PART B

Storm Water Management[60]

Section 201. **Statement of Findings**. The governing body of the Borough of State College finds that:

a. Inadequate maintenance of storm water best management practices (BMPs) causes loss of water quality, flooding and threatens public health and safety.

b. Federal and state regulations require the Borough to obtain a permit for discharges from its MS4 and to implement a program of storm water controls.

c. A comprehensive program of reasonable regulation of connections and discharges to municipal storm water management facilities is fundamental to the public health, safety, welfare, and the protection of the people of the Borough of State College and all the people of the Commonwealth, their resources, and the environment.

d. It shall be illegal to discharge non-storm water to the Borough owned separate storm sewer system. Nothing in this ordinance shall affect a discharger's responsibilities under state law.

e. Storm water is an important resource.

(Ordinance 1741, March 17, 2003, Section 101, as amended by Ordinance 1774, March 2, 2004, Section 1, and by Ordinance 2049, October 6, 2014.)

Section 202. **Purpose**. The purpose of this ordinance is to promote health, safety, and welfare within the Borough of State College through provisions designed to:

a. Manage accelerated runoff, erosion, aggradation and degradation of streams, channels and drainage ways.

b. Meet NPDES MS4 requirements.

c. Meet state water quality requirements.

d. Maintain existing flows and quality of streams and watercourses and drainways in the Borough of State College and the Commonwealth.

e. Preserve and restore the flood-carrying capacity of streams.

f. Provide proper maintenance of all permanent storm water management facilities that are constructed in the Borough.

g. Provide procedures and for storm water management and planning.

h. Protect groundwater and surface water quality.

(Ordinance 1741, March 17, 2003, Section 102, as amended by Ordinance 2049, October 6, 2014.)

Section 203. **Statutory Authority**. The Borough of State College is empowered to regulate land use activities that affect runoff by the authority by the Act of October 4, 1978 32 P.S., P.L. 864 (Act 167) Section 680.1 et seq., as amended, the "Storm Water Management Act" and Home Rule Charter and Optional Plan Law 53 Pa. C.S.A. Section 2961. (Ordinance 1741, March 17, 2003, Section 103 as amended by Ordinance 2049, October 6, 2014.)

Section 204. Applicability. This ordinance shall apply to all land, streams, drainage ways and watercourses within the Borough of State College.

This ordinance shall only apply to permanent storm water management facilities constructed as part of any of the Regulated Activities listed in this Section and to the Ownership and Maintenance of said facilities and BMPs. Storm water management and erosion and sediment pollution control during construction activities are specifically not regulated by this ordinance, but shall continue to be regulated under existing laws and ordinances.

The following activities are defined as "Regulated Activities" and shall be regulated by this ordinance:

a. Land development;
b. Subdivision;
c. Construction of new or additional impervious or semi-pervious surfaces (roadways, driveways, parking lots, etc.);
d. Construction of new buildings or additions to existing buildings;
e. Diversion or piping of any natural or man-made stream channel;
f. Installation, modification, extension, revision and repair of storm water management facilities or appurtenances thereto.
g. Land Disturbance

(Ordinance 1741, March 17, 2003, Section 104, as amended by Ordinance 2049, October 6, 2014.)

Section 205. Repealer. Ordinance 1741 enacted March 17, 2003 and Ordinance 1774 enacted March 1, 2004 are hereby repealed, in their entirety. (Ordinance 2049, October 6, 2017.)

Section 206. Severability. Should any section or provision of this ordinance be declared invalid, unconstitutional, or unenforceable by a court of competent jurisdiction, such decision

shall not affect the validity of any of the remaining provisions of this ordinance. (Ordinance 2049, October 6, 2017.)

Section 207. Compatibility with Other Ordinance Requirements. Approvals issued 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, rules, statutes, or ordinances. (Ordinance 2049, October 6, 2017.)

