

STORMWATER MANAGEMENT ORDINANCE

ORDINANCE NO. 340

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

MUNICIPALITY OF

BERN TOWNSHIP

BERKS COUNTY, PENNSYLVANIA

Adopted at a Public Meeting Held on

February 7, 2023

ARTICLE I General Provisions

§ 149-1. Statement of findings.

The governing body of the municipality finds that:

- A. Inadequate management of accelerated stormwater runoff resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of existing streams and storm sewers, greatly increases the cost of public facilities to convey and manage stormwater, undermines floodplain management and flood reduction efforts in downstream communities, reduces groundwater recharge, threatens public health and safety, and increases nonpoint source pollution of water resources.
- B. A comprehensive program of stormwater management, including reasonable regulation of development and activities causing accelerated erosion, is fundamental to the public health, safety, welfare, and the protection of the people of the municipality and all the people of the Commonwealth, their resources, and the environment.
- C. Stormwater is an important water resource that provides groundwater recharge for water supplies and supports the base flow of streams.
- D. The use of green infrastructure and low impact development (LID) are intended to address the root cause of water quality impairment by using systems and practices which use or mimic natural processes to: 1) infiltrate and recharge, 2) evapotranspire, and/or 3) harvest and use precipitation near where it falls to earth. Green infrastructure practices and LID contribute to the restoration or maintenance of pre-development hydrology.
- E. Federal and state regulations require certain municipalities to implement a program of stormwater controls. These municipalities are required to obtain a permit for stormwater discharges from their separate storm sewer systems under the National Pollutant Discharge Elimination System (NPDES) program.

§ 149-2. Purpose.

The purpose of this section is to promote health, safety, and welfare within the municipality by minimizing the harms and maximizing the benefits described in § 149-1 of the Code through provisions designed to:

- A. Meet legal water quality requirements under state law, including regulations at 25 Pa. Code 93 to protect, maintain, reclaim, and restore the existing and designated uses of the waters of this Commonwealth.
- B. Preserve natural drainage systems.
- C. Manage stormwater runoff close to the source, reduce runoff volumes and mimic predevelopment hydrology.
- D. ~~en~~ procedures and performance standards for stormwater planning and management.

- E. Maintain groundwater recharge to prevent degradation of surface and groundwater quality and to otherwise protect water resources.
- F. Prevent scour and erosion of stream banks and streambeds.

§ 149-3. Statutory authority.

- A. Act of October 4, 1978, P.L. 864 (Act 167) 32 P.S., Section 680.1 et seq., as amended, the “Storm Water Management Act” (hereinafter referred to as “the Act”);
- B. Second Class Township Code, 53 P.S. Sections 65101 et seq.;
- C. Act of July 31, 1968, P.L. 805, No. 247, 53 P.S. Section 10101, et seq., as amended, the Pennsylvania Municipalities Planning Code, Act 247 hereinafter referred to as the “MPC”).

§ 149-4. Applicability.

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

§ 149-5. Repealer.

Any Code provision of the municipality inconsistent with any of the provisions of this section is hereby repealed to the extent of the inconsistency only.

§ 149-6. Severability.

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

§ 149-7. Compatibility with other Code requirements.

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

§ 149-8. Erroneous Permit

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

§ 149-9. Waivers

- A. If the Municipality determines that any requirement under this Ordinance cannot be achieved for a particular regulated activity, the Municipality may, after an evaluation of alternatives, approve measures other than those in this Ordinance, subject to Section 149-9, paragraphs B and C.
- B. Waivers or modifications of the requirements of this Ordinance may be approved by the Municipality if enforcement will exact undue hardship because of peculiar conditions pertaining to the land in question, provided that the modifications will not be contrary to the public interest and that the purpose of the Ordinance is preserved. Cost or financial burden shall not be considered a hardship. Modification may be considered if an alternative standard or approach will provide equal or better achievement of the purpose of the Ordinance. A request for modifications shall be in writing and accompany the Stormwater Management Site Plan submission. The request shall provide the facts on which the request is based, the provision(s) of the Ordinance involved and the proposed modification.
- C. No waiver or modification of any regulated stormwater activity involving earth disturbance greater than or equal to one acre may be granted by the Municipality unless that action is approved in advance by the Department of Environmental Protection (DEP) or the delegated county conservation district.

ARTICLE II Terminology

§ 149-8. Word usage and definitions.

- A. Word usage. For the purposes of this chapter, certain terms and words used herein shall be interpreted as follows:
 - (1) 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.
 - (2) 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.
 - (3) The word "person" includes an individual, firm, association, organization, partnership, trust, company, corporation, or any other similar entity.
 - (4) The words "shall" and "must" are mandatory; the words "may" and "should" are permissive.
 - (5) The words "used or occupied" include the words "intended, designed, maintained, or arranged to be used, occupied or maintained."
- B. Definitions. As used in this chapter, the following terms shall have the meanings indicated:
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 raising livestock including tillage, plowing, disking, harrowing, pasturing and installation of conservation measures. 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 landowner or developer who has filed an application for approval to engage in any regulated activities as defined in § 149-4 of the Code.

AS-BUILT PLANS (Drawings) – Engineering or site plans or drawings that document the actual locations, dimensions and elevations of the improvements, and building components, and changes made to the original design plans. The final version of these documents, or a copy of same, are signed and sealed by a qualified Licensed Professional and submitted to the Municipality at the completion of the project, as per the requirements of Section 149-45 of this Ordinance as "final As-Built Plans".

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

BUFFER – See Riparian Buffer.

CARBONATE GEOLOGY (or carbonate rock formations) – See Karst.

CHANNEL EROSION — The widening, deepening, and headward cutting of small channels and waterways due to erosion caused by moderate to large floods.

CISTERN — An underground reservoir or tank for storing rainwater.

CONSERVATION DISTRICT — The Berks County Conservation District. A conservation district, as defined in Section 3(c) of the Conservation District Law (3 P. S. § 851(c)) that has the authority under a delegation agreement executed with DEP to administer and enforce all or a portion of the regulations promulgated under 25 Pa. Code 102.

CONSERVATION PRACTICES – Practices installed on agricultural lands to improve farmland, soil and/or water quality which have been identified in a current Conservation Plan.

CULVERT — A structure with appurtenant works which carries a stream 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.

DESIGNEE — The agent of the Bern Township Planning Commission and/or agent of the governing body involved with the administration, review or enforcement of any provisions of this section by contract or memorandum of understanding.

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

DETENTION BASIN — An impoundment structure designed to manage stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate.

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

DEP – The Pennsylvania Department of Environmental Protection.

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

DEVELOPMENT SITE (SITE) — See Project Site.

DIAMETER AT BREAST HEIGHT (DBH) – The outside bark diameter of a tree at breast height which is defined as four and one half (4.5) feet (one and thirty-seven one-hundredths of a meter (1.37 m)) above the forest floor on the uphill side of the tree.

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

DISCHARGE – 1. (verb) To release water from a project, site aquifer, drainage basin or other point of interest. 2. (noun) The rate and volume of flow of water such as in a stream, generally expressed in cubic feet per second (volume per unit of time). See also Peak Discharge.

DISCHARGE POINT – The point of discharge for a stormwater facility.

DISTURBED AREA – Unstabilized 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 all 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 streams, channels, swales, pipes, conduits, culverts, storm sewers, etc.

DRAINAGE EASEMENT — A right granted by a landowner 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. Said permit is issued prior to or with the final municipal approval.

DRAINAGE PLAN — The documentation of the stormwater management system, if any, to be used for a given development site, the contents of which are established in § 149-25 of the Code.

EARTH DISTURBANCE ACTIVITY— A construction or other human activity which disturbs the surface of the land, including, but not limited to: clearing and grubbing; grading;

excavations; embankments; road maintenance; building construction; and the moving, depositing, stockpiling, or storing of soil, rock, or earth materials.

EASEMENT – A right of use granted by a Landowner to allow a grantee the use of the designated portion of land for a specified purpose, such as for stormwater management or other drainage purposes.

EMERGENCY SPILLWAY – A conveyance area that is used to pass peak discharge greater than the maximum design storm controlled by the stormwater 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.

EROSION — The movement of soil particles by the action of water, wind, ice, chemical action or other natural forces.

EROSION AND SEDIMENT CONTROL PLAN — A plan required by the Conservation District or the Municipality to minimize accelerated erosion and sedimentation, and that must be prepared and approved per the applicable requirements.

EXISTING CONDITIONS — The initial condition of a project site prior to the proposed construction. If the initial condition of the site is undeveloped land, the land use shall be considered as meadow unless the natural land cover is proven to generate lower curve numbers or rational C value, such as forested lands.

FEMA – Federal Emergency Management Agency.

FLOOD — A general but temporary condition of partial or complete inundation of normally dry land areas from the overflow of streams, rivers, and other waters of this Commonwealth.

FLOODPLAIN — Any land area susceptible to inundation by water from any natural source or delineated by applicable Department of Housing and Urban Development, Federal Insurance Administration Flood Hazard Boundary Maps as being a special flood-hazard area. Also included are areas that comprise Group 13 Soils, as listed in Appendix A of the Pennsylvania Department of Environmental Protection (PADEP) Technical Manual for Sewage Enforcement Officers (as amended or replaced from time to time by PADEP).

FLOODWAY — The channel of the watercourse and those portions of the adjoining floodplains which are reasonably required to carry and discharge the one-hundred-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 one-hundred-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. These include timber inventory and preparation of forest management plans, silvicultural treatment, cutting budgets, logging road design and construction, timber harvesting, site preparation and reforestation.

FREEBOARD — A vertical distance between the elevation of the design highwater and the top of a dam, levee, tank, basin, or diversion ridge. The space is required as a safety margin in a pond or basin.

GEOTEXTILE – A fabric manufactured from synthetic fiber that is used to achieve specific objectives, including infiltration, separation between different types of media (i.e., between soil and stone), or filtration.

GOVERNING BODY – The Board of Supervisors of Bern Township.

GRADE — A slope, usually of a road, channel or natural ground specified in percent and shown on plans as specified herein. To grade is 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 conduct surface water from cropland.

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

GROUNDWATER – Water that occurs in the subsurface and fills or saturates the porous openings, fractures and fissures of under-ground soils and rock units.

GROUNDWATER RECHARGE — Replenishment of existing natural underground water supplies.

HOTSPOTS – Areas where prior or existing land use or activities can potentially generate highly contaminated runoff with concentrations of pollutants in excess of those typically found in stormwater.

HYDROLOGIC REGIME – The hydrologic system, cycle or balance that sustains the quality and quantity of stormwater, stream baseflow, storage, and groundwater supplies under natural conditions.

HYDROLOGIC SOIL GROUP (HSG) – A classification of soils by the Natural Resources Conservation Service (NRCS), into four (4) 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 has been, or is proposed to be, compacted or covered with a layer of material so that it prevents or is resistant to infiltration of water, including but not limited to: structures such as roofs, buildings, storage sheds; other solid, paved or concrete areas such as streets, driveways, sidewalks, parking lots, patios, tennis or other paved courts, or athletic playfields comprised of synthetic turf materials. For the purposes of determining compliance with this Ordinance, compacted soils or stone surfaces used for vehicle parking and movement shall be considered impervious. Surfaces that were designed to allow infiltration (i.e. areas of porous pavement) will be considered on a case-by-case basis by the Municipal Engineer, based on appropriate documentation and condition of the material, etc. Above ground pools are not counted as impervious areas as well as decks if they do not prevent infiltration.

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

INFILTRATION STRUCTURES / FACILITY — A structure designed to induce runoff into the ground (e.g., french drains, seepage pits, seepage trench).

INLET

- (1) A surface connection to a closed drain;
- (2) A structure at the diversion end of a conduit; or
- (3) The upstream end of any structure through which water may flow.

KARST – A type of topography that is formed over limestone or other carbonate rock formations by dissolving or solution of the rock by water, and that is characterized by closed depressions, sinkholes, caves, a subsurface network of solution conduits and fissures through which groundwater moves, and no perennial surface drainage features.

LAND DEVELOPMENT (DEVELOPMENT)

- (1) The improvement of one lot or two or more contiguous lots, tracts, or parcels of land for any purpose involving:
 - (a) A group of two or more buildings; or
 - (b) The division or allocation of land or space between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups, or other features.
- (2) Any subdivision of land;
- (3) Development in accordance with § 503_(1.1) of the PA Municipalities Planning Code.
Editor's Note: See 53 P.S. § 10501 et seq.
- (4) The creation of any additional paved area greater than 6,400 square feet, unless waived by the Board of Supervisors.

LAND EARTH DISTURBANCE — Any activity involving grading, tilling, digging, or filling of ground or stripping of vegetation or any other activity that causes an alteration to the natural condition of the land.

LIMITING ZONE — A soil horizon or condition in the soil profile or underlying strata that includes one of the following:

- (A) A seasonal high water table, whether perched or regional, determined by direct observation of the water table or indicated by other subsurface or soil conditions.
- (B) 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.
- (C) A rock formation, other stratum, or soil condition that is so slowly permeable that it effectively limits downward passage of water.

LOW IMPACT DEVELOPMENT (LID) — Site design approaches and small-scale stormwater management practices that promote the use of natural systems for infiltration, evapotranspiration, and reuse of rainwater. LID can be applied to new development, urban retrofits, and revitalization projects. LID utilizes design techniques that infiltrate, filter, evaporate, and store runoff close to its source. Rather than rely on costly large-scale conveyance and treatment systems, LID addresses stormwater through a variety of small, cost-effective landscape features located on-site.

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.

MPC — Act of July 31, 1968, P.L. 805, No. 247, 53 P.S. Section 10101, et seq., as amended, the Pennsylvania Municipalities Planning Code, Act 247.

MUNICIPALITY — Bern Township, Berks County, Pennsylvania.

NONPOINT SOURCE POLLUTION — Pollution that enters a watery body from diffuse origins in the watershed and does not result from discernible, confined, or discrete conveyances.

NONSTORMWATER DISCHARGES — Water flowing in stormwater collection facilities, such as pipes or swales, which is not the result of a rainfall event or snowmelt.

NPDES – National Pollutant Discharge Elimination System, the Federal government’s system for issuance of permits under the Clean Water Act, which is delegated to PADEP in Pennsylvania.

NRCS — USDA Natural Resource Conservation Service (previously SCS).

OPEN CHANNEL — A drainage element in which stormwater flows with an open surface. Open channels include, but shall not be limited to, natural and man-made drainageways, 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.

PARKING LOT STORAGE — Involves the use of impervious parking areas as temporary impoundments with controlled release rates during rainstorms.

PEAK DISCHARGE — The maximum rate of stormwater runoff from a specific storm event.

PENNSYLVANIA STORMWATER BEST MANAGEMENT PRACTICES MANUAL (PADEP BMP Manual) Document Number 363-0300-002 (December 2006, and as subsequently amended).

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

PLANNING COMMISSION — The Planning Commission of Bern Township.

PMF (PROBABLE MAXIMUM FLOOD) — The flood that may be expected from the most severe combination of critical meteorologic 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).

POST-CONSTRUCTION – Period after construction during which Disturbed Areas are stabilized, stormwater controls are in place and functioning, and all proposed improvements approved by the Municipality are completed.

PREDEVELOPMENT – Land cover conditions assumed to exist within the proposed Disturbed Area prior to commencement of the Regulated Activity for the purpose of calculating the Predevelopment water quality volume, infiltration volume, and peak flow rates as required in this Ordinance.

Project Site – The specific area of land where any regulated activities in the municipality are planned, conducted, or maintained.

RATIONAL FORMULA — A rainfall-runoff relation used to estimate peak flow.

RECHARGE – The replenishment of groundwater through the infiltration of rainfall, other surface waters, or land application of water or treated wastewater.

REGULATED ACTIVITY – Any Earth Disturbance Activity(ies) or any activity that involves the alteration or development of land in a manner that may affect stormwater runoff.

REGULATED EARTH DISTURBANCE ACTIVITY – Any activity involving Earth Disturbance subject to regulation under 25 Pennsylvania Code Chapter 92, Chapter 102, or the Clean Streams Law.

RELEASE RATE — The percentage of predevelopment peak rate of runoff from a site or subarea to which the postdevelopment peak rate of runoff must be reduced to protect downstream areas.

RETENTION BASIN — An impoundment with a permanent pool of water in which stormwater is stored and released during the storm event.

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

RIPERIAN BUFFER — An area of land adjacent to a body of water and managed to maintain vegetation to protect the integrity of stream channels and shorelines, to reduce the impact of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals, and to supply food, cover and thermal protection to fish and other aquatic species and wildlife.

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.

SEDIMENT — Soils or other materials transported by surface water as a product of erosion.

SEDIMENTATION — The process by which mineral or organic matter is accumulated or deposited by the movement of water.

SEDIMENT BASIN — A barrier, dam, retention or detention basin located and designed to retain rock, sand, gravel, silt, or other material transported by water.

SEDIMENT POLLUTION — The placement, discharge or any other introduction of sediment into the waters of the Commonwealth occurring from the failure to design, construct, implement or maintain control measures and control facilities in accordance with the requirements of this section.

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 ground.

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

SHEET-FLOW — Runoff that flows over the ground surface as a thin, even-layer, not concentrated in a channel.

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).

SOIL GROUP, HYDROLOGIC — 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.

SPILLWAY — A depression in the embankment of a pond or basin which is used to pass peak discharge greater than the maximum design storm controlled by the pond.

STATE WATER QUALITY REQUIREMENTS — The regulatory requirements to protect, maintain, reclaim, and restore water quality under Title 25 of the Pennsylvania Code and the Clean Streams Law.

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

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

STORMWATER MANAGEMENT SITE PLAN — The plan prepared by the developer or his representative indicating how stormwater runoff will be managed at the particular site of interest according to this section.

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 — 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 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, 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 dwellings, shall be exempt.

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.

TOWNSHIP — Bern Township.

WATERCOURSE — A stream of water; river; brook; creek; or a channel or ditch for water, whether natural or manmade.

WATERSHED — Region or area drained by a river, watercourse, or other body of water, whether natural or artificial.

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.

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

ARTICLE III Stormwater Management

§ 149-9. General requirements.

- A. All regulated activities in the municipality which do not fall under the exemption criteria shown in § 149-24 shall submit a drainage plan consistent with this chapter to the municipality for review. This criteria shall apply to the total proposed development even if development is to take place in stages. Impervious cover shall include, but not be limited to, any roof, parking or driveway areas and any new streets and sidewalks. Any areas designed to initially be gravel or crushed stone shall be assumed to be impervious for the purposes of comparison to the exemption criteria.
- B. 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 the Code.
- C. The existing points of concentrated drainage that discharge onto adjacent property shall not be altered without permission of the affected property owner(s) and shall be subject to any applicable discharge criteria specified in this section.
- D. 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 section. If diffused flow is proposed to be concentrated and discharged onto adjacent property, the developer must document that adequate downstream conveyance facilities exist to safely transport the concentrated discharge, or otherwise prove that no erosion, sedimentation, flooding or other harm will result from the concentrated discharge. Diffused flow shall not be concentrated onto adjacent property without permission of the affected property owner(s).
- E. Where a development site is traversed by watercourses, drainage easements shall be provided conforming to the line of such watercourses. The terms of the easement shall prohibit excavation, the placing of fill or structures, and any alterations that may adversely affect the flow of stormwater within any portion of the easement unless the owner has obtained approval from the Township. Also, maintenance, including mowing of vegetation within the easement, shall be required, except as approved by the appropriate governing authority.
- F. When it can be shown that, due to topographic conditions, natural drainageways on the site cannot adequately provide for drainage, open channels may be constructed conforming substantially to the line and grade of such natural drainageways. Work within natural drainageways shall be subject to approval of appropriate state, federal and local permitting processes.
- G. Where deemed appropriate, any stormwater management facilities regulated by this section that would be located in or adjacent to waters of the Commonwealth or wetlands shall be subject to approval by state and federal regulations and the appropriate permit application process. When there is a question whether a permit may be required, it is the responsibility of the developer or his agent to show that state or federal approval is not required. The applicant shall provide evidence of these approvals, prior to final plan approval.
- H. Any stormwater management facilities regulated by this section that would be located on state highway rights-of-way shall be subject to approval by the Pennsylvania Department of Transportation (PADOT).
- I. Minimization of impervious surfaces and infiltration of runoff through seepage beds, infiltration trenches, etc. are encouraged, where soil conditions permit, to reduce the size or eliminate the need for detention facilities.

