STORMWATER MANAGEMENT ORDINANCE

Implementing the Requirements of the

Dauphin County Stormwater Management Plan

ORDINANCE NO. 2010-89

MIDDLE PAXTON TOWNSHIP, DAUPHIN COUNTY, PENNSYLVANIA

Adopted at a Public Meeting Held on

January 3, 2011

Amended May 2, 2014 - #2014-02

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ARTICLE I- GENERAL PROVISIONS

Section 101. Short Title

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

Section 102. Statement of Findings

The governing body of Middle Paxton Township 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 upstream and downstream communities, reduces groundwater recharge and threatens public health and safety, and increases non-point source pollution of water resources.

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

C. Inadequate planning and management of stormwater runoff resulting from land development and redevelopment throughout a watershed can also harm surface water resources by changing the natural hydrologic patterns; accelerating stream flows (which increase scour and erosion of streambeds and stream banks thereby elevating sedimentation); destroying aquatic habitat; and elevating aquatic pollutant concentrations and loadings such as sediments, nutrients, heavy metals, and pathogens. Groundwater resources are also impacted though loss of recharge.

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

E. Public education on the control of pollution from stormwater is an essential component in successfully addressing stormwater issues.

F. 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).

G. Non-stormwater discharges to municipal separate storm sewer systems can contribute to pollution of Waters of the Commonwealth.

Section 103. Purpose

The purpose of this Ordinance is to promote health, safety and welfare within Middle Paxton Township, Dauphin County, by minimizing the harms and maximizing the benefits described in Section 102 of this Ordinance through provisions intended to:

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

B. Manage accelerated runoff and erosion and sedimentation problems close to their source, by regulating activities that cause these problems.

C. Preserve the natural drainage systems to the maximum extent practicable

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

E. Maintain existing flows and quality of streams and watercourses.

F. Preserve and restore the flood-carrying capacity of streams and prevent scour and erosion of stream banks and streambeds.

G. Manage stormwater impacts close to the runoff source, with a minimum of structures and a maximum use of natural processes.

H. Provide procedures, performance standards, and design criteria for stormwater planning and management.

I. Provide proper operations and maintenance of all temporary and permanent stormwater management facilities and Best Management Practices (BMPs) that are constructed and implemented.

J. Provide standards to meet the NPDES permit requirements.

Section 104. Statutory Authority

A. Primary Authority:

Middle Paxton Township is empowered to regulate these activities by the authority of the Act of October 4, 1978 P.L. 864 (Act 167), 32 P.S. § 680.1 et seq., as amended, the "Storm Water Management Act", and the Second Class Township Code, 53 P.S. § 65101 et seq.

B. Secondary Authority:

Middle Paxton Township also is empowered to regulate land use activities that affect runoff by the authority of the Act of July 31, 1968, P.L. 805, No. 247, 53 P.S. § 10101 et seq., as amended, "The Pennsylvania Municipalities Planning Code."

Section 105. Applicability

This Ordinance shall apply to all areas of Middle Paxton Township, any Regulated Activity within Middle Paxton Township, and all stormwater runoff entering into Middle Paxton Township's separate storm sewer system from lands within the boundaries of Middle Paxton Township.

Earth disturbance activities and associated stormwater management controls are also regulated under existing state law and implementing regulations. This Ordinance shall operate in coordination with those parallel requirements; the requirements of this Ordinance shall be no less restrictive in meeting the purposes of this Ordinance than state law.

"Regulated Activities" are any earth disturbance activities or any activities that involve the alteration or development of land in a manner that may affect stormwater runoff. "Regulated Activities" include, but are not limited to, the following listed items:

A. Earth Disturbance Activities
B. Land development
C. Subdivision
D. Construction of new or additional impervious or semi-pervious surfaces
E. Construction of new buildings or additions to existing buildings
F. Diversion or piping of any natural or man-made stream channel
G. Installation of stormwater management facilities or appurtenances thereto
H. Installation of stormwater BMPs

See Section 302 of this Ordinance for Exemption/Modification Criteria.

Section 106. Repealer

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

Section 107. Severability

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

Section 108. Compatibility with Other Ordinance Requirements

Approvals issued and actions taken pursuant to this Ordinance do not relieve the Applicant of the responsibility to comply with or to secure required permits or approvals for activities regulated by any other applicable codes, laws, rules, statutes or ordinances. To the extent that this Ordinance imposes more rigorous or stringent requirements for stormwater management, the specific requirements contained in this Ordinance shall be followed.

Section 109. Duty of Persons Engaged in the Development of Land

Notwithstanding any provision(s) of this Ordinance, including exemptions, any landowner or any person engaged in the alteration or development of land which may affect stormwater runoff characteristics shall implement such measures as are reasonably necessary to prevent injury to health, safety, or other property. Such measures also shall include actions as are required to manage the rate, volume, direction, and quality of resulting stormwater runoff in a manner which otherwise adequately protects heath, property, and water quality.

ARTICLE II-DEFINITIONS

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

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

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

C. The word "person" includes an individual, firm, association, organization, partnership, trust, company, corporation or any other similar entity.

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

E. The words "used or occupied" include the words "intended, designed, maintained, or arranged to be used, occupied or maintained".

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

Agricultural Activities – Activities associated with agriculture such as agricultural cultivation, agricultural operation, and animal heavy use areas. This includes the work of producing crops, tillage, land clearing, plowing, disking, harrowing, planting, harvesting crops, or pasturing and

raising of livestock and installation of conservation measures. Construction of new buildings or impervious area is not considered an Agricultural Activity.

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; changing of surface conditions by causing the surface to be more or less impervious; land disturbance.

Applicant - A landowner, developer, or other person who has filed an application for approval to engage in any Regulated Activities at a Project Site within Middle Paxton Township.

Best Management Practices (BMPs) – 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: "non-structural" or "structural". "Non-structural" BMPs are measures referred to as operational and/or behavior-related practices that attempt to minimize the contact of pollutants with stormwater runoff whereas "structural" BMPs are measures 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 wet 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.

BMP Manual – The Pennsylvania Stormwater Best Management Practices Manual as published by the Department of Environmental Protection, Bureau of Watershed Management, document number: 363-03000-002, effective date: December 30, 2006, and as revised.

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 Dauphin County Conservation District (DCCD). The DCCD has the authority under a delegation agreement executed with the Department of Environmental Protection to administer and enforce all or a portion of the regulations promulgated under 25 PA Code Chapter 102.

Culvert - A structure with appurtenant works that carries a stream and/or stormwater runoff 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.

Design Storm - The magnitude and temporal distribution of precipitation from a storm event measured in probability of occurrence (e.g. a 25-year storm) and duration (e.g. 24-hours), used in the design and evaluation of stormwater management systems. Also see Return Period.

Designee - The agent of the municipal planning commission and/or agent of the governing body involved with the administration, review or enforcement of any provisions of this ordinance by contract or memorandum of understanding.

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 during or after a storm event into Waters of the Commonwealth at a controlled rate.

Developer – A person, partnership, association, corporation, or other entity, or any responsible person therein or agent thereof, that undertakes any Regulated Activity of this Ordinance.

Development Site – (Site) - The specific tract of land for which a Regulated Activity is proposed. Also see Project Site.

Disturbed Area – An un-stabilized 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 convey stormwater runoff including 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, drainage, or conveyance purposes.

Drainageway – Any natural or artificial watercourse, trench, ditch, pipe, swale, channel, or similar depression into which surface water flows.

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, excavation ns, embankments, land development, agricultural plowing or tilling, timber harvesting activities, road maintenance activities, mineral extraction, and the moving, depositing, stockpiling, or storing of soil, rock or earth materials.

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

Erosion and Sediment Pollution Control Plan - A plan which is designed to minimize accelerated erosion and sedimentation.

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

Existing Conditions - The initial condition of a Project Site prior to the proposed construction. If the initial condition of the site is not forested or undeveloped land, the land use shall be considered as "meadow" unless the natural land cover is documented to generate lower Curve Numbers or Rational "C" Coefficients, such as forested lands.

FEMA – The 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.

Flood Fringe – The remaining portions of the one hundred (100) year floodplain outside of the floodway boundary.

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 - mapped as being a special flood hazard area. Included are lands adjoining a river or stream that have been or may be inundated by a 100-year flood. Also included are areas that comprise Group 13 Soils, as listed in Appendix A of the Pennsylvania Department of Environmental Protection (DEP) Technical Manual for Sewage Enforcement Officers (as amended or replaced from time to time by DEP).

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

Forest Management/Timber Operations - Planning and activities necessary for the management of forestland. 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 high water 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.

Grade - A slope, usually of a road, channel or natural ground specified in percent and shown on plans as specified herein.

(To) Grade - to finish the surface of a roadbed, top of embankment or bottom of excavation.

Groundwater Recharge - Replenishment of existing natural underground water supplies.

HEC-HMS Model Calibrated – (Hydrologic Engineering Center Hydrologic Modeling System) A computer-based hydrologic modeling technique adapted to the watersheds in Dauphin County for the Act 167 Plan. The model has been calibrated by adjusting key model input parameters.

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

Hydrologic Soil Group (HSG) – infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into one of four HSG (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting. The Natural Resource Conservation Service (NRCS) of the US Department of Agriculture defines the four groups and provides a list of most of the soils in the United States and their group classification. The soils in the area of interest may be identified from a soil survey report from the local NRCS office or the Dauphin County Conservation District.

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

Infiltration Structures – A structure designed to direct runoff into the ground (e.g., french drains, seepage pits, seepage trench, etc.)

Inlet – A surface connection to a closed drain. A structure at the diversion end of a conduit. The upstream end of any structure through which water may flow.

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

Land Development (Development) - (i) the improvement of one lot or two or more contiguous lots, tracts or parcels of land for any purpose involving (a) a group of two or more 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; (ii) any subdivision of land; (iii) Development in accordance with Section 503(1.1) of the PA Municipalities Planning Code.

Limit of Disturbance – A line provided on the SWM Site Plan that indicates the total area to be disturbed during a proposed earth disturbance activity.

Main Stem (Main Channel) - Any stream segment or other runoff conveyance facility used as a reach in the Dauphin County Act 167 watershed hydrologic model(s).

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

Municipality – Middle Paxton Township, Dauphin County, Pennsylvania.

National Pollutant Discharge Elimination System (NPDES) – The federal government's system for issuance of permits under the Clean Water Act, which is delegated to DEP in Pennsylvania.

NOAA Atlas 14 – Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 2, US Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Hydrometeorological Desgin Studies Center, Silver Spring, Maryland (2004). NOAA's Atlas 14 can be accessed at Internet address: http://hdsc.nws.noaa.gov/hdsc/pfds/.

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

NRCS - Natural Resource Conservation Service (previously Soil Conservation Service (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 not under pressure.

Outfall – (i) Point where water flows from a conduit, stream, or drain; (ii) "Point Source" as described in 40 CFR § 122.2 at the point where the Municipality's storm sewer system discharges to surface Waters of the Commonwealth.

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

PADEP (DEP) – The Pennsylvania Department of Environmental Protection.

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.

Person – An individual, partnership, public or privates association or corporation, or a governmental unit, public utility or any other legal entity whatsoever which is recognized by law as the subject of rights and duties.

Pervious Area – Any area not defined as impervious.

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

Planning Commission – The Planning Commission of the Municipality.

Point Source – Any discernible, confined, or discrete conveyance, including, but not limited to: any pipe, ditch, channel, tunnel, or conduit from which stormwater is or may be discharged, as defined in State regulations at 25 PA Code § 92.1.

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

Project Site – The specific area of land where any Regulated Activities in the Municipality are planned, conducted, or maintained.

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

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

Redevelopment – Earth disturbance activities on land, which has previously been developed.

Regulated Activities – Any earth disturbance activities or any activities that involve the alteration or development of land in a manner that may affect stormwater runoff.

Regulated Earth Disturbance Authority - Activity involving Earth Disturbance subject to regulation under 25 PA Code, Chapter 92, Chapter 102, or the Clean Streams Law.

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

Release Rate District – Those subwatershed areas in which post-development flows must be reduced to a certain percentage of pre-development flows as required to meet the plan requirements and the goals of Act 167.

Retention Volume/Removed Runoff – The volume of runoff that is captured and not release directly into the surface Waters of this Commonwealth during or after a 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 probability of a 25-year storm occurring in any one given year is 0.04 (i.e. a 4% chance).

Riparian Buffer – A vegetated area bordering perennial and intermittent streams and wetlands, that serves as a protective filter to help protect streams and wetlands from the impacts of adjacent land uses.

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.

Road Maintenance – Earth disturbance activities within the existing road right-of-way, such as grading and repairing existing unpaved road surfaces, cutting road banks, cleaning or clearing drainage ditches, and other similar activities. Road maintenance activities that do not disturb the subbase of a paved road such as milling and pavement overlays are not considered earth disturbance activities.

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.

Runoff Capture Volume – The volume of runoff that is captured (retained) and not released into surface Waters of the Commonwealth during or after a storm event.

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

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

Sediment Pollution - The placement, discharge or any other introduction of sediment into Waters of the Commonwealth occurring from the failure to properly design, construct, implement or maintain control measures and control facilities in accordance with the requirements of this Ordinance.

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

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).

Spillway (Emergency) - A depression in the embankment of a pond or basin, or other overflow structure, that is used to pass peak discharge greater than the maximum design storm controlled by the pond or basin.

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 – including, but not limited to:

A. Each stream segment in Pennsylvania has a "designated use," such as "cold water fishery" or "potable water supply," which is listed in Chapter 93. These uses must be protected and maintained, under state regulations.

B. "Existing uses" are thus attained as of November 1975, regardless of whether they have been designated in Chapter 93. Earth Disturbance activities must be designed to protect and maintain existing uses and maintain the level of water quality necessary to protect those uses in all streams, and to protect and maintain water quality in special protection streams.

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

D. Protection and maintenance of water quality in special protection streams pursuant to 25 PA Code Chapter 93.

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 also 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, snow, or ice melt.

Stormwater Hotspot – A land use or activity that generates higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff.

Stormwater Management Facilities - 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 basins, wet ponds, open channels, storm sewers, pipes and infiltration structures.

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

Stormwater Management Site Plan (SWM Site Plan) - The plan prepared by the Applicant or his representative indicating how stormwater runoff will be managed at the Project Site in accordance with this Ordinance.

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

Subwatershed Area – The smallest drainage unit of a watershed for which stormwater management criteria has been established in the Stormwater Management Plan.

Subdivision - The division or re-division 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 {Pennsylvania Municipalities Planning Code, Act of July 31, 1968, P.L 805, No. 247}.

Swale - A low-lying stretch of land that 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.

USDA – The United States Department of Agriculture.

Watercourse – A channel or conveyance of surface water, such as a stream or creek, having defined bed and banks, whether natural or artificial, with perennial or intermittent flow.

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

Watershed – Region or area drained by a river, watercourse, or other surface water, whether natural or artificial.

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, and similar areas. (The term includes but is not limited to wetland areas listed in the State Water Plan, the United States Forest Service Wetlands Inventory of Pennsylvania, the Pennsylvania Coastal Zone Management Plan and a wetland area designated by a river basin commission. This definition is used by the United States Environmental Protection Agency and the United States Army Corps of Engineers.)

ARTICLE III - STORMWATER MANAGEMENT STANDARDS

Section 301. General Requirements

A. For all Regulated Activities, unless specifically exempted in Section 302:

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

2. No Regulated Activities shall commence until the municipality issues written approval of a SWM Site Plan, which demonstrates compliance with the requirements of this Ordinance.

3. The SWM Site Plan shall demonstrate that adequate capacity will be provided to meet the Volume and Rate Control Requirements, as described under Sections 303 and 304 of this Ordinance.

4. The SWM Site Plan approved by the municipality, shall be on-site throughout the duration of the Regulated Activities.

B. For all Regulated Earth Disturbance Activities, erosion and sediment control BMPs shall be designed, implemented, operated, and maintained during the Regulated Earth Disturbance Activities (e.g., during construction) to meet the purposes and requirements of this Ordinance and to meet all requirements under Title 25 of the Pennsylvania Code (including, but not limited to Chapter 102 Erosion and Sediment Control) and the Clean Streams Law. Various BMPs and their design standards are listed in the Erosion and Sediment Pollution Control Program Manual (E&S Manual), No. 363-2134-008 (April 15, 2000), as amended and updated.

C. For all Regulated Activities, stormwater BMPs shall be designed, installed, implemented, operated, and maintained to meet the purposes and requirements of this Ordinance and to meet all requirements under Title 25 of the Pennsylvania Code and the Clean Streams Law, conform to the State Water Quality Requirements, meet all requirements under the Storm Water Management Act and any more stringent requirements as determined by the municipality.

