

COOLBAUGH TOWNSHIP
MONROE COUNTY, PENNSYLVANIA

STORMWATER MANAGEMENT AND EARTH
DISTURBANCE ORDINANCE

Ordinance No. 120-2014

JUNE 17, 2014

Coolbaugh Township
Stormwater Management and Earth Disturbance Ordinance

TABLE OF CONTENTS

Article I – General Provisions

| | | |
|-----|---|---|
| 101 | Short Title and Effective Date | 1 |
| 102 | Statement of Findings | 1 |
| 103 | Purpose | 2 |
| 104 | Statutory Authority | 3 |
| 105 | Repealer | 3 |
| 106 | Severability | 3 |
| 107 | Compatibility with Other Ordinance Requirements | 3 |

Article II – Definitions

| | | |
|-----|----------------|---|
| 201 | Interpretation | 4 |
| 202 | Definitions | 4 |

Article III – Applicability and Plan Submission

| | | |
|-----|---------------------------------------|----|
| 301 | Applicability | 13 |
| 302 | Drainage Plan and Permit | 13 |
| 303 | Drainage Plan Requirements | 15 |
| 304 | Drainage Plan Contents | 16 |
| 305 | Drainage Plan Submission | 19 |
| 306 | Drainage Plan Review | 20 |
| 307 | Drainage Permit Approval and Issuance | 21 |
| 308 | Modification of Plans | 21 |
| 309 | Inspections | 21 |
| 310 | Schedule of Inspections | 22 |
| 311 | Fees and Expenses | 22 |

Article IV – Stormwater Management

| | | |
|-----|---|----|
| 401 | General Requirements | 23 |
| 402 | Project Design Sequencing | 24 |
| 403 | Buffers | 25 |
| 404 | Stormwater Quality | 27 |
| 405 | Methods of Calculation of Runoff Pollutant Parameters | 29 |
| 406 | Groundwater Recharge | 30 |
| 407 | Stormwater Rate Control | 33 |
| 408 | Calculation Methodology | 36 |
| 409 | Additional Design Requirements | 38 |
| 410 | Erosion and Sediment Control | 39 |
| 411 | Consumptive Use Tracking Report | 39 |

Article V – Construction Maintenance

| | | |
|-----|---|----|
| 501 | Performance Guarantee | 40 |
| 502 | Maintenance Responsibilities | 40 |
| 503 | Maintenance Agreement for Privately Owned Stormwater Facilities | 41 |
| 504 | Municipal Stormwater Maintenance Fund | 41 |

Article VI – Enforcement and Penalties

| | | |
|-----|--------------------------|----|
| 601 | Right of Entry | 43 |
| 602 | Notification | 43 |
| 603 | Enforcement | 43 |
| 604 | Violations and Penalties | 44 |
| 605 | Appeals | 44 |

Appendices

Appendix A – Stormwater Management Facilities Maintenance Agreement

Appendix B – Stormwater Management Design Criteria

Appendix C – Drainage Plan Application

Appendix D – Map – Act 167 Delineated Watersheds

Appendix E – West Nile Virus Guidance

Appendix F – Consumptive Use Tracking

Appendix G – Sample Problem

Appendix H – Stormwater Conveyance Facilities and BMP Inspection Checklist

Coolbaugh Township
Stormwater Management and Earth Disturbance Ordinance

Article I
General Provisions

101. Short Title and Effective Date

The Board of Supervisors does hereby amend the Coolbaugh Township Stormwater and Earth Disturbance Ordinance to become effective on June 22, 2014. The amended Ordinance is hereby designated to be and shall be known as the “Coolbaugh Township Stormwater Management and Earth Disturbance Ordinance”, hereinafter referred to as the “Stormwater Management Ordinance”.

102. Statement of Findings

The Board of Supervisors of Coolbaugh Township 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, 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 discharge and threatens public health and safety.
- B. A comprehensive program of stormwater management, nonpoint source pollution and wetland conservation, including reasonable regulation of development activities causing accelerated erosion and sediment pollution, 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.
- C. Inadequate management of accelerated runoff from development throughout a watershed poses a threat to surface and groundwater quality.
- D. Through project design, impacts from stormwater runoff can be minimized to maintain the natural hydrologic regime, and sustain high water quality groundwater recharge, stream base flow and aquatic ecosystems. The most effective and environmentally advantageous way to manage stormwater runoff is through nonstructural project design, minimizing impervious surfaces and sprawl, avoiding sensitive areas such as buffers, steep slopes and floodplains, and designing to topography and soils to maintain the natural hydrologic regime.
- E. To effectively monitor the maintenance of base flow within a watershed, a tracking of consumptive use, including stormwater discharges and groundwater withdrawals is critical to complying with anti-degradation regulations, the Stormwater Management Act's goals

and policies and regulatory requirements to maintain stream base flows and overall health.

- F. There are portions of four watersheds within Coolbaugh Township - the Brodhead Creek watershed (as part of the Brodhead and McMichaels Creek watershed), the Tobyhanna Creek watershed, the Wallenpaupack Creek watershed, and the Lehigh River watershed. The watersheds and subwatersheds within the watersheds require various management practices.

103. Purpose

The purpose of this ordinance is to promote the public health, safety and welfare within Coolbaugh Township by maintaining the natural hydrologic regime and minimizing the impacts described in Section 102 above by way of provisions designed to:

- A. Control accelerated runoff and erosion and sediment pollution control problems at their sources by regulating activities which cause such problems.
- B. Promote alternative project designs and layouts that minimize impacts to surface and groundwater.
- C. Utilize and preserve the existing natural drainage systems.
- D. Encourage recharge of groundwater where appropriate and prevent degradation of groundwater quality.
- E. Address the quality and quantity of stormwater discharges from the development site.
- F. Maintain existing base flow and quality of streams and watercourses in the Township and the Commonwealth.
- G. Preserve and restore the flood carrying capacity of streams.
- H. Promote nonstructural BMP's.
- I. Minimize increases in stormwater runoff volume.
- J. Minimize impervious surfaces.
- K. Provide for proper maintenance of all permanent stormwater management facilities that are located in Coolbaugh Township.
- L. Provide performance standards and design criteria for watershed wide stormwater management and planning.

104. Statutory Authority

The Township is empowered to regulate land use activities that affect runoff, surface and groundwater quality and quantity by the authority of the Act of October 4, 1978, P. L. 864 (Act 167), 32 P. S. 680.1 et. Seq. as amended, commonly known as “The Stormwater Management Act” (hereinafter referred to as “The Act”); and the Act of 1968, P. L. 805 (Act 247), 53 P. S. 10101 et. Seq. as amended, commonly known as the “Municipalities Planning Code”.

105. Repealer

Any ordinance or ordinance provision of Coolbaugh Township inconsistent with any of the provisions of this Ordinance is hereby repealed to the extent of the inconsistency only.

106. Severability

Should any section or provision of this Ordinance be declared invalid by a court of competent jurisdiction, such decision shall not affect the validity of any of the remaining provisions of this Ordinance.

107. Compatibility with Other Ordinance Requirements

Approvals issued pursuant to this Ordinance 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.

Article II Definitions

201. Interpretation

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

- A. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.
- B. The word "includes" or "including" shall not limit the term to the specific example, but is intended to extend its meaning to all other instances of like kind and character.
- C. The word "person" includes an individual, firm, association, organization, partnership, trust, company, corporation, unit of government, or any other similar entity.
- D. The words "shall" and "must" are mandatory; the words "may" and "should" are permissive.
- E. The words "used or occupied" include the words "intended, designed, maintained, or arranged to be used, occupied or maintained."

202. Definitions

Accelerated Erosion - The removal of the surface of the land through the combined action of man's activity and the natural processes of a rate greater than would occur because of the natural process alone.

Agricultural Activities - The work of producing crops and/or raising livestock including tillage, plowing, disking, harrowing, pasturing and installation of conservation measures. For purposes of regulation by this Ordinance, construction of new buildings or impervious area is not considered an agricultural activity.

Alteration - As applied to land, a change in topography as a result of the moving of soil and rock from one location or position to another; also the changing of surface conditions by causing the surface to be more or less impervious; land disturbance.

Applicant - A person, individual, trustee, executor, other fiduciary, corporation, firm, partnership, association, organization or other entity acting as a unit and his/her/its successors and assigns who has filed an application for approval to engage in any Regulated Activities as defined in Section 301 of this Ordinance.

As-built drawings - Those maintained by the Contractor as he constructs the project and upon which he documents the actual locations of the building components and changes to the original contract documents. These, or a copy of same, are turned over to the Engineer at the completion of the project.

Bankfull – The channel at the top-of-bank or point where water begins to overflow onto a floodplain.

Base Flow – The portion of stream flow that is sustained by ground water discharge.

Bioretention – A storm water retention area which utilizes woody and herbaceous plants and soils to remove pollutants before infiltration occurs.

BMP (Best Management Practice) - Stormwater structures, facilities and techniques to control, maintain or improve the quantity and quality of surface runoff and groundwater recharge.

Buffer – The area of land immediately adjacent to any wetland, lake, pond, vernal pond, or stream, measured perpendicular to and horizontally from the delineated edge of the wetland, lake, pond, or vernal pond, or the top-of-bank on both sides of a stream.

Channel Erosion - The widening, deepening, and headward cutting of small channels and waterways, caused by stormwater runoff or bankfull flows.

Cistern - An underground reservoir or tank for storing rainwater.

Conservation District - The Monroe County Conservation District.

Consumptive Water Use – That part of water removed from the immediate water environment not available for other purposes such as water supply, maintenance of stream flows, water quality, fisheries and recreation, as opposed to water that is used non-consumptively, which is returned to surface water, where practicable, and groundwater.

Culvert - A structure with appurtenant works, which carries water under or through an embankment or fill.

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.

Department – The Pennsylvania Department of Environmental Protection.

Designee - The agent of the Monroe County Planning Commission, Monroe County Conservation District and/or agent of the governing body involved with the administration, review or enforcement of any provisions of this ordinance by contract or memorandum of understanding.

Design Professional (Qualified) – A Pennsylvania Registered Professional Engineer, Registered Landscape Architect or a Registered Professional Land Surveyor trained to develop stormwater management plans.

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

Detention Basin - An impoundment structure designed to manage stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate.

Detention District - Those subareas in which some type of detention is required to meet the plan requirements and the goals of Act 167.

Development Site - The specific tract of land for which a Regulated Activity is proposed.

Diffused Drainage Discharge – Drainage discharge not confined to a single point location or channel, such as sheet flow or shallow concentrated flow.

Disturbed Areas – Land area where an earth disturbance activity is occurring or has occurred.

Downslope Property Line - That portion of the property line of the lot, tract, or parcels of land being developed located such that overland or pipe flow from the site would be directed towards it.

Drainage Conveyance Facility - A Stormwater Management Facility designed to transmit stormwater runoff and shall include channels, swales, pipes, conduits, culverts, storm sewers, etc.

Drainage Easement - A right granted by a grantor to a grantee, allowing the use of private land for stormwater management purposes.

Drainage Permit - A permit issued by the Municipal governing body after the drainage plan has been approved.

Drainage Plan - The documentation of the stormwater management system, if any, to be used for a given development site.

Earth Disturbance – A construction or other human activity which disturbs the surface of land, including, but not limited to, clearing and grubbing, grading, excavations, embankments, agricultural plowing or tilling, timber harvesting activities, road maintenance activities, mineral extraction, construction, and the moving, depositing, stockpiling, or storing of soil, rock or earth materials.

Emergency Spillway – A conveyance area that is used to pass peak discharge greater than the maximum design storm controlled by the storm water facility.

Encroachment – A structure or activity that changes, expands or diminishes the course, current or cross section of a watercourse, floodway or body of water.

ERSAM – Existing resource and site analysis map.

Erosion - The movement of soil particles by the action of water, wind, ice, or other natural forces.

E & S Plan (Erosion and Sediment Control Plan) - A site specific plan that is designed to minimize accelerated erosion and sedimentation during construction.

Exceptional Value Waters – Surface waters of high quality which satisfy Pennsylvania Code Title 25 Environmental Protection, Chapter 93, Water Quality Standards, §93.4b(b) (relating to anti-degradation).

Existing Conditions - The initial condition of a project site prior to the proposed alteration.

Flood - A temporary condition of partial or complete inundation of land areas from the overflow of streams, rivers, and other waters of this Commonwealth.

Floodplain – A relatively flat or low land area which is subject to partial or complete inundation from an adjoining or nearby stream, river or watercourse; and/or any area subject to the unusual and rapid accumulation of surface waters from any source.

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

Forest Management/Timber Operations - Planning and activities necessary for the management of forest land with no change of land use proposed. These include timber inventory and preparation of forest management plans, silvicultural treatment, cutting budgets, logging road design and construction, timber harvesting and reforestation.

Freeboard - A vertical distance between the elevation of the design high-water and the top of a dam, levee, tank, basin, swale, or diversion berm. The space is required as a safety margin in a pond or basin.

Grade - A slope, usually of a road, channel or natural or finished ground specified in percent and shown on plans as specified herein. (To) Grade - to finish the surface of a roadbed, top of embankment or bottom of excavation.

Grassed Waterway - A natural or constructed waterway, usually broad and shallow, covered with erosion-resistant grasses, used to convey surface water.

Groundwater Recharge - Replenishment of existing natural underground water supplies without degrading groundwater quality.

HEC-HMS - The U.S. Army Corps of Engineers, Hydrologic Engineering Center (HEC) - Hydrologic Modeling System (HMS) computer program.

High Quality Waters – Surface waters having quality which exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water by satisfying Pennsylvania Code Title 25 Environmental Protection, Chapter 93 Water Quality Standards, §93.4b(a).

Hydrologic Regime (natural) – The hydrologic cycle or balance that sustains quality and quantity of storm water, baseflow, storage, and groundwater supplies under natural conditions.

Hydrologic Soil Group, - A classification of soils by the Natural Resources Conservation Service, formerly the Soil Conservation Service, into four runoff potential groups. The groups range from A soils, which are very permeable and produce little runoff, to D soils, which are not very permeable and produce much more runoff.

Impervious Surface - A surface that prevents or impedes the percolation of water into the ground such as rooftops, pavement, sidewalks, driveways, gravel drives, roads and parking, and compacted fill, earth or turf to be used as such. Semi-impervious surfaces are considered as

impervious surfaces, and are included in this definition.

Impoundment - A retention or detention basin designed to retain stormwater runoff and release it at a controlled rate.

Infill – Development that occurs on smaller parcels that remain undeveloped but are within or very close proximity to urban areas. The development relies on existing infrastructure and does not require an extension of water, sewer or other public utilities.

Infiltration – For stormwater to pass through the soil from the surface.

Infiltration Structures - A structure designed to direct runoff into the underground water (e.g., French drains, seepage pits, seepage trench).

Inlet - The upstream end of any structure through which water may flow.

Land Development - (i) 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; (ii) A subdivision of land; (iii) development in accordance with Section 503(1.1) of the PA Municipalities Planning Code.

Limiting zone - A soil horizon or condition in the soil profile or underlying strata which includes one of the following:

(i) A seasonal high water table, whether perched or regional, determined by direct observation of the water table or indicated by soil mottling.

(ii) A rock with open joints, fracture or solution channels, or masses of loose rock fragments, including gravel, with insufficient fine soil to fill the voids between the fragments.

(iii) A rock formation, other stratum or soil condition which is so slowly permeable that it effectively limits downward passage of water.

Lot – A part of a subdivision or a parcel, tract or area of land established by a plot or otherwise permitted by law, used as a building site or intended to be used for development or built upon as a unit, whether immediately or in the future.

Main Stem (Main Channel) - Any stream segment or other runoff conveyance facility used as a reach in the Brodhead/Tobyhanna hydrologic model.

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.

Municipality – Coolbaugh Township, Monroe County, Pennsylvania.

Natural Hydrologic Regime (see hydrologic regime).

Non-point Source Pollution - Pollution that enters a water body from diffuse origins in the watershed and does not result from discernible, confined, or discrete conveyances.

Nonstructural BMPs – Methods of controlling stormwater runoff quantity and quality, such as innovative site planning, impervious area and grading reduction, protection of natural depression areas, temporary ponding on site and other techniques.

NRCS - Natural Resource Conservation Service (previously SCS).

Open Channel - A drainage element in which stormwater flows within an open surface. Open channels include, but shall not be limited to, natural and man-made drainage ways, swales, streams, ditches, canals, and pipes flowing partly full.

Outfall - Point where water flows from a conduit, stream, or drain.

Outlet - Points of water disposal from a stream, river, lake, tidewater or artificial drain.

Parent Tract – The parcel of land from which a land development or subdivision originates existing as of the date of municipal adoption of this ordinance on June 17, 2014.

Parking Lot Storage - Involves the use of parking areas as temporary impoundments with controlled release rates during rainstorms.

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

Penn State Runoff Model (calibrated) - The computer-based hydrologic modeling technique adapted to the Brodhead and Tobyhanna watersheds for the Act 167 Plan. The model has been "calibrated" to reflect actual recorded flow values by adjoining key model input parameters.

Pipe - A culvert, closed conduit, or similar structure (including appurtenances) that conveys stormwater.

Planning Commission - The Coolbaugh Township Planning Commission.

PMF - Probable Maximum Flood - The flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in any area. The PMF is derived from the probable maximum precipitation (PMP) as determined based on data obtained from the National Oceanographic and Atmospheric Administration (NOAA).

Practicable Alternative – An alternative that is available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes.

Predevelopment – Undeveloped Condition.

Pretreatment – Techniques employed in structural and nonstructural stormwater BMPs to provide storage or filtering to help trap coarse materials and other pollutants before they enter the system, but not necessarily meet the water quality requirements of Section 404.

Rational Formula - A rainfall-runoff relation used to estimate peak flow.

Recharge Area – Undisturbed surface area or depression where stormwater collects, and a portion of which infiltrates and replenishes the underground and groundwater.

Record Drawings - Original documents revised to suit the as-built conditions and subsequently provided by the Project Engineer to the Applicant. The Project Engineer takes the Contractor's as-built plans, reviews them in detail with his/her own records for completeness, then either turns these over to the Applicant or transfers the information to a set of reproducible plans, in both cases for the Applicant's permanent records.

Redevelopment – Any construction, alteration, or improvement exceeding 5,000 square feet of impervious surface on and/or 20,000 square feet of earth disturbance on any site.

Regulated Activities - Actions or proposed actions that have an impact on stormwater runoff quality and quantity and that are specified in Section 301 of this Ordinance.

Release Rate - The percentage of existing conditions peak rate of runoff from a site or subarea to which the post development peak rate of runoff must be reduced to protect downstream areas.

Retention Basin - A structure in which stormwater is stored and not released during the storm event. Retention basins do not have an outlet other than infiltration.

Return Period - The average interval, in years, within which a storm event of a given magnitude can be expected to recur.

Riser - A vertical pipe extending from the bottom of a pond that is used to control the discharge rate from the pond for a specified design storm.

Rooftop Detention - Temporary ponding and gradual release of stormwater falling directly onto flat roof surfaces by incorporating controlled-flow roof drains into building designs.

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

SALDO – Coolbaugh Township Subdivision and Land Development Ordinance.

Sediment Basin - A barrier, dam, retention or detention basin located and designed to retain rock, sand, gravel, silt, or other material transported by water during construction.

Sediment Pollution - The placement, discharge or any other introduction of sediment into the waters of the Commonwealth.

Sedimentation - The process by which mineral or organic matter is accumulated or deposited by the movement of water or air.

Seepage Pit/Seepage Trench - An area of excavated earth filled with loose stone or similar coarse material, into which surface water is directed for infiltration into the underground water.

Semi-impervious – A surface which partially impedes the percolation of water into the ground, such as gravel, stone, pervious pavement, paving blocks, etc. See also the definition of Impervious.

Sheet Flow - Runoff that flows over the ground surface as a thin, even layer.

Soil-Cover Complex Method - A method of runoff computation developed by the NRCS that is based on relating soil type and land use/cover to a runoff parameter called Curve Number (CN).

Source Water Protection Areas (SWPA) – The zone through which contaminants, if present, are likely to migrate and reach a drinking water well or surface water intake.