- J. Roof drains shall not be connected to streets, sanitary or storm sewers or roadside ditches to promote overland flow and infiltration/percolation of stormwater where advantageous to do so. When it is more advantageous to connect directly to streets or storm sewers, then it shall be permitted on a case-by-case basis by the municipality as recommended by the Township Engineer.

§ 149-10. Rate Controls

In addition to the requirements specified below, the groundwater recharge (§ 149-16) and water quality (§ 149-17).

Post-development discharge rates shall not exceed the pre-development discharge rates for the design storms as follows:

Design Storm Postdevelopment (years)	Design Storm Predevelopment (years)
2	1
5	2
10	10
25	25
50	50
100	100

§ 149-11. Stormwater management implementation provisions; (performance standards).

- A. 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.
- B. 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 Rate Controls. In other words, unimpacted areas bypassing the stormwater management facilities would not be subject to the management district criteria.
- C. Regional detention alternatives. For certain areas, it may be more cost-effective to provide one control facility for more than one development site than to provide an individual control facility for each development site. The initiative and funding for any regional runoff control alternatives are the responsibility of prospective developers. The design of any regional control basins must incorporate reasonable development of the entire upstream watershed for which it serves. The peak outflow of a regional basin would be determined on a case-by-case basis using the hydrologic model of the watershed consistent with protection of the downstream watershed areas. "Hydrologic model" refers to the calibrated model as developed for the stormwater management plan.

§ 149-12. Design criteria for stormwater management facilities.

- A. Any stormwater facility located on state highway rights-of-way shall be subject to approval by the Pennsylvania Department of Transportation (PADOT).
- B. Any stormwater management facility (i.e., detention basin) designed to store runoff and requiring a berm or earthen embankment required or regulated by this section shall be designed to provide an emergency spillway to handle flow up to and including the one-hundred-year postdevelopment conditions. The height of embankment must be set as to provide a minimum 1.0 foot of freeboard above the maximum pool elevation computed when the facility functions for the one-hundred-year postdevelopment inflow. Should any stormwater management facility require a dam safety permit under PADEP Chapter 105, the facility shall be designed in accordance with Chapter 105 and meet the regulations of Chapter 105 concerning dam safety which may be required to pass storms larger than one-hundred-year event. The applicant shall provide evidence of PADEP approval prior to Final Plan approval.
- C. Any facilities that constitute water obstructions (e.g., culverts, bridges, outfalls, or stream enclosures), and any work involving wetlands as directed in PADEP Chapter 105 regulations (as amended or replaced from time to time by PADEP), shall be designed in accordance with Chapter 105 and will require a permit from PADEP. Any other drainage conveyance facility that does not fall under Chapter 105 regulations must be able to convey, without damage to the drainage structure or roadway, runoff from the twenty-five-year design storm with a minimum 1.0 foot of freeboard measured below the lowest point along the top of the roadway. Any facility located within a PADOT right of way must meet PADOT minimum design standards and permit submission requirements.
- D. Any drainage conveyance facility and/or channel that does not fall under Chapter 105 regulations, must be able to convey, without damage to the drainage structure or roadway, runoff from the twenty-five-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 one-hundred-year design storm. Any facility located within a PADOT right-of-way must meet PADOT minimum design standards and permit submission requirements.
- E. Adequate erosion protection shall be provided along all open channels, and at all points of discharge.
- F. The design of all stormwater management facilities shall incorporate sound engineering principles and practices. ~~The municipality shall reserve the right to disapprove any design that would result in the occupancy or continuation of an adverse hydrologic or hydraulic condition within the watershed.~~

§ 149-13. Calculation methodology.

Stormwater runoff from all development sites shall be calculated using either the Rational Method or a soil-cover-complex methodology.

- A. Any stormwater runoff calculations shall use any generally accepted calculation technique that is based on the NRCS soil-cover complex method. Table 149-13-1 Editor's Note: Said table is located at the end of this section. summarizes acceptable computation methods. It is assumed that all methods will be selected by the design professional 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 50 acres. The Rational Method is recommended for drainage areas under 20 acres. The method

utilized shall be subject to the Township Engineer's approval.

- B. All calculations consistent with this section using the soil-cover complex method shall use the appropriate design rainfall depths for the various return period storms according to NOAA Atlas 14 Point Precipitation Frequency Estimates for PA. *Editor's Note: Said appendix is on file in the Township offices.* 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 shall be used for the rainfall distribution.
- C. For the purposes of predevelopment 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 (i.e., forest), as listed in Table B-2 or B-3 in Appendix B.
- D. All calculations using the rational method shall use rainfall intensities consistent with appropriate times-of-concentration for overland flow and return periods from NOAA Atlas 14 Point Precipitation Frequency Estimates for PA. 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.
- 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. *Editor's Note: Said appendix is on file in the Township offices.*
- 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.
- G. 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. Outlet structures for stormwater management facilities shall be designed to meet the performance standards of the Code using any generally accepted hydraulic analysis technique or method and computer model. The applicant shall make available any support documentation for computer models as requested by the Township Engineer. The Township Engineer shall determine what computer models are acceptable.
- H. The design of any stormwater detention facilities intended to meet the performance standards of the Code 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 municipality may approve the use of any generally accepted full hydrograph approximation technique that shall use a total runoff volume that is consistent with the volume from a method that produces a full hydrograph.

TABLE 149-13-1
Acceptable Computation Methodologies For Stormwater Management Plans

Method	Method Developed by	Applicability
TR-20 (or commercial package based on TR-20)	USDA NRCS	Applicable where use of full hydrology computer model is desirable or necessary
TR-55 (or commercial computer package based on TR-55)	USDA NRCS	Applicable for land development plans within limitations described in TR-55
HEC-1	US Army Corps of Engineers	Applicable where use of full hydrologic computer model is desirable or necessary

Applicable where use of a PSRM	Penn State University	Hydrologic computer model is desirable or necessary; simpler than TR-20 or HEC-1
Rational method (or commercial computer package based on Rational Method)	Emil Kuichling (1989)	For sites less than 50 acres, or as approved by the municipality and/or Municipal Engineer
Other methods	Varies	Other computation methodologies approved by the municipality and/or Municipal Engineer

**Note: Successors to the above methods are also acceptable. These successors include WinTR55 for TR-55 and WinTR20 for TR-20*

§ 149-14. Erosion and sedimentation requirements.

- A. No Regulated Earth Disturbance activities within the Municipality shall commence until the Municipality receives an approval from the Conservation District of an Erosion and Sediment Control Plan for construction activities.
- B. DEP has regulations that require an Erosion and Sediment Control Plan for any earth disturbance activity of 5,000 square feet or more, under 25 Pa. Code §102.4(b).
- C. In addition, under 25 Pa. Code Chapter 92, a DEP "NPDES Construction Activities" permit is required for Regulated Earth Disturbance activities.
- D. Evidence of any necessary permit(s) for Regulated Earth Disturbance activities from the appropriate DEP regional office or County Conservation District must be provided to the Municipality. The issuance of an NPDES Construction Permit (or permit coverage under the statewide General Permit (PAG-2) satisfies the requirements subsection 149.14.A.[*]
*[*This sentence is optional – if the municipality has additional or more stringent requirements than those in state regulations, then this sentence should not be used.]*
- E. A copy of the Erosion and Sediment Control plan and any required permit, as required by DEP regulations, shall be available at the project site at all times.
- F. Additional erosion and sediment control design standards and criteria are recommended 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 received final stabilization.

§ 149-15. Nonstructural Project Design (Sequencing to Minimize Stormwater Impacts).

- A. For projects disturbing one (1) acre or more, the design of all Regulated Activities shall include evaluation of 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 of the site.
 - (1) An alternative is practicable if it is available and capable of being done after taking into consideration existing technology and logistics in light of overall project purposes and other municipal requirements.
 - (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.

- B. The applicant shall demonstrate that they designed the Regulated Activities that disturb one (1) acre or more including consideration of the following issues:
- (1) Prepare an Existing Resource and Site Analysis Map (ERSAM), showing environmentally sensitive areas including, but not limited to, steep slopes, ponds, lakes, streams, wetlands, hydric soils, vernal pools, floodplains, stream buffer zones, hydrologic soil groups A and B (areas conducive to infiltration), special geologic features, any existing recharge areas and any other requirements outlined in the municipal Subdivision and Land Development Ordinance.
 - (2) Establish appropriate buffers for each of the delineated environmentally sensitive areas. (See Section 184-177.5 of the municipal zoning ordinance for stream buffers and Section 149-23.J for special geologic feature buffers).
 - (3) Prepare a draft project layout avoiding sensitive areas identified in Section 149.15.13.1.
 - (4) Identify site specific conditions drainage areas, discharge points, recharge areas and hydrologic soil groups A and B.
 - (5) Evaluate Nonstructural Stormwater Management Alternatives.
 - a. Minimize earth disturbance.
 - b. Minimize impervious surfaces.
 - c. Break up large impervious surfaces.
 - (6) Satisfy infiltration objective (Section 149-16) and provide for stormwater pretreatment prior to infiltration. Pretreatment may not be necessary for rooftop runoff which enters the infiltration facility directly from a roof leader.
 - (7) Satisfy water quality (Section 149-17) and streambank erosion protection objective (Section 149-18).
 - (8) Determine what Management District the site falls into (Appendix D) and conduct an existing conditions runoff analysis.
 - (9) Prepare final project design to maintain existing conditions drainage areas and discharge points, to minimize earth disturbance and impervious surfaces, and to the maximum extent possible, to ensure the remaining site development has no surface or point discharge.
 - (10) Conduct a proposed conditions runoff analysis based on the final design and to meet the release rate and in turn the overbank flow and extreme event requirements (Section 308).
 - (11) Manage any remaining runoff through treatment prior to discharge, as part of detention, bioretention, direct discharge or other structural control.

§ 149-16. Volume Controls (Recharge/Infiltration)

- A. The green infrastructure and low impact development practices provided in the PaBMP Manual shall be utilized for all regulated activities wherever possible. Water volume controls shall be implemented using the *Design Storm Method* in Subsection A (CG-1 in the PaBMP Manual) currently replaced by Pennsylvania "DEP PCSM Spreadsheet." For projects whose total limit of disturbance is less than 1 acre and also for those regulated activity areas less than one acre that do not meet the exemption criteria of Section 149-24, the larger of the three volumes as calculated/required by Sections 149-16.A(3)(a); 149-17.A and 149-18 shall be infiltrated.

Maximizing the ground water recharge capacity of the area being developed is required. Design of the infiltration stormwater management facilities shall give consideration to providing ground water recharge to compensate for the reduction in the percolation that occurs when the ground surface is disturbed or impervious surface is created. It is recommended that roof runoff be directed to infiltration BMP's which can be over-designed to compensate for the infiltration losses due to parking areas. It is recommended that roof runoff be directed to infiltration BMP's which may be designed to compensate for the runoff from parking areas. These measures are required to be consistent with 149-2, and take advantage of utilizing any existing recharge areas.

Infiltration may not be feasible on every site due to site-specific limitations such as soil type. If it cannot be physically accomplished, due to seasonal high water table, soil permeability rate, soil depth or setback distances from special geologic features, then the design professional shall be responsible to show that this cannot be physically accomplished.

B. Infiltration BMPs shall meet the following minimum requirements:

(1) Infiltration Requirements:

- (a) Regulated activities will be required to infiltrate, where site conditions permit, a portion of the runoff created by the development as part of an overall stormwater management plan designed for the site. The volume of runoff to be infiltrated shall be determined from sections 149-16.A.; 149-16.B(3)(a) or 149-16.B(3)(b), depending upon demonstrated site conditions.

(2) Infiltration BMPs intended to receive runoff from developed areas shall be selected based on suitability of soils and site conditions and shall be constructed on soils that have the following characteristics:

- (a) A minimum depth of 24 inches between the bottom of the BMP and the limiting zone.
- (b) An infiltration and/or percolation rate sufficient to accept the additional stormwater load and drain completely as determined by field tests conducted by the Applicant's design professional.
- (c) The infiltration facility shall be capable of completely infiltrating the required retention (infiltration) volume within 4 days (96 hours).
- (d) Pretreatment shall be provided prior to infiltration.

(3) The size of the infiltration facility shall be based upon the following volume criteria:
(a.) NRCS Curve Number equation.

The NRCS runoff equation shall be utilized to calculate infiltration requirements (1) in inches.

$I (\text{Infiltration requirement, in inches}) = (200 / \text{CN}) - 2 \quad \text{Eqn: 149-16-1}$

Where:

CN = SCS (NRCS) curve number of existing conditions contributing to the infiltration facility.

This equation is displayed graphically in, and the infiltration requirement can be determined from Figure 149-16-1.

It has been determined that infiltrating 0.46 inches of runoff from the impervious areas will aid in maintaining the hydraulic regime of the watershed. However, the rounded Number 0.5 inches shall be used.

Figure 149-16-1. Infiltration requirement based upon NRCS Curve Number

The retention (infiltration) volume (Rev) required to meet the infiltration requirement would therefore be computed as:

$$\text{Rev} = (0.5 \text{ or } I, \text{ whichever is greater}) * \text{impervious area (square feet)} / (12 \text{ in / ft}) = \text{Cubic Feet}$$

Eqn: 149-16-2

Where:

I = infiltration requirements (in inches.)

(b.) Annual Recharge – Water Budget Approach.

If the goals of Sections 149-16.B.3.a cannot be achieved, then 0.5 inches of rainfall shall be infiltrated from all impervious areas, up to an existing site conditions curve number of 81. Above a curve number of 81, Equation 149-16-1 or the curve in Figure 149-16-1 should be used to determine the infiltration requirement.

The retention (infiltration) volume (Rev) required again would therefore be computed as:

$$\text{Rev} = (0.5 \text{ or } I, \text{ whichever is greater}) * \text{impervious area (sq.ft.)} / (12 \text{ in / ft}) = \text{Cubic Feet}$$

- C. Soils – A detailed soils evaluation of the project site shall be required where practicable to determine the suitability of infiltration facilities. The evaluation shall be performed by a qualified professional, and at a minimum, address soil permeability, depth to bedrock and subgrade stability. The general process for designing the infiltration BMP shall be:
- (1) Analyze hydrologic soil groups as well as natural and man-made features within the site to determine general areas of suitability for infiltration practices. In areas where development on fill material is under consideration, conduct geotechnical investigations of sub-grade stability; infiltration is not permitted to be ruled out without conducting these tests.
 - (2) Provide field tests such as double ring infiltrometer or hydraulic conductivity tests (at the level of the proposed infiltration surface) to determine the appropriate hydraulic conductivity rate. Percolation tests are not recommended for design purposes.
 - (3) Design the infiltration structure for the required retention (Re,) volume based on field determined capacity at the level of the proposed infiltration surface.
 - (4) If on-lot infiltration structures are proposed by the Applicant's design professional, it

must be demonstrated to the municipality that the soils are conducive to infiltrate on the lots identified.

- D. Carbonated Areas – The Applicant is required to investigate the ability of all areas on the site which are not underlain by carbonate rock to meet the infiltration requirements of Section 149-16.B. If this investigation proves infeasible, infiltration can occur on areas underlain by carbonate rock by following the recommended procedure below in conjunction with figure B-3 in Ordinance Appendix B. *However, the Applicant is not required to use infiltration in carbonate areas even if the site falls into the “Recommended” range on Figure B-3 in Ordinance Appendix B.* If infiltration is not proposed, the calculated infiltration volume (Section 149-16.B) shall be treated by an acceptable BMP.

Infiltration BMP loading rate percentages in Figure B-3 in Ordinance Appendix B shall be calculated as follows:

$$\frac{\text{Area tributary to the infiltration BMP}}{\text{Base Area of the infiltration BMP}} * 100\%$$

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

<u>Area Description</u>	<u>Weighting</u>
All disturbed area to be made impervious	100 %
All disturbed areas to be made pervious	50 %
All undisturbed impervious areas	100 %
All undisturbed pervious areas	0 %

Soil thickness is to be measured from the bottom of any proposed infiltration BMP. The effective soil thickness in Figure B-3 in Ordinance Appendix B is the measured soil thickness multiplied by the thickness factor based on soil permeability, as follows:

<u>Permeability Range</u>	<u>Thickness Factor</u>
6.0 to 12.0 inches / hr	0.8
2.0 to 6.0 inches / hr	1.0
1.0 to 2.0 inches / hr	1.4
0.75 to 1.0 inches / hr	1.2
0.5 to 0.75 inches / hr	1.0

The design of all facilities over Karst shall include an evaluation of measures to minimize adverse effects.

- E. Stormwater Hotspots – Following is a list of examples 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 shall not be allowed to recharge into groundwater where it may contaminate water supplies. Therefore, the Rev requirement shall NOT applied to development sites that fit into the hotspot category (the entire WQv must still be treated). Second, a greater level of stormwater treatment shall be considered 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.

Examples of Hotspots:

- Vehicle salvage yards and recycling facilities.
- Vehicle fueling stations.
- Vehicle service and maintenance facilities.
- Vehicle and equipment cleaning facilities.

- Fleet storage areas (bus, truck, etc.)
- Industrial sites (based on Standard Industrial Codes)
- Marinas (service and maintenance)
- Outdoor liquid container storage.
- Outdoor loading / unloading facilities.
- Public works storage areas.
- Facilities that generate or store hazardous materials.
- Commercial container nursery.
- Other land uses and activities as designated by an appropriate review authority.

The following land uses and activities are not normally considered hotspots:

- Residential streets and rural highways.
- Residential development.
- Institutional development.
- Office developments.
- Non-Industrial rooftops.
- Pervious areas, except golf courses and nurseries (which may need an Integrated Pest Management (IPM) Plan.

While large highways (average daily traffic volume (ADT) greater than 30,000) are not designated as a stormwater hotspot; it is important to ensure that highway stormwater management plans adequately protect groundwater.

- F. Caution shall be exercised where infiltration is proposed in Source Water Protection Areas as defined by the local Municipality or Water Authority.
- G. Infiltration facilities shall be used in conjunction with other innovative or traditional stormwater control facilities that are found within the PADEP State BMP Manual.
- H. Caution shall be exercised where salt or chloride (municipal salt storage) 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 facility and perform a hydrogeologic justification study if necessary.
- I. The infiltration requirement in High Quality or Exceptional Value waters shall be subject to the Department's Chapter 93 Antidegradation Regulations.
- J. Dependent upon certain land use or hotspots an impermeable liner will be required in detention basins where the possibility of groundwater contamination exists. A detailed hydrogeologic investigation may be required by the municipality.
- K. The municipality shall require the Applicant to provide safeguards against groundwater contamination for land uses that may cause groundwater contamination should there be a mishap or spill.
- L. For projects that disturb one (1) acre or more, unless otherwise specified in the zoning ordinance, the following setbacks for infiltration facilities shall apply:
 - 100 feet from water supply wells.
 - 10 feet downslope or 100 feet upslope from building foundations.
 - 50 feet from septic system drainfields.
 - 50 feet from a geologic contact with carbonate bedrock, unless a preliminary site investigation is done in the carbonate bedrock to show the absence of

- special geologic features within 50 feet of the proposed infiltration area.
- 100 feet from the property line unless documentation is provided to show all setbacks from wells, foundations and drainfields on the neighboring property will be met.

