

**TOWNSHIP OF WEISENBERG
LEHIGH COUNTY, PENNSYLVANIA
ORDINANCE NO. 2023 - 5**

**AN ORDINANCE OF THE TOWNSHIP OF WEISENBERG, LEHIGH COUNTY,
PENNSYLVANIA, CONSOLIDATING PREVIOUSLY ADOPTED TOWNSHIP STORM
WATER REGULATIONS INTO A SINGLE COMPREHENSIVE STORM WATER
MANAGEMENT ORDINANCE AND REPEALING PREVIOUS TOWNSHIP
ORDINANCES INCONSISTENT THEREWITH**

SECTION 1: STATEMENT OF LEGISLATIVE FINDINGS

WHEREAS, the Township of Weisenberg (hereinafter, "Township") is a Township of the Second Class organized and existing under and pursuant to the Second Class Township Code and other laws and regulations of the Commonwealth of Pennsylvania, as a political subdivision of the Commonwealth of Pennsylvania and County of Lehigh; and

WHEREAS, the Township is authorized by the Second Class Township Code, *as amended*, 53 P.S. § 65101 *et seq.*, and Pennsylvania's Storm Water Management Act, Act 167 of Oct. 4, 1978, P.L. 864, *as amended*, 32 P.S. § 680.1, to adopt regulations for the management of storm water runoff within the Township; and

WHEREAS, the Township has previously exercised its authority under the Second Class Township Code and Storm Water Management Act to adopt regulations relating to stormwater management by adopting Township Ordinance Nos. 7-4, 7-5, 11-2, and 11-3; and

WHEREAS, the purpose of this Ordinance is to consolidate the regulations currently contained in Township Ordinance Nos. 7-4, 7-5, 11-2, and 11-3 into a single comprehensive ordinance.

NOW, THEREFORE, BE IT ORDAINED AND ENACTED by the Board of Supervisors of Weisenberg Township, Lehigh County, as follows.

SECTION 2: ADOPTION OF COMPREHENSIVE STORM WATER MANAGEMENT ORDINANCE

The document attached hereto as **Exhibit A** (and incorporated herein by reference and made a material part hereof) is hereby adopted in full as the Township's comprehensive storm water management ordinance and shall be known as the "Weisenberg Township Stormwater Management Ordinance."

SECTION 3: SAVINGS CLAUSE

If any sentence, clause, section, or part of this Ordinance is for any reason found by a court of competent jurisdiction to be unconstitutional, illegal, or invalid, such unconstitutionality, illegality,

or invalidity shall not affect or impair any of the remaining provisions, sentences, clauses, sections, or parts of this Ordinance, and the same shall remain in full force and effect if the same can be accomplished without the structure or intent of the Ordinance having been destroyed by the elimination of that word, phrase, portion, or provision found to be invalid or void. It is hereby declared as the intent of the Board of Supervisors of the Township of Weisenberg that this Ordinance would have been adopted had such unconstitutional, illegal, or invalid sentence, clause, section, or part thereof not been included herein.

SECTION 4: REPEALER

All ordinances or parts thereof in conflict with the provisions of this Ordinance are hereby repealed to the extent of such conflict. Specifically, Township Ordinance Nos. 7-4, 7-5, 11-2, and 11-3 are hereby repealed in their entirety.

SECTION 5: EFFECTIVE DATE

This Ordinance shall become effective five (5) days after enactment by the Board of Supervisors of the Township of Weisenberg.

DULY ENACTED AND ORDAINED, this 11th day of September, 2023, by the Board of Supervisors of Weisenberg Township, Lehigh County, Pennsylvania, in lawful session duly assembled.

ATTEST:

**TOWNSHIP OF WEISENBERG
BOARD OF SUPERVISORS**



BRIAN C. CARL, Township Manager



LINDA GORGAS, Chairperson



ANTHONY C. WERLEY, Vice Chairperson



RICHARD A. BLEILER, Supervisor

EXHIBIT A
(See attached)

STORMWATER MANAGEMENT ORDINANCE

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PART 1: Stormwater Control

ARTICLE I: General Provisions

Section 1. Title.

An ordinance providing for the regulation and control of the stormwater runoff of subdivisions, land developments and major uses, including design standards, methods of calculation and construction standards and including penalties for the violation of this Part 1.

Section 2. Short title.

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

Section 3. Statement of findings.

The Board of Supervisors of the Township of Weisenberg, County of Lehigh, Commonwealth of Pennsylvania, finds:

- A. That inadequate management of accelerated runoff of stormwater resulting from development throughout the Township threatens the health, welfare and safety of the public by causing, contributing to or allowing the following to occur:
 - (1) Erosion of valuable topsoil due to increased flooding and accelerated runoff velocities.
 - (2) Damage to public and private properties due to increased deposits of sediment resulting from increased flooding.
 - (3) Overtaxing of watercourses and storm sewer systems due to increased peak flows within various watersheds.
 - (4) Increased cost of public and private stormwater management facilities due to the need to provide greater capacity and more frequent maintenance.
 - (5) Undermining of floodplain management and flood control efforts of downstream communities due to lack of control of the overall peak flow rates of the Jordan Creek, Little Lehigh Creek, Maiden Creek, and the Sacony Creek.
 - (6) Reduction of groundwater recharge due to greatly increased areas of impervious surface.
- B. A comprehensive program of stormwater management, including reasonable regulation of development and activities causing accelerated erosion, is fundamental to the public health, safety and welfare and the protection of the people of the Township and all the people of the commonwealth, their resources and the environment.

Section 4. Purpose.

The purpose of Part 1 is to create conditions favorable to the health, safety, morals and general welfare of the citizens by:

- A. Controlling accelerated runoff and erosion and sedimentation problems at their source by regulating activities which cause such problems.
- B. Utilizing and preserving the desirable existing natural drainage systems.
- C. Encouraging recharge of groundwater where appropriate.
- D. Maintaining the existing flows and quality of streams and watercourses in the Township and the commonwealth.
- E. Preserving and restoring the flood-carrying capacity of streams.
- F. Providing for proper maintenance of all permanent stormwater management structures which are constructed within the Township.
- G. Ensuring conformance of stormwater facilities with proper improvement standards.
- H. Carrying out the goals and objectives of the Northern Lehigh Multi-Municipal Comprehensive Plan, and the stormwater management plans for the Jordan Creek, Little Lehigh Creek, Maiden Creek, and the Sacony Creek watersheds as prepared by the Lehigh Valley Planning Commission.
- I. Avoiding hazards to the public health and safety and damage to public and private property and streets.
- J. Avoiding the need for large public or private expenditures to resolve stormwater problems created as a result of activities regulated by this Part 1.

Section 5. Statutory authority.

The Township of Weisenberg is empowered to regulate these activities by the authority of the Act of October 4, 1978, P.L. 864 (Act 167), the Stormwater Management Act and the Act of May 1, 1933, P.L.103, No.69 as amended, the Second Class Township Code.

Section 6. Applicability.

This Part 1 shall apply to any of the following activities:

- A. All applications for major and minor preliminary and final subdivisions or land developments involving or likely to result in the addition of greater than 5,000 square feet of impervious coverage (provided that all additions of impervious cover on the development site within the five-year period preceding the application shall be included in determining the area of additional impervious cover). Any areas which may be considered semipervious shall be considered impervious areas for the purpose of determining applicability.
- B. All activities, other than clearly agricultural activities, involving the disturbance of one acre or greater of earth.
- C. All applications for building permits for uses involving the addition of greater than 5,000 square feet of impervious cover (provided that all additions of impervious cover on the development site within five-year period preceding the application shall be included in determining the area of the additional impervious cover), but excluding uses for which a stormwater management plan was previously reviewed by the Township Engineer and approved by the Board of Supervisors as part of a subdivision or land development plan.

Any areas which may be considered semipervious shall be considered impervious areas for the purpose of determining applicability.

- D. All activities involving alteration, disturbance or relocation of a watercourse, one-hundred-year floodplain, conveyance swale, lake or stormwater detention basin, except for activities for which a stormwater management plan was previously reviewed by the Township Engineer and approved by the Board of Supervisors as part of a subdivision or land development plan.

Section 7. Interpretation.

A. Standards.

- (1) The provisions of this Part 1 shall be interpreted and applied as minimum requirements for the promotion of the public health, safety and general welfare, the protection of public and private property and the preservation of the natural environment.
 - (2) Where provisions, standards and specifications of this Part 1 conflict with those of any state statute, other ordinance or regulations, the more restrictive requirement shall apply, regardless of its source, unless specified to the contrary.
- B. Illustrations. The illustrations in this Part 1 are for general illustrative purposes and are not part of the regulations of this Part 1.

Section 8. Modifications and exceptions.

- A. Requests for variance or modification of this Part 1 shall be made to the Township in writing. A copy of the request shall be provided to each of the following:
- (1) The Township Engineer.
 - (2) The Township Solicitor.
 - (3) When any portion of the Jordan Creek and/or Little Lehigh Creek and/or Maiden Creek and/or Sacony Creek Watersheds are affected, the Lehigh Valley Planning Commission.
- B. The application shall fully document the nature of the alleged hardship. The Board of Supervisors, after receiving the advice of the Weisenberg Township Planning Commission may, but shall not be obligated to, grant a waiver provided that all of the following findings are made in a given case:
- (1) That there are unique physical circumstances or conditions, including irregularity of lot size or shape or exceptional topographical or other physical conditions peculiar to the particular property and that the unnecessary hardship is due to such conditions and not the circumstances or conditions generally created by the provisions of this Part 1 in the stormwater management district in which the property is located.
 - (2) That because of such physical circumstances or conditions, there is no possibility that the property can be developed in strict conformity with the provisions of this Part 1 and that the authorization of a waiver is therefore necessary to enable the reasonable use of the property.

- (3) That such unnecessary hardship has not been created by the applicant.
 - (4) That the waiver, if authorized, will represent the minimum waiver that will afford relief and will represent the least modification possible of the regulation in issue.
- C. In granting any waiver, the Board of Supervisors may attach such reasonable conditions and safeguards as it may deem necessary to implement the purposes of Act 167 and this Part 1.
- D. The Board of Supervisors, after receiving the advice of the Weisenberg Township Planning Commission, shall have the power to grant variances or modifications to the specific requirements of this Part, where the applicant proves to the satisfaction of the Board of Supervisors that, owing to special conditions, a variance or modification is need to:
- (1) Avoid an unreasonable hardship that was not self-created.
 - (2) Allow a modification that would be more practical and efficient while still meeting the purposes and intent of the regulation.
 - (3) Allow reasonable and more practical development of a site because of the particular site's particular and uncommon characteristics.
 - (4) Allow a layout or improvements that would clearly be more in the public interest than what would occur if the modification were not granted.

Section 9. Fees.

- A. The Board of Supervisors has established by resolution a schedule of fees and a collection procedure for all applications and other matters pertaining to reviews under this Part 1 and the Subdivision and Land Development Ordinance of the Township of Weisenberg.
- B. The applicant is also required to submit any required review fees to the Lehigh Valley Planning Commission and the County Soil Conservation DISTRICT.
- C. Plans shall not be considered filed until all fees are paid and the applications are properly signed as required.

Section 10. Township records.

The Township shall keep a record of the findings, decisions and recommendations relative to this Part 1. Such records shall be open to the public for review.

Section 11. Enforcement.

- A. Inspectors. The Plans Administrator, Township Engineer, Code Enforcement staff, Township Manager and any other persons authorized by the Board of Supervisors shall have the power to enforce the provisions of this Part 1 and the accompanying design standards and improvement specifications.
- B. Inspection. Any action under this Part 1 shall be subject to on-site inspection by the Township or its authorized representatives to ensure that there is compliance with this Part 1, other Township ordinances and the approved plans.

- C. Remedies. Any action inconsistent with the provisions of this Part 1 shall be subject to a cease and desist order and other appropriate measures by the Board of Commissioners, or its authorized representatives.
- D. If at any stage of the work the Township Engineer determines that the permanent stormwater control facilities are not being installed in accordance with the approved development plan, the Township shall revoke any existing permits until a revised development plan is submitted and approved as required by Section 12, unless the installation is immediately corrected so as to conform to the approved development plan.

Section 12. Modification of plans.

A modification to a submitted drainage plan for a proposed development site which involves a change in control methods or techniques, or which involves the relocation or redesign of control measures or which is necessary because soil or other conditions are not as stated on the drainage plan (as determined by the Township Engineer) shall require submission of the modified drainage plan. This submission shall comply with all requirements of Article III (and Article IV, where applicable) of this Part 1 and will be reviewed by the Township Engineer and the Weisenberg Township Planning Commission and approved by the Board of Supervisors.

Section 13. Violations and penalties.

A. Violations.

- (1) Any person (being the owner or agent of any lot, tract or parcel of land) who accomplishes an action that is regulated by this Part 1 and does not fully comply with this Part 1 shall be guilty of a summary offense.
- (2) The description by mete and bounds in the instrument of transfer or other document used in the process of selling or transferring shall not exempt the seller or transferor from such penalties or from the remedies herein provided.
- (3) Each day of violation shall be considered as a separate violation and shall subject the violator to the penalties listed in this section.
- (4) Actions to enforce this Part 1 shall be brought by the Board of Supervisors, or its authorized representatives.

B. Penalties.

- (1) Upon conviction of a violation of this Part 1, any person responsible for such a violation shall pay a fine of \$500 per violation, with each day accounting for an additional violation, unless another penalty is provided for under the Second Class Township Code, and shall be required to then comply with this Part 1.
- (2) All fines collected for such violations shall be paid over to the Township.

Section 14. Liability.

Neither the approval nor the granting of any building permit, occupancy permit, floodplain permit, site plan review, subdivision approval, land development approval, zoning permit, erosion review, stormwater runoff review, steep slope review or any other review or permit of this Part 1, involving any land governed by the provisions of this Part 1, by an officer, consultant, employee or agency of the Township, shall constitute a representation, guarantee or warranty of any kind by the Township or its employees, consultants, officials or agencies of the practicality or safety of any structure, use, land development or subdivision; and shall create no liability upon, nor a cause of action against such public body, official, consultant nor employee for any damage that may result pursuant thereto.

ARTICLE II: Terminology

Section 15. Word usage.

- A. For the purpose of this Part 1, words and terms used herein shall be interpreted as listed in the Zoning Ordinance or the Subdivision and Land Development Ordinance of the Township of Weisenberg.
- B. If a word is not defined by this Part 1, but is defined by Article 2 of the Zoning Ordinance, as amended, the Zoning Article definition shall apply.
- C. If a word is not defined by this Part 1, but is defined by Article 2 of the Subdivision and Land Development Ordinance, the definition in the Subdivision and Land Development Article shall apply.
- D. The word "includes" shall mean to specifically include an item but not necessarily be limited to such items.
- E. Any word or term not defined in this Part 1 or the Zoning Ordinance, or the Subdivision and Land Development Ordinance, shall be used with a meaning of standard usage, within the context of the provision, as determined by the Administrator of this Part 1.

Section 16. Definitions.

When used this Part 1, the following words, terms and phrases shall have the following meaning, unless expressly stated otherwise or unless the context clearly indicates otherwise:

CHANNEL — The bed and banks of watercourses, which confine and convey the normal flow of the water, either continuously or intermittently.

CISTERN — A receptacle for collecting and holding rainwater for reuse for irrigation or drinking water.

CONSERVATION DISTRICT — The Lehigh County Conservation District.

CONVEYANCE SWALE — A natural or man-made drainage channel that has an upstream contributing area of 10 acres.

CULVERT — A pipe, conduit or similar structure, including appurtenant works, which carries stormwater.

DAM — Any artificial barrier, together with its appurtenant works, constructed for the purpose of impounding or storing water or any other fluid or semifluid or any refuse bank, fill or structure for highway, railroad or other purposes which does or may impound water or any other fluid or semifluid.

DESIGN STORM — The magnitude of precipitation from a storm event measured in probability of occurrence (such as a fifty-year storm) and duration (such as twenty-four- hour rainfall) and used in computing stormwater management systems.

DETENTION BASIN OR POND — A natural or man-made area in which stormwater is temporarily detained and from which said water is slowly released at a rate compatible with sound stormwater and soil management practices as approved by the Township Engineer. Unless otherwise stated, this term shall include a "retention basin."

DEVELOPER — A person, partnership, association, corporation or other entity, or any responsible person therein or agent thereof that undertakes any regulated activity of this Part 1.

DEVELOPMENT SITE — The specific tract of land for which a regulated activity is proposed.

DISTURBANCE — Any activity involving the clearing, excavating, storing, grading, filling or transporting of soil or any other activity which causes soil to be exposed to the danger of erosion.

DIVERSION — A channel with or without a supporting ridge on the lower side constructed to intercept and divert surface runoff.

DRAINAGE — The removal of surface water or groundwater from land by drains, grading or other means and includes control of runoff to minimize erosion and sedimentation during and after construction or development and means necessary for water supply preservation or prevention or alleviation of flooding.

DRAINAGE EASEMENT — A right granted by a landowner to the Township or other grantee allowing the use of an area of land for stormwater management.

DRAINAGE PLAN — The documentation of the proposed stormwater management controls, if any, to be used for a given development site.

EMBANKMENT — A man-made deposit of soil, rock or other material.

EROSION — The detachment and movement of soil or rock fragments by water, wind, ice and/or gravity.

EROSION AND SEDIMENT CONTROL PLAN — A plan which fully indicates necessary land treatment measures, including a schedule for the timing of their installation, which will effectively minimize soil erosion and sedimentation and which is acceptable to the County Conservation District.

EXCAVATION or CUT — An act by which soil or soils are cut into dug, quarried, uncovered, removed, displaced or relocated.

EXISTING GRADE — The vertical location of the existing ground surface prior to cutting or filling.

FINISHED GRADE — The final elevation of the ground surface conforming to the proposed design.

FREEBOARD — The incremental depth, provided as a safety factor of design, in a stormwater management structure above that required to convey the design runoff event.

GRADING — Any stripping, cutting, filling, stockpiling or any combination thereof and shall include the land in its cut or filled condition.

GROUND FLOOR — The first floor of a building other than a cellar or basement.

GROUNDWATER RECHARGE — The process of stormwater entering into the ground to replenish the underground water table.

HYDROLOGIC ENGINEERING CENTER – HYDROGRAPH MODELING SYSTEM (HEC-HMS) — The computer-based hydrologic modeling technique adapted to the Maiden Creek and Sacony Creek Watersheds for the Act 167 Plan. The model has been calibrated to reflect actual recorded flow values by adjusting key model input parameters.

IMPERVIOUS SURFACE — A surface which substantially prevents the percolation of water into the ground.

INFILTRATION STRUCTURE — A structure designed to direct runoff into the ground, e.g., trench drain, seepage pit, seepage trench.

LAND DEVELOPMENT —

A. The improvement of one or two or more contiguous lots, tracts or parcels of land for any purpose involving:

- (1) A group of two or more buildings; or,
- (2) The division or allocation of land or space 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.

B. A subdivision of land.

LOWEST FLOOR — Lowest floor of the enclosed area, including basement.

LVPC — Lehigh Valley Planning Commission.

MAINSTEM (MAIN CHANNEL) — Any stream segment or other conveyance facility used as a reach in the Jordan Creek, Little Lehigh Creek, Maiden Creek, or the Sacony Creek hydrologic model.

MANNING EQUATION — A method for calculation of velocity of flow (feet per second) and flow rate (cubic feet per second) in open channels based upon channel shape, roughness, depth of flow and slope. Open channels may include closed conduits, provided that the flow is not under pressure.

MULCHING — The application of plant or other suitable materials on the soil's surface to conserve moisture, hold soil in place and aid in establishing plant cover.

NATURAL GROUND SURFACE — The ground surface in its original state before any grading, excavating, or filling.

OBSTRUCTION — Any structure, materials, fill or activity that would impede, retard or change natural or approved stormwater flows.

PEAK DISCHARGE — The maximum rate of flow of stormwater runoff at a given location and time resulting from a specified storm event.

PENN STATE RUNOFF MODEL — The computer-based hydrologic modeling technique adapted to the Jordan Creek and Little Lehigh Creek Watersheds for the Act 167 Plan. The model has been calibrated to reflect actual recorded flow values by adjusting key model input parameters.

RATIONAL METHOD — A method of peak runoff calculation using a standardized runoff coefficient (rational 'c'), acreage of tract and rainfall intensity determined by return period and by the time necessary for the entire tract to contribute runoff. The rational method formula is stated as follows: $Q = ciA$, where "Q" is the calculated peak flow rate in cubic feet per second, "c" is the dimensionless runoff coefficient (see Appendix C), "i" is the rainfall intensity in inches per hour, and "A" is the area of the tract in acres.

REACH — Any of the 257 man-made runoff conveyance channels used for modeling purposes to connect the subareas (within the Jordan Creek, Little Lehigh Creek, Maiden Creek, and the Sacony Creek Watersheds) and transport flows, as described in the LVPC stormwater management plans.

REGULATED ACTIVITIES — Actions or proposed action which impact upon proper management of stormwater runoff and which are governed by this Part 1.

RELEASE RATE — The percentage of the predevelopment peak rate of runoff for a development site which the postdevelopment peak rate of runoff must be controlled to protect downstream areas.

RETENTION BASIN OR POND — A natural or man-made area in which stormwater is retained on a long-term basis.

RETURN PERIOD — The average interval in years over which an event of a given magnitude can be expected to recur. For example, the twenty-five-year return period rainfall or runoff event would be expected to recur on the average once every 25 years.

RUNOFF — That part of precipitation that flows over land.

SCS — The Soil Conservation Service of the U.S. Department of Agriculture.

SEDIMENTATION — The deposition of solid material (both mineral and organic) that has been transported from its site of origin by any means of erosion.

SEDIMENTATION BASIN — A barrier or dam built across a waterway or at other suitable locations to retain rock, sand, gravel, silt or other materials to prevent these materials from entering a creek, river, stream or lake.

SEEPAGE PIT/SEEPAGE TRENCH — An area of excavated earth filled with loose stone or similar material and into which surface water is directed for infiltration into the ground.

SEMIPERVIOUS — Uncompacted aggregate (e.g., sand, gravel, crushed stone, etc.), porous pavement and infiltration structures.

SOIL-COVER-COMPLEX METHOD — A method of runoff computation developed by SCS which is based upon relating soil type and land use/cover to a runoff parameter called a curve number.

START OF CONSTRUCTION — Includes substantial improvements and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction or improvements was within 180 days of the permit date. The actual start means the first placement of permanent construction of a structure (other than a mobile home) on a site such as the pouring of slabs or footings or any work beyond the stage of excavation.

STORAGE INDICATION METHOD — A reservoir routing procedure based on solution of the continuity equation (inflow minus outflow equals the change in storage for a given time interval) and based on outflow being a unique function of storage volume.

STORM SEWER — A system of pipes or other conduits that carries intercepted runoff but is not intended to carry sanitary sewer or industrial waste.

STORMWATER DETENTION — The holding or slowing down of stormwater runoff to limit the amounts of postdevelopment runoff (release date) to a required percentage of the predevelopment amounts of runoff during peak periods.

STORMWATER MANAGEMENT DISTRICT — Individual areas as they appear on the Jordan Creek, Little Lehigh Creek, Maiden Creek, and the Sacony Creek release rate maps. Each district is assigned an allowable release rate. (See "stormwater management district, general.")

STORMWATER MANAGEMENT DISTRICT, GENERAL — Areas of the Township not included in the Jordan Creek, Little Lehigh Creek, Maiden Creek, and the Sacony Creek Watersheds.

STORMWATER MANAGEMENT PLANS (LVPC) — The plans for managing stormwater runoff adopted by the Lehigh Valley Planning Commission for the Jordan Creek, Little Lehigh Creek, Maiden Creek, and the Sacony Creek Watersheds as required by the Act of October 4, 1978, P.L. 864, (Act 167), and known as the Stormwater Management Act.

STREAM — A watercourse.

SUBAREA — The smallest unit of watershed breakdown for hydrologic modeling purposes for which the runoff control criteria have been established in the LVPC stormwater management plans.

SUBDIVISION — The division or redivision of a lot, tract or parcel of land by any means into two or more lots, tracts or parcels or other divisions of land including changes in existing lot lines for the purpose, whether immediate or future, of lease, transfer of ownership or building or lot development.

SWALE — A low lying stretch of land which gathers or carries stormwater runoff.

TEMPORARY PROTECTION — Stabilization of erosive sediment producing materials.

TOWNSHIP — The Township of Weisenberg, County of Lehigh, in the Commonwealth of Pennsylvania.

VEGETATIVE PROTECTION — Stabilization of erosive or sediment producing areas, by establishing permanent long term vegetative growth cover, by seeding of the soil or planting sod.

WATERCOURSE — Any natural or artificial waterway, stream, river, creek, ditch, channel, millrace, canal, gully, ravine or wash in which water flows in a definite direction or course either continuously or intermittently and which has a definite channel and bed. This term shall include any area adjacent thereto subject to inundation by reason of overflow of floodwaters.

WATERSHED (JORDAN) — The area which contributes stormwater runoff to the Jordan Creek as it appears on the drawing entitled "Plate I, Jordan Creek Watershed Release Rate Map" (as prepared by the Lehigh Valley Planning Commission).

WATERSHED (LITTLE LEHIGH) — The area which contributes stormwater runoff to the Little Lehigh Creek as it appears on the drawing entitled "Plate I, Little Lehigh Creek Study Area Release Rate Map" (as prepared by the Lehigh Valley Planning Commission).

WATERSHED (MAIDEN) — The area which contributes stormwater runoff to the Maiden Creek as it appears on the drawing entitled "Plate I, Maiden Creek Watershed Release Map" (as prepared by the Joint Planning Commission).

WATERSHED (SACONY) — The area which contributes stormwater runoff to the Sacony Creek as it appears on the drawing entitled "Plate I, Sacony Creek Watershed" (as prepared by the Lehigh Valley Planning Commission).

ARTICLE III: Stormwater Controls

Section 17. General.