D. The municipality may, after consultation with PA DEP and/or DCCD, approve measures for meeting the State Water Quality Requirements other than those in this Ordinance, provided that they meet the minimum requirements of, and do not conflict with, state law including, but not limited to, the Clean Streams Law.

E. All Regulated Activities shall include, to the maximum extent practicable, measures to:

1. Protect health, safety, and property

2. Meet the water quality goals of this Ordinance by implementing measures to:

    a. Minimize disturbance to floodplains, wetlands, natural slopes, existing native vegetation and woodlands.

    b. Create, maintain, or extend riparian buffers and protect existing forested buffers.

    c. Provide trees and woodlands adjacent to impervious areas whenever feasible.

    d. Minimize the creation of impervious surfaces and the degradation of Waters of the Commonwealth and promote groundwater recharge.

    e. Protect natural systems and processes (drainageways, vegetation, soils, and sensitive areas) and maintain, as much as possible, the natural hydrologic regime.

    f. Incorporate natural site elements (wetlands, stream corridors, mature forests) as design elements.

    g. Avoid erosive flow conditions in natural flow pathways.

    h. Minimize soil disturbance and soil compaction.

    i. Minimize thermal impacts to Waters of the Commonwealth.

    j. Disconnect impervious surfaces by directing runoff to pervious areas wherever possible, and decentralize and manage stormwater at its source.

3. Applicants are encouraged to incorporate the techniques for Low Impact Development Practices described in the "Pennsylvania Stormwater Best Management Practices Manual (BMP Manual)" to reduce the costs of complying with the requirements of this Ordinance and the State Water Quality Requirements.

F. Impervious Areas:

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

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

3. For projects that add impervious area to a developed parcel, the new impervious area is subject to the requirements of this Ordinance; and any existing impervious area that is within the new proposed limit of disturbance is also subject to the requirements of this Ordinance.

G. If diffused flow is proposed to be concentrated and discharged onto adjacent property, the Applicant must document that adequate downstream conveyances 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. Applicant must provide an executed easement for newly concentrated flow across adjacent properties.

H. Stormwater drainage systems shall be provided in order to permit unimpeded flow along natural watercourses, except as modified by stormwater management facilities or open channels consistent with this Ordinance.

I. Where watercourses transverse a development site, drainage easements (with a minimum width of 20 feet) 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. Also, maintenance, including mowing of vegetation within the easement may be required, except as approved by the appropriate governing authority.

J. 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 by PA DEP under regulations at 25 PA Code Chapter 105 through the Joint Permit Application process, or, where deemed appropriate by PA DEP, through the General Permit process.

K. Any stormwater management facilities or any facilities that constitute water obstructions (e.g., culverts, bridges, outfalls, or stream enclosures, etc.) that are regulated by this Ordinance, that will be located in or adjacent to Waters of the Commonwealth (including wetlands), shall be subject to approval by PA DEP under regulations at 25 PA Code Chapter 105 through the Joint Permit Application process, or, where deemed appropriate by PA DEP, the General Permit process. When there is a question whether wetlands may be involved, it is the responsibility of the Applicant or his agent to show that the land in question cannot be classified as wetlands; otherwise, approval to work in the area must be obtained from PA DEP.

L. Should any stormwater management facility require a dam safety permit under PA DEP Chapter 105, the facility shall be designed in accordance with Chapter 105 and meet the regulations of Chapter 105 concerning dam safety which may be required to pass storms larger than 100-year event.

M. Any stormwater management facilities regulated by this Ordinance that would be located on State highway rights-of-way shall be subject to approval by the Pennsylvania Department of Transportation (PennDOT).

N. When stormwater management facilities are proposed within 1,000 feet of a downstream Municipality, the stormwater analysis shall be submitted to the downstream Municipal's engineer for review and comment.

O. 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.

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

Q. The design of facilities over karst shall include an evaluation and implementation of measures to minimize adverse effects.

R. Roof drains should not be directly connected to streets, sanitary or storm sewers or roadside ditches to prevent overload flow, and promoted 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.

Section 302. Exemptions/Modifications

A. Under no circumstance shall the Applicant be exempt from implementing such measures as necessary to:

1. Meet State Water Quality Standards and Requirements.
2. Protect health, safety, and property.
3. Meet special requirements for High Quality (HQ) and Exceptional Value (EV) watersheds.

B. The Applicant must demonstrate that the following BMPs are being utilized to the maximum extent practicable to receive consideration for the exemptions:

1. Design around and limit disturbance of Floodplains, Wetlands, Natural Slopes over 15%, existing native vegetation, and other sensitive and special value features.
2. Maintain riparian and forested buffers.
3. Limit grading and maintain non-erosive flow conditions in natural flow paths.
4. Maintain existing tree canopies near impervious areas.

5. Minimize soil disturbance and reclaim disturbed areas with topsoil and vegetation.
6. Direct runoff to pervious areas.

C. The Applicant must demonstrate that the proposed development/additional impervious area will not adversely impact the following:

1. Capacities of existing drainageways and storm sewer systems.
2. Velocities and erosion
3. Quality of runoff if direct discharge is proposed.
4. Existing known problem areas.
5. Safe conveyance of the additional runoff.
6. Downstream property owners.

D. An Applicant proposing Regulated Activities, after demonstrating compliance with Sections 302.A and 302.B may be exempted from the requirements of this Ordinance according to Table 1 below and the following conditions. If the applicant requests an exemption and meets all of the conditions below, the requirements of Section 302.C are assumed to be met.

1. MINIMUM SEPARATION

a. New impervious cover must be separated from the features listed in 302.D.1.b below by the minimum separation distances listed in Table 1.

b. Minimum separation distance is the shortest distance from the edge of the proposed new impervious cover, or roof drain discharge point, in the flow direction of runoff, to any of the following:

i. Perennial or intermittent streams or watercourses
ii. Swales or ditches
iii. Wetlands
iv. Lakes, ponds and other surface water bodies
v. Storm sewer or combined sewer systems
vi. Public roads
vii. Property lines
viii. Cropland, pasture land, manure storage areas and other agricultural land unless the area meets the requirements of 3.02.D.4.b below.
ix. Other features deemed relevant by the Municipal Governing Body

2. MULTIPLE IMPERVIOUS AREAS

a. If the proposed new impervious area receives runoff from an existing contiguous impervious area or contributes runoff to an existing contiguous impervious area, the total impervious area to be considered for this exemption shall be the new impervious area only.

b. If the existing and proposed new impervious are not contiguous, the total impervious area to be considered for this exemption shall be the new impervious area only. In this case, the total separation area may include the distance between the two impervious areas.

c. Separation from the features listed in Section 3.02.D.1.b shall be determined from the edge, or roof drain discharge, of either the existing or proposed new impervious area, whichever is most downslope.

d. The municipality reserves the right to consider existing conditions and runoff issues in determining the needed separation area under this section.

TABLE 1 – MINIMUM SEPARATION DISTANCES

New Impervious Area in Square Feet	**Minimum Separation Distance**	
	NO ROOF DRAIN	ROOF DRAIN
0-250	25	40
251-500	50	75
501-1,000	75	110
1,001-1,500	100	150
1,501-2,000	125	190
2,001-2,500	150	225
2,501-3,000	175	260
3,001-4,000	200	300
4,001-5,000	225	340
5,001 to 10,000	350	525
Where Middle Paxton Township believes that conditions present in the receiving area (slope, soil type, existing problems, etc.) warrant additional separation distance, Middle Paxton Township may request additional separation distance or require Stormwater management controls.		

3. DISCHARGE

a. With the exception of roof drains, runoff from the proposed new impervious cover may not be concentrated. Roof drains:

i. Must discharge to a stabilized separation area meeting the criteria in Table 1 and Section 3.02.D.4.

ii. May not discharge to concentrated flow areas.

b. Separation shall be determined from the roof drain discharge point, unless the discharge is to an impervious area. In this case the separation shall be determined from the edge of the impervious area.

4. SEPARATION AREA

a. The area separating the proposed new impervious discharge from any features such as those listed in Section 302.D.1.b must at all times meet the following criteria:

i. Be maintained in stable vegetative cover.

ii. Eroded areas in the separation area must be immediately repaired.

iii. No new impervious cover may be installed in the separation areas unless the requirements of this ordinance are met.

iv. Runoff in the separation area must be maintained as unconcentrated flow.

b. The separation area may contain cropland, pasture land, manure storage areas and other agricultural land provided the land is in compliance with Title 25 Chapter 102.4.a (relating to erosion and sediment pollution control on agricultural land) and Title 25 Chapter 91.36.a (relating to pollution control at agricultural operations) of The Pennsylvania Code.

5. An applicant for an exemption that cannot meet the criteria above may qualify for reduced requirements based on the following:

a. The applicant must demonstrate compliance with Sections 302.A, 302.B and 302.C above.

b. Reduced requirements will be according to the following Table 2:

TABLE 2 – REDUCED STORMWATER MANAGEMENT REQUIREMENTS

New Impervious Area*In Square Feet Since the Date of Adoption of this Ordinance	Applicant Must Submit to the Municipality
0 – 1,000	
1,000 – 5,000	Volume Controls and SWM Site Plan & Report **
> 5,000	Rate Controls, Volume Controls, SWM Site Plan & Report and Record Drawings

*Gravel in the existing condition shall be considered pervious and proposed gravel shall be considered impervious.

**For minor projects up to 2,500 sq. ft. of new impervious and less than 5,000 sq. ft. of disturbed area(s), the Small Project Manual, Appendix E, may be used for storm water management site plan and report.

6. REQUIREMENT FOR ADDITIONAL STORMWATER MANAGEMENT CONTROLS

   a. Middle Paxton Township reserves the right to require additional stormwater management controls if an exempted project is determined to be causing adverse impacts of any kind.

7. OBLIGATION TO MEET OTHER REQUIREMENTS

   a. Nothing in this section shall relieve the applicant of any responsibility under other regulations such as, but not limited to, municipal ordinances or codes and state and federal regulations related to stormwater management, NPDES permitting requirements for erosion and sediment pollution control and Post Construction Stormwater Management, stream and wetland encroachment or floodplain management.

E. The purpose of this section is to ensure consistency of stormwater management planning between local ordinances and NPDES permitting (when required) and to ensure that the Applicant has a single and clear set of stormwater management standards to which the Applicant is subject. Middle Paxton Township may accept alternative stormwater management controls provided that:

   1. The Applicant, in consultation with Middle Paxton Township, PADEP and/or DCCD, states that meeting the requirements of the Volume Controls or Rate Controls of this Ordinance is not possible or creates an undue hardship.

   2. The alternative stormwater management controls, proposed by the Applicant, are documented to be acceptable to the Municipality, PADEP and/or DCCD for NPDES requirements pertaining to post construction stormwater management requirements.

   3. The alternative stormwater management controls are in compliance with all other sections of this Ordinance including, but not limited to, Sections 301.D, 302.A, 302.B and 302.C.

F. Forest management and timber operations are exempt from Rate and Volume Control requirements and SWM Site Plan preparation requirement of this Ordinance provided the activities are performed according to the requirements of 25 PA Code Chapter 102. It should be noted that temporary roadways are not exempt.

G. Agricultural activities are exempt from the requirements of this Ordinance provided the activities are performed according to the requirements of 25 PA Code Chapter 102.

H. Linear roadway improvement projects that create additional impervious area are not exempt from the requirements of this Ordinance. However, alternative stormwater management strategies may be applied at the joint approval of the Municipality and the Dauphin County Conservation District (if an NPDES permit is required) when site limitations (such as limited right-of-way) and constraints (as shown and provided by the Applicant), preclude the ability of the Applicant to meet the enforcement of the stormwater management standards in this Ordinance. All strategies must be consistent with PADEP's regulations, including NPDES requirements.

I. Middle Paxton Township may, after an Applicant has demonstrated compliance with Sections 302.A, 302.B, and 302.C, grant a modification of the requirements of one or more provisions of this Ordinance if the literal enforcement will exact undue hardship because of peculiar conditions pertaining to the land in question, provided that such modification will not be contrary to the public interest and that the purpose and intent of the Ordinance is observed.

   All requests for a modification shall be in writing and shall state in full the grounds and facts of unreasonableness or hardship on which the request is based, the provision or provisions of the Ordinance involved, and the minimum modification necessary.

J. MUNICIPAL DECISION

   All requests for exemptions or modifications shall be at the discretion of Middle Paxton Township. Demonstration that a proposed project meets exemption or modification requirements does not necessarily obligate Middle Paxton Township to grant the request for exemption or modification.

   Middle Paxton Township may consider any and all relevant factors such as, but not limited to, runoff concentration, slope, soil characteristics, existing problems, adjacent properties, sensitive environmental features and recommendations from other municipal entities such as planning commissions, municipal engineers and solicitors in determining whether or not to grant any request for exemption or modification.

Section 303. Volume Controls

A. The Low Impact Development Practices provided in the BMP Manual and in Appendix B of this Ordinance shall be utilized for all Regulated Activities to the maximum extent practicable.

B. Stormwater runoff Volume Controls shall be implemented using the Design Storm Method or the Simplified Method. For Regulated Activities equal to or less than one (1) acre, this Ordinance establishes no preference for either method; therefore, the Applicant may select either method on the basis of economic considerations, the intrinsic

limitations on the applicability of the analytical procedures associated with each methodology, and other factors.

1. The *Design Storm Method* (CG-1 in the BMP Manual) is applicable to any sized Regulated Activity. This method requires detailed modeling based on the site conditions.

    a. Do not increase the post-development total runoff volume when compared to the pre-development total runoff volume for the 2-year/24-hour storm event.

    b. For hydrologic modeling purposes:

        i. Existing non-forested pervious areas must be considered meadow good condition) for pre-development hydrologic calculations.

        ii. Twenty (20) percent of existing impervious area, when present on the proposed project site, and contained within the new proposed limit of disturbance shall be considered meadow (good condition) for pre-development hydrologic calculations for re-development.

2. The *Simplified Method* (CG-2 in the BMP Manual) is independent of site conditions and should be used if the Design Storm Method is not followed. This method is not applicable to Regulated Activities greater than one (1) acre of disturbance. For new impervious surfaces:

    a. Stormwater facilities shall capture at least the first two (2) inches of runoff from all new impervious surfaces.

    b. At least the first one (1) inch of runoff from new impervious surfaces shall be permanently removed from the runoff flow, i.e. it shall not be released into surface Waters of the Commonwealth. Removal options include reuse, evaporation, transportation, and infiltration.

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

2A. For minor projects less than 2,500 sq. ft. of new impervious and less than 5,000 sq. ft. of disturbed area on existing lots of record, the Small Project Manual of complete permanent removal of the first 2” of runoff may be used provided that the following conditions are met:

a. The proposed activity will not result in the disturbance of land within floodplains, wetlands, environmentally sensitive areas, riparian forest buffers, or slopes greater than 15%.

b. The proposed activity will not be conducted within any existing drainage or storm water easement created by or shown on any recorded plan.

c. The proposed activity will minimize soil disturbance, take steps to minimize erosion during construction activity, and promptly reclaim all disturbed areas with topsoil and vegetation.

d. The proposed activity will not adversely impact any existing known problem areas or downstream property owners or the quality of runoff entering any storm sewer.

e. All runoff will be directed to pervious areas on the subject property. No runoff will be directed onto an abutting street or neighboring property

C. All applicable worksheets from Chapter 8 of the BMP Manual must be used when establishing Volume Controls where CG-2 is used.

D. Actual field infiltration tests at the location of the proposed elevation of the stormwater BMPs are required when 5,000 square feet or greater of new impervious surface is added. Infiltration test shall be conducted in accordance with BMP Manual. Middle Paxton Township shall be notified 24-hours prior to infiltration tests being conducted as to provide an opportunity to witness the tests.

Section 304. Rate Controls

A. Lands contained with Dauphin County that have not had release rates established under an approved Act 167 Stormwater Management Plan:

1. Post-development discharge rates shall not exceed the pre-development discharge rates for the 1-year, 2-year, 10-year, 25-year, 50-year, and 100-year storms.

B. Lands contained within Dauphin County that have had release rates established under an approved Act 167 Stormwater Management Plan:

1. Post-development discharge rates shall not exceed the pre-development discharge rates for the 1-year, 2-year, 10-year, 25-year, 50-year, and 100-year storms.

2. For the 2-year, 10-year, and 25-year storms, the post-development peak discharge rates shall be in accordance with the approved release rate map for the individual watershed.

ARTICLE IV – E&S STANDARDS

Section 401. Erosion and Sedimentation Requirements During Earth Disturbance Activities

A. The applicant shall meet requirements as contained in 25 PA Code, Chapters 92 and 102 as required and applicable as follows:

1. The implementation and maintenance of erosion and sediment control BMPs
2. Development of written plans.
3. Submission of plans for approval.
4. Obtaining Erosion and Sediment Control and NPDES permits.
5. Maintaining plans and permits on site.