§ 149-17. Water quality requirements.

- A. Developed areas shall provide adequate storage and treatment facilities necessary to capture and treat stormwater runoff. The infiltration volume computed under Section 149-16 may be a component of the water quality volume if the Applicant chooses to manage both components in a single facility. If the infiltration volume is less than the water quality volume, the remaining water quality volume may be captured and treated by methods other than infiltration BMP's. The required water quality volume (WQv) is the storage capacity needed to capture and treat a portion of stormwater runoff from the developed areas of the site.

To achieve this goal, the following criterion is established:

The following calculation formula is to be used to determine the water quality storage volume, (WQv), in acre-feet of storage for the Schuylkill River and Tulpehocken watersheds.

$WQv = [(P)(Rv)(A)] / 12$	Eqn: 149-17-1
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WQv = Water Quality Volume (acre-feet)

P = 1 inch

A = Total contributing drainage area to the water quality BMP (acres)

Rv = $0.05 + 0.009 (I)$ where I is the percent of the area that is impervious surface ((impervious area / A)*100)

This volume requirement can be accomplished by the permanent volume of a wet basin or the detailed volume from other BMP's.

Release of water can begin at the start of the storm (i.e., the invert of the water quality orific is at the invert of the facility). The design of the facility shall provide for protection from clogging and unwanted sedimentation.

- B. For areas within defined Special Protection subwatersheds which include Exceptional Value (EV) and High Quality (HQ) waters, Cold Water Fishery (CWF) the temperature and quality of water and streams shall be maintained.
- C. To accomplish the above, the Applicant shall use innovative or traditional stormwater control facilities that are found within the PADEP State BMP Manual.
- D. Designs may achieve the water quality objectives through a combination of BMP's (best management practices). All BMP's used for water quality control shall be in accordance with design specifications outlined in the Pennsylvania Stormwater Best Management Practices Manual (PADEP BMP Manual); Maryland Stormwater Design Manual, Maryland Department of the Environment, (<http://www.mde.state.md.us/Programs/Water/Programs/SedimentandStormwater/home/index.asp>), latest edition; or other design manuals approved by the Township Engineer.
- E. In selecting the appropriate BMPs or combinations thereof, the land developer 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.
- F. The following additional factors should be considered when evaluating the suitability of BMPs used to control water quality at a given development site:
- (1) Peak discharge and required volume control.
 - (2) Stream bank erosion.
 - (3) Efficiency of the BMPs to mitigate potential water quality problems.
 - (4) The volume of runoff that will be effectively treated.
 - (5) The nature of the pollutant being removed.
 - (6) Maintenance requirements.
 - (7) Creation/protection of aquatic and wildlife habitat.
 - (8) Recreational value.
 - (9) Enhancement of aesthetic and property value.
- G. Evidence of any necessary permit(s) for regulated earth disturbance activities from the appropriate DEP regional office must be provided to the Municipality. The issuance of an NPDES Construction Permit (or permit coverage under the statewide General Permit (PAG-2) satisfies the requirements of subsection 149-17.A.
- H. If a perennial or intermittent stream passes through the site, the applicant shall create a stream buffer extending a minimum of fifty (50) feet to either side of the top-of-bank of the channel. The buffer area shall be maintained with appropriate native vegetation (Reference to Appendix H of Pennsylvania Handbook of Best Management Practices for Developing Area for plant lists). If the applicable rear or side yard setback is less than fifty (50) feet, the buffer width may be reduced to twenty-five (25) percent of the setback to a minimum of ten (10) feet. If an existing buffer is legally prescribed (i.e. deed, covenant, easement, etc.) and it exceeds the requirements of this Ordinance, the existing buffer shall be maintained. [The Municipality may select a smaller or larger buffer width if desired, but the selected buffer may not be less than ten (10) feet]. This does not include lakes or wetlands.

§ 149-18. Streambank Erosion Requirements.

In addition to the control of the water quality volume, in order to minimize the impact of stormwater runoff on downstream streambank erosion, the primary requirement is to design a BMP to detain the proposed conditions 2-year, 24-hour design storm to the existing conditions 1-year peak 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 conditions 1-year storm takes a minimum of 24 hours to drain from the facility from a point where the maximum volume from the 1-year storm is captured (i.e., the maximum water surface elevation is achieved in the facility). 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 minimum orifice size in the outlet structure to the BMP shall be a three (3) inch diameter orifice and a trash rack shall be installed to prevent clogging. On sites with small contributing drainage areas to this BMP that do not provide enough runoff volume to allow a 24-hour attenuation with the 3 inch orifice, the calculations shall be submitted showing this condition. Orifice sizes less than 3 inches can be utilized provided that the design will prevent clogging of

the intake.

§ 149-19. Floodplain methodology.

- A. All existing and proposed one-hundred-year floodplains shall be delineated on the Comprehensive Stormwater Management Plan (see § 149-23 through § 149-29). If the one-hundred-year floodplain is not mapped by the Federal Emergency Management Agency as part of the National Flood Insurance Program, the horizontal and vertical limits of the floodplain shall be determined utilizing the standard step method (i.e., HEC-RAS or similar approved computer model). If the HEC-RAS model is used, the applicant shall submit a computer disc containing all input files for the calculations, in order to expedite the floodplain review. If the drainage area is less than 100 acres, the Mannings equation may be used.
- B. The methods below shall be used to compute the design flow(s) in the drainage course although other methods may be used with approval of the Township. A conservative average of two methods shall be used, and the design flow is subject to approval by the Township.
 - (1) The graphical and tabular methods in TR-55. The graphical method may be used for streams whose drainage area at the point of interest is no larger than 2,000 acres, and the tabular hydrograph method may be used for drainage areas up to 20 square miles (12,800 acres).
 - (2) The rational method may be used for streams whose drainage area at the point of interest is no larger than 320 acres.
 - (3) The method in Water Resources Bulletin Number 13, Floods in Pennsylvania, issued by the Pennsylvania Department of Environmental Resources (now Protection) may be used for streams whose drainage area at the point of interest is larger than two square miles.
 - (4) The "Procedure PSU-IV for Estimating Design Flood Peaks on Ungaged Pennsylvania Watersheds."
 - (5) The Penn State Runoff Model (PSRM).

§ 149-20. Additional stormwater management system design criteria for selected best management practices.

- A. Infiltration devices shall be selected based on suitability of soils and site conditions. Suitability of soils shall be determined by soil infiltration testing, with suitability typically defined as having minimum percolation rates of 0.5 inches per hour at the elevation of the bottom of the facility (lower rates can be acceptable in special situations).
- B. Soil infiltration testing shall be performed for all proposed infiltration areas; soil testing shall include evaluation of appropriate soil horizons with deep pits and percolation measurements, making sure to assess percolation rates at the proposed infiltration device bed bottom. Soil testing, including the frequency and locations of the tests, should be reviewed and approved by the Township. The design soil infiltration rate shall be the average infiltration rate measured at each proposed area.
- C. The lowest elevation of the infiltration area shall be at least two feet above the Seasonal High-Water Table (SHWT) and bedrock, except in the case of limestone formations, in which case the distance shall be four feet.
- D. All roof drains which discharge to infiltration systems shall have appropriate measures to prevent clogging by vegetation and prevent sinkhole formation.
- E. All infiltration systems shall have appropriate positive overflow controls within one foot of the

finished surface or grade.

- F. All infiltration systems shall have a setback of 15 feet from all residential structures and property lines. Seepage into subgrade structures shall be prevented.
- G. All infiltration systems shall be designed to infiltrate the stored volume within 48 hours.
- H. All surface inflows shall be designed to minimize the discharge of sediment into the infiltration system in order to prevent sediment accumulation, which reduces stormwater storage capacity and ultimately clogs the infiltration mechanism.
- I. Special provisions are required when using infiltration BMPs in carbonate areas in order to avoid groundwater contamination and solution channel/sinkhole formation. In these cases, the Township may require that a detailed geologic evaluation of the project site be performed to determine the suitability for recharge, including both the potential for groundwater contamination and potential for sinkhole formation. The evaluation shall be performed by a qualified geologist and/or soil scientist, and at a minimum, address soil permeability, depth to bedrock, susceptibility to sinkhole formation, and subgrade stability.
 - (1) Because potential for these problems to develop increases as soil thickness decreases, the soil mantle should be determined to be a minimum of four feet in thickness, in order to both remove pollutants and uniformly disperse groundwater movement, which is important to avoid solution channel formation.
 - (2) In carbonate areas, BMPs which disperse stormwater over the largest feasible area should be used (e.g., subtle berms and level spreaders) so as not to significantly modify the natural hydrologic regime. Use of infiltration BMPs which result in significant increases (more than a 100% increase) in the predevelopment rate of infiltration per unit area should be avoided in carbonate areas, unless a detailed geologic evaluation (see below) demonstrates that the potential for sinkhole formation is minimal.
 - (3) Stormwater runoff from significant pollutant producing sources (so called hot spots such as industrial uses, gas stations, fast food and other commercial uses generating large numbers of vehicle trips, and other uses at the determination of the Township) shall be filtered and/or pretreated using a water quality BMP before being discharged in carbonate areas.

§ 149-21. Need for basins, storm sewers, culverts, bridges and other structural installations.

Basins, storm sewers, culverts, bridges and other structural installations shall be provided to safely accommodate stormwater, where natural nonstructural practices are not feasible and where stormwater flows otherwise would have adverse impact on the environment and the general welfare of the Township of Bern and its citizens in order to:

- A. Maintain natural hydrologic regimes of streams and watercourses. Such flows may be redirected as required, subject to the approval of PADEP.
- B. Promote drainage of all low points along the line of streets. Overflow swales shall be designed to convey the full one-hundred-year storm flows away from all street low points. These swales shall be located to prevent flooding of the downslope lots.
- C. Intercept stormwater runoff along streets at intervals reasonably related to the extent and grade of the area drained, and to prevent substantial flow of water across intersections or flooding of intersections during the design storm stipulated elsewhere in this section.
- D. Insure adequate and unimpeded flow of stormwater under driveways in, near, or across natural watercourses or drainage swales. Suitable pipes or other waterway openings shall be provided as necessary.

§ 149-22. Design of basins (detention and retention), storm sewers, culverts, bridges and other structural installations.

A. Standards for conventional basins shall meet requirements listed in this section.

- (1) Basins shall be installed prior to any earthmoving or land disturbances that they will serve. The phasing of their construction shall be noted in the erosion and sedimentation control narrative and on the E&S plan. Permanent vegetation shall be established prior to denuding any other land, unless the basin functions as an E&S device.
- (2) Basins shall be designed to provide for groundwater recharge wherever feasible. For basins located in the carbonate area, a detailed geologic evaluation of the project site shall be performed to determine the suitability for recharge, including both the potential for groundwater contamination and potential for sinkhole formation. The evaluation shall be performed by a qualified geologist and/or soil scientist, and at a minimum, address soil permeability, depth to bedrock, susceptibility to sinkhole formation, and subgrade stability. Soils used for the construction of basins shall have low-erodibility factors (K factors). The Township may require an impermeable liner to be installed up to the one-hundred-year design water surface elevation.
- (3) Energy dissipaters and/or level spreaders shall be installed at points where pipes or drainage ways discharge from basins. Multiple outlet structures and multiple outlet piping from the basin may be required by the Township to reduce the impact of point discharges.
- (4) The following slope restrictions shall apply to basins:
 - (a) Exterior slopes of compacted soil shall not exceed one foot vertical for three feet horizontal, and may be further reduced if the soil has unstable characteristics.
 - (b) Interior slopes of the basin shall not exceed one foot vertical in three feet horizontal except with approval of the Township and:
 - [1] Where maximum water depth will not exceed three feet; or
 - [2] When a two-inch rainfall in one hour will not exceed the capacity of the basin in one hour; or
 - [3] Where concrete, stone or brick walls are used with side slopes proposed to be steeper than one-foot vertical in three-feet horizontal, in which case the basin shall be fenced by a permanent fence 42 inches in height and a ramp of durable, nonslip materials for maintenance vehicles shall be provided for access into the basin.
 - (c) The minimum bottom slope shall be three percent for grass, and 0.75% for concrete paving. One percent may be used for grass if an underdrain system is provided. A concrete low flow channel may be required for basins where the distance from the inlet pipe to the outlet structure exceeds 100 feet, depending upon site conditions. The minimum channel width shall be four feet. The channel shall be constructed of four-inch thick concrete (3,300 psi twenty-eight-day strength) over four inches of PADOT No. 2A stone.
- (5) Basins shall also be designed to meet the following requirements:
 - (a) The minimum top of berm width shall be eight feet, unless waived by the Township.
 - (b) Outlet pipes shall have a minimum diameter of 12 inches. For pipe lengths exceeding 100 feet, the minimum diameter shall be 15 inches.

- (c) Properly spaced antiseep collars shall be installed on all basin outlet pipes. Design calculations shall be provided.
 - (d) All basins shall be constructed with a compacted relatively impervious (Unified Soil Classification CL-ML or CL) key trench and core. The key trench shall extend at least two feet into undisturbed subsoil (below topsoil layer). The minimum bottom width of the trench shall be six feet and the minimum top width of the core shall be four feet. The side slopes of the compacted core and trench shall not exceed one horizontal to one vertical, and the top elevation of the core shall be set at or above the twenty-five-year design water elevation.
- (6) Basin outlet structures and emergency spillways
- (a) Outlet structures within basins which will control peak discharge flows and distribute the flows by pipes to discharge areas shall be constructed primarily of concrete or masonry material and shall have childproof, nonclogging trash racks over all design openings, except those openings designed to carry perennial stream flows. Trash rack material should be epoxy-coated galvanized or stainless steel. Other materials are subject to the approval of the Township.
 - (b) Six inches of freeboard shall be provided between the crest of the primary outlet structure and the invert of the emergency spillway.
 - (c) Emergency spillways shall be constructed in undisturbed earth wherever possible. When constructed in fill, sod, precast concrete paving blocks, concrete or permanent erosion-control matting shall be used. Design calculations shall be submitted indicating that the specified material can withstand velocities based on the one-hundred-year design storm event. When using sod, it shall be applied along the inside slope above the twenty-five-year water surface elevation, along the face and sides of the spillway and down the outside slope to existing grade. Emergency spillways shall be designed to safely convey the one-hundred-year basin inflow hydrograph through the basin assuming the principal outlet is completely blocked and the basin water surface elevation is equal to the spillway invert elevation.
- (7) Basin inlet and outlet structures should be located at maximum distances from one another. The Township may require a rock filter berm or rockfilled gabions between inlet and outlet areas when the distance is deemed insufficient for sediment trappings.
- (8) Permanent grasses or stabilization measures shall be established on the sides of all earthen basins by hydroseeding within five days of initial construction (or conversion from sediment basin or sediment trap). The Township may require jute or erosion-control matting to be installed inside the basin or on the basin embankment.
- (9) Stormwater runoff shall discharge to a suitable natural drainage course (except where prohibited by riparian buffer area regulations of this section) or storm sewer system. Where not possible or not permitted, level spreading devices or other suitable facilities (i.e., swale) shall be designed with sufficient capacity to convey the one-hundred-year storm event without creating any safety flooding, or property hazard. Securing of necessary drainage easements for this purpose shall be the sole responsibility of the developer.
- (10) The Township may require soil samples from the site to be analyzed to determine if these soils are suitable for berm embankment construction. If the soils are found to be unsuitable, the developer shall import suitable soils for constructing the basin.

B. Swale design.

- (1) Grass swales not specifically designed as BMP devices shall have a minimum bottom slope of two percent. Swales lining shall be designed based on the ten-year velocity.

Swales shall have sufficient and freeboard to convey the one-hundred-year storm discharge without creating any safety or property hazard.

- (2) Swales, when located outside of the Township right-of-way, shall be located within an easement not less than 20 feet wide, but of sufficient width to allow access for maintenance and to convey the one-hundred-year storm. A note on the plan shall indicate that the easement allows the Township the right, though not the responsibility, to perform needed maintenance and/or repairs.

C. Storm sewer design.

- (1) Where storm sewers are required, they shall be placed immediately in front of the curb within the right-of-way.
- (2) Storm sewers shall have a minimum diameter of 15 inches and only reinforced cement concrete pipe shall be used where the Township will have ultimate maintenance responsibility. All storm sewer, sanitary sewers, water pipes, and other utilities beneath a paved surface shall be bedded and backfilled with PADOT No. 2A stone. This backfill shall be placed in six-inch lifts and solidly compacted to the satisfaction of the Township. The minimum grade of the pipe shall be 1/2%.
- (3) For storm sewers not to be maintained by the Township, smooth bore corrugated polyethylene pipe up to a maximum diameter of 48 inches may be used in lieu of concrete. The minimum diameter shall be 15 inches and the minimum grade shall be 1/2%.
- (4) In carbonate areas, watertight pipe connections are required and appropriate specifications shall be specified on the plans.
- (5) Headwalls, endwalls, or end sections shall be required on all open pipes, shall be of concrete construction and shall be set on a minimum of 12 inches of AASHTO No. 57 (PADOT 2B) coarse aggregate.
- (6) All storm sewers shall be constructed per PADOT specifications as outlined in Publication 408 Design Manual, Part Z Highway Design and Standards for Roadway Construction, RC-Series unless otherwise dictated by the Township Code.
- (7) Any changes in alignment shall be straight sections connected by inlets or manholes.
- (8) When there is a change in pipe size through an inlet, the top inside elevation of the outlet pipe shall be at or below the top inside elevations of all incoming pipes.
- (9) Storm sewer sizes shall be determined based upon the following design storm frequencies:
 - (a) Storm sewers shall be designed to be able to convey postdevelopment runoff from a twenty-five-year design storm without surcharging inlets.
 - (b) Gutter capacity shall be analyzed. Inlets shall be spaced such that gutter spread does not exceed one-half the lane width (one-fourth the road width).
 - (c) Inlets shall be evaluated for efficiency. Inlet efficiencies shall be based on PennDOT Publication 13, Design Manual Part 2, Chapter 10. Other methods may be utilized but shall be subject to the Township Engineer's approval.
 - (d) The design of storm sewer systems within the drainage area of detention or retention facilities must be analyzed for adequacy during the one-hundred-year storm, including the effects of the control facility tailwater. This may require a hydraulic grade line analysis. When approved by the Township, overflow swales may be provided at low points in streets to safely convey the full one-hundred-year peak flow to the control facility, in lieu of providing the full capacity in the storm sewer.