Special Protection Subwatersheds - Watersheds for which the receiving waters are exceptional value (EV) or high quality (HQ) waters.

Spillway – A conveyance that is used to pass the peak discharge of the maximum design storm controlled by the stormwater facility.

Storage Indication Method - A reservoir routing procedure based on solution of the continuity equation (inflow minus outflow equals the change in storage) with outflow defined as a function of storage volume and depth.

Storm Frequency - The number of times that a given storm "event" occurs or is exceeded on the average in a stated period of years. See "Return Period".

Storm Sewer - A system of pipes and/or open channels that convey intercepted runoff and stormwater from other sources, but excludes domestic sewage and industrial wastes.

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

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

Stormwater Management Plan - The plan for managing those land use activities that will influence stormwater runoff quality and quantity.

Stormwater Management Site Plan - The plan prepared by the Applicant or his representative indicating how stormwater runoff will be managed at the particular site of interest according to this Ordinance.

Stream – A natural watercourse.

Stream Enclosure - A bridge, culvert or other structure in excess of 100 feet in length upstream to downstream which encloses a regulated water of this Commonwealth.

Subarea (Subwatershed)- The smallest drainage unit of a watershed for which stormwater management 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 (2) 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 ten acres, not involving any new street or easement of access or any residential dwelling, shall be exempted.

Swale - A low lying stretch of land which gathers or carries surface water runoff.

Timber Operations - See Forest Management.

Time of Concentration (Tc) - The time for surface runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. This time is the combined total of overland flow time and flow time in pipes or channels, if any.

Watercourse - A channel or conveyance of surface water having defined bed and banks, whether natural or artificial, with perennial, intermittent or seasonal flow.

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

Wellhead – The point at which a groundwater well bore hole meets the surface of the ground.

Wellhead Protection Area - The surface and subsurface area surrounding a water supply well, well field, spring or infiltration gallery supplying a public water system, through which contaminants are reasonably likely to move toward and reach the water source.

Wetland - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, fens, and similar areas, and which are defined as such by the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*.

Article III

Applicability and Plan Submission

301. Applicability

The provisions of this ordinance shall apply to the following regulated activities unless specifically exempted by the terms of this ordinance set forth in Section 302:

- A. Land Development
- B. Land Subdivision
- C. Planned Residential Development
- D. Alteration of the natural hydrologic regime as follows:
 - 1. Earth disturbance of 20,000 square feet, or more.
 - 2. Construction of new or additional impervious or semi-impervious surface.
 - 3. Construction of new buildings or additions to existing buildings.
 - 4. Diversion piping or encroachments in any natural man-made channel.
 - 5. Nonstructural or structural stormwater management BMP's or appurtenances thereto.
 - 6. Stream enhancements or restoration projects.
 - 7. Redevelopment of a site which will increase runoff or change a discharge point. Any development that does not increase runoff must still comply with Sections 404, 405 & 406 relating to water quality, stream bank erosion and groundwater recharge.

302. Drainage Plan and Drainage Permit

Any individual, corporation or other legal entity undertaking any regulated activity in Coolbaugh Township, unless specifically exempted from the provisions of this ordinance as set forth below in Section 302(A), must file an application for a drainage permit accompanied by a drainage plan consistent with the plan content and stormwater management requirements set forth in this Ordinance. For any activity regulated by this Ordinance, the preliminary or final approval of subdivision and/or land development plans, the issuance of any building or occupancy permit, or the commencement of any earth disturbance may not proceed until the Applicant or his/her agent has received written approval of a Drainage Plan, has been issued a Drainage Permit and has received an adequate Erosion and Sediment Pollution Control Plan review from the Conservation District.

A. Exemptions

1. A regulated activity involving Earth disturbance affecting less than 20,000 square feet and creating less than 5,000 square feet of impervious or semi-impervious surface. If a development involving a regulated activity is to take place in phases, the calculation of impervious or semi-impervious surfaces shall be cumulative covering all phases of the development of the parent tract. This exemption shall not apply to diversion piping or encroachments in any natural or man-made channel, nonstructural or structural stormwater management BMP's or appurtenances, or stream enhancements or restoration projects.
2. Use of land for gardening for home consumption.
3. Agriculture when operated in accordance with a Conservation Plan or Erosion and Sediment Control Plan found adequate by the Conservation District.
4. Forest management operations which are following the Department of Environmental Protection's management practices contained in the publication "Soil Erosion and Sedimentation Control Guidelines for Forestry" and are operating under an approved E & S Plan, and are in compliance with the stream buffer requirements of Section 403 of this Ordinance, applicable flood plain management requirements and applicable provisions of the Coolbaugh Township Natural Features Ordinance.
5. The development of single family residential building lots which are 1 acre or less and are part of a subdivision plan approved and recorded prior to June 17, 2014, the date of the adoption of this ordinance.
6. For projects requiring an NPDES Stormwater Permit, the PA DEP requirements relating to stormwater quality, volume control and temperature control shall supersede those specific requirements of this Ordinance, except that the stormwater quality provisions of Section 404.A and the Stormwater Rate Runoff Control of Section 407 must be met by the design. This provision shall not apply to the critical water quality criteria established in the Wallenpaupack subwatershed M-WC, which must be met in addition to PA DEP requirements.

B. Additional exemption criteria

1. Exemption responsibilities- An exemption shall not relieve the applicant from implementing such measures as are necessary to protect the public health and welfare. An exemption shall not relieve the applicant from providing adequate stormwater management for regulated activities to meet the purposes of this ordinance. If the Board of Supervisors, in its sole discretion and after review by the Township Engineer, determines that a regulated activity could reasonably be

expected to cause a drainage problem downstream, or that the regulated activity would result in an undue disruption of natural drainage patterns so as to cause soil erosion, groundwater recharge problems, stream bank erosion or other stormwater quantity or quality problems, the Township shall require a drainage plan submittal.

2. Parent Tracts - Ordinance criteria shall apply to the total development even if the development is to take place in phases. The date of the adoption of this ordinance, June 17, 2014, 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.

C. Waivers and Modifications

The provisions of this Ordinance are considered as minimum standards for the protection of the public health, safety and welfare of the residents and inhabitants of Coolbaugh Township and the surrounding area. However, the Township reserves the right, in its sole discretion, based upon specific site conditions or specific characteristics of the proposed project, to waive, modify or extend provisions of this Ordinance in individual cases as may be necessary in the public interest, provided that such variation shall not have the effect of nullifying the intent and purpose of these regulations. In permitting a variation from these regulations, the following criteria must be met by the applicant:

1. The applicant for a modification or waiver must make the request in writing to the Board of Supervisors, setting forth in detail the reasons in support of the request.
2. The written request shall be forwarded to the Township Engineer, and where applicable, to the Township Planning Commission for a recommendation regarding the request.
3. The applicant must demonstrate that the alternatives analysis required by this Ordinance was conducted, and that stormwater management cannot be implemented in strict compliance with the terms of this ordinance without preventing the reasonable use and development of the subject property.
4. The applicant must provide a stormwater management alternative that demonstrates to the satisfaction of the Board of Supervisors that the intent and purpose of this Ordinance are preserved.

303. Drainage Plan Requirements

All stormwater management system design, plans and/or construction shall:

- A. Comply with all of the requirements of this Ordinance including the alternative management analysis set forth in Section 401.
- B. Minimize accelerated erosion and resulting sediment pollution by demonstrating

compliance with the standards of Chapter 102 (Erosion and Sediment Pollution Control) of Title 25 of the rules and regulations of the Pennsylvania Department of Environmental Protection.

- C. Be designed and constructed utilizing the requirements of this Ordinance and, where applicable, the regulations and policies of the Commonwealth of Pennsylvania, including the Pennsylvania Stormwater Best Management Practices Manual, dated December, 2006 (Pennsylvania Stormwater BMP Manual), as it may be amended from time to time.
- D. Be designed and constructed in such a way as to conserve, minimize and mitigate impact upon wetlands, buffers, surface and groundwater resources and the natural hydrologic regime by utilizing best management practices as set forth in the Pennsylvania Stormwater BMP Manual.
- E. Utilizing the requirements of this Ordinance and the Pennsylvania Stormwater BMP Manual, analyze and evaluate non-structural project design, minimize impervious and non-impervious surfaces, avoid environmentally sensitive areas such as wetlands, buffers, steep slopes, flood hazard areas and design to topography and soil types in order to maintain the natural hydrologic regime.
- F. If a pre-application meeting is scheduled with the Monroe County Conservation District for any project subject to this Ordinance, Coolbaugh Township shall be given adequate notice of the meeting so that the Township Engineer may attend. This should be prior to submission of the drainage plan application to the Township.

304. Drainage Plan Contents

The drainage plan shall consist of a general description of the project including sequencing items described in Section 402, calculations, maps and plans, as follows: All drainage plan materials shall be submitted to the Township in a format that is clear, concise, legible, neat and well organized; otherwise, the drainage plan shall not be accepted for review. The preparation of the drainage plan shall comply with the requirements of the Engineer, Land Surveyor and Geologist Registration Law.

A. Narrative Report

A narrative report describing the project and giving the purpose and engineering assumptions and calculations for control measures and facilities. The narrative report must include, as a minimum, the following:

1. A general description of the project including a statement of total square feet of earth disturbance, total square feet of proposed impervious and semi-impervious surface and the overall stormwater management concept for the project.
2. An alternatives analysis consistent with the sequencing provisions of Section 402 of this ordinance.

3. The effect of the project (in terms of runoff volumes and peak flows) on adjacent properties and on any existing stormwater collection system that may receive runoff from the project.
4. Complete hydrologic, hydraulic and structural computations for all stormwater management facilities.
5. An Erosion and Sediment Control Plan, including all reviews and letters of completeness and adequacy from the Monroe County Conservation District.
6. A general description of pre- and post- construction nonpoint source pollution controls.
7. A Consumptive Use Tracking Report as submitted to the Monroe County Conservation District for projects located in the Brodhead Creek Watershed.
8. All calculations, assumptions and criteria used in the design of the control measures and structures.
9. A maintenance program for all stormwater management, erosion and sediment pollution control BMP's for both the construction period and after construction is complete. The program must include the proposed ownership of the permanent controls, the identity of the parties responsible for the maintenance of the controls and the details for the financial responsibility for any required maintenance.
10. A description of federal, state and/or local agency involvement with the project.

B. Site Plan(s)

An individual site plan(s) of the project area shall be prepared and submitted in conformance with the size and format requirements for plans set forth in the Subdivision and Land Development Ordinance. The plan(s) shall contain the items and information set forth below. In the appropriate submittal, these requirements can be combined with the plan content requirements of the Coolbaugh Township Natural Features Ordinance (Chapter 9).

1. The location of the project relative to highways, municipalities or other identifiable landmarks.
2. North arrow with meridian noted.
3. A graphic and written scale. The plan shall be prepared at a scale which permits all required and pertinent information to be clearly shown.
4. Tract boundaries and tract sizes, existing and proposed, with distances marked to

the nearest foot and boundaries to the nearest degree.

5. Existing and proposed contours at intervals of 2 feet. In areas of steep slopes greater than 15%, 5 foot contours intervals may be used.
6. Streams, lakes, ponds or other bodies of water within the project area or outside the project area if the body of water could be affected by runoff from the project.
7. Existing easements and adjoining property owners.
8. Existing and proposed land uses.
9. Soil types and boundaries.
10. The location of all existing and proposed utilities, sanitary sewers, and water lines located within the site and outside the site within fifty (50) feet of property boundaries.
11. Other physical features including flood hazard boundaries, buffers, existing drainage courses, areas of natural vegetation to be preserved, and the total extent of the upstream area draining through the site.
12. The name of the development, the name and address of the owner of the property, the name of the individual or firm preparing the plan, date of submission and revision dates.
13. Existing and proposed man-made features including structures, roads, paved areas, buildings, wells, sewage disposal systems, drainage facilities and any other significant features.
14. The location(s) of public water supply wells and surface water intakes as well as their source water protection areas.
15. Proposed changes to land surfaces and vegetative cover to include the limits of earth disturbance, type and amount of impervious or semi- impervious surface to be added, and areas to be cut and filled.
16. Wetlands as delineated by a qualified wetlands scientist and surveyed by a licensed land surveyor.
17. Existing and proposed drainage patterns, swales and open channels.
18. Existing streams, lakes, ponds, vernal ponds, wetlands or other waters of the Commonwealth within the project area.
19. Existing and proposed drainage area boundaries, including on-site and off-site contributory areas.

20. Existing and proposed stormwater management and erosion and sediment pollution control BMP's.
21. Details/profiles of all proposed stormwater management and erosion and sediment pollution control BMP's.
22. Soil test locations.
23. Areas subject to special deed restrictions affecting or affected by stormwater management.
24. Easements and rights-of-way to proposed stormwater controls.
25. A note on the plan indicating the location and responsibility for maintenance of stormwater management facilities that would be located offsite. All offsite facilities shall meet the performance standards and design criteria specified in this Ordinance.
26. A note on the plan referencing the associated narrative report and erosion and sediment pollution control plan.
27. A statement signed by the applicant acknowledging that any revision to the drainage plan must be approved by the Township, and that a revised E&S Plan must be approved by the Monroe County Conservation District.
28. The following signature block to be signed by the designer:
"I, (designer), on this date (date of signature); hereby certify that the drainage plan meets all design standards and criteria of the Coolbaugh Township Stormwater Management and Earth Disturbance Ordinance."

305. Drainage Plan Submission

- A. The Drainage Plan shall be submitted along with the Drainage Permit Application according to the procedure required by the Coolbaugh Township Subdivision and Land Development Ordinance, or, in the case of a regulated activity not subject to the SALDO, as directed by the Zoning Office. The Drainage Permit application form is attached to this Ordinance as Appendix C.
- B. For any activities that require an NPDES permit for stormwater discharges from construction activities, or a PA DEP joint permit application, or a PennDOT Highway Occupancy Permit, or any other permit under applicable state or federal regulations, or are regulated under Chapter 105 (Dam Safety and Waterway Management) or Chapter 106 (Floodplain Management) of PaDEP's Rules and Regulations, the proof of application for said permit(s) or approvals shall be part of the submission. The drainage plan shall be coordinated with the state and federal permit process and the Township's SALDO review process.

- C. The application shall be accompanied by the requisite fee as set forth in the Township's fee schedule.
- D. For those regulated activities which require SALDO approval, the drainage plan shall be submitted by the applicant as part of the preliminary plan or land development plan submission.
- E. For those regulated activities that do not require SALDO approval, the application shall be accompanied by the requisite number of applications and plans as set forth by Township resolution.
- F. Any submission found incomplete shall not be accepted for review and shall be returned to the Applicant with written notification of the manner in which the Application is incomplete.

Section 306. Drainage Plan Review

- A. The Township Engineer shall review the drainage plan for consistency with any applicable Act 167 Stormwater Management Plan, the provisions of this Ordinance and any applicable provisions of the Coolbaugh Township Subdivision and Land Development Ordinance.
- B. The Monroe County Conservation District shall review the Consumptive Use Tracking Report. Where thresholds for consumptive use have been established, the Conservation District will notify the Township and the applicant in the event that established thresholds have been met.
- C. The Erosion and Sedimentation Pollution Control Plan shall be reviewed by the Monroe County Conservation District and found adequate to meet the requirements of 25 Pa. Code Section 102 regulations prior to approval of the drainage plan.
- D. For regulated activities requiring approval under the Coolbaugh Township Subdivision and Land Development Ordinance, the review of the drainage plan shall adhere to the time requirements of that ordinance and the applicable provisions of the Pennsylvania Municipalities Planning Code.
- E. For the review of all other regulated activities requiring drainage plan approval, the Township Engineer shall review the plans and advise the Township and the applicant within 90 days of receipt of a complete drainage plan application whether or not the plan meets the requirements of this ordinance. Any drainage plan found to be inconsistent or non-compliant with these regulations may be revised and re-submitted triggering a new 90 day review period.
- F. In the event the drainage plan is found to be inconsistent or non-compliant with this Ordinance, and no revised plans have been submitted, the Township shall notify the

applicant that the drainage plan, and any associated subdivision, land development and/or permit application, has been rejected. The applicant may file an appeal of this decision as set forth in Section 605 of this Ordinance.

Section 307. Drainage Permit Approval and Issuance

- A. The drainage permit will be issued after approval of the drainage plan. The drainage permit shall be issued by the Board of Supervisors concurrently with final subdivision or land development approval, or by the Zoning Officer concurrently with the issuance of the Zoning Permit whichever, is applicable.
- B. A drainage permit shall not be issued unless all required approvals or permits have been obtained from state and federal agencies including the following: approval of an Erosion and Sedimentation Pollution Control Plan by the Monroe County Conservation District, approval of any required NPDES permit, approval of a PennDOT Highway Occupancy Permit where stormwater control issues are involved and any other required state or federal permits related to stormwater management issues, and a maintenance contract in accordance with Section 503 has been executed.
- C. The municipality's approval of a drainage plan shall be valid for a period not to exceed five years, commencing on the date that the municipality signs the approved drainage plan. If stormwater management facilities included in the approved drainage plan have not been substantially constructed within this five year time period, then the municipality may consider the drainage plan disapproved and may revoke any and all permits.

Section 308. Modification of Plans

- A. Modification of an approved or rejected drainage plan that involves a change in stormwater management facilities or techniques, or that involves the relocation or re-design of stormwater management facilities, or that is necessary because soil or other conditions are not as stated in the original drainage plan shall require the re-submission of a modified drainage plan consistent with Section 305 of this Ordinance, and subject to review as set forth in Section 306 of this Ordinance.

Section 309. Inspections

- A. The Applicant's Design Professional shall make inspections during construction according to the submitted and approved inspection schedule. At the completion of the project, and as a prerequisite for the release of the performance guarantee, the Applicant shall provide a certification from a Design Professional verifying that the inspections have been made and that the construction has been completed according to the approved plans and specifications, and approved revisions thereto, as described in Section 501 of this Ordinance.

- B. During any stage of the work, if the Township or its designee determines that the stormwater management facilities are not being implemented according to the approved drainage plan, or that site conditions are not as stated or shown on the drainage plan, the Board of Supervisors or the Zoning Officer, whichever is applicable, may suspend or revoke the drainage permit until a revised plan is submitted and approved as set forth in Section 308 of this Ordinance.
- C. Any portion of the work which does not comply with the approved Drainage Plan must be corrected by the permittee within the time period specified by the Township. No work may proceed on any subsequent phase of the drainage plan, the subdivision or land development or building construction until the required corrections have been made.
- D. A final observation of all required improvements shown on the approved Drainage Plan shall be conducted by the Township Engineer or designee to verify general compliance with the drainage plan prior to issuance of any Occupancy Permit. The permittee must supply a certification from an engineer that all required improvements have been completed in accordance with the approved drainage plan prior to the return of any performance or improvements guarantees by the Township. As-built plans are required, unless determined not to be necessary by the Township.

Section 310. Schedule of Inspections

- A. The Applicant shall submit a proposed schedule of inspections to be made by the Applicant’s Design Professional for review and approval by the Township.
- B. The Township or its municipal designee shall observe the installation of the permanent stormwater management facilities as deemed appropriate by the Township.
- B. During any stage of the work, if the Township or its designee determines that the permanent stormwater management facilities are not being installed in accordance with the approved Drainage Plan, the Township shall revoke any existing permits or other approvals and issue a cease and desist order until a revised Drainage Plan is submitted and approved, as specified in this Ordinance.
- C. A final observation of all stormwater management facilities shall be conducted by the Township or its designee to verify compliance with the approved Drainage Plan prior to the issuance of any Occupancy Permit.

Section 311. Fees and Expenses

- A. A fee schedule for the drainage permit, covering the reimbursement of costs to Coolbaugh Township for plan review, permit issuance and inspections shall be approved by resolution of the Board of Supervisors, who shall have the right to amend the fee schedule by resolution, as necessary.
- B. An Occupancy Permit for a completed project subject to a drainage permit will not be issued until all required fees have been paid.

