

ORDINANCE NO. 2007-04

AN ORDINANCE AMENDING EAST ALLEN TOWNSHIP ORDINANCE NO. 98-1 (AS AMENDED BY ORDINANCE NO. 2005-02), STORMWATER MANAGEMENT ORDINANCE, TO INCLUDE THE PROVISIONS OF THE ACT 167 STORMWATER MANAGEMENT PLAN WATER QUALITY UPDATE AS ADOPTED BY NORTHAMPTON COUNTY AND APPROVED BY THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION.

BE IT ORDAINED AND ENACTED, AND IT IS HEREBY ORDAINED AND ENACTED, by the Board of Supervisors, East Allen Township, County of Northampton, Commonwealth of Pennsylvania, Ordinance No. 98-1, as amended by Ordinance 2005-02, is amended as follows:

1. AMEND **SECTION 101. STATEMENT OF FINDINGS** TO READ AS FOLLOWS:

The governing body of the municipality 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, overtakes 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.
- B. A comprehensive program of stormwater management, 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 base flow 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 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. Non-stormwater discharges to municipal separate storm sewer systems can contribute to pollution of waters of the Commonwealth by the municipality.

2. AMEND **SECTION 102. PURPOSE** TO READ AS FOLLOWS:

The purpose of this Ordinance is to promote the public health, safety and welfare within the municipality by minimizing the damages and maximizing the benefits described in Section 101 of this Ordinance 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 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 Chapter 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 stream banks and streambeds.
- K. Provide standards to meet the NPDES permit requirements.

3. AMEND **SECTION 104. APPLICABILITY** TO READ AS FOLLOWS:

- A. This Ordinance shall apply to the entire Township.
- B. The following activities are defined as Regulated Activities and shall be governed by this Ordinance:
 - 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.

4. ADD THE FOLLOWING NEW SECTION:

SECTION 105. EXEMPTIONS

- A. Impervious Cover - Any proposed Regulated Activity, except those defined in Section 104.B.(5), (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 Ordinance. 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 Ordinance. 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 Ordinance.
1. The date of the municipal Ordinance adoption of the original Act 167 Stormwater Management Ordinance, February 19, 1993, 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.
 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 Ordinance is exempt from the Drainage Plan preparation provisions of this Ordinance, except as cited in Section 105.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 Ordinance, preparation of a new Drainage Plan, subject to the provisions of this Ordinance, 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. 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.
- D. No exemptions shall be provided for Regulated Activities as defined in Sections 104.B.(5), (6), and (7).

5. **AMEND SECTION 201. SPECIFIC DEFINITIONS BY ADDING THE FOLLOWING DEFINITIONS:**

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 104, to meet State Water Quality Requirements, to promote groundwater recharge and to otherwise meet the purposes of this Ordinance.

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 sub-surface, for later re-use, 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 non-infiltration 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.

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

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 (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.

Diffused Drainage – See Sheet Flow.

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.

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 Chapter 93.1)

Fill – Man-made deposits of natural soils or rock products and waste materials.

Filter Strips – See Vegetated Buffers.

Hardship Waiver Request – A written request for a waiver alleging that the provisions of this Ordinance inflict unnecessary hardship upon the applicant. A Hardship Waiver does not apply to and is not available from the water quality provisions of this Ordinance and should not be granted.

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 US 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.

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 307.P.

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 (i) 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 (ii) 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.

(NOTE: Replaces the existing definition of Land Development)

Loading Rate – The ratio of the land area draining to the system, as modified by the weighing factors in Section 307.U, compared to the base area of the infiltration system.

Low Impact Development – A development approach that promotes practices that will minimize post-development 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.

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 post-development. 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.

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.

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.

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.

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.

Recharge Volume (REv) – The portion of the water quality volume (WQv) used to maintain groundwater recharge rates at development sites. (see Section 307.J)

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.

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.

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.

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.

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 non-carbonate 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

A 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

- B. "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.
- C. 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.

Stormwater - The surface runoff generated by precipitation reaching the ground surface.