B. Evidence of any necessary plan or permit approval for Earth Disturbance activities from DEP or the Dauphin County Conservation District must be provided to Middle Paxton Township.

C. A copy of the approved Erosion and Sediment Control Plan and any other permit, as required by DEP or the Dauphin County Conservation District, shall be available at the project site at all times if required under Chapter 102.

D. Construction of temporary roadways (e.g. for utility construction, timber harvesting, etc.) shall comply with all applicable standards for erosion and sedimentation control and stream crossing regulations under 25 PA Code Chapters 102 and 105. The Erosion and Sedimentation Control Plan shall be submitted to the Dauphin County Conservation District for approval and shall address the following, as applicable:

1. Design of the roadway system, including haul roads, skid roads, landing areas, trails, and storage and staging areas.

2. Runoff control structures (e.g., diversions, culverts, detention ponds, etc.).

3. Stream crossings for both perennial and intermittent streams.

4. Access to public roadways including design of rock construction entrance for mud and debris control.

5. A remediation plan for restoring the disturbed area through re-grading, topsoil placement, reseeding, and other stabilization techniques, as required.

E. Additional erosion and sedimentation control design standards and criteria that must be applied where infiltration BMPs are proposed included the following:

1. Areas proposed for infiltration BMPs shall be protected from sedimentation and compaction during the construction phase, as to maintain their maximum infiltration capacity.

2. Infiltration BMPs shall be protected from receiving sediment-laden runoff.

3. The source of protection for infiltration BMPs shall be identified (i.e. orange construction fence surrounding the perimeter of the BMP).

Section 402. Total Maximum Daily Load (TMDL) Requirements.

A. Agricultural activities contributory to a watershed within Dauphin County containing an established non-point source (agricultural) TMDL, shall be conducted in compliance with Chapter 102 (Erosion and Sediment Pollution Control), Chapter 91 – Section 91.36 (General Provisions related to Manure Management) and Act 38 (Nutrient Management).

B. As of the date of the establishment of this Ordinance, non-point source (agricultural) TMDLs are established in the following watersheds (refer to the Dauphin County Act 167 Plan for stream reaches with established TMDLs):

1. Conewago Creek Watershed

2. Unnamed Tributary to Bow Creek Watershed

3. Jackson Creek Watershed

4. Little Jackson Creek

C. This section shall apply also to agricultural activities conducted in watersheds where TMDLs are established in the future.

ARTICLE V – FLOODPLAIN STANDARDS

Section 501. Floodplain Requirements – RESERVED

ARTICLE VI – RIPARIAN BUFFER STANDARDS

Section 601. Riparian Buffer Requirements - RESERVED

ARTICLE VII – DESIGN CRITERIA

Section 701. Design Criteria for Stormwater Management & Drainage Facilities

A. General Design Guidelines:

1. Stormwater shall not be transferred from one watershed to another, unless (1) the watersheds are sub-watersheds of a common watershed which join together within the perimeter of the property; (2) the effect of the transfer does not alter the peak rate discharge onto adjacent lands; or (3) easements from the affected landowner(s) are provided.

2. Consideration shall be given to the relationship of the subject property to the drainage pattern of the watershed. A concentrated discharge of stormwater to an adjacent property shall be within an existing watercourse or confined in an easement or returned to a pre-development flow type condition.

3. Stormwater BMPs and recharge facilities are encouraged (e.g., rooftop storage, drywells, cisterns, recreation area ponding, diversion structures, porous pavements, holding tanks, infiltration systems, stream channel storage, in-line storage in storm sewers, and grading patterns). They shall be located, designed, and constructed in accordance with the latest technical guidance published by DEP, provided they are accompanied by detailed engineering plans and performance capabilities and supporting site specific soils, geology, runoff and groundwater and infiltration rate data to verify proposed designs. Additional guidance from other sources may be accepted at the discretion of the Municipal Engineer (a pre-application meeting is suggested).

4. All existing and natural watercourses, channels, drainage systems and areas of surface water concentration shall be maintained in their existing condition unless an alteration is approved by the appropriate regulatory agency.

5. No outlet structure from a stormwater management facility, or swale, shall discharge directly onto a Municipal or State roadway.

6. The invert of all stormwater management facilities and underground infiltration/storage facilities shall be located a minimum of two (2) feet above the seasonal high groundwater table or other soil limiting zone. The invert of stormwater facilities may be lowered if adequate sub-surface drainage, which does not alter the existing water table level, is provided.

7. Any stormwater management facility may be required to be fenced with a minimum four 94) foot high fence of material acceptable to Middle Paxton Township. Gates with a minimum opening of ten (10) feet shall be provided for access.

8. Stormwater management facilities excavated to carbonate rock must either be fitted with an impervious clay liner, or over-excavated four (4) feet and refilled with a suitable material mix. Suitable backfill material is subject to the approval of the Municipal Engineer.

9. The type, location, and number of landscaping and planting specification shall be provided for all stormwater management facilities and be specific for each type of facility.

B. Stormwater Management Facilities (with a depth of water equal to or greater than 3 feet measured from the lowest point inside a facility to the crest of the emergency spillway):

1. Any stormwater management facility designed to store runoff and requiring a berm or earthen embankment, shall be designed to provide an emergency spillway to handle peak rate of stormwater runoff up to and including the 100- year post-development flow, with a blocked primary outlet structure. The height of embankment must be set as to provide a minimum one (1) foot of freeboard through the spillway, above the maximum water surface elevation, computed when the spillway functions for the 100-year post-development inflow, with a blocked outlet structure. The primary outflow structure must be designed to pass all design storms (up to and including the 100-year event) without discharging through the emergency spillway. The maximum water depth within any stormwater management facility shall be no greater than eight (8) feet when functioning through the primary outlet structure.

2. Emergency spillways shall be armored to prevent erosion during the 100-year post-development flow, with blocked primary outlet structure. Synthetic liners or rip-rap may be used, and calculations sufficient to support proposed armor must be provided. An earthen plug must be used to accurately control the spillway invert if rip-rap is the proposed armoring material. Emergency spillway armor must extend up the sides of the spillway, and continue at full width to a minimum of ten (10) feet past the toe of slope.

3. A stormwater management facility berm cross sections must be at least five (5) feet wide at the top, and eight (8) feet wide through the emergency spillway. For fill embankments, the side slopes shall be no steeper than 3:1 on the inside of the facility and 2:1 on the outside of the facility. For cut slopes, the side slopes shall be no steeper than 2:1.

4. A cutoff and key trench of impervious material shall be provided under all embankments four (4) feet or greater in height.

5. Soils used for the construction of stormwater management facilities shall have low-erodibility factors ("K" factors) (refer to E&S Manual) and be identified on the SWM Site Plan.

6. Trash racks must be provided to prevent clogging of primary outflow structure stages for all orifices equivalent to twelve (12) inches or smaller in diameter.

7. Anti-seep collars must be provided on all outflow culverts in accordance with the methodology contained in the latest edition of the E&S Manual. An increase in seepage length of 15 percent must be used in accordance with the requirements for permanent anti-seep collars.

8. Conventional, non-BMP stormwater management facilities (i.e. dry detention basins) must empty over a period of time not less than 24 hours and not more than 72 hours from the end of the facility's inflow hydrograph. Infiltration tests performed at the facility locations and proposed basin bottom depths, in accordance with the BMP Manual, must support time-to-empty calculations if infiltration is a factor is the sizing of the stormwater management facility.

9. Impervious low-flow channels are not permitted within stormwater management facilities to promote water quality and groundwater recharge for frequent storm events. Facilities designed as water quality / infiltration BMPs may have a bottom slope of zero. Minimal maintenance, saturation tolerant vegetation must be provided in basins designed as water quality / infiltration BMPs. Conventional, non-BMP stormwater management facilities must have a minimum slope of 1% extending radially out from the primary outlet structure. Water storage below the lowest outlet structure stage (i.e. dead storage) is permitted in stormwater management facilities designed as water quality 1 infiltration BMPs.

10. Stormwater management facilities bottom elevations must be greater than adjacent floodplain elevations (FEMA or HEC-RAS analysis). If no floodplain is defined, bottom elevations must be higher than existing ground elevations fifty (50) feet from top of stream bank in the facilities vicinity.

11. Basin outflow culverts discharging into floodplains must account for tailwater. Tailwater corresponding to the 100-year floodplain elevation may be used for all design storms, or the Applicant may elect to determine flood elevations of the adjacent watercourse for each design storm. The floodplain is assumed to be fifty (50) feet from top of stream bank in areas where a floodplain is not designated, or where no other evidence is provided.

12. Exceptions to those requirements may be made at the discretion of Middle Paxton Township for BMPs that retain or detain water, but are of a much smaller scale than traditional stormwater management facilities.

C. Storm Sewer Facilities:

1. Storm sewers must be able to convey post-development runoff from a ten (10) year design storm without surcharging inlets where appropriate. When connecting to an existing storm sewer system, the Applicant must demonstrate that the

proposed system will not exacerbate any existing stormwater problems and that adequate downstream capacity exists.

2. A minimum pipe size of fifteen (15) inches in diameter shall be used in all roadway systems (public or private) proposed for construction. Pipes shall be designed to provide a minimum velocity of two and one-half (2 1/2) feet per second when flowing full, but in all cases, the slope shall be no less than 0.5%. Arch pipe of equivalent cross-sectional area may be substituted in lieu of circular pipe where cover or utility conflict conditions exist.

3. In proposed curbed roadway sections, the maximum encroachment of water on the roadway pavement shall not exceed half of a through travel lane or one (1) inch less than the depth of curb during the ten (10) year design storm of five (5) minute duration. Gutter depth shall be verified by inlet capture/capacity calculations that account for road slope and opening area. The maximum distance between inlets in curbed roadway sections shall be no more than 600 feet, however access to underground pipes shall be provided every 300 feet.

4. Standard Type "C" inlets with 8" hoods shall be used along vertical concrete curbs roadway networks. Type "C" inlets with 10" hoods that provide a 2" sump condition may be used with approval of the Municipal Engineer when roadway longitudinal slopes are 1.0% or less.

5. For inlets containing a change in pipe size, the elevation for the crown of the pipes shall be the same or the smaller pipe's crown shall be at a higher elevation.

6. All inlets shall provide a minimum 2" drop between the lowest inlet pipe invert elevation and the outlet pipe invert elevation.

7. On curbed sections, a double inlet shall be placed at the low point of sag vertical curves, or an inlet shall be placed at the low point and on each side of the low point at a distance not to exceed 100 feet, or at an elevation not to exceed 0.2 feet above the low point.

8. At all roadway low points, swales and easements shall be provided behind the curb or swale and through adjacent properties to channelize and direct any overflow of stormwater runoff away from dwellings and structures.

9. Inlets shall be placed so drainage cannot cross intersections or street centerlines.

10. All inlets in paved areas shall have heavy duty bicycle safe grating consistent with PennDOT Publication 72M. A note to this effect shall be added to the SWM Site Plan or inlet details therein.

11. Inlets must be sized to accept the specified pipe sizes without knocking out any of the inlet corners. All pipes entering or exiting inlets shall be cut flush with the inlet wall. A note to this effect shall be added to the SWM Site Plan or inlet details therein.

12. Inlets shall have weep holes covered with geotextile fabric placed at appropriate elevations to completely drain the sub grade prior to placing the base and surface course on roadways.

13. Inlets, junction boxes, or manholes greater than five (5) feet in depth shall be equipped with ladder rungs and shall be detailed on the SWM Site Plan.

14. Inlets shall not have a sump condition in the bottom (unless designed as a water quality BMP). Pipes shall be flush with the bottom of the box or concrete channels shall be poured.

15. Inlets, manholes, pipes, and culverts shall be constructed in accordance with the specifications set forth in PennDOT's Publication 408, latest edition, and as detailed in the PennDOT's Publication 72M - Standards for Roadway Construction (RC), latest edition, or as approved by the Municipal Engineer. All material and construction details (inlets, manholes, pipe trenches, etc.), must be shown on the SWM Site Plan, and a note added that all construction must be in accordance with PennDOT's Publication 408 and PennDOT's Publication 72M, latest edition. A note shall be added to the plan stating that all frames, concrete top units, and grade adjustment rings shall be set in a bed of full mortar according to Publication 408.

16. Accessible drainage structures shall be located on continuous storm sewer system at all vertical dislocations, at all locations where a transition in storm sewer pipe sizing is required, at all vertical and horizontal angle points exceeding five (5) degrees, and at all points of convergence of two (2) or more storm sewer pipes.

17. All storm drainage piping (equal to or greater than 12") discharging to the ground surface shall be provided with either reinforced concrete headwalls and end sections or plastic and metal pipe end sections compatible with the pipe size involved in accordance with PennDOT Publication 408 and Publication 72M.

18. Outlet protection shall be provided at all surface discharge points with storm drainage piping (equal to or greater than 12") in order to minimize erosion consistent with the E&S Manual.

19. Pavement base drain shall be provided at all low point in cut areas, toe of slope areas, and other areas as dictated by proven engineering principles and design judgment. All base drain shall be in accordance with PennDOT Publication 408.

D. Swale Conveyance Facilities:

1. Swales must be able to convey post-development runoff from a 10-year design storm with six (6) inches of freeboard to top of the swale.

2. Swales shall have side slopes no steeper than 3:1.

3. All swales shall be designed, labeled on the SWM Site Plan, and details provided to adequately construct and maintain the design dimension of the swales.

4. Swales shall be designed for stability using velocity or shear criteria. Velocity criteria may be used for channels with less than 10% slope. Shear criteria may be used for all swales. Documentation must be provided to support velocity and/or shear limitations used in calculations.

5. Where swale bends occur, the computed velocities or shear stresses shall be multiplied by the following factor for the purpose of designing swale erosion protection:

    a. 1.75 — When swale bend is 30 to 60 degrees

    b. 2.00 — When swale bend is 60 to 90 degrees

    c. 2.50 — When swale bend is 90 degrees or greater

6. Swales must be designed for both temporary and permanent conditions in accordance with the latest E&S Manual.

Section 702. Calculation Methodology

A. All calculations shall be consistent with the guidelines set forth in the BMP Manual.

B. Stormwater runoff from all development sites shall be calculated using either the Rational Method or a Soil Cover Complex methodology. Methods shall be selected by the Qualified Professional based on the individual limitations and suitability of each method for a particular site.

C. Rainfall Values:

1. Rational Method — The Pennsylvania Department of Transportation Drainage Manual, Intensity-Duration-Frequency Curves, Publication 584, Chapter 7A, latest edition, shall be used in conjunction with the appropriate time of concentration and return period.

2. Soil Cover Complex Method — The Soil Conservation Service Type II, 24-hour rainfall distribution shall be used in conjunction with rainfall depths from NOAA Atlas 14 or consistent with the following table.

Return Interval (Year)	24-hour Rainfall Total (inches)
1	2.40
2	2.90
10	4.36
25	5.43
50	6.38
100	7.48

D. Peak Flow Rates:

1. Rational Method — May be used for drainage areas up to 20 acres. Extreme caution should be used by the Qualified Professional if the watershed has more than one main drainage channel, if the watershed is divided so that hydrologic properties are significantly different in one verses the other, if the time of concentration exceeds 60 minutes, or if stormwater runoff volume is an important factor. The combination of Rational Method hydrographs based on timing shall be prohibited.

   a. The use of the Modified Rational Method to design stormwater management facilities must be approved by the Municipal Engineer.

2. Soil Cover Complex Method — May be used for drainage areas greater than 20 acres. This method is recommended for design of stormwater management facilities and where stormwater runoff volume must be taken into consideration.

3. For comparison of peak flow rates, flows shall be rounded to a tenth of a cubic foot per second (cfs).

E. Runoff Coefficients:

1. Rational Method — Use Table C-1 (Appendix C).

2. Soil Cover Complex Method — Use Table C-2 (Appendix C).

3. For the purposes of pre-development peak flow rate and volume determination, existing non-forested pervious areas conditions shall be considered as meadow (good condition).

4. For the purposes of pre-development peak flow rate and volume determination, twenty (20) percent of existing impervious area, when present on the project site, and contained within the new proposed limit of disturbance, shall be considered

meadow (good condition) for pre-development hydrologic calculations for re-development.

F. Design Storm:

1. All drainage facilities (inlets, pipes, and swales) shall be designed to safely convey the 10-year storm.

2. All stormwater management facilities shall be verified by routing the proposed 1-year, 2-year, 10-year, 25-year, 50-year, and 100-year hydrographs through the facility using the storage indication (Modified Puls) method. The design storm hydrograph shall be computed using a calculation method that produces a full hydrograph.

3. The stormwater management and drainage system shall be designed to safely convey the post-development 100-year storm event to stormwater detention facilities, for the purpose of meeting peak rate control.

4. All structures (culvert or bridges) proposed to convey runoff under a Municipal road shall be designed to pass the 50-year design storm with a minimum one (1) foot of freeboard measured below the lowest point along the top of the roadway.