- (e) Open channels (swales) shall be designed to provide freeboard equal to one-fourth the depth of flow (a minimum of six inches and with velocities (and/or sheer stress) requirements as defined by PADEP Chapter 102 regulations.
- (10) Storm sewer design shall be based upon PADOT design methods. Inlet efficiency and bypass flow shall be determined for all inlets, and the gutter flow spread shall not exceed 1/2 the travel lane width or to a maximum of eight feet where parking is permitted. The Township may require that a hydraulic grade-line analysis be performed on storm sewer systems.
- (11) Culverts shall be evaluated for inlet and outlet control restrictions.
- (12) Rainfall intensity curves and other hydraulic design data, provided by the Pennsylvania Department of Transportation and/or manufacturers of storm drainage structures, shall be used for design purposes.
- (13) Manholes and/or inlets shall not be more than 300 feet apart on pipe sizes up to 24 inches, and not more than 400 feet apart on larger sizes.
- (14) Inlets, manholes, covers and frames shall conform to Pennsylvania Department of Transportation specifications. At street intersections, every attempt should be made to place inlets in the tangent and not in the curved portion of the curbing.
- (15) When precast concrete inlets or manholes are used within a street, a minimum of two courses of brick masonry or grade ring shall be placed to bring the grate or cover to proper elevation. If brick is used, every third vertical joint shall be left open; if grade rings are used, the horizontal joints shall be left open to facilitate drainage of the base course. Geotextile fabric shall be wrapped around the outside of the brick masonry or grade rings to prevent the washing of fines into the structure.
- (16) Precast inlet tops and boxes shall meet the requirements of PennDot Publication 408. PennDot type "C" precast concrete inlet tops are to be provided with a five-inch-by-twenty-four-inch cast iron "Dump No Waste - Drains To Waterway" (with one-half-inch raised lettering) plate with trout logo as manufactured by E. Jordan Iron Works or approved equal. Bottom of covers are to be clearly marked with grade of iron (ASTM A48, Class 35B), product number and date of manufacture. **[Added 5-3-2005 by Ord. No. 218-2005]**
- (17) The words "Dump No Waste - Drains To Waterway" in one-and-one-quarter-inch raised letters with bass logo shall be cast or stamped into the storm sewer manhole covers as manufactured by E. Jordan Iron Works or approved equal. Bottoms of covers are to be clearly marked with grade of iron (ASTM A48, Class 35B), product number and date of manufacture. **[Added 5-3-2005 by Ord. No. 218-2005]**

D. Roof drains.

- (1) Storm water roof drains shall not discharge water directly over a sidewalk or into any sanitary sewer line.
- (2) Except for single-family homes, proposed roof drains and collector locations shall be shown on the storm drainage plans. Roof drains and collectors shall meet all BOCA codes and the Township Code.

E. Design of bridges and culverts.

- (1) Bridges and culverts shall have ample waterway to carry the design flows, based on a minimum storm frequency of 25 years, unless a larger design flow is required by PADEP. One-hundred-year water depths shall not exceed six inches above the roadway centerline elevation. Bridge and/or culvert construction shall be in accordance with the PADOT specifications and shall meet the requirements of the PADEP. The appropriate permits and approvals must be acquired by the applicant prior to final plan approval.

- (2) Culverts shall be provided with wing walls and constructed for the full width of the right-of-way. If the character of the road is expected to change for future planning, the cartway of the bridge shall be made to anticipate this condition. On each side of the bridge cartway, the bridge railing must be set back from the edge of the final cartway and this area may be used to place sidewalks, present or future.

§ 149-23. Various other site development requirements.

- A. Procedures for protecting soils or geologic structures with water supply potential from contamination by surface water or other disruption by construction activity shall be established in consultation with the Township and such areas shall include, at minimum, those underlain by carbonate limestone formations. The Township may require pollution control facilities to be provided on existing or proposed stormwater management systems within or adjacent to the project site.
- B. Provisions for protecting existing wells or other water supplies shall be established.
- C. All wet basin designs shall incorporate biologic minimization controls consistent with the West Nile Guidance found in Appendix F.
- D. Any stormwater management facility (i.e., 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 and may be subject to PaDEP Chapter 105 regulations.
- E. Graded slopes shall not be steeper than three horizontal units to one vertical unit.
- F. Any approvals required by the steep slope provisions in the Township Code (§ 184-27) shall be secured prior to earthmoving or stripping of vegetation.
- G. Any facilities that constitute water obstructions (e.g., culverts, bridges, outfalls, or stream enclosures), water encroachments, and any work involving wetlands governed by PaDEP Chapter 105 regulations (as amended or replaced from time to time by PaDEP), are subject to PaDEP Chapter 105 regulations.
- H. A minimum of four inches of topsoil shall be provided on all disturbed areas prior to final seeding and mulching.
- I. Mature healthy trees of at least six inches DBH and other significant existing vegetation within the limits of earth disturbance shall be located in the field and on the storm drainage plan and shall be retained and protected. Such trees shall not be removed except as provided on the approved subdivision or land development plan. The filling of soil over the roots of trees to be preserved is prohibited (roots are presumed to extend out from the tree as far as the tree's branches extend outward.)
- J. No stormwater detention facility shall be placed within fifty (50) feet of a special geologic feature. No stormwater conveyance facility shall be constructed within fifty (50) feet of a special geologic feature, unless it is constructed of durable pipe utilizing watertight joints.

ARTICLE IV Drainage Plan Requirements

§ 149-24. Exemptions and Modified Requirements.

A. Requirements for Exempt Activities.

- (1) An exemption from any requirement of this Ordinance shall not relieve the Applicant from implementing all other applicable requirements of this Ordinance or from implementing such measures as are necessary to protect public health, safety, and welfare, property and water quality.
- (2) An exemption shall not relieve the Applicant from complying with the requirements for State-designated special protection waters designated by PADEP as high quality (HQ) or exceptional value (EV) waters, or any other current or future State or municipal water quality protection requirements.
- (3) An exception under this Ordinance shall not relieve the Applicant from complying with all other applicable municipal ordinances or regulations.

B. Regulated Activities that:

- (1) Any Regulated Activity that meets the impervious area exemption criteria in Table 149-24.1 shall not be required to implement the stormwater quantity controls, specified in Section 149-10 of this Ordinance. These criteria shall apply to the total development even if development is to take place in phases. The approval date of this Ordinance 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. Impervious areas existing on the "parent tract" prior to the approval date of this Ordinance shall not be considered in cumulative impervious area calculations for exemption purposes.

TABLE 149-24.1
Impervious Area Exemption Criteria

Total Parcel Size	Impervious Area Exemption (sq.ft.)
0 to <0.125 ac	500 sq. ft.
0.125 to <0.5 ac	1,500 sq. ft.
0.5 to <1 ac	3,250 sq. ft.
≥1 ac	5,000 sq. ft.

- (2) Are listed in Subsection 149-24.C, are exempt from those (and only those) requirements of this Ordinance that are included in the sections and articles listed in Table 149-24.2. Exemptions are for the items noted in Tables 149-24.1 and 149-24.2 only, and shall not relieve the Landowner from other applicable requirements of this Ordinance. Exemption shall not relieve the Applicant from implementing such measures as are necessary to protect health, safety, and welfare, property, and water quality.

TABLE 149-24.2

Thresholds for Regulated Activities that are Exempt from the Provisions of this Ordinance as Listed Below (see Notes below)

Ordinance Article/Section	Activities Listed in Subsection 149-24.C. Or those activities	Regulated Impervious Surfaces that do not meet the requirements	Projects greater than 1 ac of earth disturbance

	that meet the criteria of 149-24.B(1)	of Sections 149-24.B. or C. and propose less than 1 ac. of earth disturbance	
Article I	Not Exempt	Not Exempt	Not Exempt
Article II	Not Exempt	Not Exempt	Not Exempt
Sections 149-9.G&H., and 149-14;-21 through -25.	Not Exempt	Not Exempt	Not Exempt
Sections 149-9.A. through F.; I.: & J., 149-10.; &149-15.	Exempt	Exempt	Not Exempt
Article IV	Exempt	Exempt	Not Exempt
Article V	Exempt	Exempt	Not Exempt
Article VI	Exempt	Exempt	Not Exempt
Article VII	Exempt	Exempt	Not Exempt
Article VIII	Not Exempt	Not Exempt	Not Exempt
Article IX	Not Exempt	Not Exempt	Not Exempt
Other Erosion, Sediment and Pollution Control Requirements	Must comply with Title 25, Chapter 102 of the PA Code and other applicable State and municipal codes, including the Clean Streams Law.		

Table 149-24.2 Notes:

- Specific activities listed in Subsection 149-24.C are exempt from the indicated requirements, regardless of size.
- A Proposed Regulated Activity must be less than BOTH the Proposed Impervious Surfaces and proposed Earth Disturbance thresholds to be eligible for exemption from the requirements listed in this table.
- "Proposed Impervious Surface" – as defined in this Ordinance.
- "Exempt" – Regulated Activities are exempt from the requirements of listed section(s) only; all other provisions of this Ordinance apply.

C. Exemptions for Specific Activities.

The following specific Regulated Activities are exempt from the requirements of Sections 149-

9.A. through F.; & 149 - 15 and Article IV, Article V, Article VI and Article VII of this Ordinance (as shown in Table 149-24.2), unless otherwise noted below. All other conveyance and system design standards established by the Municipality in other codes or ordinances shall be required, and all other provisions of this Ordinance shall apply.

- (1) Emergency Exemption – Emergency maintenance work performed for the protection of public health, safety and welfare. This exemption is limited to repair of the existing facility; upgrades, additions or other improvements are not exempt. A written description of the scope and extent of any emergency work performed shall be submitted to the Municipality within two (2) calendar days of the commencement of the activity. A detailed plan shall be submitted no later than thirty (30) days following commencement of the activity. If the Municipality finds that the work is not an emergency, then the work shall cease immediately and the requirements of this Ordinance shall be addressed as applicable.
- (2) Maintenance – Any maintenance to an existing stormwater management system, facility, BMP or Conveyance made in accordance with plans and specifications approved by the Municipal Engineer or Municipality.
- (3) Existing Landscaping – Use of land for maintenance, replacement or enhancement of existing landscaping.
- (4) Gardening – Use of land for gardening for home consumption.
- (5) Agricultural Related Activities –
 - a. Agricultural Activities (as defined in Article II).
 - b. Conservation Practices (as defined in Article II) that do not involve construction of any new or expanded Impervious Surfaces.
- (6) Forest Management – Forest management operations, which are consistent with a sound forest management plan as filed with the Municipality and which comply with the Pennsylvania Department of Environmental Protection’s management practices contained in its publication “Soil Erosion and Sedimentation Control Guidelines for Forestry” (as amended or replaced by subsequent guidance). Such operations are required to have an Erosion and Sedimentation Control Plan, which meets the requirements of 25 PA Code Chapter 102 and meets the erosion and sediment control standards of Section 149-14 of this Ordinance.
- (7) Maintenance of Existing Paved Surfaces – Replacement of existing paved surfaces shall meet the erosion and sediment control requirements of 25 PA Code Chapter 102 and Section 149-14 of this Ordinance, and is exempt from all other requirements of this Ordinance listed in Subsection 149-24.C above. Resurfacing of existing paved surfaces is exempt from the requirements of this Ordinance listed above. Construction of new or additional Impervious Surfaces shall comply with all requirements of this Ordinance as indicated in Table 149-24.1.
- (8) Municipal Roadway Shoulder Improvements – Shoulder improvements conducted within the existing roadway cross-section of municipal owned roadways, unless an NPDES permit is required, in which case the proposed work must comply with all requirements of this Ordinance.
- (9) In-Place Replacement of Residential Dwelling Unit – The replacement in the exact footprint of an existing one- or two-family dwelling unit.
- (10) In-Place Replacement, Repair, or Maintenance of Residential Impervious Surfaces – The replacement of existing residential patios, decks, driveways, pools, garages and / or sidewalks that are accessory to an existing one- or two-family dwelling unit in the exact footprint of the existing Impervious Surface.

D. Modified Requirements for Small Projects.

- (1) Regulated Impervious Surfaces that do not meet the requirements of Sections 149-24.B. or C. and propose less than 1 ac. of earth disturbance may apply the modified requirements presented in the "Simplified Approach to Stormwater Management for Small Projects" (Simplified Approach) (Appendix H) to comply with the requirements of Sections 149-9.A. through F.; 149-10.; 149-15 and Article IV, Article V, Article VI and Article VII of this Ordinance (as shown in Table 149-24.2). The Applicant shall first contact the Township or their designee to confirm that the proposed project is eligible for use of the Simplified Approach and is not otherwise exempt from these Ordinance provisions; to determine what components of the proposed project are to be considered as Impervious Surfaces; and to determine if other known Site or local conditions exist that may preclude the use of any techniques included in the Simplified Approach. Appendix A includes instructions and procedures for preparation, submittal, review and approval of documents required when using the Simplified Approach and shall be adhered to by the Applicant. All other provisions of this Ordinance shall apply.
- (2) The Board of Supervisors hereby delegates authority for execution of all agreements, contracts and covenants associated with the small projects set forth in Section D(1) above.

TABLE 149-24.2

Thresholds for Regulated Activities that are Eligible for "Modified" requirements for the Provisions of this Ordinance that are Listed Below

Ordinance Article/Section	Activities Listed in Subsection 149-24. D.
Article I	All Provisions Apply
Article II	All Provisions Apply
Sections 149-9.G&H., and 149-14;-21 through -25.	All Provisions Apply
Sections 149-9.A. through F.; 149-10.; & 149-15	Exempt if Modified Requirements of Subsection 149-24. D. are Applied
Article IV	Exempt if Modified Requirements of Subsection 149-24. D. are Applied
Article V	Exempt if Modified Requirements of Subsection 149-24. D. are Applied
Article VI	Exempt if Modified Requirements of Subsection 149-24. D. are Applied
Article VII	Exempt if Modified Requirements of Subsection 149-24. D. are Applied
Article VIII	All Provisions Apply

Article IX	All Provisions Apply
Other Erosion, Sediment and Pollution Control Requirements	Must comply with Title 25, Chapter 102 of the PA Code and other applicable State and municipal codes, including the Clean Streams Law.

Table 149-24.2 Notes:

- "Modified Requirements" – Regulated Activities listed within the Subsections of this Ordinance noted in Table 149-24.2 are eligible for exemption only from the indicated sections and subsections of this Ordinance and only if the modified requirements of Subsection 149-24.D. are met to the satisfaction of the Municipality; all other provisions of this Ordinance apply.

§ 149-25. General requirements.

For any of the activities regulated by this section, 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 land disturbance activity may not proceed until the property owner or developer or his/her agent has received written approval of a drainage plan from the municipality.

§ 149-26. Drainage plan contents.

The drainage plan shall consist of all applicable calculations, maps, and plans. A note on the maps shall refer to the associated computations and erosion and sedimentation control plan by title and date. The cover sheet of the computations and erosion and sedimentation control plan shall refer to the associated maps by title and date. All drainage plan materials shall be submitted to the municipality in a format that is clear, concise, legible, neat, and well organized; otherwise, the drainage plan shall be disapproved and returned to the applicant. The following items shall be included in the drainage plan:

A. General.

- (1) General description of project.
- (2) General description of permanent stormwater management techniques, including construction specifications of the materials to be used for stormwater management facilities.
- (3) Complete hydrologic, hydraulic, and structural computations for all stormwater management facilities.
- (4) A general description of nonpoint source pollution controls.

B. Map(s) of the project area shall be submitted on twenty-four-inch x thirty-six-inch sheets and shall be prepared in a form that meets the requirements for recording at the offices of the Recorder of Deeds of Berks County. The contents of the maps(s) shall include, but not be limited to:

- (1) The location of the project relative to highways, municipalities or other identifiable landmarks.
- (2) Existing contours at intervals of two feet. In areas of steep slopes (greater than 15

percent), five-foot contour intervals may be used.

- (3) Existing streams, lakes, ponds, or other bodies of water within the project area.
- (4) Other physical features including flood hazard boundaries, sinkholes, streams, existing drainage courses, areas of natural vegetation to be preserved, and the total extent of the upstream area draining through the site.
- (5) The locations of all existing and proposed utilities, sanitary sewers, and water lines within 50 feet of property lines.
- (6) An overlay showing soil names and boundaries.
- (7) Limits of earth disturbance, including the type and amount of impervious area that would be added.
- (8) Proposed structures, roads, paved areas, and buildings.
- (9) Final contours at intervals of two feet. In areas of steep slopes (greater than 15%), five-foot contour intervals may be used.
- (10) The name of the development, the name and address of the owner of the property, and the name of the individual or firm preparing the plan.
- (11) The date of submission.
- (12) A graphic and written scale of one inch equals no more than 50 feet; for tracts of 20 acres or more, the scale shall be one inch equals no more than 100 feet.
- (13) A north arrow.
- (14) The total tract boundary and size with instances marked to the nearest foot and bearings to the nearest degree.
- (15) Existing and proposed land use(s).
- (16) A key map showing all existing man-made features beyond the property boundary that would be affected by the project.
- (17) Horizontal and vertical profiles of all open channels, including hydraulic capacity.
- (18) Overland drainage paths.
- (19) A fifteen-foot-wide access easement around all stormwater management facilities that would provide ingress to and egress from a public right-of-way.
- (20) A note on the plan indicating the location and responsibility for maintenance of stormwater management facilities that would be located off-site. All off-site facilities shall meet the performance standards and design criteria specified in this section.
- (21) A construction detail of any improvements made to sinkholes and the location of all notes to be posted, as specified in this section.
- (22) A statement, signed by the landowner, acknowledging the stormwater management system to be a permanent fixture that can be altered or removed only after approval of a revised plan by the municipality.
- (23) The following signature block for the Design Engineer:
I, (Design Engineer), on this date (date of signature), hereby certify that the drainage plan meets all design standards and criteria of the Schuylkill River / Tulpehocken Creek (whichever is / are appropriate) Watershed Act 167 Stormwater Management Ordinance.
- (24) The location of all erosion and sedimentation control facilities.

C. Supplemental information.

- (1) A written description of the following information shall be submitted.
 - (a) The overall stormwater management concept for the project.
 - (b) Stormwater runoff computations as specified in this section.
 - (c) Stormwater management techniques to be applied both during and after development.
 - (d) Expected project time schedule.
 - (e) Development stages (project phases) if so proposed.
 - (f) An operation and maintenance plan in accordance with Article VII of this Ordinance.
- (2) A soil erosion and sedimentation control plan, where applicable, including all reviews and approvals, as required by PADEP.
- (3) A geologic assessment of the effects of runoff on sinkholes as specified in this section.
- (4) The effect of the project (in terms of runoff volumes and peak flows) on adjacent properties and on any existing municipal stormwater collection system that may receive runoff from the project site.
- (5) A declaration of adequacy and highway occupancy permit from the PADOT District Office when utilization of a PADOT storm drainage system is proposed.

D. Stormwater management facilities.

- (1) All stormwater management facilities must be located on a plan and described in detail.
- (2) When groundwater recharge methods such as seepage pits, beds or trenches are used, the locations of existing and proposed septic tank infiltration areas and wells must be shown.
- (3) All calculations, assumptions, and criteria used in the design of the stormwater management facilities must be shown.

§ 149-27. Plan submission.

For all activities regulated by this section, the steps below shall be followed for submission. For any activities that require a PADEP joint permit application and regulated under Chapter 105 (Dam Safety and Waterway Management) or Chapter 106 (Floodplain Management) of PADEP's Rules and Regulations, require a PADOT highway occupancy permit, or require any other permit under applicable state or federal regulations, the proof of application for said permit(s) shall be part of the plan. The plan shall be coordinated with the state and federal permit process.

- A. The drainage plan shall be submitted by the developer as part of the preliminary plan submission for the regulated activity.
- B. Four copies of the drainage plan shall be submitted.
- C. Distribution of the drainage plan will be as follows:
 - (1) Two copies to the municipality accompanied by the requisite municipal review fee, as specified in this section.
 - (2) One copy to the Municipal Engineers.
 - (3) One copy to the County Planning Commission/Department.

§ 149-28. Drainage plan review.