Stormwater Filters - Any number of structural mechanisms such as multi-chamber 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 clean out.

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.

Technical Best Management Practice Manual & 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 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.

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 307.B.)

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.

6. **AMEND SECTION 301. GENERAL REQUIREMENTS TO READ AS FOLLOWS:**

- A. All Regulated Activities in the municipality shall be subject to the stormwater management requirements of this Ordinance.
- 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 Ordinance.
- 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 Ordinance. 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 pre-development 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 100-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 304 for the 100-year return period runoff and to provide a freeboard allowance of one-half (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 100-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 Ordinance 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 Ordinance.
- I. Techniques described in Appendix F (Low Impact Development) of this Ordinance are encouraged because they reduce the costs of complying with the requirements of this Ordinance and the State Water Quality Requirements.
- J. Infiltration for stormwater management is encouraged where soils and geology permit, consistent with the provisions of this Ordinance and, where appropriate, the Recommendation Chart for Infiltration Stormwater Management BMPs in Carbonate Bedrock in Appendix D.

7. **AMEND SECTION 302. STORMWATER MANAGEMENT DISTRICTS**
TO READ AS FOLLOWS:

- A. Mapping of Stormwater Management Districts - To implement the provisions of the Pennsylvania Department of Environmental Protection approved Stormwater Management Plans (and Plan Update), the municipality is hereby divided into Stormwater Management Districts consistent with the Release Rate Maps presented in the Plan Update. The boundaries of the Stormwater Management Districts are shown on official maps which are available for inspection at the municipal office. Copies of the official maps at a reduced scale are included in Appendix A for general reference.

B Description of Stormwater Management Districts - 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 II) 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 Ordinance. 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 II), these watershed areas may discharge post-development 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 303.P. 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 303.D. 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 307.
2. Dual Release Rate Districts - Within these districts, the 2-year post-development peak discharge must be controlled to 30% of the pre-development 2-year runoff peak. Further, the 10-year, 25-year 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.

3. **AMEND SECTION 303. STORMWATER MANAGEMENT DISTRICT IMPLEMENTATION PROVISIONS TO READ AS FOLLOWS:**

- 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 Ordinance.
- B. Any stormwater management controls required by this Ordinance and subject to a dual release rate criteria shall meet the applicable release rate

criteria for each of the 2-, 10-, 25- and 100-year return period runoff events consistent with the calculation methodology specified in Section 304.

- 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 Ordinance 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 2-year return period event within their banks at velocities consistent with protection of the channels from erosion.
 - 2. Natural or man-made channels or swales must be able to convey the increased 25-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 25-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 pre-development 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 re-combine 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 pre-development drainage area on a site may not be changed post-development to create potentially adverse conditions on downstream properties except as part of a "No Harm" or Hardship waiver procedure.
- H. No portion of a site may be regraded between the watershed of one creek and the watershed of any adjacent creek except as part of a "No Harm" or Hardship Waiver procedure.
- I. 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 303.D. and the minimum orifice criteria.
- J. 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 303.D. and the detention criteria in Section 304.
- K. 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 areas 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.
- L. 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.
- M. 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 pre-development are not subject to the release rate provisions of this Ordinance.
- N. "No Harm" Water Quantity Option - 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 Lehigh River. Proof of "no harm" must be shown using the capacity criteria specified in Section 303.D. If downstream capacity analysis is a part of the "no harm" justification.

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 (2-, 10-, 25- and 100-year) shall be the values from the calibrated PSRM Model for the Watershed 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.
2. 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).
3. 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 303.P.

Any "no harm" justifications shall be submitted by the developer as part of the Drainage Plan submission per Article V. Developers submitting "no harm" justifications must still meet all of the water quality requirements in Section 307.

- O. 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.
- P. Capacity Improvements - 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 303.D. 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.

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.