- A. See the provisions of Part 2 of this Ordinance for those portions of the Township that are within an Act 167 Stormwater Management Area. Stormwater management plans within an Act 167 Area must be consistent with the said Act 167. Areas not within an Act 167 Stormwater Management Area shall be subject to the same design requirements, except release rates, as listed in the Act 167 Ordinance.
- B. Velocity Control Measures. The Board of Supervisors, based upon the recommendations of the Township Engineer, may require specific sizes or types of stormwater velocity control measures based upon both the need to control the velocity and upon long-term maintenance concerns.
- C. Stormwater runoff from any subdivision or land development (including during construction and earthmoving) shall not occur at a peak rate (measured in cubic feet per second) that is greater after development than occurred prior to development.
- D. Runoff shall be controlled from a site using appropriate means of detention of water on the site and/or other approved types of stormwater management, within the requirements of this Ordinance
- E. Runoff that is detained shall be held and released at a pre determined controlled rate by appropriately installed devices. The release shall be in the same manner as the natural or predevelopment means of discharge from a site (such as point discharge or sheet flow.)
- F. Stormwater runoff shall not be increased or redirected in such a way that it results in hazards to persons or property or interferes with the normal movement of vehicles.
- G. All stormwater management methods are subject to approval by the Township Engineer, including all outlet locations.
- H. All lots shall be laid out and graded to prevent cross lot drainage, to provide positive drainage away from proposed building locations and any primary or alternate septic system locations. Stormwater shall also not be redirected towards buildings or on-lot septic systems off of the site.
- I. All stormwater management plans shall take into account and provide for existing flow from upstream areas within the entire watershed.
- J. The existing points of natural drainage discharge onto adjacent property shall not be altered to increase flows nor shall the concentration of water runoff be increased because of development without the written approval of all affected landowners.
- K. No stormwater runoff or watercourse shall be diverted in a way that overloads existing drainage systems, or creates flooding or the need for additional drainage structures on other private properties or public lands without Township approval of provisions to be made by the developer for properly handling such conditions, including water runoff impoundments, if necessary.

- L. An adequate storm sewer system consisting of inlets and underground drainage pipes with approved outlets shall be constructed where the runoff of stormwater and the prevention of erosion cannot be accomplished satisfactorily by surface drainage facilities, as determined by the Board of Supervisors, based upon recommendation of the Township Engineer. Such determination shall be based upon the expected velocity and depth of the stormwater flows (including depths in the street) and the proximity of dwellings
 - (1) Underground flows. Any diverted or affected underground water flows shall be properly dissipated or controlled to prevent velocities or concentrations that could harm a street or cause erosion within the right-of-way. Appropriate methods of control may include, but are not limited to: perforated pipe or other methods to slow the discharge of the water.
- M. Sequence of construction. No substantial grading shall occur and no building permits shall be issued for any building unless any detention basin, siltation basin or improved major swale approved to handle the resulting runoff is in place. Any detention basin shall be seeded and stabilized and have an installed outlet structure prior to the construction of any streets or buildings within that drainage basin.
- N. Phasing. The phasing of a development shall ensure that all stormwater facilities needed to manage runoff from a phase are in place and functioning adequately prior to and after the construction of buildings in that phase. This shall, for example, include the extension of the main outfall line, this may require the use of temporary structures, what shall be shown on submitted plans. If the development occurs in phases, the entire system shall be shown as part of the preliminary plan submission.

Section 18. Calculation of stormwater runoff.

- A. The methods and design storms shall be consistent with the Act 167 Ordinance and as indicated in Appendix C.
- B. The stormwater calculations shall include the following:
 - (1) Pre- and post-development drainage maps showing existing and proposed grades and including any off-site tributary area,
 - (2) Pre- and post-development runoff calculations,
 - (3) Detention basin design calculations (as applicable),
 - (4) Pipe and swale sizing calculations,
 - (5) Such information as the Township Engineer determines is needed to determine compliance with this Ordinance, including, but not limited to, slopes, proposed elevations, typical cross sections and details.
- C. Where crop farming or disturbed earth exists on the site prior to development, meadow in good condition shall be used as the starting base for the pre- development calculation.

Section 19. Design submission.

- A. Within the 100-year floodplain, any stormwater management structures and systems shall be designed to handle a 100-year storm.
- B. The stormwater management plan shall show that a 100-year storm can be safely conveyed without jeopardizing any principle building on or adjacent to the site.
- C. All plans showing the proposed storm drainage construction must be accompanied by a complete design stamped and signed by a PA Registered Engineer or Surveyor.

Section 20. Detention basins standards.

- A. Perforated Risers, staggered orifices, V notch wires, or other outlet structures as approved by the Township Engineer, may be required for outlet control.
- B. All detention basins shall be designed with an emergency spillway.
 - (1) All stormwater detention facilities shall provide a minimum 1.0 foot freeboard above the maximum pool elevation association with the 2- year through 25-year runoff events. An emergency spillway shall be designed to pass the 100-year runoff event with a minimum 0.5 foot freeboard.
 - (2) The downstream slope of the spillway shall as a minimum extend to the toe of the berm embankment. The edge of the basin grading shall be within the subject property.
 - (3) All detention basin outflow structures shall be designed with trash racks over the outflows.
- C. The minimum top width of a detention basin berm shall be 10 feet, unless the Township Engineer determines that a differing width is needed for maintenance and structural purposes.
- D. In order to provide proper drainage, a minimum grade of 1.5 percent, directed toward the outlet structure, shall be maintained across the basin floor.
- E. Slopes of Basin. The maximum inside slope of earth detention basin embankments shall be 5 horizontal to 1 vertical. The maximum outside slope shall be 5 to 1. The Board of Supervisors may permit a reduction of inside and outside slopes to a 3 to 1 maximum where the applicant proves that such slopes will be able to be properly and attractively maintained. The top or toe of any slope shall be located at a minimum of 5 feet from any property line. Whenever possible the side slopes and basin shape shall be amenable to the natural topography. Straight side slopes are prohibited. The maximum slope of an accessway for maintenance shall be 8 horizontal to 1 vertical where such accessway is required by the Board of Supervisors, based upon the recommendations of the Township Engineer.
- F. Where no existing point of concentration exists, the outfall from a detention basin shall not discharge closer than 30 feet from the adjoining property line, unless permission is given, in writing, by said adjacent property owner.

- G. Where discharge from the detention basin is to be spread into sheet flow, the allowable flow be determined by the predevelopment flow rate for a 2 year storm, across the length of the spreader.
- H. Antiseep collars and a cutoff trench shall be required on basins having a berm height exceeding 5 feet. Watertight antiseep collars shall be installed around the discharge pipe at intervals not to exceed 24 feet or as approved by the Township Engineer. Such collars shall extend a minimum of 2 feet beyond the outside of the pipe.
- I. Basins not having direct access to a public street shall have a 25 foot wide, usable access easement to a public street for the purpose of maintenance.
- J. The design engineer shall verify that the operation of the detention facility will not significantly increase downstream peaking conditions.
- K. For the purpose of the Section, a retention basin shall be required to meet the same standards as a detention basin.
- L. Landscaped Screening of Detention Basins.
 - (1) A detention basin with a basin depth of greater than 20 inches shall be screened from view of existing dwellings, a residential zoning district, or public streets, unless the basin would meet all of the following conditions:
 - (a) It would have an average slope of less than 5 to 1 on the inside of the berm of the basin,
 - (b) Either: a) both the inside and outside of the basin would be planted in grass and intended to be mowed or planted in other attractive vegetative ground cover or b) would be designed to closely resemble a natural pond, and
 - (c) The basin would not be surrounded by a primarily metal fence.
 - (2) Any required screening shall meet the "buffer yard" standards of the Township Zoning Ordinance, unless the Board of Supervisors approve an alternate landscaping arrangement that serves the same purposes. This landscaping shall not be required along an area where natural vegetation will be maintained that will completely fulfill this purpose.
 - (3) Thorny and prickly shrubs (that are also attractive) are encouraged to be used around detention basins to discourage entry by children.
- M. Areas of stormwater basins that are visible from streets and dwellings shall be attractively maintained.
- N. All outflow structures from storage facilities shall be equipped with a regulatory device that will permit modification to regulate the amount of outflow, Suitable anti-cortex and/or velocity retarders shall be used.
 - (1) Entrances to stormwater popes, including outflow popes in detention basins, shall have childproof gates or similar devices.
- O. Retention Basins. Aeration devices may be required, dependent upon the quality of the influent and detention time.

Section 21. Construction Standards.

- A. Standards. Construction and materials of storm drainage and control facilities (including pipes) and erosion control facilities shall be in accordance with the approved plans and any accompanying specifications. The construction details and standards of the following publications, or their successor publications, in their most recent revision shall be used:
 - (1) "County Erosion and Sedimentation Control Handbook."
 - (2) PennDOT, For 408, Specifications.
 - (3) PennDOT, RC Series, Roadway Construction Standards.
- B. Pipe Materials. All pipe materials shall meet PennDOT standards. Drainage pipes may be constructed out of corrugated metal, aluminized corrugated metal, corrugated polyethylene plastic, bituminous coated corrugated metal or reinforced concrete, or closely similar materials pre-approved by the Township Engineer. However, only reinforced concrete shall be used for drainage pipes under the structure of streets, unless a material with similar characteristics is determined to be acceptable by the Township Engineer.

Section 22. Drainage pipe, culvert and catch basin design.

- A. Open pipe ends must be fitted with concrete end walls, prefabricated end sections, rip-rap and/or energy dissipaters, as deemed appropriate by the Township Engineer.
- B. Drainage pipes shall have a minimum slope of 0.5 percent, and drainage swales not designed for stormwater detention shall have a minimum slope of 2 percent. As a minimum, the tops of all pipes should be at the same elevation when changing pipe sizes.
- C. Manholes or inlets be used at all changes in horizontal alignment, at changes of vertical grade and at all pipe intersections. No run of pipe shall exceed 400 feet in length, without appropriate measures to allow cleanout.
- D. Bridges and culverts shall meet PennDOT Construction Standards. DEP shall be contacted to determine if a dams and waterways permit is required.
- E. Appropriate safety grates shall be attached to all catch basins, stormwater inlets, pipe openings and other stormwater receiving structures, as needed. Along streets and pedestrian areas, bicycle safe grates shall be used as needed.
- F. Storm Sewer Outfall. Storm sewer outfall shall be designed, with respect to the elevation of the invert or other features, that when the receiving watercourse is within a 25-year storm, the storm sewer will continue to drain the area it is designed to serve.
- G. "V" shaped Swales shall not be permitted.

Section 23. Stormwater easements.

- A. Where a subdivision or development is traversed by a watercourse, drainageway, channel or stream that the Township Engineer determines is subject to significant stormwater flows, there shall be provided a drainage easement established along the following:
 - (1) The 100-year floodway, where that is defined;
 - (2) Where a 100-year floodway is not defined, the 100-year floodplain;
 - (3) Where a 100-year floodplain is not defined, a width shall be used that includes a minimum of 25 feet on each side of the top of the primary bank of the waterway.
- B. The drainage easements required by the above subsection are intended to preserve the unimpeded flow of natural drainage and to provide for future possible widening, deepening, relocating, improving or protecting of such drainage facilities. The Township Engineer may require up to a 0.5 foot freeboard and/or an additional 10 feet building setback if deemed necessary along newly constructed watercourses.
- C. If a major man-made drainage channel would pass within close proximity to homes and possibly threaten the safety of persons, the Board of Supervisors, based upon the advice of the Township engineer, may require such certain lengths of such channel to be placed within appropriate underground pipes.
- D. It shall be the responsibility of the applicant to obtain all stormwater easements on, over or through other properties that are needed to carry out the proposed storm management plan.

Section 24. Surface waters.

- A. All natural streams, channels, swales, drainage systems and/or areas of concentration of surface water shall be maintained in their existing condition unless alternation is approved by the township Engineer. The applicant shall be responsible to obtain all necessary DEP permits (see Chapter 105 of Title 25 of the State regulations).
- B. Creek Alignments. Any change to the alignment of a watercourse, or any blocking, impeding or redirecting of a watercourse shall only occur with written approval of DEP and the Township Engineer.

Section 25. Ownership and maintenance of stormwater facilities.

- A. A system for the ownership and maintenance responsibilities of all temporary and permanent stormwater facilities and erosion and sedimentation control facilities that is satisfactory to the Board of Supervisors shall be established prior to Final Plan approval including:
 - (1) Description of temporary and permanent maintenance requirements.
 - (2) Identification of responsible individual, corporation, association or other entity for ownership and maintenance of both temporary and permanent stormwater management and erosion and sedimentation control facilities.

- (3) Establishment of suitable easements for access to all facilities for maintenance.
- (4) The Township may, at the complete discretion of the Board of Supervisors, decide not to accept an offer by the applicant for Township ownership of stormwater facilities.
- (5) Stormwater facilities shall be designed to require minimal maintenance.
- (6) All storm drainage facilities shall be properly maintained by the party designated as responsible on the final subdivision plan, unless the Board of Supervisors agree to accept a change in the party responsible of the party owning the facility.

ARTICLE IV: Specific Requirements for the Jordan Creek, Little Lehigh Creek,
Maiden Creek and Sacony Creek Watersheds

Section 26. Applicability.

- A. This article shall only apply to those areas of the Township which are contained within the Jordan Creek, Little Lehigh Creek, Maiden Creek and/or the Sacony Creek drainage basins as delineated on the official maps available for inspection at the Township Building, and which are incorporated herein by reference.
- B. This article shall only apply to permanent stormwater management facilities constructed as part of the activities listed in this section. Stormwater management and erosion and sedimentation control during construction involved with any of these activities are specifically not regulated by this article.
- C. This article contains only those stormwater runoff control criteria and standards which are necessary or desirable from a total watershed perspective. Additional stormwater management design criteria (e.g., inlet spacing, inlet type, collection system details, etc.) are regulated by Article III of this Part 1.
 - (1) The following activities are defined as regulated activities and shall be regulated by this article, except those which meet the waiver specifications presented hereafter:
 - (a) Land development.
 - (b) Subdivision.
 - (c) Construction of new or additional impervious surfaces (driveways, parking lots, etc.).
 - (d) Construction of new buildings or additions to existing buildings.
 - (e) Diversions or piping of any natural or man-made stream channel.
 - (f) Installation of stormwater systems or appurtenances thereto.
 - (2) This article shall not apply to any development located entirely within the general stormwater management district.
 - (3) Any proposed regulated activity, except those defined in Subsection C(1)(e) and (f), which would add less than 5,000 square feet of additional impervious cover (provided that all additions of impervious cover on the development site within the five-year period preceding the application shall be included in determining the area of additional impervious cover) is exempt from meeting the provisions of this article. For development taking place in stages, the entire development plan shall be used in determining conformance with this criteria. Additional impervious cover shall include, but not be limited to, any roof, parking or driveway areas and any new streets and sidewalks constructed as part of or for the proposed regulated activity. Any areas which may be designed to initially be semipervious (e.g., uncompacted aggregate) shall be considered impervious areas for the purpose of waiver evaluation. No waiver shall be provided for regulated activities as defined in Subsection C(1)(e) and (f).

Section 27. Stormwater management districts.

- A. Mapping of stormwater management districts. The Township is hereby divided into stormwater management districts consistent with the Stormwater Management Release Rate Maps presented in Appendix A. The boundaries of the stormwater management districts are shown on an official map which is available for inspection at the Township Building.
- B. Description of stormwater management districts. Four types of stormwater management districts are applicable to the Township, namely Single Release Rate Districts, Provisional No Detention Districts, and Dual Release Rate Districts as described below.
 - (1) Single Release Rate Districts. There are five Single Release Rate Districts which differ in the extent to which postdevelopment runoff shall be controlled. The release rates and districts are 50%, 60%, 80%, 90% and 100%. Within a given district, the postdevelopment peak rate of stormwater runoff shall be controlled to the stated percentage of the predevelopment peak rate of stormwater runoff in order to protect downstream watershed areas.
 - (2) Provisional No Detention Districts. These watershed areas may discharge postdevelopment peak runoff without detention facilities without adversely affecting the total watershed peak flow. In certain instances, however, the "local" runoff conveyance facilities, which transport runoff from the site to the main channel, may not have adequate capacity to safely transport increased peak flows associated with not providing detention for a proposed development. In those instances, the developer shall either use 100% release rate control or provide increased capacity of downstream drainage elements to convey increased peak flows consistent with Section 28H. In determining if adequate capacity exists in the local watershed drainage network, the developer shall assume that the entire local watershed is developed per current zoning and that all new development would use the runoff controls specified in this Part 1. Similarly, any capacity improvement shall be designed to convey runoff from development of all areas tributary to the improvement consistent with the capacity criteria specified in Section 28H.
 - (3) Dual Release Rate Districts. The anticipated postdevelopment runoff from these areas can only be controlled across the range of return periods from two years through 100 years by implementing a dual system of release rates. Within this district, the two-year postdevelopment runoff shall be controlled to 30% of the predevelopment two-year runoff peak. Further, the ten-, twenty-five-, fifty-, and one-hundred-year postdevelopment runoff shall be controlled to the stated percentage of the predevelopment peak. Release rates associated with the ten-year through one-hundred-year events vary from 60% to 100% depending upon the location in the watersheds.

Section 28. Stormwater management district implementation provisions.

- A. The exact location of the stormwater management district boundaries as they apply to a given development site shall be determined by mapping the boundaries using the two-foot topographic contours provided as part of the drainage plan. The district boundaries as originally drawn coincide with the intersection of the watercourse and a physical feature (such as the confluence with another watercourse or a potential flow obstruction, e.g., culvert, bridge, etc.) to the topographic divide consistent with topography.

- B. Any downstream capacity analysis conducted in accordance with this Part 1 shall use the following criteria for determining adequacy for accepting increased peak flow rates:
- (1) Natural or man-made channels or swales shall be able to convey the increased runoff associated with a twenty-five-year and more frequent return period events within their banks at velocities consistent with protection of the channels from erosion. All conveyance swales shall be capable of conveying the one-hundred-year and more frequently occurring storms within their banks at velocities consistent with protection of the channels from erosion. Acceptable velocities shall be based upon criteria included in the DEP Soil Erosion and Sedimentation Control Manual (April 1990, or most recent edition).
 - (2) Culverts, bridges or any other facilities which must pass or convey flows from the tributary area shall have sufficient capacity to pass or convey the increased flows associated with the fifty-year-return period runoff event, except for facilities located within a designated floodplain area which shall be capable of passing or conveying the one-hundred-year-return period runoff. Any facilities which constitute stream enclosures per DEP Chapter 105 regulations shall be designed to convey the one-hundred-year-return period runoff.
- C. For a proposed development site located wholly within one release rate category area, the total runoff from the site shall meet the applicable release rate criteria. For development sites with multiple points of concentrated runoff discharge, individual drainage points may be designed for up to a 100% release rate so long as the total runoff from the site is controlled to the applicable release rate.
- D. For a proposed development site located within two or more release rate category areas, the maximum peak rate of runoff that may be discharged at any point shall be limited to the predevelopment peak rate of runoff at that point multiplied by the applicable release rate. The control rates shall apply regardless of any grading modifications which may change the drainage area which discharges at a given point.
- E. For the proposed development sites located partially within a release rate category area and partially within a provisional no detention area, a significant portion of the site area subject to the release rate control shall not be drained to the discharge point(s) located in the no detention area.
- F. No harm option. For any proposed development site located within the General Stormwater Management District, the developer has the option of using a less restrictive runoff control (including no detention) if the developer can prove that no harm would be caused by discharging at a higher runoff rate than that specified by this article. Proof of no harm would have to be shown from the development site through the remainder of the downstream drainage network to the confluences of Little Lehigh Creek with the Lehigh River and/or Maiden Creek with the Schuylkill River. Attempts to prove no harm based upon downstream peak flow versus capacity analysis shall be governed by the following provisions:
- (1) The peak flow values to be used for downstream areas for the design return period storms (two, 10, 25, and 100 years) shall be the values from the calibrated Penn State Runoff Model for the Jordan Creek and/or Little Lehigh Creek and/or Maiden Creek and/or the Sacony Creek Watersheds. These flow values will be supplied to the developer by the Township Engineer upon request.

- (2) The capacity of downstream conveyance facilities for increased peak flows shall be based upon the capacity criteria as specified in Subsection B.
 - (3) Any available capacity in the downstream conveyance system as documented by a developer may be used by the developer only in proportion to the development site acreage relative to the total upstream undeveloped acreage from the identified capacity (i.e., if the site area is 10% of the upstream undeveloped acreage, then up to 10% of the documented downstream available capacity may be used to convey additional runoff from the site.
 - (4) Developer proposed runoff controls which would generate increased peak flow rates at documented storm drainage problem areas shall, by definition, be precluded from successful attempts to prove no harm, except in conjunction with proposed capacity improvements for the problem areas consistent with Subsection H.
 - (5) Any no harm justifications shall be submitted by the developer as part of the drainage plan submission.
- G. Regional or subregional detention alternatives. For certain areas within the watershed, it may be more cost effective to provide one control facility for an entire subarea, group of subareas or portion of a subarea incorporating more than one development site than to provide an individual control facility for each development site. The initiative and funding for any regional or subregional runoff control alternatives are the responsibility of prospective developers. The design of any regional control basins shall incorporate reasonable development of the entire upstream watershed. The peak outflow of a regional basin would be determined on a case-by-case basis using the hydrologic model of the watershed consistent with protection of the downstream watershed areas. "Hydrologic model" refers to the calibrated applicable version of the Penn State Runoff Model as developed for the stormwater management plan (LVPC).
- H. Capacity improvements.
- (1) Any capacity improvements proposed to meet the requirements of this article shall be designed based upon the assumption of development of all areas tributary to the proposed improvement and the capacity criteria specified in Subsection B. In addition, all new development upstream of a proposed capacity improvement shall be assumed to implement the applicable runoff controls consistent with this article except that all new development within the entire subarea(s) within which the proposed development site is located shall be assumed to implement the developer's proposed discharge control, if any.
 - (2) Capacity improvements may also be provided as necessary to implement any regional or subregional detention alternatives or to implement a modified no harm option which proposes specific capacity improvements to document the validity of a less stringent discharge control which would not create any harm downstream.

PART 2

Jordan Creek, Little Lehigh Creek, Maiden Creek, and Sacony Creek Watersheds

ARTICLE V: General Provisions

Section 29. Short title.

This Part 2 shall be known and may be cited as the "Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watersheds Act 167 Stormwater Management Water Quality Ordinance."

Section 30. Findings.

The Board of Supervisors of the Township of Weisenberg, County of Lehigh, and Commonwealth of Pennsylvania finds that:

- A. Inadequate management of accelerated runoff of stormwater resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, changes the natural hydrologic patterns, destroys aquatic habitat, elevates aquatic pollutant concentrations and loadings, overtaxes the carrying capacity of streams and storm sewers, greatly increases the cost of public facilities to carry and control stormwater, undermines floodplain management and flood-control efforts in downstream communities, reduces groundwater recharge, and threatens public health and safety, and increases nonpoint source pollution of water resources.
- B. A comprehensive program of stormwater management (SWM), including reasonable regulation of development and activities causing accelerated erosion and loss of natural infiltration, is fundamental to the public health, safety and welfare and the protection of the people of the municipality and all of the people of the commonwealth, their resources and the environment.
- C. Stormwater can be an important resource by providing groundwater recharge for water supplies and baseflow of streams, which also protects and maintains surface water quality.
- D. Public education on the control of pollution from stormwater is an essential component in successfully addressing stormwater.
- E. Federal and state regulations require certain municipalities, including the Township of Weisenberg, 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).
- F. Nonstormwater discharges to municipal separate storm sewer systems can contribute to pollution of waters of the commonwealth by the municipality.
- G. Incorporate methods described in the Pennsylvania Stormwater Best Management Practices Manual (BMP Manual No. 363-0300-002 (December 2006), as amended and updated.). If methods other than green infrastructure and LID methods are proposed to achieve the volume and rate controls required under this Ordinance, the SWM Site Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable.

Section 31. Purpose.

The purpose of this Part 2 is to promote the public health, safety and welfare within the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watersheds by minimizing the damages and maximizing the benefits described in Section 30 of this Part 2 by provisions designed to:

- A. Manage stormwater runoff impacts at their source by regulating activities which cause such problems.
- B. Utilize and preserve the desirable existing natural drainage systems.
- C. Encourage infiltration of stormwater, where appropriate, to maintain groundwater recharge, to prevent degradation of surface and groundwater quality and to otherwise protect water resources.
- D. Maintain the existing flows and quality of streams and watercourses in the municipality and the commonwealth.
- E. Preserve and restore the flood-carrying capacity of streams.
- F. Provide for proper maintenance of all permanent stormwater management "Best Management Practices (BMPs)" that are implemented in the municipality.
- G. Provide review procedures and performance standards for stormwater planning, design and management.
- H. Manage stormwater impacts close to the runoff source which requires a minimum of structures and relies on natural processes.
- I. Meet legal water quality requirements under state law, including regulations at 25 Pa. Code § 93.4a to protect and maintain "existing uses" and maintain the level of water quality to support those uses in all streams and to protect and maintain water quality in "special protection" streams.
- J. Prevent scour and erosion of streambanks and streambeds.
- K. Provide standards to meet the NPDES permit requirements.

Section 32. Statutory authority.

The Township of Weisenberg is empowered to regulate these activities by the authority of the Pennsylvania Stormwater Management Act, Act of October 4, 1978, P.L. 864 (Act 167), as amended, 32 P.S. § 680.1 et seq., and the Second Class Township Code, Act of May 1, 1933, P.L. 103, No. 69 as amended.

Section 33. Applicability.

This Part 2 applies to those areas of the Township of Weisenberg which are located within the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watersheds as delineated on official maps available for inspection at the Weisenberg Township Municipal Building; provided, nevertheless, that all provisions of this Part 2 which are required to meet National Pollution Discharge Elimination System Phase II regulations issued by the United States Environmental Protection Agency, including municipal separate storm sewer system (MS4) requirements, shall apply to the entire municipal limits of the Township of Weisenberg. Maps

of the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watersheds at a reduced scale are included in Appendix A for general reference.

A. The following activities are defined as regulated activities and shall be governed by this Part 2:

- (1) Land development.
- (2) Subdivision.
- (3) Construction of new or additional impervious surfaces (driveways, parking lots, etc.).
- (4) Construction of new buildings or additions to existing buildings.
- (5) Diversion or piping of any natural or man-made stream channel.
- (6) Installation of stormwater systems or appurtenances thereto.
- (7) Regulated earth disturbance activities.
- (8) Other than that included in Section 33B(1) through (7), any Earth Disturbance Activities or any activities that involve the alteration or development of land in a manner that may affect stormwater runoff onto adjacent property.

Section 34. Exemptions.