5. All design within State or Federal right-of-ways or that falls under the design criteria of any higher authority must meet the requirements of that agency in addition to meeting the minimum requirements of this Ordinance.

G. Time of Concentration:

1. Time of concentration shall be computed using the NRCS Segmental Method as described in TR-55 (SCS 1986 or most current update). The length of sheet flow shall be limited to 100-feet. The Manning's "n" Roughness Coefficient for TR-55 sheet flow can be found in Table C-4 (Appendix C). Time of concentration for channel and pipe flow shall be computed using Manning's equation.

2. For sites with insignificant channelized flow and less than 20% imperviousness coverage, the time of concentration may be computed using the NRCS equation for lag time:

$$\text{Time of Concentration} = T_C = [(T_{lag}/.6) * 60] \text{ (minutes)}$$

$$T_{lag} = \frac{L^{0.8}\,(S+1)^{0.7}}{1900\sqrt{Y}}$$

Where:
T_{lag} = Lag time (hours)
L = Hydraulic length of watershed (feet)

Y = Average overland slope of watershed (percent)
S = Maximum retention in watershed as defined by:
S = [(1000/CN) — 10]
CN = NRCS Curve Number for watershed as defined by the NRCS Loss Method

3. Additionally, the following provisions shall apply to calculations for time of concentration:

   a. The post-development time of concentration shall never be greater that the pre-development time of concentration for any watershed or subwatershed.

   b. The minimum time of concentration for any watershed shall be five (5) minutes.

   c. The designer may choose to assume a five (5) minute time of concentration for any post-development watershed or subwatershed without providing any computations.

   d. The designer must provide computations for all pre-development time of concentration paths. A five (5) minute time of concentration can not be assumed for pre-development.

   e. Undetained fringe areas (areas that are not tributary to a stormwater facility but where a reasonable effort has been made to convey runoff from all new impervious coverage to best management practices) may be assumed to represent the pre-development conditions for purpose of time of concentration calculations.

H. Drainage areas tributary to sinkholes or closed depressions in areas underlain by limestone or carbonate geologic features shall be excluded from the modeled point of analysis defining pre-development flows. If left undisturbed during construction activities, areas draining to closed depressions may also be removed from peak runoff rates in the post-development analysis. New, additional contributing runoff shall not be directed to existing sinkholes or closed depressions.

I. Where uniform flow is anticipated, the Manning's equation shall be used for hydraulic computations and to determine the capacity of open channels, pipes, and storm sewers. The Manning's equation should not be used for analysis of pipes under pressure flow or for analysis of culverts. Manning's "n" values shall be obtained from Table C-3 (Appendix C). Inlet control shall be checked at all inlet boxes to ensure the headwater depth during the ten (10) year design event is contained below the top of grate for each inlet box.

J. Middle Paxton Township 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.

K. Middle Paxton Township has the authority to require that computed existing runoff rates be reconciled with field observations, conditions and site history. If the designer can substantiate, through actual physical calibration, that more appropriate runoff and time of concentration values should be utilized at a particular site, then appropriate variations may be made upon review and approval of the Township.

ARTICLE VIII – SWM SITE PLAN & REPORT REQUIREMENTS

Section 801. General Requirements

For any of the activities regulated by this Ordinance and not eligible for the exemptions provided in Section 302, the 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 SWM Site from the Municipality.

Section 802. SWM Site Plan & Report Contents

The SWM Site Plan & SWM Site Report shall consist of all applicable calculations, maps and plans. All SWM Site Plan materials shall be submitted to Middle Paxton Township in a format that is clear, concise, legible, neat and well organized; otherwise, the SWM Site Plan shall be rejected.

Appropriate sections from the Municipal Subdivision and Land Development Ordinance, and other applicable local ordinances, shall be followed in preparing the SWM Site Plan.

A. SWM Site Plan shall include (but not be limited to):

1. Plans no larger than 24-inch x 36-inch sheets and in a form that meets the requirements for recording in the Office of the Recorder of Deeds of Dauphin County.

2. The name of the development; name and location address of the property site; name, address, and telephone number of the Applicant/Owner of the property; and name, address, telephone number, email address, and engineering seal of the individual preparing the SWM Site Plan.

3. The date of submission and dates of all revisions.

4. A graphical and written scale on all drawings and maps.

5. A north arrow on all drawings and maps.

6. A location map at a minimum scale of one (1) inch equals one-thousand (1,000) feet.

7. Metes and bounds description of the entire tract perimeter.

8. Existing and final contours at intervals of two (2) feet.

9. Existing waterbodies within the project area including streams, lakes, ponds, field delineated wetlands or other bodies of water, sinkholes, flood hazard boundaries (FEMA delineated floodplains and floodways), areas of natural vegetation to be preserved, the total extent of the upstream area draining through the site, and overland drainage paths.

10. The location of all existing and proposed utilities, on-lot wastewater facilities, water supply wells, sanitary sewers, and water lines on and within fifty (50) feet of property lines.

11. A key map showing all existing man-made features beyond the property boundary that may be affected by the project.

12. Soil names and boundaries with identification of the Hydraulic Soil Group classification.

13. The proposed limit of disturbance line and associated proposed disturbed acres.

14. Proposed structures, roads, paved areas, and buildings, including plans and profiles of roads and paved areas and floor elevations of buildings.

15. Horizontal alignment, vertical profiles, and cross sections of all open channels, pipes, swales and other BMPs.

16. The location and clear identification of the nature of permanent stormwater BMPs.

17. The location of all erosion and sedimentation control facilities.

18. A minimum twenty (20) foot wide access easement around all stormwater management facilities that would provide ingress to and egress from a public right-of-way. In lieu of providing an easement to the public right-of-way, a note may be added to the plan granting the Municipality or their designees' access to all easements via the nearest public right-of-way.

19. Construction details for all drainage and stormwater BMPs.

20. Construction details of any improvements made to sinkholes.

21. Identification of short-term and long-term ownership, operations, and maintenance responsibilities.

22. Notes and Statements:

    a. A statement, signed by the landowner, acknowledging that the stormwater BMPs are fixtures that cannot be altered or removed without prior approval by Middle Paxton Township.

    b. A statement referencing the Operation and Maintenance (O&M) Agreement and stating that the O&M Agreement is part of the SWM Site Plan.

    c. A note indicating that Record Drawings will be provided for all stormwater management facilities prior to occupancy, or the release of financial security.

    d. The following signature block for the Qualified Professional preparing the SWM Site Plan:

       "I, _____, hereby certify that the Stormwater Management Plan meets all design standards and criteria of Middle Paxton Township's Stormwater Management Ordinance"

B. SWM Site Report shall include (but not limited to):

1. The name of the development; name and location address of the property site; name, address, and telephone number of the Applicant/Owner of the property; and name, address, telephone number, email address, and engineering seal of the individual preparing the SWM Site Report.

2. Project description narrative including expected project time schedule.

3. Location map showing the project site and its location relative to release rate districts.

4. Drainage area maps for all watersheds and inlets depicting the time of concentration paths.

5. A detailed description of the existing site conditions. A detailed site evaluation shall be completed for projects proposed in areas of carbonate geology or karst topography, and other environmentally sensitive areas such as brownfields.

6. Complete hydrologic, hydraulic and structural computations, calculations, assumptions, and criteria for the design of all stormwater BMPs.

7. Description of, justification, and actual field results for infiltration testing with respect to the type of test and test location for the design of infiltration BMPs.

8. Calculations showing the total drainage area and impervious area oading rates to each BMP.

9. The effect of the project (in terms of runoff volumes, water quality, and peak flows) on surrounding properties and aquatic features and on any existing municipal stormwater collection system that may receive runoff from the project site.

10. Description of the proposed changes to the land surface and vegetative cover including the type and amount of impervious area to be added.

11. All applicable worksheets from Chapter 8 of the BMP Manual when establishing volume controls.

12. Identification of short-term and long-term ownership, operation, and maintenance responsibilities as well as schedules and costs for inspection and maintenance activities for each permanent stormwater or drainage BMP, including provisions for permanent access or maintenance easements.

C. Supplemental information to be provided prior to recording of the SWM Site Plan, as applicable:

1. Signed and executed Operations and Maintenance Agreement (Appendix A).

2. Signed and executed easements, as required for all on-site and off-site work.

3. An Erosion and Sedimentation Control Plan & approval letter from the Dauphin County Conservation District.

4. A NPDES Permit.

5. Permits from PADEP and ACOE.

6. A Geologic Assessment.

7. A Wetland Delineation Report.

8. A Highway Occupancy Permit from PennDOT when utilization of a PennDOT storm drainage system is proposed or when proposed facilities would encroach onto a PennDOT right-of-way.

Section 803. SWM Site Plan & Report Submission

A. The Applicant shall submit the SWM Site Plan & Report for the Regulated Activity.

B. Three (3) copies of the SWM Site Plan and Report shall be submitted to Middle Paxton Township and may be distributed as follows:

1. Two (2) copies for the Township accompanied by the requisite Review Fee, as specified in this Ordinance

2. One (1) copy for the Municipal Engineer

C. Additional copies shall be submitted as requested by the Township, Tri-County Regional Planning Commission Dauphin County Conservation District or PADEP.

Section 804. SWM Site Plan & Report Review

A. Middle Paxton Township shall require receipt of a complete SWM Site Plan and Report as specified in this Ordinance. Middle Paxton Township shall review the SWM Site Plan and Report for consistency with the purposes, requirements and intent of this Ordinance.

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

C. Middle Paxton Township shall notify the Applicant in writing within forty-five (45) calendar days whether the SWM Site Plan and Report is approved or disapproved if the SWM Site Plan and Report is not part of a Subdivision or Land Development Plan. If the SWM Site Plan and Report involves a Subdivision or Land Development Plan, the timing shall follow the Subdivision and Land Development process according to the Township's Planning Code.

D. Middle Paxton Township's Building Permit Office shall not issue a building permit for any Regulated Activity if the SWM Site Plan and Report has been found to be inconsistent with this Ordinance, as determined by the Township. All required permits from PADEP must be obtained prior to issuance of a building permit.

Section 805. Modification of Plans

A. A modification to a submitted SWM Site Plan and Report for a development site that involves a change in stormwater management facilities or techniques, or that involves the relocation or re-design of stormwater management facilities, or that is necessary because soil or other conditions are not as stated on the SWM Site Plan as determined by Middle Paxton Township, shall require a resubmission of the modified SWM Site plan in accordance with this Ordinance.

Section 806. Resubmission of Disapproved SWM Site Plan & Report

A. A disapproved SWM Site Plan & Report may be resubmitted with the revisions addressing the Township's concerns documented in writing, the Township in accordance with this Ordinance. The applicable Review Fee must accompany a resubmission of a disapproved SWM Site Plan and Report.

Section 807. Authorization to Construct and Term of Validity

A. Middle Paxton Township's approval of a SWM Site Plan and Report authorizes the Regulated Activities contained in the SWM Site Plan for a maximum term of validity of five (5) years following the date of approval. The Township may specify a term of validity shorter than five (5) years in the approval for any specific SWM Site Plan. Terms of validity shall commence on the date the Township signs the approval for a SWM Site Plan. If stormwater management facilities included in the approved site have not been constructed, or if an Record Drawing of these facilities has not been approved within this time, then the Township may consider the SWM Site Plan disapproved and may revoke any and all permits or approvals.

Section 808. Record Drawings, Completion Certificate and Final Inspection

A. The Applicant shall be responsible for providing Record Drawings of all stormwater BMPs included in the approved SWM Site Plan. The Record Drawings and an explanation of any discrepancies with the approved SWM Site Plan shall be submitted to Middle Paxton Township.

B. The Record Drawings shall include a certification of completion signed by a Qualified Professional verifying that all permanent stormwater BMPs have been constructed according to the SWM Site Plan and Report.

C. After receipt of the Record Drawings and certification of completion, the Township may conduct a final inspection.

ARTICLE IX – EASEMENTS

Section 901. Easements

A. Easements shall be established to accommodate the existence of drainageways.

B. Easements shall be established for all on-site stormwater management or drainage facilities, including but not limited to: detention facilities (inlets, manholes, pipes, etc.).

C. Easements are required for all areas used for off-site stormwater control.

D. All easements shall be a minimum of twenty (20) feet wide.

E. Easements shall provide ingress to and egress from a public right-of-way. In lieu of providing an easement to the public right-of-way, a note may be added to the plan granting Middle Paxton Township or their designees access to all easements via the nearest public right-of-way.

F. Where possible, easements shall be centered on side and/or rear lot lines.

G. The following note shall be placed on the recorded plan, "Nothing shall be planted or placed within the easement which would adversely affect the function of the easement, or conflict with any conditions associated with such easement."

H. A note shall be placed on the SWM Site Plan identifying the party responsible for assuring the continued functionality and required maintenance of any easement.

ARTICLE X – MAINTENANCE RESPONSIBILITIES

Section 1001. Financial Guarantee

A. The applicant should provide a Financial Guarantee to Middle Paxton Township for the timely installation and proper construction of all stormwater management controls as required by the approved SWM Site Plan and this Ordinance, equal to 110% of the full construction cost of the required controls in accordance with the Municipalities Planning Code.

B. At the completion of the project and as a prerequisite for the release of the Financial Guarantee, the Applicant shall:

1. Provide a certification of completion from an engineer, architect, surveyor or other qualified professional, verifying that all permanent facilities have been constructed according to the SWM Site Plan & Report and approved revisions thereto.

2. Provide a set of Record Drawings.

3. Request a final inspection from Middle Paxton Township to certify compliance wit this Ordinance, after receipt of the certification of completion and Record Drawings by Middle Paxton Township.

Section 1002. Maintenance Responsibilities

A. The SWM Site Plan & Report for the project site shall describe the future operation and maintenance responsibilities. The operation and maintenance description shall outline required routine maintenance actions and schedules necessary to ensure proper operation of the stormwater control facilities.

B. The SWM Site Plan & Report for the project site shall establish responsibilities for the continuing operation and maintenance of all proposed stormwater control facilities, consistent with the following principals:

1. If a development consists of structures or lots that are to be separately owed and in which streets, sewers, and other public improvements are to be dedicated to Middle Paxton Township, stormwater control facilities/BMPs may also be dedicated to and maintained by Middle Paxton Township.

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/BMPs shall be the responsibility of the owner or private management entity.

3. Facilities, areas, or structures used as stormwater BMPs shall be enumerated as permanent real estate appurtenances and recorded as deed restrictions or easements that run with the land.

4. The SWM Site Plan & Operation and Maintenance (O&M) Agreement shall be recorded as a restrictive deed covenant that runs with the land.

5. Middle Paxton Township may take enforcement actions against an Applicant for failure to satisfy any provision of this Ordinance.

C. Middle Paxton Township, upon recommendation of the Municipal Engineer, shall make the final determination on the continuing, maintenance responsibilities prior to final approval of the SWM Site Plan & Report. Middle Paxton Township may require a dedication of such facilities as part of the requirements for approval of the SWM Site Plan. Such a requirement is not an indication that the Township will accept the facilities. Middle Paxton Township reserves the right to accept or reject the ownership and operating responsibility for any portion of the stormwater management controls.

D. If Middle Paxton Township accepts ownership of stormwater BMPs, Middle Paxton Township may, at its discretion, require a fee from the Applicant to the Township to offset the future cost of inspections, operations, and maintenance.

E. It shall be unlawful to alter or remove any permanent stormwater BMP required by an approved SWM Site Plan, or to allow the property to remain in a condition, which does not conform to an approved SWM Site Plan, unless Middle Paxton Township grants an exception in writing.

Section 1003. Maintenance Agreement for Privately Owned Stormwater Facilities

A. Prior to final approval of the SWM Site Plan & Report, the Applicant shall sign the Operation and Maintenance (O&M) Agreement (Appendix A) covering all stormwater

control facilities that are to be privately owned. The Operation and Maintenance (O&M) Agreement shall be recorded with the SWM Site Plan and made a part hereto.

B. Other items may be included in the Operation and Maintenance (O&M) Agreement where determined necessary to guarantee the satisfactory operation and maintenance of all BMP facilities. The Operation and Maintenance (O&M) Agreement shall be subject to the review and approval of Middle Paxton Township and its solicitor.

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

ARTICLE XI – INSPECTIONS

Section 1101. Schedule of Inspections

A. PADEP or its designees normally ensure compliance with any permits issued, including those for stormwater management. In addition to PADEP compliance programs, Middle Paxton Township or its assignee may inspect all phases of the installation of temporary or permanent stormwater management facilites.

B. During any stage of Earth Disturbance Activities, if the Municipality determines that the temporary or permanent stormwater management facilities are not being installed in accordance with the approved SWM Site Plan, Middle Paxton Township shall revoke any existing permits or approvals until a revised SWM Site Plan is submitted and approved as specified in this Ordinance.