9. AMEND SECTION 304. CALCULATION METHODOLOGY TO READ AS FOLLOWS:

- 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:

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

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*	THICKNESS FACTOR
6.0 to 12.0 inches/hour	0.3
2.0 to 6.0 inches/hour	1.0
1.0 to 2.0 inches/hour	1.4
0.75 to 1.0 inches/hour	1.2
0.5 to 0.75 inches/hour	1.0

*If the permeability rate, as measured by the adapted 25 P.A. 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 in/hr or less than 0.5 in/hr, as measured by the adapted 25 P.A. 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 Ordinance 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. All stormwater detention facilities shall provide a minimum 1.0 foot freeboard above the maximum pool elevation associated with the 2- through 25-year runoff events. A 0.5 foot freeboard shall be provided above the maximum pool elevation of the 100-year runoff event. The freeboard shall be measured from the maximum pool elevation to the invert of the emergency spillway. The 2- through 100-year storm events shall be controlled by the primary outlet structure. An emergency spillway for each 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 offsite 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 100-year event.

- I. The minimum circular orifice diameter for controlling discharge rates from detention facilities shall be three (3) inches. Designs where a lesser size orifice would be required to fully meet release rates shall be acceptable with a 3-inch orifice provided that as much of the site runoff as practical is directed to the detention facilities. The minimum 3 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 24-hour rainfall distribution. The 24-hour rainfall depths for the various return periods to be used consistent with this Ordinance may be taken from NOAA Atlas 14, Volume 2 Version 2.1, 2004 or the PennDOT Intensity - Duration - Frequency Field Manual ("PDT-IDF") (May 1936) for Region 4. The following values are taken from the PDT-IDF Field Manual:

<u>Return Period</u>	<u>24-Hour Rainfall Depth</u>
1-year	2.40 inches
2-year	3.00 inches
5-year	3.60 inches
10-year	4.56 inches
25-year	5.52 inches
50-year	6.43 inches
100-year	7.44 inches

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

- 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 A.
- L. Runoff Curve Numbers (CNs) to be used in the soil-cover-complex method shall be based upon the matrix presented in Appendix B.
- M. Runoff coefficients for use in the Rational Method shall be based upon the table presented in Appendix B.
- 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 1936). 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. Bank-full 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 pre-development 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 post-development 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. 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.
- Q. 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 Ordinance may differ from the criteria that are used in the permitting of dams under the Dam Safety Program.
10. **AMEND SECTION 307. POST-CONSTRUCTION WATER QUALITY CRITERIA** TO READ AS FOLLOWS:
- A. 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. This Ordinance provides standards to meet NPDES Permit requirements associated with construction activities and MS4 permit requirements.
 - B. The Water Quality Volume (WQv) shall be captured and treated. The WQv shall be calculated two ways. 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 post-development runoff coefficient for the 2-year storm

P = 1.25 inches

A = Area in acres of proposed Regulated Activity

Second, the WQv shall be calculated as the difference in runoff volume from pre-development to post-development for the 2-year return period storm. The effect of closed depressions on the site shall be considered in this calculation. 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 purposes of water quantity/peak rate control.

- C. 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.
- D. 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 Commonwealth from thermal impacts.
- E. 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 Section 307.O., except for minor areas on the periphery of the site that cannot reasonably be drained to an infiltration facility or other BMP.
- F. 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 Ordinance.
- G. The applicant shall document the bedrock type(s) present on the site from published sources. Any apparent boundaries between carbonate and non-carbonate bedrock shall be verified through more detailed site evaluations by a qualified geotechnical professional.
- H. 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.

I. Sites where applicants intend to use infiltration BMPs must meet the following criteria:

- Depth to bedrock below the invert of the BMP greater than or equal to 2 feet.
- Depth to seasonal high water table below the invert of the BMP greater than or equal to 3 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 2 and 3 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).
- 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.
- 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 set back 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.

