/Sewer/Stream):
Inlet/Sewer System</td><td>Existing Discharge Point (Inlet/Sewer/Stream):
N/A</td></tr>
<tr><td></td><td>Discharge Method for Runoff in Excess of 2":
Spillway
Capacity**:
50 cfs</td><td>Discharge Method for Runoff in Excess of 2":
Orifice Outlet
Capacity**:
77 cfs</td><td>Discharge Method for Runoff in Excess of 2":
N/A
Capacity**:
N/A</td></tr>
<tr><td colspan="4">*Infiltration facilities with stone beds: 40% void space, multiply volume in stone portion by 0.4. Calculations:
Facility #1 has 1 ft. of stone: 500 ft^2 x 1 ft. stone x 0.4 = 200 ft^3 in stone portion; Volume = 500 ft^3 stone + (833 – 200) = 1,133 cu. ft.
Depth = 1 ft. stone + (833 – 200) / 500 ft^2 = 1 ft. + 1.3 ft = 2.3 ft.
Facility #2 has ½ ft. of stone: 300 ft^2 x ½ ft. stone x 0.4 = 60 ft^3 in stone portion; Volume = 150 ft^3 stone + (500 – 60) = 590 cu. ft.
Depth = ½ ft. stone + (500 – 60) / 300 sq. ft. = ½ ft. + 1.3 ft. = 1.8 ft.</td></tr>
<tr><td colspan="4">**If a grass spillway is used: Capacity (cfs) = 2.5 x Length x Freeboard$^{1.5}$
**If an orifice structure is used: Capacity (cfs) = 0.6 x Orifice Area x (2 x 32.2 x Flow Depth Above Orifice)$^{0.5}$
Capacity Calculations:
Facility #1 spillway: Capacity = 2.5 x (20 ft.) x (1 ft.)$^{1.5}$ = 50 cfs
Facility #2 orifice outlet: Use 1 ft. high by 2 ft. wide orifice; Capacity = 0.6 x (2 ft^2) x (2 x 32.2 x 1)$^{0.5}$ = 77 cfs</td></tr>
</table>

Project Sketch



APPENDIX E

STORMWATER MANAGEMENT FOR SMALL PROJECTS

Applicability: Stormwater management procedures for projects between 1,000 sq. ft. and 5,000 sq. ft. of proposed impervious area or total earth disturbance between 5,000 sq. ft. and 10,000 sq. ft. for which site conditions prevent the use of Ordinance Appendix C.1 - Disconnected Impervious Area (DIA) as a BMP.

Note: This small projects document is not to be used to plan for multiple lots without obtaining prior written approval from Lehman Township. Approvals and actions associated with this document do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other code, law or ordinance.

E.1 Introduction

These methods have been developed to allow homeowners to comply with stormwater management criteria for new projects to meet the requirements of the Act 167 Stormwater Management Ordinance of Lehman Township including sizing, designing, locating, and installing on-lot measures, referred to herein as "Best Management Practices" (BMPs). Pennsylvania Act 167 was authorized on October 4, 1978 (32 P.S., P.L. 864) and gave Pennsylvania municipalities the power to regulate activities that affect stormwater runoff and surface and groundwater quantity and quality.

Individual home construction projects on single-family lots which result in 1,000 sq. ft. to 5,000 sq. ft. of proposed impervious area (including the building footprint, driveway, sidewalks, and parking areas) are not required to submit formal stormwater management (SWM) site plans to Lehman Township; however, they must address water quality and infiltration goals, and submit the worksheet as outlined in this small projects document. If the guidelines presented in this brochure are followed, the individual homeowner will not require professional services to comply with these water quality and infiltration goals.

Section E.2 presents options of BMPs that can be considered for on-lot stormwater management. Section E.3 describes requirements and outlines the method for designing a suitable BMP, and a description of what needs to be included on the simple sketch plan, and the Small Projects Worksheet in Table E.4. Section E.4 contains an example of how to obtain the size and dimensions of the BMPs, complete the site sketch, and prepare the Small Project Worksheet.

The stormwater management method for small projects requires:

- The first 1" of rainfall runoff from proposed impervious surfaces to be captured (see definition of captured in Article II of the Ordinance).

The purpose of this small projects document is to help reduce stormwater runoff in the community, to maintain groundwater recharge, to prevent degradation of surface and groundwater quality, and to otherwise protect water resources and public safety.

What needs to be sent to Lehman Township?

Stormwater computations and a sketch plan must be submitted to Dennison Township. The small projects worksheet found in Table E.4 and a simple sketch plan containing the features described in Step 5 of Section E.3 is provided as an example, or may be used for submission to Lehman Township, and if applicable, the contractor prior to construction.

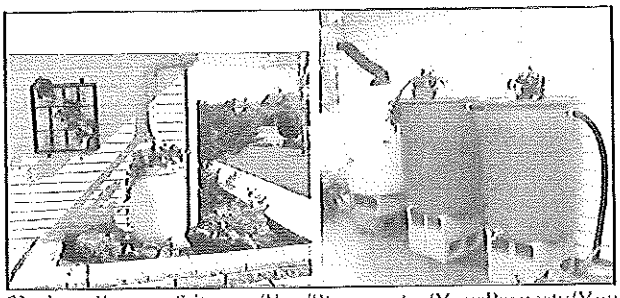
E.2 Description of BMPs

The following is a description of several types of BMPs that could be implemented. Refer to Chapter 6 of the PA BMP Manual which can be found on the PA Department of Environmental Protection's website for specifications and steps for construction for the following BMPs. A list of routine maintenance for each of the BMPs described below is also included at the end of this section.