Article IV
Stormwater Management

Section 401. General Requirements

- A. Applicants proposing Regulated Activities in Coolbaugh Township which do not fall under the exemption criteria included in Section 302 shall submit a drainage plan consistent with this ordinance to the municipality for review. These criteria shall apply to the total proposed development even if development is to take place in stages.
- B. The Applicant is required to perform an alternatives analysis to find practicable alternatives to the surface discharge of stormwater, the creation of impervious surfaces and the degradation of waters of the Commonwealth, and must maintain as much as possible the natural hydrologic regime.
 - 1. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes.
 - 2. All practicable alternatives to the discharge of stormwater are presumed to have less adverse impact on quantity and quality of waters of the Commonwealth unless otherwise demonstrated.
- C. The Drainage Plan must be designed through an alternatives analysis consistent with the sequencing provisions of Section 402 to ensure maintenance of the natural hydrologic regime and to promote groundwater recharge and protect groundwater and surface water quality and quantity. The Drainage Plan designer must proceed sequentially in accordance with Article IV of this ordinance.
- D. Stormwater drainage systems shall be provided in order to permit unimpeded flow along natural watercourses, except as modified by stormwater management facilities or open channels consistent with this Ordinance.
- E. The existing points of concentrated drainage that discharge onto adjacent property shall not be altered in any manner which could cause property damage without permission of the affected property owner(s) and shall be subject to any applicable discharge criteria specified in this Ordinance.
- F. Areas of existing diffused drainage discharge shall be subject to any applicable discharge criteria in the general direction of existing discharge, whether proposed to be concentrated or maintained as diffused drainage areas, except as otherwise provided by this ordinance. If diffused drainage discharge is proposed to be concentrated and discharged onto adjacent property, the Applicant must document that adequate downstream conveyance facilities exist to safely transport the concentrated discharge, or otherwise prove that no erosion, sedimentation, flooding or other impacts will result from the concentrated discharge.
- G. Where a development site is traversed by existing watercourses, drainage easements shall be provided conforming to the top of bank of such watercourses. The terms of the easement shall prohibit any alterations which may adversely affect the flow of stormwater within any portion of the easement.

- H. Any stormwater management facilities regulated by this Ordinance that would be located in the floodway of waters of the Commonwealth or wetlands shall be subject to approval by PaDEP through the Joint Permit Application process, or, where deemed appropriate by PaDEP, the General Permit process. When there is a question whether wetlands may be involved, it is the responsibility of the Applicant to show that the land in question cannot be classified as wetlands; otherwise approval to work in the area must be obtained from PaDEP.
- I. Any stormwater management facilities regulated by this Ordinance that would be located on State highway rights-of-way shall be subject to approval by the Pennsylvania Department of Transportation (PennDOT).
- J. Infiltration of runoff through seepage beds, infiltration trenches, etc. where soil conditions permit, and minimization of impervious surfaces to the extent permitted by the municipality's Zoning Ordinance are required to reduce the size or eliminate the need for, detention facilities or other structural BMP's.
- K. In order to promote overland flow and infiltration, roof drains shall not be connected to streets, or storm sewers or roadside ditches. Direct connection of roof drains to storm sewers or roadside ditches shall only be permitted by the Township on a case by case basis when it is demonstrated that it is more advantageous to do so from an environmental standpoint. It is recommended that roof runoff be directed to infiltration BMP's. Considering potential pollutant loading, roof drain runoff will not require pretreatment, in most cases.
- L. All stormwater runoff, other than roof runoff, shall be treated for water quality prior to discharge to surface or groundwater.
- M. Adequacy of downstream facilities and effect of project on downstream properties must be considered in the stormwater design.

402. Project Design Sequencing

The Applicant shall demonstrate that the Regulated Activities have been designed in the following sequence to minimize the increases in stormwater runoff and impacts to water quality:

- A. Prepare an Existing Resource and Site Analysis Map (ERSAM), showing environmentally sensitive areas including, but not limited to, slopes in excess of 15%, ponds, lakes, streams, wetlands, hydric soils, vernal ponds, flood plains, buffer areas, hydrologic soil groups A and B (areas conducive to infiltration), any existing recharge areas and any other requirements outlined in the municipal Subdivision and Land Development ordinance.
- B. Establish buffers according to Section 403.
- C. Prepare a draft project layout avoiding earth disturbance in sensitive areas identified in Section 402.A and minimizing total site earth disturbance as much as possible. The ratio of the disturbed area to the entire site area and measures taken to minimize earth disturbance shall be included on the ERSAM.
- D. Identify site specific predevelopment drainage areas, discharge points, recharge areas to be preserved and hydrologic soil groups A and B to be utilized for recharge.

- E. Evaluate Nonstructural Stormwater Management Alternatives
 - 1. Minimize earth disturbance
 - 2. Minimize impervious surfaces
 - 3. Break up large impervious surfaces.
- F. Satisfy water quality and stream bank erosion protection objective (Section 404).
- G. Satisfy groundwater recharge (infiltration) objective (Section 406) and provide for stormwater treatment prior to infiltration.
- H. Determine in which Management District the site is located (Appendix D), and conduct a predevelopment runoff analysis.
- I. Prepare final project design to maintain predevelopment drainage areas and discharge points, to minimize earth disturbance and impervious surfaces, and to reduce runoff to the maximum extent possible.
- J. Conduct a post development runoff analysis based on the final design and to meet the release rate, and in turn the overbank flow and extreme event requirements (Section 407).
- K. Manage any remaining runoff through treatment prior to discharge, as part of detention, bioretention, direct discharge or other structural control. All stormwater runoff, other than roof top runoff, shall be treated for water quality prior to discharge to surface or groundwater.
- L. Satisfy the soil erosion and sediment control requirements (Section 410).
- M. Prepare a Consumptive Use Tracking Report for projects located within the Brodhead Creek Watershed (Section 411).

403. Buffers

- A. Where required by 25 PA Code, Chapter 102, buffers shall be provided accordingly.
- B. Where not specifically required by 25 PA Code, Chapter 102, buffers shall be established adjacent to all wetlands, vernal ponds, lakes, ponds, streams and natural watercourses, as required herein.
- C. Exemptions – Lots with an area of one (1) acre or less within residential subdivisions which were approved prior to the effective date of this Ordinance shall be exempt from the requirements for the establishment of buffers, except that this exemption shall not apply to parcels on approved subdivision plans which may be considered remaining lands, residual lands, reserved lands, recreation areas, or homeowners association lands.
- D. Where buffers along various water resources overlap, the more restrictive requirements shall apply.
- E. 50' Inner Buffers

1. Inner buffers shall be established with a width of 50' from the edge of any wetlands, vernal pond, lake, pond and from the top-of-bank on both sides of any stream or natural watercourse (measured horizontally, perpendicular or radial to such edge or top-of-bank).
2. Within the inner buffer, the following uses and activities are permitted, provided that not more than thirty-five percent (35%) of the inner buffer on the parcel shall be altered by grading, filling, construction or development:
 - a. Stormwater conveyances approved by the Township.
 - b. Maintenance and restoration of the buffer.
 - c. The correction of hazardous or dangerous conditions.
 - d. Stream crossings and encroachments permitted by the PA DEP.
 - e. Unpaved, stable trails used for passive recreation.
 - f. In the case of an inner buffer adjacent to lake or pond, boat docks are also permitted.
 - g. In the case of an inner buffer along a stream or natural watercourse, fish hatcheries, wildlife sanctuaries and boat launches are also permitted, provided they are constructed as not to alter the flood plain cross-section.

F. 100' Outer Buffers

1. Except as otherwise required by 25 PA Code, Chapter 102, outer buffers shall be established with a width of 100' from the inner buffer (measured horizontally, parallel to and concentric with the inner buffer), around the inner buffer of wetlands, vernal ponds, streams and watercourses; no outer buffer is required around lakes and ponds.
2. Within the outer buffer, the following areas and activities are permitted, provided that not more than twenty percent (20%) of the area of the outer buffer on the parcel shall be altered by these uses and activities:
 - a. Any use or activity permitted in the inner buffer for the corresponding water resource.
 - b. Access roads constructed to approximate existing grade.
 - c. Limited forestry activities that do not clear-cut the buffer (e.g., selective regeneration harvest) conducted in accordance with a forestry management plan.

- d. Plant nurseries, provided no new buildings are constructed.
- e. Parking lots constructed to approximate existing grade.
- f. Additions to existing buildings.
- g. Stormwater Management facilities.
- h. In the case of buffers along a stream or natural watercourse, uses accessory to residential uses, outdoor athletic and passive sports facilities, provided no building is constructed.

404. Stormwater Quality

In addition to the performance standards and design criteria requirements of this Ordinance, the Applicant shall comply with the following water quality requirements of this Article.

- A. For water quality and streambank erosion, the objective is to design a water quality BMP to detain the proposed condition's 2-year, 24-hour design storm to the existing condition's 1-year flow using the SCS Type II distribution. Additionally, provisions shall be made (such as adding a small orifice at the bottom of the outlet structure) so that the proposed condition's 1-year storm takes a minimum of 24 hours to drain from the facility from a point where the maximum volume of water from the 1-year storm is captured. (i.e., the maximum water surface elevation is achieved in the facility.) This can be accomplished by configuration of the outlet structure not to control the larger storms, or by a bypass or channel to divert only the 2-year flood into the basin or divert flows in excess of the 2-year storm away from the basin. Where practicable, water quality controls shall meet the requirements found in the Pennsylvania Stormwater BMP manual. Release of water can begin at the start of the storm (i.e., the invert of the water quality orifice is at the invert of the facility). The design of the facility shall consider and minimize the chances of clogging and sedimentation. Orifices smaller than 3 inches diameter are not recommended. However, if the design professional can provide proof that smaller orifices are protected from clogging by use of trash racks, etc., smaller orifices may be permitted.
- B. In selecting the appropriate BMPs or combinations thereof, the Applicant shall consider the following:
 - 1. Total contributing area.
 - 2. Permeability and infiltration rate of the site soils.
 - 3. Slope and depth to bedrock.
 - 4. Seasonal high water table.
 - 5. Proximity to building foundations and well heads.
 - 6. Erodibility of soils.

7. Land availability and configuration of the topography.
 8. Peak discharge and required volume control.
 9. Stream bank erosion.
 10. Efficiency of the BMPs to mitigate potential water quality problems.
 11. The volume of runoff that will be effectively treated.
 12. The nature of the pollutant being removed.
 13. Maintenance requirements.
 14. Creation/protection of aquatic and wildlife habitat.
 15. Recreational value.
- C. For areas within defined Special Protection subwatersheds which includes Exceptional Value (EV) and High Quality (HQ) waters, the temperature and quality of water and streams shall be maintained through the use of temperature sensitive BMPs and stormwater conveyance systems.
- D. The Applicant shall consider the guidelines found in the Pennsylvania Stormwater BMP Manual, and other acceptable guidelines for constructed wetlands, where proposed.
- E. Pretreatment in accordance with Section 401.L shall be provided prior to infiltration.
- F. Streambank restoration projects shall include the following:
1. No restoration or stabilization projects may be undertaken without examining the fluvial geomorphology of stable reaches above and below the unstable reach.
 2. Restoration project design must then consider maintenance of stability in the adjacent stable reaches of the stream channel.
 3. An Erosion and Sediment Control Plan approved by the Conservation District must be provided by the Applicant.
 4. All applicable State and Federal permits must be obtained.
- G. All wet basin designs shall incorporate biologic controls in accordance with the West Nile Virus Guidance found in Appendix E.
- H. To accomplish the above, the Applicant shall submit original and innovative designs to the Municipality for review and approval. Such designs may achieve the water quality objectives through a combination of BMPs (Best Management Practices).
- I. In the Wallenpaupack watershed, critical areas for control of post-development runoff quality have been defined based on the projected pollutant loading of the subwatersheds. In Coolbaugh Township, the Wallenpaupack M-WC subwatershed is defined as one of these critical areas. The control criteria for these critical areas are established as 0.13 mg/l for phosphorus (as total soluble phosphorous) and 65 mg/l for sediment (as total suspended solids). See Section 405 for method of calculation of runoff pollutant parameters.

405. Methods of Calculation of Runoff Pollutant Parameters

A. The methods of computation used to determine total phosphorous and sediment loads shall be one of the following methods or other method approved by the Township in advance:

1. The application of the unit areal loading rates is presented at the end of this Appendix for phosphorus and sediment loads. The total load for a given pollutant at a development site is the summation of the pollutant loads generated by each land use type for the site. The individual land use loads are calculated by multiplying the land use area (in acres) by the appropriate loading rate.
2. The simple method for phosphorus pollutant export as set forth in the “A Framework for Evaluating Compliance with the 10% Rule in the Criteria Area”.

$$L = (P)(P_j)(R_v)/12*(C)(A)(2.72)$$

Where L = phosphorus pollutant export (in pounds)

P = rainfall depth (in inches) for the year

P_j = a factor that corrects P for storms that produce no runoff

R_v = runoff coefficient for the site which expresses the fraction of rainfall that is converted into runoff

C = the average storm concentration of phosphorus for the land use (in mg/l)

A = total area of the site (in acres)

2.72 = conversion factor to produce load in pounds

3. The universal soil loss equation for sediment erosion

$$A = (R)(K)(L)(C)(P)$$

Where A = computed soil loss in tons/day for a given storm

R = rainfall energy factor

K = soil erodibility factor

L = slope length factor

C = vegetative cover factor

P = erosion control practice factor

B. Refer to Appendix G for a sample problem that describes the typical procedure to be followed in selecting a control technique to control runoff pollutants.

406. Groundwater Recharge

Maximizing the ground water recharge capacity of the area being developed is required. The design shall be consistent with the measures listed in Section 103 and take advantage of utilizing any existing recharge areas.

- A. Regulated activities will be required to recharge (infiltrate), where practicable based on suitability of soils and site conditions, a portion of the runoff created by the development, except as provided in 406B. The following criteria shall apply to recharge facilities:
1. Infiltration BMP's shall be selected based on suitability of soils and site conditions. A detailed soils evaluation of the project site performed by a qualified design professional shall be performed to determine general areas of suitability for infiltration practices. The evaluation shall include at a minimum, the following:
 - a. An analysis of the hydrologic soil groups as well as material and man-made features within the watershed to determine general areas of suitability for infiltration practices.
 - b. Depth to limiting zone, bedrock and water table and subgrade stability.
 - c. Site specific infiltration test results. The tests shall be run at the elevation of the proposed infiltration surface and shall be in accordance with ASTM Guide No. D5126 to determine the appropriate hydraulic conductivity rate.
 - d. Infiltration rates to be used on the design based on the site specific testing.
 2. A minimum depth of 24 inches shall be maintained between the bottom of the infiltration BMP and the limiting zone of the soil.
 3. The infiltration rate of the soils as determined by field tests must be sufficient to accept the additional stormwater load and drain completely.
 4. The volume of runoff to be recharged shall be determined based on the following equation:

$$Re \text{ (cu. ft.)} = I \text{ (in)} \times \text{Impervious area (sq. ft.)} \times (1 \text{ ft./12 in}) \quad \text{Eqn. 406.1}$$

where: Re is the required recharge volume
I is the infiltration requirement

The infiltration requirement (I) shall be determined based upon the following:

- a. NRCS Curve Number Equation

$$I \text{ (in)} = (200/CN) - 2 \quad \text{Eqn: 406.2}$$

where: I is the infiltration requirement
 CN is the NRCS curve number for the area contributing to the recharge facility based on existing conditions.

Equation 406.2 is displayed graphically in Figure 406.1

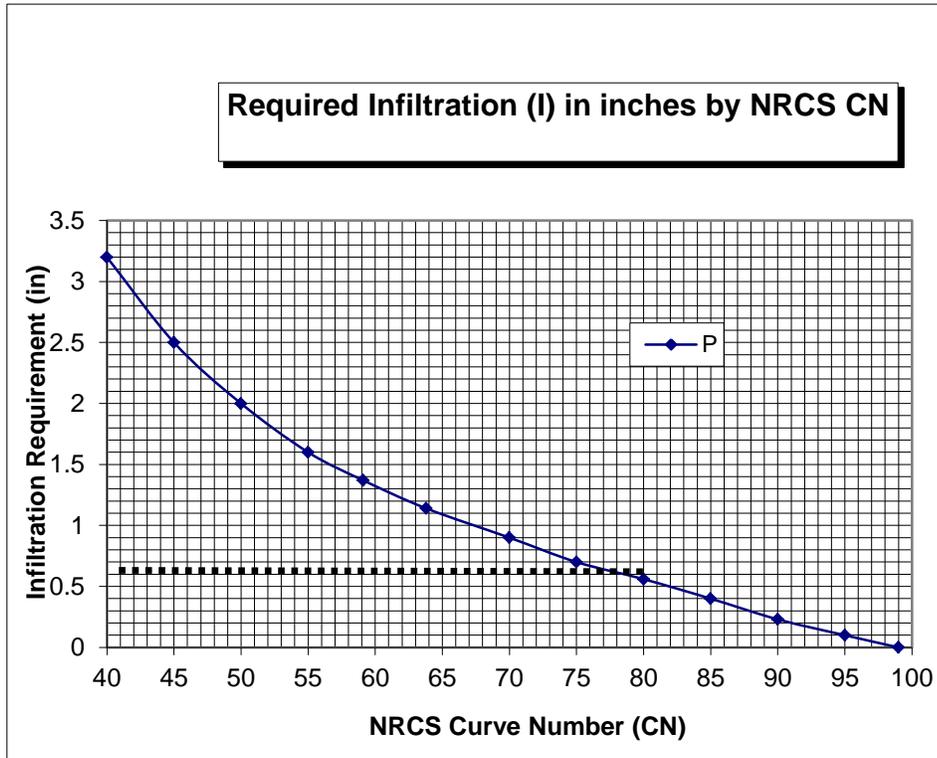


Figure 406.1 Infiltration requirement based upon NRCSA Curve Number

b. Annual Recharge – Water Budget Approach

It has been determined that infiltrating 0.6 inches of runoff from the impervious areas will aid in maintaining the hydrologic regime of the watershed. If the goals of Section 406.A.4 cannot be achieved due to soils limitations and/or site conditions, then the infiltration requirement (I) may be reduced to 0.6 when existing conditions curve numbers (CN) are less than 77.

5. The recharge facility shall be capable of completely infiltrating the recharge volume with 4 days.
6. Pretreatment in accordance with Section 401.L shall be provided prior to infiltration.

7. If individual on-lot infiltration structures are proposed, it must be demonstrated that the soils are conducive to infiltration on those lots.
- B. Stormwater Hotspots – A stormwater hotspot is defined as a land use activity that generates higher concentrations of hydrocarbons, trace metals or toxicants than are found in typical stormwater runoff, based on monitoring studies. Table 406.1 provides samples of designated hotspots. If a site is designated as a hotspot, it has important implications for how stormwater is managed. First and foremost, untreated stormwater runoff from hotspots cannot be allowed to infiltrate into groundwater where it may contaminate water supplies. Therefore, the Re_v requirement is NOT applied to development sites that fit into the hotspot category (the entire WQ_v must still be treated). Second, a greater level of stormwater treatment may be needed at hotspot sites to prevent pollutant washoff after construction. EPA’s NPDES stormwater program requires some industrial sites to prepare and implement a stormwater pollution prevention plan.

Table 406.1 – Classification of Stormwater Hotspots

| |
|---|
| The following land uses and activities are samples of stormwater hotspots: |
| • Salvage yards and recycling facilities |
| • Fleet storage areas (bus, truck, etc.) |
| • Public works storage areas |
| • Facilities that generate or store hazardous materials |
| • Commercial gasoline and fuel oil sales |
| • Vehicle fluid replacement facilities |
| • Vehicle service stations, repair facilities and body repair and painting facilities |
| • Dry-cleaning and dyeing establishments and laundries that utilize cleaning solvents |
| • Printing and photo-processing establishments |
| • Furniture and finish-stripping establishments |
| |

Extreme caution shall be exercised where salt or chloride would be a pollutant since soils do little to filter this pollutant and it may contaminate the groundwater. The qualified design professional shall evaluate the possibility of groundwater contamination from the proposed infiltration/recharge facility and perform a hydrogeologic justification study if necessary. The infiltration requirement in High Quality/Exceptional Value waters shall be subject to the Department’s Chapter 93 Antidegradation Regulations. The municipality may require the installation of an impermeable liner in detention basins where the possibility of groundwater contamination exists. A detailed hydrogeologic investigation may be required by the municipality.