J. For entirely non-carbonate 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 Section 307.1.

1. The REv shall be calculated as follows:

$$REv = 0.25 \times I \times 12$$

Where REv = Recharge Volume in acre-feet

I = impervious area in acres

2. The Preliminary Site Investigation described in Section 307.H. 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.
 3. 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.
 4. The site must meet the conditions listed in Section 307.I.
 5. 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 Section 307.O.
 6. If REv is infiltrated, it may be subtracted from the WQv required to be captured and treated.
- K. In entirely carbonate areas, where the applicant intends to use infiltration BMPs, the Preliminary Site Investigation described in Section 307.H. 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 304, 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 Section 307.I. are required for infiltration in carbonate areas.

Applicants are encouraged to infiltrate the REv, as calculated in Section 307.J., 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 non-infiltration BMPs. If infiltration is not proposed, the full WQv shall be treated by two acceptable BMPs, as specified in Section 307.O.

- L. If a site has both carbonate and non-carbonate areas, the applicant shall investigate the ability of the non-carbonate portion of the site to fully meet this Ordinance to meet the requirements for REv for the whole site through infiltration. If that proves infeasible, infiltration in the carbonate area as described in Section 307.K. or 2 other non-infiltration BMPs as described in Section 307.O. must be used. No infiltration structure in the non-carbonate 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.
- M. If infiltration BMPs are proposed in carbonate areas, the post-development 2-year runoff volume leaving the site shall be 80% or more of the pre-development runoff volume for the carbonate portion of the site to prevent infiltration of volumes far in excess of the pre-development infiltration volume.
- N. Site areas proposed for infiltration shall be protected from disturbance and compaction except as necessary for construction of infiltration BMPs.
- O. 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, 13
Minimum Disturbance/ Minimum Maintenance Practices	1, 9
Significant Reduction of Existing Impervious Cover	N/A
Stormwater Filters ^A (Sand, Pear, 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 ^B	4, 7, 15, 16, 19
Wet Detention Ponds	4, 5, 6, 3

^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 of this Ordinance.

* If this BMP is used to treat the entire WQI then it is the only BMP required because it meets BMP selection water quality performance.

* See table below.

*Water Quality Interests include such BMPs as Oil Water Separators, Sediment Traps, Buffer Strips, Jumps, and Filtered 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", Schueier, T. R., Kumbie, 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, 2004.
16	"Virginia Stormwater Management Handbook", Virginia Department of Conservation and Recreation, Richmond, Virginia, 1999.

Number	Design Reference Title
17	"Water Resources Engineering", Mays, L. W., John Wiley & Sons, Inc., 2005.
13	"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/certs/stormwater/techs.html .

- P. Stormwater runoff from Hot Spot land uses shall be pre-treated. In no case, may the same BMP be employed consecutively to meet this requirement and the requirement in Section 307.O. Acceptable methods of pre-treatment are listed below.

Hot Spot Land Use	Pre-treatment Method(s)
Vehicle Maintenance and Repair Facilities including Auto Parts Stores	-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	-Water Quality Inlets -Spill Prevention and Response Program
Storage Areas for Public Works	-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	-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
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.

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 in Section 30⁷ D. above.

- Q. The use of infiltration BMPs is prohibited on Hot Spot land use areas.
- R. 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.
- S. 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 30⁷.I., 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.
- T. 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 stream bank destabilization, to satisfy State Water Quality Requirements, by controlling the 2-year post-development runoff to a 30% Release Rate.
- U. 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.

11 AMEND SECTION 401.N.(3) TO CHANGE THE AMOUNT OF \$3,000 TO BE \$40,000.

12. AMEND SECTION 402.G.(1) CURB INLET TO ADD THE FOLLOWING LANGUAGE AT THE END OF THE EXISTING SECTION:

The collection capacity of curbed inlets is to be determined using PennDOT standard efficiency charts for the capture capacity of Type C inlets.

All inlets shall be labeled with an embedded plastic disk indicating a prohibition against pollutants.

13. AMEND SECTION 402.G.(3) TO READ AS FOLLOWS:

Pipe Materials. Existing storm piping shall be extended using the same pipe materials to the next connected stormwater structure. Otherwise, all storm piping shall be new Class III Reinforced Concrete Piping with O-ring joints, or smooth-lined HDPE pipe, with watertight joints. All storm piping shall meet all requirements of PennDOT. Piping shall be saw cut at the ends, as needed, and not hammered or broken.