Rain Barrels/Cisterns

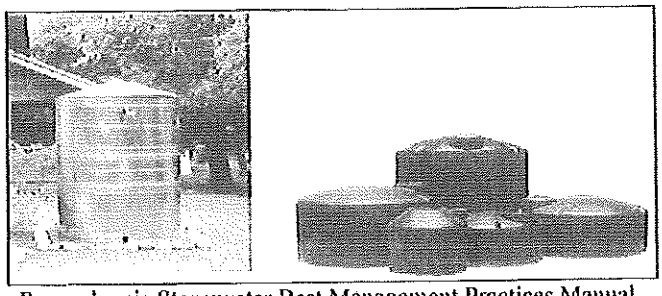
- Rain barrels and cisterns are large containers that collect drainage from roof leaders and temporarily store water to be released to lawns, gardens, and other landscaped areas; rain barrels are typically less than 50 gallons in size, and cisterns typically have volumes of up to 1,000 gallons or more, and can be placed on the surface or underground.

Figure E.1. Rain Barrels.



Source (left): http://www.rfcity.org/Eng/Stormwater/YourProperty/YourProperty.htm
Source (right): :http://www.floridata.com/tracks/transplantedgardener/Rainbarrels.cfm

Figure E.2. Cisterns.

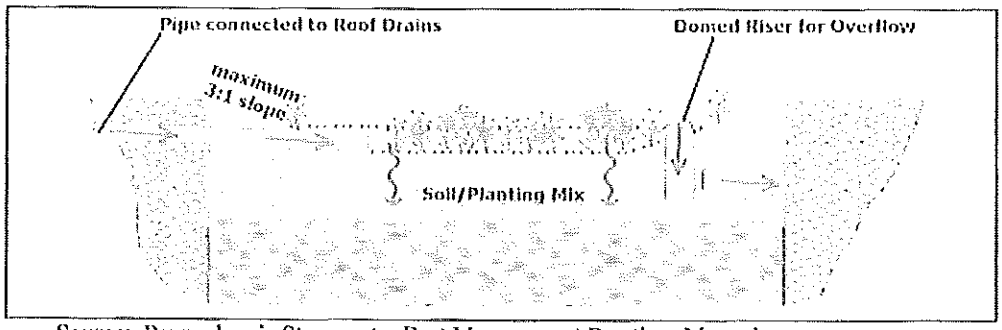


Source: Pennsylvania Stormwater Best Management Practices Manual.

Rain Garden/Bioretention Area

- A rain garden/bioretention area is an excavated depression area on the surface of the land in which native vegetation is planted to filter and use stormwater runoff; depths of 1.0 foot or less are recommended. Planting species should be native to Pennsylvania.

Figure E.3. Typical Rain Garden/Bioretention Area.



Source: Pennsylvania Stormwater Best Management Practices Manual.

Table E.1. Sample Plant List for Use in a Rain Garden/Bioretention Area.

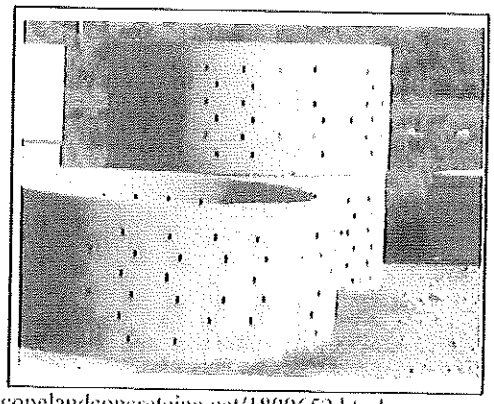
Common Name	Scientific Name	Plant Type
Red Maple	Acer rubrum	Tree
Grey Birch	Betula populifolia	Tree
Shadbush Serviceberry	Amelanchier canadensis	Tree
Eastern Cotton-wood	Populus grandidentata	Tree
Virginia Sweetspire	Itea virginica	Shrub
Red-Twig Dogwood	Cornus sericea (stolonifera) 'Arctic Fire'	Shrub
Southern Arrow-wood	Viburnum dentatum	Shrub
Black Choke Berry	Aronia melanocarpa	Shrub
Great Blue Lobelia	Lobelia siphilitica	Perennial
Dwarf Pink false aster	Boltonia asteroides 'Nana'	Perennial
White false aster	Boltonia asteroides 'Snowbank'	Perennial
Switchgrass	Panicum virgatum	Grass

Source: Pennsylvania Stormwater Best Management Practices Manual.

Dry Wells

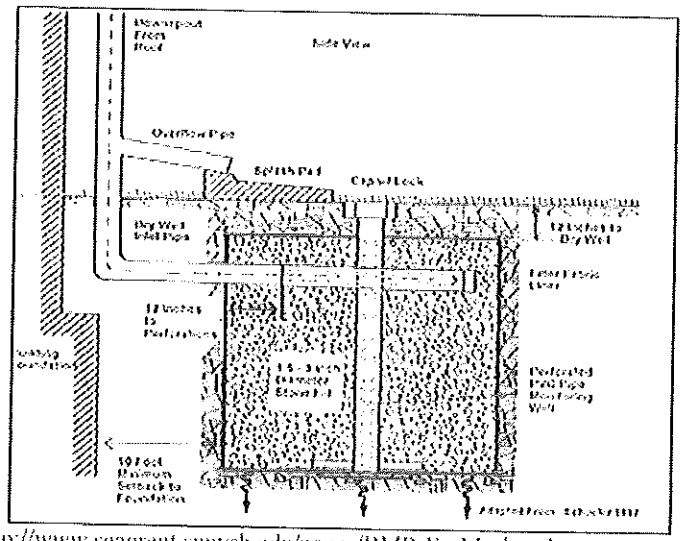
- A dry well, also referred to as a seepage pit is a subsurface storage facility that temporarily stores and infiltrates runoff from the roofs of buildings or other impervious surfaces; recommended depth of dry well is between 1.0 and 4.0 feet.
- Dry Well #1 – structural prefabricated chamber; no stone fill.
- Dry Well #2 – excavated pit filled with stone fill.