C. Stormwater BMPs shall be inspected by the landowner, or the landowner's designee according to the inspection schedule described on the SWM Site Plan for each BMP.

1. Middle Paxton Township may require copies of the inspection reports, in a form as stipulated by Middle Paxton Township.

2. If such inspections are not conducted or inspection reports not submitted as scheduled, Middle Paxton Township, or its designee, may conduct such inspections and charge the owner appropriate fees. Non-payment of fees may result in a line against the property.

a. Prior to conducting such inspections, Middle Paxton Township shall inform the owner of its intent to conduct such inspections. The owner shall be given thirty (30) days to conduct required inspections and submit the required inspection reports to the Township.

Section 1102. Right-of-Entry

A. Upon presentation of proper credentials, duly authorized representatives of Middle Paxton Township may enter at reasonable times, upon any property within the Township, to inspect the implementation, condition, or operations and maintenance of the stormwater BMPs in regard to any aspect governed by this Ordinance.

B. Stormwater BMP owners and operators shall allow persons working on behalf of Middle Paxton Township ready access to all parts of the premises for the purposes of determining compliance with this Ordinance.

C. Persons working on behalf of Middle Paxton Township shall have the right to temporarily locate on any stormwater BMP in the Township such devices, as are necessary, to conduct monitoring and/or sampling of the discharges from such stormwater BMP.

D. Unreasonable delay in allowing the Township access to a stormwater BMP is a violation of this Ordinance.

ARTICLE XII-ENFORCEMENT AND PENALTIES

Section 1201. Notification

A. In the event that a person fails to comply with the requirements of this Ordinance, an approved SWM Site Plan, or fails to conform to the requirements of any permit or approval issued hereunder, Middle Paxton Township shall provide written notification, via certified mail, of the violation to the Landowner indicated on the O&M Agreement. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of these violations(s).

B. Failure to comply within the time specified shall subject such person to the penalties provisions of this Ordinance. All such penalties shall be deemed cumulative and shall not prevent the Township from pursuing any and all other 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 Ordinance.

Section 1202. Enforcement

A. The Middle Paxton Township Board of Supervisors is hereby authorized and directed to enforce all of the provisions of this Ordinance. The approved SWM Site Plan shall be on file at the project site throughout the duration of the construction activity. The Municipal Engineer or other Township designee may make periodic inspections during construction.

B. Adherence to Approved SWM Site Plan:

1. It shall be unlawful for any person, firm or corporation to undertake any Regulated Activity on any property except as provided for by an approved SWM Site Plan and pursuant to the requirements of this Ordinance.

2. It shall be unlawful to alter or remove any control structure required by the SWM Site Plan pursuant to this Ordinance.

3. It shall be unlawful to allow a property to remain in a condition that does not conform to the approved SWM Site Plan.

Section 1203. Public Nuisance

A. A violation of any provision of this Ordinance is hereby deemed a Public Nuisance.
B. Each day that a violation continues shall constitute a separate violation.

Section 1204. Suspension and Revocation

A. Any approval or permit issued by Middle Paxton Township may be suspended or revoked for:

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

2. A violation of any provision of this Ordinance or any other applicable law, Ordinance, rule or regulation relating to the Regulated Activity.

3. The creation of any condition or the commission of any act, during the Regulated Activity which constitutes or creates a hazard or nuisance, pollution, or which endangers the life or property of others.

B. A suspended approval or permit may be reinstated by the Township when:

1. The Township or its designee has inspected and approved the corrections to the violation(s) that caused the suspension.

2. The Township is satisfied that the violation(s) has been corrected.

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

Section 1205. Penalties

A. Anyone violating the provisions of this ordinance shall be guilty of a summary offense and upon conviction, shall be subject to a fine of not more than $1,000.00 for each violation, recoverable with costs. Each day that the violation continues shall be a separate offense and penalties shall be cumulative.

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

Section 1206. Appeals

A. Any person aggrieved by any action of the Township or its designee, relevant to the provisions of this Ordinance, may appeal to the Board of Supervisors within thirty (30) days of that action.

B. Any person aggrieved by any decision of the Board of Supervisors, relevant to the provisions of this ordinance, may appeal to the Dauphin County Court of Common Pleas within thirty (30) days of the Board's decision.

ARTICLE XIII-PROHIBITIONS

Section 1301. Prohibited Discharges and Connections

A. Any drain (including indoor drains and sinks), or conveyance whether on the surface or underground, that allows any non-stormwater discharge including sewage, process wastewater, and wash water to enter the Township's separate storm sewer system or Waters of the Commonwealth is prohibited.

B. Any drain or conveyance connected from a commercial or industrial land use to the Township's separate storm sewer system, which has not been documented in plans, maps, or equivalent records, and approved by the Township is prohibited.

C. No person shall allow, or cause to allow, discharges into the Township's separate storm sewer system or into surface Water of the Commonwealth, which are not composed entirely of stormwater, except: (1) as provided in subsection 1301.D below, and (2) discharges allowed under a state or federal permit.

D. The following discharges are authorized unless they are determined to be significant contributors to pollution to the Waters of the Commonwealth:

- Discharges from firefighting activities	- Flows from riparian habitats and wetlands
- Portable water sources including dechlorinated water line and fire hydrant flushings	- Uncontaminated water from foundations or from footing drains
- Irrigation drainage	- Lawn watering
- Air conditioning condensate	- Dechlorinated swimming pool

	discharges
- Springs	- Uncontaminated groundwater
- Water from crawl space pumps	- Water from individual residential car washing
- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spill material has been removed) and where detergents are not used	- Routine external building washdown (which does not use detergents or other compounds)

E. In the event that the Township or PADEP determines that any of the discharges identified in subsection 1301.D, significantly contribute to pollution of Waters of the Commonwealth, or is so notified by PADEP, the Township will notify the responsible person(s) to cease the discharge.

F. Upon notice provided by the Township or PADEP under subsection 1301.E, the discharger will have a reasonable time, as determined by the Township or PADEP, to cease the discharge, consistent with the degree of the pollution caused by the discharge.

G. Nothing in this Section shall affect a discharger's responsibilities under Commonwealth Law.

Section 1302. Roof Drains

A. Roof drains and sump pumps shall discharge to infiltration areas, vegetative BMPs, or pervious areas to the maximum extent practicable.

Section 1303. Alteration of BMPs

A. No person shall modify, remove, fill, landscape, or alter any existing stormwater BMP, facilities, areas or structures unless it is part of an approved maintenance program, without the written approval of the Township.

B. No person shall place any structure, fill, landscaping, or vegetation into a stormwater BMP, facilities, areas, structures, or within a drainage easement which would limit or alter the functioning of the BMP without the written approval of the Township.

ARTICLE XIV-FEES AND EXPENSES

Section 1401. General

A. The fee required by this Ordinance is the Municipal Review Fee. The Municipal Review fee shall be established by Middle Paxton Township to defray review costs incurred by the Township and the Municipal Engineer. The Applicant shall pay all fees.

Section 1402. Expenses Covered by Fees

A. The fees required by this Ordinance shall, at a minimum, cover:

1. Administrative and clerical costs.

2. Review of the SWM Site Plan & Report by the Township.

3. Pre-construction meetings..

4. Inspection of stormwater management facilities/BMPs and drainage improvements during construction.

5. Final inspection upon completion of the stormwater management facilities/BMPs and drainage improvements presented in the SWM Site Plan.

6. Any additional work required to enforce any permit provisions regulated by this Ordinance, correct violations, and assure proper completion of stipulated remedial actions.

Section 1403. Recording of Approved SWM Site Plan and Related Agreements

A. The owner of any land upon which permanent BMPs will be placed, constructed, or implemented, as described in the SWM Site Plan, shall record the following documents in the Office of the Recorder of Deeds of Dauphin County, with sixty (60) days of approval of the SWM Site Plan by the Municipality.

1. The SWM Site Plan.

2. Operations and Maintenance (O&M) Agreement (Appendix A).

3. Easements under Section 901.

B. Middle Paxton Township may suspend or revoke any approvals granted for the project site upon discovery of the failure of the owner to comply with this Section.

ENACTED and ORDAINED at a regular meeting of the Middle Paxton Township Supervisors on this 2nd day of May, 2014. This Amendment to the Stormwater Ordinance shall take effect immediately.

Chairman

ATTEST:

Secretary

I hereby certify that the foregoing Ordinance was advertised in the Upper Dauphin Sentinel on 4/15/14, a newspaper of general circulation in the municipality and was duly enacted and approved as set forth at a regular meeting of the Supervisors of Middle Paxton Township held on May 2, 2014.

Secretary

[TOWNSHIP SEAL]

APPENDIX A – OPERATION AND MAINTENANCE AGREEMENT

STANDARD STORMWATER FACILITIES MAINTENANCE

AND MONITORING AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 20__, by and between _____, (hereinafter the "Landowner") and Middle Paxton Township, Dauphin County; Pennsylvania, (hereinafter "Municipality");

WITNESSETH

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

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

WHEREAS, the Subdivision/Land Management Plan (hereinafter "Plan") for the _____ Subdivision which is expressly made a part hereof, as approved or to be approved by the Municipality, provides for detention or retention of stormwater within the confines of the Property; and

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

WHEREAS, the Municipality requires, through the implementation of the Mid-Dauphin Watershed Stormwater Management Plan, that stormwater management facilities as shown on the Plan be constructed and adequately maintained by the Landowner, his successors and assigns.

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

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

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

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

4. In the event the Landowner fails to operate and maintain the BMPs per Paragraph 2, the Township or its representatives may enter upon the property and take whatever action is deemed necessary to maintain said BMPs. It is expressly understood and agreed that the Township is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Township. The Landowner may be subjected to the Penalties Section of the applicable Ordinance.

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

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

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

8. The Township may inspect the BMPs whenever necessary to ensure their continued functioning.

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

ATTEST:

WITNESS the following signatures and seals:

(SEAL) For the Municipality:

_____

(SEAL) For the Landowner:

_____

ATTEST:

_____ (City, Borough, Township)

County of _____, Pennsylvania

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

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

_____

NOTARY PUBLIC (SEAL)

APPENDIX B - LOW IMPACT DEVELOPMENT PRACTICES

LOW IMPACT DEVELOPMENT PRACTICES
ALTERNATIVE APPROACHES FOR MANAGING STORMWATER RUNOFF

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

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

- **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 minimize 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. The routing of roof drains and crowning the driveway to allow runoff to discharge to pervious areas is desirable as the pervious area essentially acts as a filter strip.

- **Reducing the Use of Storm Sewers.** By reducing the use of storm sewers for draining streets, parking lots, and backyards, 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 cartway widths. Municipal planners and traffic designers should encourage narrower neighborhood streets, which ultimately could lower maintenance and maintenance related costs.

- **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, 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, reduced water quality degradation of receiving streams and water bodies, 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 C - STORMWATER MANAGEMENT DESIGN CRITERIA

TABLE C-1
DESIGN STORM RAINFALL AMOUNT

Return Interval (Year)	24-hour Rainfall Total (inches)
1	2.40
2	2.90
10	4.36
25	5.43
50	6.38
100	7.48

TABLE C-2
RUNOFF CURVE NUMBERS
(FROM NRCS (SCS) TR-55)

Runoff Curve Numbers for Urban Areas					
Cover Description		**Curve Numbers for Hydrologic Soil Groups**			
Cover Type and Hydrologic Condition	***Average % Impervious Area***	***A***	***B***	***C***	***D***
Fully Developed Urban Areas (Vegetation Established)					
Open Space (lawns, parks, golf courses, etc)					
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.		98	98	98	98
Streets and Roads					
Paved: Curbed and Storm Sewers		98	98	98	98
Paved: Open Ditches		83	89	92	93
Gravel		76	85	89	91
Dirt		72	82	87	89
Western Desert Urban Areas					
Natural Desert Landscaping (pervious area only)		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 Acres	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

Runoff Curve Numbers for Cultivated Agricultural Lands						
Cover Description			**Curve Numbers for Hydrologic Soil Groups**			
Cover Type	***Treatment***	***Hydrologic Condition***	***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

Runoff Curve Numbers for Other Agricultural Lands					
Cover Description		**Curve Numbers for Hydrologic Soil Groups**			
Cover Type	***Hydrologic Condition***	***A***	***B***	***C***	***D***
Pasture, Grassland, or Range – Continuous Forage for Grazing	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	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods – Grass Combination (orchard or tree farm)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads – Buildings, Lanes, Driveways and Surrounding Lots.	--	59	74	82	86

Runoff Curve Numbers for Cultivated Agricultural Lands					
Cover Description		**Curve Numbers for Hydrologic Soil Groups**			
Cover Type	***Hydrologic Condition***	***A***	***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 under story.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush With Grass under story.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert Shrub – Major Plants Include Saltbrush, Greasewood, Creosotebush, Blackbrush, Bursage, Palo Verde, Mesquite and Cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

TABLE C-3 RUNOFF COEFFICIENTS FOR THE RATIONAL EQUATION*

LAND USE	A Soils[1]			B Soils[1]			C Soils[1]			D Soils[1]		
	<2%	2 - 6%	>6%	<2%	2 - 6%	>6%	<2%	2 - 6%	>6%	<2%	2 - 6%	>6%
Cultivated Land	0.08	0.13	0.16	0.11	0.15	0.21	0.14	0.19	0.26	0.18	0.23	0.31
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
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
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
Residential lot size 1/8 acre	0.25	0.28	0.31	0.27	0.30	0.35	0.30	0.33	0.38	0.33	0.36	0.42
Residential 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
Residential 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
Residential 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
ResIdential 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
Industrial	0.67	0.68	0.68	0.68	0.68	0.69	0.68	0.68	0.69	0.69	0.69	0.70
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
Streets	0.70	0.71	0.72	0.71	0.72	0.74	0.72	0.73	0.76	0.73	0.75	0.78
Open Space	0.05	0.10	0.14	0.08	0.13	0.19	0.12	0.17	0.24	0.15	0.21	0.28
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
Construction Sites - Bare, packed soil, smooth	0.30	0.35	.040	0.35	.040	0.45	0.40	0.45	0.50	0.50	0.55	0.60
Construction Sites - Bare, packed soil, rough	.020	0.25	0.30	0.25	0.30	0.35	0.30	0.35	0.40	0.40	0.45	0.50

*Runoff Coefficients for storm recurrence intervals less than 25 years

Adapted from McCuen, R.H., Hydrologic Analysis and Design (2004)

[1]According to the USDA NRCS Hydrologic Soils Classification System

TABLE C-4 - MANNING ROUGHNESS COEFFICIENTS

Material	Typical Manning Roughness Coefficient
Concrete	0.012
Gravel Bottom with Sides - Concrete	0.02
- Mortared Stone	0.023
- RipRap	0.033
Natural Stream Channels	
Clean, Straight Stream	0.030
Clean, Winding Stream	0.040
Winding With Weeds and Pools	0.050
With Heavy Brush and Timb	0.100
Flood Plains	
Pasture	0.035
Field Crops	0.040
Light Brush and Weeds	0.050
Dense Brush	0.070
Dense Trees	0.100

APPENDIX D- DRAINAGE PLAN APPLICATION AND FEE SCHEDULE

DRAINAGE PLAN APPLICATION

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

Application is hereby made for review of the stormwater management and erosion and Sedimentation control plan and related data as submitted herewith in accordance with The Middle Paxton Township Stormwater Management and Earth Disturbance Ordinance.

_____ final plan _____ preliminary plan _____ sketch plan

Date of submission: _____ submission no:._____

1. Name of subdivision or development_____

Name of applicant _____ Telephone No._____

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

Address_____

City _____Zip Code_____

Applicant's interest in subdivision or development_____
(If other than property owner give owners name and address)

3. Name of property owner _____ Telephone No._____
Address_____City_____
Zip Code _____

Name of engineer or surveyor _____

Telephone no. _____Address _____

City _____ Zip Code _____

1. Type of subdivision or development proposed:

____ Single Family lots	_____ Townhouses	____ Commercial (multi lot)
____ Two Family lots	_____ Garden Apartments	____ Commercial (one lot)
____ Cluster lots	_____ Campground	____ Industrial (one lot)
____ Planned Residential	_____ Other	

If other, describe type of development _____

6. Lineal feet of new road proposed? _____l.f.

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

a. Existing (to remain)_____ s.f. _____% of property
b. Proposed _____ s.f. _____% of property

8. Stormwater

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

b. Design storm utilized (on-site conveyance systems) (24 hr.)
(Check one)

- no. of sub area_____
- watershed name_____
- If other, explain:
  _____
  _____

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

d. Number of sub areas from Plate 1, of the _____ Watershed Stormwater Management Plan.

e. Type of proposed runoff control _____

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

g. Does the plan meet the requirements of Article III of the stormwater ordinance?_____

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

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

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

k. Is a construction schedule or staging attached? _____

l. Is a recommended maintenance program attached? _____

9. Has an Erosion and sediment pollution control (E&S Plan) been submitted to the County Conservation District?

a. Total area of earth disturbance _____ s.f.