Section 208. Landowner Responsibility.

a. The granting of any exemption, permit, or approval by the Borough does not relieve the applicant from assuring that storm water runoff from the development site will not cause injury or damage to other persons or property.

b. No person shall allow, or cause to allow, storm water discharges into the Borough's separate storm sewer system which are not composed entirely of storm water except (1) as provided in Section 113.m of this ordinance and (2) discharges allowed under a state or federal permit.

c. No person shall allow, or cause to allow, the connection of any drain or conveyance to the Borough's separate storm sewer system, whether on the surface or subsurface, which allows any non-storm water discharge including sewage, process wastewater, and wash water, to enter the separate storm sewer system, or any connection to the separate storm sewer system from indoor drains and sinks. No drain or conveyance connected from a commercial or industrial land use shall be allowed to connect to the separate storm sewer system which has not been documented in plans, maps, or equivalent records and approved by the Borough Engineer. The owner of such commercial or industrial land use drain or conveyance system shall provide satisfactory evidence that such discharge meets the discharge criteria of this ordinance.

(Ordinance 1741, March 17, 2003, Section 107, as amended by Ordinance 1774, March 2, 2004, Section 2, as amended by Ordinance 2049, October 6, 2014.)

Section 209. References. Specific methods and publications indicated in this ordinance shall, in all cases, refer to the latest available edition and include revisions or amendments thereto. (Ordinance 1741, March 17, 2003, Section 108, as amended by Ordinance 2049, October 6, 2014.)

Section 210. Exemptions and Exclusions. Activities identified below are exempt from the requirement to submit a Storm Water Management Site Plan to the Borough for review. Exemption shall not relieve the applicant from implementing such measures as are necessary to protect health, safety, and property. These measures include adequate and safe conveyance of storm water on the site and as it leaves the site. This exemption shall not relieve the applicant

from meeting the special requirements for water quality and groundwater recharge for high quality (HQ) and exceptional value (EV) watersheds (PA DEP Chapter 93 and anti-degradation requirement), and Sections 116 C and E of this ordinance relative to recharge and water quality volume requirements.

a. All development and subdivision activities which have impervious coverage of less than 10 percent of the total site area up to a maximum impervious area of 2,500 square feet. However, adequate and safe conveyance of storm water from the site must be provided. For developments that are to be constructed in phases, the sum of all final phases must be considered in establishing exemption eligibility. Impervious cover may include, but not be limited to, any roof, parking or driveway areas, and any new streets and sidewalks, or bikeway utilizing impervious materials.

b. Land disturbance associated with the construction or alteration of 1- and 2-family dwellings, provided that the disturbance does not alter any storm water condition beyond the boundaries of the lot or alter provisions of a previously approved Storm Water Management Plan for the lot or encompassing subdivision. Mulitple (>2) lot subidivisions cannot be exempted

c. Any site less than one (1) acre in size that decreases the total site impervious area following development, and:

(1) Is not located within a recognized sensitive area (as defined in Section 112, Definitions, of this ordinance);

(2) Is not defined as a water quality sensitive (WQS) development (as defined in Section 112, Definitions, and Appendix B, Maps); or

(3) Is not located in an area where existing downstream storm water problems are known to occur (the Borough Engineer shall make the final determination as to pre-existing problems, but the Borough must be supplied with supporting documentation of past problems).

d. In addition, the Borough Engineer may waive the requirement to prepare a storm water management site plan for sites larger than 1.0 acre for which the overall site impervious area is being decreased, and which meets the other conditions identified above.

e. Agriculture and Silviculture activities as defined in Section 112, Definitions, that are conducted according to requirements of 25 Pa. Code 102.f.Property and storm water facilities owned and/or controlled by the Borough of State College and used for public purposes are excluded from the provisions of the within ordinance.

The diversion or piping of any natural or man-made stream channel and/or for the installation of storm water management facilities or modifications thereto cannot be exempted. These activities always require the submission of a Storm Water Management Site Plan. Exemptions a and b cannot be combined for use with small residential subdivisions.

In addition to the general exemptions identified above, exemptions for specific technical criteria are identified where applicable in Section 114.

(Ordinance 1741, March 17, 2003, Section 109, as amended by Ordinance 2049, October 6, 2014.)