Figure E.4. Dry Well #1 – Structural Prefabricated Chamber.



Source: http://www.copelandconcreteinc.net/1800652.html

Figure E.5. Dry Well #2 – Excavated Pit Filled with Stone Fill.

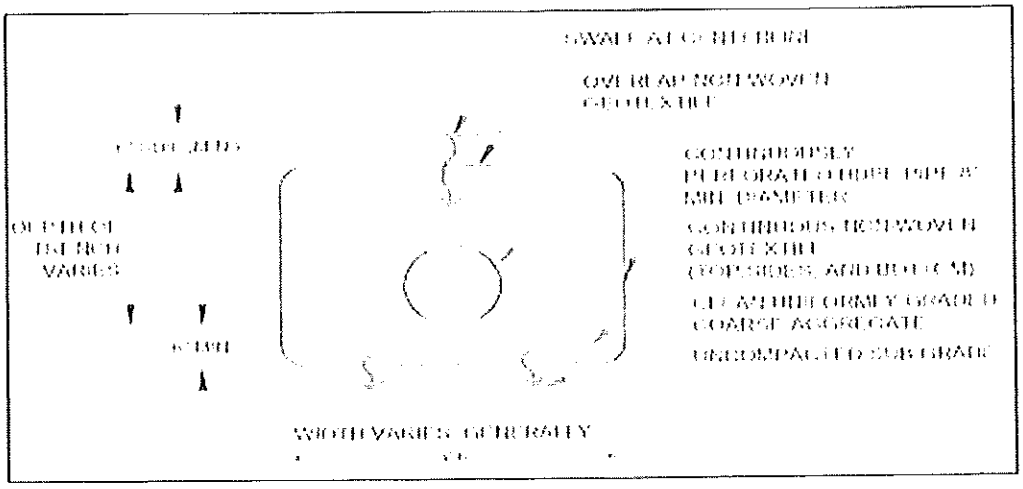


Source: http://www.seagrant.sunysb.edu/pages/BMPsForMarinas.htm

Infiltration Trench

- An infiltration trench is a long, narrow, rock-filled trench with or without a perforated pipe that receives stormwater runoff and has no outlet.
- Runoff is stored in the void space between the stones and in the pipe and infiltrates through the bottom and into the underlying soil matrix.
- The width is limited to between 3 and 8 feet, and the depth ranges from 2 to 5 feet.

Figure E.6. Infiltration Trench.



Source: Pennsylvania Stormwater Best Management Practices Manual.

Routine Maintenance for BMPs

- Vegetation along the surface of an infiltration trench should be maintained in good condition, and any bare spots should be revegetated as soon as possible.
- Vehicles shouldn't be parked or driven on an infiltration trench, and care should be taken to avoid excessive compaction by mowers.
- Any debris such as leaves blocking flow from reaching an infiltration trench or bioretention/rain garden should be routinely removed.
- While vegetation is being established, pruning and weeding may be required for a bioretention/rain garden.
- Mulch in a bioretention/rain garden needs to be re-spread when erosion is evident. Once every two to three years or after major storms the entire area may require mulch replacement.
- At least twice a year the landowner needs to inspect the bioretention/rain garden for sediment buildup and vegetative conditions.
- During periods of extended drought, the bioretention/rain garden requires watering.
- Trees and shrubs in a bioretention/rain garden need to be inspected at least twice per year by the landowner to evaluate their health. If they are in poor health, they need to be replaced.
- Dry wells need to be inspected by the landowner at least four times a year and after significant rainfalls, and debris/trash, sediment, and any other waste material need to be removed and disposed of at suitable disposal/recycling sites and in compliance with local, state, and federal waste regulations.
- For dry wells, gutters need to be regularly cleaned out, and proper connections must be maintained to facilitate the effectiveness of the dry well.
- The filter screen for the dry well that intercepts roof runoff must be replaced as necessary.
- Dry wells that are damaged need to be fixed or replaced immediately.
- If an intermediate sump box exists in conjunction with a dry well, it must be cleaned out at least once per year.
- Rain barrels and cisterns need to be cleared of debris routinely at least every three months and after significant storms to allow stormwater from gutters to enter them.
- Gutters that directly convey rain water to dry wells, rain barrels, and cisterns need to be routinely cleared of trash and debris at least every three months and after significant storms.
- Rain barrels and cisterns must be kept covered.
- Rain barrels and cisterns should be routinely emptied so that they are only ¼ of the way full to allow for storage of additional rainwater.
- Overflow outlets from rain barrels and cisterns must be kept free and clear of debris.
- Rain barrels and cisterns that are damaged need to be fixed or replaced immediately.

E.3. Determination of BMPs and Volume Requirements

All proposed impervious areas must be included in the determination of the amount of new impervious areas and the size of proposed BMPs needed to control stormwater.

Proposed impervious areas on an individual residential lot include:

- Roof area
- Pavement
- Sidewalks
- Driveways
- Patios
- Porches
- Permanent pools
- Parking areas

Sidewalks, driveways, or patios that are constructed with gravel or pervious pavers that will not be converted to an impervious surface in the future need not be included in this calculation. Therefore, the amount of proposed impervious area can be reduced for proposed driveways, patios, and sidewalks through the use of gravel, pervious pavement, and turf pavers. All proposed impervious areas must be constructed so that runoff is conveyed to a BMP; no runoff can be directed to storm sewers, inlets, or other impervious areas (i.e., street).