10. Wetlands

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

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

c. Have the wetland lines been surveyed? _____

d. Total acreage of wetland within the property _____

e. Total acreage of wetland disturbed _____

f. Supporting documentation _____

11. Filing

a. Has the required fee been submitted? _____

amount $_____

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

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

d. General comments about stormwater management at development site

CERTIFICATE OF OWNERSHIP AND ACKNOWLEDGMENT OF APPLICATION:
COMMONWEALTH OF PENNSYLVANIA COUNTY OF _____

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

Property Owner(s)

My Commission Expires _____, 20_____

_____Notary Public

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

This Information To Be Completed By The Municipality

Middle Paxton Township Official Submission Receipt

Date complete application received _____Plan Number_____

Fees _____ Date fees paid _____Received by _____

Official submission receipt date _____

Received by _____

FEE SCHEDULE

Middle Paxton Township

Drainage Plan
Schedule of Fees

	Residential	Non-Residential
Filing Fee	$50.00	$100.00
Deposit Amounts*		
1-3 Lots or less than 10 acres	$500.00	$1000.00
4-10 Lots or less than 20 acres	$1000.00	$1500.00
11+ Lots or more than 20 acres	$1500.00 plus $50.00 per acre or lot	$2000.00 plus $50.00 per acre or lot
Modification Requests (per request)	$25.00	$50.00
Sketch Plan Concept Reviews	$200.00	$500.00
Construction Inspection Fee Estimated amount needs to be Included in Improvement Guarantee	Actual cost incurred	
Post Construction Inspection Fee five year review period, posted at completion of work before occupancy permit issued, and must be noted on approved plan with responsible person noted.	$300.00 per lot or $500.00 for 1-4 lot Subdivision with combined B.M.P.'s, $750.00 for 4-10 lots, $1000.00 for subdivision greater than 10 lots plus $100.00 per B.M.P.	

Notes:
Filing Fee – Non-refundable

*__Deposit Amounts__ – If cost incurred is less than deposit, a refund will be issued.
If the Deposit balance falls below $200.00, an additional $500.00 will be requested to cover any future engineering review fees.
If the Deposit account has a negative balance, no extension of time request will be granted, or permits issued until the account is paid in full.

CALCULATED SUBMISSION FEE

Middle Paxton Township

Drainage Plan

Subdivision name _____Submittal No._____

Owner _____Date _____

Engineer _____

Filing Fee……..._____

Deposit Amount- #Lots_____ - Base……_____

Additional Amount……_____

Modification Request - #_____……_____

Other…..._____……_____

TOTAL……_____

APPENDIX E
STORM WATER MANAGEMENT SITE PLAN EXEMPTION APPLICATION
MIDDLE PAXTON TOWNSHIP

Owner's Name: _____

Address: _____

_____

Project Location: _____

Phone #: _____ Fax #: _____

Email: _____

Person to be completing the work: _____

Address: _____

Phone #: _____ Fax #: _____

Email: _____

Description of Existing Conditions and Proposed Activity

1. Has any impervious surface been installed on this property since the enactment of this Storm Water Management Ordinance?

   [ ] No

   [ ] Yes; total area of previously installed impervious surface _____ sq. ft.

2. Are you removing existing impervious surface as part of this project?

   [ ] No

   [ ] Yes; total area of impervious surface to be removed _____ sq. ft.

3. Addition of impervious surface with this project (must be less than 500 sq. ft):

   Total area of new impervious surface proposed _____ sq. ft.

   Type of new impervious surface:

   [ ] Driveway [ ] Shed [ ] Garage [ ] Deck [ ] Walkway [ ] Patio [ ] Building Addition

   [ ] Other (please describe) _____

4. Removal of ground cover, grading, filling, or excavation of an area:

   Total area of land disturbance _____ sq. ft.

   Type of regulated ground work activity (check all that apply):

   [ ] Ground Cover Change [ ] Grading [ ] Filling [ ] Excavation
   [ ] Other Earth Disturbance Activity (please describe) _____
   _____

5. Provide a copy of the Zoning or Building Permit Sketch.

By my signature below, I certify to the Township that, to the best of my knowledge, the following statements are true:

- The proposed activity will not result in the disturbance of land within floodplains, wetlands, environmentally sensitive areas, riparian forest buffers, or slopes greater than 15%.
- The proposed activity will not be conducted within any existing drainage or storm water easement created by or shown on any recorded plan.
- The proposed activity will minimize soil disturbance, take steps to minimize erosion during construction activity, and promptly reclaim all disturbed areas with topsoil and vegetation.
- The proposed activity will not adversely impact any existing known problem areas or downstream property owners or the quality of runoff entering any storm sewer.
- I will minimize soil disturbance, take steps to minimize erosion during construction activity, and promptly reclaim all disturbed areas with topsoil and vegetation.
- I will take steps to insure that runoff will be directed to pervious areas on the subject property. No runoff will be directed onto an abutting street or neighboring property.
- I acknowledge the Township's right to review the provided information, at my expense, and to deny this application or to revoke this permit application if any of the above statements are found to be false.

The undersigned hereby represents that, to the best of their knowledge and belief, all information listed above is true, correct and complete.

_____ _____

Date Signature of Owner / Applicant

- Municipal Use Only –

Date Received: _____ File #: _____ Submitted Fee: _____

Property Account #: _____

Approval Date of Application: _____

Comments: _____

APPENDIX F

SMALL PROJECT APPLICATION AND STORMWATER MANAGEMENT DESIGN ASSISTANCE MANUAL

FOR SMALL PROJECTS IN MIDDLE PAXTON TOWNSHIP DAUPHIN COUNTY, PENNSYLVANIA

SMALL PROJECTS SIMPLIFIED APPROACH

Prepared By:

Light-Heigel & Associates, Inc.
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TABLE OF CONTENTS

Small Projects Stormwater Control Application

Application is hereby made to Middle Paxton Township for the issuance of a Storm Water Management Plan approval for Land Disturbance as defined in the Middle Paxton Township Storm Water Management Ordinance. January 3, 2011 shall be a starting point from which the impervious or disturbed areas for small project activity shall be cumulatively considered.

General Information from the Applicant

Name of Owner: _____ Date: _____
Address of Owner: _____
Name of Applicant (if different than owners): _____
Address of Applicant: _____
Contact Phone Number: _____ Email Address: _____
Address of Project: _____
Brief Description of Project: _____
_____
_____

Did the Applicant meet with the Township Staff concerning this project?
Yes ☐ No ☐ When? _____

Distance from the proposed project to the nearest water feature (stream, pond, lake, wetlands). Check one: ☐ 50 feet or less ☐ More than 50 feet

The amount of impervious cover (sq. ft.) _____
Area of earth to be disturbed with this project including storm water management facilities (sq. ft.) _____

Is the applicant proposing to use a stone lined trench or dry well to control stormwater from the proposed impervious areas? ☐ Yes ☐ No.

Has the applicant dug any test pits in the areas where the stone lined trench or dry well are proposed to be used in order to see if there is shallow bedrock, an elevated water table or other limiting zone limitations that would make the use of these storm water control BMPs infeasible? ☐ Yes ☐ No

Is the applicant proposing to use a cistern/tank to control storm water from the proposed impervious areas? ☐ Yes ☐ No

If Yes, how will the cistern be emptied?_____
_____
What will be the use of the cistern water? _____
_____
How much water will be used per day? _____ gal. Per week? _____gal.

Simplified SWM Site Plan

Attach a Simplified SWM Site plan (i.e. sketch plan); an example is shown on the next page.

This sketch plan should include:

1. The approximate location of the property lines.
2. Existing sidewalks, buildings, driveways, or other impervious areas with dimensions in feet and areas in square feet.
3. The location where the proposed impervious area is going to be located with dimensions in feet and areas in square feet.
4. Dimensions from the property line to the proposed impervious areas.
5. Arrows showing the general stormwater flow direction across the project area.
6. The location of the proposed stormwater control facilities with dimensions and distances from the existing/proposed structures.
7. The location of existing utilities (water, sewer, gas, etc.).
8. Pa 1 Call number.
9. The area of disturbance delineated on the plan showing the area in square feet.

I acknowledge the Township's right to review the provided information, at my expense, and to deny this application or to revoke this permit application if any of the above statements are found to be false.

The Applicant assumes all risk and responsibilities for the design submitted. The manual is provided as a guide. However, it provides no specific design for any project.

The undersigned hereby represents that, to the best of his knowledge and belief, all information listed above and on the storm water management plan herewith submitted is true, correct and complete.

_____ _____

Date Applicant

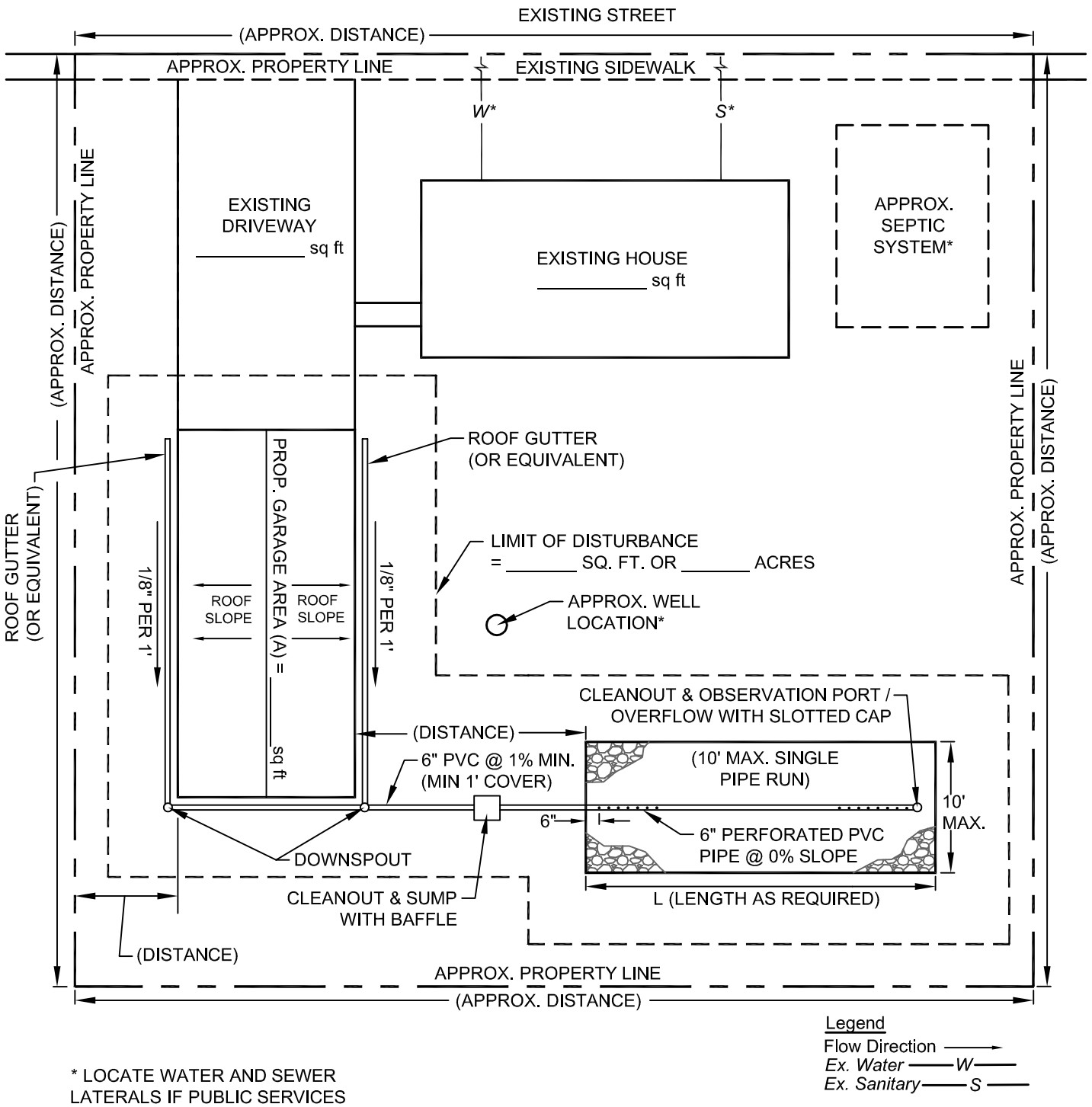
OFFICE USE

Date Received _____ Township File # _____

Property Account # _____

Submission Fee _____

Date of Application Approval _____



Legend

Flow Direction ——→

Ex. Water ——W——

Ex. Sanitary ——S——

* LOCATE WATER AND SEWER LATERALS IF PUBLIC SERVICES EXIST. LOCATE SEWER SYSTEM AND WELL IF NO PUBLIC SEWER OR WATER IS AVAILABLE

SAMPLE STORMWATER MANAGEMENT SITE PLAN

SHEET 1 OF 5

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SAMPLE WORKSHEET

Proposed Impervious and disturbed areas and Stormwater Control Volume Estimates:

1. What is the total proposed impervious area (A) in square feet? _____
2. What is the total earth disturbance area in square feet? _____
3. Take the total proposed impervious area (A) and determine the required stormwater runoff volume and BMP adjustments as required in the table below.

Stormwater Volume Estimates and Volume Adjustments by BMP (2 inch of rain)		
Proposed Impervious Area (A*) =	sq ft	
Stormwater Runoff Volume (B) =	(A)/6 =	(B) = cu ft
Stormwater BMP	Stormwater Volume Adjustment	Adjusted Stormwater Volume cu ft (C)
Cistern	B(cu ft) x 1.25**x7.50****	Adjusted Volume in Gallons
Rain Gardens/Bioretention Areas/Non-Stone lined dry wells	No Volume Adjustment needed	cu ft
Stone Lined Infiltration Trench or Dry Well	B(cu ft) x 2.5***	cu ft

* From Question 1 above. (Also see Sample Site Plan)
** Conversion factor assuming Cistern is 25% full.
*** Conversion factor assuming volume of voids = 40% i.e. dividing the volume by 0.4 is equivalent to multiplying the volume by 2.5
****1 Cubic ft = 7.5 Gallons

Example: 30'x50' Pole Building

Proposed Impervious Area = 1,500 sq ft

Stormwater Volume Estimates and Volume Adjustments by BMP		
Proposed Impervious Area (A) =	1,500 sq ft	
Stormwater Runoff Volume (B) cu ft =	(A)/6 = 1,500/6 =	(B) = 250 cu ft
Stormwater BMP	Stormwater Volume Adjustment	Adjusted Stormwater Volume cu ft (C)
Cistern	250 x 1.25 x 7.50	312.5 cu ft or 2,343.75 Gal
Rain Gardens/Bioretention Areas/Non-Stone lined dry wells	No Volume Adjustment Needed	250 cu ft
Stone Lined Infiltration Trench or Dry Well	250 cu ft x 2.5 =	625 cu ft

Conclusion:

1. A cistern for water re-use of at least 2,344 gallons could be used to collect the runoff from the new impervious cover.
2. A rain garden/bioretention area for surface water absorption of at least 10' wide x 21' long x 1' deep x SSF***** (10x21x1x1.20=252 cu ft) could be used.
   ***** SSF = Side Slope Factor; Factor is 1.10 for 0.5' deep, 1.20 for 1.0' deep rain gardens
3. An underground infiltration stone lined trench of 10' wide x 32' long by 2' deep (10'x32'x2'=640 cu ft) could be used.