- A. The Municipal Engineer shall review the drainage plan for consistency with the adopted Tulpehocken Creek Watershed Act 167 Stormwater Management Plan. The Municipality shall require receipt of a complete plan, as specified in this section.
- B. The Municipal Engineer shall review the drainage plan for any submission or land development against the municipal subdivision and land development Code provisions not superseded by this section. Editor's Note: See Ch. 154, Subdivision and Land Development.
- C. For activities regulated by this section, the Municipal Engineer shall notify the municipality in writing, within 30 calendar days, whether the drainage plan is consistent with the stormwater management plan. Should the drainage plan be determined to be consistent with the stormwater management plan, the Municipal Engineer will forward an approval letter to the Developer with a copy to the Municipal Secretary.
- D. Should the drainage plan be determined to be inconsistent with the stormwater management plan, the Municipal Engineer will forward a disapproval letter to the Developer with a copy to the Municipal Secretary citing the reason(s) for the disapproval. Any disapproved drainage plans may be revised by the developer and resubmitted consistent with this section.
- E. For regulated activities specified in §§ 149-4C and 149-4D of the Code, the Municipal Engineer shall notify the Municipal Building Permit Officer in writing, within a time frame consistent with the Municipal Building Code and/or Municipal Subdivision Section of the Code, Editor's Note: See Ch. 57, Building Construction, and Ch. 154, Subdivision and Land Development, whether the drainage plan is consistent with the stormwater management plan and forward a copy of the approval/disapproval letter to the developer. Any disapproved drainage plan may be revised by the developer and resubmitted consistent with this section.
- F. For regulated activities requiring a PADEP joint permit application, the Municipal Engineer shall notify PADEP whether the drainage plan is consistent with the Stormwater Management Plan and forward a copy of the review letter to the municipality and the developer. PADEP may consider the Municipal Engineer's review comments in determining whether to issue a permit.
- G. The municipality shall not approve any subdivision or land development for regulated activities specified in § 149-4 of the Code if the drainage plan has been found to be inconsistent with the stormwater management plan, as determined by the Municipal Engineer. All required permits from PADEP must be obtained prior to approval of any subdivision or land development.
- H. The Municipal Building Permit Office shall not issue a building permit for any regulated activity specified in § 149-4 of the Code if the drainage plan has been found to be inconsistent with the stormwater management plan, as determined by the Municipal Engineer, or without considering the comments of the Municipal Engineer. All required permits from PADEP must be obtained prior to issuance of a building permit.
- I. The developer shall be responsible for completing record drawings of all stormwater management facilities included in the approved drainage plan. The record drawings and an explanation of any discrepancies with the design plans shall be submitted to the Municipal Engineer for final approval. In no case shall the municipality approve the record drawings until the municipality receives a copy of an approved declaration of adequacy, highway occupancy permit from the PADOT District Office, and any applicable permits from PADEP.
- J. The Municipality's approval of a drainage plan, if granted simultaneously with plat plan approval, shall be valid for a period not to exceed five years. This five-year time period shall commence on the date that the municipality signs the approved drainage plan. If stormwater

management facilities included in the approved drainage plan have not been constructed, or if constructed, and record drawings of these facilities have not been approved within this five-year time period, then the municipality may consider the drainage plan disapproved and may revoke any and all permits. Drainage plans that are considered disapproved by the municipality shall be resubmitted in accordance with § 149-28 of the Code.

§ 149-29. Modification of plans.

- A. A modification to a submitted drainage plan for a development site that involves a change in stormwater management facilities or techniques, or that involves the relocation or redesign of stormwater management facilities, or that is necessary because soil or other conditions are not as stated on the drainage plan as determined by the Municipal Engineer, shall require a resubmission of the modified drainage plan consistent with § 149-27 of the Code and be subject to review as specified in § 149-28 of the Code.
- B. A modification to an already approved or disapproved drainage plan shall be submitted to the municipality, accompanied by the applicable review fee. A modification to a drainage plan for which a formal action has not been taken by the municipality shall be submitted to the municipality, accompanied by the applicable municipality review fee.

§ 149-30. Resubmission of disapproved drainage plans.

A disapproved drainage plan may be resubmitted, with the revisions addressing the Municipal Engineer's concerns documented in writing addressed, to the Municipal Secretary in accordance with § 149-27 of the Code and distributed accordingly and be subject to review as specified in § 149-28 of the Code. The applicable municipality review fee must accompany a resubmission of a disapproved drainage plan.

ARTICLE V Inspections

§ 149-31. Schedule of inspections.

- A. The Municipal Engineer or his municipal assignee shall inspect all phases of the installation of the permanent stormwater management facilities as deemed appropriate by the Municipal Engineer.
- B. During any stage of the work, if the Municipal Engineer determines that the permanent stormwater management facilities are not being installed in accordance with the approved Stormwater Management Plan, the municipality shall revoke any existing permits and issue a cease-and-desist stop-work order until a revised drainage plan is submitted and approved, as specified in this section.

ARTICLE VI Fees and Expenses

§ 149-32. General.

The fee required by this section is the municipal review fee. The Municipal Review fee shall be established by the municipality to defray review costs incurred by the municipality and the Municipal Engineer. All fees shall be paid by the applicant.

§ 149-33. Municipality drainage plan review fee.

The municipality shall establish a review fee schedule by resolution of the municipal governing body based on the size of the regulated activity and based on the municipality's costs for reviewing drainage plans. The municipality shall periodically update the review fee schedule to ensure that review costs are adequately reimbursed.

§ 149-34. Expenses covered by fees.

The fees required by this section shall at a minimum cover:

- A. Administrative costs.
- B. The review of the drainage plan by the municipality and the Municipal Engineer.
- C. The site inspections.
- D. The inspection of stormwater management facilities and drainage improvements during construction.
- E. The final inspection upon completion of the stormwater management facilities and drainage improvements presented in the drainage plan.
- F. Any additional work required to enforce any permit provisions regulated by this section, correct violations, and assure proper completion of stipulated remedial actions.

ARTICLE VII Maintenance Responsibilities

§ 149-35. Performance guarantee.

The applicant should provide a financial guarantee to the municipality for the timely installation and proper construction of all stormwater management controls as required by the approved stormwater plan and this section equal to the full construction cost of the required controls.

§ 149-36. Maintenance responsibilities.

- A. The drainage plan for the development site shall contain an operation and maintenance plan prepared by the developer and approved by the municipal engineer. The operation and maintenance plan shall outline required routine maintenance actions and schedules necessary to insure proper operation of the facility(ies).
- B. The drainage plan for the development site shall establish responsibilities for the continuing operating and maintenance of all proposed stormwater control facilities, consistent with the following principals:
 - (1) If a development consists of structures or lots which are to be separately owned and in which streets, sewers and other public improvements are to be dedicated to the municipality, stormwater control facilities may also be dedicated to and maintained by the municipality (the municipality is not obligated to accept ownership).
 - (2) If a development site is to be maintained in a single ownership or if sewers and other public improvements are to be privately owned and maintained, then the ownership and maintenance of stormwater control facilities shall be the responsibility of the owner or private management entity.
- C. The governing body, upon recommendation of the Municipal Engineer, shall make the final determination on the continuing maintenance responsibilities prior to final approval of the

stormwater management plan. The governing body reserves the right to accept the ownership and operating responsibility for any or all of the stormwater management controls.

§ 149-37. Maintenance agreement for privately owned stormwater facilities.

- A. Prior to final approval of the site's stormwater management plan, the property owner shall sign and record the maintenance agreement contained in Appendix A Editor's Note: Said appendix is on file in the Township Offices. 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 Municipal Solicitor and governing body.

§ 149-38. Post-construction maintenance inspections.

- A. Stormwater detention and retention basins or facilities shall be inspected by a registered professional engineer licensed in the Commonwealth of Pennsylvania on behalf of the applicant or responsible entity (including the Township Engineer for dedicated facilities) on the following basis:
 - (1) Annually for the first five years.
 - (2) Once every three years thereafter.
 - (3) During or immediately after the cessation of a one-hundred year or greater storm event.
- B. The professional engineer conducting the inspection shall be required to submit a written report to the Township within one month following completion of the inspection. The report will present documentation and include pictures regarding the condition of the facility and recommend necessary repairs, if needed. Any needed repairs shall be implemented by the owner within one month of the report issuance date.

§ 149-39. Municipal stormwater maintenance fund.

- A. Persons installing stormwater storage facilities shall be required to pay a specified amount to the Municipal Stormwater Maintenance Fund to help defray costs of periodic inspections and maintenance expenses. The amount of the deposit shall be determined as follows:
 - (1) If the storage facility is to be privately owned and maintained, the deposit shall cover the cost of periodic inspections performed by the municipality for a period of 10 years, as estimated by the Municipal Engineer. After that period of time, inspections will be performed at the expense of the municipality.
 - (2) If the storage facility is to be owned and maintained by the municipality, the deposit shall cover the estimated costs for maintenance and inspections for 10 years. The Municipal Engineer will establish the estimated costs utilizing information submitted by the applicant.
 - (3) The amount of the deposit to the fund shall be converted to present worth of the annual series values. The Municipal Engineer shall determine the present worth equivalents, which shall be subject to the approval of the governing body.
- B. 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 facility, 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 will be returned to the depositor.

ARTICLE VIII Prohibitions [Added 5-3-2005 by Ord. No. 218-2005]

§ 149-40. Prohibited discharges.

- A. Any drain or conveyance, whether on the surface or subsurface, that allows any non-stormwater discharge including sewage, process wastewater, and wash water to enter a regulated small MS4 or to enter the surface waters of this Commonwealth is prohibited.
- B. No person in the municipality shall allow, or cause to allow, stormwater discharges into the municipality's separate storm sewer system or discharges into waters of this Commonwealth, which are not composed entirely of stormwater, except as provided in Subsection B below, and discharges allowed under a state or federal permit.
- C. Discharges which may be allowed based on a finding by the municipality that the discharges do not significantly contribute to pollution to surface waters of the Commonwealth are:
 - (1) Discharges from fire-fighting activities.
 - (2) Potable water sources, including water line and fire hydrant flushings, if such discharges do not contain detectable concentrations of Total Residual Chlorine (TRC).
 - (3) Non-contaminated irrigation water, water from lawn maintenance, landscape drainage and flows from riparian habitats and wetlands.
 - (4) Diverted stream flows and springs.
 - (5) Non-contaminated pumped ground water and water from foundation and footing drains and crawl space pumps.
 - (6) Non-contaminated HVAC condensation and water from geothermal systems.
 - (7) Residential (i.e., not commercial) vehicle wash water where cleaning agents are not utilized.
 - (8) Non-contaminated hydrostatic test water discharges, if such discharges do not contain detectable concentrations of TRC.
- D. In the event that the municipality or DEP determines that any of the discharges identified in Subsection C significantly contribute to pollution of waters of the Commonwealth, or is so notified by DEP, the municipality will notify the responsible person to cease the discharge.
- E. Upon notice provided by the municipality under Subsection D, the discharger will have a reasonable time, as determined by the municipality, to cease the discharge consistent with the degree of pollution caused by the discharge.
- F. Nothing in this section shall affect a discharger's responsibilities under state law.

§ 149-41. Prohibited connections.

- A. The following connections are prohibited, except as provided in § 149-40B above:
 - (1) Any drain or conveyance, whether on the surface or subsurface, which allows any nonstormwater discharge, including sewage, process wastewater, and wash water, to enter the separate storm sewer system, and any connections to the storm drain system from indoor drains and sinks; and
 - (2) Any drain or conveyance connected from a commercial or industrial land use to the separate storm sewer system which has not been documented in plans, maps, or equivalent records, and approved by the municipality.

§ 149-42. Roof drains.

- A. Roof drains shall not be connected to streets, sanitary or storm sewers or roadside ditches in order to promote overland flow and infiltration/percolation of stormwater where advantageous to do so. When it is more advantageous to connect directly to streets or storm sewers, then it shall be permitted on a case-by-case basis by the municipality.
- B. When it is more advantageous to connect directly to streets or storm sewers, connections of roof drains to streets or roadside ditches may be permitted by the municipality.
- C. Roof drains shall discharge to infiltration areas or vegetative BMPs to the maximum extent practicable.

ARTICLE IX Enforcement and Penalties [Amended 5-3-2005 by Ord. No. 218-2005]

§ 149-43. Right of entry.

Upon presentation of proper credentials, duly authorized representatives of the municipality may enter at reasonable times upon any property within the municipality to inspect the condition of the stormwater structures and facilities in regard to any aspect regulated by this chapter.

§ 149-44. Notification.

In the event that a person fails to comply with the requirements of this chapter, or fails to conform to the requirements of any permit issued hereunder, the municipality 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 violations. Failure to comply within the time specified shall subject such person to the penalty provisions of this chapter. All such penalties shall be deemed cumulative and resort by the municipality from pursuing any and all remedies. It shall be the responsibility of the owner 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 chapter.

§ 149-45. Enforcement.

The municipal governing body is hereby authorized and directed to enforce all of the provisions of this chapter. All inspections regarding compliance with the drainage plan shall be the responsibility of the Municipal Engineer or other qualified persons designated by the municipality.

- A. A set of design plans approved by the municipality shall be on file at the site throughout the duration of the construction activity. Periodic inspections may be made by the municipality 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 § 149-4 of the Code on any property, except as provided for in the approved drainage plan and pursuant to the requirements of this chapter. It shall be unlawful to alter or remove any control structure required by the drainage plan pursuant to this section or to allow the property to remain in a condition which does not conform to the approved drainage plan.
- C. At the completion of the project, and as a prerequisite for the release of the performance guarantee, the owner or his representatives shall:
 - (1) Provide a certification of completion from an engineer, architect, surveyor or other qualified person verifying that all permanent facilities have been constructed according

to the plans and specifications and approved revisions thereto.

- (2) Provide a set of as-built (record) drawings.
- D. After receipt of the certification by the municipality, a final inspection shall be conducted by the Municipal Engineer or designated representative to certify compliance with this chapter.
 - E. Prior to revocation or suspension of a permit, the governing body will schedule a hearing to discuss the noncompliance if there is no immediate danger to life, public health or property. The expense of a hearing shall be the owner's responsibility.
 - F. Suspension and revocation of permits.
 - (1) Any permit issued under this chapter may be suspended or revoked by the governing body for:
 - (a) Noncompliance with or failure to implement any provision of the permit.
 - (b) A violation of any provision of this chapter or any other applicable law, 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, or as outlined in this chapter of the Code.
 - (2) A suspended permit shall be reinstated by the governing body when:
 - (a) The Municipal Engineer or his 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 governing body is satisfied that the violation of the Code, law, or rule and regulation has been corrected.
 - (3) A permit that has been revoked by the governing body cannot be reinstated. The applicant may apply for a new permit under the procedures outlined in this chapter.
 - G. Occupancy permit. An occupancy permit shall not be issued unless the certification of completion pursuant to § 149-43C has been secured. The occupancy permit shall be required for each lot owner and/or developer for all subdivisions and land development in the municipality.

§ 149-46. Public nuisance.

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

§ 149-47. Violations and penalties.

- A. Anyone violating the provisions of this chapter shall be guilty of a summary offense and, upon conviction, shall be subject to a fine of not more than \$500 for each violation, recoverable with costs, or imprisonment of not more than 30 days, or both. Each day that the violation continues shall be a separate offense.
- B. In addition, the municipality, through its Solicitor, may institute injunctive mandamus or any other appropriate action or proceeding at law or in equity for the enforcement of this chapter. 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.

§ 149-48. Appeals.

- A. Any person aggrieved by any action of the municipality or its designee may appeal to the municipality's governing body within 30 days of that action.
- B. Any person aggrieved by any decision of the municipality's governing body may appeal to the County Court of Common Pleas in the County where the activity has taken place within 30 days of the municipal decision.

Appendix A

ORDINANCE APPENDIX "A"

Prepared By:
Township Solicitor
Address
Phone

Return To:
Township Solicitor
Address
Phone

Property Address:
Bern Township
Berks County, Pennsylvania

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

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

WITNESSETH

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

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

WHEREAS, the Stormwater Controls and BMP Operations and Maintenance Plan
approved by the Municipality (hereinafter referred to as the "Plan") for the property identified
herein, which is attached hereto as Appendix A and made part hereof, as approved by the
Municipality, provides for management of stormwater within the confines of the Property
through the use of Best Management Practices (BMPs); and

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

WHEREAS, for the purposes of this agreement, the following definitions shall apply:
BMP - "Best Management Practice;" activities, facilities, designs, measures or
procedures used to manage stormwater impacts from land development, to protect and maintain

water quality and groundwater recharge and to otherwise meet the purposes of the Municipal Stormwater Management Ordinance, including but not limited to infiltration trenches, seepage pits, filter strips, bioretention, wet ponds, permeable paving, rain gardens, grassed swales, forested buffers, sand filters and detention basins.

- Infiltration Trench - A BMP surface structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer.
- Seepage Pit - An underground BMP structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer.
- Rain Garden - A BMP overlain with appropriate mulch and suitable vegetation designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or underground aquifer.

WHEREAS, the Municipality requires, through the implementation of the Plan, that ~~stormwater management BMPs as required by said Plan and the Municipal Stormwater Management Ordinance~~ be constructed and adequately operated and maintained by the Landowner, his successors and assigns.

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

1. The BMPs shall be constructed by the Landowner in accordance with the plans and specifications identified in the Plan.
2. The Landowner shall operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality and in accordance with the specific maintenance requirements noted on the Plan.
3. The Landowner, his successors and assigns, hereby grants permission to the Municipality, his authorized agents and employees, upon presentation of proper identification, to enter upon the Property at reasonable times, and to inspect the BMPs whenever the Municipality deems necessary. Whenever possible, the Municipality shall notify the Landowner prior to entering the Property. The purpose of the inspection is to assure safe and proper functioning of the BMPs. The inspection shall cover the entire facilities, berms, outlet structures, pond areas, access roads, etc. When inspections are conducted by the Municipality, the Municipality shall give the Landowner, his successors and assigns, copies of the inspection report with findings and evaluations.
4. All reasonable costs for said inspections by the Municipality shall be born by the Landowner and payable to the Municipality.
5. The Landowner shall convey to the municipality easements and/or rights-of-way to assure access for periodic inspections by the municipality and maintenance, if required.

6. Landowner shall continuously and perpetually maintain the BMPs in accordance with the conditions of approval, the Plan, and with manufacturers specifications, including but not limited to:

(a) Inspections of all BMPs shall be completed annually by a civil engineer licensed in the Commonwealth of Pennsylvania. A written inspection report prepared by the civil engineer shall be submitted to the Municipality by July 31st of each year. The report shall identify the condition of the BMPs, repairs and maintenance performed during the year and/or required, any previously unreported incidents of malfunctions or potential pollution events during the year, and any cleanup required, and any other pertinent information to properly ascertain that the BMPs are functioning properly and in accordance with the design and approved Plan. The report shall include a certification by the civil engineer that the facilities are functioning and will continue to function properly as aforesaid.

(b) All materials collected by the BMPs, including but not limited to oil and sediment, shall be disposed of in accordance with state, federal, and any other applicable regulations. The annual report shall include a list of all materials disposed and certification of regulatory compliance with disposal requirements.

(c) Should the BMPs not function properly or adequately, the Municipality shall be notified by the Landowner in writing within ten (10) days of the discovery of the malfunction and of the maintenance, repairs or modifications which the Landowner proposed to undertake to resolve the malfunction or inadequacy. All maintenance, repairs or modifications shall be made in accordance with the specifications of the manufacturer or designer of the BMPs. If a repair or modification is made in a manner which is not within manufacturer or designer specifications, said repair or modification shall be approved in writing by the manufacturer or designer, and a copy of the approval shall be filed with the Municipality. The proposed maintenance, repairs, or modifications must be completed within thirty (30) days of discovery of the malfunction or inadequacy, or immediately upon discovery if the malfunction or inadequacy poses a threat to the public health or safety.