All new construction should incorporate design techniques that include: minimizing the amount of land disturbance, reducing impervious cover, disconnecting gutters and directing runoff to vegetated areas to infiltrate, and redirecting the flow of runoff from impervious driveways to vegetated areas instead of to the street or gutter.

Below are the steps that must be undertaken to meet the Ordinance requirements. The results obtained for each step must be included in the Small Projects Worksheet found in Table E-4:

STEP 1 – Determine the total area of all proposed impervious surfaces (square feet) that will need to drain to one or more BMPs.

STEP 2 – Determine locations where BMPs need to be placed, and the contributing impervious area "*I*" (square feet) to each.

STEP 3 – Select the BMPs to be used and determine the requirements of each from Section E.3.

STEP 4 – Obtain the required storage volume "*V*" (cubic feet) and surface area "*A*" (square feet) needed for each of the proposed BMPs from the appropriate heading below.

Note: all calculations are based on 1 inch of rainfall.

For Rain Barrels/Cisterns

- The typical volume of a rain barrel is less than 50 gallons; if a greater volume is required, more than one rain barrel will be needed or a cistern may be used.
- For calculations, assume the rain barrel is already 25% full.
- Calculate volume in Cubic Feet:

$$V_{cf} = (1 \text{ inch} \times 1/12 \times I) / 0.75$$

- Convert to Gallons:

$$V_{gal} = V_{cf} \times 7.48$$

For Rain Gardens/Bioretention or Dry Well #1:

- Rain gardens and bioretention areas are only used for depths less than or equal to 1.0 feet; a dry well #1 is used for depths between 1.0 and 4.0 feet.
- Select the depth "*D*" (feet) for the facility.
- For calculations, assume the facility is empty (0% full).
- Calculate volume in Cubic Feet:

$$V_{cf} = (1 \text{ inch} \times 1/12 \times I)$$

- Calculate surface area of the facility in Square Feet:

$$A_{sf} = V_{cf} / D$$

For Dry Well #2 or Infiltration Trench:

- A dry well #2 is used for depths between 1.5 feet and 4.0 feet; an infiltration trench is used for depths between 2.0 and 5.0 feet.
- Select the depth "*D*" (feet) for the facility.
- For calculations, assume the void ratio of the stone is 40%.
- Calculate volume in Cubic Feet:

$$V_{cf} = (1 \text{ inch} \times 1/12 \times D) / 0.4$$

- Calculate surface area of the facility in Square Feet:

$$A_{sf} = V_{cf} / D$$

- Determine the dimensions of the facility based on "*A*" calculated.

STEP 5 - Sketch a simple site plan that includes:

- Name and address of the owner of the property, and or name and address of the individual preparing the plan, along with the date of submission.
- Location of proposed structures, driveways, or other paved areas with approximate size in square feet.
- Location, orientation, and dimensions of all proposed BMPs. For all rain gardens/bioretention, infiltration trenches, and dry wells, the length, width, and depth must be included on the plan. For rain barrels or cisterns the volume must be included.
- Location of any existing or proposed on-site septic system and/or potable water wells showing rough proximity to infiltration facilities.
- Location of any existing waterbodies such as; streams, lakes, ponds, wetlands, or other waters of the Commonwealth within 100 feet of the project site, and the distance to the project site and/or BMPs. It is recommended that the project or BMPs be located at least than fifty (50) feet away from a perennial or intermittent stream. If an existing buffer is legally prescribed (i.e., deed, covenant, easement, etc.), the existing buffer shall be maintained.
- Location of all existing structures including buildings, driveways, and roads within fifty (50) feet of the project site.

Fill in the small projects worksheet found in Table E.4, then submit the worksheet and the simple site sketch (or equivalent) to Lehman Township.

Table E.4. Small Projects Worksheet.

Small Projects Worksheet					
STEP 1					
Component #1 of Project	Impervious Area from Component #1	Component #2 of Project	Impervious Area from Component #2	Component #3 of Project	Impervious Area from Component #3
	sq. ft.		sq. ft.		sq. ft.
Total Impervious Area =		sq. ft.			
STEP 2					
BMP #1		BMP #2		BMP #3	
Captures:		Captures:		Captures:	
Impervious Area I_1:	sq. ft.	Impervious Area I_2:	sq. ft.	Impervious Area I_3:	sq. ft.
STEP 3					
BMP #1		BMP #2		BMP #3	
Type:		Type:		Type:	
STEP 4					
BMP #1		BMP #2		BMP #3	
Volume:		Volume:		Volume:	
Dimensions:		Dimensions:		Dimensions:	

Note: For additional BMPs, use additional sheets

E.4. Example

Joe Homeowner wants to build an 800 sq. ft. two car garage, and a 700 sq. ft. impervious driveway. Site conditions in the urban setting prevent the use of Disconnected Impervious Area (DIA) as a BMP.

STEP 1 – Determine the total area of all proposed impervious surfaces that will need to drain to one or more BMPs.

- Garage roof: 20 ft. x 40 ft. = 800 sq. ft.
- Driveway: 50 ft. x 14 ft. = 700 sq. ft.
- Total proposed impervious surface = 800 + 700 = **1,500 sq. ft.**

STEP 2 – Determine locations where BMPs need to be placed, and the contributing impervious area "*I*" to each.

- Use BMP #1 to capture runoff from the garage (I_1 = 800 sq. ft.)
- Use BMP #2 to capture runoff from the driveway (I_2 = 700 sq. ft.).