Section 211. Invalid Approval. Any approval or authorization issued or approved based on false, misleading or erroneous information provided by an applicant is invalid following notification. Any work undertaken or use established pursuant to such approval or other authorization is unlawful. No action shall be taken by a board, commission, council, department or employee of the Borough purporting to validate such a violation. (Ordinance 2049, October 6, 2014.)

Section 212. Definitions. For the purposes of this Chapter, certain terms and words used herein shall be interpreted as presented below. Additional definitions are provided in the Act 167 Plan.

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".

Agricultural Activities – The work of producing crops and raising livestock including tillage, plowing, disking, harrowing, pasturing and installation of conservation measures. Construction of new buildings or impervious area is not considered an agricultural activity.

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

Applicant – A landowner or developer who has filed an application for approval to engage in any Regulated Activities as defined in Section 104 of this ordinance.

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

Borough – The Borough of State College, Centre County, Pennsylvania

Borough Engineer – A professional engineer licensed in the Commonwealth of Pennsylvania and duly appointed by the Borough of State College as their representative. In the event that a Storm Water Utility is formed, all references to the Borough Engineer shall be considered to also imply the Storm Water Utility Engineer.

Buffer Area – Area that is protected from development in order to prevent degradation of the water body or water quality.

Capture Depth – Depth of runoff captured from a given area and either allowed to evaporate, infiltrate, or be discharged through a spillway at a negligible rate.

Carbonate – A sediment formed by the organic or inorganic precipitation of mineral compounds characterized by the fundamental chemical ion CO_3, the principal element in limestone and dolomite strata.

Channel – A perceptible natural or artificial waterway, which periodically or continuously contains moving water having a definite bed and banks, which confine the water.

Closed Or Undrained Depression – In a karst geologic area a distinct bowl-shaped depression in the land surface; size and amplitude are variable; drainage is internal. It differs from a sinkhole in that the ground surface is unbroken and usually occurs in greater density per unit area.

Conservation District – The Centre County Conservation District.

Credits – A deduction from the required amount. In this ordinance, implies reduction of required water quality volumes due to using a recommended practice.

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 5-year storm) and duration (e.g., 24 hours), used in the design and evaluation of storm water management systems.

Designee – The governing body 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 storm water runoff by temporarily storing the runoff and releasing it at a predetermined 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 – The specific tract of land for which a Regulated Activity is proposed.

Discharger – One who discharges to the municipal separate storm sewer system.

Dolomite – (1) A mineral consisting of calcium magnesium carbonate found as compact lime stone; or (2) limestone or marble rich in magnesium carbonate.

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 Storm Water Management Facility designed to transmit storm water runoff and shall include streams, channels, swales, pipes, conduits, culverts, storm sewers, etc.

Drainage Easement – A right granted by a landowner to a grantee, allowing the use of public or private land for storm water management purposes.

Drainage-way – The natural or man-made path of surface water from a given area.

Earth Disturbance Activity – A construction or other human activity which disturbs the surface of the land, including, but not limited to: clearing and grubbing, grading, excavations, embankments, road maintenance, building construction, and the moving, depositing, stockpiling, or storing of soil, rock or earth materials.

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

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

Exfiltration – The process by which water or moisture moves from a subsurface trench, bed, or other feature into the subsoil. Exfiltration is best measured by a soil's percolation rate.

Existing Conditions – The initial condition of a project site prior to the proposed construction.

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

Floodplain – Any land area susceptible to inundation by water from any natural source or delineated by applicable Department of Housing and Urban Development, Federal Insurance Administration Flood Hazard Boundary - Mapped as being a special flood hazard area.

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.

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

Groundwater Recharge – Replenishment of existing natural underground water supplies.