14. AMEND SECTION 402.G.(7) TO READ AS FOLLOWS:

Concentrated stormwater discharges shall be designed to minimize the impact of development on downstream properties. Flow retarding and dissipating facilities are required to meet this goal. Such structures shall be no closer than 50 feet to downstream off-site properties or drainage easement boundaries.

15. AMEND SECTION 402.G. TO ADD THE FOLLOWING SUBSECTION:

- (13) Upstream open culvert headwalls or wing walls for pipes shall be fitted with slanted durable protective grates.

16. AMEND SECTION 501. GENERAL REQUIREMENTS TO READ AS FOLLOWS:

For any of the Regulated Activities of this Ordinance, 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.

17. AMEND SECTION 502. EXEMPTIONS TO READ AS FOLLOWS:

Exemptions from the Drainage Plan Requirements are as specified in Section 105.

18. AMEND SECTION 503. DRAINAGE PLAN CONTENTS TO READ AS FOLLOWS:

The following items shall be included in the Drainage Plan:

- A General

1. The extent to which the proposed grading and impervious cover avoid disturbance of significant environmental resources and preserve existing site hydrology.
2. 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.
3. A description of how the proposed stormwater management controls and BMPs serve to mitigate any adverse impacts on environmental resources on the site.

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.

19. AMEND SECTION 901. RIGHT OF ENTRY TO READ AS FOLLOWS:

- A. Upon presentation of proper credentials and with the consent of the land owner, 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 Ordinance.
- B. In the event that the land owner refuses admission to the property, duly authorized representatives of the municipality may seek an administrative search warrant issued by a district justice to gain access to the property.

20. AMEND SECTION 902. NOTIFICATION TO READ AS FOLLOWS:

- A. Whenever the municipality finds that a person has violated a prohibition or failed to meet a requirement of this Ordinance, 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.

3. 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 Ordinance. 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.

21. **AMEND SECTION 905. VIOLATION AND PENALTIES TO READ AS FOLLOWS:**

- A. Any person, partnership or corporation who or which has violated the provisions of this Ordinance shall, upon being found liable therefore in a civil enforcement proceeding commenced by the municipality, pay a judgment of not more than Five Hundred (\$500.00) Dollars 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 district justice. If the defendant neither pays nor timely appeals the judgment, the municipality may enforce the judgment pursuant to a separate violation, unless the district justice, determining that there has been a violation, further determines that there was a good faith basis for the person, partnership, or corporation violating this Chapter 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 (5th) day following the date of the determination of a violation by the district justice 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. District justices 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 Ordinance. Any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus or other appropriate forms of remedy or relief.

- A. Monocacy Creek Watershed Map, Appendix A - 1 2 and the Release Rate Summary Table on the preceding page.
- B. Catasauqua Creek Watershed Map - Appendix A - 2 2.
- C. Hokendauqua Creek Watershed Map, Appendix A - 3.