STEP 3 – Select the BMPs to be used and determine the requirements of each from Section E.3.

- BMP #1 – rain barrel/cistern
- BMP #2 – infiltration trench

STEP 4 – Obtain the required storage volume "*V*" and surface area "*A*" needed for each of the proposed BMPs from the appropriate heading below.

For Rain Barrel/Cistern (BMP #1)

- Calculate volume in cubic feet:

$$V_{cf} = (1 \text{ inch} \times 1/12 \times I_1) / 0.75$$
$$= (1 \text{ inch} \times 1/12 \times 800) / 0.75$$
$$= 88.89 \text{ cubic feet}$$

- Convert to gallons:

$$V_{gal} = V_{cf} \times 7.48$$
$$= 88.89 \times 7.48$$
$$= 664.8 \text{ gallons} \rightarrow \text{round up to } 665 \text{ gallons}$$

For Infiltration Trench (BMP #2)

- Select depth "*D*" for the facility of **2 feet** (between 2.0 feet and 5.0 feet).
- Calculate volume in cubic feet:

$$V_{cf} = (1 \text{ inch} \times 1/12 \times I_2) / 0.4$$
$$= (1 \text{ inch} \times 1/12 \times 700) / 0.4$$
$$= 145.8 \text{ cubic feet} \rightarrow \text{round up to } 150 \text{ cubic feet}$$

- Calculate surface area of the facility in square feet:

$$A_{sf} = V_{cf} / D$$
$$= 150 / 2$$
$$= 75 \text{ square feet}$$

- The driveway is 50 feet long, so using the upper 30 feet of the driveway as the length of the infiltration trench, the width of the trench =

$$75 \text{ square feet} / 30 \text{ feet} = 2.5 \text{ feet}$$

- Use a **2.5 ft. wide x 30 ft. long x 2 ft. deep** infiltration trench.

STEP 5 – Prepare a simple site sketch (Figure E.7) and complete Small Projects Worksheet (Table E.4) to send to Municipality.

Figure E.7. Simple Site Sketch of Proposed Project and Proposed BMPs.