Hydrologic Soil Group – Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSGs (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting. The NRCS 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 development site may be identified from a soil survey report that can be obtained from local NRCS offices or conservation district offices. Soils become less pervious as the HSG varies from A to D (NRCS[3,4])

Impervious Surface (Area) – A surface that prevents the infiltration of water into the ground. Impervious surfaces (or areas) shall include, but not be limited to: roofs, additional indoor living spaces, patios, garages, storage sheds and similar structures, and any new street or sidewalk. Decks, parking areas, and the driveway areas are not counted as impervious areas if they do not prevent infiltration.

Impoundment – A retention or detention basin designed to retain storm water runoff and release it at a controlled rate.

Infiltration Rate – The infiltration rate of a soil is related to the soil's final infiltration capacity and represents the rate at which water enters the soil/air interface at the top of the soil profile. Infiltration rates are measured in units of length/time.

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.

Interceptor – A channel, berm, or dike constructed across a slope for the purpose of intercepting storm water, reducing the velocity of flow, and diverting it to outlets where it may be disposed.

Karst – A type of topography that is formed over limestone, dolomite, or gypsum by bedrock solution, and that is characterized by closed depressions or sinkholes, caves, and underground drainage (from AGI, Glossary of Geology, 1972).

Land Development – Inclusion of any or all of the following meanings: (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 Pennsylvania Municipalities Planning Code.

Land/Earth Disturbance – Any activity involving grading, tilling, digging, or filling of ground or stripping of vegetation or any other activity that causes an alteration to the natural condition of the land.

Land Use – The use employed in an area.

Limestone – A rock that, by accumulation of organic remains, consists mainly of calcium carbonate.

Lineaments – Straight or gently curved, lengthy features frequently expressed topographically as depressions or lines on the earth's surface. They can be more easily observed at a height of 100 meters or more and are usually found by researching aerial photographs or satellite photography. They are usually located in areas of faulting or in dense jointing along some rock stratigraphy.

Main Stem (Main Channel) – Any stream segment or other runoff conveyance facility used as a reach in the Spring Creek hydrologic model.

Minimum Allowable Discharge – In relation to this Storm Water Management Ordinance, the minimum rate that can be discharged for any drainage area for design storm events up to and including the 10-year event regardless of the modeled pre-development runoff estimate.

MS4 – Municipal Separate Storm Sewer System

Natural Conservation Areas – A natural area protected during development for its water quality or recharge enhancing abilities.

NPDES – National Pollution Discharge Elimination System

NRCS – National Resources Conservation Service

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

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

PA DEP – Pennsylvania State Department of Environmental Protection.

PaDOT – Pennsylvania State Department of Transportation.

Peak Discharge – The maximum rate of storm water runoff from a specific storm event.

Percolation Rate – The rate at which water moves through a soil profile. Percolation rates are measured in units of time/length.

Pipe – A culvert, closed conduit, or similar structure (including appurtenances) that conveys storm water.

Planning Commission – The planning commission of the Borough of State College.

Point Discharge – The discharge from a pipe or channel that concentrates runoff at a single area.

Project Site – The specific area of land where any regulated activities in the Borough of State College 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 this ordinance.

Recharge Volume – The volume of water that is required to be recharged from developed sites.

Regulated Activities – Actions or proposed actions that have an impact on storm water runoff and that are specified in Section 104 of this ordinance.

Regulated Earth Disturbance Activity – Activity involving earth disturbance subject to regulation under 25 Pa. Code 92a, 25 Pa. Code 102, and/or the Clean Streams Law.

Retention Basin – An impoundment in which storm water is stored and not released during the storm event. Stored water may be released from the basin at some time after the end of the storm.

Return Period – The average interval, in years, within which a storm event of a given magnitude can be expected to recur. For example, the 25-year return period rainfall has a 4 percent probability of occurring in any given year.

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

Safe Passage – The routing of peak runoff events, usually the 100-year design event, safely through a structure without failure of that structure.

Scour – Generally refers to the change in a channel configuration provoked by sediment imbalance, due to natural or manmade causes, between the supply and transport capacity of the channel.

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

Sensitive (Water Quality) Area – An area protected because development within that area could potentially cause contamination of groundwater reservoirs. These sensitive land areas are defined in Appendix B, Exhibit-1 **Sensitive Recharge Area** – An undeveloped area that has significant benefit to the groundwater recharge of storm water.