APPLICANT'S WORKSHEET

Stormwater Volume Estimates and Volume Adjustments by BMP		
Proposed Impervious Area (A) =	_____ sq ft	
Stormwater Runoff Volume (B) =	(A)/6 = cu ft	(B) = cu ft
Stormwater BMP	Stormwater Volume Adjustment	Adjusted Stormwater Volume cu ft (C)
Cistern	(B)_____(cu ft) x 1.25 x 7.50	
Rain Gardens/Bioretention Areas/Non-Stone lined dry wells	No Volume Adjustment Needed	(B) _____
Stone Lined Infiltration Trench or Dry Well	(B)_____ (cu ft) x 2.5 =	

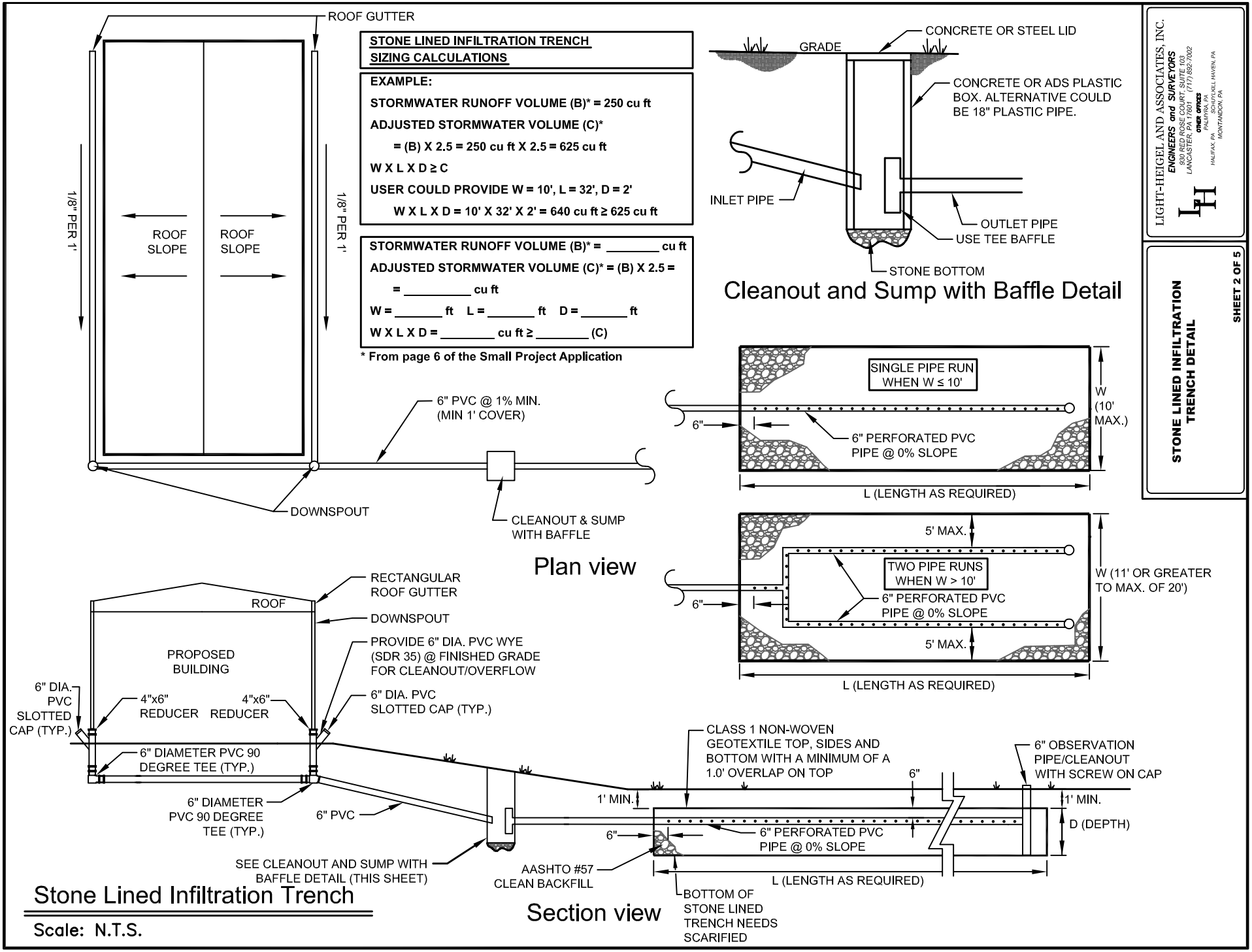
I propose to use a _____ of _____
(size)

for the stormwater control of my small project.

APPENDICES

APPENDIX - A

Stormwater Control BMPs



Stone Lined Infiltration Trench

Scale: N.T.S.

STONE LINED INFILTRATION TRENCH SIZING CALCULATIONS

EXAMPLE:

STORMWATER RUNOFF VOLUME (B)* = 250 cu ft

ADJUSTED STORMWATER VOLUME (C)*

= (B) X 2.5 = 250 cu ft X 2.5 = 625 cu ft

W X L X D ≥ C

USER COULD PROVIDE W = 10', L = 32', D = 2'

W X L X D = 10' X 32' X 2' = 640 cu ft ≥ 625 cu ft

STORMWATER RUNOFF VOLUME (B)* = _____ cu ft

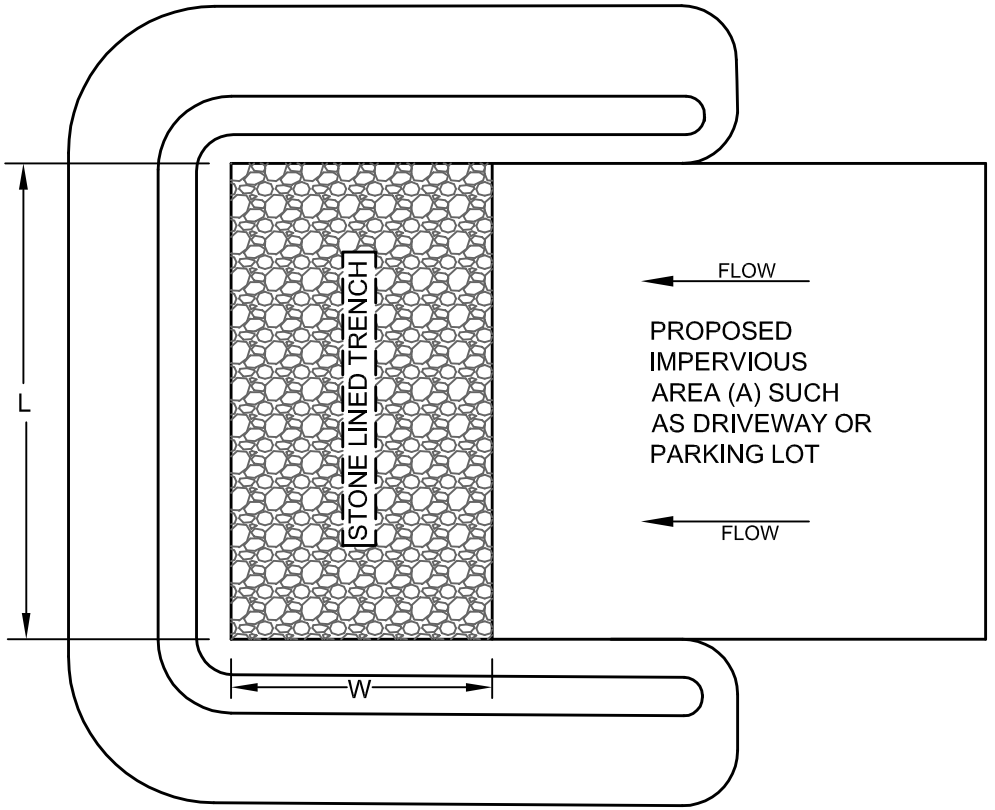
ADJUSTED STORMWATER VOLUME (C)* = (B) X 2.5 =

= _____ cu ft

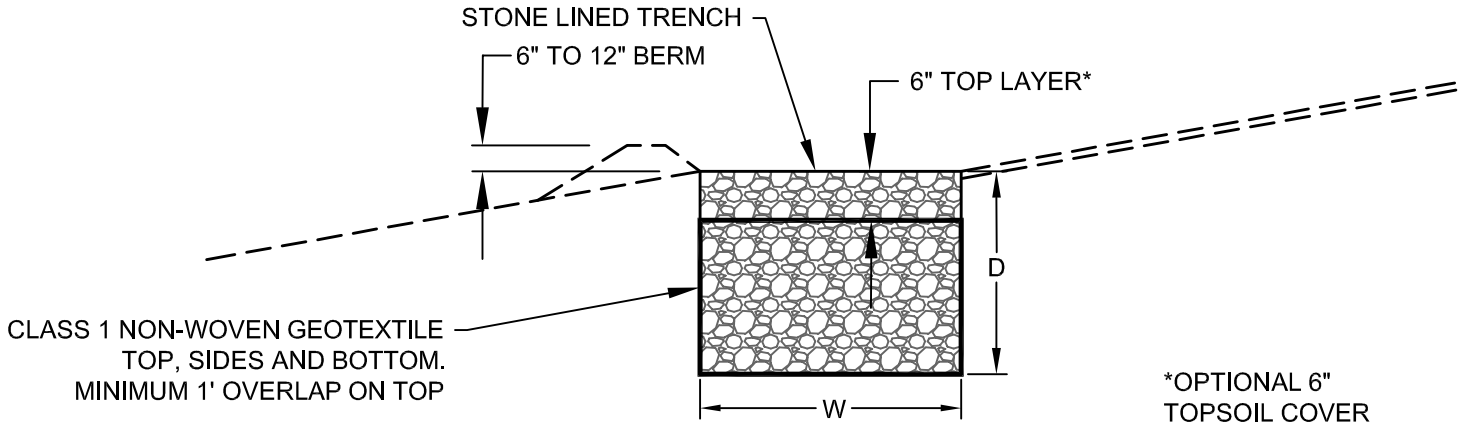
W = _____ ft L = _____ ft D = _____ ft

W X L X D = _____ cu ft ≥ _____ (C)

*** From page 6 of the Small Project Application**



Plan view



Section view (Scale: N.T.S)

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STONE LINED INFILTRATION TRENCH AT GRADE DETAIL

RAIN GARDEN / BIORETENTION AREA SIZING CALCULATIONS

EXAMPLE:

STORMWATER RUNOFF VOLUME (B)* = 250 cu ft
(NO VOLUME ADJUSTMENT NEEDED)

W X L X D X SSF ≥ B

USER COULD PROVIDE W = 10', L = 21', D = 1'

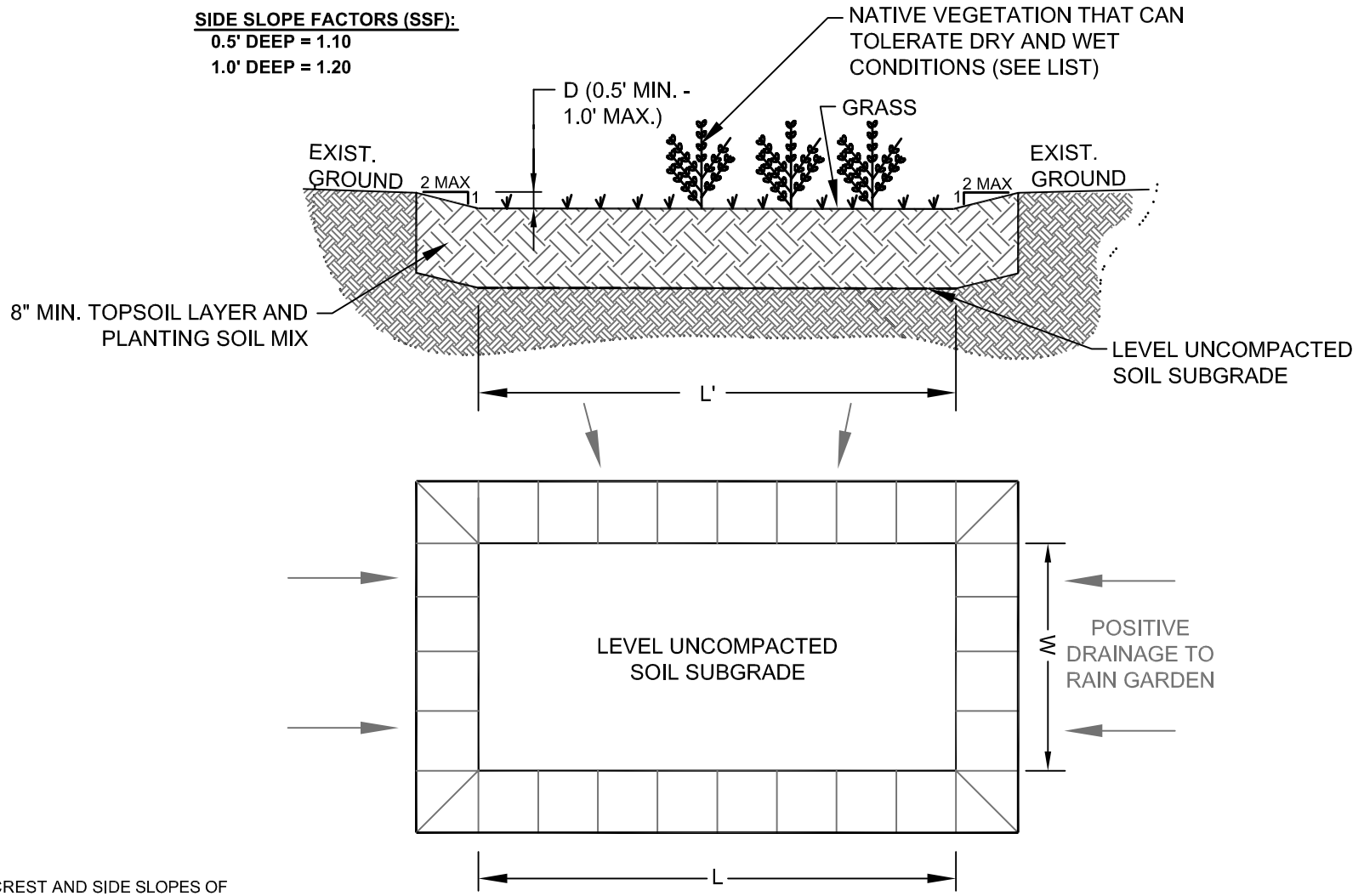
W X L X D X SSF = 10' X 21' X 1' X 1.20 = 252 cu ft ≥ 250 cu ft

STORMWATER RUNOFF VOLUME (B)* = _____ cu ft

W = _____ ft L = _____ ft D = _____ ft SSF = _____

W X L X D X SSF= _____ cu ft ≥ _____ (B)

SIDE SLOPE FACTORS (SSF):
0.5' DEEP = 1.10
1.0' DEEP = 1.20



Rain Garden/Bioretention Area

Scale: N.T.S.

NOTE
LINE CREST AND SIDE SLOPES OF SPILLWAY W/ NORTH AMERICAN GREEN TYPE S75 EROSION CONTROL BLANKET (OR EQUAL).

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RAINGARDEN / BIORETENTION AREA DETAIL

A Rain Garden (Bioretention Area) is an excavated depression area on the surface of the land in which native vegetation is planted to filter and use stormwater runoff. Runoff ponds on top of the surface of the rain garden and then infiltrates into an enhanced soil/planting mix below the surface where plants can use the water to grow. Bioretention also improves water quality, vegetation filters the water, and the root systems encourage or promote infiltration. Key elements of a rain garden include:

- Ponding depths recommended to **1 foot** or less.
- Native vegetation that can tolerate dry and wet weather.
- An overflow area where, if the bioretention area were to overflow, the overflow would flow over pervious area (i.e. grass, meadow), and would not cause harm to property, or;
- An overflow such as a domed riser to allow excess flow from large storms to travel to other substantial infiltration areas or pervious areas.
- For most areas, maximum 3:1 slopes are recommended, however, where space is limited, 2:1 side slopes may be acceptable with approval from the municipal engineer.
- The soil/planting mix depth should be between 1.5 feet to 6 feet deep.