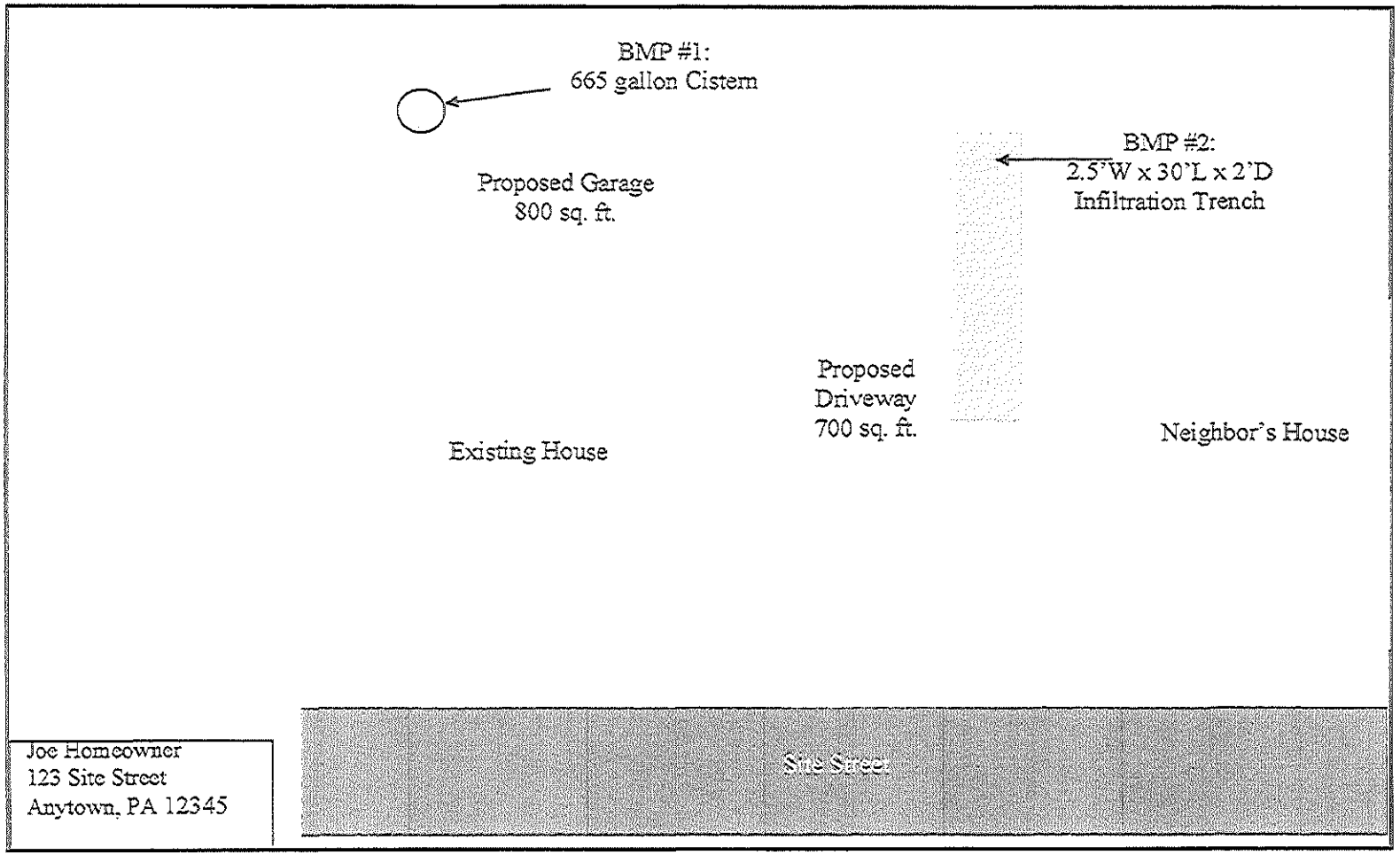


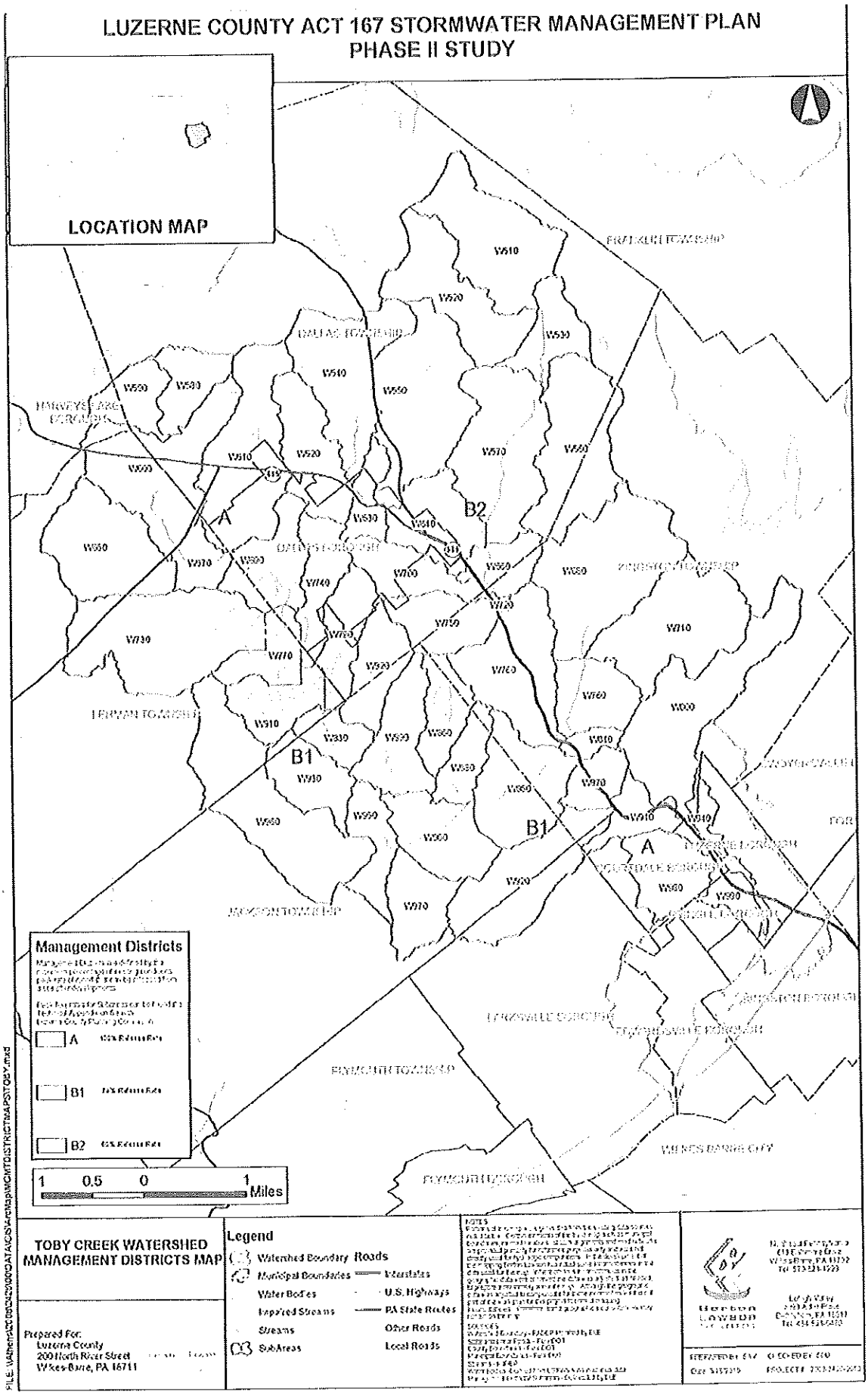
Table E.4. Small Projects Worksheet.