Separate Storm Sewer System – A separate non-sanitary system reserved for storm sewer discharge.

Sheet Flow – Runoff that flows over the ground surface as a thin, even layer, not concentrated in a channel.

Sinkhole – A localized, gradual or rapid sinking of the land surface to a variable depth, occurring in areas of carbonate bedrock; generally characterized by a roughly circular outline, a distinct

breaking of the ground surface and downward movement of soil into bedrock voids.

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

Stabilization – The proper placing, grading and/or covering of soil, rock or earth to ensure their resistance to erosion, sliding or other movement.

State Water Quality Requirement – The regulatory requirements to protect, maintain, reclaim, and restore water quality under Title 25 of the Pennsylvania Code and the Clean Streams Law.

Storm water – Drainage runoff from the surface of the land resulting from precipitation or snow or ice melt.

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

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

Storm Water Management Plan – The plan for managing storm water runoff in the Spring Creek Watershed adopted by the Centre County Commissioners as required by the Act of October 4, 1978, P.L. 864, (Act 167), and known as the "Spring Creek Watershed Action 167 Storm Water Management Plan.

Storm Water Management Site Plan – The plan prepared by the developer or his representative indicating how storm water runoff will be managed at the development site in accordance with this Ordinance. Storm water Management Site Plan will be designated as SWM Site Plan throughout this Ordinance. The contents of the SWM Site Plan are established in Section 122.

Strata – Tabular or sheet-like mass, distinct layers of homogenous or gradational sedimentary material (consolidated rock or unconsolidated earth) of any thickness, visually separable from other layers above and below by a discrete change in the character of the material deposited or by a sharp physical break deposition or both.

Stratigraphic Unit – A stratum or body of strata recognized as a unit in the classification of the rocks of the earth's crust with respect to any specific rock character, property, attribute or for any purpose such as description, mapping, and correlation.

Structural Fill – For the purposes of this ordinance, shall imply any soil mass that is compacted in lifts to some tested criteria (standard or modified proctor) such as those under foundations or adjacent to retaining walls. Areas that for several years after construction respond to

precipitation events similar to impervious areas.

Subarea – The smallest drainage unit of a watershed for which storm water management criteria have been established in the Storm Water Management Plan.

Swale – A natural low-lying stretch of land or minor man made conveyance channel, which gathers or carries surface water runoff.

SWM – Storm Water management.

Topography – The general configuration of a land surface or any part of the earth's surface, including its relief and position of its natural and man-made features. The natural or physical surface features of a region, considered collectively as to its form.

Undetained Area – An area of a site that cannot be routed to a storm water management facility because of its location. Generally small areas around access drives or below storm water management facilities.

Water Quality Depth – Depth of precipitation required to be used in computing the water quality volume based on the percentage of imperviousness of a site.

Water Quality Sensitive (WQS) Development – Land development projects that have a high potential to cause catastrophic loss to local water quality and could potentially threaten ground water reservoirs. See Section 112 for additional definition.

Water Quality Volume – Volume of runoff required to be controlled from a site in a water quality BMP.

Watershed – The entire region or area drained by a river or other body of water, whether natural or artificial, a drainage basin or sub-basin.

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

Water Table – Upper surface of a layer of saturated material in the soil.

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

(Ordinance 1741, March 17, 2003, Section 110, as amended by Ordinance 2049, October 6,

2014.)

Section 213. General Requirements.

a. All regulated activities in the Borough of State College which do not fall under the exemption criteria shown in Section 110 of this ordinance shall submit a SWM Site Plan to the Borough for review. This plan must be consistent with the Spring Creek Watershed Storm Water Management Plan. These criteria shall apply to the total proposed development even if development is to take place in phases. Impervious cover shall include, but not be limited to, any roof, parking or driveway areas, and any new streets and sidewalks. Any areas designed to initially be gravel or crushed stone shall be assumed to be impervious for the purposes of comparison to the waiver criteria. The PA DEP Storm water BMP Manual, as amended and updated, shall be used for design of storm water management facilities. No disturbance may be performed prior to approval of a SWM Site Plan. All activities (especially earth disturbance activities) must comply with this ordinance, Title 25 PA Code, as amended and updated and the Clean Streams Law 35 P.S. §691.1, et seq., as may be amended from time to time.

b. Storm water drainage systems shall be provided in order to permit unimpeded flow along natural watercourses, except as modified by storm water management facilities or open channels consistent with this ordinance.