A. Map 3, RELEASE RATES, Carasauqua Creek, Monocacy Creek, and Nancy Run Act 167 Study Areas, Appendix A-1.

B. Map 6, RELEASE RATES, Hokendauqua Creek Act 167 Study Area, Appendix A - 2

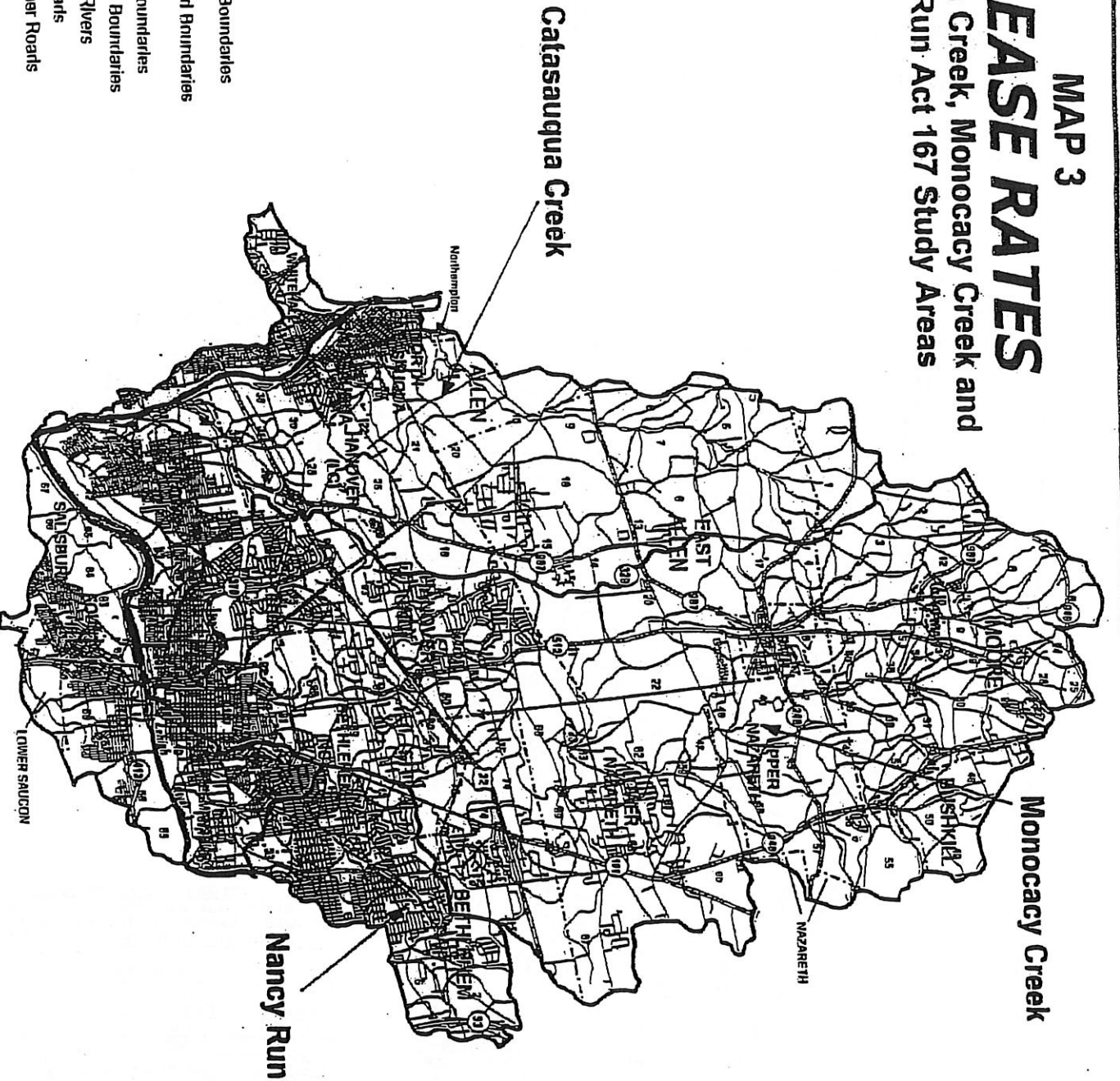
Any Ordinance or parts of Ordinances of the Township inconsistent herewith are hereby repealed to the extent of the inconsistency.

doi:10.1017/S0022292412001607 Printed in the United Kingdom © 2012 Cambridge University Press

MAP 3

RELEASE RATES

Catasauqua Creek, Monocacy Creek and
Nancy Run Act 167 Study Areas



RELEASE RATE SUMMARY TABLES

Dual Release Rate Categories (50-1) define a 30% Release Rate for the 2-7 year storm and the indicated Release Rate for the 10-, 25- and 100-year storms.