(d) The Municipality reserves the right to require the Landowner to install and maintain additional BMPs (such as an oil absorbent hydrophobic boom, etc.) if the facilities do not function to assure the quality of the stormwater leaving the storm water management facility.

7. In the event the Landowner fails to operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality, the Municipality or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s). This provision shall not be construed to allow the Municipality to erect any permanent structure on the land of the Landowner. It is expressly understood and agreed that the Municipality is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Municipality.

8. The Landowner, his successors and assigns, will perform maintenance in accordance with the maintenance schedule for the BMP(s) including sediment removal as outlined on the approved schedule and/or Subdivision/Land Management Plan.

9. In the event the Municipality, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like on account of the Landowner's or his successors' and assigns' failure to perform such work, the Landowner, his successors and assigns, shall reimburse the Municipality upon demand, within 10 days of receipt of invoice thereof, for all costs incurred by the Municipality hereunder. If not paid within said 10-day period, the Municipality may enter a lien against the property in the amount of such costs, or may proceed to recover its costs through proceedings at law or in equity.

10. The Landowner, his successors and assigns, shall indemnify the Municipality and his agents and employees against any and all damages, accidents, casualties, occurrences or claims which might arise or be asserted against the Municipality for the construction, presence, existence or maintenance of the BMP(s) by the Landowner, his successors and assigns.

11. In the event a claim is asserted against the Municipality, his agents or employees, the Municipality shall promptly notify the Landowner, his successors and assigns, and they shall defend, at their own expense, any suit based on such claim. If any judgment or claims against the Municipality, his agents or employees shall be allowed, the Landowner, his successors and assigns shall pay all costs and expenses in connection therewith.

12. In the advent of an emergency or the occurrence of special or unusual circumstances or situations, the Municipality may enter the Property, if the Landowner is not immediately available, without notification or identification, to inspect and perform necessary maintenance and repairs, if needed, when the health, safety or welfare of the citizens is at jeopardy. However, the Municipality shall notify the landowner of any inspection, maintenance, or repair undertaken within 5 days of the activity. The Landowner shall reimburse the Municipality for its costs, within 10 days of receiving an invoice for same.

This Agreement shall be recorded among the land records of Berks County, Pennsylvania and shall constitute a covenant running with the Property and/or equitable servitude, and shall be binding on the Landowner, and his or its administrators, executors, heirs, assigns, and any other successors in interests, in perpetuity.

ATTEST:

WITNESS the following signatures and seals:

For the Municipality:
TOWNSHIP OF BERN,
Berks County, Pennsylvania

By: _____
Name:
Title:

Attest: _____

For the Landowner:

_____ (SEAL)

Attest: _____

COMMONWEALTH OF PENNSYLVANIA:

COUNTY OF BERKS :

On this, the ____ day of _____, 200__, before me, the undersigned officer, personally appeared _____, who acknowledged himself to be the _____ of the Township of Bern, a municipal corporation, and that he as such _____, being authorized to do so, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by himself as _____.

IN WITNESS WHEREOF, I hereunder set my hand and official seal.

Notary Public

COMMONWEALTH OF PENNSYLVANIA :

: ss.

COUNTY OF BERKS :

On this, the ____ day of _____, 200__, before me, the undersigned officer, personally appeared _____ and _____, known to me (or satisfactorily proven) to be the persons whose names are subscribed to the within instrument, and acknowledged that they executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I hereunder set my hand and official seal.

Notary Public

Appendix B

**ORDINANCE APPENDIX B -
STORMWATER MANAGEMENT DESIGN CRITERIA**

TABLE B-1
DESIGN STORM RAINFALL AMOUNT (INCHES)
Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F" May 1986.

FIGURE B-1
SCS RAINFALL DISTRIBUTION - S CURVE
Source: NRCS (SCS) TR-55

FIGURE B-2
PENNDOT STORM INTENSITY-DURATION-FREQUENCY CURVE
REGION 4
Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F" May 1986.

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-1
Design Storm Rainfall Amount (Inches)

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

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

Design Storm Frequency (years)	24 Hours Rainfall Amount (inches) Region 4
1	2.40
2	3.00
5	3.60
10	4.56
25	5.52
50	6.48
100	7.44

**<<FIGURE B-1>>
<<NRCS (SCS) TYPE II RAINFALL DISTRIBUTION>>**

Figure B-1 SCS 24-hour rainfall distributions

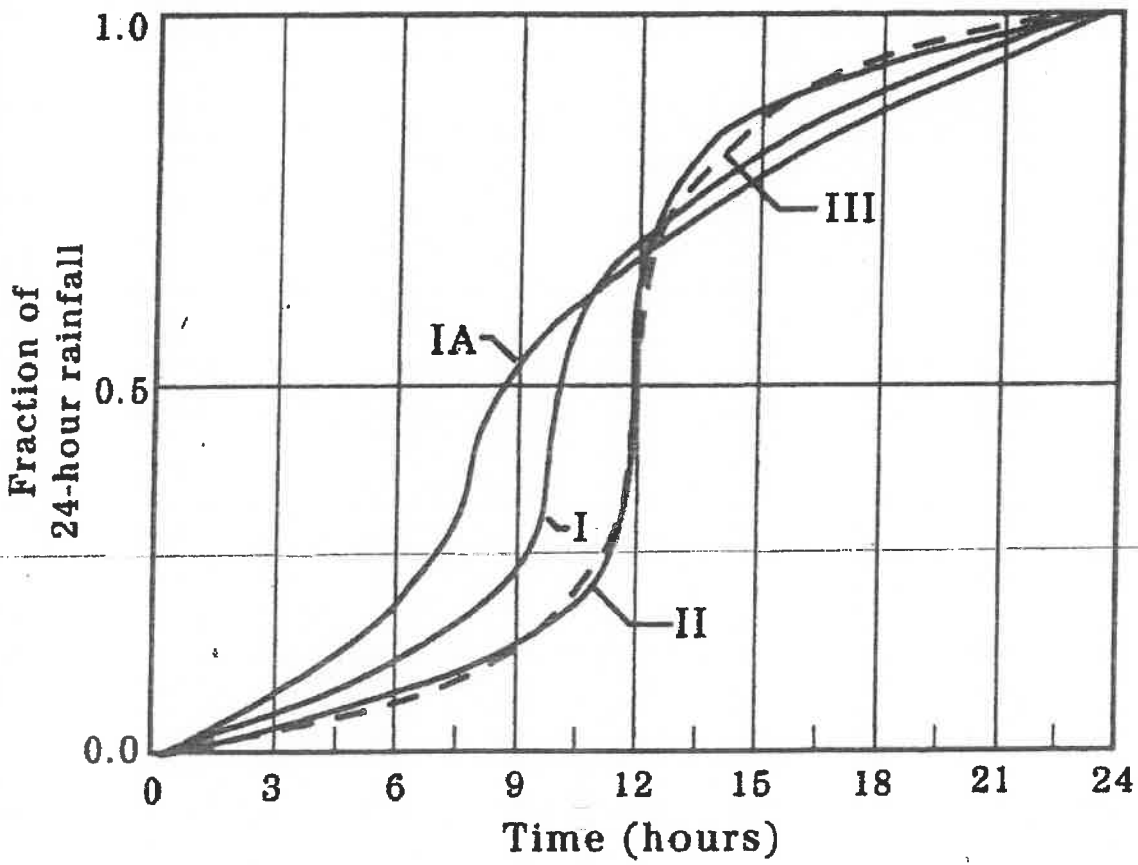


TABLE B-2 Runoff Curve Numbers

Table 2-2a Runoff curve numbers for urban areas ^{1/}

Cover description Cover type and hydrologic condition	Average percent impervious area ^{2/}	Curve numbers for hydrologic soil group			
		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) ^{3/} :					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ^{4/}		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	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
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation) ^{5/}					
		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

¹ Average runoff condition, and $I_a = 0.2S$.

² The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

³ CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

⁴ Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

⁵ Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands ^{1/}

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment ^{2/}	Hydrologic condition ^{3/}	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

¹ Average runoff condition, and $I_a=0.2S$

² Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

³ Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good $\geq 20\%$), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands ^{1/}

Cover type	Cover description	Hydrologic condition	Curve numbers for hydrologic soil group			
			A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. ^{2/}		Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.		—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. ^{3/}		Poor	48	67	77	83
		Fair	35	56	70	77
		Good	30 ^{4/}	48	65	73
Woods—grass combination (orchard or tree farm). ^{5/}		Poor	57	73	82	86
		Fair	43	65	76	82
		Good	32	58	72	79
Woods. ^{6/}		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	30 ^{4/}	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.		—	59	74	82	86

^{1/} Average runoff condition, and $I_a = 0.2S$.

^{2/} *Poor*: <50% ground cover or heavily grazed with no mulch.

Fair: 50 to 75% ground cover and not heavily grazed.

Good: > 75% ground cover and lightly or only occasionally grazed.

^{3/} *Poor*: <50% ground cover.

Fair: 50 to 75% ground cover.

Good: >75% ground cover.

^{4/} Actual curve number is less than 30; use CN = 30 for runoff computations.

^{5/} CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

^{6/} *Poor*: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.

Fair: Woods are grazed but not burned, and some forest litter covers the soil.

Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands ^{1/}

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition ^{2/}	A ^{3/}	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

¹ Average runoff condition, and $I_{a_s} = 0.2S$. For range in humid regions, use table 2-2c.

² Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: > 70% ground cover.

³ Curve numbers for group A have been developed only for desert shrub.

REGION 4

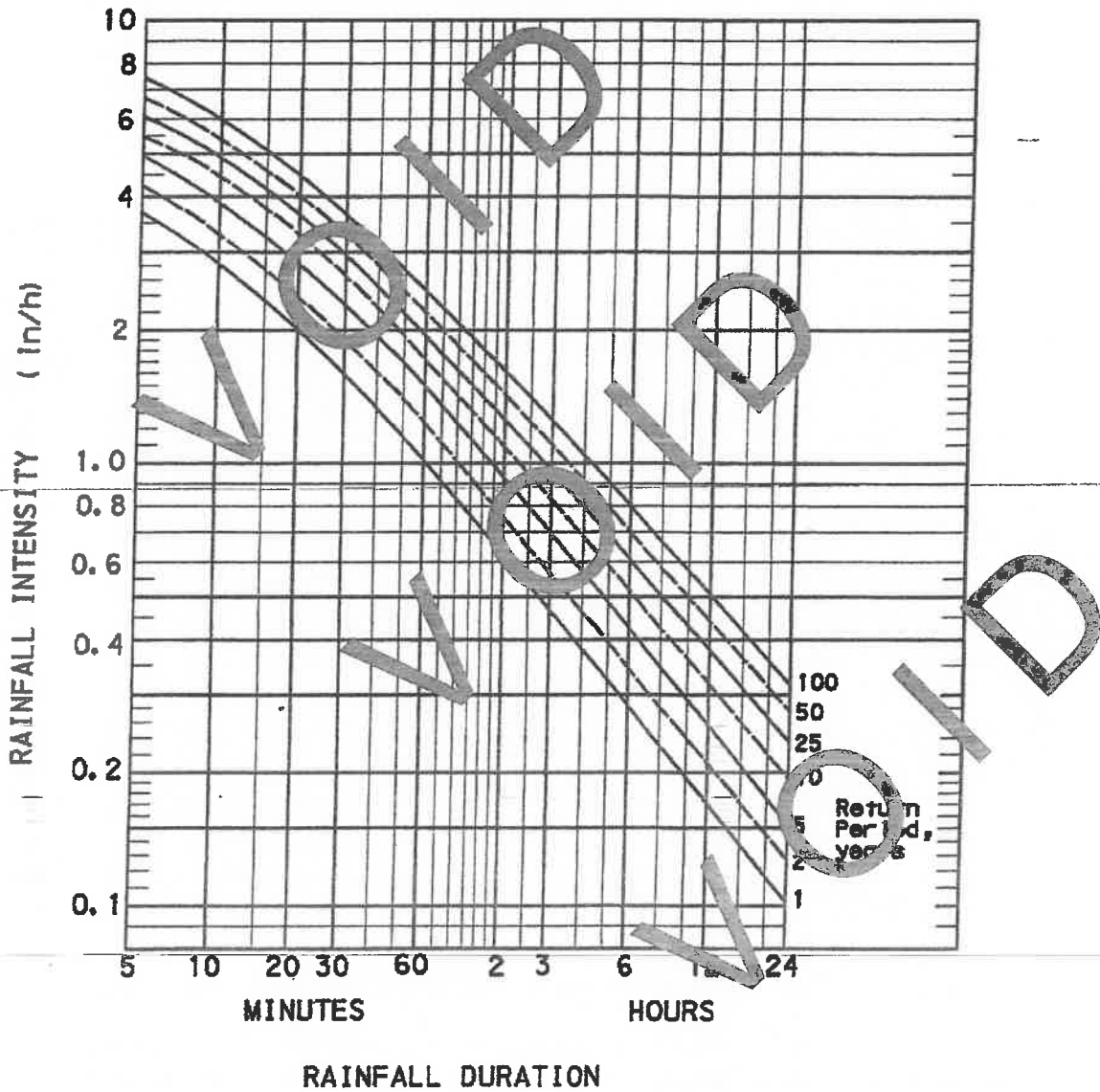


FIGURE 10.2. (ENGLISH)
STORM INTENSITY DURATION FREQUENCY
CURVES FOR REGION 4

TABLE B-3
RATIONAL RUNOFF COEFFICIENTS
By Hydrologic Soils Group and Overland Slope (%)

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 Land	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
	0.14 ^b	0.18	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 Lot Size 1/8 Acre	0.25	0.28	0.31	0.27	0.30	0.33	0.30	0.33	0.38	0.33	0.36	0.42
	0.33	0.37	0.40	0.35	0.39	0.44	0.38	0.42	0.49	0.41	0.45	0.54
Lot Size 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
Lot Size 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
Lot Size 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
Lot Size 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	0.71	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	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87
	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97

^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. Wong and R.H. McCuen, 1981, "Comparison of Urban Flood Frequency Procedures", Preliminary Draft, U.S. Department of Agriculture, Soil Conservation Service, Baltimore, MD.

**TABLE B-4
MANNING ROUGHNESS COEFFICIENTS**

**Roughness Coefficients (Manning's "n") For Overland / Sheet Flow
(From U.S. Army Corps of Engineers & NRCS TR-55)**

<u>Surface Description</u>	<u>n</u>
Dense Growth	0.4 -
Pasture	0.3 -
Lawns	0.2 -
Bluegrass Sod	0.2 -
Short Grass Prairie	0.5 -
	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 -
Fallow (no residue)	0.05
Cultivated Soils	
Residue Cover Less Than or = 20%	0.06
Residue Cover Greater Than 20%	0.17
Grass	
Dense Grasses	0.24
Bermuda Grass	0.41
Range (natural)	0.13
Woods (Light Underbrush)	0.40

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

<u>Reach Description</u>	<u>n</u>
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*	

*depending upon type, coating and diameter

FIGURE B-3
Recommendation Chart for Infiltration Stormwater Management BMP's in Carbonate Bedrock

SITE RISK FACTORS		CARBONATE BEDROCK											
		2 to 4 Feet				Over 4 Feet to 8 Feet				Over 8 Feet			
Geology Type	Effective Soil Thickness	Low Buffer	Medium Buffer	High Buffer	Low Buffer	Medium Buffer	High Buffer	Low Buffer	Medium Buffer	High Buffer	Low Buffer	Medium Buffer	High Buffer
Special Geologic Features*	Lowest than 2 Feet	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary
DESIGN FACTORS	Lowest/Highest Buffer	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%
	(Unacceptable)	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%
DESIGN FACTORS	Medium Buffer	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%
	(Acceptable)	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%	100 - 30%
PROGRAM SUBRARY GUIDANCE**		RECOMMENDED				RECOMMENDED				NOT RECOMMENDED			

* Special Geologic Feature Buffer widths are as follows:

Low Buffer is less than 50 feet

Medium Buffer is 50 feet to 100 feet

High Buffer is greater than 100 feet

** Rates greater than 50% not recommended.

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

1 Infiltration systems may be allowed at the determination of the Engineer and/or Geologist, provided that a Detailed Site Investigation is undertaken which confirms nature of rock, location of Special Geologic Features, and adequacy of the buffer between the SGP and the proposed stormwater system(s).

2 In these Special Geologic Features: Low Buffer situations, infiltration systems may be allowed at the determination of the Engineer and/or Geologist, provided that a Detailed Site Investigation is undertaken and a 25 foot buffer from SGFs is maintained.

Appendix C

**ORDINANCE APPENDIX C -
DRAINAGE PLAN APPLICATION AND FEE SCHEDULE**
(Application and Fee Schedule shall be per the Bern Township land subdivision
plan or development plan review application or minor land subdivision plan
review application.)

VOID Appendix D

VOID
APPENDIX D -
TULPEHOCKEN CREEK SCHUYLKILL RIVER STORMWATER
MANAGEMENT DISTRICT WATERSHED MAPS

VOID
FIGURE D-1
TULPEHOCKEN CREEK MANAGEMENT DISTRICTS MAP

VOID
FIGURE D-2
SCHUYLKILL RIVER MANAGEMENT DISTRICTS MAP

Appendix E

ORDINANCE APPENDIX E LOW IMPACT DEVELOPMENT (LID) PRACTICES

ALTERNATIVE APPROACH FOR MANAGING STORMWATER RUNOFF

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

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

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

- **Preserving Natural Drainage Features.** Protecting natural drainage features, particularly vegetated drainage swales and channels, is desirable because of their ability to infiltrate and attenuate flows and to filter pollutants. However, this objective is often not accomplished in land development. In fact, commonly held drainage philosophy encourages just the opposite pattern -- streets and adjacent storm sewers typically are located in the natural headwater valleys and swales, thereby replacing natural drainage functions with a completely impervious system. As a result, runoff and pollutants generated from impervious surfaces flow directly into storm sewers with no opportunity for attenuation, infiltration, or filtration. Developments designed to fit site topography also minimizes the amount of grading on site.

- **Protecting Natural Depression Storage Areas.** Depressional storage areas have no surface outlet, or drain very slowly following a storm event. They can be commonly seen as ponded areas in farm fields during the wet season or after large runoff events. Traditional development practices eliminate these depressions by filling or draining, thereby obliterating their ability to reduce surface runoff volumes and trap pollutants. The volume and release-rate characteristics of

depressions should be protected in the design of the development site. The depressions can be protected by simply avoiding the depression or by incorporating its storage as additional capacity in required detention facilities.

- **Avoiding introduction of impervious areas.** Careful site planning should consider reducing impervious coverage to the maximum extent possible. Building footprints, sidewalks, driveways and other features producing impervious surfaces should be evaluated to minimize impacts on runoff.
- **Reducing the Hydraulic Connectivity of Impervious Surfaces.** Impervious surfaces are significantly less of a problem if they are not directly connected to an impervious conveyance system (such as storm sewer). Two basic ways to reduce hydraulic connectivity are routing of roof runoff over lawns and reducing the use of storm sewers. Site grading should promote increasing travel time of stormwater runoff, and should help reduce concentration of runoff to a single point in the development.
- **Routing Roof Runoff Over Lawns.** Roof runoff can be easily routed over lawns in most site designs. The practice discourages direct connections of downspouts to storm sewers or parking lots. The practice also discourages sloping driveways and parking lots to the street. By routing roof drains and crowning the driveway to run off to the lawn, the lawn is essentially used as a filter strip.
- **Reducing the Use of Storm Sewers.** By reducing use of storm sewers for draining streets, parking lots, and back yards, the potential for accelerating runoff from the development can be greatly reduced. The practice requires greater use of swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a "reasonable" time. The practice requires educating local citizens and public works officials, who expect runoff to disappear shortly after a rainfall event.
- **Reducing Street Widths.** Street widths can be reduced by either eliminating on-street parking or by reducing roadway widths. Municipal planners and traffic designers should encourage narrower neighborhood streets which ultimately could lower maintenance.
- **Limiting Sidewalks to One Side of the Street.** A sidewalk on one side of the street may suffice in low-traffic neighborhoods. The lost sidewalk could be replaced with bicycle/recreational trails that follow back-of-lot lines. Where appropriate, backyard trails should be constructed using pervious materials.
- **Using Permeable Paving Materials.** These materials include permeable interlocking concrete paving blocks or porous bituminous concrete. Such materials should be considered as alternatives to conventional pavement surfaces, especially for low use surfaces such as driveways, overflow parking lots, and emergency access roads.