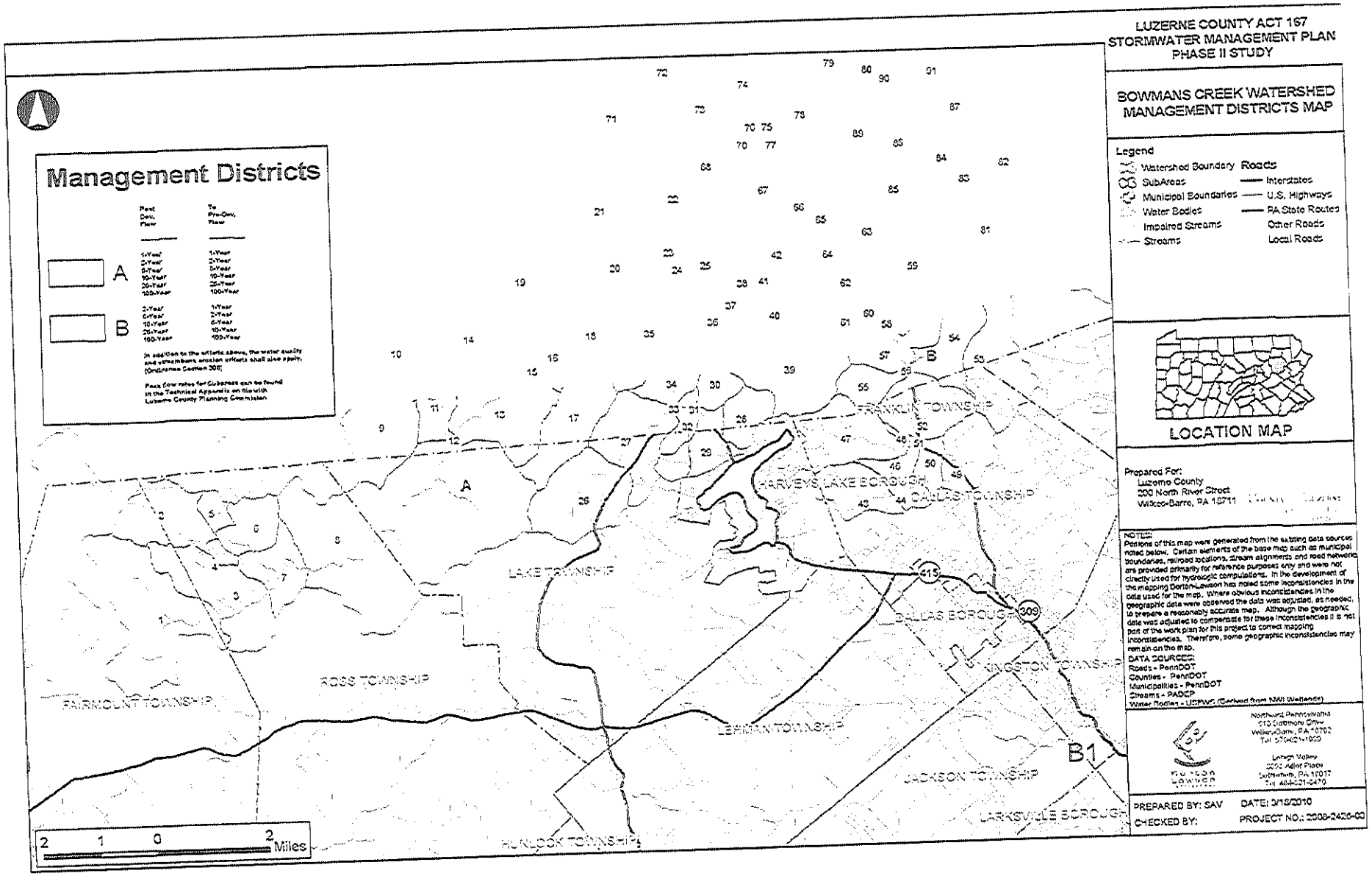
Small Projects Worksheet					
STEP 1					
Component #1 of Project	Impervious Area from Component #1	Component #2 of Project	Impervious Area from Component #2	Component #3 of Project	Impervious Area from Component #3
Garage Roof	800 sq. ft.	Driveway	700 sq. ft.	N/A	N/A
Total Impervious Area =		1,500 sq. ft.			
STEP 2					
BMP #1		BMP #2		BMP #3	
Captures:	Garage Roof	Captures:	Driveway	Captures:	N/A
Impervious Area I_1:	800 sq. ft.	Impervious Area I_2:	700 sq. ft.	Impervious Area I_3:	N/A
STEP 3					
BMP #1		BMP #2		BMP #3	
Type:	Cistern	Type:	Infiltration Trench	Type:	N/A
STEP 4					
BMP #1		BMP #2		BMP #3	
Volume:	88.89 cu. ft.	Volume:	150 cubic feet	Volume:	N/A
Dimensions:	665 gallons	Dimensions:	2.5' W x 30'L x 2' D	Dimensions:	N/A
Note: For additional BMPs, use additional sheets					

APPENDIX F.1

STORMWATER MANAGEMENT DISTRICT MAPS

LUZERNE COUNTY ACT 167 STORMWATER MANAGEMENT PLAN
PHASE II STUDY





LUZERNE COUNTY ACT 167
STORMWATER MANAGEMENT PLAN
PHASE II STUDY

SOWMANS CREEK WATERSHED MANAGEMENT DISTRICTS MAP

Legend

- Watershed Boundary
- SubAreas
- Municipal Boundaries
- Water Bodies
- Impaired Streams
- Streams

Roads

- Interstates
- U.S. Highways
- PA State Routes
- Other Roads
- Local Roads

LOCATION MAP

Prepared For:
Luzerne County
200 North River Street
Wilkes-Barre, PA 18711

NOTE:
Portions of this map were generated from the existing data sources noted below. Certain elements of the base map such as municipal boundaries, railroad locations, stream alignments and road networks are provided primarily for reference purposes only and were not directly used for hydrologic computations. In the development of the mapping Dorish-Lawson has noted some inconsistencies in the data used for the map. Where obvious inconsistencies in the geographic data were observed the data was adjusted, as needed, to prepare a reasonably accurate map. Although the geographic data was adjusted to compensate for these inconsistencies it is not part of the work plan for this project to correct mapping inconsistencies. Therefore, some geographic inconsistencies may remain on the map.