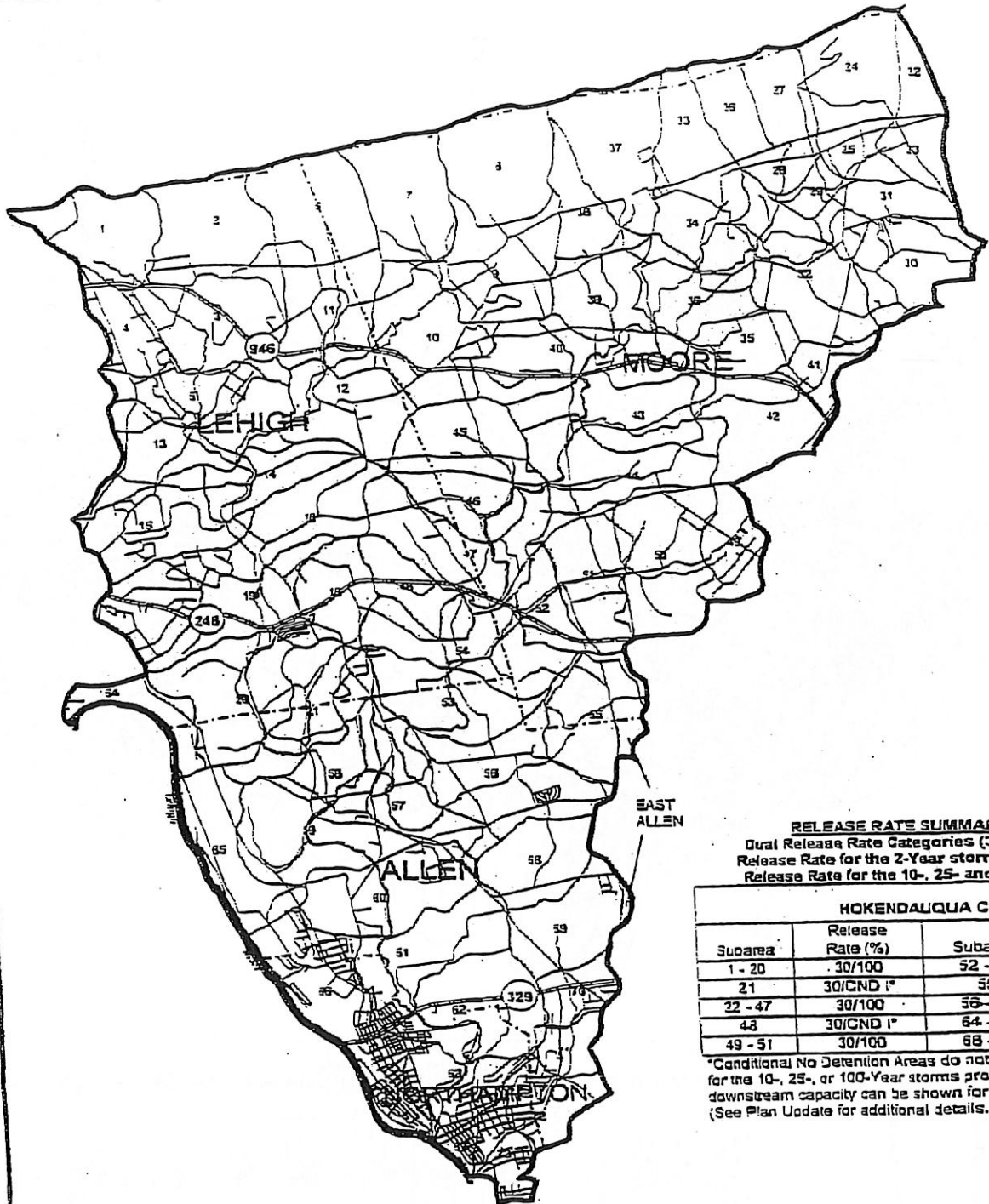
CATASAUQUA CREEK STUDY AREA			
Subarea	Release Rate (%)	Subarea	Release Rate (%)
1-8	30/100	40	30/100
9-12	30/100	41	30/100
13-21	30/100	42-49	30/100
22-24	30/100	50-51	30/100
25-33	30/100	52-53	30/100
34	30/100	54-60	30/100
35-37	30/100	61-62	30/100
38-39	30/100	63-65	30/100
40-43	30/100	66-72	30/100