A. Impervious cover. Any proposed regulated activity, except those defined in Section 33B(6) and (7), which would create 10,000 square feet or less of additional impervious cover is exempt from the drainage plan preparation provisions of this Part 2. All of the impervious cover added incrementally to a site above the initial 10,000 square feet shall be subject to the drainage plan preparation provisions of this Part 2. If a site has previously received an exemption and is proposing additional development such that the total impervious cover on the site exceeds 10,000 square feet, the total impervious cover on the site proposed since the original ordinance date must meet the provisions of this Part 2.

- (1) The following dates of the enactment by the Township of Weisenberg of amendments to the Weisenberg Township Stormwater Management Ordinance to implement the Stormwater Management Plans for the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watersheds as prepared by the Lehigh Valley Planning Commission shall be the starting point from which to consider tracts as "parent tracts" in which future subdivisions and respective impervious area computations shall be cumulatively considered:
 - (a) For the Jordan Creek Watershed; plan dated May 1992.
 - (b) For the Little Lehigh Watershed; plan dated March 1998.
 - (c) For the Maiden Creek Watershed; plan dated April 2010.
 - (d) For the Sacony Creek Watershed; plan dated April 2010.
- (2) For development taking place in stages, the entire development plan must be used in determining conformance with these criteria.

- (3) Additional impervious cover shall include, but not be limited to, additional indoor living spaces, decks, patios, garages, driveways, storage sheds and similar structures, any roof, parking or driveway areas and any new streets and sidewalks constructed as part of or for the proposed regulated activity.
 - (4) Any additional areas proposed to initially be gravel, crushed stone, porous pavement, etc., shall be assumed to be impervious for the purposes of comparison to the exemption criteria. Any existing gravel, crushed stone or hard-packed soil areas on a site shall be considered as pervious cover for the purpose of exemption evaluation.
- B. Prior drainage plan approval. Any regulated activity for which a drainage plan was previously prepared as part of a subdivision or land development proposal that received preliminary plan approval from the municipality prior to the effective date of this Part 2 is exempt from the drainage plan preparation provisions of this Part 2, except as cited in Subsection C, provided that the approved drainage plan included design of stormwater facilities to control runoff from the site currently proposed for regulated activities consistent with ordinance provisions in effect at the time of approval and the approval has not lapsed under the Municipalities Planning Code. If significant revisions are made to the drainage plan after both the preliminary plan approval and the effective date of this Part 2, preparation of a new drainage plan, subject to the provisions of this Part 2, shall be required. Significant revisions would include a change in control methods or techniques, relocation or redesign of control measures or changes necessary because soil or other conditions are not as stated on the original drainage plan.
- C. Activities associated with Section 33B(8) shall be exempt from the Drainage Plan preparation requirements of the Ordinance unless the municipality determines that the activity could create a new or relocated concentrated drainage discharge. Agricultural plowing and tilling as may be covered by Section 33B(8) are exempt from the Drainage Plan provisions of this ordinance.
- D. These exemptions shall not relieve the applicant from implementing such measures as are necessary to protect health, safety, property, and state water quality requirements. These measures include adequate and safe conveyance of stormwater on the site and as it leaves the site. These exemptions do not relieve the applicant from the responsibility to secure required permits or approvals for activities regulated by any other applicable code, rule, act or ordinance.
- E. No exemptions shall be provided for regulated activities as defined in Section 33B(5) and (6).
- F. Agricultural activity is exempt from the rate control and Drainage Plan preparation requirements of this Ordinance provided that activities are performed according to the requirements of 25 Pa. Code 102.
- G. Forest management and timber operations are exempt from the rate control and Drainage Plan preparation requirements of this Ordinance provided the activities are performed according to the requirements of 25 Pa. Code 102.
- H. The municipality may deny or revoke any exemption pursuant to this Section at any time for any project that the municipality believes may pose a threat to public health, safety, property or the environment.

Section 35. Relationship to Stormwater Management Ordinance.

The Weisenberg Township Stormwater Management Ordinance, Part 1, Stormwater Control, of this Chapter, is not repealed by this Part 2. This Part 2, and the Weisenberg Township Stormwater Management Ordinance (Part 1 of this chapter), are intended to be and shall be read in Pari Materia and construed together, if possible, as one ordinance so that effect may be given to both. If there exists an irreconcilable conflict between a provision of this Part 2 and the Weisenberg Township Stormwater Management Ordinance (Part 1 of this chapter), effect shall be given to that provision which imposes the greater stormwater management and control, and protection of water quality, as determined by the Township Engineer.

Section 36. Compatibility with other ordinance requirements.

Approvals issued pursuant to this Part 2 do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other applicable code, rule, act or ordinance.

Section 37. Duty of persons engaged in land development.

Notwithstanding any provisions of this Part 2, including exemption and waiver provisions, any landowner and any person engaged in the alteration or development of land which may affect stormwater runoff characteristics shall implement such measures as are reasonably necessary to prevent injury to health, safety or other property. Such measures shall include such actions as are required to manage the rate, volume, direction and quality of resulting stormwater runoff in a manner which otherwise adequately protects health and property from possible injury.

Section 38. Repealer.

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

Section 39. Erroneous Permit.

Any permit or authorization issued or approved based on false, misleading or erroneous information provided by an applicant is void without the necessity of any proceedings for revocation. Any work undertaken or use established pursuant to such permit or other authorization is unlawful. No action may be taken by a board, agency or employee of the Township purporting to validate such a violation.

ARTICLE VI: Terminology

Section 40. Definitions and word usage.

For the purposes of this Part 2, 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.
- D. As used in this Part 2, the following terms shall have the meanings indicated:

ACCELERATED EROSION — The removal of the surface of the land through the combined action of human activities and natural processes, at a rate greater than would occur because of the natural processes alone.

BEST MANAGEMENT PRACTICE (BMP) — Activities, facilities, measures or procedures used to manage stormwater quantity and quality impacts from the regulated activities listed in Section 33, to meet state water quality requirements, to promote groundwater recharge and to otherwise meet the purposes of this Part 2.

BEST MANAGEMENT PRACTICE OPERATIONS AND MAINTENANCE

PLAN — Documentation, included as part of a drainage plan, detailing the proposed BMPs, how they will be operated and maintained and who will be responsible.

BIORETENTION — Densely vegetated, depressed features that store stormwater and filter it through vegetation, mulch, planting soil, etc. Ultimately stormwater is evapotranspired, infiltrated, or discharged. Optimal bioretention areas mimic natural forest ecosystems in terms of species diversity, density, distribution, use of native plants, etc.

BUFFER —

- (1) **STREAMSIDE BUFFER** — A zone of variable width located along a stream that is vegetated and is designed to filter pollutants from runoff.
- (2) **SPECIAL GEOLOGIC FEATURE BUFFER** — A required isolation distance from a special geologic feature to a proposed BMP needed to reduce the risk of sinkhole formation due to stormwater management activities.

CAPTURE/REUSE — Stormwater management techniques such as cisterns and rain barrels which direct runoff into storage devices, surface or subsurface, for later reuse, such as for irrigation of gardens and other planted areas. Because this stormwater is utilized and no pollutant discharge results, water quality performance is superior to other noninfiltration BMPs.

CARBONATE BEDROCK — Rock consisting chiefly of carbonate minerals, such as limestone and dolomite; specifically a sedimentary rock composed of more than 50% by weight of carbonate minerals that underlies soil or other unconsolidated, superficial material.

CISTERN — An underground reservoir or tank for storing rainwater.

CLOSED DEPRESSION — A distinctive bowl-shaped depression in the land surface. It is characterized by internal drainage, varying magnitude, and an unbroken ground surface.

CONCENTRATED DRAINAGE DISCHARGE — Stormwater runoff leaving a property via a point source.

CONSERVATION DISTRICT — The Lehigh County Conservation District.

CONSTRUCTED WETLANDS — Constructed wetlands are similar to wet ponds (see below) and consist of a basin which provides for necessary stormwater storage as well as a permanent pool or water level, planted with wetland vegetation. To be successful, constructed wetlands must have adequate natural hydrology (both runoff inputs as well as soils and water table which allow for maintenance of a permanent pool of water). In these cases, the permanent pool must be designed carefully, usually with shallow edge benches, so that water levels are appropriate to support carefully selected wetland vegetation.

CULVERT — A pipe, conduit or similar structure including appurtenant works which carries surface water.

DAM — An artificial barrier, together with its appurtenant works, constructed for the purpose of impounding or storing water or another fluid or semifluid or a refuse bank, fill or structure for highway, railroad or other purposes which does or may impound water or another fluid or semifluid.

DEP — The Pennsylvania Department of Environmental Protection.

DESIGN STORM — The depth and time distribution of precipitation from a storm event measured in probability of occurrence (e.g., one-hundred-year storm) and duration (e.g., twenty-four-hour) and used in computing stormwater management control systems.

DETENTION BASIN — A basin designed to retard stormwater runoff by temporarily storing the runoff and releasing it at the appropriate release rate.

DEVELOPER — A person, partnership, association, corporation or other entity, or any responsible person therein or agent thereof, that undertakes any regulated activity of this Part 2.

DEVELOPMENT SITE (SITE) — The specific tract of land for which a regulated activity is proposed.

DIFFUSED DRAINAGE — See "sheet flow."

DIRECT RECHARGE (D-RE) BMP — A BMP which directs runoff to an underground infiltration surface. Examples include infiltration trenches, seepage beds, and drywells such as that nearly all runoff becomes recharge to groundwater.

DRAINAGE EASEMENT — A right granted by a landowner to a grantee, allowing the use of private land for stormwater management purposes.

DRAINAGE PLAN — The documentation of the proposed stormwater quantity and quality management controls to be used for a given development site, including a BMP operations and maintenance plan, the contents of which are established in Section 52.

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 removal of soil particles by the action of water, wind, ice, or other geological agents.

EXISTING USES — Those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards. (25 Pa. Code § 93.1)

FILL — Man-made deposits of natural soils or rock products and waste materials.

FILTER STRIPS — See "vegetated buffers."

FREEBOARD — The incremental depth in a stormwater management structure, provided as a safety factor of design, above that required to convey the design runoff event.

GREEN INFRASTRUCTURE — Systems and practices that use or mimic natural processes to infiltrate, evapotranspire, or reuse stormwater on the site where it is generated.

GROUNDWATER RECHARGE — Replenishment of existing natural underground water supplies.

HARDSHIP WAIVER REQUEST — A written request for a waiver alleging that the provisions of this Part 2 inflict unnecessary hardship upon the applicant. A hardship waiver does not apply to and is not available from the water quality provisions of this Part 2 and should not be granted.

HYDROLOGIC ENGINEERING CENTER – HYDROLOGIC MODELING SYSTEM (HEC-HMS) — The computer-based hydrologic modeling technique developed by the U.S. Army Corps of Engineers and adapted to the Sacony Creek Headwaters for the Act 167 Plan. The model was "calibrated" to reflect actual flow values by adjusting key model input parameters.

HOT SPOT LAND USES — A land use or activity that generates higher concentrations of hydrocarbons, trace metals or other toxic substances than typically found in stormwater runoff. These land uses are listed in Section 45A(19).

HYDROLOGIC SOIL GROUP (HSG) — Soils are classified into four HSGs (A, B, C and D) to indicate the minimum infiltration rates, which are obtained for bare soil after prolonged wetting. The Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture 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 permeable as the HSG varies from A to D.

IMPERVIOUS SURFACE (IMPERVIOUS COVER) — A surface which prevents the percolation of water into the ground.

INFILTRATION PRACTICE — A practice designed to direct runoff into the ground, e.g., French drain, seepage pit, seepage trench or bioretention area.

KARST — A type of topography or landscape characterized by depressions, sinkholes, limestone towers and steep-sided hills, underground drainage and caves. Karst is usually formed on carbonate rocks, such as limestones or dolomites and sometimes gypsum.

LAND DEVELOPMENT — Any of the following activities:

- (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 Planning Code.

LOADING RATE — The ratio of the land area draining to the system, as modified by the weighting factors in Section 49B, compared to the base area of the infiltration system.

LOCAL RUNOFF CONVEYANCE FACILITIES — Any natural channel or man-made conveyance system which has the purpose of transporting runoff from the site to the mainstem.

LOW IMPACT DEVELOPMENT — A development approach that promotes practices that will minimize postdevelopment runoff rates and volumes thereby minimizing needs for artificial conveyance and storage facilities. Site design practices include preserving natural drainage features, minimizing impervious surface area, reducing the hydraulic connectivity of impervious surfaces and protecting natural depression storage.

MAINSTEM (MAIN CHANNEL) — Any stream segment or other conveyance used as a reach in the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek hydrologic models, as applicable.

MANNING EQUATION (MANNING FORMULA) — A method for calculation of velocity of flow (e.g., feet per second) and flow rate (e.g., cubic feet per second) in open channels based upon channel shape, roughness, depth of flow and slope. "Open channels" may include closed conduits so long as the flow is not under pressure.

MARYLAND STORMWATER DESIGN MANUAL — A stormwater design manual written by the Maryland Department of the Environment and the Center for Watershed Protection. As of January 2004, the manual can be obtained through the following Web site: www.mde.state.md.us.

MINIMUM DISTURBANCE/MINIMUM MAINTENANCE PRACTICES (MD/MM) — Site design practices in which careful limits are placed on site clearance prior to development allowing for maximum retention of existing vegetation (woodlands and other), minimum disturbance and compaction of existing soil mantle and minimum site application of chemicals postdevelopment. Typically, MD/MM includes disturbance setback criteria from buildings as well as related site improvements such as walkways, driveways, roadways, and any other improvements. These criteria may vary by community context as well as by type of development being proposed. Additionally, MD/MM also shall include provisions (e.g., deed restrictions, conservation easements) to protect these areas from future disturbance and from application of fertilizers, pesticides, and herbicides.

MUNICIPALITY — The Township of Weisenberg, Lehigh County, Pennsylvania.

NO HARM OPTION — The option of using a less restrictive runoff quantity control if it can be shown that adequate and safe runoff conveyance exists and that the less restrictive control would not adversely affect health, safety and property.

NPDES — National Pollutant Discharge Elimination System.

NRCS — Natural Resources Conservation Service, U.S. Department of Agriculture. (Formerly the Soil Conservation Service.)

OIL/WATER SEPARATOR — A structural mechanism designed to remove free oil and grease (and possibly solids) from stormwater runoff.

OUTFALL — "Point source" as described in 40 CFR 122.2 at the point where the municipality's storm sewer system discharges to surface waters of the commonwealth.

OWNER — One with an interest in and often dominion over a property.

PEAK DISCHARGE — The maximum rate of flow of stormwater runoff at a given location and time resulting from a specified storm event.

PENN STATE RUNOFF MODEL (PSRM) — The computer-based hydrologic modeling technique adapted to each watershed for the Act 167 Plans. The model was calibrated to reflect actual flow values by adjusting key model input parameters.

PERSON — An individual, partnership, public or private association or corporation, firm, trust, estate, municipality, governmental unit, public utility or any other legal entity whatsoever which is recognized by law as the subject of rights and duties.

POINT SOURCE — Any discernible, confined and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel or conduit from which stormwater is or may be discharged, as defined in state regulations at 25 Pa. Code § 92.1.

PRELIMINARY SITE INVESTIGATION — The determination of the depth to bedrock, the depth to the seasonal high water table and the soil permeability for a possible infiltration location on a site through the use of published data and on-site surveys. In carbonate bedrock areas, the location of special geologic features must also be determined along with the associated buffer distance to the possible infiltration area. See Appendix G.

PRETREATMENT — Measures implemented for Hot Spot Land Uses designed to reduce the concentration of hydrocarbons, trace metals, and other toxic substances to levels typically found in stormwater runoff.

PUBLIC WATER SUPPLIER — A person who owns or operates a public water system.

PUBLIC WATER SYSTEM — A system which provides water to the public for human consumption which has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. (See 25 Pa. Code Chapter 109.)

QUALIFIED GEOTECHNICAL PROFESSIONAL — A licensed professional geologist or a licensed professional engineer who has a background or expertise in geology or hydrogeology.

RATIONAL METHOD — A method of peak runoff calculation using a standardized runoff coefficient (rational 'c'), acreage of tract and rainfall intensity determined by return period and by the time necessary for the entire tract to contribute runoff. The rational method formula is stated as follows: $Q = ciA$, where "Q" is the calculated peak flow rate in cubic feet per second, "c" is the dimensionless runoff coefficient (see Appendix C), "i" is the rainfall intensity in inches per hour, and "A" is the area of the tract in acres.

REACH — Any of the natural or man-made runoff conveyance channels used for watershed runoff modeling purposes to connect the subareas and transport flows downstream.

RECHARGE VOLUME (REv) — The portion of the water quality volume (WQv) used to maintain groundwater recharge rates at development sites. (See Section 45A(13).)

REGULATED ACTIVITIES — Actions or proposed actions which impact upon proper management of stormwater runoff and which are governed by this Part 2 as specified in Section 33.

REGULATED EARTH DISTURBANCE ACTIVITIES — Earth disturbance activity other than agricultural plowing or tilling of one acre or more with a point source discharge to surface waters or to the municipality's storm sewer system or earth disturbance activity of five acres or more regardless of the planned runoff. This includes earth disturbance on any portion of, part or during any stage of a larger common plan of development.

RELEASE RATE — The percentage of the predevelopment peak rate of runoff for a development site to which the postdevelopment peak rate of runoff must be controlled to avoid peak flow increases throughout the watershed.

RETURN PERIOD — The average interval in years over which an event of a given magnitude can be expected to recur. For example, the twenty-five-year return period rainfall or runoff event would be expected to recur on the average once every 25 years.

ROAD MAINTENANCE — Earth disturbance activities within the existing road cross section such as grading and repairing existing unpaved road surfaces, cutting road banks, cleaning or clearing drainage ditches and other similar activities.

RUNOFF — That part of precipitation which flows over the land.

SEDIMENT TRAPS/CATCH BASIN SUMPS — Chambers which provide storage below the outlet in a storm inlet to collect sediment, debris and associated pollutants, typically requiring periodic clean out.

SEEPAGE PIT/SEEPAGE TRENCH — An area of excavated earth filled with loose stone or similar material and into which surface water is directed for infiltration into the ground.

SEPARATE STORM SEWER SYSTEM — A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) primarily used for collecting and conveying stormwater runoff.

SHEET FLOW — Stormwater runoff flowing in a thin layer over the ground surface.

SOIL-COVER-COMPLEX METHOD — A method of runoff computation developed by NRCS which is based upon relating soil type and land use/cover to a runoff parameter called a "curve number."

SPECIAL GEOLOGIC FEATURES — Carbonate bedrock features, including but not limited to closed depressions, existing sinkholes, fracture traces, lineaments, joints, faults, caves, pinnacles and geologic contacts between carbonate and noncarbonate bedrock which may exist and must be identified on a site when stormwater management BMPs are being considered.

SPILL PREVENTION AND RESPONSE PROGRAM — A program that identifies procedures for preventing and, as needed, cleaning up potential spills and makes such procedures known and the necessary equipment available to appropriate personnel.

STATE WATER QUALITY REQUIREMENTS — As defined under state regulations — protection of designated and existing uses (See 25 Pa. Code Chapters 93 and 96) — including:

- (1) Each stream segment in Pennsylvania has a "designated use," such as "cold water fishes" or "potable water supply," which is listed in Chapter 93. These uses must be protected and maintained, under state regulations.
- (2) "Existing uses" are those attained as of November 1975, regardless whether they have been designated in Chapter 93. Regulated earth disturbance activities must be designed to protect and maintain existing uses and maintain the level of water quality necessary to protect those uses in all streams, and to protect and maintain water quality in special protection streams.

- (3) Water quality involves the chemical, biological and physical characteristics of surface water bodies. After regulated earth disturbance activities are complete, these characteristics can be impacted by addition of pollutants such as sediment, and changes in habitat through increased flow volumes and/or rates as a result of changes in land surface area from those activities. Therefore, permanent discharges to surface waters must be managed to protect the stream bank, streambed and structural integrity of the waterway, to prevent these impacts.

STORAGE INDICATION METHOD — A method of routing or moving an inflow hydrograph through a reservoir or detention structure. The method solves the mass conservation equation to determine an outflow hydrograph as it leaves the storage facility.

STORM DRAINAGE PROBLEM AREAS — Areas which lack adequate stormwater collection and/or conveyance facilities and which present a hazard to persons or property. These areas are identified by the municipality or Municipal Engineer.

STORM SEWER — A system of pipes or other conduits which carries intercepted surface runoff, street water and other wash waters, or drainage, but excludes domestic sewage and industrial wastes.

STORMWATER — The surface runoff generated by precipitation reaching the ground surface.

STORMWATER FILTERS — Any number of structural mechanisms such as multichamber catch basins, sand/peat filters, sand filters, and so forth which are installed to intercept stormwater flow and remove pollutants prior to discharge. Typically, these systems require periodic maintenance and cleanout.

STORMWATER MANAGEMENT PLAN — The plan for managing stormwater runoff adopted by the Lehigh Valley Planning Commission for the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watersheds, as applicable, as required by the Pennsylvania Stormwater Management Act, Act of October 4, 1978, P.L. 864 (Act 167), as amended, 32 P.S. § 680.1 et seq.

STREAM — A watercourse.

SUBAREA — The smallest unit of watershed breakdown for hydrologic modeling purposes for which the runoff control criteria have been established in the stormwater management plan.

SUBDIVISION — The division or redivision of a lot, tract or parcel of land by any means into two or more lots, tracts, parcels or other divisions of land including changes in existing lot lines for the purpose, whether immediate or future, of lease, partition by the court for distribution to heirs or devisees, transfer of ownership or building or lot development; provided, however, that the subdivision by lease of land for agricultural purposes into parcels of more than 10 acres, not involving any new street or easement of access or any residential dwelling, shall be exempted.

SURFACE WATERS OF THE 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 water, or parts thereof, whether natural or artificial, within or on the boundaries of this commonwealth.

SWALE — A low-lying stretch of land which gathers or carries surface water runoff. See also "vegetated swales."

TECHNICAL BEST MANAGEMENT PRACTICE MANUAL AND INFILTRATION FEASIBILITY REPORT, NOVEMBER 2002 — The report written by Cahill Associates that addresses the feasibility of infiltration in carbonate bedrock areas in the Little Lehigh Creek Watershed. The report is available at the Lehigh Valley Planning Commission offices.

TRASH/DEBRIS COLLECTORS — Racks, screens or other similar devices installed in a storm drainage system to capture coarse pollutants (trash, leaves, etc.).

VEGETATED BUFFERS — Gently sloping areas that convey stormwater as sheet flow over a broad, densely vegetated earthen area, possibly coupled with the use of level spreading devices. Vegetated buffers should be situated on minimally disturbed soils, have low-flow velocities and extended residence times.

VEGETATED ROOFS — Vegetated systems installed on roofs that generally consist of a waterproof layer, a root-barrier, drainage layer (optional), growth media, and suitable vegetation. Vegetated roofs store and eventually evapotranspire the collected rooftop rainfall; overflows may be provided for larger storms.

VEGETATED SWALES —

- (1) Vegetated earthen channels designed to convey stormwater. These swales are not considered to be water quality BMPs.
- (2) Broad, shallow, densely vegetated, earthen channels designed to treat stormwater while slowly infiltrating, evapotranspiring, and conveying it. Swales should be gently sloping with low-flow velocities to prevent erosion. Check dams may be added to enhance performance.

WATERCOURSE — Any channel of conveyance of surface water having defined bed and banks, whether natural or artificial, with perennial or intermittent flow.

WATER QUALITY INSERTS — Any number of commercially available devices that are inserted into storm inlets to capture sediment, oil, grease, metals, trash, debris, etc.

WATER QUALITY VOLUME (WQv) — The volume needed to capture and treat 90% of the average annual rainfall volume. (See Section 45.)

WATERSHED — The entire region or area drained by a river or other body of water, whether natural or artificial.

WET DETENTION PONDS — Basins that provide for necessary stormwater storage as well as a permanent pool of water. To be successful, wet ponds must have adequate natural hydrology (both runoff inputs as well as soils and water table which allow for maintenance of a permanent pool of water) and must be able to support a healthy aquatic community so as to avoid creation of mosquito and other health and nuisance problems.

ARTICLE VII: Stormwater Management Requirements

Section 41. Riparian Buffers.

- A. In order to protect and improve water quality, a Riparian Buffer Easement shall be created and recorded as part of any subdivision or land development that encompasses a Riparian Buffer.
- B. Except as required by Chapter 8-201, the Riparian Buffer Easement shall be measured to be the greater of the limit of the 100 year floodplain or a minimum of 35 feet from the top of the streambank (on each side).
- C. Minimum Management Requirements for Riparian Buffers.
 - (1) Existing native vegetation shall be protected and maintained within the Riparian Buffer Easement.
 - (2) Whenever practicable invasive vegetation shall be actively removed and the Riparian Buffer Easement shall be planted with native trees, shrubs and other vegetation to create a diverse native plant community appropriate to the intended ecological context of the site.
- D. The Riparian Buffer Easement shall be enforceable by the municipality and shall be recorded in the appropriate County Recorder of Deeds Office, so that it shall run with the land and shall limit the use of the property located therein. The easement shall allow for the continued private ownership and shall count toward the minimum lot area required by Zoning, unless otherwise specified in the Zoning Ordinance.
- E. Any permitted use within the Riparian Buffer Easement shall be conducted in a manner that will maintain the extent of the existing 100-year floodplain, improve or maintain the stream stability, and preserve and protect the ecological function of the floodplain.
- F. The following conditions shall apply when public and/or private recreation trails are permitted within Riparian Buffers:
 - (1) Trails shall be for non-motorized use only.
 - (2) Trails shall be designed to have the least impact on native plant species and other sensitive environmental features.
- G. Septic drainfields and sewage disposal systems shall not be permitted within the Riparian Buffer Easement and shall comply with setback requirements established under 25 Pa. Code Chapter 73.

Section 42. General requirements.

- A. All regulated activities in the municipality shall be subject to the stormwater management requirements of this Part 2.
- B. Storm drainage systems shall be provided to permit unobstructed flow in natural watercourses except as modified by stormwater detention facilities, recharge facilities, water quality facilities, pipe systems or open channels consistent with this Part 2.
- C. The existing locations of concentrated drainage discharge onto adjacent property shall not be altered without written approval of the affected property owner(s).