The Applicant shall provide safeguards against groundwater contamination for uses which may cause groundwater contamination, should there be a mishap or spill.

- C. Extreme caution shall be exercised where infiltration is proposed in Source Water Protection Areas or that may affect a wellhead or surface water intake.
- D. Recharge/infiltration facilities shall be used in conjunction with other innovative or traditional BMPs, stormwater control facilities, and nonstructural stormwater management alternatives.

407. Stormwater Runoff Rate Control

- A. There are portions of four watersheds within Coolbaugh Township - the Brodhead Creek watershed (as part of the Brodhead and McMichaels Creek watershed), the Tobyhanna Creek watershed, the Wallenpaupack Creek watershed, and the Lehigh River watershed. Act 167 Stormwater Management Plans have been adopted for the Brodhead and McMichaels Creek, the Tobyhanna Creek, and the Wallenpaupack Creek watersheds. In these plans, the watersheds have been divided into stormwater management districts as shown on the map of Act 167 Delineated Watersheds, in Appendix D.

Standards for managing runoff from each subarea in the various watersheds are shown in Table 407.1. Proposed (post-development) stormwater runoff rates of development sites must be controlled to the stormwater runoff rates shown in Table 407.1 for the indicated design storms.

In addition to the requirements specified in Table 407.1 below, the stormwater quality (Section 404), groundwater recharge (Section 406), and erosion and sediment control (Section 410) requirements shall be implemented.

TABLE 407.1 – Stormwater Runoff Release Rate Requirements

| District | Proposed Conditions | (Reduce to) | Existing Conditions |
|----------------------------------|---------------------|-------------|---------------------|
| Tobyhanna Creek Watershed | | | |
| A | 2 - year | | 1 - year |
| | 10 - year | | 10 - year |
| | 50 - year | | 50 - year |
| B | 2 - year | | 1 - year |
| | 10 - year | | 2.33 - year |
| | 50 - year | | 10 - year |
| B-1 | 2 - year | | 1 - year |
| | 5 - year | | 2 - year |
| | 10 - year | | 5 - year |
| | 25 - year | | 10 - year |
| | 50 - year | | 25 - year |
| | 100 - year | | 100 - year |

| Brodhead Creek Watershed | | | |
|--------------------------------------|--|------------|---------------------------------------|
| B-1 | | 2 - year | 1 - year |
| | | 5 - year | 2 - year |
| | | 10 - year | 5 - year |
| | | 25 - year | 10 - year |
| | | 100 - year | 50 - year |
| B-2 | | 2 - year | 1 - year |
| | | 5 - year | 2 - year |
| | | 25 - year | 5 - year |
| | | 100 - year | 100 - year |
| Wallenpaupack Creek Watershed | | | |
| M-TC | | 2 - year | Lesser of 1 - year or 90% of 2 - year |
| | | 5 - year | 90% of 5 - year |
| | | 10 - year | 90% of 10 - year |
| | | 25 - year | 90% of 25 - year |
| | | 50 - year | 90% of 50 - year |
| | | 100 - year | 90% of 100 - year |
| M-WC | | 2 - year | Lesser of 1-year or 70% of 2 - year |
| | | 5 - year | 70% of 5 - year |
| | | 10 - year | 70% of 10 - year |
| | | 25 - year | 70% of 25 - year |
| | | 50 - year | 70% of 50 - year |
| | | 100 - year | 70% of 100 - year |
| Lehigh River Watershed | | | |
| | | 2 - year | 1 - year |
| | | 5 - year | 5 - year |
| | | 10 - year | 10 - year |
| | | 25 - year | 25 - year |
| | | 50 - year | 50 - year |
| | | 100 - year | 100 - year |

- B. General - Proposed (post-development) stormwater runoff rates from any Regulated Activity shall not exceed the rates of stormwater runoff indicated in Table 407.1 for the indicated design storms.
- C. District Boundaries - The boundaries of the Stormwater Management Districts are shown on the map of Act 167 Delineated Watersheds (Appendix D).
- D. Sites Located in More Than One District - For a proposed development site located within two or more stormwater management district category subareas, the peak discharge rate from any subarea shall be the existing conditions peak discharge for that subarea. 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 by the municipalities 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.

- E. Off-Site Areas - Off-site areas that 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.
- F. Site Areas - Where the site area to be impacted by a proposed development activity differs significantly from the total site area, only the proposed impact area utilizing stormwater management measures shall be subject to the Management District Criteria. In other words, unimpacted areas bypassing the stormwater management facilities would not be subject to the Management District Criteria.
- G. "No Harm" Option - For any proposed development site not located in a provisional direct discharge district, the Applicant has the option of using a less restrictive runoff control (including no detention) if the Applicant can prove that "no harm" would be caused by discharging at a higher runoff rate than that specified by the Stormwater Management Plan. The "no harm" option is used when an Applicant can prove that the proposed hydrographs can match existing hydrographs, or if it can be proved that the proposed conditions will not cause increases in peaks at all points downstream. Proof of "no harm" must be shown based upon the following "Downstream Impact Evaluation" which shall include a "downstream hydraulic capacity analysis" consistent with Section 407.H to determine if adequate hydraulic capacity exists. The Applicant shall submit to the municipality this evaluation of the impacts due to increased downstream stormwater flows in the watershed.
 - 1. The Hydrologic Regime of the site must be maintained.
 - 2. The "Downstream Impact Evaluation" shall include hydrologic and hydraulic calculations necessary to determine the impact of hydrograph timing modifications due to the proposed development upon a dam, highway, structure, natural point of restricted streamflow or any stream channel section, established with the concurrence of the municipality.
 - 3. The evaluation shall continue downstream until the increase in flow diminishes due to additional flow from tributaries and/or stream attenuation.
 - 4. The peak flow values to be used for downstream areas for the design return period storms (2, 5, 10, 25, 50, and 100-year) shall be the values from the calibrated models for the Brodhead/McMichaels Watershed, the Tobyhanna Watershed or the Wallenpaupack Watershed. These flow values can be obtained from the original Act 167 watershed storm water management plans.
 - 5. Applicant-proposed conditions 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 407.H.
 - 6. A financial distress shall not constitute grounds for the municipality to approve the use of the "no-harm" option.
 - 7. Downstream capacity improvements may be provided as necessary to achieve the "no harm" option.

8. Any "no harm" justifications shall be submitted by the Applicant as part of the Drainage Plan submission per Article III.
- H. "Downstream Hydraulic Capacity Analysis" - Any downstream hydraulic capacity analysis conducted in accordance with this Ordinance shall use the following criteria for determining adequacy for accepting increased peak flow rates:
1. Existing 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. Acceptable velocities shall be based upon criteria included in the DEP *Erosion and Sediment Pollution Control Program Manual*.
 2. Existing natural or man-made channels or swales must be able to convey 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.
- I. Hardship Option - The Stormwater Management Plans and their standards and criteria are designed to maintain existing conditions peak flows and volumes throughout the watersheds as the watersheds becomes developed. There may be certain instances, however, where the standards and criteria established are too restrictive for a particular Applicant. The existing drainage network in some areas may be capable of safely transporting slight increases in flows without causing a problem or increasing flows elsewhere. If an Applicant cannot meet the stormwater standards due to lot conditions or if conformance would become a hardship to an Applicant, the hardship option may be applied. A financial distress shall not constitute grounds for the Municipality to approve the use of the hardship option. The Applicant would have to plead his/her case to the Board of Supervisors with the final determination made by the Municipality. Any Applicant's pleading the "hardship option" will assume all liabilities that may arise due to exercising this option. A financial distress shall not constitute grounds for the municipality to approve the use of the "no-harm" option.

408. Calculation Methodology

- A. Stormwater runoff from all development sites shall be calculated using a generally accepted calculation technique that is based on the NRCS soil cover complex method. Table 408-1 summarizes acceptable computation methods and the method selected by the design professional shall be based on the individual limitations and suitability of each method for a particular site. The Municipality may allow the use of the Rational Method to estimate peak discharges from drainage areas that contain less than 200 acres. The Soil Cover Complex Method shall be used for drainage areas greater than 200 acres.

TABLE 408-1
Acceptable Computation Methodologies For
Stormwater Management Plans

| <u>METHOD</u> | <u>METHOD DEVELOPED BY</u> | <u>APPLICABILITY</u> |
|--|-----------------------------------|---|
| <u>TR-20</u> (or commercial computer package based on TR-20) | USDA NRCS | Applicable where use of full hydrology computer model is desirable or necessary. |
| <u>TR-55</u> (or commercial computer package based on TR-55) | USDA NRCS | Applicable for land development plans within limitations described in TR-55. |
| <u>HEC-1 / HEC-HMS</u> | US Army Corps of Engineers | Applicable where use of full hydrologic computer model is desirable or necessary. |
| <u>PSRM</u> | Penn State University | Applicable where use of a hydrologic computer model is desirable or necessary; simpler than TR-20 or HEC-1. |
| <u>Rational Method</u> (or commercial computer package based on Rational Method) | Emil Kuichling (1889) | For sites less than 200 acres, or as approved by the Municipality and/or Municipal Engineer. |
| <u>Other Methods</u> | Varies | Other computation methodologies approved by the Municipality and/or Municipal Engineer. |

- B. All calculations consistent with this Ordinance using the soil cover complex method shall use the appropriate design rainfall depths for the various return period storms according to the region in which they are located as presented in Table B-1 in Appendix B of this Ordinance. If a hydrologic computer model such as PSRM or HEC-1 is used for stormwater runoff calculations, then the duration of rainfall shall be 24 hours. The SCS 'S' curve shown in Figure B-1, Appendix B of this Ordinance shall be used for the rainfall distribution.
- C. Times-of-concentration for overland flow shall be calculated using the methodology presented in Chapter 3 of Urban Hydrology for Small Watersheds, NRCS, TR-55 (as amended or replaced from time to time by NRCS). Times-of-concentration for channel and pipe flow shall be computed using Manning's equation.
- D. All calculations using the Rational Method shall use rainfall intensities consistent with appropriate times-of-concentration and return periods from the NOAA Charts for the appropriate PennDOT region (from PENNDOT Pub 584, Chapter 7) (Appendix B).
- E. Runoff Curve Numbers (CN) for both existing and proposed conditions to be used in the soil cover complex method shall be obtained from Table B-2 in Appendix B of this Ordinance, except as noted in G and H, below.
- F. Runoff coefficients (C) for both existing and proposed conditions for use in the Rational method shall be obtained from Table B-3 in Appendix B of this Ordinance, except as noted in G and H, below.

- G. For the purposes of existing conditions flow rate determination, undeveloped land shall be considered as "meadow" in good condition, unless the natural ground cover generates a lower curve number or Rational "C" value, as listed in Table B-2 or B-3 in Appendix B of this Ordinance.
- H. The designer shall consider that the runoff from proposed sites graded to the subsoil will not have the same runoff conditions as the site under existing conditions, even after topsoiling or seeding. The designer shall increase his proposed condition "CN" or "C" to better reflect proposed soil conditions.
- I. Where uniform flow is anticipated, the Manning equation shall be used for hydraulic computations, and to determine the capacity of open channels, pipes, and storm sewers. Values for Manning's roughness coefficient (n) shall be consistent with Table B-4 in Appendix B of the Ordinance.
- J. Outlet structures for stormwater management facilities shall be designed to meet the performance standards of this Ordinance using any generally accepted hydraulic analysis technique or method.
- J. The design of any stormwater detention facilities intended to meet the performance standards of this Ordinance shall be verified by routing the design storm hydrograph through these facilities using the Storage-Indication Method. For drainage areas greater than 200 acres in size, the design storm hydrograph shall be computed using a calculation method that produces a full hydrograph. The Township may approve the use of any generally accepted full hydrograph approximation technique that uses a total runoff volume that is consistent with the volume from a method that produces a full hydrograph.
- L. Existing conditions runoff calculations must consider natural or man-made features or structures that may limit existing runoff including such features as existing culverts that may restrict flow and natural or man made depressions.

409. Additional Design Requirements

- A. Any stormwater management facility (i.e., BMP, detention basin) designed to store runoff and requiring a berm or earthen embankment required or regulated by this Ordinance shall be designed to provide an emergency spillway to handle flow up to and including the 100-year proposed conditions. Emergency spillways shall be constructed on undisturbed ground and shall not be constructed on embankment fill. The height of embankment must provide a minimum 1.0 foot of freeboard above the maximum pool elevation computed when the facility functions for the 100-year proposed conditions inflow. Should any stormwater management facility require a dam safety permit under PA DEP Chapter 105, the facility shall be designed in accordance with Chapter 105, which may require facilities to pass storms larger than the 100-year event.
- B. Any other drainage conveyance facility (e.g. culverts, bridges, outfalls of stream enclosure) that does not fall under PaDEP Chapter 105 regulations must be able to convey, without damage to the drainage structure or roadway, runoff from the 25-year design storm with a minimum 1.0 foot of freeboard measured below the lowest point along the top of the roadway.
- C. Any drainage conveyance facility and/or channel not governed by PA DEP Chapter 105

regulations, must be able to convey, without damage to the drainage structure or roadway, runoff from the 25-year design storm. Conveyance facilities to or exiting from stormwater management facilities (i.e., detention basins) shall be designed to convey the design flow to or from that structure. Roadway crossings located within designated floodplain areas must be able to convey runoff from a 100-year design storm.

- D. Storm sewers must be able to convey proposed conditions runoff from a 25-year design storm without surcharging inlets, where appropriate.
- E. Stormwater conveyance facilities must be designed to convey the design storms to the stormwater facilities.
- F. The design of all stormwater management facilities shall incorporate sound engineering principles and practices. The Municipality reserves the right to disapprove any design that would result in the creation of or continuation of a stormwater problem area.
- G. A fifteen foot wide access easement to and around all stormwater management facilities is required to provide ingress and egress from a public right-of-way.

410. Erosion and Sediment Control

- A. Any earth disturbance must be conducted in conformance with PA Title 25, Chapter 102, “Erosion and Sediment Control.”
- B. Additional erosion and sediment control design standards and criteria to be applied where infiltration BMPs are proposed shall include the following:
 - 1. Areas proposed for infiltration BMPs shall be protected from sedimentation and compaction during the construction phase to maintain maximum infiltration capacity.
 - 2. Infiltration BMPs shall not be constructed nor receive runoff until the entire contributory drainage area to the infiltration BMP has achieved final stabilization.

411. Consumptive Use Tracking Report

All Regulated Activities located within the Brodhead Creek Watershed shall submit a “Consumptive Use Tracking Report” (CUTR), which shall be developed in accordance with Appendix F as follows:

- A. Residential Development or Redevelopment – The CUTR shall be submitted to the Monroe County Conservation District along with the erosion and sedimentation control plan.
- B. Commercial/Industrial Development or Redevelopment – The CUTR shall be submitted to the Monroe County Conservation District during the Land Development plan approval process.

Article V
Construction Maintenance

501. Performance Guarantee

- A. For subdivisions and land developments the Applicant shall provide a financial performance guarantee to the Township for the timely installation and proper construction of all stormwater management controls as required by the approved Drainage Plan in the amount and method of payment provided for in the Subdivision and Land Development Ordinance.
- B. For other Regulated Activities, the Township may require a financial guarantee from the Applicant in an amount equal to one hundred ten (110) percent of the estimated construction cost of the stormwater management controls as required by the approved Drainage Plan.
- C. At the completion of the project, and as a prerequisite for the release of the performance guarantee, the Applicant or his representatives shall:
 - 1. Provide a certification from a Design Professional verifying that the inspections have been made and that the construction has been completed according to the approved plans and specifications, and approved revisions thereto.
 - 2. Submit testing results, such as for the compaction of an earthen berm, as may be required by the Township.
 - 3. Provide a set of record drawings.
- D. After the Township receives the certification, a final inspection shall be conducted by the Township Engineer or designee to verify compliance with this ordinance.

502. Maintenance Responsibilities

- A. The Drainage Plan for the development site shall contain an operation and maintenance plan prepared by the Applicant and approved by the Township. The operation and maintenance plan shall outline required routine maintenance actions and schedules necessary to ensure proper operation of the stormwater management facilities. Stormwater management facilities shall be maintained in accordance with the Stormwater Management Conveyance Facilities and BMP Inspection Checklist in Appendix H.
- B. The Drainage Plan for the development site shall establish responsibilities for the continuing operation and maintenance of all proposed stormwater management facilities, consistent with the following principles:
 - 1. If a development consists of structures or lots which are to be separately owned and in which streets, sewers or other public improvements or other public improvements are to be offered for dedication to the Township, stormwater management facilities may also be offered for dedication to the Township, however, the Township is not obligated to accept ownership.

2. If a development site is to be maintained in a single ownership, or if streets, sewers or other public improvements are to be privately owned and maintained, then the ownership and maintenance of stormwater management facilities shall be the responsibility of the property Applicant, owner or private management facility, as approved by the Township.
 3. If the ownership and/or responsibility for maintenance of the stormwater management facilities is to be assigned or delegated to a homeowners' association, condominium unit owners' association or similar entity ("transferee"), such transferee shall enter into an agreement with the Township, which shall be in the form and substance acceptable to the Township, acknowledging and agreeing to its responsibilities to perform all maintenance of the stormwater management facilities, according to the Stormwater Management Facilities Maintenance Agreement in Appendix A. If such transferee fails to maintain the stormwater management facilities, the Township shall have the same rights granted to municipalities under Section 705 of the Pennsylvania Municipalities Planning Code, as amended, with reference to maintenance of common open space, to maintain the stormwater management facilities.
- C. The Township, upon recommendation of the Township Engineer, shall make the final determination on the continuing maintenance responsibilities prior to approval of the Drainage Plan. The Township reserves the right, but not the obligation, to accept the ownership and operating responsibility for any or all of the stormwater management facilities.

503. Maintenance Agreement for Privately Owned Stormwater Facilities

- A. Prior to approval of the site's Drainage Plan, the Applicant shall sign and record the Maintenance Agreement contained in Appendix A which is attached and made part hereof, covering all stormwater control facilities that are to be privately owned.
- B. Other items may be included in the agreement where determined necessary to guarantee the satisfactory maintenance of all facilities. The Maintenance Agreement shall be subject to the review and approval of the Township.

504. Municipal Stormwater Maintenance Fund for Certain Facilities

- A. For stormwater basins which will be owned by a homeowners' association, condominium unit owners' association or similar entity, or by the owner of an individual lot which contains a basin to manage stormwater from other lots or properties, or for stormwater basins for which ownership will be transferred to the Township, a nonrefundable deposit to the Municipal Stormwater Maintenance Fund will be required to cover the cost of inspections and long-term maintenance. The amount of the deposit shall be determined as follows:
 1. The amount of the deposit to the fund shall be established by the fee schedule adopted by the Township.

2. Inspections - The amount of the deposit shall cover the estimated cost of biannual inspections for ten (10) years, based on the fee schedule.
 3. Long-Term Maintenance – The amount of the deposit shall also cover the estimated cost of long-term major maintenance, based on the fee schedule.
- B. The long-term maintenance portion of the deposit shall be for the repair of major damage, such as serious wash-outs, failure of the berm or outlet(s), spillway restoration, settlement or subsidence damage, and similar major items in case the owner is unable to make such repairs as required by the Maintenance Agreement, and the damage poses a public hazard or nuisance. This deposit does not cover routine maintenance, including mowing, brush cutting, reseeding, fertilizing, repair of minor erosion, minor repair of the fence and gate, etc. which shall be the responsibility of the owner of the basin.
- C. If a storage facility is proposed that also serves as a recreation facility (e.g., ball field, lake), the Township may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreation purpose.
- D. If at some future time a storage facility (whether publicly or privately owned) is eliminated due to the installation of storm sewers or other storage facilities, the unused portion of the maintenance fund deposit will be applied to the cost of abandoning the facility and connecting to the storm sewer system or other facility. Any amount of the deposit remaining after the costs of abandonment are paid shall remain in the Municipal Stormwater Maintenance Fund.