MONOCACY CREEK STUDY AREA			
Subarea	Release Rate	Subarea	Release Rate
1, 3	30/100	53	30/100
4	30/100	54	30/100
5	30/100	55	30/100
6	30/100	56	30/100
7	30/100	57, 62	30/100
8	30/100	63, 73	30/100
9	30/100	74	30/100
10, 11	30/100	75	30/100
12	30/100	76	30/100
13, 16	30/100	77	30/100
17	30/100	78	30/100
18, 22	30/100	79	30/100
23, 26	30/100	80	30/100
28, 28	30/100	81	30/100
29, 35	30/100	82	30/100
36	30/100	83, 70	30/100
37	30/100	84	30/100
38	30/100	85	30/100
39, 42	30/100	86	30/100
43	30/100	87, 65	30/100
44	30/100	88	30/100
45, 47	30/100	89	30/100
48	30/100	90, 53	30/100
49	30/100	91, 04	30/100
50	30/100	92, 56	30/100
51	30/100	93	30/100
52	30/100	94	30/100
53	30/100	95, 101	30/100
54	30/100	96	30/100
55	30/100	97	30/100
56	30/100	98	30/100
57	30/100	99	30/100
58	30/100	100	30/100
59	30/100	101	30/100
60	30/100	102	30/100
61	30/100	103	30/100
62	30/100	104	30/100
63	30/100	105	30/100
64	30/100	106	30/100
65	30/100	107	30/100
66	30/100	108	30/100
67	30/100	109	30/100
68	30/100	110	30/100
69	30/100	111	30/100
70	30/100	112	30/100
71	30/100	113	30/100
72	30/100	114	30/100
73	30/100	115	30/100
74	30/100	116	30/100
75	30/100	117	30/100
76	30/100	118	30/100
77	30/100	119	30/100
78	30/100	120	30/100
79	30/100	121	30/100
80	30/100	122	30/100
81	30/100	123	30/100
82	30/100	124	30/100
83	30/100	125	30/100
84	30/100	126	30/100
85	30/100	127	30/100
86	30/100	128	30/100
87	30/100	129	30/100
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89	30/100	131	30/100
90	30/100	132	30/100
91	30/100	133	30/100
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96	30/100	138	30/100
97	30/100	139	30/100
98	30/100	140	30/100
99	30/100	141	30/100
100	30/100	142	30/100
101	30/100	143	30/100
102	30/100	144	30/100
103	30/100	145	30/100
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141	30/100	183	30/100
142	30/100	184	30/100
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313	30/100	355	30/100
314	30/100	356	30/100
315	30/100	357	30/100
316	30/100	358	30/100
317	30/100	359	30/100
318	30/100	360	30/100
319	30/100	361	30/100
320	30/100	362	

MAP 6

RELEASE RATES

Hokendauqua Creek Act 167 Study Area



- Subarea Boundaries
- Watershed Boundary
- Municipal Boundaries
- Major Roads
- Minor/Other Roads
- River
- Streams

RELEASE RATE SUMMARY TABLES
 Dual Release Rate Categories (30/-) define a 30% Release Rate for the 2-Year storm and the indicated Release Rate for the 10-, 25- and 100-Year storms.

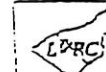
HOKENDAUQUA CREEK			
Subarea	Release Rate (%)	Subarea	Release Rate (%)
1 - 20	30/100	52 - 54	30/CNI
21	30/CND 1*	55	30/100
22 - 47	30/100	56 - 57	30/CNI
48	30/CND 1*	64 - 67	30/CNI
49 - 51	30/100	68 - 73	30/100

*Conditional No Detention Areas do not need detention for the 10-, 25-, or 100-Year storms provided that adequate downstream capacity can be shown for increased peak flow. (See Plan Update for additional details.)



0 5,300 10,600
 1" = 5,300'

Source: Lehigh Valley Planning Commission



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