- D. Areas of existing diffused drainage discharge onto adjacent property shall be managed such that, at minimum, the peak diffused flow does not increase in the general direction of discharge, except as otherwise provided in this Part 2. If diffused flow is proposed to be concentrated and discharged onto adjacent property, the developer must document that there are adequate downstream conveyance facilities to safely transport the concentrated discharge to the point of predevelopment flow concentration, to the stream reach or otherwise prove that no harm will result from the concentrated discharge. Areas of existing diffused drainage discharge shall be subject to any applicable release rate criteria in the general direction of existing discharge whether they are proposed to be concentrated or maintained as diffused drainage areas.
- E. Where a site is traversed by watercourses other than those for which a one-hundred- year floodplain is defined by the municipality, there shall be provided drainage easements conforming substantially with the line of such watercourses. The width of any easement shall be adequate to provide for unobstructed flow of storm runoff based on calculations made in conformance with Section 49 for the one-hundred-year return period runoff and to provide a freeboard allowance of 0.5 foot above the design water surface level. The terms of the easement shall prohibit excavation, the placing of fill or structures, and any alterations which may adversely affect the flow of stormwater within any portion of the easement. Also, periodic maintenance of the easement to ensure proper runoff conveyance shall be required. Watercourses for which the one-hundred-year floodplain is formally defined are subject to the applicable municipal floodplain regulations.
- F. When it can be shown that, due to topographic conditions, natural drainage swales on the site cannot adequately provide for drainage, open channels may be constructed conforming substantially to the line and grade of such natural drainage swales. Capacities of open channels shall be calculated using the Manning Equation.
- G. Post-construction BMPs shall be designed, installed, operated and maintained to meet the requirements of the Clean Streams Law and implementing regulations, including the established practices in 25 Pa. Code Chapter 102 and the specifications of this Part 2 as to prevent accelerated erosion in watercourse channels and at all points of discharge.
- H. No earth disturbance activities associated with any regulated activities shall commence until approval by the municipality of a plan which demonstrates compliance with the requirements of this Part 2.
- I. Techniques described in Appendix F (Low Impact Development) of this Part 2 are encouraged because they reduce the costs of complying with the requirements of this Part 2 and the state water quality requirements.
- J. Green infrastructure practices provided in the BMP Manual 4 shall be utilized for all regulated activities wherever possible.
- K. Infiltration for stormwater management is encouraged where soils and geology permit, consistent with the provisions of this Part 2 and, where appropriate, the Recommendation Chart for Infiltration Stormwater Management BMPs in Carbonate Bedrock in Appendix D.

Section 43. Permit requirements by other government entities.

The following permit requirements apply to certain regulated and earth disturbance activities and must be met prior to commencement of regulated and earth disturbance activities, as applicable:

- A. All regulated and earth disturbance activities subject to permit requirements by DEP under regulations at 25 Pa. Code Chapter 102.
- B. Work within natural drainageways subject to permit by DEP under 25 Pa. Code Chapters 102 and 105.
- C. Any stormwater management facility that would be located in or adjacent to surface waters of the commonwealth, including wetlands, subject to permit by DEP under 25 Pa. Code Chapter 105.
- D. Any stormwater management facility that would be located on a state highway right-of-way or require access from a state highway shall be subject to approval by the Pennsylvania Department of Transportation (PennDOT).
- E. Culverts, bridges, storm sewers or any other facilities which must pass or convey flows from the tributary area and any facility which may constitute a dam subject to permit by DEP under 25 Pa. Code Chapter 105.

Section 44. Erosion and sediment control during regulated earth disturbance activities.

- A. No regulated earth disturbance activities within the municipality shall commence until approval by the municipality of an erosion and sediment control plan for construction activities. Written approval by DEP or a delegated County Conservation District shall satisfy this requirement.
- B. An erosion and sediment control plan is required by DEP regulations for any earth disturbance activity of 5,000 square feet or more under Pa. Code § 102.4(b).
- C. A DEP NPDES stormwater discharges associated with construction activities permit is required for regulated earth disturbance activities under Pa. Code Chapter 92.
- D. Evidence of any necessary permit(s) for regulated earth disturbance activities from the appropriate DEP regional office or County Conservation District must be provided to the municipality before the commencement of an earth disturbance activity.
- E. A copy of the erosion and sediment control plan and any permit, as required by DEP regulations, shall be available at the project site at all times.

Section 45. Post-construction water quality criteria.

- A. Post-construction water quality criteria for Jordan Creek and Little Lehigh Creek Watersheds are as follows:
 - (1) No regulated earth disturbance activities within the municipality shall commence until approval by the municipality of a drainage plan which demonstrates compliance with this Part 2. This Part 2 provides standards to meet NPDES permit requirements associated with construction activities and MS4 permit requirements.

- (2) The water quality volume (WQv) shall be captured and treated. The WQv shall be calculated two ways.

(a) First, WQv shall be calculated using the following formula:

$$WQv = \frac{(c)P(A)}{12}$$

Where WQv = Water quality volume in acre-feet
c = Rational Method postdevelopment runoff coefficient for the 2-year storm
P = 1.25 inches
A = Area in acres of proposed regulated activity

- (3) Second, the WQv shall be calculated as the difference in runoff volume from predevelopment to postdevelopment for the two-year return period storm. The effect of closed depressions on the site shall be considered in this calculation.
- (4) In the Little Lehigh Creek watershed, the larger of these two calculated volumes shall be used as the WQv to be captured and treated, except that in no case shall the WQv be permitted to exceed 1.25 inches of runoff over the site area. This standard does not limit the volume of infiltration an applicant may propose for purpose of water quantity/ peak rate control.
- (5) The WQv shall be calculated for each postdevelopment drainage direction on a site for sizing BMPs. Site areas having no impervious cover and no proposed disturbance during development may be excluded from the WQv calculations and do not require treatment.
- (6) In the Jordan Creek watershed, if an applicant is proposing to use a dry extended detention basin, wet pond, constructed wetland or other BMP that ponds water on the land surface and may receive direct sunlight, the discharge from that BMP must be treated by infiltration, a vegetated buffer, filter strip, bioretention, vegetated swale or other BMP that provides a thermal benefit to protect the high quality waters of the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watersheds, as applicable, from thermal impacts.
- (7) In the Little Lehigh Creek watershed, if an applicant is proposing to use a wet pond, constructed wetland, or other BMP that ponds water on the land surface and may receive direct sunlight, the discharge from that BMP must be treated by infiltration, a vegetated buffer, filter strip, bioretention, vegetated swale or other BMP that provides a thermal benefit to protect the High Quality waters of the Little Lehigh Creek from thermal impacts.
- (8) The WQv for a site as a result of the regulated activities must either be treated with infiltration or two acceptable BMPs such as those listed in Subsection 18 of this section, except for minor areas on the periphery of the site that cannot reasonably be drained to an infiltration facility or other BMP.
- (9) In the Jordan Creek watershed, infiltration BMPs shall not be constructed on fill unless the applicant demonstrates that the fill is stable and otherwise meets the infiltration BMP standards of this Part 2. In the Little Lehigh Creek watershed, infiltration BMPs shall not be constructed on fill.

- (10) The applicant shall document the bedrock type(s) present on the site from published sources. Any apparent boundaries between carbonate and noncarbonate bedrock shall be verified through more detailed site evaluations by a qualified geotechnical professional.
- (11) For each proposed regulated activity in the watershed where an applicant intends to use infiltration BMPs, the applicant shall conduct a preliminary site investigation, including gathering data from published sources, a field inspection of the site, a minimum of one test pit and a minimum of two percolation tests, as outlined in Appendix G. This investigation will determine depth to bedrock, depth to the seasonal high water table, soil permeability and location of special geologic features, if applicable. This investigation may be done by a certified sewage enforcement officer (SEO) except that the location(s) of special geologic features shall be verified by a qualified geotechnical professional.
- (12) In the Jordan Creek watershed, Sites where applicants intend to use infiltration BMPs must meet the following criteria:
- (a) Depth to bedrock below the invert of the BMP greater than or equal to two feet.
 - (b) Depth to seasonal high water table below the invert of the BMP greater than or equal to three feet; except for infiltration of residential roof runoff where the seasonal high water table must be below the invert of the BMP. (If the depth to bedrock is between two and three feet and the evidence of the seasonal high water table is not found in the soil, no further testing to locate the depth to seasonal high water table is required.)
 - (c) Soil permeability (as measured by the adapted 25 PA Code § 73.15. percolation test in Appendix G) greater than or equal to 0.5 inches/hour and less than or equal to 12 inches per hour.
 - (d) Setback distances or buffers as follows:
 - 100 feet from water supply wells.
 - 15 feet downgradient or 100 feet upgradient from building foundations; except for residential development where the required setback is 15 feet downgradient or 40 feet upgradient from building foundations.
 - 50 feet from septic system drainfields; except for residential development where the required setback is 25 feet from septic system drainfields.
 - 50 feet from a geologic contact with carbonate bedrock unless a preliminary site investigation is done in the carbonate bedrock to show the absence of special geologic features within 50 feet of the proposed infiltration area.
 - 100 feet from the property line unless documentation is provided to show that all setbacks from existing or potential future wells, foundations and drainfields on neighboring properties will be met; except for one- and two-family residential dwellings where the

required setback is 40 feet unless documentation is provided to show that all setbacks from existing or potential future wells, foundations and drainfields on neighboring properties will be met.

- (13) For entirely noncarbonate sites, the recharge volume (REv) shall be infiltrated unless the applicant demonstrates that it is infeasible to infiltrate the REv for reasons of seasonal high water table, permeability rate, soil depth or setback distances; or except as provided in Subsection A(21) of this section.

- (a) The REv shall be calculated as follows:

$$\text{REv} = (0.25) * (I)/12$$

Where REv = Recharge volume in acre-feet

I = Impervious area in acres

- (b) The preliminary site investigation described in Subsection A(11) of this section is required and shall continue on different areas of the site until a potentially suitable infiltration location is found or the entire site is determined to be infeasible for infiltration. For infiltration areas that appear to be feasible based on the preliminary site investigation, the additional site investigation and testing as outlined in Appendix G shall be completed.
- (c) If an applicant proposes infiltration, the municipality may determine infiltration to be infeasible if there are known existing conditions or problems that may be worsened by the use of infiltration.
- (d) The site must meet the conditions listed in Subsection A(12) of this section.
- (e) If it is not feasible to infiltrate the full REv, the applicant shall infiltrate that portion of the REv that is feasible based on the site characteristics. If none of the REv can be infiltrated, REv shall be considered as part of the WQv and shall be captured and treated as described in Subsection A(18) of this section.
- (f) If REv is infiltrated, it may be subtracted from the WQv required to be captured and treated.
- (14) In entirely carbonate areas, where the applicant intends to use infiltration BMPs, the preliminary site investigation described in Subsection A(11) of this section shall be conducted. For infiltration areas that appear feasible based on the preliminary site investigation, the applicant shall conduct the additional site investigation and testing as outlined in Appendix G. The soil depth, percolation rate and proposed loading rate, each weighted as described in Section 49, along with the buffer from special geologic features shall be compared to the Recommendation Chart for Infiltration Stormwater Management BMPs in Carbonate Bedrock in Appendix D to determine if the site is recommended for infiltration. In addition to the recommendation from Appendix D, the conditions listed in Subsection A(12) of this section are required for infiltration in carbonate areas. Applicants are encouraged to infiltrate the REv, as calculated in Subsection A(13) of this section, but are not required to use infiltration BMPs on a carbonate site even if the site falls in the "Recommended" range on the chart in Appendix D. Any amount of volume infiltrated can be subtracted from the WQv to be

treated by noninfiltration BMPs. If infiltration is not proposed, the full WQv shall be treated by two acceptable BMPs, as specified in Subsection A(18) of this section.

- (15) If a site has both carbonate and noncarbonate areas, the applicant shall investigate the ability of the noncarbonate portion of the site to fully meet this Part 2 to meet the requirements for REv for the whole site through infiltration. If that proves infeasible, infiltration in the carbonate area as described in Subsection A(14) of this section or two other noninfiltration BMPs as described in Subsection A(18) of this section must be used. No infiltration structure in the noncarbonate area shall be located within 50 feet of a boundary with carbonate bedrock, except when a preliminary site investigation has been done showing the absence of special geologic features within 50 feet of the proposed infiltration area.
- (16) If infiltration BMPs are proposed in carbonate areas, the postdevelopment two-year runoff volume leaving the site shall be 80% or more of the predevelopment runoff volume for the carbonate portion of the site to prevent infiltration of volumes far in excess of the predevelopment infiltration volume.
- (17) Site areas proposed for infiltration shall be protected from disturbance and compaction except as necessary for construction of infiltration BMPs.
- (18) If infiltration of the entire WQv is not proposed, the remainder of the WQv shall be treated by two acceptable BMPs in series for each discharge location. Sheet flow draining across a pervious area can be considered as one BMP. Sheet flow across impervious areas and concentrated flow shall flow through two BMPs. If sheet flow from an impervious area is to be drained across a pervious area as one BMP, the length of the pervious area must be equal to or greater than the length of impervious area. In no case may the same BMP be employed consecutively to meet the requirement of this section. Acceptable BMPs are listed below along with the recommended reference for design.

Best Management Practice	Design Reference Number^C
Bioretention ^A	4, 5, 11, 16
Capture reuse ^B	4, 14
Constructed wetlands	4, 5, 8, 10, 16
Dry extended detention ponds	4, 5, 8, 12, 18
Minimum disturbance/minimum maintenance practices	1, 9
Significant reduction of existing impervious cover	N/A
Stormwater filters ^A (sand, peat, compost, etc.)	4, 5, 10, 16

Vegetated buffers/filter strips	2, 3, 5, 11, 16, 17
Vegetated roofs	4, 13
Vegetated swales ^A	2, 3, 5, 11, 16, 17
Water quality inlets ^D	4, 7, 15, 16, 19
Wet detention ponds	4, 5, 6, 8

NOTES:

A This BMP could be designed with or without an infiltration component. If infiltration is proposed, the site and BMP will be subject to the testing and other infiltration requirements in this Part 2.

B If this BMP is used to treat the entire WQv then it is the only BMP required because of this BMPs superior water quality performance.

C See table below.

D Water quality inlets include such BMPs as oil/water separators, sediment traps/ catch basin sumps, and trash/debris collectors in catch basins.

Number Design Reference Title

- 1 "Conservation Design For Stormwater Management — A Design Approach to Reduce Stormwater Impacts From Land Development and Achieve Multiple Objectives Related to Land Use," Delaware Department of Natural Resources and Environmental Control, The Environmental Management Center of the Brandywine Conservancy, September 1997
- 2 "A Current Assessment of Urban Best Management Practices: Techniques for Reducing Nonpoint Source Pollution in the Coastal Zone," Schueler, T. R., Kumble, P. and Heraty, M., Metropolitan Washington Council of Governments, 1992
- 3 "Design of Roadside Channels with Flexible Linings," Federal Highway Administration, Chen, Y. H. and Cotton, G. K., Hydraulic Engineering Circular 15, FHWA-IP-87-7, McLean Virginia, 1988
- 4 "Draft Stormwater Best Management Practices Manual," Pennsylvania Department of Environmental Protection, January 2005
- 5 "Evaluation and Management of Highway Runoff Water Quality," Federal Highway Administration, FHWA-PD-96-032, Washington, D.C., 1996
- 6 "Evaporation Maps of the United States," U.S. Weather Bureau (now NOAA/National Weather Service) Technical Paper 37, Published by Department of Commerce, Washington D.C., 1959
- 7 "Georgia Stormwater Manual," AMEC Earth and Environmental, Center for Watershed Protection, Debo and Associates, Jordan Jones and Goulding, Atlanta Regional Commission, Atlanta, Georgia, 2001
- 8 "Hydraulic Design of Highway Culverts," Federal Highway Administration, FHWA HDS 5, Washington, D.C., 1985 (revised May 2005)
- 9 "Low Impact Development Design Strategies — An Integrated Design Approach, Prince Georges County, Maryland Department of Environmental Resources, June 1999

- 10 "Maryland Stormwater Design Manual," Maryland Department of the Environment, Baltimore, Maryland, 2000
- 11 "Pennsylvania Handbook of Best Management Practices for Developing Areas," Pennsylvania Department of Environmental Protection, 1998
- 12 "Recommended Procedures for Act 167 Drainage Plan Design," LVPC, Revised 1997
- 13 "Roof Gardens History, Design, and Construction," Osmundson, Theodore. New York: W.W. Norton & Company, 1999
- 14 "The Texas Manual on Rainwater Harvesting," Texas Water Development Board, Austin, Texas, Third Edition, 2005
- 15 "VDOT Manual of Practice for Stormwater Management," Virginia Transportation Research Council, Charlottesville, Virginia, 200
- 16 "Virginia Stormwater Management Handbook," Virginia Department of Conservation and Recreation, Richmond, Virginia, 1999
- 17 "Water Resources Engineering," Mays, L. W., John Wiley & Sons, Inc., 2005
- 18 "Urban Hydrology for Small Watersheds," Technical Report 55, U.S. Department of Agriculture, Natural Resources Conservation Service, 1986
- 19 U.S. EPA, Region 1 New England Web site (as of August 2005) <http://www.epa.gov/NE/assistance/ceitts/stormwater/techs/html>

(19) Stormwater runoff from hot spot land uses shall be pretreated. In no case, may the same BMP be employed consecutively to meet this requirement and the requirement in Subsection A(18) of this section.

(a) Acceptable methods of pretreatment are listed below.

Hot Spot Land Use	Pretreatment Method(s)
Vehicle maintenance and repair facilities including auto parts stores	<ul style="list-style-type: none"> - Water quality inlets - Use of drip pans and/or dry sweep material under vehicles/equipment - Use of absorbent devices to reduce liquid releases - Spill prevention and response program
Vehicle fueling stations	<ul style="list-style-type: none"> - Water quality inlets - Spill prevention and response program
Storage areas for public works	<ul style="list-style-type: none"> - Water quality inlets - Use of drip pans and/or dry sweep material under vehicles/equipment - Use of absorbent devices to reduce liquid releases - Spill prevention and response program - Diversion of stormwater away from potential contamination areas

Hot Spot Land Use	Pretreatment Method(s)
Outdoor storage of liquids	- Spill prevention and response program
Commercial nursery operations	- Vegetated swales/filter strips - Constructed wetlands - Stormwater collection and reuse
Salvage yards and recycling facilities*	- BMPs that are a part of a stormwater pollution prevention plan under an NPDES permit
Fleet storage yards and vehicle cleaning facilities*	- BMPs that are a part of a stormwater pollution prevention plan under an NPDES permit
Facilities that store or generate regulated substances*	- BMPs that are a part of a stormwater pollution prevention plan under an NPDES permit
Marinas*	- BMPs that are a part of a stormwater pollution prevention plan under an NPDES permit

* Regulated under the NPDES Stormwater Program.

- (b) Design references for the pretreatment methods, as necessary, are listed below. If the applicant can demonstrate to the satisfaction of the municipality that the proposed land use is not a hot spot, then the pretreatment requirement would not apply.

Pretreatment Method	Design Reference ^A
Constructed wetlands	4, 5, 8, 10, 16
Diversion of stormwater away from potential contamination areas	4, 11
Stormwater collection and reuse (especially for irrigation)	4, 14
Stormwater filters (sand, peal, compost, etc.)	4, 5, 10, 16
Vegetated swales	2, 3, 5, 11, 16, 17
Water quality inlets	4, 7, 15, 16, 19

NOTES:

^A These numbers refer to the Design Reference Title Chart in Subsection A(18) above.

- (20) The use of infiltration BMPs is prohibited on hot spot land use areas.
- (21) Stormwater infiltration BMPs shall not be placed in or on a special geologic feature(s). Additionally, stormwater runoff shall not be discharged into existing on- site sinkholes.
- (22) Applicants shall request, in writing, public water suppliers to provide the Zone I wellhead protection radius, as calculated by the method outlined in the Pennsylvania Department of Environmental Protection wellhead protection

regulations, for any public water supply well within 400 feet of the site. In addition to the setback distances specified in Subsection A(12) of this section, infiltration is prohibited in the Zone I radius as defined and substantiated by the public water supplier in writing. If the applicant does not receive a response from the public water supplier, the Zone I radius is assumed to be 100 feet.

- (23) The volume and rate of the net increase in stormwater runoff from the regulated activities must be managed to prevent the physical degradation of receiving waters from such effects as scour and streambank destabilization, to satisfy state water quality requirements, by controlling the two-year postdevelopment runoff to a release rate of 30%.
 - (24) The municipality may, after consultation with DEP, approve alternative methods for meeting the state water quality requirements other than those in this section, provided that they meet the minimum requirements of and do not conflict with state law, including but not limited to the Clean Streams Law.
- B. Post-Construction water quality criteria for the Maiden Creek and Sacony Creek watersheds.
- (1) No Regulated Earth Disturbance Activities within the municipality shall commence until approval by the municipality of a Drainage Plan which demonstrates compliance with this Ordinance.
 - (2) The WQv shall be captured and treated with evapotranspiration and/or direct recharge BMPs. The WQv shall be calculated as the difference in runoff volume from pre-development to post-development for the 24-hour, 2-year return period storm. This may be calculated using either the Soil-Cover-Complex Method or Rational Method using the 2-year rainfall depth as noted in Section 49J. The effect of closed depressions on the site shall be considered in this calculation. The WQv shall be captured and treated in a manner consistent with the standards outlined in Section 46 of the Ordinance.
 - (3) The WQv shall be calculated for each post-development drainage direction on a site for sizing BMPs. Site areas having no impervious cover and no proposed disturbance during development may be excluded from the WQv calculations and do not require treatment.
 - (4) Sites where applicants intend to use infiltration BMPs must meet the following criteria:
 - (a) Depth to bedrock below the invert of the BMP greater than or equal to 2 feet.
 - (b) Depth to seasonal high water table below the invert of the BMP greater than or equal to 2 feet; except for infiltration of residential roof runoff where the seasonal high water table must be below the invert of the BMP.
 - (c) Soil permeability (as measured using the standards listed in Appendix C of the Pennsylvania Stormwater Best Practices Manual) greater than or equal to 0.1 inches/hour and less than or equal to 10 inches per hour.
 - (d) Setback distances or buffers as follows:
 - 100 feet from water supply wells, or 50 feet in residential development.

- 10 feet downgradient or 100 feet upgradient from building foundations.
- (e) 50 feet from septic system drainfields.
- (5) Site areas proposed for infiltration shall be protected from disturbance and compaction except as necessary for construction of infiltration BMPs.
 - (6) If infiltration of the entire WQv is not proposed, the remainder of the WQv shall be treated by acceptable BMPs for each discharge location. Acceptable BMPs are listed in Appendix H.
 - (7) Stormwater runoff from Hot Spot land uses shall be pretreated. Suggested methods of pretreatment are listed in Appendix H.
 - (8) The use of infiltration BMPs is prohibited on Hot Spot land use areas unless the applicant can demonstrate that existing and proposed site conditions, including any proposed runoff pretreatment, create conditions suitable for runoff infiltration under this Part 2.
 - (9) Applicants shall request, in writing, Public Water Suppliers to provide the Zone I Wellhead Protection radius, as calculated by the method outlined in the Pennsylvania Department of Environmental Protection Wellhead Protection regulations, for any public water supply well within 400 feet of the site. In addition to the setback distances specified in Section 45B(4), infiltration is prohibited in the Zone I radius as defined and substantiated by the Public Water Supplier in writing. If the applicant does not receive a response from the Public Water Supplier, the Zone I radius is assumed to be 100 feet.
 - (10) The municipality may, after consultation with DEP, approve alternative methods 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.

Section 46. Existing water balance preservation standards for the Maiden Creek and Sacony Creek watersheds.

- A. The entire WQv as calculated in Section 45B(2) of this Ordinance shall be captured and treated by either direct recharge (D-RE) or evapotranspiration (ET) BMPs.
- B. Lawn area up to a maximum of 33% of the entire site area may be allowed to bypass water quality BMPs. As much proposed impervious area as practical shall be directed to water quality BMPs.
- C. Existing impervious area that is not proposed to be treated by D-RE BMPs should be excluded from all water balance calculations.
- D. A maximum of 30% of the total annual rainfall for a site may be directly recharged to groundwater using direct recharge (D-RE) BMPs, for runoff from impervious areas.
 - (1) For development sites with greater than 33% proposed impervious cover:
 - (a) If all impervious cover is directed to ET BMPs to capture the entire 2-year, 24-hour event, the D-RE standard is met.

- (b) Up to 33% of the site as impervious cover may be directed to D-RE BMPs designed to capture the entire 2-year, 24-hour event. All remaining impervious cover shall be directed to ET BMPs designed to capture the remainder of the WQv.
- (c) For ET and/or D-RE BMPs designed for runoff from impervious areas designed to capture less than the entire 2-year, 24-hour event, Appendix C shall be used to assure that the maximum D-RE standard is met
- (2) For development sites with less than 33% proposed impervious cover, all proposed impervious and the entire WQv may be directed to D-RE BMPs.
- (3) The maximum 30% D-RE standard applies on an overall site basis, rather than in each drainage direction.

Section 47. Stormwater management districts.

- A. Mapping of stormwater management districts. To implement the provisions of the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watershed Stormwater Management Plans, as applicable, the municipality is hereby divided into stormwater management districts consistent with the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watershed Release Rate Maps presented in the Plan Update.
- B. Description of stormwater management districts for the Jordan Creek and Little Lehigh Creek watersheds. Two types of stormwater management districts may be applicable to the municipality, namely Conditional/ Provisional No Detention Districts and Dual Release Rate Districts as described below.
 - (1) Conditional/Provisional No Detention Districts. Within these districts, the capacity of the "local" runoff conveyance facilities (as defined in Article VI) must be calculated to determine if adequate capacity exists. For this determination, the developer must calculate peak flows assuming that the site is developed as proposed and that the remainder of the local watershed is in the existing condition. The developer must also calculate peak flows assuming that the entire local watershed is developed per current zoning and that all new development would use the runoff controls specified by this Part 2. The larger of the two peak flows calculated will be used in determining if adequate capacity exists. If adequate capacity exists to safely transport runoff from the site to the main channel (as defined in Article VI), these watershed areas may discharge postdevelopment peak runoff without detention facilities. If the capacity calculations show that the "local" runoff conveyance facilities lack adequate capacity, the developer shall either use a 100% release rate control or provide increased capacity of downstream elements to convey increased peak flows consistent with Section 48P. Any capacity improvements must be designed to convey runoff from development of all areas tributary to the improvement consistent with the capacity criteria specified in Section 48D. By definition, a storm drainage problem area associated with the "local" runoff conveyance facilities indicates that adequate capacity does not exist. Sites in these districts are still required to meet all of the water quality requirements in Section 45.