Article VI

Enforcement and Penalties

601. Right of Entry

The maintenance agreement and application form provide for right of entry upon presentation of proper credentials by duly authorized representatives of the Township to inspect the condition of the stormwater structures and facilities in regard to any aspect regulated by this Ordinance.

602. Notification

In the event that a person fails to comply with the requirements of this Ordinance, or fails to conform to the requirements of any permit issued hereunder, the Township shall provide written notification of the violation. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of these violation(s). Failure to comply within the time specified shall 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 remedies. It shall be the responsibility of the Applicant of the real property on which any Regulated Activity is proposed to occur, is occurring, or has occurred, to comply with the terms and conditions of this Ordinance.

603. Enforcement

The Coolbaugh Township Board of Supervisors is hereby authorized and directed to enforce all of the provisions of this ordinance. All inspections regarding compliance with the drainage plan shall be the conducted by the Township Engineer or other qualified persons designated by the Township.

- A. Design Plans - A set of design plans approved by the Township shall be on file at the site throughout the duration of the construction activity. Periodic inspections may be made by the Township or designee during construction.
- B. Adherence to Approved Plan - It shall be unlawful for any person, firm or corporation to undertake any Regulated Activity under Section 104 on any property except as provided for in the approved drainage plan and pursuant to the requirements of this ordinance. It shall be unlawful to alter or remove any control structure required by the drainage plan pursuant to this ordinance or to allow the property to remain in a condition which does not conform to the approved drainage plan.
- C. Hearing - Prior to revocation or suspension of a permit and at the request of the applicant, the governing body will give notice to the Applicant and will schedule a hearing to discuss the Applicants non-compliance, unless there is immediate danger to life, public health or property. Such hearing shall be held before the governing body in accordance with the Pennsylvania Local Agency Law.
- D. Suspension and Revocation of Permits
 - 1. Any permit issued by the Township may be suspended or revoked for any of the following reasons:
 - a. Non-compliance with or failure to implement any provision of the permit.

- b. A violation of any provision of this ordinance or any other applicable law, ordinance, rule or regulation relating to the project.
 - c. 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.
2. A suspended permit shall be reinstated by the Board of Supervisors when:
- a. The Township Engineer or Township designee has inspected and approved the corrections to the stormwater management and erosion and sediment pollution control measure(s), or the elimination of the hazard or nuisance, and/or;
 - b. The Board of Supervisors is satisfied that the violation of the ordinance, law, or rule and regulation has been corrected.
3. A permit that has been revoked cannot be reinstated. The Applicant may apply for a new permit under the procedures outlined in this Ordinance.

E. Occupancy Permit

The Township shall not issue a Certificate of Zoning Compliance unless the certification of completion pursuant to Section 501.C has been approved by the Township.

604. Violations and Penalties

- A. The violation of any provision of this ordinance is hereby deemed a Public Nuisance.
- B. Each day that a violation continues shall constitute a separate violation.
- C. Anyone violating the provisions of this ordinance shall be subject to a civil penalty of not more than \$500.00 for each violation, recoverable with costs, and reasonable counsel fees. Each day that the violation continues shall be separate offense.
- D. In addition, the Township may institute injunctive, mandamus or any other appropriate action or proceeding at law or in equity for the enforcement of this Ordinance. Any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus or other appropriate forms of remedy or relief.

605. Appeals

- A. Any person aggrieved by any action of the Township Engineer or Township designee may appeal to the Board of Supervisors within thirty (30) days of that action.
- B. Any person aggrieved by any decision of the Township hereunder may appeal to the County Court of Common Pleas in the County within thirty (30) days of the municipal decision.

APPENDIX A

STORMWATER MANAGEMENT FACILITIES MAINTENANCE AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, by and between _____, a Pennsylvania Corporation (or individual Owner) with offices at _____ (herein the Owner) and the Township of Coolbaugh, County of Monroe, Commonwealth of Pennsylvania, a Pennsylvania Second Class Township (herein the Township).

WHEREAS, the Owner is in the process of developing a tract, lot or parcel of land situate in Coolbaugh Township, Monroe County, Pennsylvania as a _____, said tract, lot or parcel of land more specifically identified in Exhibit A hereto; and

WHEREAS, after due consideration of all data presented, the Township Board of Supervisors and Planning Commission have approved the final plans of _____ prepared by _____ together with various supporting plans, profiles, data, specifications and related documents; and

WHEREAS, included in the various final plans is the Drainage Plan which includes various stormwater management facilities to be constructed and located on the tract described in Exhibit A; and

WHEREAS, Section 503 of the Coolbaugh Township Stormwater Management and Earth Disturbance Ordinance, Chapter _____ of the Township of Coolbaugh Code of Ordinances requires a binding agreement between the Owner of the tract, its successors, assigns and all subsequent owners of the tract on which the stormwater management facilities are located and the Township providing for the maintenance of all permanent stormwater management facilities and any other items deemed necessary by the Township to guarantee the maintenance of the stormwater management facilities, and the continued proper functioning of the stormwater management system; and

WHEREAS, the approval of the Coolbaugh Township Board of Supervisors of said final plans and issuance of permits are contingent upon the execution of this Agreement by the parties hereto.

NOW, THEREFORE, intending to be legally bound hereby and in consideration of receiving approval of the Stormwater Management Plan (hereinafter the Plan) from the Board of Supervisors, and in consideration of receiving permits from the Township to develop the tract, Owner, for the Owner and the successors and assigns of the Owner, and all subsequent owners of the subject tract, covenants and agrees as follows:

1. Owner shall maintain all stormwater management facilities in accordance with the approved Drainage Plan, and shall keep all such facilities in a safe and attractive manner including the periodic removal of all debris or litter within and around the facilities.

2. Owner hereby conveys to the Township any necessary license or easement/right-of-way to assure access for periodic inspections of the facilities, and hereby grants to the agents and/or representatives of the Township the right to enter said property at reasonable times to inspect said facilities in order to investigate and/or ascertain the condition of the stormwater management facilities.

3. Owner agrees to keep on file with the Township the current name, address and telephone number of the person or agent responsible for maintenance activities.

4. If the Township determines that the Owner has failed to properly maintain the stormwater management facilities in accordance with the requirements of the Plan and this Agreement, the Township shall provide written notice to the Owner of the maintenance deficiencies to be corrected. If the Owner does not correct the deficiencies within thirty (30) days of the notice, Owner hereby authorizes the agents or employees of the township to enter the subject property and correct the deficiencies. The Township may grant reasonable extensions to the thirty (30) day period if the Owner demonstrates that the work cannot be completed during that period.

5. If the Township is required to perform the necessary corrective work, the Owner hereby agrees to reimburse the Township for the cost of the remediation work. If the Owner fails to reimburse the township for the costs of remediation, the township may undertake collection procedures including, but not limited to, the filing of a municipal lien claim against the subject property.

6. If the maintenance responsibility under this contract is assigned to another person or legal entity, or if the ownership of the tract is transferred to a new owner, the Township shall be notified. The new assignee or owner shall then consent to and join in this Agreement, or the original owner shall remain responsible for compliance with this Agreement along with the new assignee or owner.

7. The Owner shall include a specific reference to this Stormwater Management Facilities Maintenance Agreement in any deed of conveyance for any property that includes the said facilities or any part thereof.

8. The Owner agrees to indemnify and hold harmless the Township and all of its elected and appointed officials, agents and employees from any and all liability, loss or damage, including attorney's fees and costs of investigation and defense, as a result of the design, installation, construction, maintenance or successful operation of the stormwater management facilities.

9. The Owner shall pay the sum of _____ into the Municipal Stormwater Management Fund as set forth in Section 504 of the Ordinance to defray the costs of periodic inspection and maintenance expenses.

APPENDIX B

STORMWATER MANAGEMENT DESIGN CRITERIA

TABLE B-1

DESIGN STORM RAINFALL AMOUNT

Source: "Field Manual of Pennsylvania Department of Transportation"
RAINFALL INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F May 1986.

FIGURE B-1

SCS TYPE II RAINFALL DISTRIBUTION S-CURVE

FIGURE B-2

PENNDOT DELINEATED REGIONS

Source: "Field Manual of Pennsylvania Department of Transportation"
RAINFALL INTENSITY-DURATION-FREQUENCY CHARTS

FIGURE B-3

NOAA CHARTS - REGION 4

Source: PennDOT Drainage Manual, Publication 584, 2010 Edition
RAINFALL INTENSITY-DURATION-FREQUENCY CHARTS

FIGURE B-4

NOAA CHARTS - REGION 5

Source: PennDOT Drainage Manual, Publication 584, 2010 Edition
RAINFALL INTENSITY-DURATION-FREQUENCY CHARTS

TABLE B-2

RUNOFF CURVE NUMBERS

Source: NRCS (SCS) TR-55

TABLE B-3

RATIONAL RUNOFF COEFFICIENTS

TABLE B-4

MANNING ROUGHNESS COEFFICIENTS

TABLE B-5

24-HOUR STORM VALUES REPRESENTING 90% OF ANNUAL RAINFALL

TABLE B-6

NONSTANDARD STORMWATER MANAGEMENT – STORMWATER CREDITS FOR COMPUTING PROPOSED CONDITIONS HYDROGRAPH

TABLE B-1
DESIGN STORM RAINFALL AMOUNT (INCHES)

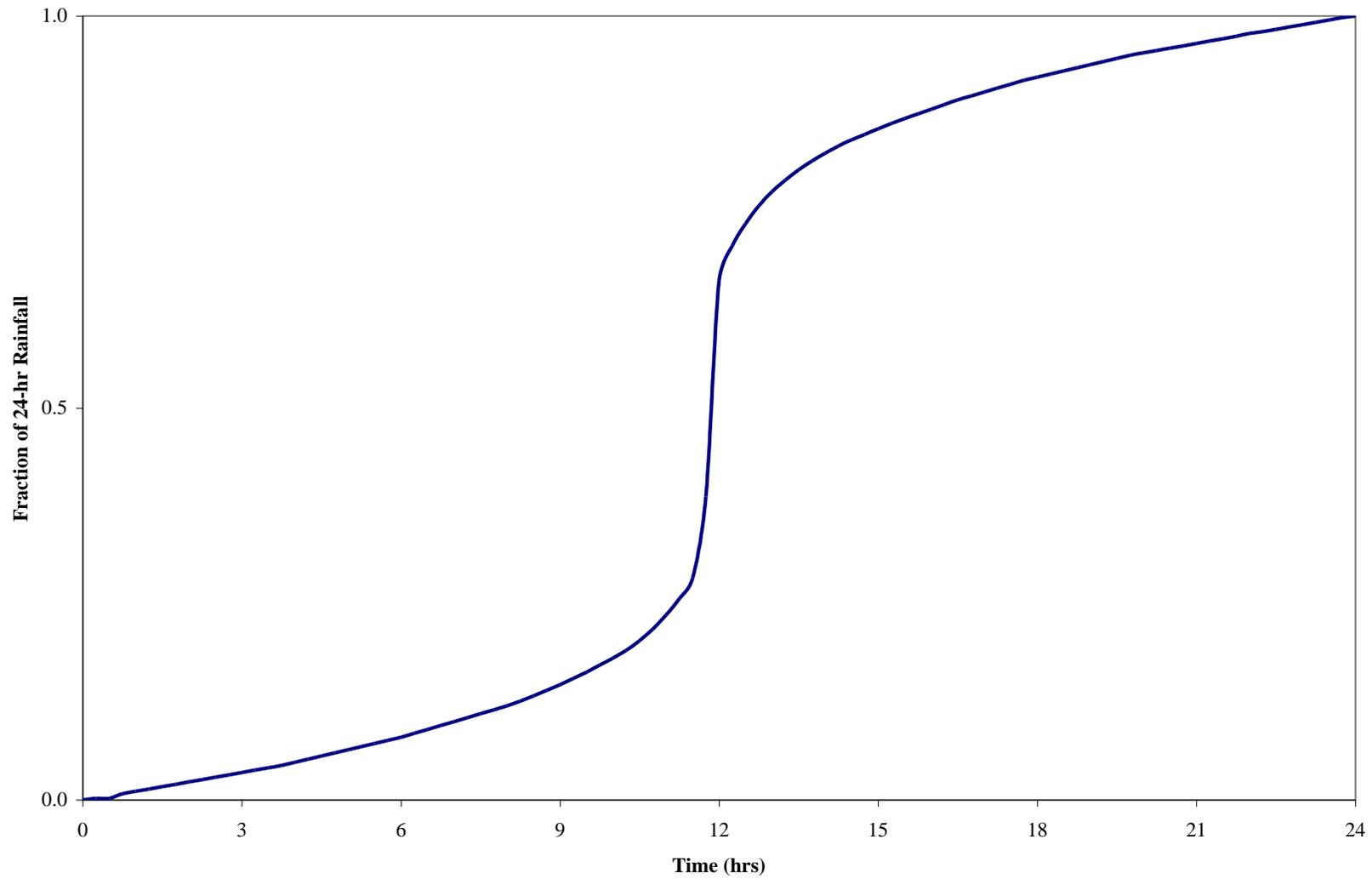
The design storm rainfall amount chosen for design should be obtained from the PennDOT region in which the site is located according to Figure B-2.

Source: "Field Manual of Pennsylvania Department of Transportation"
RAINFALL-DURATION-FREQUENCY CHARTS
P D T - I D F May 1986.

| Region 4 | | | | | | | |
|-----------------|---------------------------------|------|------|-------|-------|-------|--------|
| Duration | Precipitation Depth (in) | | | | | | |
| | 1 Yr | 2 Yr | 5 Yr | 10 Yr | 25 Yr | 50 Yr | 100 Yr |
| 5 min | 0.30 | 0.35 | 0.41 | 0.45 | 0.50 | 0.55 | 0.61 |
| 15 min | 0.58 | 0.68 | 0.80 | 0.93 | 1.03 | 1.13 | 1.25 |
| 1 hr | 1.01 | 1.22 | 1.48 | 1.70 | 1.91 | 2.16 | 2.41 |
| 2 hrs | 1.24 | 1.50 | 1.84 | 2.14 | 2.46 | 2.80 | 3.18 |
| 3 hrs | 1.38 | 1.71 | 2.10 | 2.43 | 2.82 | 3.24 | 3.69 |
| 6 hrs | 1.68 | 2.04 | 2.52 | 3.06 | 3.60 | 4.14 | 4.74 |
| 12 hrs | 2.04 | 2.52 | 3.00 | 3.84 | 4.56 | 5.16 | 6.00 |
| 24 hrs | 2.40 | 2.88 | 3.60 | 4.56 | 5.76 | 6.48 | 7.44 |

| Region 5 | | | | | | | |
|-----------------|---------------------------------|------|------|-------|-------|-------|--------|
| Duration | Precipitation Depth (in) | | | | | | |
| | 1 Yr | 2 Yr | 5 Yr | 10 Yr | 25 Yr | 50 Yr | 100 Yr |
| 5 min | 0.33 | 0.38 | 0.45 | 0.50 | 0.56 | 0.63 | 0.68 |
| 15 min | 0.64 | 0.75 | 0.90 | 1.00 | 1.15 | 1.35 | 1.50 |
| 1 hr | 1.10 | 1.35 | 1.61 | 1.85 | 2.15 | 2.60 | 2.98 |
| 2 hr | 1.34 | 1.66 | 2.00 | 2.34 | 2.70 | 3.26 | 3.76 |
| 3 hr | 1.50 | 1.86 | 2.28 | 2.67 | 3.09 | 3.69 | 4.29 |
| 6 hr | 1.86 | 2.28 | 2.82 | 3.36 | 3.90 | 4.62 | 5.40 |
| 12 hr | 2.28 | 2.76 | 3.48 | 4.20 | 4.92 | 5.76 | 6.72 |
| 24 hr | 2.64 | 3.36 | 4.32 | 5.28 | 6.24 | 7.20 | 8.40 |

FIGURE B-1
NRCS (SCS) TYPE II RAINFALL DISTRIBUTION - S CURVE



**FIGURE B-2
PENNDOT DELINEATED REGIONS**

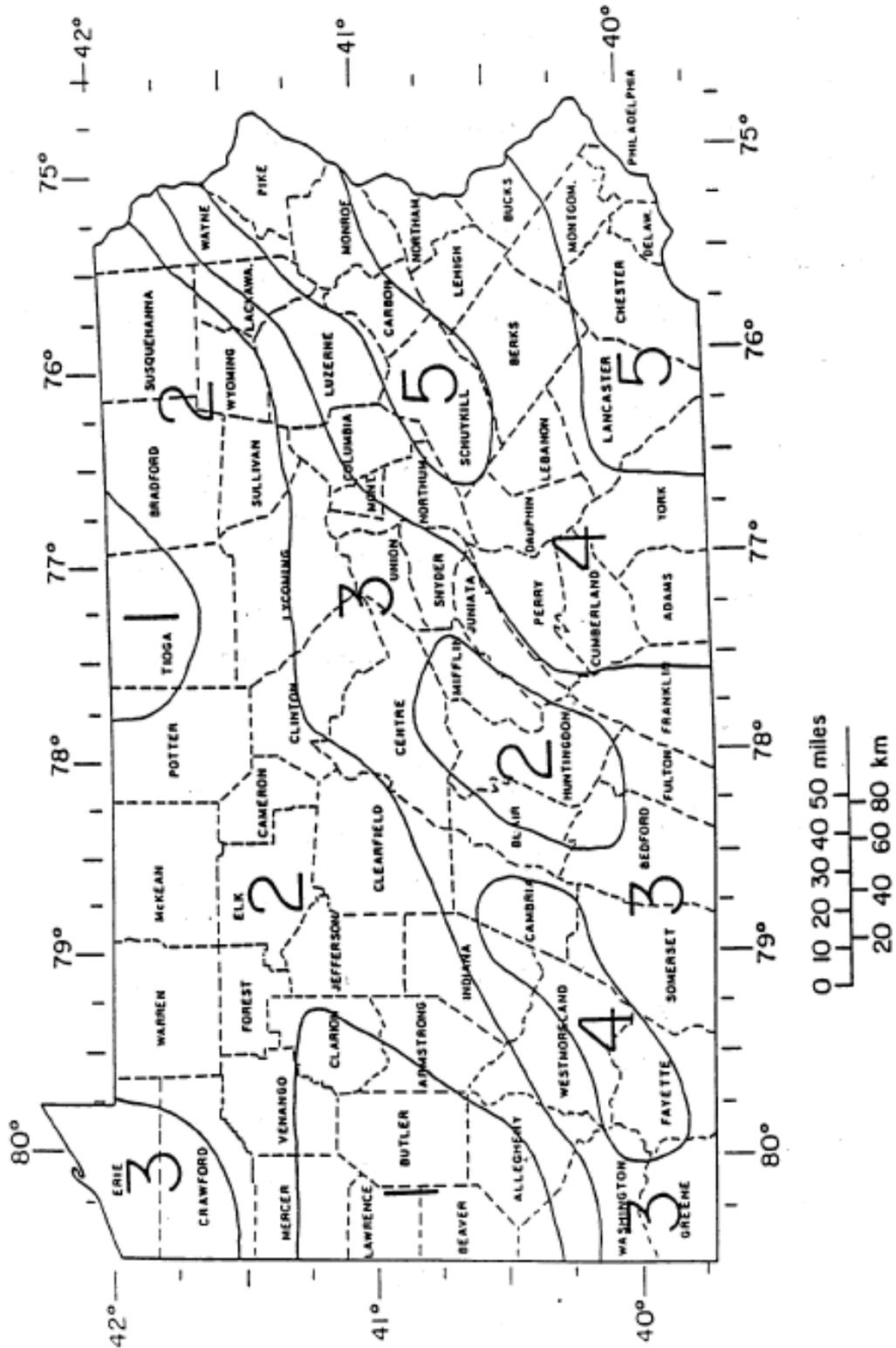


Figure 7A.14(a) Rainfall Intensity for 1- through 100-year Storms for Region 4 (U.S. Customary).
Region 4