DATA SOURCES:
Roads - PennDOT
Counties - PennDOT
Municipalities - PennDOT
Streams - PADEP
Water Bodies - USFWS (Derived from NWI Wetlands)

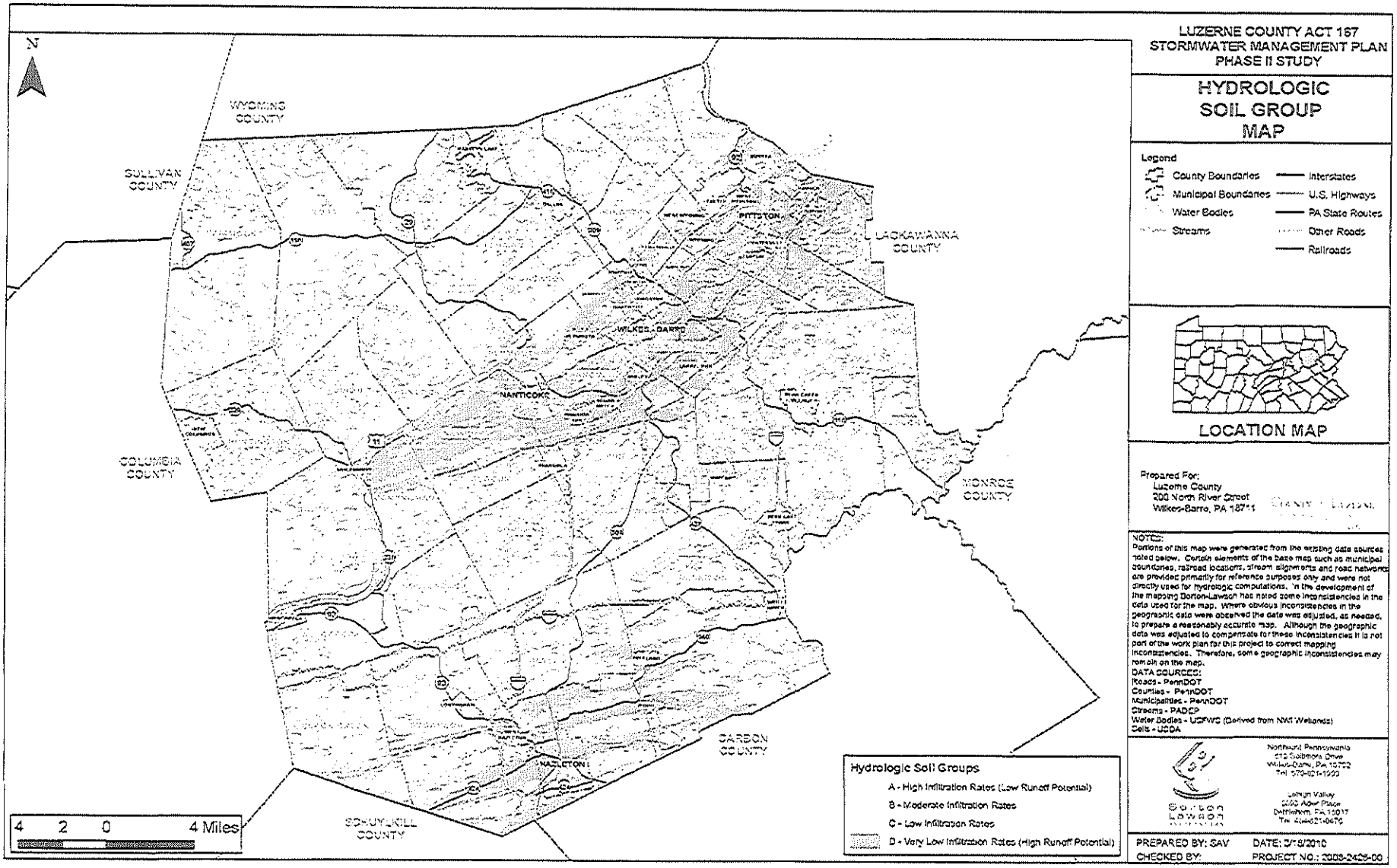
Northeast Pennsylvania
210 Baltimore Drive
Wilkes-Barre, PA 18702
Tel: 570-821-1999

Lehigh Valley
3000 Atrium Place
Bethlehem, PA 18017
Tel: 484-21-0470

PREPARED BY: SAV DATE: 3/19/2010
CHECKED BY: PROJECT NO.: 2008-2426-00

APPENDIX F.2

HYDROLOGIC SOIL (HSG) GROUP MAPS



LUZERNE COUNTY ACT 167
STORMWATER MANAGEMENT PLAN
PHASE II STUDY

HYDROLOGIC SOIL GROUP MAP

Legend

- County Boundaries
- Municipal Boundaries
- Water Bodies
- Streams
- Interstates
- U.S. Highways
- PA State Routes
- Other Roads
- Railroads

LOCATION MAP

Prepared For:
Luzerne County
200 North River Street
Wilkes-Barre, PA 18711

NOTES:
Portions of this map were generated from the existing data sources noted below. Certain elements of the base map such as municipal boundaries, railroad locations, stream alignments and road networks are provided primarily for reference purposes only and were not directly used for hydrologic computations. In the development of the mapping Dorton+Lawson has noted some inconsistencies in the data used for the map. Where obvious inconsistencies in the geographic data were observed the data was adjusted, as needed, to prepare a reasonably accurate map. Although the geographic data was adjusted to compensate for these inconsistencies it is not part of the work plan for this project to correct mapping inconsistencies. Therefore, some geographic inconsistencies may remain on the map.

DATA SOURCES:
Roads - PennDOT
Counties - PennDOT
Municipalities - PennDOT
Streams - PADCP
Water Bodies - USFWS (Derived from NWI Wetlands)
Soils - USDA

Dorton Lawson

Northeast Pennsylvania
512 Baltimore Drive
Wilkes-Barre, PA 18702
Tel: 570-821-1999

Lehigh Valley
2050 Abel Place
Bethlehem, PA 18017
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PREPARED BY: SAV DATE: 3/19/2010
CHECKED BY: PROJECT NO.: 2008-2425-00