- (2) Dual Release Rate Districts. Within these districts, the two-year postdevelopment peak discharge must be controlled to 30% of the predevelopment two-year runoff peak. Further, the ten-, twenty-five-, and one-hundred-year postdevelopment peak runoff must be controlled to the stated percentage of the predevelopment peak. Release rates associated with the ten- through one-hundred-year events vary from 50% to 100% depending upon location in the watershed.
- C. Description of Stormwater Management Districts for the Maiden Creek and Sacony Creek watersheds – The 10-, 25-, and 100-year post development peak runoff must be controlled to the stated percentage of the pre-development peak. Release Rates associated with the 10- through 100-year events vary from 50% to 100% depending upon location in the watershed.

Section 48. Stormwater management district implementation provisions.

- A. Applicants shall provide a comparative pre- and post-construction stormwater management hydrograph analysis for each direction of discharge and for the site overall to demonstrate compliance with the provisions of this Part 2.
- B. Any stormwater management controls required by this Part 2 and subject to a dual release rate criteria shall meet the applicable release rate criteria for each of the two-, ten-, twenty-five- and one-hundred-year return period runoff events consistent with the calculation methodology specified in Section 49.
- C. The exact location of the Stormwater Management District boundaries as they apply to a given development site shall be determined by mapping the boundaries using the two-foot topographic contours provided as part of the drainage plan. The district boundaries as originally drawn coincide with topographic divides or, in certain instances, are drawn from the intersection of the watercourse and a physical feature such as the confluence with another watercourse or a potential flow obstruction (e.g., road, culvert, bridge, etc.). The physical feature is the downstream limit of the subarea and the subarea boundary is drawn from that point up slope to each topographic divide along the path perpendicular to the contour lines.
- D. Any downstream capacity analysis conducted in accordance with this Part 2 shall use the following criteria for determining adequacy for accepting increased peak flow rates:
 - (1) Natural or man-made channels or swales must be able to convey the increased runoff associated with a two-year return period event within their bank velocities consistent with protection of the channels from erosion.
 - (2) Natural or man-made channels or swales must be able to convey the increased twenty-five-year return period runoff without creating any hazard to persons or property.
 - (3) Culverts, bridges, storm sewers or any other facilities which must pass or convey flows from the tributary area must be designed in accordance with DEP Chapter 105 regulations (if applicable) and, at minimum, pass the increased twenty-five-year return period runoff.

- E. For a proposed development site located within one release rate category subarea, the total runoff from the site shall meet the applicable release rate criteria. For development sites with multiple directions of runoff discharge, individual drainage directions may be designed for up to a 100% release rate so long as the total runoff from the site is controlled to the applicable release rate.
- F. For a proposed development site located within two or more release category subareas, the peak discharge rate from any subarea shall be the predevelopment peak discharge for that subarea multiplied by the applicable release rate. The calculated peak discharges shall apply regardless of whether the grading plan changes the drainage area by subarea. An exception to the above may be granted if discharges from multiple subareas recombine in proximity to the site. In this case, peak discharge in any direction may be a 100% release rate provided that the overall site discharge meets the weighted average release rate.
- G. For a proposed development site located partially within a release rate category subarea and partially within a Conditional/Provisional No Detention subarea, the size of the predevelopment drainage area on a site may not be changed postdevelopment to create potentially adverse conditions on downstream properties except as part of a "no harm" or hardship waiver procedure.
- H. For Sires straddling major watershed divides (e.g. Sacony and Maiden or Jordan), runoff volumes shall be managed to prevent diversion of runoff between watersheds, as practicable.
- I. No portion of a site may be regraded between any of the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watersheds and any adjacent watershed except as part of a "no harm" or hardship waiver procedure.
- J. Within a release rate category area, for a proposed development site which has areas which drain to a closed depression(s), the design release from the site will be the lesser of a) the applicable release rate flow assuming no closed depression(s) or b) the existing peak flow actually leaving the site. In cases where b) would result in an unreasonably small design release, the design discharge of less than or equal to the release rate will be determined by the available downstream conveyance capacity to the main channel calculated using Section 48D and the minimum orifice criteria.
- K. Off-site areas which drain through a proposed development site are not subject to release rate criteria when determining allowable peak runoff rates. However, on-site drainage facilities shall be designed to safely convey off-site flows through the development site using the capacity criteria in Section 48D and the detention criteria in Section 49.
- L. For development sites proposed to take place in phases, all detention ponds shall be designed to meet the applicable release rate(s) applied to all site areas tributary to the proposed pond discharge direction. All site tributary areas will be assumed as developed, regardless of whether all site tributary acres are proposed for development at that time. An exception shall be sites with multiple detention ponds in series where only the downstream pond must be designed to the stated release rate.
- M. Where the site area to be impacted by a proposed development activity differs significantly from the total site area, only the proposed impact area shall be subject to the release rate criteria. The impact area includes any proposed cover or grading changes.

- N. Development proposals which, through groundwater recharge or other means, do not increase either the rate or volume of runoff discharged from the site compared to predevelopment are not subject to the release rate provisions of this Part 2.
- O. "No harm" water quantity option.
- (1) For any proposed development site not located in a Conditional/Provisional No Detention District, the developer has the option of using a less restrictive runoff control (including no detention) if the developer can prove that special circumstances exist for the proposed development site and that "no harm" would be caused by discharging at a higher runoff rate than that specified by the plan. Special circumstances are defined as any hydrologic or hydraulic aspects of the development itself not specifically considered in the development of the plan runoff control strategy. Proof of "no harm" would have to be shown from the development site through the remainder of the downstream drainage network to the confluence of the creek with the Delaware or Lehigh River. Proof of "no harm" must be shown using the capacity criteria specified in Section 48D if downstream capacity analysis is a part of the "no harm" justification.
 - (2) Attempts to prove "no harm" based upon downstream peak flow versus capacity analysis shall be governed by the following provisions:
 - (a) The peak flow values to be used for downstream areas for the design return period storms (two-, ten-, twenty-five-, and one-hundred-year) shall be the values from the calibrated PSRM Models for the Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watersheds, as applicable, or as calculated by an applicant using an alternate method acceptable to the municipality. The flow values from the PSRM Model would be supplied to the developer by the municipality upon request.
 - (b) Any available capacity in the downstream conveyance system as documented by a developer may be used by the developer only in proportion to his development site acreage relative to the total upstream undeveloped acreage from the identified capacity (i.e., if his site is 10% of the upstream undeveloped acreage, he may use up to 10% of the documented downstream available capacity).
 - (c) Developer-proposed runoff controls which would generate increased peak flow rates at storm drainage problem areas would, by definition, be precluded from successful attempts to prove "no harm," except in conjunction with proposed capacity improvements for the problem areas consistent with Section 48Q.
 - (3) Any "no harm" justifications shall be submitted by the developer as part of the drainage plan submission per Article VIII. Developers submitting "no harm" justifications must still meet all of the water quality requirements in Section 45.
- P. Regional detention alternatives. For certain areas within the study area, it may be more cost-effective to provide one control facility for more than one development site than to provide an individual control facility for each development site. The initiative and funding for any regional runoff control alternatives are the responsibility of prospective developers. The design of any regional control basins must incorporate reasonable development of the entire upstream watershed. The peak outflow of a regional basin would be determined based on the required release rate at the point of discharge.

Q. Capacity improvements.

- (1) In certain instances, primarily within the Conditional/Provisional No Detention Areas, local drainage conditions may dictate more stringent levels of runoff control than those based upon protection of the entire watershed. In these instances, if the developer could prove that it would be feasible to provide capacity improvements to relieve the capacity deficiency in the local drainage network, then the capacity improvements could be provided by the developer in lieu of runoff controls on the development site. Peak flow calculations shall be done assuming that the local watershed is in the existing condition and then assuming that the local watershed is developed per current zoning and using the specified runoff controls. Any capacity improvements would be designed using the larger of the above peak flows and the capacity criteria specified in Section 48D.
- (2) All new development in the entire subarea(s) within which the proposed development site is located shall be assumed to implement the developer's proposed discharge control, if any.
- (3) Capacity improvements may also be provided as necessary to implement any regional detention alternatives or to implement a modified "no harm" option which proposes specific capacity improvements to provide that a less stringent discharge control would not create any harm downstream.

Section 49. Calculation methodology.

- A. Stormwater runoff from all development sites shall be calculated using either the Rational Method or the Soil-Cover-Complex Methodology.
- B. Infiltration BMP loading rate percentages in the Recommendation Chart for Infiltration Stormwater Management BMPs in Carbonate Bedrock in Appendix D shall be calculated as follows:

$$\left(\frac{\text{Area Tributary to infiltration BMP}}{\text{Base area of infiltration BMP}} \right) \cdot 100\%$$

The area tributary to the infiltration BMP shall be weighted as follows:

- | | |
|--|----------------|
| All disturbed areas to be made impervious: | weight at 100% |
| All disturbed areas to be made pervious: | weight at 50% |
| All undisturbed pervious areas: | weight at 0% |
| All existing impervious areas: | weight at 100% |

- C. Soil thickness is to be measured from the bottom of any proposed infiltration system. The effective soil thickness in the Recommendation Chart for Infiltration Stormwater Management BMPs in Carbonate Bedrock in Appendix D is the measured soil thickness multiplied by the thickness factor based on soil permeability (as measured by the adapted 25 PA Code § 73.15. percolation test in Appendix G), as follows:

**Permeability Range*
(inches per hour)**

Thickness Factor

6.0 to 12.0

0.8

2.0 to 6.0

1.0

1.0 to 2.0

1.4

0.75 to 1.0

1.2

0.5 to 0.75

1.0

NOTES:

* If the permeability rate (as measured by the adapted 25 PA Code § 73.15. percolation test in Appendix G) falls on a break between two thickness factors, the smaller thickness factor shall be used.

Sites with soil permeability greater than 12.0 inches per hour or less than 0.5 inches per hour, as measured by the adapted 25 PA Code § 73.15 percolation test in Appendix G, are not recommended for infiltration.

- D. The design of any detention basin intended to meet the requirements of this Part 2 shall be verified by routing the design storm hydrograph through the proposed basin using the storage indication method or other methodology demonstrated to be more appropriate. For basins designed using the Rational Method technique, the design hydrograph for routing shall be either the Universal Rational Hydrograph or the Modified Rational Method trapezoidal hydrograph which maximizes detention volume. Use of the Modified Rational hydrograph shall be consistent with the procedure described in Section "PIPE.RAT" of the Users' Manual for the Penn State Urban Hydrology Model (1987).
- E. BMPs designed to store or infiltrate runoff and discharge to surface runoff or pipe flow shall be routed using the storage indication method.
- F. BMPs designed to store or infiltrate runoff and discharge to surface runoff or pipe flow shall provide storage volume for the full WQv below the lowest outlet invert.
- G. Wet detention ponds designed to have a permanent pool for the WQv shall assume that the permanent pool volume below the primary outlet is full at the beginning of design event routing for the purposes of evaluating peak outflows.
- H. Freeboard Requirements
 - (1) For the Jordan Creek and Little Lehigh Creek watersheds, the freeboard requirements are as follows. All stormwater detention facilities shall provide a minimum 1.0 foot freeboard above the maximum pool elevation associated with the two- through twenty-five- year runoff events. A 0.5 foot freeboard shall be provided above the maximum pool elevation of the one-hundred-year runoff event. The freeboard shall be measured from the maximum pool elevation to the invert of the emergency spillway. The two- through one-hundred-year storm events shall be controlled by the primary outlet structure. An emergency spillway for each basin shall be designed to pass the one- hundred-year return frequency storm peak basin inflow rate with a minimum 0.5 foot freeboard measured to the top of basin. The freeboard criteria shall be met considering any off-site areas tributary to the basin as developed, as applicable. If this detention facility is considered to be a dam as per DEP Chapter 105, the design of the facility must be consistent with the Chapter 105 regulations, and may be required to pass a storm greater than the one-hundred-year event.

- (2) For the Maiden Creek and Sacony Creek watersheds, the freeboard requirements are as follows. All above-ground stormwater detention facilities shall provide a minimum 0.5 feet of freeboard above the maximum pool elevation associated with the 2- through 100-year runoff events, or an additional ten percent of the 100-year storage volume as freeboard volume, whichever is greater. All below-ground stormwater detention and infiltration facilities shall have an additional ten percent of the 100-year storage volume available within the storage medium, as well as a minimum of 0.5 feet of freeboard. The freeboard shall be measured from the maximum pool elevation to the invert of the emergency spillway for above-ground facilities, and from the maximum pool elevation to the lowest overflow elevation for below-ground facilities. The 2- through 100-year storm events shall be controlled by the primary outlet structure. An emergency spillway for each above-ground basin shall be designed to pass the 100-year return frequency storm peak basin inflow rate with a minimum 0.5 foot freeboard measured to the top of basin. The freeboard criteria shall be met considering any off-site areas tributary to the basin as developed, as applicable. Exceptions to the freeboard requirements are as follows:
- Bioretention BMPs with a ponded depth less than or equal to 0.5 feet are exempt from the freeboard requirements.
 - Small detention basins, with a ponded depth less than or equal to 1.5 feet or having a depth to the top of the berm less than or equal to 2.5 feet, may provide twenty percent additional storage volume measured from the maximum ponded depth to the invert of the emergency spillway in lieu of the above requirements. The depth of the emergency spillway must be sufficient to pass either two times the 100-year peak or the 100-year peak with 0.2' of freeboard to the top of berm, whichever is greater.
 - Small infiltration basins, with a ponded depth less than or equal to 1.5 feet or having a depth to the top of the berm less than or equal to 2.5 feet, may provide twenty percent additional storage volume measured from the maximum ponded depth to the top of the berm in lieu of the above requirements. In this case, an emergency spillway is only necessary if runoff in excess of the basin volume would cause harm to downstream owners. If a spillway is necessary, it must be sufficiently sized to pass the 100-year peak inflow.
- I. The minimum circular orifice diameter for controlling discharge rates from detention facilities shall be three inches. Designs where a lesser size orifice would be required to fully meet release rates shall be acceptable with a three-inch orifice provided that as much of the site runoff as practical is directed to the detention facilities. The minimum three-inch diameter does not apply to the control of the WQv.
- J. Runoff calculations using the Soil-Cover-Complex Method shall use the Natural Resources Conservation Service Type II twenty-four-hour rainfall distribution. The twenty-four-hour rainfall depths for the various return periods to be used consistent with this Part 2 may be taken from NOAA Atlas 14, Volume 2, Version 2.1, 2004, or the PennDOT Intensity - Duration - Frequency Field Manual ("PDT-IDF") (May 1986) for Region 4. The following values are taken from the PDT-IDF Field Manual:

Return Period	24-Hour Rainfall Depth (inches)
1-year	2.40
2-year	3.00
5-year	3.60
10-year	4.56
25-year	5.52
50-year	6.48
100-year	7.44

A graphical and tabular presentation of the Type II, 24-hour distribution is included in Appendix C.

- K. Runoff calculations using the Rational Method shall use rainfall intensities consistent with appropriate times of concentration and return periods and NOAA Atlas 14, Volume 2, Version 2.1, 2004, or the Intensity-Duration-Frequency Curves as presented in Appendix C.
- L. Runoff curve numbers (CNs) to be used in the Soil-Cover-Complex Method shall be based upon the matrix presented in Appendix C.
- M. Runoff coefficients for use in the Rational Method shall be based upon the table presented in Appendix C.
- N. All time of concentration calculations shall use a segmental approach which may include one or all of the flow types below:
 - (1) Sheet flow (overland flow) calculations shall use either the NRCS average velocity chart (Figure 3-1, Technical Release-55, 1975) or the modified kinematic wave travel time equation (Equation 3-3, NRCS TR-55, June 1986). If using the modified kinematic wave travel time equation, the sheet flow length shall be limited to 50 feet for designs using the Rational Method and limited to 150 feet for designs using the Soil-Cover-Complex Method.
 - (2) Shallow concentrated flow travel times shall be determined from the watercourse slope, type of surface and the velocity from Figure 3-1 of TR-55, June 1986.
 - (3) Open channel flow travel times shall be determined from velocities calculated by the Manning Equation. Bankfull flows shall be used for determining velocities. Manning 'n' values shall be based on the table presented in Appendix C.
 - (4) Pipe flow travel times shall be determined from velocities calculated using the Manning Equation assuming full flow and the Manning 'n' values from Appendix C.
- O. If using the Rational Method, all predevelopment calculations for a given discharge direction shall be based on a common time of concentration considering both on- site and any off-site drainage areas. If using the Rational Method, all postdevelopment calculations for a given discharge direction shall be based on a common time of concentration considering both on-site and any off-site drainage areas.

- P. When conditions exist such that a proposed detention facility may experience a tailwater effect, the basin shall be analyzed without any tailwater effect for all storm events for comparison against the required Release Rates. An additional routing of the 100- year storm with the full tailwater effect shall be performed to check that the basin has sufficient storage to contain the 100-year tributary flow with a tailwater.
- Q. The Manning Equation shall be used to calculate the capacity of watercourses. Manning 'n' values used in the calculations shall be consistent with the table presented in Appendix C or other appropriate standard engineering 'n' value resources. Pipe capacities shall be determined by methods acceptable to the municipality.
- R. The Pennsylvania DEP, Chapter 105, Rules and Regulations, apply to the construction, modification, operation or maintenance of both existing and proposed dams, water obstructions and encroachments throughout the watershed. Criteria for design and construction of stormwater management facilities according to this Part 2 may differ from the criteria that are used in the permitting of dams under the Dam Safety Program.

ARTICLE VIII: Drainage Plan Requirements

Section 50. Submission and approval of plan required.

For any of the regulated activities of this Part 2, prior to the final approval of subdivision and/or land development plans, or the issuance of any permit, or the commencement of any regulated earth disturbance activity, the owner, subdivider, developer or his agent shall submit a drainage plan and receive municipal approval of the plan.

Section 51. Exemptions.

Exemptions from the drainage plan requirements are as specified in Section 34.

Section 52. Contents.

The following items shall be included in the drainage plan:

A. General

- (1) General description of project.
- (2) General description of proposed permanent stormwater controls.
- (3) The name and address of the project site, the name and address of the owner of the property and the name of the individual or firm preparing the drainage plan.

B. Map(s) of the project area showing:

- (1) The location of the project relative to highways, municipalities or other identifiable landmarks.
- (2) Existing contours at intervals of two feet. In areas of steep slopes (greater than 15%), five-foot contour intervals may be used. Off-site drainage areas impacting the project including topographic detail.
- (3) Streams, lakes, ponds or other bodies of water within the project area.
- (4) Other features including flood hazard boundaries, existing drainage swales, wetlands, closed depressions, sinkholes and areas of natural vegetation to be preserved.
- (5) Locations of proposed underground utilities, sewers and water lines. The locations of all existing and proposed utilities, sanitary sewers and water lines within 50 feet of property lines of the project site.
- (6) An overlay showing soil types and boundaries based on the Lehigh County Soil Survey, as applicable, latest edition. Any hydric soils present on the site should be identified as such.
- (7) An overlay showing geologic types, boundaries and any special geologic features present on the site.
- (8) Proposed changes to land surface and vegetative cover.
- (9) Proposed structures, roads, paved areas and buildings.

- (10) Final contours at intervals of two feet. In areas of steep slopes (greater than 15%), five-foot contour intervals may be used.
- (11) Stormwater Management District boundaries applicable to the site.
- (12) Clear identification of the location and nature of permanent stormwater BMPs.
- (13) An adequate access easement around all stormwater BMPs that would provide municipal ingress to and egress from a public right-of-way.
- (14) A schematic showing all tributaries contributing flow to the site and all existing man-made features beyond the property boundary that would be affected by the project.
- (15) The location of all public water supply wells within 400 feet of the project and all private water supply wells within 100 feet of the project.

C. Stormwater management controls and BMPs.

- (1) All stormwater management controls and BMPs shall be shown on a map and described, including:
 - (a) Groundwater recharge methods such as seepage pits, beds or trenches. When these structures are used, the locations of septic tank infiltration areas and wells shall be shown.
 - (b) Other control devices or methods such as rooftop storage, semipervious paving materials, grass swales, parking lot ponding, vegetated strips, detention or retention ponds, storm sewers, etc.
- (2) All calculations, assumptions and criteria used in the design of the BMPs shall be shown.
- (3) All site testing data used to determine the feasibility of infiltration on a site.
- (4) All details and specifications for the construction of the stormwater management controls and BMPs.

D. The BMP operations and management plan, as required in Article XI, describing how each permanent stormwater BMP will be operated and maintained and the identity of the person(s) responsible for operations and maintenance. A statement must be included, signed by the landowner, acknowledging that the stormwater BMPs are fixtures that cannot be altered or removed without approval by the municipality.

E. Environmental resources.

- (1) An environmental resources site design assessment that describes the following:
 - (a) The extent to which the proposed grading and impervious cover avoid disturbance of significant environmental resources and preserve existing site hydrology.
 - (b) An assessment of whether alternative grading and impervious cover site design could lessen the disturbance of significant environmental resources and/or make better use of the site hydrologic resources.

- (c) A description of how the proposed stormwater management controls and BMPs serve to mitigate any adverse impacts on environmental resources on the site.
 - (2) Significant environmental resources considered in the site design assessment include, but are not limited to, steep slopes, ponds, lakes, streams, wetlands, hydric soils, floodplains, riparian vegetation, native vegetation and special geologic features.
- F. 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 Manual⁴. A detailed site evaluation shall be completed for projects proposed in areas of carbonate geology or karst topography, and other environmentally sensitive areas, such as brownfields.
 - (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 42.
 - (4) Expected project time schedule.
 - (5) A soil erosion and sediment control plan, where applicable, as prepared for and submitted to the approval authority.
 - (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) A justification must be included in the SWM Site Plan if BMPs other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls under this Ordinance.

Section 53. Plan submission.

- A. For regulated activities specified in Section 33B(1) and (2):
 - (1) The drainage plan shall be submitted by the developer to the Municipal Secretary (or other appropriate person) as part of the preliminary plan submission for the subdivision or land development.

- (2) Four copies of the drainage plan shall be submitted.
- (3) Distribution of the drainage plan will be as follows:
 - (a) One copy to the municipal governing body.
 - (b) One copy to the Municipal Engineer.
 - (c) Two copies to the Lehigh Valley Planning Commission, except for drainage plans involving less than 10,000 square feet of additional impervious cover.
- (4) Drainage plans involving more than 10,000 square feet of additional impervious cover shall be submitted by the developer (or, at the option of the municipality, through the municipality) to the Lehigh Valley Planning Commission as part of the preliminary plan submission. The Lehigh Valley Planning Commission will conduct an advisory review of the drainage plan for consistency with the Jordan Creek, Little Lehigh Creek, Maiden Creek, and the Sacony Creek Watershed Stormwater Management Plans, as applicable. The LVPC will not review details of the erosion and sedimentation plan or the BMP operations and maintenance plan.
 - (a) Two copies of the drainage plan shall be submitted.
 - (b) The LVPC will provide written comments to the developer and the municipality, within a time frame consistent with established procedures under the Municipalities Planning Code, as to whether the drainage plan has been found to be consistent with the stormwater management plan.
- B. For regulated activities specified in Section 33B(3) and (4), the drainage plan shall be submitted by the developer to the municipal building permit officer as part of the building permit application.
- C. For regulated activities specified in Section 33B(5), (6) and (7):
 - (1) The drainage plan shall be submitted by the developer to the Lehigh Valley Planning Commission for coordination with the DEP permit application process under Chapter 105 (Dam Safety and Waterway Management), Chapter 106 (Floodplain Management) of DEP's Rules and Regulations and the NPDES regulations.
 - (2) One copy of the drainage plan shall be submitted.
- D. Earthmoving for all regulated activities under Section 33 shall be conducted in accordance with the current federal and state regulations relative to the NPDES and DEP Chapter 102 regulations.

Section 54. Drainage Plan Review.

- A. The Township Engineer shall review the drainage plan, including the BMP operations and maintenance plan, for consistency with the adopted Jordan Creek, Little Lehigh Creek, Maiden Creek and Sacony Creek Watershed Stormwater Management Plans, as applicable, as embodied by this Part 2 and with any permits issued by DEP. The municipality shall also review the drainage plan against any additional storm drainage provisions contained in the municipal subdivision and land development or zoning ordinance, as applicable.

- B. The Lehigh Valley Planning Commission shall provide an advisory review of the drainage plan for consistency with the Stormwater Management Plan
- C. For regulated activities specified in §§ 8-204(1) and (2), the LVPC shall provide written comments to the Township, within a time frame consistent with established procedures under Act 247, as to whether the drainage plan has been found to be consistent with the Stormwater Management Plan.
- D. For regulated activities specified in §§ 8-204(5) and (6) the LVPC shall notify D.E.P. whether the drainage plan is consistent with the Stormwater Management Plan and forward a copy of the review letter to the Township and developer.
- E. For any SWM Site Plan that proposes to use any BMPs other than green infrastructure and LID practices to achieve the volume and rate controls required under this Ordinance, the Municipality will not approve the SWM Site Plan unless it determines that green infrastructure and LID practices are not practicable.
- F. The Township shall notify the applicant in writing whether the drainage plan, including the BMP operations and maintenance plan, is approved.
- G. The Township shall not approve any subdivision or land development [regulated activities Section 33B(1) and (2)] or building permit application [regulated activities Section 33B(3) and (4)] if the drainage plan has been found to be inconsistent with the stormwater management plan.
- H. The municipality may require an "as-built survey" of all stormwater BMPs and an explanation of any discrepancies with the drainage plan.

Section 55. Modification of plans.

A modification to a submitted drainage plan for a proposed development site which involves a change in control methods or techniques, or which involves the relocation or redesign of control measures, or which is necessary because soil or other conditions are not as stated on the drainage plan (as determined by the municipality) shall require a resubmission of the modified drainage plan consistent with Section 43 subject to review per Section 44 of this Part 2.

Section 56. Resubmission of Disapproved Plans.

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

Section 57. Hardship waiver procedure.