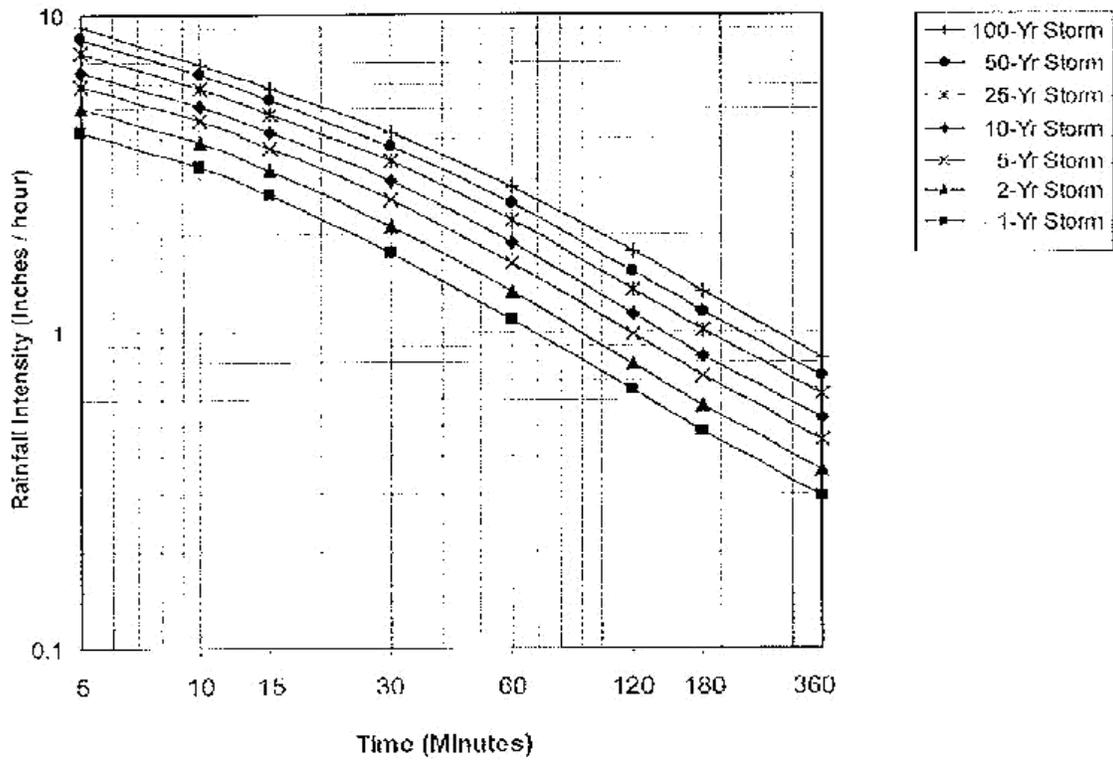


Figure 7A.14(b) Rainfall Amount for 1- through 100-year Storms for Region 4 (U.S. Customary).
Region 4

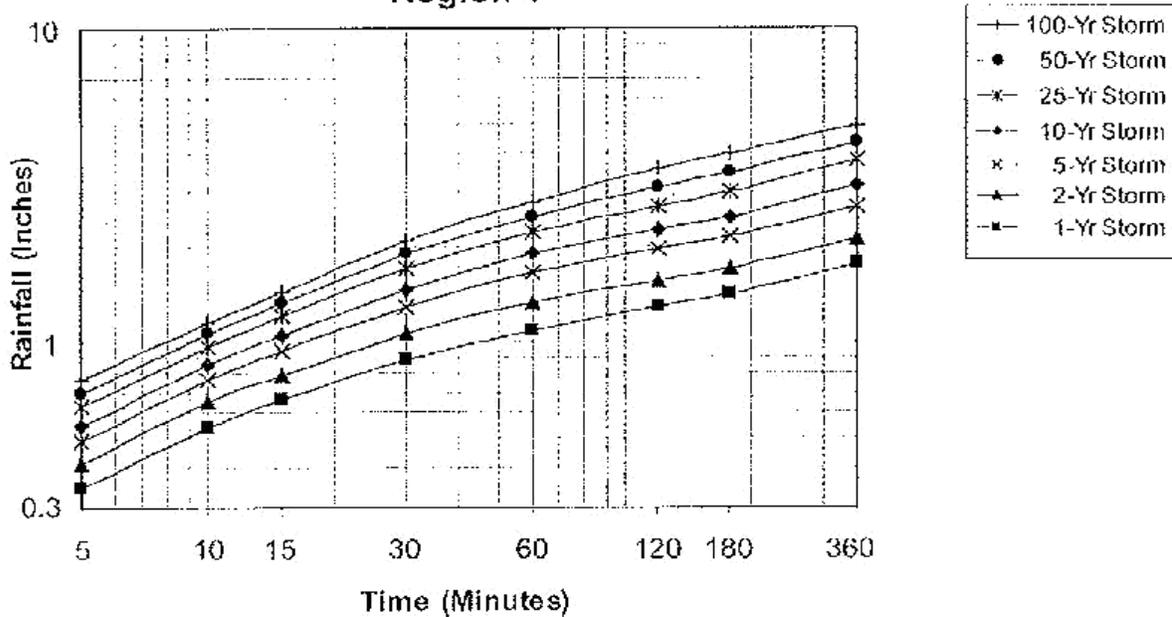


Figure 7A.16(a) Rainfall Intensity for 1- through 100-year Storms for Region 5 (U.S. Customary).

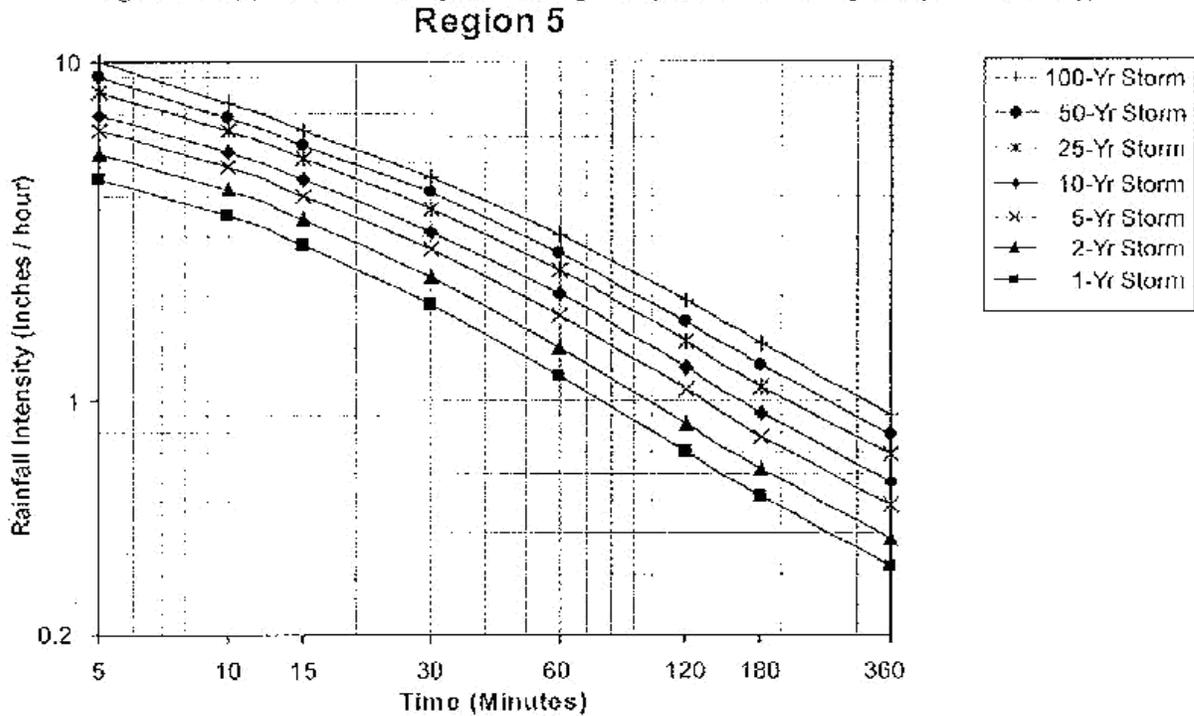


Figure 7A.16(b) Rainfall Amount for 1- through 100-year Storms for Region 5 (U.S. Customary).

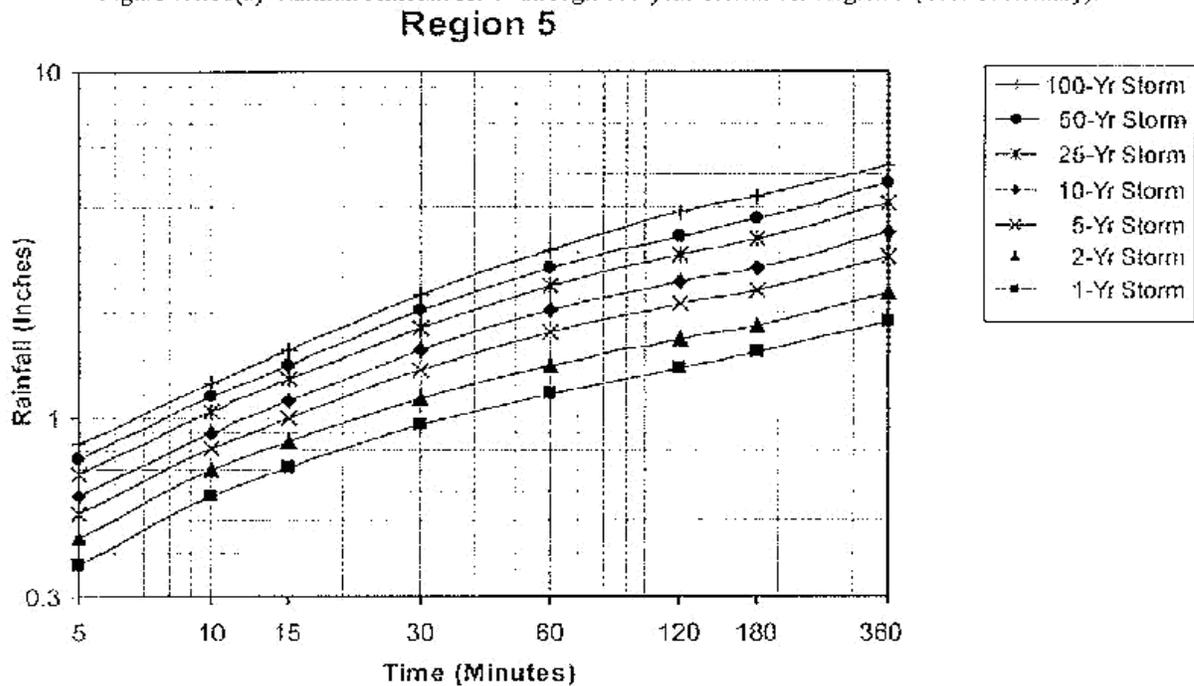


TABLE B-2
RUNOFF CURVE NUMBERS
 (From NRCS (SCS) TR-55)

| LAND USE DESCRIPTION | | Hydrologic Condition | HYDROLOGIC SOIL GROUP | | | |
|--|---|----------------------|-----------------------|----|----|----|
| | | | A | B | C | D |
| Open Space | | | | | | |
| | Grass cover < 50% | Poor | 68 | 79 | 86 | 89 |
| | Grass cover 50% to 75% | Fair | 49 | 69 | 79 | 84 |
| | Grass cover > 75% | Good | 39 | 61 | 74 | 80 |
| Meadow | | | 30 | 58 | 71 | 78 |
| Agricultural | | | | | | |
| | Pasture, grassland, or range – Continuous forage for grazing | Poor | 68 | 79 | 86 | 89 |
| | Pasture, grassland, or range – Continuous forage for grazing. | Fair | 49 | 69 | 79 | 84 |
| | Pasture, grassland, or range – Continuous forage for grazing | Good | 39 | 61 | 74 | 80 |
| | Brush-brush-weed-grass mixture with brush the major element. | Poor | 48 | 67 | 77 | 83 |
| | Brush-brush-weed-grass mixture with brush the major element. | Fair | 35 | 56 | 70 | 77 |
| | Brush-brush-weed-grass mixture with brush the major element. | Good | 30 | 48 | 65 | 73 |
| Fallow | Bare soil | ----- | 77 | 86 | 91 | 94 |
| | Crop residue cover (CR) | Poor | 76 | 85 | 90 | 93 |
| | | Good | 74 | 83 | 88 | 90 |
| Woods – grass combination (orchard or tree farm) | | | | | | |
| | | Poor | 57 | 73 | 82 | 86 |
| | | Fair | 43 | 65 | 76 | 82 |
| | | Good | 32 | 58 | 72 | 79 |
| Woods | | | | | | |
| | | Poor | 45 | 66 | 77 | 83 |
| | | Fair | 36 | 60 | 73 | 79 |
| | | Good | 30 | 55 | 70 | 77 |
| Commercial | (85% Impervious) | | 89 | 92 | 94 | 95 |
| Industrial | (72% Impervious) | | 81 | 88 | 91 | 93 |
| Institutional | (50% Impervious) | | 71 | 82 | 88 | 90 |
| Residential districts by average lot size: | | | | | | |
| 1/8 acre or less (town houses) | % Impervious | | | | | |
| | 65 | | 77 | 85 | 90 | 92 |

| | | | | | |
|---|----|----|----|----|----|
| 1/4 acre | 38 | 61 | 75 | 83 | 87 |
| 1/3 acre | 30 | 57 | 72 | 81 | 86 |
| 1/2 acre | 25 | 54 | 70 | 80 | 85 |
| 1 acre | 20 | 51 | 68 | 79 | 84 |
| 2 acres | 12 | 46 | 65 | 77 | 82 |
| Farmstead | | 59 | 74 | 82 | 86 |
| Smooth Surfaces (Concrete, Asphalt, Gravel or Bare Compacted Soil) | | 98 | 98 | 98 | 98 |
| Water | | 98 | 98 | 98 | 98 |
| Mining/Newly Graded Areas (Pervious Areas Only) | | 77 | 86 | 91 | 94 |

* Includes Multi-Family Housing unless justified lower density can be provided.

Note: Existing site conditions of bare earth or fallow ground shall be considered as meadow when choosing a CN value.

TABLE B-3
RUNOFF COEFFICIENTS FOR THE RATIONAL METHOD

| 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 | 0.08 ^a | 0.13 | 0.16 | 0.11 | 0.15 | 0.21 | 0.14 | 0.19 | 0.26 | 0.18 | 0.23 | 0.31 |
| Land | 0.14 ^b | 0.08 | 0.22 | 0.16 | 0.21 | 0.28 | 0.20 | 0.25 | 0.34 | 0.24 | 0.29 | 0.41 |
| Pasture | 0.12 | 0.20 | 0.30 | 0.18 | 0.28 | 0.37 | 0.24 | 0.34 | 0.44 | 0.30 | 0.40 | 0.50 |
| | 0.15 | 0.25 | 0.37 | 0.23 | 0.34 | 0.45 | 0.30 | 0.42 | 0.52 | 0.37 | 0.50 | 0.62 |
| Meadow | 0.10 | 0.16 | 0.25 | 0.14 | 0.22 | 0.30 | 0.20 | 0.28 | 0.36 | 0.24 | 0.30 | 0.40 |
| | 0.14 | 0.22 | 0.30 | 0.20 | 0.28 | 0.37 | 0.26 | 0.35 | 0.44 | 0.30 | 0.40 | 0.50 |
| Forest | 0.05 | 0.08 | 0.11 | 0.08 | 0.11 | 0.14 | 0.10 | 0.13 | 0.16 | 0.12 | 0.16 | 0.20 |
| | 0.08 | 0.11 | 0.14 | 0.10 | 0.14 | 0.18 | 0.12 | 0.16 | 0.20 | 0.15 | 0.20 | 0.25 |
| Residential | 0.25 | 0.28 | 0.31 | 0.27 | 0.30 | 0.35 | 0.30 | 0.33 | 0.38 | 0.33 | 0.36 | 0.42 |
| 1/8 Acre | 0.33 | 0.37 | 0.40 | 0.35 | 0.39 | 0.44 | 0.38 | 0.42 | 0.49 | 0.41 | 0.45 | 0.54 |
| 1/4 Acre | 0.22 | 0.26 | 0.29 | 0.24 | 0.29 | 0.33 | 0.27 | 0.31 | 0.36 | 0.30 | 0.34 | 0.40 |
| | 0.30 | 0.34 | 0.37 | 0.33 | 0.37 | 0.42 | 0.36 | 0.40 | 0.47 | 0.38 | 0.42 | 0.52 |
| 1/3 Acre | 0.19 | 0.23 | 0.26 | 0.22 | 0.26 | 0.30 | 0.25 | 0.29 | 0.34 | 0.28 | 0.32 | 0.39 |
| | 0.28 | 0.32 | 0.35 | 0.30 | 0.35 | 0.39 | 0.33 | 0.38 | 0.45 | 0.36 | 0.40 | 0.50 |
| 1/2 Acre | 0.16 | 0.20 | 0.24 | 0.19 | 0.23 | 0.28 | 0.22 | 0.27 | 0.32 | 0.26 | 0.30 | 0.37 |
| | 0.25 | 0.29 | 0.32 | 0.28 | 0.32 | 0.36 | 0.31 | 0.35 | 0.42 | 0.34 | 0.38 | 0.48 |
| 1 Acre | 0.14 | 0.19 | 0.22 | 0.17 | 0.21 | 0.26 | 0.20 | 0.25 | 0.31 | 0.24 | 0.29 | 0.35 |
| | 0.22 | 0.26 | 0.29 | 0.24 | 0.28 | 0.34 | 0.28 | 0.32 | 0.40 | 0.31 | 0.35 | 0.46 |
| Industrial | 0.67 | 0.68 | 0.68 | 0.68 | 0.68 | 0.69 | 0.68 | 0.69 | 0.69 | 0.69 | 0.69 | 0.70 |
| | 0.85 | 0.85 | 0.86 | 0.85 | 0.86 | 0.86 | 0.86 | 0.86 | 0.87 | 0.86 | 0.86 | 0.88 |
| Commercial | 0.71 | 0.71 | 0.72 | 0.71 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 |
| | 0.88 | 0.88 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.90 | 0.89 | 0.89 | 0.90 |
| Streets | 0.70 | 0.71 | 0.72 | 0.71 | 0.72 | 0.74 | 0.72 | 0.73 | 0.76 | 0.73 | 0.75 | 0.78 |
| | 0.76 | 0.77 | 0.79 | 0.80 | 0.82 | 0.84 | 0.84 | 0.85 | 0.89 | 0.89 | 0.91 | 0.95 |
| Open Space | 0.05 | 0.10 | 0.14 | 0.08 | 0.13 | 0.19 | 0.12 | 0.17 | 0.24 | 0.16 | 0.21 | 0.28 |
| | 0.11 | 0.16 | 0.20 | 0.14 | 0.19 | 0.26 | 0.18 | 0.23 | 0.32 | 0.22 | 0.27 | 0.39 |
| Parking or | 0.85 | 0.86 | 0.87 | 0.85 | 0.86 | 0.87 | 0.85 | 0.86 | 0.87 | 0.85 | 0.86 | 0.87 |
| Impervious | 0.95 | 0.96 | 0.97 | 0.95 | 0.96 | 0.97 | 0.95 | 0.96 | 0.97 | 0.95 | 0.96 | 0.97 |

a = Runoff coefficients for storm recurrence intervals less than 25 years

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

Source: Rawls, W.J., S.L. Long, and R.H. McDuen, 1981, Comparison of Urban Flood Frequency procedures, Preliminary Draft Report prepared for the Soil Conservation Service, Beltsville, Maryland.