- **Reducing Building Setbacks.** Reducing building setbacks reduces driveway and entry walks and is most readily accomplished along low-traffic streets where traffic noise is not a problem.
- **Constructing Cluster Developments.** Cluster developments can also reduce the amount of impervious area for a given number of lots. The biggest savings is in street length, which also will reduce costs of the development. Cluster development clusters the construction activity onto less-sensitive areas without substantially affecting the gross density of development.

In summary, a careful consideration of the existing topography and implementation of a combination of the above mentioned techniques may avoid construction of costly stormwater control measures. Other benefits include reduced potential of downstream flooding, water quality degradation of receiving streams/water bodies and enhancement of aesthetics and reduction of development costs. Beneficial results include more stable baseflows in receiving streams, improved groundwater recharge, reduced flood flows, reduced pollutant loads, and reduced costs for conveyance and storage.

Appendix F

ORDINANCE APPENDIX F
West Nile Virus Guidance

(This source is from the Monroe County, PA Conservation District who researched the potential of West Nile Virus problems from BMPs due to a number of calls they were receiving)

Monroe County Conservation District Guidance:
Stormwater Management and West Nile Virus
Source: Brodhead McMichaels Creeks Watershed Act 167 Stormwater Management Ordinance 2/23/04

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 non-point 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 outweigh their potential to become breeding grounds for mosquitoes.

Appendix G

ORDINANCE APPENDIX G REFERENCES

BMP Manuals

California

California Stormwater BMP Handbook: New Development and Redevelopment (January 2003) – separate file available at <http://www.cabmphandbooks.org/Development.asp>

Georgia

Georgia Stormwater Management Manual Volume 2: Technical Handbook (August 2001) separate file (<http://www.georgiastormwater.com/>)

Maryland

2000 Maryland Stormwater Design Manual –

[http://www.mde.state.md.us/Programs/Waterprograms/SedimentandStormwater/stormwater design/index.asp](http://www.mde.state.md.us/Programs/Waterprograms/SedimentandStormwater/stormwater%20design/index.asp)

Massachusetts

Stormwater Management, Volume Two: Stormwater Technical Handbook (Massachusetts, 1997) – separate file available at

<http://www.state.ma.us/dep/brp/stormwtr/stormpub.htm>

Minnesota

Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates (July 2001) –

<http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm>

New Jersey

Revised Manual for New Jersey: Best Management Practices for Control of Non-point Source Pollution from Stormwater (Fifth Draft May 2000) –

<http://www.state.nj.us/dep/watershedmgt/bmpmanual.htm>

New York

New York State Stormwater Management Design Manual (2001) –

<http://www.dec.state.ny.us/website/dow/swmanual/swmanual.html>

Pennsylvania

Pennsylvania Association of Conservation Districts, Pennsylvania Handbook of Best Management Practices for Developing Areas, November 14, 1997.

Pennsylvania Department of Environmental Protection, Pennsylvania Stormwater Best Management Practices Manual, December 30, 2006 –

<http://www.depweb.state.pa.us/watershedmgmt/cwp/view.asp?a=1437&Q=518682&PM=1>

Washington

Stormwater Management Manual for Western Washington (August 2001) –
<http://www.ecv.wa.gov/programs/wq/stormwater/manual.html>

Federal

Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring (FHWA) – <http://www.fhwa.dot.gov/environment/ultraurb/3fs1.htm>

USEPA Infiltration Trench Fact Sheet (September 1999) –
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/post.cfm>

Riparian Buffer References

Alliance for the Chesapeake Bay, Pennsylvania Department of Environmental Protection, September 2000. *Forest Buffer Toolkit*, Stream ReLeaf Program.

Penn State College of Agricultural Sciences, 1996. *Establishing Vegetative Buffer Strips Along Streams to Improve Water Quality*. Publication # AGRS-67.

Fike, Jean, June 1999. *Terrestrial & Palustrine Plant Communities of Pennsylvania*, Pennsylvania Natural Diversity Inventory, The Nature Conservancy, Western Pennsylvania Conservancy, and Pennsylvania Department of Conservation and Natural Resources.

Pennsylvania Association of Conservation Districts, Inc., Keystone Chapter, Soil and Water Conservation Society, Pennsylvania Department of Environmental Protection, Natural Resources Conservation Service, 1998. *Pennsylvania Handbook of Best Management Practices for Developing Areas*. Prepared by CH2MHill.

Palone, R. S. and A. H. Todd (eds), 1997. *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers*. Chesapeake Bay Program and Northeastern Area State and Private Forestry. Natural Resources Conservation Service Cooperative State Research Education and Extension Services.

The Federal Interagency Stream Restoration Working Group (FISRWG, 10/1998). *Stream Corridor Restoration Principles, Processes, and Practices*. GPO Item No. 0120-A; SuDocs No. A57.6/2:EN3/PT.653. ISBN-0-934213-59-3. Published October 1998. Revised August 2000.

Appendix H

APPENDIX H

**SIMPLIFIED APPROACH TO
STORMWATER MANAGEMENT
FOR SMALL PROJECTS**

[Faint, illegible text follows, likely bleed-through from the reverse side of the page.]

**Simplified Approach to
Stormwater Management
for Small Projects**

Handbook

Errata Notes:

The following corrections are noted for Figure 6:

1. Label for BMP #1 Cistern – should read "(166 Gallons)"
2. Label for BMP #2 Infiltration Trench – should read "(20'L x 3'W x 3.5'D)"

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Bern Township, Berks County

Revised Date: *[date]*

STORMWATER MANAGEMENT PROCEDURES FOR MEETING THE SIMPLIFIED APPROACH REQUIREMENTS

Introduction

This Handbook has been developed to allow homeowners or applicants for small projects to comply with stormwater management requirements of the Stormwater Management Ordinance of the Municipality, including sizing, designing, locating and installing on-lot measures, referred to herein as "Best Management Practices" (BMPs). Only projects that meet the size thresholds specified in the Municipality's Stormwater Management Ordinance may use this Simplified Approach and are then not required to submit a formal Stormwater Management Site plan to the Municipality. However, these projects are still required to address certain requirements, such as stormwater quality, infiltration, rate and volume management goals as outlined in this Simplified Approach Handbook.

Pennsylvania Act 167 (PA Stormwater Management Act) was authorized on October 4, 1978 (32 P.S., P.E. 864) and gave Pennsylvania Municipalities the power to regulate activities that affect flooding, streambank erosion, stormwater runoff and surface and groundwater quantity and quality. The Municipality's Stormwater Management Ordinance was prepared to comply with the PA Act 167 requirements and includes provisions allowing this Simplified Approach to be used for small projects as specified in their Ordinance.

If the guidelines presented in this Handbook are followed, the applicant may not require professional engineering services to comply with these stormwater management goals. This Handbook is organized into five sections:

- Section 1 describes requirements and a simplified approach for designing a suitable BMP, and a description of what needs to be included on the simplified stormwater management (SWM) site plan (i.e. sketch plan).
- Section 2 presents definitions of key terms.
- Section 3 presents options of BMPs that can be considered for on-lot stormwater management.
- Section 4 illustrates an example of how to obtain the size and dimensions of a BMP(s) for a sample project.
- Section 5 describes the requirements to be met for a "Simplified Approach Operation, Maintenance and Inspection Plan and Agreement".

The Simplified Approach requires:

- The applicant to submit the following to the Municipality for review and approval prior to beginning construction:
 - A Simplified Stormwater Management (SWM) Site Plan (i.e. sketch plan), and accompanying Worksheet, and
 - A completed and signed "Simplified Approach Operation, Maintenance and Inspection Plan and Agreement".

1. Determination of Simplified Approach Volume Requirements

All proposed impervious areas (as required by the Municipality's Ordinance) must be included in the determination of the amount of new impervious areas and the size of proposed BMPs needed to manage stormwater. Proposed impervious areas on an individual residential lot generally include, but are not limited to: roof area, pavement, sidewalks, driveways, patios, porches, permanent pools, or parking areas, etc. See the definitions provided in Section 2 and check with the Township to confirm what features of the proposed project must be included in the calculation of new impervious areas. Sidewalks, driveways, or patios that are constructed with gravel or pervious pavers and will not be disturbed or altered in the future may not need to be included in this calculation (check with the Township). In these cases, the amount of proposed impervious area may be reduced for proposed driveways, patios, and sidewalks through the use of gravel, pervious pavement, and turf pavers. All proposed impervious areas must be constructed so that runoff is conveyed to a BMP(s); no runoff may be directed to storm sewers, inlets or other impervious areas (i.e. street) without effective stormwater management from a site.

In addition, the use of low impact development is recommended to further minimize the effect of the new construction on water, land, and air. Low impact development is a method of development that incorporates design techniques that include: minimizing the amount of land disturbance, reducing the amount of impervious cover, disconnecting gutters and directing stormwater runoff to vegetated areas to infiltrate, and redirecting the flow of stormwater runoff from impervious surfaces to vegetated areas instead of the street or gutter.

Below are the steps that must be undertaken to meet the Ordinance requirements. The size and description of the proposed construction as well as important aspects related to the design of the BMP(s) must be documented in the Simplified Approach Worksheet found in Table 4. All individuals planning on using the Simplified Approach are encouraged to review the planned project with the Township prior to initiating the Simplified Approach to confirm the following:

- That the proposed project is not otherwise exempt from the stormwater management control and engineered Stormwater Management Site Plan requirements of the Municipality's Stormwater Management Ordinance;
- That the proposed project size is within the range eligible to use this Simplified Approach;
- To determine which components of the proposed project must be included in the calculation of "impervious areas"; and
- Whether any local conditions are known to the Township that would preclude the use of any of the techniques included in this Simplified Approach.

Step 1 - Prepare the Simplified SWM Site Plan (i.e. sketch plan) that includes:

- Name and address of the owner of the property, and name and address of individual preparing the plan (if different than the property owner), along with the date of submission.
- Location of all existing structures including buildings, driveways, and roads within fifty (50) feet of the project site.

For Rain Barrels/Cisterns:

Step 3A - Select the proposed impervious area value in Column 1 of Table 1 that is closest to, but not less than the determined value.

Step 3B - Determine the volume that needs to be provided in cubic feet and gallons to satisfy the volume requirements using Columns 2 and 3 in Table 1.

For Rain Gardens/Bioretenion or Dry Well #1:

Step 3A - Select the proposed impervious area value in Column 1 of Table 2 that is closest to, but not less than the determined value.

Step 3B - Determine the volume that needs to be provided in cubic feet to satisfy the volume requirements using Column 2 in Table 2.

Step 3C - Using the value from Column 2 determined above, and the depth (D) of the proposed BMP, simply determine the surface area needed from Column 3 of Table 2.

Note: The arrows under Column 3 in Table 2 indicate which range of depths is appropriate for each BMP. To determine the depth based on the area, select an area that corresponds to the required volume, and is closest to, but not more than the area to be used. To determine the area based on the depth, select a depth that is closest to, but not less than the depth that is to be used.

For Infiltration Trench or Dry Well #2:

Step 3A - Select the proposed impervious area value in Column 1 of Table 3 that is closest to, but not less than the determined value.

Step 3B - Determine the volume that needs to be provided in cubic feet to satisfy the volume requirements using Column 2 in Table 3.

Step 3C - Using the value from Column 2 determined above, and the depth (D) of the proposed BMP, simply determine the surface area needed from Column 3 of Table 3.

Note: The arrows under Column 3 in Table 3 indicate which range of depths is appropriate for each BMP. To determine the depth based on the area, select an area that corresponds to the required volume, and is closest to, but not less than the area to be used. To determine the area based on the depth, select a depth that is closest to, but not less than the depth that is to be used.

Step 4 - Submit the final SWM Site Plan, Simplified Approach Worksheet, and signed and notarized "Simplified Approach Operation, Maintenance and Inspection Plan and Agreement" (a sample document is provided in the accompanying appendix) to the Municipality for review and approval prior to beginning construction. After the Municipality has signed the "Simplified Approach Operation, Maintenance and Inspection Plan and Agreement", record the Agreement at the County's Office of Recorder of Deeds. Construction can begin only after the Municipality has issued its approval of the proposed project to the applicant.

Table 2: Simplified Approach - Calculating Rain Garden/Bioretenation and Dry Well #1 Storage Volume and Surface Area for 1 Inch Rainfall

Total Proposed Impervious Area (square feet)	Volume of Rain Garden/Bioretenation or Dry Well #1 (cubic feet)	Surface Area of Rain Garden/Bioretenation or Dry Well #1 (square feet)									
		Area Required for a BMP with a Depth (D) of 0.5'	Area Required for a BMP with a Depth (D) of 1.0'	Area Required for a BMP with a Depth (D) of 1.5'	Area Required for a BMP with a Depth (D) of 2.0'	Area Required for a BMP with a Depth (D) of 2.5'	Area Required for a BMP with a Depth (D) of 3.0'	Area Required for a BMP with a Depth (D) of 3.5'	Area Required for a BMP with a Depth (D) of 4.0'		
	V	A (sf)									
50	4	8	4	3	2	2	1	1	1	1	
100	8	17	8	6	4	3	3	2	2	2	
150	13	25	13	8	6	5	4	4	3	3	
200	17	33	17	11	8	7	6	5	4	4	
250	21	42	21	14	10	8	7	6	5	4	
300	25	50	25	17	13	10	8	7	6	5	
350	29	58	29	19	15	12	10	8	7	6	
400	33	67	33	22	17	13	11	10	8	7	
450	38	75	38	25	19	15	13	11	10	8	
500	42	83	42	28	21	17	14	13	11	9	
550	46	92	46	31	23	18	15	14	12	10	
600	50	100	50	33	25	20	17	15	13	11	
650	54	108	54	36	27	22	18	17	14	13	
700	58	117	58	39	29	23	20	18	15	14	
750	63	125	63	42	31	25	22	19	17	15	
800	67	133	67	44	33	27	23	21	18	16	
850	71	142	71	47	35	28	24	22	19	17	
900	75	150	75	50	38	30	25	24	20	18	
950	79	158	79	53	40	32	26	25	21	19	
999	83	167	83	56	42	33	28	26	23	20	

It is assumed that the rain garden/bioretenation or the dry well #1 are empty prior to receiving runoff (i.e. 0% full)

Table-4: Simplified Approach Worksheet

Name of Property Owner(s):		Date:		
Name of Applicant(s) [if different than Owner(s)]:				
Contact Phone #:		Email Address:		
Address of Project:				
Description of Project:				
Met with Township to discuss proposed project. [insert date of meeting]				
Distance from earth disturbance to nearest surface water feature (stream, pond, wetland, etc.) (if required by the Municipality, circle one): 50 feet or less More than 50 feet				
<input type="checkbox"/> Step 1: Attach Simplified SWM Site Plan (i.e. sketch plan), per Section 1, Step 1				
Step 2: Determine the Impervious Area to be Managed				
Total Proposed Impervious Area (square feet):				
Total Earth Disturbance (square feet):				
Step 3: Select the BMP(s) to be Used and Appropriate Sizing Criteria				
Rain Barrel or Cistern				
Proposed Impervious Surface from Column 1 in Table 1	Volume from Column 3 in Table 1			
Rain Garden/Bioretenion or Dry Well #1				
Proposed Impervious Surface from Column 1 in Table 2	Volume of BMP from Column 2 in Table 2	Area Dimensions of BMP - Column 3 in Table 2	Depth of BMP from Column 3 in Table 2	Types of Materials to be Used
Infiltration Trench or Dry Well #2				
Proposed Impervious Surface from Column 1 in Table 3	Volume of BMP from Column 2 in Table 3	Area Dimensions of BMP - Column 3 in Table 3	Depth of BMP from Column 3 in Table 3	Types of Materials to be Used
<input type="checkbox"/> Step 4: Complete, Sign & have Operation, Maintenance and Inspection Plan and Agreement Notarized and Recorded at the County Recorder of Deeds (when signed by Municipality)				

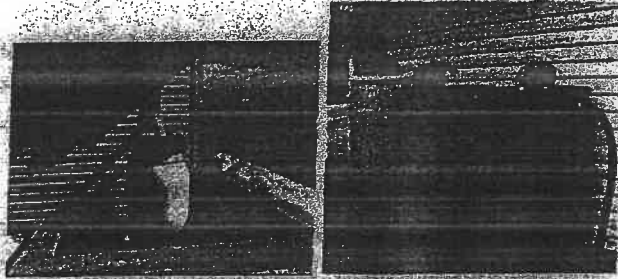
Note: For additional BMPs, use additional sheet(s).

Potable - A water supply that is either absent of contaminants or contains contaminant levels that are below a given threshold level that makes the water as suitable for drinking.

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

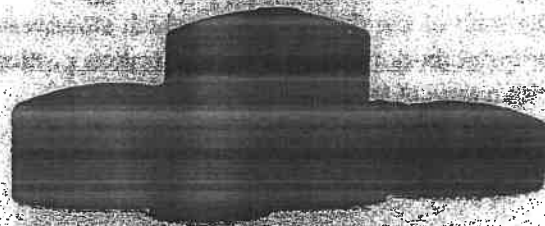
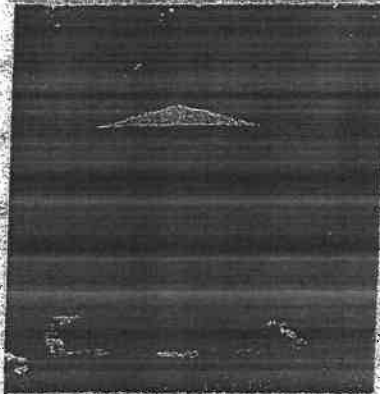
Stormwater - Drainage runoff from the surface of the land resulting from precipitation, or snow or ice melt.