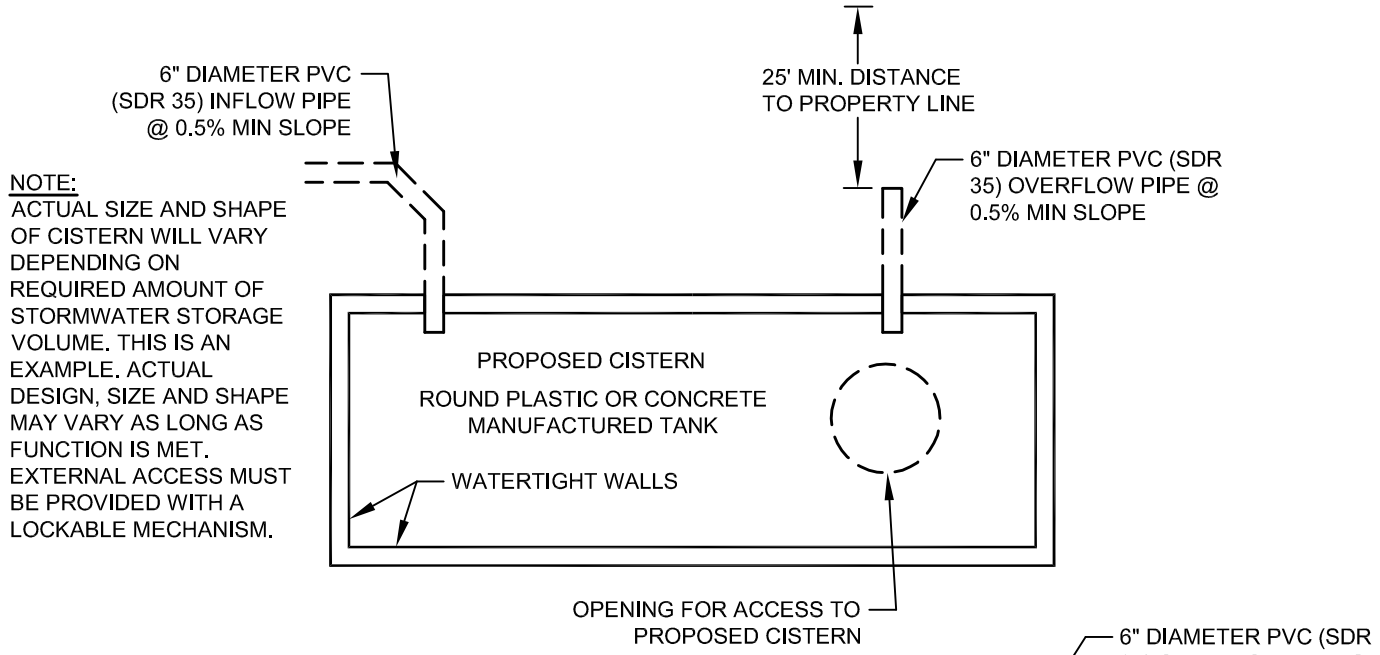
Rain Garden Native Planting List

Perennials and Ferns:

Blue false indigo (Baptisia australis)
Blue flag iris (Iris versicolor)
Blue star (Amsonia tabernaemontana)
Blue vervain (Verbena hastata)
Boltonia (Boltonia asteroides)
Boneset (Eupatorium perfoliatum)
Bottlebrush grass (Hystrix patula)
Broomsedge (Andropogon virginicus)
Cardinal flower (Lobelia cardinalis)
Cinnamon fern (Osmunda cinnamomea)
Culvers root (Veronicastrum virginicum)
Golden ragwort (Senecio aureus)
Goldenrod (Solidago patula, S. rugosa)
Great blue lobelia (Lobelia siphlitica)
Green bullrush (Scirpus atrovirens)
Horsetail (Equisetum species)
Marsh marigold (Caltha palustris)
Mistflower (Eupatorium colestinum)
Monkey flower (Mimulus ringens)
New England aster (Aster novae-anglia)
New York aster (Aster novi-belgii)
Obedient plant (Physotegia virginiana)
Royal fern (Osmunda regalis)
Seedbox (Ludwigia alternifolia)
Sensitive fern (Onoclea sensibilis)
Sneezeweed (Helenium autumnale)
Soft rush (Juncus effusus)
Swamp milkweed (Asclepias incarnata)
Swamp rose mallow (Hibiscus moscheutos)
Swamp sunflower (Helianthus angustifolius)
Switchgrass (Panicum virgatum)
Threadleaf coreopsis (Coreopsis verticillata)
Tussock sedge (Carex stricta)
White turtlehead (Chelone glabra)
Woolgrass (Scirpus cyperinus)

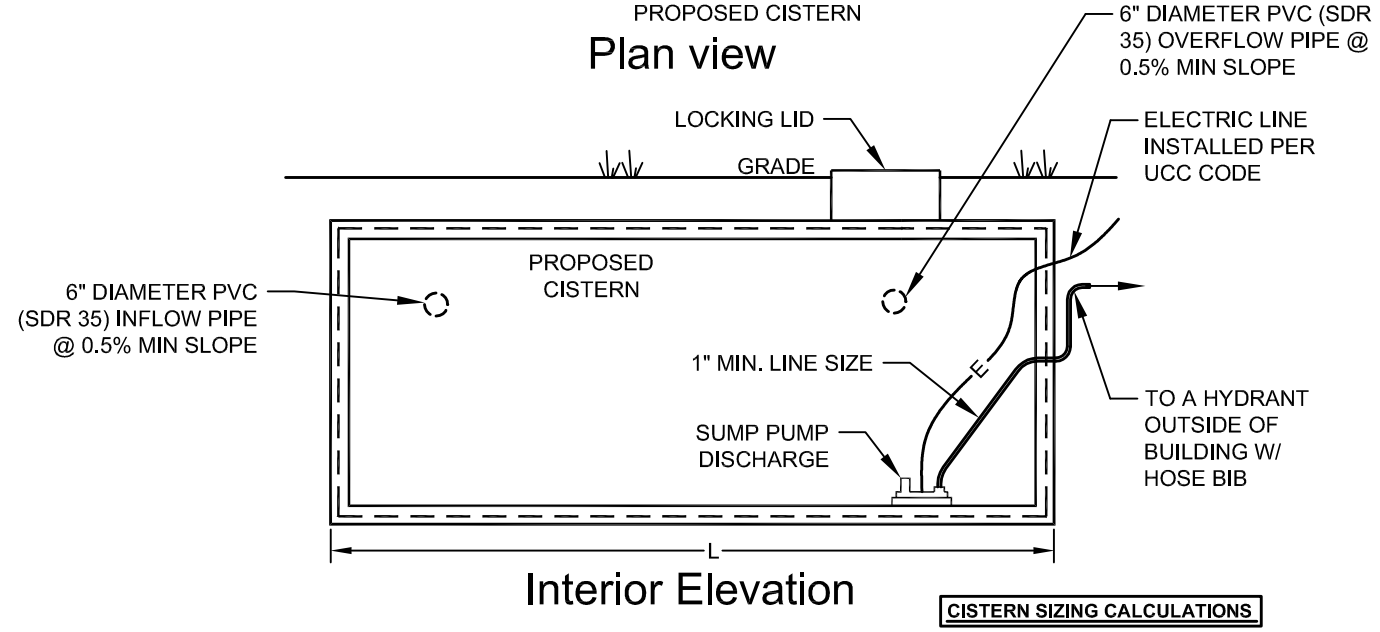
Shrubs:

American beautyberry (Calicarpa americana)
Arrowwood (Viburnum dentatum)
Black chokeberry (Aronia melanocarpa)
Broad-leaved meadowsweet (Spirea latifolia)
Buttonbush (Cephalanthus occidentalis)
Elderberry (Sambucus canadensis)
Inkberry (Ilex glabra)
Narrow-leaved meadowsweet (Spirea alba)
Ninebark (Physocarpus opulifolius)
Possumhaw (Viburnum nudum)
Red-osier dogwood (Cornus sericea)
St. Johnswort (Hypericum densiflorum)
Silky dogwood (Cornus amomum)
Smooth alder (Alnus serrulata)
Spicebush (Lindera benzoin)
Swamp azalea (Rhododendron viscosum)
Swamp rose (Rosa palustris)
Sweet pepperbush (Clethra alnifolia)
Wild raisin (Viburnum cassinoides)
Winterberry (Ilex verticillata)
Virginia sweetspire (Itea virginica)



NOTE:
ACTUAL SIZE AND SHAPE OF CISTERN WILL VARY DEPENDING ON REQUIRED AMOUNT OF STORMWATER STORAGE VOLUME. THIS IS AN EXAMPLE. ACTUAL DESIGN, SIZE AND SHAPE MAY VARY AS LONG AS FUNCTION IS MET. EXTERNAL ACCESS MUST BE PROVIDED WITH A LOCKABLE MECHANISM.

Plan view



Interior Elevation

CISTERN SIZING CALCULATIONS

EXAMPLE:

STORMWATER RUNOFF VOLUME (B) = 250 cu ft

ADJUSTED STORMWATER VOLUME (C)

= (B) X 1.25 = 250 cu ft X 1.25 = 312.5 cu ft

= 312.5 cu ft X 7.5 GAL/cu ft = 2,343.75 GAL.

W X L X D ≥ C

USER COULD PROVIDE W = 12', L = 10', D = 3'

W X L X D = 12' X 10' X 3' = 360 cu ft ≥ 312.5 cu ft (2,343.75 GAL.)

STORMWATER RUNOFF VOLUME (B)* = _____ cu ft

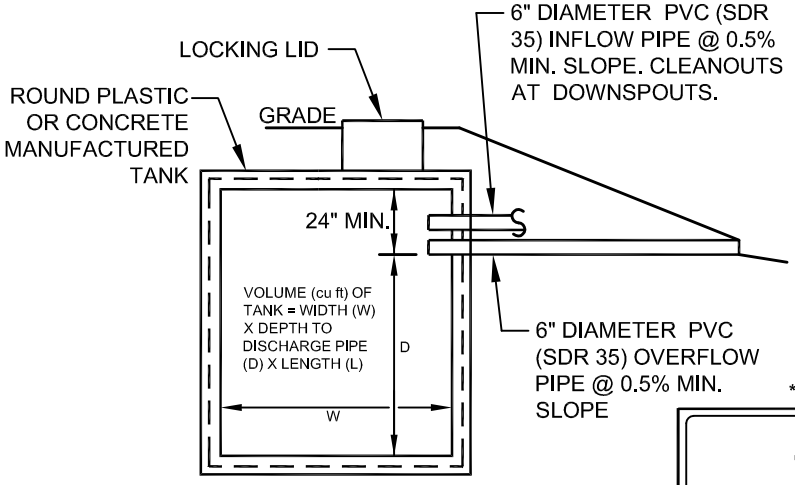
ADJUSTED STORMWATER VOLUME (C)* = (B) X 1.25 =

_____ cu ft X 7.5 GAL/cu ft = _____ GAL.

W = _____ ft L = _____ ft D = _____ ft

W X L X D = _____ cu ft ≥ _____ (C) (OR _____ GAL.)

*** From page 6 of the Small Project Application**



Section View

CISTERN DETAILS

SHEET 5 OF 5

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APPENDIX - B

Stormwater Control BMPs Operation, Maintenance, and Inspection Plan and Agreement

Sizing and design considerations for Stormwater Control BMPs

There are several different types of Stormwater Control BMPs the applicant can choose from for their projects needs. A combination of Stormwater Control BMPs may be needed to control stormwater runoff from the proposed impervious areas. The following is only a partial list of more common storm water Control BMPs and does not cover all of the BMPs available.

These BMPs are:

1. Cisterns
2. Rain Garden/Bioretention Areas
3. Stone Lined Trench or Stone Filled Dry Well

Cisterns

Cisterns are large containers that collect drainage from roof leaders and temporarily store water to be released to lawns, gardens, and other landscaped areas after the rainfall event has ended. Cisterns can have volumes of 200 gallons (27 cu ft) or more, and can be placed either on the surface or underground. Figure 1 shows examples of cisterns that could be used to manage stormwater from a project. Cisterns are manufactured in a variety of shapes and sizes. All of these facilities must make provisions for the following items:

- There must be a means to release the water stored in the container between storm events in order for the necessary storage volume to be available for the next storm.
- Stormwater must be kept from entering other potable systems, and pipes and storage units must be clearly marked “Do Not Drink”.
- An overflow outlet should be placed a few inches below the top of the storage container with an overflow pipe to divert flow away from structures once the storage containers are filled.
- Use screens to filter debris, and covers (lids) placed over the containers to prevent insects and debris from entering the storage chamber.
- Make sure cisterns are watertight and do not leak.
- Rain barrels are typically assumed to be 25% full to calculate volume since they are not always emptied before each storm.

Figure 1: Source (for both photographs): Pennsylvania Stormwater BMP Manual (PADEP, 2006)

Stone Lined Infiltration Trench

An infiltration trench is a long, narrow, rock-filled trench with or without a perforated pipe that receives stormwater runoff, and has no outlet. Runoff is stored in the void space between the stones and in the pipe, and infiltrates through the bottom and into the underlying soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Infiltration trenches shall incorporate or make provisions for the following elements:

- Perforated pipe is to be set level.
- The width is limited to between 3 to 8 feet, and the depth ranges from 2 to 6 feet.
- Trench should be wrapped in nonwoven geotextile (top, sides, and bottom).
- There should be a positive overflow that allows stormwater that cannot be stored or infiltrated to be discharged into a nearby vegetated area.
- Roof downspouts may be connected to infiltration trenches, but should contain a cleanout to collect sediment and debris before entering the infiltration area.
- Infiltration testing is recommended to ensure soil is capable of infiltrating stormwater.
- It is recommended that there be a 2 foot clearance above the regularly occurring seasonal high water table, and have a minimum depth to bedrock of 2 feet.
- The infiltration trench should be at least 50 feet from individual water supply wells, 100 feet from community or municipal water supply wells, and 50 feet from any septic system component. It should not be located near hotspots which are areas where land use or activities generate highly contaminated runoff, with concentrations of pollutants that are higher than those that are typically found in stormwater (e.g. vehicle salvage yards, recycling facilities, vehicle fueling stations, maintenance facilities, etc.).
- The infiltration trench should be located so that it presents no threat to sub-surface structures such as building foundations and basements.
- Protect infiltration areas from compaction by heavy equipment during and after construction.
- The ratio of the collected area to the footprint of the facility should be as small as possible with a ratio of less than 5:1 preferred.

Dry Wells

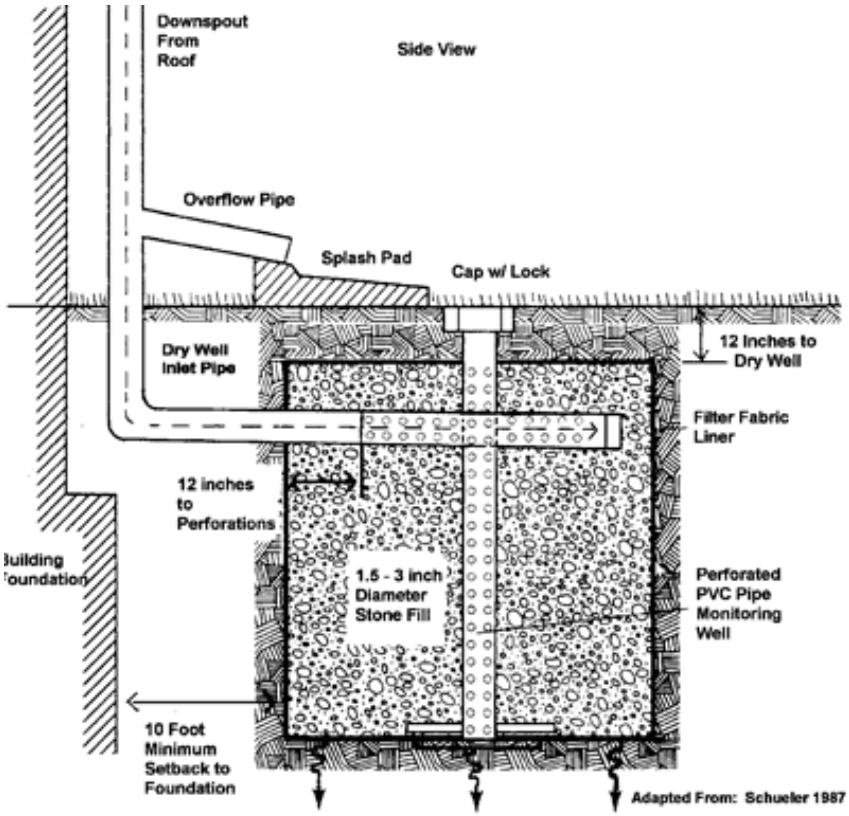
A dry well, also referred to as a seepage pit, is a subsurface storage facility that temporarily stores and infiltrates runoff from the roofs of buildings or other impervious surfaces. A dry well can be either a structural prefabricated chamber (Dry Well #1) or an excavated pit filled with stone fill (Dry Well #2). Dry Wells discharge the stored runoff via infiltration into the surrounding or underlying soils. Figure 4 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 from the building foundation to avoid foundation seepage problems, and are not recommended if their installation would create a risk for basement flooding.
- Construction of a dry well should be performed after surface soils in all other areas of the site are 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 stone with an average of one and one half to three (1.5 –

3.0) inches in diameter with the gravel fill wrapped in a nonwoven geotextile that separates the stone fill from the surrounding soil.

- At least 1 foot of soil needs to 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 connect to other on-site substantial infiltration areas or pervious areas.
- Every dry well needs to have at least one monitoring well.
- Infiltration testing is recommended to ensure the underlying soil is capable of infiltrating the needed volume of stormwater.

Dry Well #1
Source (for photograph): http://www.copelandconcreteinc.net/1800652.html



Dry Well #2
Source (for photograph): http://www.seagrant.sunysb.edu/cprocesses/pdfs/BMPsForMarinas.htm

Figure 4: Typical Dry Well Structural Prefabricated Chamber (Dry Well #1) and Typical Dry Well Configuration filled with Stone Fill (Dry Well #2)

Operation, Maintenance, Inspection Plan, and Agreement

Regardless to which stormwater control BMPs the applicant chooses to use an Operation, Maintenance, and Inspection Plan and Agreement will need to be signed, notarized, and submitted to the Municipality.

Following approval and signature by the Middle Paxton Township, the landowner must have the agreement recorded at the Dauphin County Office of the Recorder of Deeds, so that the agreement will be applicable to future landowners, with a copy of the recorded agreement submitted to the Township.

See Ordinance for the Operation, Maintenance, and Inspection Plan and Agreement.