- A. The municipality may hear requests for waivers where it is alleged that the provisions of this Part 2 inflict unnecessary hardship upon the applicant. The waiver request shall be in writing and accompanied by the requisite fee based upon a fee schedule adopted by the municipality. A copy of the waiver request shall be provided to each of the following: municipality, Municipal Engineer, Municipal Solicitor and Lehigh Valley Planning Commission. The request shall fully document the nature of the alleged hardship.
- B. The municipality may grant a waiver provided that all of the following findings are made in a given case:
 - (1) That there are unique physical circumstances or conditions, including irregularity of lot size or shape, or exceptional topographical or other physical conditions peculiar to the particular property, and that the unnecessary hardship is due to such conditions, and not the circumstances or conditions generally created by the provisions of this Part 2 in the stormwater management district in which the property is located;
 - (2) That because of such physical circumstances or conditions, there is no possibility that the property can be developed in strict conformity with the provisions of this Part 2, including the "no harm" provisions, and that the authorization of a waiver is therefore necessary to enable the reasonable use of the property;
 - (3) That such unnecessary hardship has not been created by the applicant;
 - (4) That the waiver, if authorized, will represent the minimum waiver that will afford relief and will represent the least modification possible of the regulation in issue; and
 - (5) That financial hardship is not the criteria for granting of a hardship waiver.
- C. In granting any waiver, the municipality may attach such conditions and safeguards as it may deem necessary to implement the purposes of this Part 2. If a hardship waiver is granted, the applicant must still manage the quantity, velocity, direction and quality of resulting storm runoff as is necessary to prevent injury to health, safety or other property.
 - (1) For regulated activities described in Section 33B(1) and (2), the Board of Supervisors shall hear requests for and decide on hardship waiver requests on behalf of the municipality.
 - (2) For regulated activities in Section 33B(3), (4), (5), (6) and (7) the Zoning Hearing Board shall hear requests for and decide on hardship waiver requests on behalf of the municipality.
 - (3) The municipality shall not waive the water quality provisions of this Part 2.
- D. No waiver or modification of any regulated stormwater activity involving earth disturbance greater than or equal to one acre may be granted by the Township unless that action is approved in advance by the Department of Environmental Protection (DEP) or the delegated Lehigh County Conservation District.

Section 58. Authorization to Construct and Term of Validity.

The 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. The 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 the Township signs the approval for an SWM Site Plan. If an approved SWM Site Plan is not completed according to Section 50 within the term of validity, then the Township may consider the SWM Site Plan disapproved and may revoke any and all permits. SWM Site Plans that are considered disapproved by the Township shall be resubmitted in accordance with Section 56 of this Ordinance.

Section 59. 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 Township.
- 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. The latitude and longitude coordinates for all permanent SWM BMPs must also be submitted, at the central location of the BMPs. If any licensed qualified professionals contributed to the construction plans, then a licensed qualified professional must sign the completion certificate.
- C. After receipt of the completion certification by the Township, the Township may conduct a final inspection.

ARTICLE IX: Inspections

Section 60. Schedule of inspections.

- A. DEP or its designees (e.g., County Conservation District) normally ensure compliance with any permits issued, including those for stormwater management. In addition to DEP compliance programs, the municipality or its designee may inspect all phases of the construction, operations, maintenance and any other implementation of stormwater BMPs.
- B. The landowner or the owner's designee (including the Township for dedicated and owned facilities) shall inspect SWM BMPs, facilities and/or structures installed under this Ordinance according to the following frequencies, at a minimum, to ensure the BMPs, facilities and/or structures continue to function as intended:
 - Annually for the first 5 years.
 - Once every 3 years thereafter.
 - During or immediately after the cessation of a 10-year or greater storm.

Inspections should be conducted during or immediately following precipitation events. A written inspection report shall be created to document each inspection. The inspection report shall contain the date and time of the inspection, the individual(s) who completed the inspection, the location of the BMP, facility or structure inspected, observations on performance, and recommendations for improving performance, if applicable. Inspection reports shall be submitted to the Township within 30 days following completion of the inspection.

- C. During any stage of the regulated earth disturbance activities, if the municipality or its designee determines that any BMPs are not being implemented in accordance with this Part 2, the municipality may suspend or revoke any existing permits issued by the municipality or other approvals issued by the municipality until the deficiencies are corrected.

ARTICLE X: Fees and Expenses

Section 61. Fee for review of drainage plan.

The municipality may charge a reasonable fee for review of the drainage plan, including the BMP operations and maintenance plan, to defray review costs incurred by the municipality. The applicant shall pay all such fees.

Section 62. Expenses covered by fees.

The fees required by this Part 2 shall at a minimum cover:

- A. The review of the drainage plan, including the BMP operations and maintenance plan, by the municipality.
- B. The site inspection.
- C. The inspection of required controls and improvements during construction.
- D. The final inspection upon completion of the controls and improvements required in the plan.
- E. Any additional work required to monitor and enforce any permit provisions, regulated by this Part 2, correct violations, and assure the completion of stipulated remedial actions.
- F. Administrative and clerical costs.
- G. Attendance at meetings.

ARTICLE XI: Stormwater BMP Operations and Maintenance Plan Requirements

Section 63. General requirements.

No regulated earth disturbance activities within the municipality shall commence until approval by the municipality of the BMP operations and maintenance plan which describes how the permanent (e.g., post-construction) stormwater BMPs will be properly operated and maintained.

Section 64. Responsibilities for operations and maintenance of BMPs.

- A. The BMP operations and maintenance plan for the project site shall establish responsibilities for the continuing operation and maintenance of all permanent stormwater BMPs, as follows:
 - (1) If a Plan includes structures or lots which are to be separately owned and in which streets, sewers and other public improvements are to be dedicated to the municipality, stormwater BMPs may also be dedicated to and maintained by the municipality;
 - (2) If a Plan includes operations and maintenance by a single owner or if sewers and other public improvements are to be privately owned and maintained, then the operation and maintenance of stormwater BMPs shall be the responsibility of the owner or private management entity.
- B. The municipality shall make the final determination on the continuing operations and maintenance responsibilities. The municipality reserves the right to accept or reject the operations and maintenance responsibility for any or all of the stormwater BMPs.

Section 65. Adherence to approved BMP operations and maintenance plan.

It shall be unlawful to alter or remove any permanent stormwater BMP required by an approved BMP operations and maintenance plan or to allow the property to remain in a condition which does not conform to an approved BMP operations and maintenance plan unless an exception is granted in writing by the municipality.

Section 66. Operations and maintenance agreement for privately owned stormwater BMPs.

- A. The property owner shall sign an operations and maintenance agreement with the municipality covering all stormwater BMPs that are to be privately owned. The agreement shall be substantially the same as the agreement in Appendix E of this Ordinance.
- B. Other items may be included in the agreement where determined by the municipality to be reasonable or necessary to guarantee the satisfactory operation and maintenance of all permanent stormwater BMPs. The agreement shall be subject to the review and approval of the municipality.

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

Section 67. Stormwater management easements.

Stormwater management easements shall be provided by the property owner if necessary for access for inspections and maintenance or for preservation of stormwater conveyance, infiltration, detention areas and other BMPs by persons other than the property owner. The purpose of the easement shall be specified in any agreement under Section 66.

Section 68. Recording of approved BMP operations and maintenance plan and related agreements.

- A. The owner of any land upon which permanent BMPs will be placed, constructed or implemented, as described in the BMP operations and maintenance plan, shall record the following documents in the Office of the Recorder of Deeds for Lehigh County within 90 days of approval of the BMP operations and maintenance plan by the municipality:
 - (1) The operations and maintenance plan or a summary thereof.
 - (2) Operations and maintenance agreements under Section 66.
 - (3) Easements under Section 67.
- B. Facilities, areas, or structures used as SWM BMPs shall be enumerated as permanent real estate appurtenances and recorded as deed restrictions or conservation easements that run with the land.
- C. The O&M Plan shall be recorded as a restrictive deed covenant that runs with the land.
- D. The Township may take enforcement actions against an owner for any failure to satisfy the provisions of this Article.
- E. The municipality may suspend or revoke any approvals granted for the project site upon discovery of the failure of the owner to comply with this section.

Section 69. Performance Guarantee.

For SWM Site Plans that involve subdivision and land development, the applicant shall provide a financial guarantee to the Township for the timely installation and proper construction of all stormwater management controls as required by the approved SWM Site Plan and this Ordinance in accordance with the provisions of Sections 509, 510, and 511 of the Pennsylvania Municipalities Planning Code.

Section 70. Municipal Stormwater BMP Operations and Maintenance Fund.

- A. If stormwater BMPs are accepted by the municipality for dedication, the municipality may require the applicant to pay a specified amount to the Municipal Stormwater BMP Operations and Maintenance Fund to help defray costs of operations and maintenance activities. The amount may be determined as follows:

- (1) If the BMP is to be owned and maintained by the municipality, the amount shall cover the estimated costs for operation and maintenance in perpetuity, as determined by the municipality.
 - (2) The amount shall then be converted to present worth of the annual series values.
- B. If a BMP is proposed that also serves as a recreation facility (e.g., ball field, lake), the municipality may adjust the amount due accordingly.

ARTICLE XII: Prohibitions

Section 71. Prohibited discharges; permitted discharges.

- A. No person in the municipality shall allow or cause to allow stormwater discharges into the municipality's separate storm sewer system which are not composed entirely of stormwater except as provided in Subsection B below or as allowed under a state or federal permit.
- B. Discharges that may be allowed based on the municipality finding that the discharge(s) do not significantly contribute pollution to surface waters of the commonwealth are listed below.
 - (1) Discharges from fire-fighting activities.
 - (2) Potable water sources including dechlorinated water line and fire hydrant flushings.
 - (3) Irrigation drainage.
 - (4) Routine external building washdown which does not use detergents or other compounds.
 - (5) Air-conditioning condensate.
 - (6) Water from individual residential car washing.
 - (7) Springs.
 - (8) Water from crawl space pumps.
 - (9) Uncontaminated water from foundation or footing drains.
 - (10) Flows from riparian habitats and wetlands.
 - (11) Lawn watering.
 - (12) Pavement washwaters 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.
 - (13) Dechlorinated swimming pool discharges.
 - (14) Uncontaminated groundwater.
- C. In the event that the municipality determines that any of the discharges identified in Subsection B significantly contribute to pollution of waters of the commonwealth or is so notified by DEP, the municipality will notify the responsible person to cease the discharge.
- D. Upon notice provided by the municipality under Subsection C, the discharger will have a reasonable time, as determined by the municipality, to cease the discharge consistent with the degree of pollution caused by the discharge.
- E. Nothing in this section shall affect a discharger's responsibilities under state law.

Section 72. Prohibited connections.

The following connections are prohibited, except as provided in Section 71B above:

- A. Any drain or conveyance, whether on the surface or subsurface, which allows any nonstormwater discharge including sewage, process wastewater and wash water to enter the separate storm sewer system and any connections to the storm drain system from indoor drains and sinks.
- B. Any drain or conveyance connected from a commercial or industrial land use to the separate storm sewer system which has not been documented in plans, maps or equivalent records and approved by the municipality.

Section 73. Roof drains and Sump Pumps.

- A. Roof drains and sump pumps shall not be connected to streets, sanitary or storm sewers or roadside ditches, except as provided in Subsection B.
- B. When it is more advantageous to connect directly to streets or storm sewers, connections of roof drains to streets or roadside ditches may be permitted by the municipality.
- C. Roof drains and sump pumps shall discharge to infiltration areas or vegetative BMPs to the maximum extent practicable.

Section 74. Alteration of BMPs.

- A. No person shall modify, remove, fill, landscape or alter any existing stormwater BMP without the written approval of the municipality unless it is part of an approved maintenance program.
- B. No person shall place any structure, fill, landscaping or vegetation into a stormwater BMP or within a drainage easement, which would limit or alter the functioning of the BMP, without the written approval of the municipality.

ARTICLE XIII: Right of Entry; Notification; Enforcement

Section 75. Right of entry.

- A. Upon presentation of proper credentials and with the consent of the landowner, duly authorized representatives of the municipality may enter at reasonable times upon any property within the municipality to inspect the implementation, condition or operation and maintenance of the stormwater BMPs or to investigate or ascertain the condition of the subject property in regard to any aspect regulated by this Part 2.
- B. In the event that the landowner refuses admission to the property, duly authorized representatives of the municipality may seek an administrative search warrant issued by a Magisterial District Judge to gain access to the property.

Section 76. Notification.

- A. Whenever the municipality finds that a person has violated a prohibition or failed to meet a requirement of this Part 2, the municipality may order compliance by written notice to the responsible person. Such notice may require without limitation:
 - (1) The name of the owner of record and any other person against whom the municipality intends to take action.
 - (2) The location of the property in violation.
 - (3) The performance of monitoring, analyses and reporting.
 - (4) The elimination of prohibited connections or discharges.
 - (5) Cessation of any violating discharges, practices or operations.
 - (6) The abatement or remediation of stormwater pollution or contamination hazards and the restoration of any affected property.
 - (7) Payment of a fine to cover administrative and remediation costs.
 - (8) The implementation of stormwater BMPs
 - (9) Operation and maintenance of stormwater BMPs.
- B. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of the violation(s). Said notice may further advise that should the violator fail to take the required action within the established deadline, the work will be done by the municipality or designee and the expense thereof, together with all related lien and enforcement fees, charges and expenses, shall be charged to the violator.
- C. Failure to comply within the time specified shall also subject such person to the penalty provisions of this Part 2. All such penalties shall be deemed cumulative and shall not prevent the municipality from pursuing any and all other remedies available in law or equity.

Section 77. Public nuisance.

- A. The violation of any provision of this Part 2 is hereby deemed a public nuisance.
- B. Each day that an offense continues shall constitute a separate violation.

Section 78. Suspension and revocation of permits and approvals.

- A. Any building, land development or other permit or approval issued by the municipality may be suspended or revoked by the municipality for:
 - (1) Noncompliance with or failure to implement any provision of the permit.
 - (2) A violation of any provision of this Part 2.
 - (3) The creation of any condition or the commission of any act during construction or development which constitutes or creates a hazard or nuisance, pollution or which endangers the life or property of others.
- B. A suspended permit or approval shall be reinstated by the municipality when:
 - (1) The municipality or designee has inspected and approved the corrections to the stormwater BMPs or the elimination of the hazard or nuisance.
 - (2) The municipality is satisfied that the violation of the ordinance, law or rule and regulation has been corrected.
 - (3) Payment of all municipal fees, costs and expenses related to or arising from the violation has been made.
- C. A permit or approval which has been revoked by the municipality cannot be reinstated. The applicant may apply for a new permit under the procedures outlined in this Part 2.

Section 79. Violations and penalties.

- A. Any person, partnership or corporation who or which has violated the provisions of this Part 2 shall, upon being found liable therefor in a civil enforcement proceeding commenced by the municipality, pay a judgment of not more than \$500 plus all court costs, including reasonable attorney's fees incurred by the municipality as a result thereof. No judgment shall commence or be imposed, levied or payable until the date of the determination of a violation by the Magisterial District Judge. If the defendant neither pays nor timely appeals the judgment, the municipality may enforce the judgment pursuant to a separate violation, unless the Magisterial District Judge, determining that there has been a violation, further determines that there was a good faith basis for the person, partnership, or corporation violating this Part 2 to have believed that there was no such violation, in which event there shall be deemed to have been only one such violation until the fifth day following the date of the determination of a violation by the Magisterial District Judge and thereafter each day that a violation continues shall constitute a separate violation.

- B. The Court of Common Pleas, upon petition, may grant an order of stay upon cause shown, tolling the per diem judgment pending a final adjudication of the violation and judgment.
- C. Nothing contained in this section shall be construed or interpreted to grant to any person or entity other than the municipality the right to commence any action for enforcement pursuant to this section.
- D. Magisterial District Judges shall have initial jurisdiction in proceedings brought under this section.
- E. In addition, the municipality, through its Solicitor, may institute injunctive, mandamus or any other appropriate action or proceeding at law or in equity for the enforcement of this Part 2. 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 80. Appeals.

Any person aggrieved by any action of the municipality or its designee relevant to the provisions of this Part 2 may appeal using the appeal procedures established in the Pennsylvania Municipalities Planning Code.

APPENDIX A

(Not Included in Plan Copy of Ordinance)

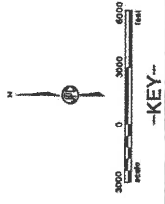
- A-1 Map of Little Lehigh Creek Watershed**
- A-2 Municipal Map of Stormwater Management Districts**

APPENDIX B

(Not Included in Plan Copy Text)

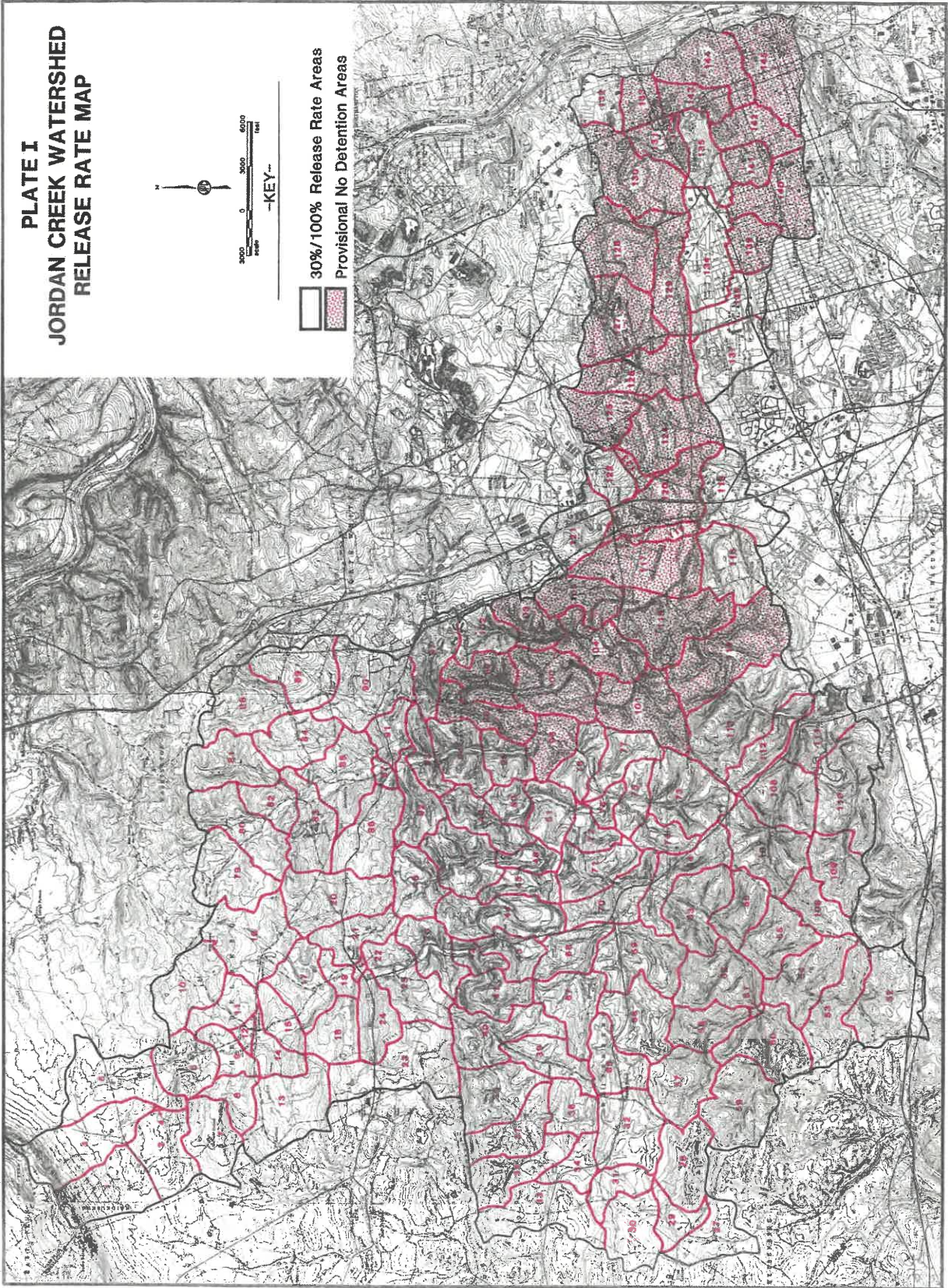
- B-1 Map of Storm Drainage Problem Areas**
- B-2 Description of Storm Drainage Problem Areas**

PLATE I
JORDAN CREEK WATERSHED
RELEASE RATE MAP



—KEY—

- 30%/100% Release Rate Areas
- Provisional No Detention Areas



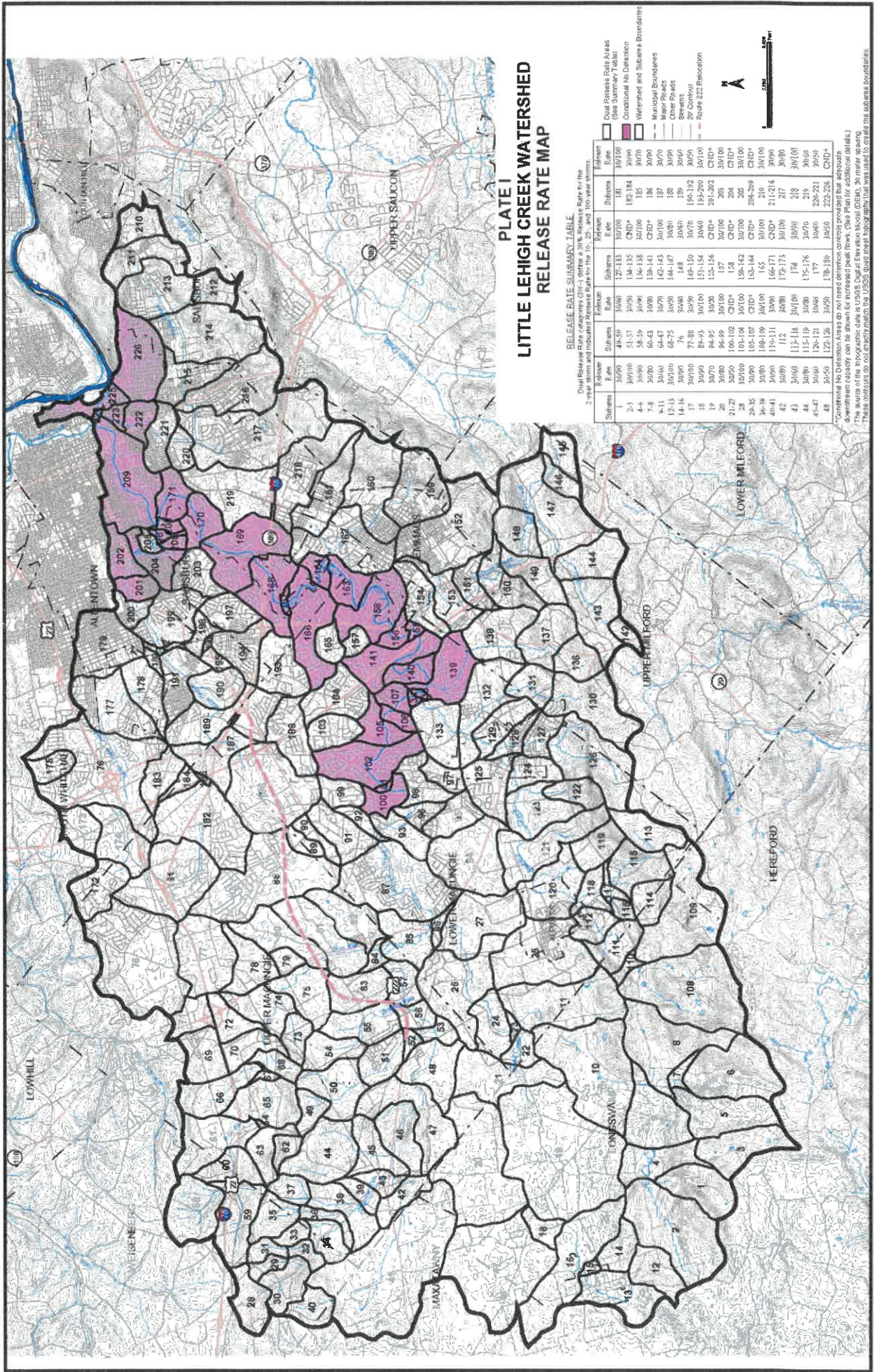
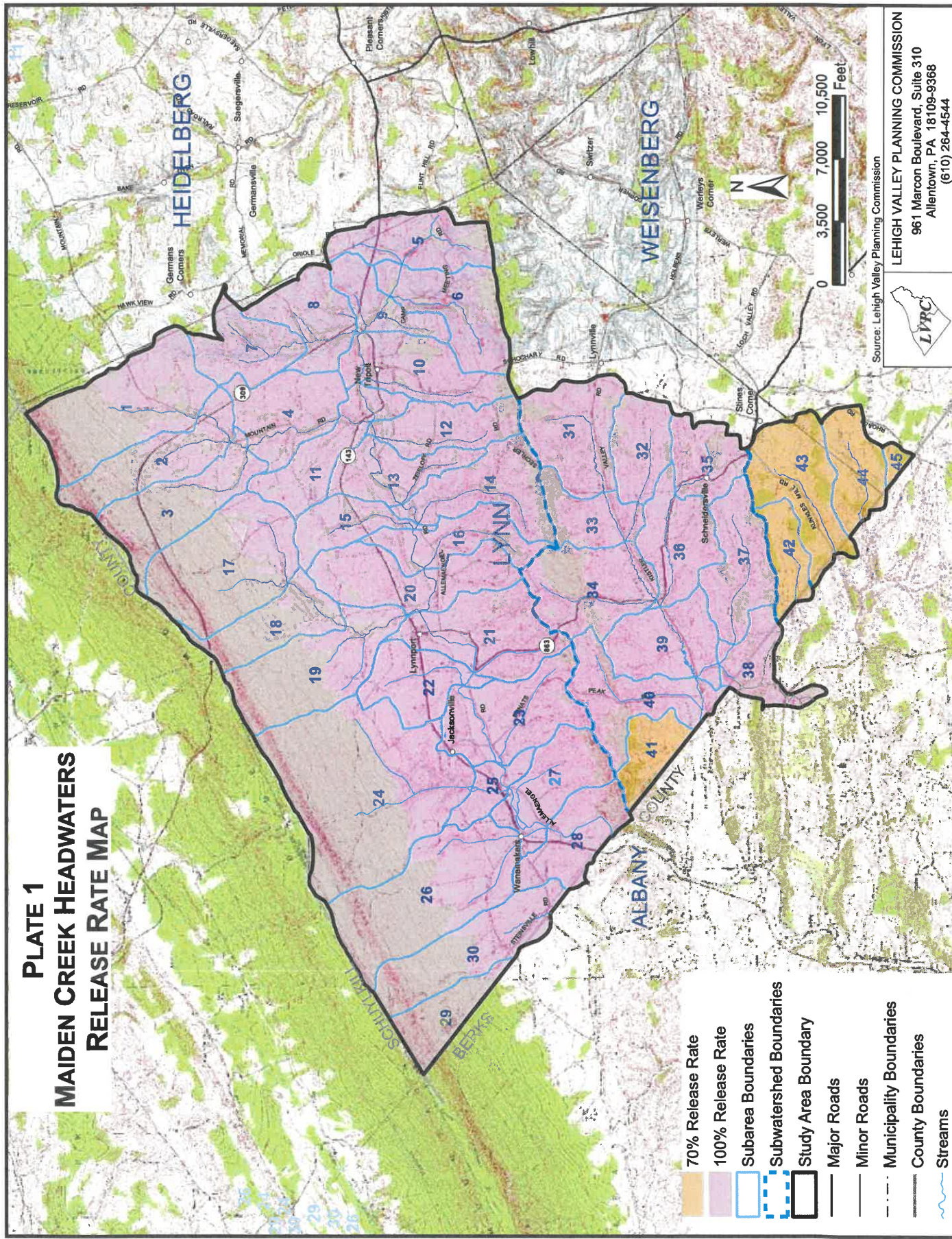