TABLE B-4

RUNOFF COEFFICIENTS (Manning's "n") FOR OVERLAND FLOW

(U.S. Army Corps Of Engineers, HEC-1 Users Manual)

| Surface Description | n | | |
|--|----------|---|------|
| | | - | |
| Dense Growth | 0.4 | - | 0.5 |
| Pasture | 0.3 | - | 0.4 |
| Lawns | 0.2 | - | 0.3 |
| Bluegrass Sod | 0.2 | - | 0.5 |
| Short Grass Prairie | 0.1 | - | 0.2 |
| Sparse Vegetation | 0.05 | - | 0.13 |
| Bare Clay-Loam Soil (eroded) | 0.01 | - | 0.03 |
| Concrete/Asphalt - very shallow depths (less than 1/4 inch) | 0.10 | - | 0.15 |
| - small depths (1/4 inch to several inches) | 0.05 | - | 0.10 |

Roughness Coefficients (Manning's "n") For Channel Flow

| <i>Reach Description</i> | <i>n</i> |
|---|----------------------------|
| Natural stream, clean, straight, no rifts or pools | 0.03 |
| Natural stream, clean, winding, some pools or shoals | 0.04 |
| Natural stream, winding, pools, shoals, stony with some weeds | 0.05 |
| Natural stream, sluggish deep pools and weeds | 0.07 |
| Natural stream or swale, very weedy or with timber underbrush | 0.10 |
| Concrete pipe, culvert or channel | 0.012 |
| Corrugated metal pipe | 0.012-0.027 ⁽¹⁾ |
| High Density Polyethylene (HDPE) Pipe | |
| Corrugated | 0.021-0.029 ⁽²⁾ |
| Smooth Lined | 0.012-0.020 ⁽²⁾ |

(1) Depending upon type, coating and diameter

(2) Values recommended by the American Concrete Pipe Association, check Manufacturer's recommended value.

TABLE B-5

24-HOUR STORM VALUES REPRESENTING 90 % of ANNUAL RAINFALL

| PennDOT Rainfall Region | P Inches |
|-------------------------|----------|
| 1 | 1.13 |
| 2 | 1.48 |
| 3 | 1.60 |
| 4 | 1.95 |
| 5 | 2.04 |

TABLE B-6

NONSTANDARD STORMWATER MANAGEMENT
Stormwater Credits for Computing Proposed conditions Hydrograph

The developer may, subject to approval of the municipal engineer, use the stormwater credits, described in the following table, in computing proposed conditions hydrograph:

| Nonstructural Stormwater Measure | Description |
|---|---|
| Natural Area Conservation | Conservation of natural areas such as forest, wetlands, or other sensitive areas in a protected easement thereby retaining their existing hydrologic and water quality characteristics. |
| Disconnection of Rooftop Runoff | Rooftop runoff is disconnected and then directed over a pervious area where it may either infiltrate into the soil or filter over it. This is typically obtained by grading the site to promote overland flow or by providing bioretention on single-family residential lots. |
| Disconnection of Non-Rooftop Runoff | Disconnect surface impervious cover by directing it to pervious areas where it is either infiltrated or filtered through the soil. |
| Buffers | Buffers effectively treat stormwater runoff. Effective treatment constitutes capturing runoff from pervious and impervious areas adjacent to the buffer and treating the runoff through overland flow across a grass or forested area. |
| Grass Channel (Open Section Roads) | Open grass channels are used to reduce the volume of runoff and pollutants during smaller storms. |
| Environmentally Sensitive Rural Development | Environmental site design techniques are applied to low density or rural residential development. |

APPENDIX C

DRAINAGE PLAN APPLICATION

(To be attached to the "land subdivision plan or development plan review application or "minor land subdivision plan review application")

Application is hereby made for review of the Stormwater Management and Erosion and Sedimentation Control Plan and related data as submitted herewith in accordance with the Coolbaugh Township Stormwater Management and Earth Disturbance Ordinance.

_____ Final Plan _____ Preliminary Plan _____ Sketch Plan

Date of Submission _____ Submission No. _____

1. Name of subdivision or development _____

2. Name of Applicant _____ Telephone No. _____

(if corporation, list the corporation's name and the names of two officers of the corporation)

_____ Officer 1
_____ Officer 2

Address _____

Zip _____

Applicants interest in subdivision or development
(if other than property owner give owners name and address)

3. Name of property owner _____ Telephone No. _____

Address _____

Zip _____

4. Name of engineer or surveyor _____ Telephone No. _____

Address _____

Zip _____

5. Type of subdivision or development proposed:

_____ Single-Family Lots _____ Townhouses _____ Commercial(Multi-Lot)
_____ Two Family Lots _____ Garden Apartments _____ Commercial (One-Lot)

| | | |
|---------------------------------------|------------------------|------------------------------|
| _____ Multi-Family Lots | _____ Mobile-Home Park | _____ Industrial (Multi-Lot) |
| _____ Cluster Type Lots | _____ Campground | _____ Industrial (One-Lot) |
| _____ Planned Residential Development | _____ Other (_____) | |

6. Lineal feet of new road proposed _____ L.F.

7. Area of proposed and existing conditions impervious area on entire tract.

a. Existing (to remain) _____ S.F. _____ % of Property
 b. Proposed _____ S.F. _____ % of Property

8. Stormwater

a. Does the peak rate of runoff from proposed conditions exceed that flow which occurred for existing conditions for the designated design storm? _____

b. Design storm utilized (on-site conveyance systems) (24 hr.) _____
 No. of Subarea _____
 Watershed Name _____

Explain: _____

c. Does the submission and/or district meet the release rate criteria for the applicable subarea? _____

d. Number of subarea(s) from Appendix D. _____

e. Type of proposed runoff control _____

f. Does the proposed stormwater control criteria meet the requirement/guidelines of the Stormwater Ordinance? _____

If not, what variances/waivers are requested? _____

Reasons _____

g. Does the plan meet the requirements of Article IV of the Stormwater Ordinance? _____

If not, what variances/waivers are requested? _____

Reasons Why _____

h. Was TR-55, June 1986 utilized in determining the time of concentration? _____

i. What hydrologic method was used in the stormwater computations? _____

j. Is a hydraulic routing through the stormwater control structure submitted? _____

k. Is a construction schedule or staging attached? _____

l. Is a recommended maintenance program attached? _____

9. Erosion and Sediment Pollution Control (E&S):

a. Has the stormwater management and E&S plan, supporting documentation and narrative been submitted to the Monroe County Conservation District? _____

b. Total area of earth disturbance _____ S.F.

10. Wetlands

a. Have the wetlands been delineated by someone trained in wetland delineation? _____

b. Have the wetland lines been verified by a state or federal permitting authority? _____

c. Have the wetland lines been surveyed? _____

d. Total acreage of wetland within the property _____

e. Total acreage of wetland disturbed _____

f. Supporting documentation _____

11. Filing

a. Has the required fee been submitted? _____

Amount _____

b. Has the proposed schedule of construction inspection to be performed by the Applicant's engineer been submitted? _____

c. Name of individual who will be making the inspections _____

d. General comments about stormwater management at the development _____

CERTIFICATE OF OWNERSHIP AND ACKNOWLEDGMENT OF APPLICATION:

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF MONROE

On this the _____ day of _____, 20____, before me, the undersigned officer, personally appeared _____ who being duly sworn, according to law, deposes and says that _____ owners of the property described in this application and that the application was made with _____ knowledge and/or direction and does hereby agree with the said application and to the submission of the same.

_____ Property Owner

My Commission Expires _____ 20____
Notary Public _____

THE UNDERSIGNED HEREBY CERTIFIES THAT TO THE BEST OF HIS KNOWLEDGE AND BELIEF THE INFORMATION AND STATEMENTS GIVEN ABOVE ARE TRUE AND CORRECT.

SIGNATURE OF APPLICANT _____



(Information Below This Line To Be Completed By The Municipality)

_____ (Name of) Municipality official submission receipt:

Date complete application received _____ Plan Number _____

Fees _____ date fees paid _____ received by _____

Official submission receipt date _____

Received by _____

Municipality

APPENDIX D

MAP – ACT 167 DELINEATED WATERSHEDS

Attached separately.

APPENDIX E

West Nile Virus Guidance

Monroe County Conservation District Guidance: Stormwater Management and West Nile Virus

The Monroe County Conservation District recognizes the need to address the problem of non-point source pollution impacts caused by runoff from impervious surfaces. The new stormwater policy being integrated into Act 167 Stormwater Management regulations by the PA Department of Environmental Protection (DEP) will make non-point pollution controls an important component of all future plans and updates to existing plans. In addition, to meet post-construction anti-degradation standards under the state National Pollution Discharge Elimination System (NPDES) permitting program, applicants will be required to employ Best Management Practices (BMPs) to address non-point pollution concerns.

Studies conducted throughout the United States have shown that wet basins and in particular constructed wetlands are effective in traditional stormwater management areas such as channel stability and flood control, and are one of the most effective ways to remove stormwater pollutants (United States Environmental Protection Agency 1991, Center for Watershed Protection 2000). From Maryland to Oregon, studies have shown that as urbanization and impervious surface increase in a watershed, the streams in those watersheds become degraded (CWP 2000). Although there is debate over the threshold of impervious cover when degradation becomes apparent (some studies show as little as 6% while others show closer to 20%), there is agreement that impervious surfaces cause nonpoint pollution in urban and urbanizing watersheds, and that degradation is ensured if stormwater BMPs are not implemented.

Although constructed wetlands and ponds are desirable from a water quality perspective there may be concerns about the possibility of these stormwater management structures becoming breeding grounds for mosquitoes. The Conservation District feels that although it may be a valid concern, **municipalities should not adopt ordinance provisions prohibiting wet basins for stormwater management.**

Mosquitoes

The questions surrounding mosquito production in wetlands and ponds have intensified in recent years by the outbreak of the mosquito-borne West Nile Virus. As is the case with all vector-borne maladies, the life cycle of West Nile Virus is complicated, traveling from mosquito to bird, back to mosquito and then to other animals including humans. *Culex pipiens* was identified as the vector species in the first documented cases from New York in 1999. This species is still considered the primary transmitter of the disease across its range. Today there are some 60 species of mosquitoes that inhabit Pennsylvania. Along with *C. pipiens*, three other species have been identified as vectors of West Nile Virus while four more have been identified as potential vectors.

The four known vectors in NE Pennsylvania are *Culex pipiens*, *C. restuans*, *C. salinarius* and *Ochlerotatus japonicus*. All four of these species prefer, and almost exclusively use, artificial containers (old tires, rain gutters, birdbaths, etc.) as larval habitats. In the case of *C. pipiens*, the most notorious of the vector mosquitoes, the dirtier the water the better they like it. The important factor is that these species do not thrive in functioning wetlands where competition for resources and predation by larger aquatic and terrestrial organisms is high.

The remaining four species, *Aedes vexans*, *Ochlerotatus Canadensis*, *O. triseriatus* and *O. trivittatus* are currently considered potential vectors due to laboratory tests (except the *O. trivittatus*, which did have one confirmed vector pool for West Nile Virus in PA during 2002). All four of these species prefer vernal habitats and ponded woodland areas following heavy summer rains. These species may be the greatest threat of disease transmission around stormwater basins that pond water for more than four days. This can be mitigated however by establishing ecologically functioning wetlands.

Stormwater Facilities

If a stormwater wetland or pond is constructed properly and a diverse ecological community develops, mosquitoes should not become a problem. Wet basins and wetlands constructed as stormwater management facilities, should be designed to attract a diverse wildlife community. If a wetland is planned, proper hydrologic soil conditions and the establishment of hydrophytic vegetation will promote the population of the wetland by amphibians and other mosquito predators. In natural wetlands, predatory insects and amphibians are effective at keeping mosquito populations in check during the larval stage of development while birds and bats prey on adult mosquitoes.

The design of a stormwater wetland must include the selection of hydrophytic plant species for their pollutant uptake capabilities and for not contributing to the potential for vector mosquito breeding. In particular, species of emergent vegetation with little submerged growth are preferable. By limiting the vegetation growing below the water surface, larvae lose protective cover and there is less chance of anaerobic conditions occurring in the water.

Stormwater ponds can be designed for multiple purposes. When incorporated into an open space design a pond can serve as a stormwater management facility and a community amenity. Aeration fountains and stocked fish should be added to keep larval mosquito populations in check.

Publications from the PA Department of Health and the Penn State Cooperative Extension concerning West Nile Virus identify aggressive public education about the risks posed by standing water in artificial containers (tires, trash cans, rain gutters, bird baths) as the most effective method to control vector mosquitoes.

Conclusion

The Conservation District understands the pressure faced by municipalities when dealing with multifaceted issues such as stormwater management and encourages the incorporation of water quality management techniques into stormwater designs. As Monroe County continues to grow, conservation design, groundwater recharge and constructed wetlands and ponds should be among the preferred design options to reduce the impacts of increases in impervious surfaces. When designed and constructed appropriately, the runoff mitigation benefits to the community from these design options will far out weigh their potential to become breeding grounds for mosquitoes.

(Gross Water Use) (Table x.x Multiplier)(Water Use)

6. Consumptive Use

$$\frac{\text{_____ gallons/day}}{\text{(Stormwater)}} + \frac{\text{_____ gallons/day}}{\text{(Water Use)}} = \frac{\text{_____ gallons/day}}{\text{(Consumptive Use)}}$$

*Calculated per Section 304

7. Example

10-Lot Subdivision with On-Site Wells and Central Sewage

Stormwater: -420 gal/day (calculated per Section 304)

Water Use: 10 units x 190 gal/unit/day = 1900 gal/day
 1900 gal/day x 1.00 = 1900 gal/day

Consumptive Use: -420 gal/day + 1900 gal/day = 1480 gal/day

Table x.x. Multipliers for Water Use Calculation (*Do not use for industrial projects.*)

| | | Central Out of Watershed | Central Within Watershed | On-Site Well |
|--------------------|------------------|-----------------------------|-----------------------------|--------------|
| Sewage Disposal | Land Disposal | 0 | 0.14 | 0.14 |
| | Stream Discharge | 0 | 1.00 | 1.00 |

Water Source

NOTES: A multiplier of 0 will result in a debit to the source watershed *by the reviewing entity*. A multiplier of 0.14, derived from the Pocono Creek Goal-Based Watershed Management Project, is designed to protect aquatic habitat during summer low flows. A multiplier of 1.00 assumes that water is not available to sustain aquatic base flows.

| WATER USE FOR CONSUMPTIVE USE TRACKING | | |
|---|--------------------------|-------------------------|
| <i>TYPE OF ESTABLISHMENT</i> | <i>UNIT</i> | <i>GALLONS/UNIT/DAY</i> |
| Residential | | |
| Hotels and motels | Room | 100 |
| Multiple family dwellings and apartments, including townhouses, duplexes and condominiums | Unit | 400 |
| Rooming houses | Room | 200 |
| Residential Subdivisions (On-Lot Sewage) | Single family residences | 400* |
| +Residential Subdivisions (Central Sewage) | Single family residences | 190 |
| | | |
| *For units of 3 bedrooms or less; for each bedroom | over 3, add 100 gallons | |
| | | |
| Commercial | | |
| Airline catering | Meal served | 3 |
| Airports - not including food | Passenger | 5 |
| Airports | Employee | 10 |
| >Barber shops | Chair | 54.6 |
| One licensed operator beauty shops | Station | 200 |
| >Bowling alleys | Alley | 133 |
| Bus service areas - not including food | Patron and employee | 5 |
| >Bus/rail depots | Square foot | 3.33 |
| >Car washes | Inside square foot | 4.78 |
| Country clubs - not including food | Patron and employee | 30 |
| >Drive-in restaurants | Car stall | 109 |
| Drive-in theaters - not including food | Space | 10 |
| Factories and plants exclusive of industrial wastes | Employee | 35 |
| Laundries, self-service | Washer | 400 |
| >Laundries, non self-service | Square foot | 0.25 |
| >Medical Offices | Square foot | 0.62 |
| Mobile home parks, independent | Space | 400 |
| Movie theaters - not including food | Auditorium seat | 5 |
| >Night clubs | Person served | 1.33 |
| >Office buildings | Square foot | 0.19 |
| Offices | Employee | 10 |
| Restaurants (toilet and kitchen wastes) | Patron | 10 |
| Restaurants (additional for bars and cocktail lounges) | Patron | 2 |
| Restaurants (kitchen and toilet wastes, single-service utensils) | Person | 8.5 |
| Restaurants (kitchen waste only, single-service utensils) | Patron | 3 |
| >Service stations | Inside square foot | 3.33 |

| | | |
|---|--------------------|-------------------------|
| Stores | Public toilet | 400 |
| Warehouses | Employee | 35 |
| Work or construction camps (semipermanent) with flush Toilets | Employee | 50 |
| Work or construction camps (semipermanent) w/o flush Toilets | Employee | 35 |
| TYPE OF ESTABLISHMENT | UNIT | GALLONS/UNIT/DAY |
| | | |
| Institutional | | |
| Churches | Seat | 3 |
| Churches (additional kitchen waste) | Meal served | 3 |
| Churches (additional with paper service) | Meal served | 1.5 |
| Hospitals, with laundry | Bed space | 300 |
| Hospitals, without laundry | Bed space | 220 |
| Institutional food service | Meal | 20 |
| Institutions other than hospitals | Bed space | 125 |
| Schools, boarding | Resident | 100 |
| Schools, day (without cafeterias, gyms or showers) | Student & employee | 15 |
| Schools, day (with cafeterias, but no gyms or showers) | Student & employee | 20 |
| Schools, day (with cafeterias, gym and showers) | Student & employee | 25 |
| >YMCA/YWCA | Person | 33.3 |
| Recreational and Seasonal | | |
| Camps, day (no meals served) | Person | 10 |
| Camps, hunting and summer residential (night and day) with limited plumbing including water-carried toilet wastes | Person | 50 |
| Campgrounds with individual sewer and water hookup | Space | 100 |
| Campgrounds with water hookup only and/or central comfort Station which includes water-carried toilet wastes | Space | 50 |
| Fairgrounds and parks, picnic - with bathhouses, showers and flush toilets | Person | 15 |
| Fairgrounds and parks, picnic - toilet wastes only | Person | 5 |
| Swimming pools and bathhouses | Person | 10 |

NOTE: If type of establishment proposed is not listed or if more project specific values are available, supporting documentation must be provided.

SOURCE: PA Title 25§73.17. Sewage flows, unless otherwise indicated

Crews, James E. and MaryAnn Miller, 1983. Forecasting Municipal and Industrial Water Use.

IWR Research Report 83R-3. U.S. Army Corps of Engineers, Fort Belvoir, Virginia + Watershed Protection Advisory Committee Meeting #3 held at Monroe County Public Safety Center
May 16, 2003.

APPENDIX G

SAMPLE PROBLEM

SELECTION OF CONTROL TECHNIQUE TO MEET DESIGN CRITERIA FOR RUNOFF POLLUTANTS

Step 1: Identify the type of development activity.

Example – A small shopping center is proposed for a 15 acre lot in the Manny Run (M-MR) subwatershed. Four acres of the lot will be covered by a single, flat roof commercial structure. Six acres of the lot will be an asphalt parking lot. The remaining five acres are grass-covered with some small shrubbery and trees.

Step 2: Using Table G-1 of this Appendix, determine the control design criteria to be used.

Example – For subwatershed M-MR, release rate for peak flow rate -60%. Maximum loading rates for pollutants are 16.68 lb/MG for phosphorus and 918 lb/MG for sediment.

Step 3: Using the computational methods presented in §408, calculate the storm runoff's peak flow rate and pollutant loadings for pre- and post-development conditions.

Example – Calculate peak flow rates. Assume calculated peak flow rates are equal to 2,000 gpd for pre-development and 4,600 gpd (0.0046 MG/day) for post-development for the 100 year storm event. The design peak flow rate, based on the release rate percentage is $0.60 * 2,000 \text{ gpd} = 1,200 \text{ gpd}$.

Calculate pollutant loadings. Using the unit areal loading rates presented in Appendix B.10 of the Wallenpaupack Creek Watershed Plan for the Main Stem and commercial land use (P – 0.92 lb/ac/yr and TSS – 300 lb/ac/yr) calculated loading in lb/MG for post-development conditions.

P loading in lb/MG –

$$\frac{0.92 \text{ lb} * \text{acre} \times \text{year}}{\text{acre} \times \text{year}} \times \frac{\text{day} *}{0.0046 \text{ MG}} \times \frac{(4+6) \text{ acres} *}{1} \times \frac{\text{Year} -}{365 \text{ days}} = \frac{5.48 \text{ lb}}{\text{MG}}$$

Since the P loading estimate of 5.48 lb/MG is less than the maximum allowable loading rate of 16.68 lb/MG, P control is not considered a problem for this sample.