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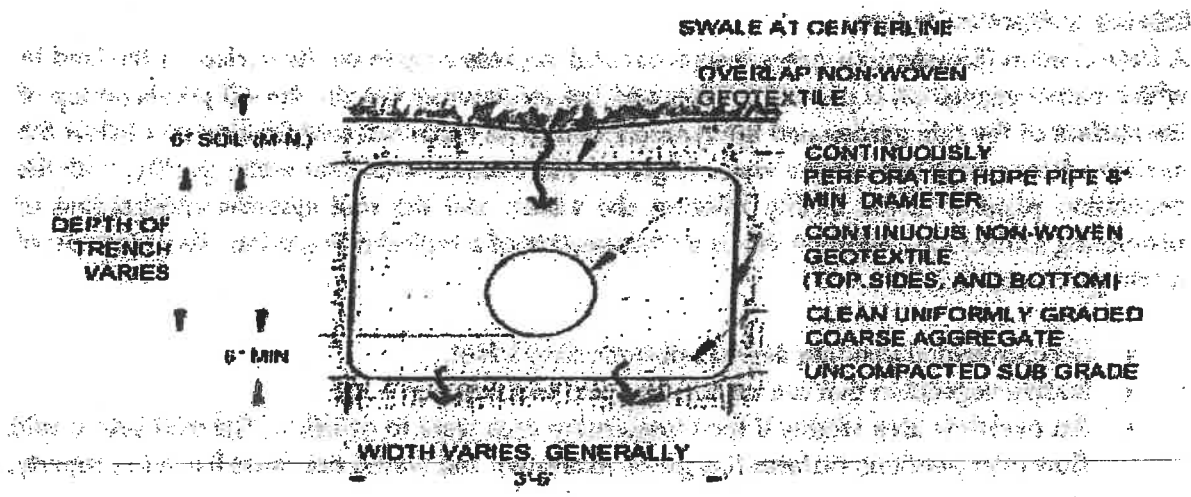
Source (picture on left): <http://www.rfcity.org/Env/Stormwater/YourProperty/YourProperty.htm>
Source (picture on right): <http://www.floridata.com/news/transplantsgardener/Rainbarrels.cfm>

Figure 1: Rain Barrels



Source (for both pictures): Pennsylvania Stormwater BMP Manual (PADEP, 2006)

Figure 2: Cisterns



Source: Pennsylvania Stormwater BMP Manual (PADEP, 2006)

Figure 3: Cross-Section of Typical Infiltration Trench

Dry Wells

A dry well, also referred to as a seepage pit, is a subsurface storage facility that temporarily stores and infiltrates runoff from the roofs of buildings or other impervious surfaces. A dry well can be either a structural prefabricated chamber (Dry Well #1) or an excavated pit filled with stone fill (Dry Well #2). Dry Wells discharge the stored runoff via infiltration into the surrounding or underlying soils. Figure 5 shows a typical prefabricated dry well and a typical dry well configuration with stone fill. The following elements shall be incorporated into all dry well designs:

- These facilities should be located a minimum of ten (10) feet (or as otherwise required by the Municipality) from the building foundation to avoid foundation seepage problems, and are not recommended if their installation would create a risk of flooding other structures constructed at or below grade.
- Dry well should be constructed after all earth disturbance associated with a given project or site is stabilized to avoid clogging.
- During construction, compaction of the subgrade soil in the bottom of the dry well should be avoided, and construction should be performed only with light machinery.
- For Dry Well #2 designs, the depth of dry well should be between 1.5 feet to 4 feet. Gravel fill should consist of uniformly graded stone with an average diameter of between one and one half and two (1.5–2.0) inches with the gravel fill wrapped in a nonwoven geotextile to separate the stone fill from the surrounding soil.
- At least 1 foot of soil must be placed over the top of the dry well.
- Dry wells should be inspected at least four (4) times annually as well as after large storm events.
- Dry wells should have overflow pipes to allow high volumes of runoff to overflow the facility and flow into a connected infiltration area, pervious area, or other connected storm sewer designed to receive the excess runoff.
- Every dry well must have at least one monitoring well to assist in the inspection of the dry well to determine how much water is retained within the well during dry weather periods.
- Infiltration testing is recommended to ensure the underlying soil is capable of infiltrating the needed volume of stormwater.

4. Example

Simplified Approach to Stormwater Management for a Residential Garage and Driveway addition

Joe Homeowner wants to build a 400 square foot two car garage, and a 540 square foot (30' long x 18' wide) impervious driveway that is graded so that the stormwater runoff drains to the grassy area along one edge of the driveway. (An annotated copy of Table 1 is provided below as Table 5 and an annotated copy of Table 3 is provided below as Table 6, and outlines the steps of this example) and a completed Table 4 is provided as Table 7.

STEP 1 – Make a sketch of the site plan as shown in Figure 6.

STEP 2 – Determine the total area of all proposed impervious surfaces to drain to each BMP:

Garage Roof (Front)	10 ft. x 20 ft.	=	200 sq. ft.
Garage Roof (Rear)	10 ft. x 20 ft.	=	200 sq. ft.
Driveway	30 ft. x 18 ft.	=	540 sq. ft.
Total Proposed Impervious Surface			940 sq. ft.
Total Proposed Earth Disturbance Area			2,500 sq. ft. (estimated)

Note: If the driveway used pervious pavement (i.e. paving blocks), then the total impervious area would only be 400 square feet, and no stormwater management practices would need to control runoff from the project.

STEP 3 – Select the BMP(s) to be Used and Appropriate Sizing Criteria

Select a BMP or combination of BMPs from Section 3 to be used to satisfy the volume requirement. Determine the length, width, depth and other requirements for the BMPs in Section 3. A BMP needs to be placed to catch runoff from the back of the garage, and a BMP needs to be placed to capture runoff from the front of the garage and the driveway. Figure 6 shows the direction the runoff flows and the locations where the BMPs are to be placed.

Joe Homeowner would like to use a rain barrel (BMP #1) to capture the runoff from the rear of the garage and an infiltration trench (BMP #2) to capture runoff from the front of the garage and the driveway.

BMP #1 (Rain Barrel/Cistern) – Steps 3A and 3B

facility by reading the depth from the column heading at the top of the table. Therefore, the depth of the trench would need to be 3 feet.

Selected BMPs:

- BMP #1: Rain barrel(s) that provides for at least 166 gallons, and**
- BMP #2: A 20' long x 3' wide x 3' deep infiltration trench**

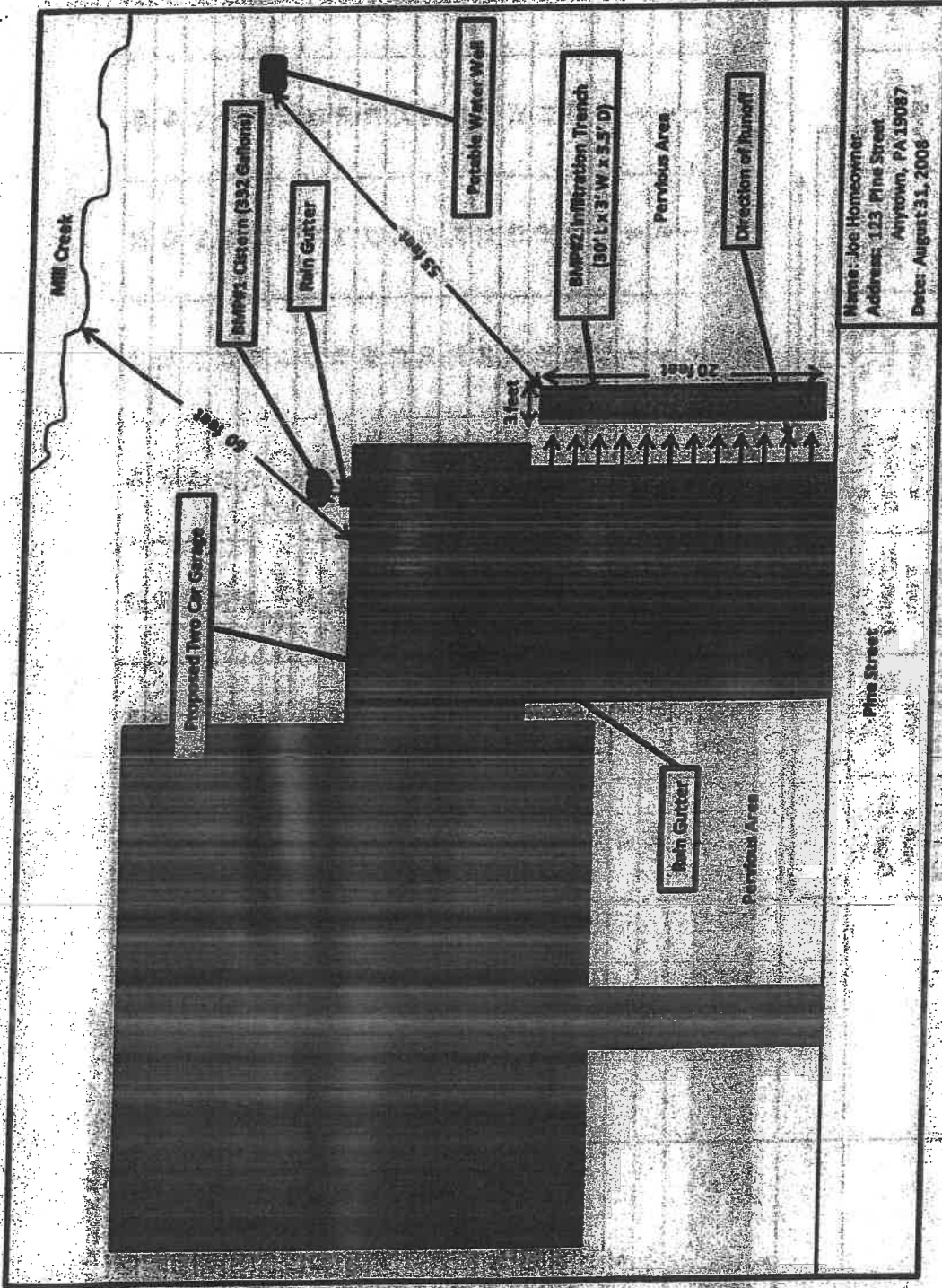


Figure 6: Example of Simplified Stormwater Management Site Plan for Joe Homeowner

Table 7: Simplified Approach Worksheet – Example for Joe Homeowner

Name of Property Owner(s): Joe Homeowner		Date: 8/26/12		
Name of Applicant(s) [if different than Owner(s)]: N/A				
Contact Phone #: 610-555-1234		Email Address: joe@homeowner.com		
Address of Project: 123 Pine St, Anytown, PA 19355				
Description of Project: Add a 2-car garage and driveway				
Met with Municipal Engineer to discuss proposed project. [date of meeting 6/1/12]				
Distance from earth disturbance to nearest surface water feature (stream, pond, wetland, etc.) (if required by the Municipality, circle one): 50 feet or less More than 50 feet				
<input checked="" type="checkbox"/> Step 1: Attach Simplified SWM Site Plan (i.e. sketch plan), per Section .1, Step 1				
Step 2: Determine the Impervious Area to be Managed				
Total Proposed Impervious Area (square feet): 940 sq. feet				
Total Earth Disturbance (square feet): ~ 2,500 sq. feet				
Step 3: Select the BMP(s) to be Used and Appropriate Sizing Criteria				
Rain Barrel or Cistern				
Proposed Impervious Surface from Column 1 in Table 1	Volume from Column 3 in Table 1			
200 sq. feet	166 gallons			
Rain Garden/Bioretenention or Dry Well #1				
Proposed Impervious Surface from Column 1 in Table 2	Volume of BMP from Column 2 in Table 2	Area Dimensions of BMP - Column 3 in Table 2	Depth of BMP from Column 3 in Table 2	Types of Materials to be Used
N/A				
Infiltration Trench or Dry Well #2				
Proposed Impervious Surface from Column 1 in Table 3	Volume of BMP from Column 2 in Table 3	Area Dimensions of BMP - Column 3 in Table 3	Depth of BMP from Column 3 in Table 3	Types of Materials to be Used
740 sq. feet	156 cubic feet	20 ft by 3 ft	3 ft	Infiltration trench, uniformly graded aggregate, 8" HDPE pipe, geotextile, grass planted on top.
<input checked="" type="checkbox"/> Step 4: Complete, Sign & have Operation, Maintenance and Inspection Agreement Notarized and Recorded at the County Recorder of Deeds (when signed by the Municipality)				

Note: For additional BMPs, use additional sheet(s).

Appendix H.3
Simplified Approach – Stormwater Best Management Practices Operation, Maintenance, and Inspection Plan and Agreement

SAMPLE AGREEMENT

...

**STORMWATER BEST MANAGEMENT PRACTICES
OPERATION, MAINTENANCE, AND INSPECTION PLAN AND
AGREEMENT**

THIS AGREEMENT, made and entered into this _____ day of _____, 20____, by and between _____, (hereinafter the "Landowner"), and _____ (City, Borough, Township), Berks County, Pennsylvania, (hereinafter "Municipality")

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property by virtue of a deed of conveyance recorded in the land records of Berks County, Pennsylvania, at Deed Book _____ and Page _____ (hereinafter "Property"); and

WHEREAS, the Landowner recognizes that the stormwater management best management practices or BMPs (hereinafter referred to as "BMP" or "BMP(s)") located on the Property at _____

_____ (address of Property where BMP is located) must be inspected and maintained; and

WHEREAS, the Municipality and the Landowner, for itself and for its administrators, executors, successors, heirs, and assigns, agree that the health, safety, and welfare of the residents of the Municipality and the protection and maintenance of water quality require that on-site BMP(s) be constructed and maintained on the Property; and

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

BMP - "Best Management Practice;" activities, facilities, designs, measures or procedures used to manage stormwater impacts from land development, to protect and maintain water quality and ground water recharge and to otherwise meet the purposes of the Municipality's Stormwater Management Ordinance, including, but not limited to infiltration trenches, dry wells, bioretention, rain gardens, permeable paving, rain barrels and cisterns, etc. The BMP(s) are permanent appurtenances to the Property; and

2. Bioretention/Rain Garden

- a. Any debris, such as leaves blocking flow from reaching a bioretention/rain garden, is to be routinely removed.
- b. Pruning and weeding are required as needed including removal of invasive species, especially while vegetation is being established for a bioretention/rain garden.
- c. Mulch cover is to be maintained in a bioretention/rain garden, re-spread and replaced as needed to prevent erosion, reduce weed growth and assist with plant survival, without restricting the infiltration of stormwater.
- d. At least twice a year the Landowner is to inspect the bioretention/rain garden for sediment buildup, ground cover and vegetative conditions and make any repairs as needed.
- e. Watering is required as needed, including during periods of extended dry weather and drought.
- f. Trees and shrubs in a bioretention/rain garden are to be inspected at least twice per year by the Landowner to evaluate their health. If they are in poor health they are to be replaced.

3. Dry Wells

- a. Dry wells are to be inspected by the landowner at least four (4) times a year and after significant rainfalls, and debris, trash, sediment, and any other waste material need to be removed and disposed of at suitable disposal or recycling sites and in compliance with local, state, and federal waste regulations.
- b. For dry wells, gutters are to be regularly cleaned out and ensure that proper connections are maintained to facilitate the effectiveness of the dry well.
- c. The filter screen for downspouts or roof gutters which intercepts roof runoff and conveys it to the dry well must be cleaned and replaced as necessary.
- d. Dry wells that are damaged are to be fixed or replaced within two (2) weeks of being damaged.
- e. If an intermediate sump box exists in conjunction with a dry well, it must be cleaned out at least once per year.

4. Rain Barrels and Cisterns

- a. Rain Barrels and Cisterns are to be cleared of debris routinely at least every three (3) months and after significant storms to allow stormwater from gutters to enter them.
- b. Gutters that directly convey rain water to dry wells, rain barrels, and cisterns are to be routinely cleared of trash and debris at least every three (3) months and after significant rainfall events.
- c. Rain Barrels and cisterns should be routinely emptied to allow for storage of additional rain water.
- d. Overflow outlets from rain barrels and cisterns must be kept free and clear of debris.
- e. Rain Barrels and cisterns that are damaged are to be fixed or replaced within two (2) weeks of being damaged.

Landowner agrees that the Municipality or its representatives may, in addition to and not in derogation or diminution of any remedies available to it under the Stormwater Ordinance or other statutes, codes, rules or regulations, or this Agreement, enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s). It is expressly understood and agreed that the Municipality is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Municipality.

7. In the event the Municipality, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality for all expenses (direct and indirect) incurred within [] days of delivery of an invoice from the Municipality. Failure of the Landowner to make prompt payment to the Municipality may result in enforcement proceedings, which may include the filing of a lien against the Property, which filing is expressly authorized by the Landowner.

NOTE TO EDITOR: Municipality must insert appropriate number of days. Municipality may, at its option, delete the language requiring Landowner to reimburse the Municipality.

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

9. The Landowner, its executors, administrators, assigns, heirs, and other successors in interests, hereby release and shall release the Municipality, its employees, agents and designated representatives from all damages, accidents, casualties, occurrences or claims which might arise or be asserted against the Municipality and/or its said employees, agents or representatives, arising out of the construction, presence, existence, or maintenance of the BMP(s) either by the Landowner or Municipality. In the event that a claim is asserted or threatened against the Municipality, its employees, agents or designated representatives, the Municipality shall notify the Landowner and the Landowner shall defend, at his own expense, any claim, suit, action or proceeding, or threatened claim, suit, action or proceeding against the Municipality or, at the request of the Municipality, pay the cost, including attorneys' fees, of defense of the same undertaken on behalf of the Municipality. If any judgment or claims against the Municipality, its employees, agents or designated representatives shall be allowed, the Landowner shall pay all damages, judgments or claims and any costs and expenses incurred by the Municipality, including attorneys fees, regarding said damages, judgment or claims.

10. The Municipality may enforce this Agreement in accordance with its Stormwater Ordinance, at law or in equity, against the Landowner for breach of this Agreement. Remedies may include fines, penalties,

bearing date of the _____ day of _____, 20__, has acknowledged the same before me
in my said County and State.

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

NOTARY PUBLIC

(SEAL)

BERN TOWNSHIP STORMWATER APPLICATION

Application is hereby made for review of the Stormwater facilities submitted herewith and more particularly described below:

1. Name Applicant(s): _____

Address: _____

Phone No. _____

2. Name of Owner(s): _____

(If other than Applicant)

Address: _____

Phone No. _____

3. Applicant's interest, if other than owner _____

4. Location of Parcel _____

5. Engineer or Surveyor responsible for plan: _____

Address: _____

Phone No. _____

6. Total Acreage: _____ Number of Lots: _____

7. Lot Use Proposed _____ Single Family _____ Commercial _____
 _____ Two Family _____ Industrial _____
 _____ Townhouse _____ Other(specify) _____
 _____ Multi-Family _____

8. Size of proposed structure: _____

Filing Fee Amount _____ Received _____

Signature of Applicant _____

FOR TOWNSHIP USE ONLY

<input type="checkbox"/> Exempt	<input type="checkbox"/> Small Project	<input type="checkbox"/> Other										
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Total Parcel Size</th> <th style="width: 50%;">Impervious Area Exemption (sq.ft.)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0 to <0.125 ac</td> <td style="text-align: center;">500 sq. ft.</td> </tr> <tr> <td style="text-align: center;">0.125 to <0.5 ac</td> <td style="text-align: center;">1,500 sq. ft.</td> </tr> <tr> <td style="text-align: center;">0.5 to <1 ac</td> <td style="text-align: center;">3,250 sq. ft.</td> </tr> <tr> <td style="text-align: center;">≥1 ac</td> <td style="text-align: center;">5,000 sq. ft.</td> </tr> </tbody> </table>	Total Parcel Size	Impervious Area Exemption (sq.ft.)	0 to <0.125 ac	500 sq. ft.	0.125 to <0.5 ac	1,500 sq. ft.	0.5 to <1 ac	3,250 sq. ft.	≥1 ac	5,000 sq. ft.	<p>> Impervious Area Exemption and <1 ac. Disturbance*</p> <p>Application Fee \$75 \$500 escrow required</p>	<p>>5,000 Ft² Impervious Area or >1 ac. Disturbance*</p> <p>Application Fee \$250 \$1,000 escrow required</p>
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0 to <0.125 ac	500 sq. ft.											
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0.5 to <1 ac	3,250 sq. ft.											
≥1 ac	5,000 sq. ft.											
<p>Application Fee \$25 No escrow required</p>												

***NOTE: If greater than 5,000 Ft² of disturbance, Berks County Conservation District approval of an Erosion and Sedimentation Control Plan is required.**