PLATE 1 **MAIDEN CREEK HEADWATERS** **RELEASE RATE MAP**



- 70% Release Rate
- 100% Release Rate
- Subarea Boundaries
- Subwatershed Boundaries
- Study Area Boundary
- Major Roads
- Minor Roads
- Municipality Boundaries
- County Boundaries
- Streams

Source: Lehigh Valley Planning Commission

LEHIGH VALLEY PLANNING COMMISSION
 961 Marcon Boulevard, Suite 310
 Allentown, PA 18109-9368
 (610) 264-4544

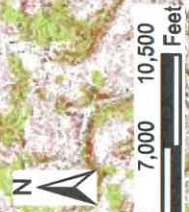
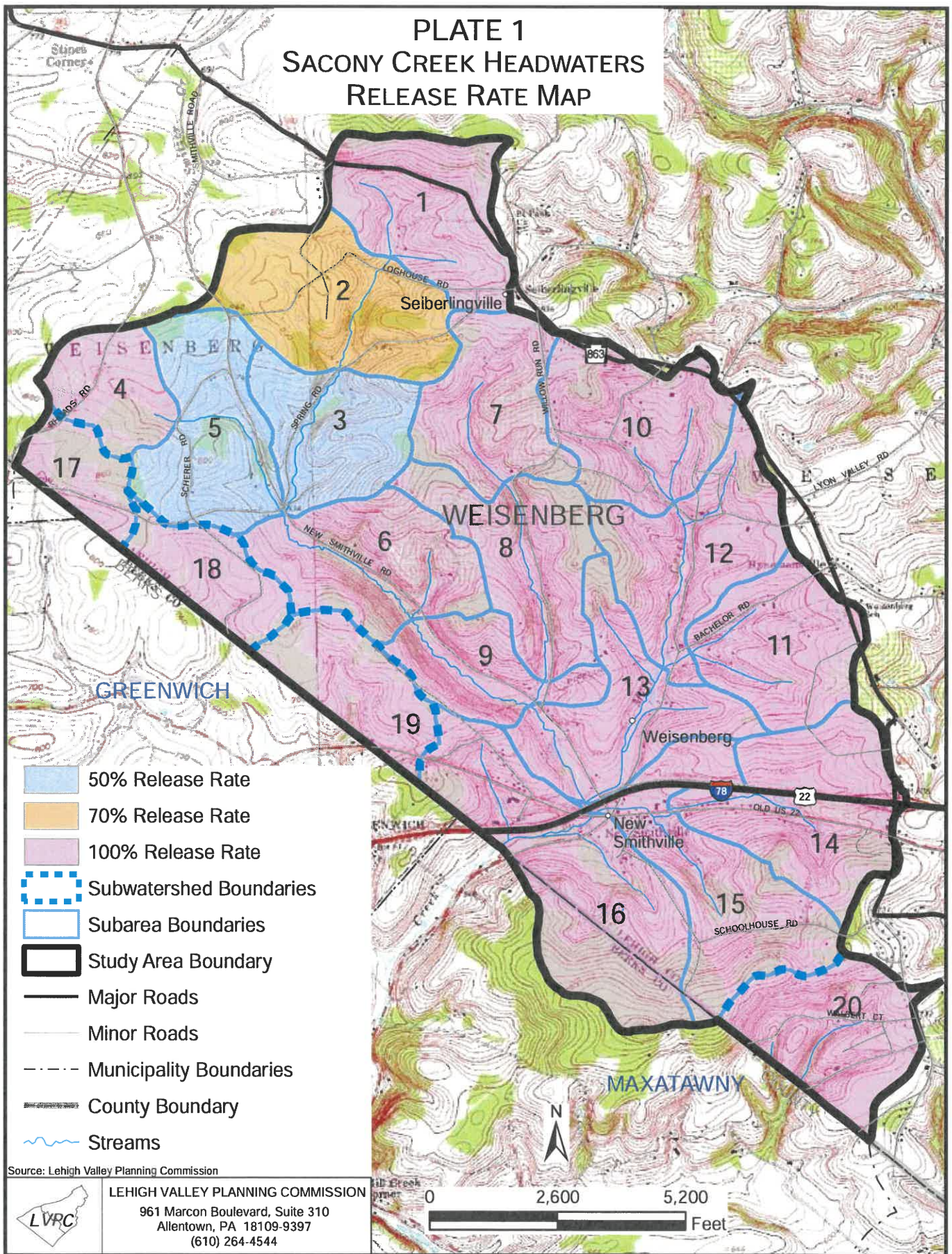


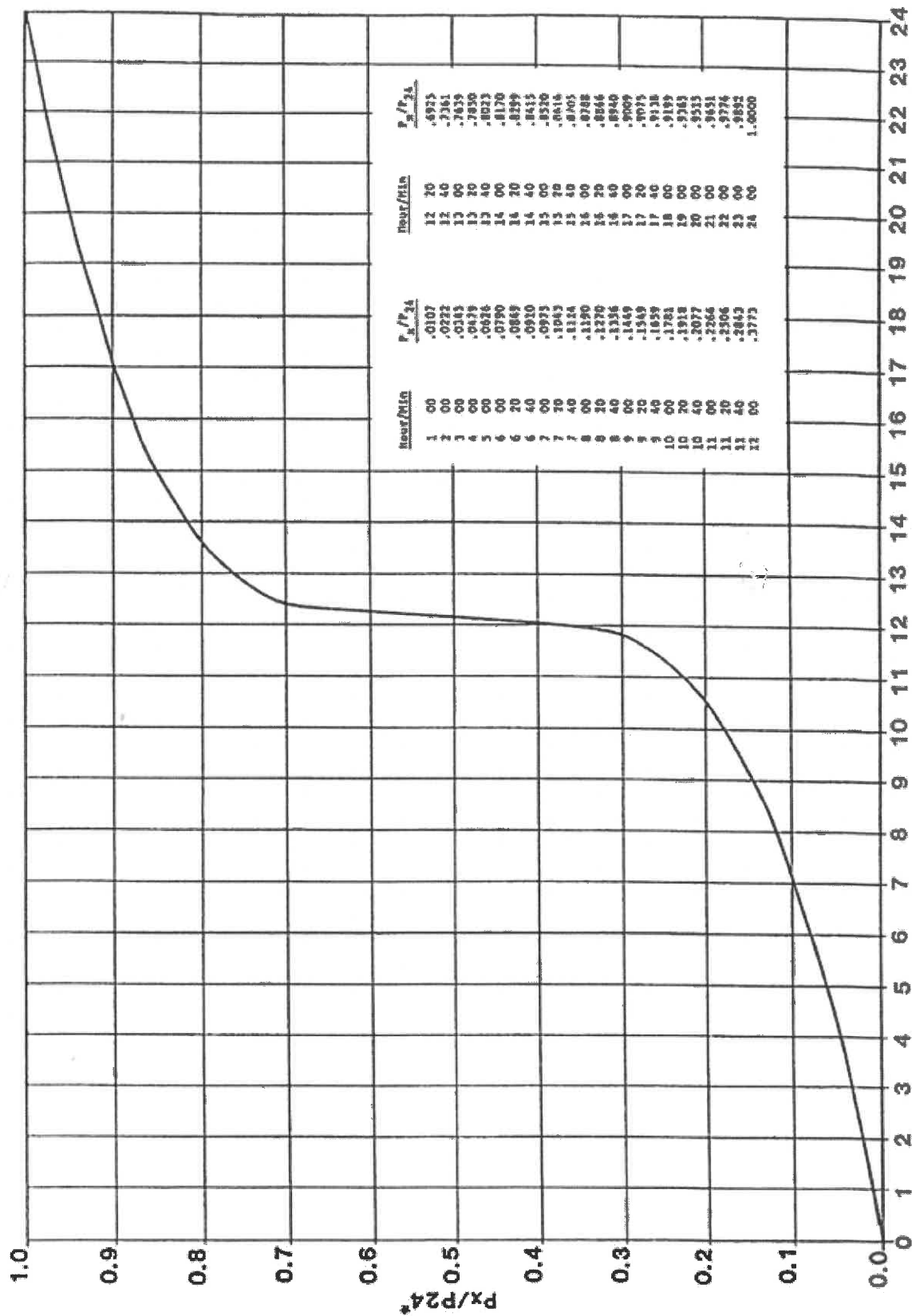
PLATE 1 SACONY CREEK HEADWATERS RELEASE RATE MAP



APPENDIX C

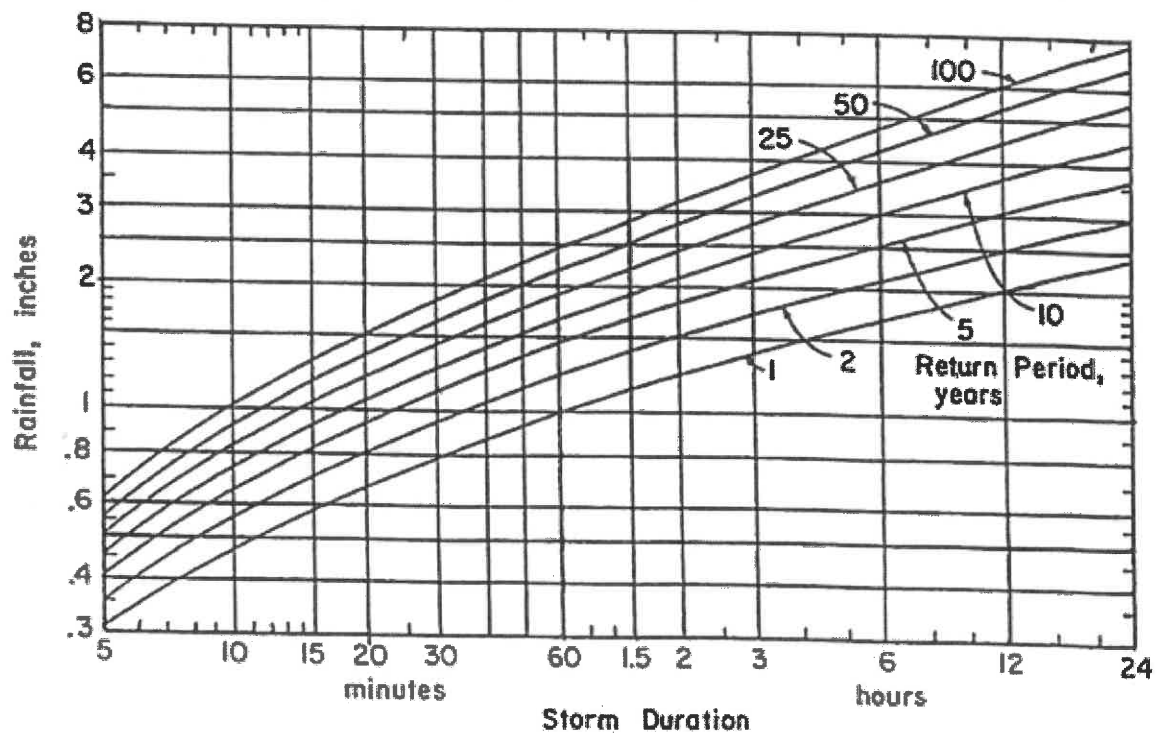
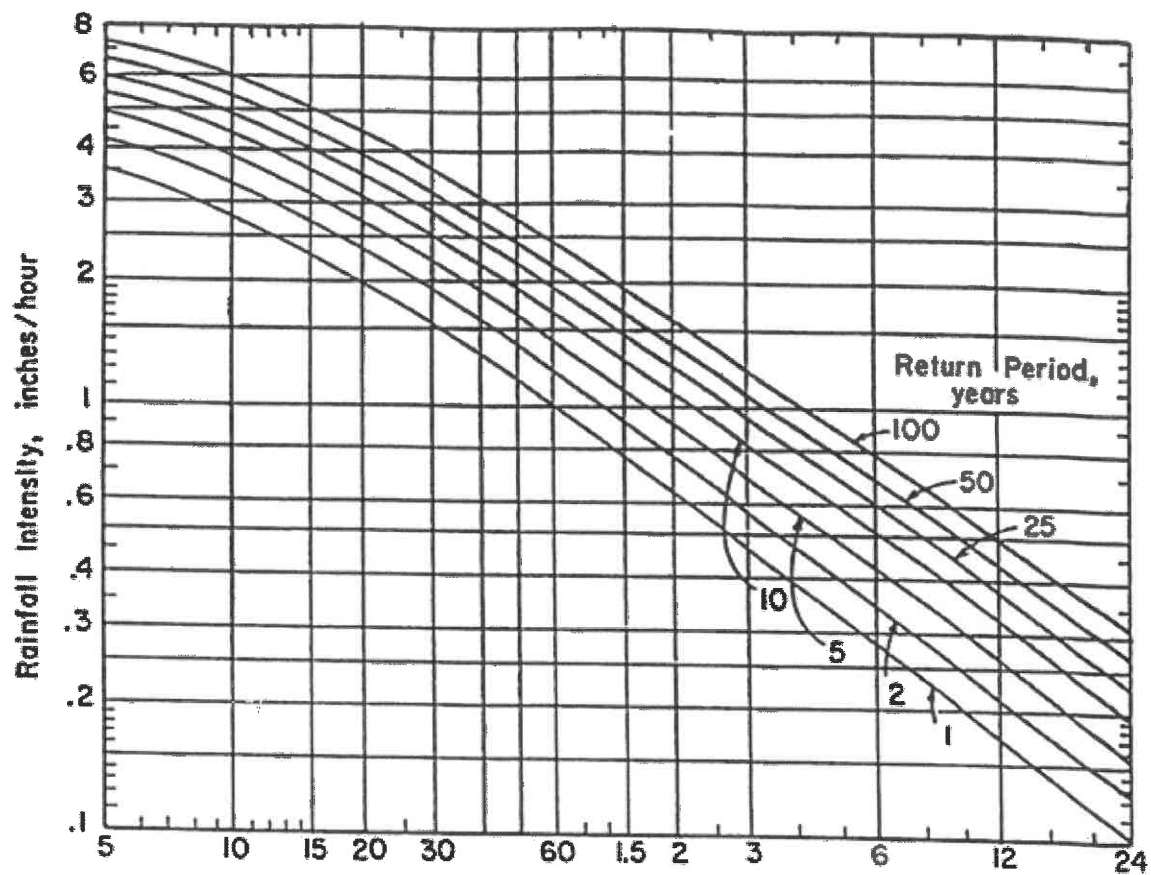
- C-1 NRCS Type II 24-Hour Rainfall Distribution (Graphic & Tabular)**
- C-2 Intensity-Duration-Frequency Curves**
- C-3 Runoff Curve Numbers and Percent Imperviousness Values**
- C-4 Runoff Coefficients for the Rational Method**
- C-5 Manning 'n' Values**
- C-6 Percent D-RE per Fraction Impervious versus Storage Curve**
- C-7 Percent D-RE per Fraction Impervious versus Storage Curve Usage Instructions**

NRCS TYPE II RAINFALL DISTRIBUTION



* P_x/P_{24} equals cumulative percentage rainfall as a fraction of the total 24 hour rainfall. HOURS

INTENSITY-DURATION-FREQUENCY CURVES*



*Source: Pennsylvania Dept. of Transp. Design Rainfall Curves (1986).

RUNOFF CURVE NUMBERS AND PERCENT IMPERVIOUSNESS VALUES*

Cover Description		Curve numbers for hydrologic soil group**			
Land Use/Cover Type	Average percent impervious area	A	B	C	D
Open space (lawns, parks, golf courses, cemeteries, etc.): Good condition (grass cover greater than 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
$\frac{1}{8}$ acre or less (townhouses)	65	77	85	90	92
$\frac{1}{4}$ acre	38	61	75	83	87
$\frac{1}{2}$ acre	30	57	72	81	86
$\frac{3}{4}$ acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Woods		30	55	70	77
Agriculture		Refer to Table 2-2b in source document (TR55) by crop type and treatment.			

*Source: Natural Resources Conservation Service Technical Release No. 55, Second Edition, June 1986.

**Hydrologic Soil Group based on the County Soil Survey latest edition.

RUNOFF COEFFICIENTS FOR THE RATIONAL METHOD*												
HYDROLOGIC SOIL GROUP AND SLOPE RANGE**												
LAND USE	A			B			C			D		
	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
Cultivated ^A	^a 0.18	0.23	0.28	0.24	0.29	0.33	0.30	0.34	0.38	0.33	0.37	0.41
	^b 0.23	0.29	0.34	0.30	0.36	0.40	0.36	0.41	0.45	0.39	0.44	0.48
Pasture ^B	0.09	0.13	0.17	0.19	0.24	0.29	0.27	0.31	0.36	0.31	0.35	0.39
	0.12	0.17	0.23	0.24	0.30	0.36	0.33	0.38	0.43	0.37	0.42	0.46
Meadow, Lawn ^C	0.05	0.08	0.12	0.15	0.20	0.24	0.23	0.28	0.32	0.28	0.32	0.36
	0.07	0.12	0.17	0.19	0.25	0.30	0.28	0.34	0.39	0.33	0.39	0.43
Forest, Woods	0.03	0.05	0.08	0.11	0.16	0.20	0.20	0.25	0.29	0.25	0.30	0.34
	0.04	0.08	0.12	0.15	0.21	0.26	0.25	0.31	0.36	0.31	0.37	0.41
Gravel	0.24	0.29	0.33	0.32	0.36	0.40	0.35	0.39	0.43	0.37	0.41	0.44
	0.30	0.36	0.40	0.38	0.43	0.47	0.42	0.46	0.50	0.44	0.48	0.51
Parking, Other Impervious	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87
	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97
Residential, Commercial, Industrial and Other “Developed”	Runoff coefficients should be calculated based upon weighted average of impervious area coefficients and pervious area coefficients from above based upon soil type, slope and the particular development proposal.											

*Coefficients for all land uses except parking and other impervious cover are based on the Rossmiller Equation for translating NRCS curve numbers into Rational Method 'c' values. The source for the parking and other impervious cover coefficients is RAWLS, W.J., S.L. WONG and R.H. McCUEN, 1981. Comparison of urban flood frequency procedures. Preliminary draft report prepared for the Soil Conservation Service, Beltsville, MD.

**Hydrologic Soil Group based on the county soil survey latest edition.

a - Runoff coefficients for storm recurrence intervals less than 25 years.

b - Runoff coefficients for storm recurrence intervals of 25 years or more.

^ARepresents average of cultivated land with and without conservation treatment from TR-55, January 1975. These values are consistent with several categories of cultivated lands from TR-55, June 1986.

^BRepresents grasslands in fair condition with 50% to 75% grass cover.

^CRepresents grasslands in good condition with greater than 75% grass cover.

MANNING 'n' VALUES BY TYPICAL REACH DESCRIPTION

<u>Reach Description</u>	<u>Manning 'n'</u>
Natural stream, clean, straight, no rifts or pools	0.030
Natural stream, clean, winding, some pools and shoals	0.040
Natural stream, winding, pools, shoals, stony with some weeds	0.050
Natural stream, sluggish with deep pools and weeds	0.070
Natural stream or swale, very weedy or with timber under brush	0.100
<hr/>	
Concrete pipe, culvert or channel	0.012
Corrugated metal pipe	0.012-0.027*
<hr/>	
*Depending upon type and diameter.	

ROUGHNESS COEFFICIENTS (MANNING 'n') FOR SHEET FLOW

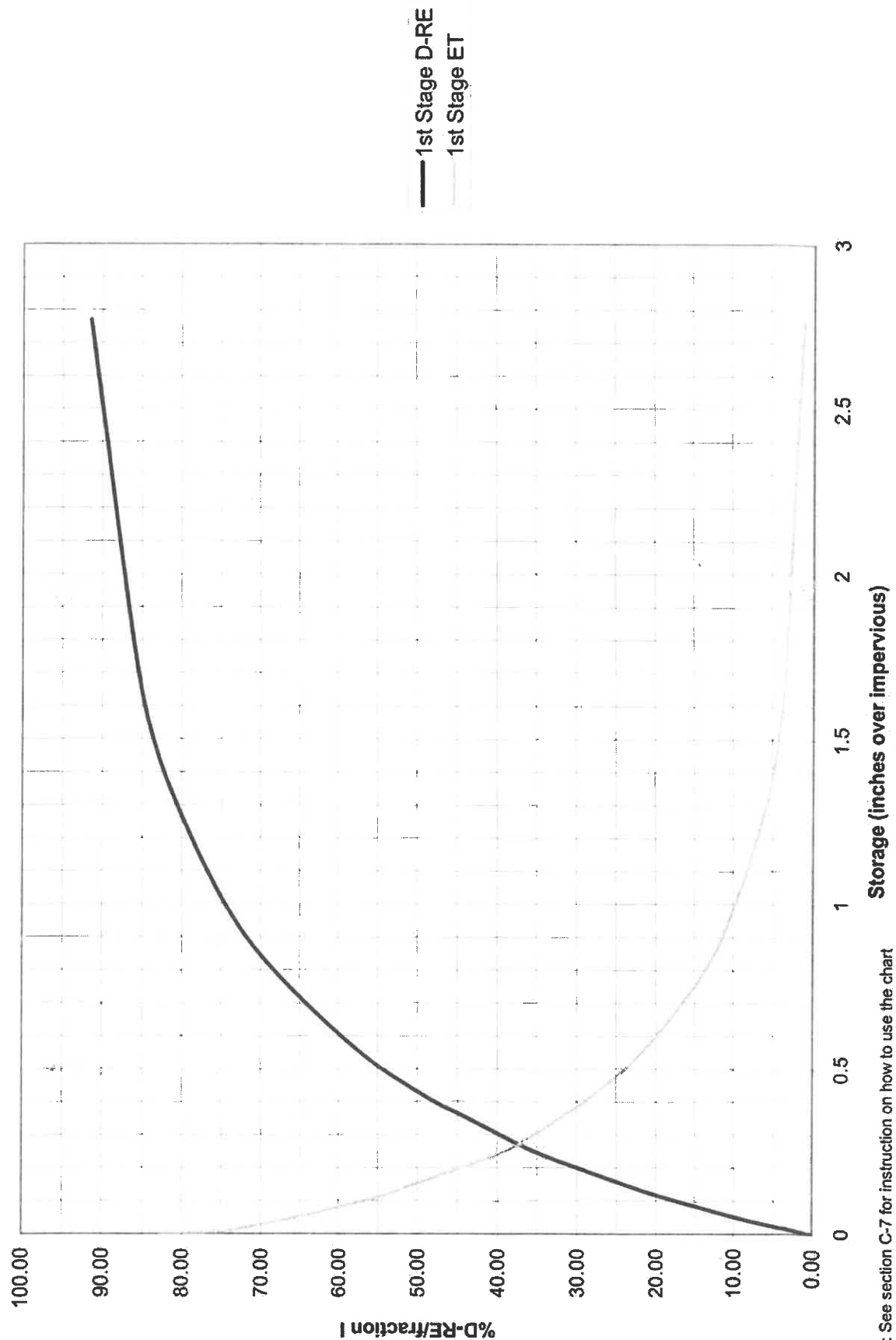
<u>Surface Description</u>	<u>Manning 'n'</u> ¹
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.050
Cultivated soils:	
Residue cover <= 20%	0.060
Residue cover > 20%	0.170
Grass:	
Short grass prairie	0.150
Dense grasses ²	0.240
Bermuda grass	0.410
Range (natural)	0.130
Woods: ³	
Light underbrush	0.400
Dense underbrush	0.800
<hr/>	

¹The 'n' values are a composite of information compiled by Engman (1986).

²Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass and native grass mixtures.

³When selecting 'n', consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

% Direct Recharge (D-RE) per Fraction Impervious vs. Storage



Note: See section C-7 for instruction on how to use the chart

PERCENT D-RE PER FRACTION IMPERVIOUS VERSUS STORAGE CURVE USAGE INSTRUCTIONS

The “1st Stage D-RE” curve is based on impervious areas being diverted first to a D-RE BMP designed to capture less than the 2-year event, with the remaining 2-year runoff overflowing into an ET BMP. The “1st stage ET” curve is based on reversing the above. The curves may be used for the whole site, or for pieces of a site to achieve successful designs as follows:

- A. If used for whole site designs, the “fraction I” used is the proposed impervious as a fraction of the entire site. As an example, for a 60% impervious site with all impervious directed to a first stage D-RE BMP, use 30% D-RE with 0.60 fraction I to yield 50% D-RE/fraction I and translate into 0.42 inches of storage over impervious areas. The total first stage D-RE maximum BMP storage is 0.42 inches of depth times the surface area of the impervious cover. Similarly, if a first stage ET BMP followed by a second stage D-RE BMP was used, the minimum ET storage is 0.15 inches over the impervious cover.
- B. If used for pieces of the site smaller than the whole site, the fraction I used is the impervious cover of the part of the site in question as a fraction of the area of the same piece. Each piece may be designed for 30% D-RE if desired, but individual pieces may exceed 30% D-RE provided all BMPs on site are providing less than 30% D-RE in aggregate. In this case, the BMP storage for each piece is used in the chart with the fraction I using the whole site area to determine the contribution of each piece to the 30% D-RE allowable. As an example, still using the 60% impervious site, a piece of the site uses a D-RE BMP first. The piece is half of the total area of the site and is 80% impervious. The BMP is designed for 0.6 inches of runoff from the impervious surfaces. Using 0.6 inches of storage and a fraction I of 0.80, the piece is designed for (%D-RE/Fraction I = 60) 48% D-RE. The impervious cover in this piece has fraction I of 0.4 of the overall site acreage and, therefore, using 0.6 inches of storage and a fraction I of 0.4 yields a D-RE/ fraction I of 60% using the graph which solves to a D-RE of 24%. This means that this piece uses 24% of the allowable 30% D-RE. The remaining piece(s) will need to be designed for 6% or less D-RE. The remaining piece in this example has a fraction I of the overall site of 0.2. Using 6% D-RE and a fraction I of 0.2 yields a D-RE/fraction I of 30%. Entering the graph at that value, the maximum storage for the piece in a first stage D-RE BMP is 0.2 inches over the impervious portion of its tributary area.
- C. If more than two stages of ET and D-RE BMPs are used to control the WQv, the design considerations are as follows:
 1. If the design has a first stage ET BMP draining to additional stage ET BMPs and subsequent D-RE BMP, add the storage volumes of the ET BMPs and use this volume as the first stage ET storage volume.
 2. Similarly, if two or more D-RE BMPs are used first followed by an ET BMP, add the storage volumes of the D-RE BMPs and use this volume as the first stage D-RE storage volume.