TSS loading in lb/MG –

| | | | | |
|-------------|-----------|----------------|----------|---------|
| 300 lb * | day * | (4 + 6) acres* | Year - | 5.48 lb |
| acre x year | 0.0046 MG | 1 | 365 days | MG |

Step 4: Select potential stormwater control techniques based on physical suitability for the particular development site using Tables C-1 to C-4 of the Wallenpaupack Creek Watershed Pan.

Example:

- Infiltration pits and trenches
- Porous pavement (asphalt)
- Seepage areas
- Cistern storage
- Impoundment (dry)
- Impoundment (wet)
- Parking lot storage
- Rooftop detention
- Filter strips

Step 5: Evaluate the potential control techniques based on the techniques' control and pollutant removal capabilities to determine which techniques meet the control criteria. Use the performance estimates of Table G-2 of this Appendix.

Example –

Infiltration pits and trenches:

Runoff Peak Rate

4,600 – 0.90 (4,600) – 460 gpd (ok)

Sediment

1,787 – 0.45 (1,787) – 983 lb/MG (over)

Phosphorus

5.48 – 0.40 (5.48) – 3.28 lb/MG (ok)

Porous Pavement (asphalt):

Runoff Peak Rate

4,600 – 1.00 (4,600) – 0 gpd (ok)

Sediment (unknown)

Phosphorus

5.48 – 0.40 (5.48) – 3.29 lb/MG (ok)

Seepage Areas:

Runoff Peak Rate

4,600 – 0.45 (4,600) – 2,070 gpd (over)

Sediment

1,787 – 0.45 (1,787) – 983 lb/MG (over)

Phosphorus

5.48 – 0.45 (5.48) – 3.01 lb/MG (ok)

Cistern Storage:

Runoff Peak Rate

4,600 – 0.80 (4,600) – 920 gpd (ok)

Sediment

1,787 – 0.48 (1,787) – 929 lb/MG (over)

Phosphorus

5.48 – 0.45 (5.48) – 3.01 lb/MG (ok)

Impoundment (dry):

Runoff Peak Rate

4,600 – 0.80 (4,600) – 920 gpd (ok)

Sediment

1,787 – 0.15 (1,787) – 1519 lb/MG (over)

Phosphorus

5.48 – 0.10 (5.48) – 4.93 lb/MG (ok)

Impoundment (wet):

Runoff Peak Rate

4,600 – 0.80 (4,600) – 920 gpd (ok)

Sediment

1,787 – 0.60 (1,787) – 715 lb/MG (ok)

Phosphorus

5.48 – 0.30 (5.48) – 3.29 lb/MG (ok)

Parking Lot Storage:

Runoff Peak Rate

4,600 – 0.80 (4,600) – 920 gpd (ok)

Sediment

1,787 – 0.45 (1,787) – 983 lb/MG (over)

Phosphorus

5.48 – 0.45 (5.48) – 3.01 lb/MG (ok)

Rooftop Detention:

Runoff Peak Rate

4,600 – 0.80 (4,600) – 920 gpd (ok)

Sediment

(not applicable)

Phosphorus

(not applicable)

Filter Strip:

Runoff Peak Rate

4,600 – 0.45 (4,600) – 2530 gpd (over)

Sediment

1,787 – 0.85 (1,787) – 268 lb/MG (ok)

Phosphorus

5.48 – 0.80 (5.48) – 1.10 lb/MG (ok)

Based on these calculations, the following alternative control techniques are recommended:

Alternative 1 – Construct a wet impoundment in the five acres of undeveloped area to receive runoff from the flat roof and the parking lot.

Alternative 2 – Use rooftop detention in conjunction with filter strips which are constructed around the perimeter of the parking lot to receive its runoff. The water detained in the rooftop should be recycled for water uses during dry weather (cleaning parking lot and/or watering grassland) or released to the filter strips after the storm.

- Step 6: Evaluate the alternative based on the control techniques, implementation and operation features. A preliminary design of the alternatives could also be done at this time to better evaluate the control capabilities in order to select a preferred alternative.

**TABLE G-1
CONTROL DESIGN CRITERIA**

| <u>Subwatershed</u> | <u>Peak Flow Rate^a</u> | <u>Maximum Rates (lb/MG)^c</u> | |
|--|-----------------------------------|--|-----------------|
| | | <u>Loading Phosphorus</u> | <u>Sediment</u> |
| General Criteria for Noncritical Areas | Predevelopment | 16.68 | 918 |
| <u>Critical Areas:</u> | | | |
| E-WS | 90 | 16.68 | 918 |
| E-KC | 80 | 16.68 | 918 |
| E-BC | 70 | 16.68 | 918 |
| E-WC | 70 | 16.68 | 918 |
| E-MC | 90 | 16.68 | 918 |
| M-SHC | 60 | 16.68 | 918 |
| M-TC | 90 | 16.68 | 918 |
| M-WC ¹ | 70 | 4.17 | 542 |
| M-WC ² | 100 ^b | 4.17 | 542 |
| M-WC ³ | 80 | 4.17 | 542 |
| M-WC ⁴ | 100 ^b | 4.17 | 542 |
| M-WC ⁵ | 80 | 4.17 | 542 |
| M-WC ⁶ | 80 | 4.17 | 542 |
| M-WC ⁷ | 60 | 4.17 | 542 |
| M-WC ⁸ | 80 | 4.17 | 542 |
| M-WC ⁹ | 100 ^b | 4.17 | 542 |

| <u>Subwatershed</u> | <u>Peak Flow Rate^a</u> | <u>Loading Phosphorus</u> | <u>Sediment</u> |
|--|-----------------------------------|---------------------------|-----------------|
| W-WC ¹⁰ | Predevelopment | 4.17 | 542 |
| W-WC ¹¹ | 80 | 4.17 | 542 |
| Maximum Rates (lb/MG)^c | | | |
| <u>Critical Areas:</u> | | | |
| W-WC ¹² | Predevelopment | 4.17 | 542 |
| W-WC ¹³ | 60 | 4.17 | 542 |
| W-WC ¹⁴ | 60 | 4.17 | 542 |
| W-WC ¹⁵ | 100 ^b | 4.17 | 542 |
| M-MR | 60 | 16.68 | 918 |
| M-FR | 90 | 16.68 | 918 |
| M-NC | 60 | 16.68 | 918 |
| M-MC | 80 | 16.68 | 918 |
| M-RPC | 70 | 16.68 | 918 |
| W-JC | 90 | 16.68 | 918 |
| W-WiC | 70 | 16.68 | 918 |
| W-WeC | 90 | 16.68 | 918 |
| W-SC | 60 | 16.68 | 918 |
| W-MHC | 70 | 16.68 | 918 |
| W-UC | 80 | 16.68 | 918 |
| W-BC | 80 | 16.68 | 918 |
| M-WL | Predevelopment | 4.17 | 542 |
| L-LW | Predevelopment | 4.17 | 542 |
| L-SeB | Predevelopment | 4.17 | 542 |
| L-DC | Predevelopment | 4.17 | 542 |
| L-AC | Predevelopment | 4.17 | 542 |

^a The numbers presented in this column represent the percent of the predevelopment peak flow rate. Therefore, 90 means that the postdevelopment peaks should be controlled to 90% of the predevelopment peaks. Predevelopment in this column means that the postdevelopment peaks should be controlled to equal predevelopment peaks.

^b These were determined to be critical areas (subminimum release rate areas) and are described in Appendix B, §4 of the plan.

^c The critical areas for runoff quality control parameters are assigned loading rates of 4.17 lb/MG (0.5 mg/l) for total soluble phosphorus which is based in the Lake Wallenpaupack Watershed Management District voluntary effluent guidelines and the 542 lb/MG (65 mg/l) for total suspended solids which is based on Federal Water Pollution Control Act (NPDES) for secondary effluent discharge standards.

¹ to ⁹ represent portions of the main branch subwatershed, (M-WC).
¹⁰ to ¹⁵ represent portions of the west branch subwatershed, (W-WC).

**TABLE G-2
STORMWATER MANAGEMENT ALTERNATIVES
PERFORMANCE ESTIMATES**

| <u>Control Practice</u> | <u>Runoff Peak Rate</u> | <u>Sediment</u> | <u>Type of Control</u> ¹ |
|--------------------------------------|---------------------------------|-----------------|-------------------------------------|
| | | | <u>Phosphorus</u> |
| <u>VOLUME CONTROLS</u> | | | |
| Infiltration Pits and Trenches | 90% | 30% – 60% | 60% |
| Land Surface Control and Zoning | UK | UK | UK |
| Porous Pavement (Asphalt) | 100% | UK | 40% |
| Porous Pavement (Concrete) | 75% | UK | 30% – 60% |
| Seepage Areas | 30% – 60% | 30% – 60% | 30% – 60% |
| <u>PEAK RATE CONTROLS</u> | | | |
| Channel Modification | 30% – 60% | N | N |
| Cistern Storage | >60% | 25% – 70% | 30% – 60% |
| Floodplain Management | UK | N | N |
| Impoundment (Dry Detention) | >60% | <30% | 10% |
| Parking Lot Storage | >60% | 30% – 60% | 30% – 60% |
| Rooftop Detention | >60% | N | N |
| <u>EROSION CONTROLS</u> | | | |
| Bank Stabilization | <30% | >60% | >60% |
| Conservation tillage | | | |
| General | 30% – 60% | >60% | 30% – 60% |
| No-Till | 30% – 60% | >60% | >60% |
| Contour Plowing | 30% – 60% | 15% – 55% | 30% – 60% |
| Cover Cropping | | | |
| Alone | <30% | 50% – 60% | 30% – 60% |
| With Conservation Tillage | 30% – 60% | 95% | >60% |
| Critical Area Planting | 30% – 60% | >60% | >60% |
| Diversion | <30% | 30% – 60% | 30% – 60% |
| Farmland Management | 30% – 60% | >60% | >60% |
| Fencing | N | >60% | 60% – 80% |
| Road Paving | N | UK | UK |
| Storm Sewers (Without Treatment) | 60% | N | N |
| Stripcropping – Contour | 30% – 60% | >60% | >60% |
| Terracing | 30% – 60% | >60% | >60% |
| | | | Avg. 80% |
| <u>SOURCE POLLUTION CONTROLS</u> | | | |
| Agricultural Waste Storage Structure | >60% | >60% | >60% |
| Filter Strips | 30% – 60% | 85% | >60% |
| Sediment Basin | N | >60% | >60% |

| <u>Control Practice</u> | <u>Runoff Peak Rate</u> | <u>Sediment</u> | <u>Type of Control</u> ¹ |
|-------------------------|---------------------------------|-----------------|-------------------------------------|
| | | | <u>Phosphorus</u> |
| Street Cleaning | | | |
| Mechanical Sweepers | N | 50% | 30% – 60% |
| Vacuum Sweepers | N | 95% | 30% – 60% |
| Wetland Preservation | 30% – 60% | 75% | 50% |

¹ N – not applicable or negligible preventive effect or reduction capability.

V – variable preventive effect or reduction capability where performance is exclusively dependent on application.

UK – unknown preventive effect or reduction capability.

Sources: Chesapeake Bay Foundation, Best Management Practices for Stormwater Control, Harrisburg, PA, (November 1988).

Metropolitan Washington Council of Governments, Department of Environmental Programs, A Framework for Evaluating Compliance with the 10% Rule in the Critical Area, (April 1987).

Metropolitan Washington Council of Governments, Department of Water Resources, Controlling Stormwater Runoff in Developing Areas, Selected Best Management Practices, (1979).

Virginia State Water Control Board, Best Management Practices Handbook – Urban Planning Bulletin 321, (1979).

APPENDIX H

STORMWATER MANAGEMENT CONVEYANCE FACILITIES AND BMP INSPECTION CHECKLIST

Facility Location: _____

Inspector: _____ Date: _____

| ITEM | OBSERVATION | REMEDIAL ACTION |
|---|-------------|-----------------|
| Obstruction of inlet(s) | | |
| Obstruction of Outlet(s) | | |
| Valves, sluice gates, access hatches, etc. | | |
| Inlets, outlets, pipes and conduits | | |
| Debris/sediment accumulation in pipes | | |
| Erosion or sedimentation | | |
| Embankment cracking or settling | | |
| Animal burrowing | | |
| Seepage outside embankment | | |
| Seepage along pipe(s) | | |
| Slow draining infiltration devices | | |
| Algae, stagnation, odors, etc. | | |
| Saturated conditions in non-wetland areas | | |
| Vegetation in basin and on slopes trimmed | | |
| Poor or distressed vegetation/grass | | |
| Distressed aquatic shoreline vegetation | | |
| Discolored grass (pH or nutrient imbalance) | | |
| Excessive sediment covering vegetation | | |
| Invasive or noxious weeds | | |
| Emergency spillway | | |
| Condition of outlet protection | | |
| Conveyance/upslope channel(s) | | |
| Discharge/downslope channel(s) | | |
| Vandalism | | |
| Fence, gates, and lock(s) | | |
| Access road | | |
| | | |
| | | |

Coolbaugh Township Code of Ordinances, No. 120-2014
Stormwater Management and Earth Disturbance Ordinance

REPEALER

All existing ordinances or parts of ordinances, which are contrary to the provisions of this Ordinance, are hereby repealed to the extent necessary to give this Ordinance full force and effect.

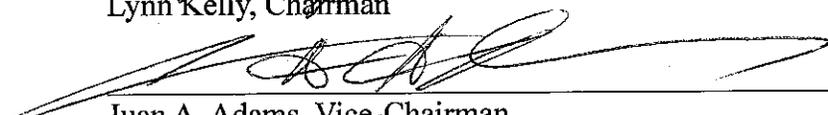
ADOPTION

BE IT HEREBY ENACTED This 17th Day of June, 2014, by the Coolbaugh Township Board of Supervisors, Monroe County, Pennsylvania, to be effective five (5) days after adoption.

COOLBAUGH TOWNSHIP BOARD OF SUPERVISORS



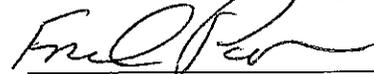
Lynn Kelly, Chairman



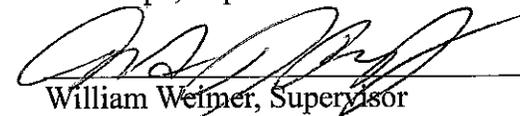
Juan A. Adams, Vice-Chairman



Robert M. Zito, Secretary/Supervisor

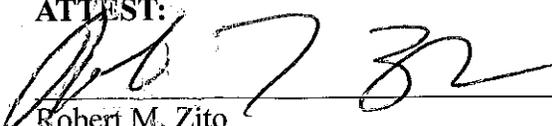


Fred Pope, Supervisor



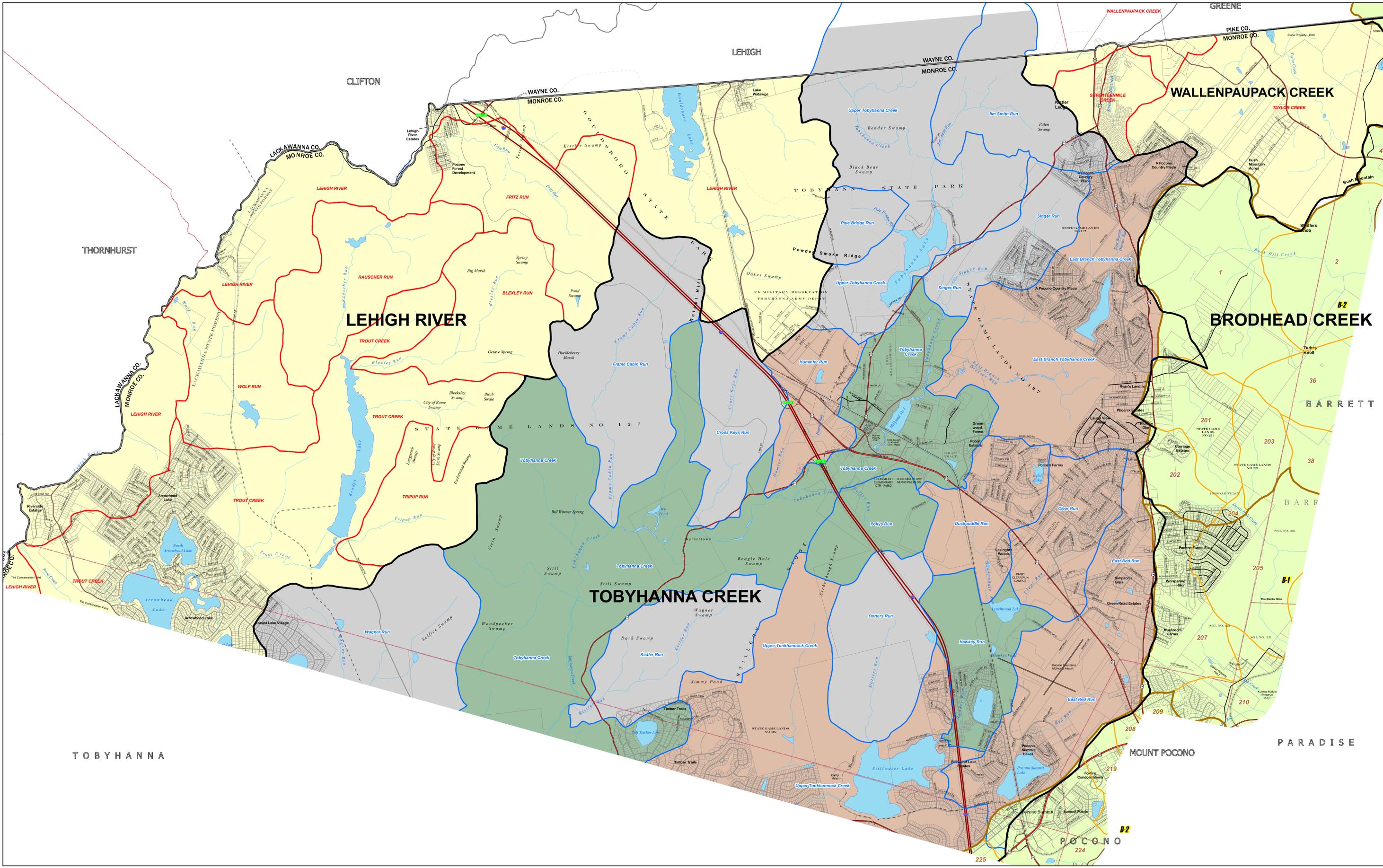
William Welmer, Supervisor

ATTEST:

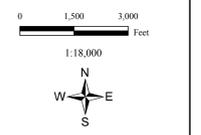


Robert M. Zito
Township Secretary

**ACT 167
DELINEATED
WATERSHEDS**
COOLBAUGH TOWNSHIP
MONROE COUNTY, PENNSYLVANIA



- LEGEND**
- Act 167 Watershed Boundaries
 - Brodhead Creek Management Districts
 - Brodhead Creek Subwatershed Area
 - Other Subwatersheds
 - Tobyhanna Creek/Tunkhannock Creek Subwatersheds
 - less impacted/less threatened
 - less impacted/more threatened
 - more impacted/more threatened
 - Road Centerlines
 - Interstates
 - US Traffic Routes
 - PA Traffic Routes
 - Ramps
 - State Routes
 - Municipal Roads
 - Private Roads
 - Private Driveways
 - Trails
 - Abandoned Railroad
 - Abandoned Rail ROW
 - Lakes & Ponds
 - Streams
 - Tax Parcel Boundaries
 - County Boundaries
 - Municipal Boundaries



The County of Monroe makes no express or implied warranties concerning the release of this information. The County of Monroe is unaware of the use or uses to be made of this data. Consequently, the County of Monroe does not warrant this data as fit for any particular purpose.



www.monroecounty.gov/planning

PREPARED BY:
**Monroe County
Planning Commission**
1 Quaker Plaza Room 106
Stroudsburg, PA 18360-2169
(570) 517-3100
mcp@monroecounty.gov

April 2013