3. In designs with more than two ET or D-RE BMPs used in series to control the WQv and rules C.1 and C.2 don't apply, the chart shall be applied conservatively to assure the D-RE standard is not violated. For example, with proposed use of a first stage D-RE BMP, second stage ET BMP, and third stage D-RE BMP, all storage provided shall be assumed to be D-RE for use in the chart. Essentially, any ET BMP applied beyond the first stage will be ignored for purposes of determining compliance with the D-RE standard.

PERMISSIBLE VELOCITIES FOR SELECTED CHANNELS

CHANNEL LINING	PERMISSIBLE CHANNEL VELOCITY (FEET PER SECOND)
Vegetation ¹	
Grass Mixture	4.0 - 5.0
Kentucky Bluegrass	5.0 - 7.0
Kentucky 31 Tall Fescue	3.0 - 6.0
Red Clover or Red Fescue	2.5 - 3.5
Red Top	2.5 - 3.5
Red Canarygrass	3.0 - 4.0
Sericea Lespedeza	2.5 - 3.5
Sudan Grass	2.5 - 3.5
Weeping Lovegrass	2.5 - 3.5
Bare Earth, Easily Eroded ²	
Fine Sand	1.5
Sand Loam	1.75
Silt Loam or Alluvial Silts, Loose	2.0
Firm Loam	2.50
Bare Earth, Erosion Resistant ²	
Fine Gravel	2.5
Stiff Clay or Alluvial Silts, Firm	3.75
Loam to Cobbles (Graded)	3.75
Silt to Cobbles (Graded or Course Gravel)	4.0
Cobbles and Stones or Shales and Hardpans	6.0
Rock Lined	
6" Rip Rap	9.0
9" Rip Rap	11.5
12" Rip Rap	13.0

¹ Maximum permissible velocities dependent on soil erodibility and slope.

² Maximum permissible velocities in bare earth channels - for straight channels where slopes <0.02 ft./ft.

Source: Department of Environmental Protection, *Erosion and Sediment Pollution Control Program Manual*, April 1990.

APPENDIX D

Recommendation Chart for Infiltration Stormwater Management BMP's in Carbonate Bedrock

SITE RISK FACTORS		CARBONATE BEDROCK												
		Less than 2 Feet		2 to 4 Feet				Over 4 Feet to 8 Feet				Over 8 Feet		
Geology Type			Low Buffer	Medium Buffer	High Buffer	Low Buffer	Medium Buffer	High Buffer	Low Buffer	Medium Buffer	High Buffer	Low Buffer	Medium Buffer	High Buffer
Eutrophic Soil Thickness														
Special Geologic Features*		Low/High Buffer	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary
		(Unacceptable)												
DESIGN FACTORS	Initiation Loading Rates (% Increase) **	(Unacceptable)	0-100% 300% 500%	0-100% 300% 500%	0-100% 300% 500%	0-100% 300% 500%	0-100% 300% 500%	0-100% 300% 500%	0-100% 300% 500%	0-100% 300% 500%	0-100% 300% 500%	0-100% 300% 500%	0-100% 300% 500%	0-100% 300% 500%
	PROGRAM SUMMARY GUIDANCE ***													



* Special Geologic Feature Buffer widths are as follows:

- Low Buffer is less than 50 feet
- Medium Buffer is 50 feet to 100 feet
- High Buffer is greater than 100 feet

** Rates greater than 500% not recommended.

*** Assumes adequately permeable soils and lack of natural constraints as required for all infiltration systems.

1. Infiltration systems may be allowed at the determination of the Engineer and/or Geologist, provided that a Detailed Site Investigation is undertaken which confirms nature of rock, location of Special Geologic Features, and adequacy of the buffer between the SCF and the proposed stormwater system(s).
2. In these Special Geologic Features: Low Buffer situations, infiltration systems may be allowed at the determination of the Engineer and/or Geologist, provided that a Detailed Site Investigation is undertaken and a 25 foot buffer from SCFs is maintained.

*** APPENDIX E**

**STORMWATER BEST MANAGEMENT PRACTICES
OPERATIONS AND MAINTENANCE AGREEMENT**

THIS AGREEMENT, made and entered into this _____ day of _____, 200__, by and between _____, (hereinafter the "Landowner"), and _____, _____ County, Pennsylvania, (hereinafter "municipality");

WITNESSETH

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

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

WHEREAS, the stormwater management BMP Operations and Maintenance Plan approved by the municipality (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 the municipality, provides for management of stormwater within the confines of the Property through the use of Best Management Practices (BMP's); and

WHEREAS, the municipality, and the Landowner, his successors and assigns, agree that the health, safety, and welfare of the residents of the municipality and the protection and maintenance of water quality require that on-site stormwater Best Management Practices be constructed and maintained on the Property; and

WHEREAS, for the purposes of this agreement, the following definitions shall apply:

BMP – "Best Management Practice;" activities, facilities, designs, measures or procedures used to manage stormwater impacts from land development, to protect and maintain water quality and groundwater recharge and to otherwise meet the purposes of the Municipal Stormwater Management Ordinance, including but not limited to infiltration trenches, seepage pits, filter strips, bioretention, wet ponds, permeable paving, rain gardens, grassed swales, forested buffers, sand filters and detention basins.

Infiltration Trench – A BMP surface structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,

Seepage Pit – An underground BMP structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,

Rain Garden – A BMP overlain with appropriate mulch and suitable vegetation designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or underground aquifer, and

WHEREAS, the municipality requires, through the implementation of the Plan, that stormwater management BMPs as required by said Plan and the Municipal Stormwater

Management Ordinance be constructed and adequately operated and maintained by the Landowner, his successors and assigns. And

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 BMPs shall be constructed by the Landowner in accordance with the plans and specifications identified in the Plan.
2. The Landowner shall operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the municipality and in accordance with the specific maintenance requirements noted on the Plan.
3. The Landowner hereby grants permission to the municipality, its authorized agents and employees, to enter upon the property, at reasonable times and upon presentation of proper identification, to inspect the BMP(s) whenever it deems necessary. Whenever possible, the municipality shall notify the Landowner prior to entering the property.
4. In the event the Landowner fails to operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the municipality, the municipality or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s). This provision shall not be construed to allow the municipality to erect any permanent structure on the land of the Landowner. It is expressly understood and agreed that the municipality 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 the municipality.
5. In the event the municipality, 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 the municipality for all expenses (direct and indirect) incurred within 10 days of receipt of invoice from the municipality *and if not timely paid, a municipal lien shall be placed upon the premises for 110% of the invoice amount, plus statutorily allowed fees, expenses and costs.*
6. The intent and purpose of this Agreement is to ensure the proper maintenance of the onsite BMP(s) 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, *hereby release and hold harmless* the municipality's employees and designated representatives 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. In the event that a claim is asserted against the municipality, its designated representatives or employees, the municipality shall promptly notify the Landowner and the Landowner shall defend, at his own expense, any suit based on the claim. If any judgment or claims against the municipality's employees or designated representatives shall be allowed, the Landowner shall pay all costs and expenses regarding said judgment or claim.
8. The municipality shall inspect the BMP(s) *as necessary* to ensure their continued functioning.

This Agreement shall be recorded at the Office of the Recorder of Deeds of _____ 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 the municipality:

(SEAL)

For the Landowner:

ATTEST:

_____ (City, Borough, Township)

County of _____, 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 _____, 200_.

NOTARY PUBLIC

(SEAL)

APPENDIX F

LOW IMPACT DEVELOPMENT PRACTICES

ALTERNATIVE APPROACH FOR MANAGING STORMWATER RUNOFF

Natural hydrologic conditions may be altered radically by poorly planned development practices, such as introducing unneeded impervious surfaces, destroying existing drainage swales, constructing unnecessary storm sewers, and changing local topography. A traditional drainage approach of development has been to remove runoff from a site as quickly as possible and capture it in a detention basin. This approach leads ultimately to the degradation of water quality as well as expenditure of additional resources for detaining and managing concentrated runoff at some downstream location.

The recommended alternative approach is to promote practices that will minimize post-development runoff rates and volumes, which will minimize needs for artificial conveyance and storage facilities. To simulate pre-development hydrologic conditions, forced infiltration is often necessary to offset the loss of infiltration by creation of impervious surfaces. The ability of the ground to infiltrate depends upon the soil types and its conditions.

Preserving natural hydrologic conditions requires careful alternative site design considerations. Site design practices include preserving natural drainage features, minimizing impervious surface area, reducing the hydraulic connectivity of impervious surfaces, and protecting natural depression storage. A well-designed site will contain a mix of all those features. The following describes various techniques to achieve the alternative approach:

- **Preserving Natural Drainage Features.** Protecting natural drainage features, particularly vegetated drainage swales and channels, is desirable because of their ability to infiltrate and attenuate flows and to filter pollutants. However, this objective is often not accomplished in land development. In fact, commonly held drainage philosophy encourages just the opposite pattern -- streets and adjacent storm sewers typically are located in the natural headwater valleys and swales, thereby replacing natural drainage functions with a completely impervious system. As a result, runoff and pollutants generated from impervious surfaces flow directly into storm sewers with no opportunity for attenuation, infiltration, or filtration. Developments designed to fit site topography also minimizes the amount of grading on site.
- **Protecting Natural Depression Storage Areas.** Depressional storage areas have no surface outlet, or drain very slowly following a storm event. They can be commonly seen as ponded areas in farm fields during the wet season or after large runoff events. Traditional development practices eliminate these depressions by filling or draining, thereby obliterating their ability to reduce surface runoff volumes and trap pollutants. The volume and release-rate characteristics of depressions should be protected in the design of the development site. The depressions can be protected by simply avoiding the depression or by incorporating its storage as additional capacity in required detention facilities.

- **Avoiding Introduction of Impervious Areas.** Careful site planning should consider reducing impervious coverage to the maximum extent possible. Building footprints, sidewalks, driveways and other features producing impervious surfaces should be evaluated to minimize impacts on runoff.
- **Reducing the Hydraulic Connectivity of Impervious Surfaces.** Impervious surfaces are significantly less of a problem if they are not directly connected to an impervious conveyance system (such as storm sewer). Two basic ways to reduce hydraulic connectivity are routing of roof runoff over lawns and reducing the use of storm sewers. Site grading should promote increasing travel time of stormwater runoff, and should help reduce concentration of runoff to a single point in the development.
- **Routing Roof Runoff Over Lawns.** Roof runoff can be easily routed over lawns in most site designs. The practice discourages direct connections of downspouts to storm sewers or parking lots. The practice also discourages sloping driveways and parking lots to the street. By routing roof drains and crowning the driveway to run off to the lawn, the lawn is essentially used as a filter strip.
- **Reducing the Use of Storm Sewers.** By reducing use of storm sewers for draining streets, parking lots, and back yards, the potential for accelerating runoff from the development can be greatly reduced. The practice requires greater use of swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a “reasonable” time. The practice requires educating local citizens and public works officials, who expect runoff to disappear shortly after a rainfall event.
- **Reducing Street Widths.** Street widths can be reduced by either eliminating on-street parking or by reducing roadway widths. Municipal planners and traffic designers should encourage narrower neighborhood streets which ultimately could lower maintenance.
- **Limiting Sidewalks to One Side of the Street.** A sidewalk on one side of the street may suffice in low-traffic neighborhoods. The lost sidewalk could be replaced with bicycle/recreational trails that follow back-of-lot lines. Where appropriate, backyard trails should be constructed using pervious materials.
- **Using Permeable Paving Materials.** These materials include permeable interlocking concrete paving blocks or porous bituminous concrete. Such materials should be considered as alternatives to conventional pavement surfaces, especially for low use surfaces such as driveways, overflow parking lots, and emergency access roads.
- **Reducing Building Setbacks.** Reducing building setbacks reduces driveway and entry walks and is most readily accomplished along low-traffic streets where traffic noise is not a problem.
- **Constructing Cluster Developments.** Cluster developments can also reduce the amount of impervious area for a given number of lots. The biggest savings is in street length, which also will reduce costs of the development. Cluster development clusters the construction activity onto less-sensitive areas without substantially affecting the gross density of development.

APPENDIX G

PRELIMINARY SITE INVESTIGATION AND TESTING REQUIREMENTS

Required Data and Site Information: The following data shall be gathered utilizing standard testing procedures as part of a Preliminary Site Investigation:

Bedrock composition – Any apparent boundaries between carbonate and non-carbonate bedrock must be verified by a qualified geotechnical professional.

Bedrock structural geology – This includes the possible presence of faults and mapping of conspicuous fracture traces or lineaments.

Overburden and soil mantle composition and thickness

Permeability of the soil

Depth to the seasonal high water table

Presence of special geologic features – This includes sinkholes, closed depressions, fracture traces, lineaments and geologic contacts between carbonate and non-carbonate bedrock

Investigation Required for All Sites

Review of Available Data, Maps and Reports: Some of the required information, as listed above, can be found in existing published data. Suggested resources include the following:

Geologic maps and references for the development area

The Little Lehigh Creek Basin Carbonate Prototype Area Closed Depression Map – available at the LVPC

USGS topographic maps

Lehigh and Berks County soil survey maps

Aerial photographs from the LVPC or other sources

Relevant Pennsylvania Geologic Survey Open File Reports (Kochanov 1987a, 1987b) that provide maps of sinkholes and Karst features for Lehigh and Berks counties

Field Inspections: In addition to gathering data from published sources, a field inspection of the proposed site is required. A field inspection can provide additional information relating to site features such as carbonate bedrock features, indicators of seasonal high stream-level or water table levels, streams, springs, etc.

Soil Test Pit and Percolation Test Requirements: A minimum of one test pit and a minimum of 2 percolation tests are required for every site. A test pit is a 2-3 foot wide, 8 foot deep trench excavated with a backhoe for observing subsurface conditions. The test pits will be used to describe soil depth and quality, including soil horizons, and testing of permeability or percolation rates.

Percolation tests are to be conducted as follows (adapted from § 73.15. “Percolation Tests” of the Pennsylvania Code)

1. The percolation tests shall be made in separate holes uniformly spaced over the possible infiltration area.
2. An “Initial Presoak” should not be performed.

3. Percolation holes located within the possible infiltration area shall be used in the calculation of the average percolation rate.
4. Holes having a uniform diameter of 6 to 10-inches shall be bored or dug as follows:
 - a. To the depth of the bottom of the possible infiltration BMP
 - b. Alternate depths if the test pits/auger holes indicate that the soils are more suitable at a different depth (i.e., if a clay horizon is identified and more suitable soils are located beneath the horizon, and infiltration test should be performed in the suitable horizon).
5. The bottom and sides of the hole shall be scarified with a knife blade or sharp-pointed instrument to completely remove any smeared soil surfaces and to provide a natural soil interface into which water may percolate. Loose material shall be removed from the hole. Two inches of coarse sand or fine gravel shall be placed in the bottom of the hole to protect the soil from scouring and clogging of the pores.
6. Immediately before the percolation test, as a final presoak, water shall be placed in the hole to a minimum depth of 6-inches over the gravel and readjusted every 30 minutes for 1 hour.
7. The drop in the water level during the last 30 minutes of the final presoaking period shall be applied to the following standard to determine the time interval between readings for each percolation hole:
 - a. If water remains in the hole, the interval for readings during the percolation test shall be 30 minutes.
 - b. If no water remains in the hole, the interval for readings during the percolation test may be reduced to 10 minutes.
8. After the final presoaking period, water in the hole shall again be adjusted to approximately 6-inches over the gravel and readjusted when necessary after each reading.
 - a. Measurement to the water level in the individual percolation holes shall be made from a fixed reference point and shall continue at the interval determined from step No. 7 (above) for each individual percolation hole until a minimum of eight readings are completed or until a stabilized rate of drop is obtained, whichever occurs first. A stabilized rate of drop means a difference of $\frac{1}{4}$ -inch or less of drop between the highest and lowest readings of four consecutive readings.
 - b. The drop that occurs in the final period in percolation test holes, expressed as inches per hour, shall be used to calculate the average percolation rate.
 - c. When the rate of drop in a percolation test is too slow to obtain a measurable rate, the rate of 0.25 inches per hour shall be assigned to that hole for use in calculating the average percolation rate. The infiltration area may be placed over holes with no measurable rate when the average percolation rate for the possible infiltration area is within the acceptable range.

When a percolation test hole yields a percolation rate of greater than 12-inches per hour, the proposed infiltration area may not be designed or installed within 25-feet of this hole unless the

municipality determines that a testing anomaly caused the fast percolation rate and a retest of the area yields acceptable percolation rates. This percolation rate limit is established to protect groundwater quality and to minimize the risk of subsidence.

Additional Site Investigation and Testing Required if Infiltration is Proposed

Soil Test Pit Requirements: The required number of test pits varies with Effective Soil Thickness. As risk factors increase, the number of test pits increases. A minimum of 2 test pits, uniformly spaced within the proposed infiltration area (e.g. the 2 pits should be centered on each half of the proposed infiltration area), are required for any site proposing infiltration unless the applicant can demonstrate that one test pit is adequately representative of the area proposed for infiltration. For larger infiltration areas, multiple test pits shall be developed at the densities as listed below:

Effective Soil Thickness (ft.)	Test Pit Density (per acre of proposed infiltration area)*	Percolation Tests (per acre of proposed infiltration area)**	Auger Grid Spacing (Feet On-Center)
8	4	8	50
4 to 8	6	12	35
2 to 4	8	16	25

*No. of Test Pits required = Infiltration sq. ft./43,560 sq. ft. x test pit density from chart rounded up to the nearest whole number

** No. of Percolation Tests required = Infiltration sq. ft./43,560 sq. ft. x percolation tests from chart rounded up to the nearest whole number

Soil Auger Testing Requirements for Carbonate Areas: Because soil depth is not uniform in many carbonate areas, test pits will not be sufficient to accurately determine the depth to bedrock. Augering provides this essential data as inexpensively as possible. Track-rig rotary soil auger test drilling allows relatively inexpensive, qualitative determination of the presence of overburden voids and will generally penetrate to the top-of-bedrock. Augers typically extend to depths of 20 feet. Special augers extend to as much as 50 feet. Augers do not extend into the bedrock. Auger testing should be performed in a grid pattern across the proposed infiltration area, spaced as indicated in the above table.

Percolation Testing Requirements: A minimum of six percolation tests shall be conducted in accordance with the procedures listed above unless the applicant can demonstrate that fewer tests accurately represent the percolation rate of the proposed infiltration area. Additional testing shall be required if the initial test results show significant variability in percolation rate. For larger infiltration areas, percolation tests shall be conducted at the densities listed in the table above.

APPENDIX F

LIST OF ACCEPTABLE BMPs

Best Management Practice	Design Reference Number ^b
Bioretention ^a	4, 5, 11, 16
Capture/Reuse	4, 14
Constructed Wetlands	4, 5, 8, 10, 16
Dry Extended Detention Ponds	4, 5, 8, 12, 18
Minimum Disturbance/ Minimum Maintenance Practices	1, 9
Significant Reduction of Existing Impervious Cover	N/A
Stormwater Filters ^a (Sand, Peat, Compost, etc.)	4, 5, 10, 16
Vegetated Buffers/Filter Strips	2, 3, 5, 11, 16, 17
Vegetated Roofs	4, 13
Vegetated Swales ^a	2, 3, 5, 11, 16, 17
Water Quality Inlets ^c	4, 7, 15, 16, 19
Wet Detention Ponds	4, 5, 6, 8

^a This BMP could be designed with or without an infiltration component. If infiltration is proposed, the site and BMP will be subject to the testing and other infiltration requirements in this Ordinance.

^b See table below.

^c Water Quality Inlets include such BMPs as Oil/Water Separators, Sediment Traps/Catch Basin Sumps, and Trash/Debris Collectors in Catch Basins.

Number	Design Reference Title
1	"Conservation Design For Stormwater Management – A Design Approach to Reduce Stormwater Impacts From Land Development and Achieve Multiple Objectives Related to Land Use", Delaware Department of Natural Resources and Environmental Control, The Environmental Management Center of the Brandywine Conservancy, September 1997
2	"A Current Assessment of Urban Best Management Practices: Techniques for Reducing Nonpoint Source Pollution in the Coastal Zone", Schueler, T. R., Kumble, P. and Heraty, M., Metropolitan Washington Council of Governments, 1992.
3	"Design of Roadside Channels with Flexible Linings", Federal Highway Administration, Chen, Y. H. and Cotton, G. K., Hydraulic Engineering Circular 15, FHWA-IP-87-7, McLean Virginia, 1988.

LIST OF ACCEPTABLE BMPs

Number	Design Reference Title
4	"Draft Stormwater Best Management Practices Manual", Pennsylvania Department of Environmental Protection, January 2005.
5	"Evaluation and Management of Highway Runoff Water Quality", Federal Highway Administration, FHWA-PD-96-032, Washington, D.C., 1996.
6	"Evaporation Maps of the United States", U.S. Weather Bureau (now NOAA/National Weather Service) Technical Paper 37, Published by Department of Commerce, Washington D.C., 1959.
7	"Georgia Stormwater Manual", AMEC Earth and Environmental, Center for Watershed Protection, Debo and Associates, Jordan Jones and Goulding, Atlanta Regional Commission, Atlanta, Georgia, 2001.
8	"Hydraulic Design of Highway Culverts", Federal Highway Administration, FHWA HDS 5, Washington, D.C., 1985 (revised May 2005).
9	"Low Impact Development Design Strategies <i>An Integrated Design Approach</i> ", Prince Georges County, Maryland Department of Environmental Resources, June 1999.
10	"Maryland Stormwater Design Manual", Maryland Department of the Environment, Baltimore, Maryland, 2000.
11	"Pennsylvania Handbook of Best Management Practices for Developing Areas", Pennsylvania Department of Environmental Protection, 1998.
12	"Recommended Procedures for Act 167 Drainage Plan Design", LVPC, Revised 1997.
13	"Roof Gardens History, Design, and Construction", Osmundson, Theodore. New York: W.W. Norton & Company, 1999.
14	"The Texas Manual on Rainwater Harvesting", Texas Water Development Board, Austin, Texas, Third Edition, 2005.
15	"VDOT Manual of Practice for Stormwater Management", Virginia Transportation Research Council, Charlottesville, Virginia, 2004.
16	"Virginia Stormwater Management Handbook", Virginia Department of Conservation and Recreation, Richmond, Virginia, 1999.
17	"Water Resources Engineering", Mays, L. W., John Wiley & Sons, Inc., 2005.
18	"Urban Hydrology for Small Watersheds", Technical Report 55, US Department of Agriculture, Natural Resources Conservation Service, 1986.
19	US EPA, Region 1 New England web site (as of August 2005) http://www.epa.gov/NE/assistance/ceitts/stormwater/techs/html .

LIST OF ACCEPTABLE BMPs

PRE-TREATMENT METHODS FOR “HOT SPOT” LAND USES

Hot Spot Land Use	Pre-treatment Method(s)
Vehicle Maintenance and Repair Facilities including Auto Parts Stores	<ul style="list-style-type: none"> -Water Quality Inlets -Use of Drip Pans and/or Dry Sweep Material Under Vehicles/Equipment -Use of Absorbent Devices to Reduce Liquid Releases -Spill Prevention and Response Program
Vehicle Fueling Stations	<ul style="list-style-type: none"> -Water Quality Inlets -Spill Prevention and Response Program
Storage Areas for Public Works	<ul style="list-style-type: none"> -Water Quality Inlets -Use of Drip Pans and/or Dry Sweep Material Under Vehicles/Equipment -Use of Absorbent Devices to Reduce Liquid Releases -Spill Prevention and Response Program -Diversion of Stormwater away from Potential Contamination Areas
Outdoor Storage of Liquids	<ul style="list-style-type: none"> -Spill Prevention and Response Program
Commercial Nursery Operations	<ul style="list-style-type: none"> -Vegetated Swales/Filter Strips -Constructed Wetlands -Stormwater Collection and Reuse
Salvage Yards and Recycling Facilities*	-BMPs that are a part of a Stormwater Pollution Prevention Plan under an NPDES Permit
Fleet Storage Yards and Vehicle Cleaning Facilities*	-BMPs that are a part of a Stormwater Pollution Prevention Plan under an NPDES Permit
Facilities that Store or Generate Regulated Substances*	-BMPs that are a part of a Stormwater Pollution Prevention Plan under an NPDES Permit
Marinas*	-BMPs that are a part of a Stormwater Pollution Prevention Plan under an NPDES Permit
Certain Industrial Uses (listed under NPDES)*	-BMPs that are a part of a Stormwater Pollution Prevention Plan under an NPDES Permit

*Regulated under the NPDES Stormwater Program

Design references for the pre-treatment methods, as necessary, are listed below. If the applicant can demonstrate to the satisfaction of the municipality that the proposed land use is not a Hot Spot, then the pre-treatment requirement would not apply.

LIST OF ACCEPTABLE BMPs

Pre-treatment Method	Design Reference[^]
Constructed Wetlands	4, 5, 8, 10, 16
Diversion of Stormwater Away from Potential Contamination Areas	4, 11
Stormwater Collection and Reuse (especially for irrigation)	4, 14
Stormwater Filters (Sand, Peat, Compost, etc.)	4, 5, 10, 16
Vegetated Swales	2, 3, 5, 11, 16, 17
Water Quality Inlets	4, 7, 15, 16, 19

[^]These numbers refer to the Design Reference Title Chart beginning on page F-1.