(1) Storm Water management facilities and related installations also shall be provided:

(a) To ensure adequate drainage of all low points along the curb line of streets.

(b) To intercept storm water runoff along streets at intervals reasonably related to the extent and grade of the area drained, and to prevent substantial flow of water across intersections or flooded intersections during storms, in accordance with the procedures contained in Design Manual Part 2 (DM-2), Chapter 10, of the Pennsylvania Department of Transportation (PaDOT).

(c) To ensure adequate and unimpeded flow of storm water under driveways in, near, or across natural watercourses or drainage swales. Suitable pipes or other waterways shall be provided as necessary.

(d) To properly drain storm water runoff from all land development projects, except as required by recharge criteria. All lot and open areas shall be designed to drain to the nearest practical street or drainage system, existing or proposed, as defined by the Borough Engineer, with no impact on adjoining properties, unless an area specifically designed for storm water detention is provided.

c. The existing points of concentrated drainage that discharge onto adjacent property shall not be altered without permission of the altered property owner(s) and shall be subject to any applicable discharge criteria specified in this ordinance.

d. Areas of existing diffused drainage discharge shall be subject to any applicable discharge criteria in the general direction of existing discharge, whether proposed to be concentrated or maintained as diffused drainage areas, except as otherwise provided by this ordinance. If diffused flow is proposed to be concentrated and discharged onto adjacent property, the developer must document that adequate downstream conveyance facilities exist to safely transport the concentrated discharge, or otherwise prove that no erosion, sedimentation, flooding or other harm will result from the concentrated discharge. If, in the opinion of the Borough Engineer, there will be an impact on downstream property, the Borough may require that the developer obtain a storm water easement.

e. Where a development site is traversed by watercourses, drainage easements shall be provided conforming to the line of such watercourses. The terms of the easement shall prohibit excavation, the placing of fill or structures, and any alterations that may adversely affect the flow of storm water within any portion of the easement. Developers are encouraged to allow water courses and streams areas to revert to a natural condition. Mowing or similar types of vegetation control are discouraged while removal of invasive species are encouraged.

f. When it can be shown that, due to topographic conditions, natural drainage ways on the site cannot adequately provide for drainage, open channels may be constructed conforming substantially to the line and grade of such natural drainage ways. Work within natural drainage ways shall be subject to approval by PA DEP through the Joint Permit Application process, or, where deemed appropriate by PA DEP, through the General Permit process.

g. Any storm water management facilities regulated by this ordinance that would be located in or adjacent to waters of the Commonwealth or wetlands shall be subject to approval by PA DEP 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 developer 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.

h. Any storm water 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).

i. Low Impact Development (LID) is to be used to maximum extent practicable. Minimization of impervious surfaces and infiltration of runoff through seepage beds, recharge trenches, etc., are encouraged, where soil conditions permit, to reduce the size or eliminate the need for detention facilities.

j. To promote overland flow and infiltration/percolation of storm water, roof drains should not be connected to streets, storm sewers, or roadside ditches unless approved by the Borough Engineer on a case-by-case basis.

k. Where deemed necessary by the Borough Engineer, the applicant shall submit an

analysis of the impacts of detained storm water flows on downstream areas within the watershed. These impacts shall be identified with concurrence from the Borough Engineer. The analysis shall include hydrologic and hydraulic calculations necessary to determine the impact peak discharge modifications from the proposed development have on critical locations such as dams, tributaries, existing developments, undersized culverts, flood-prone areas, etc.

l. When storm water management facilities are proposed within 1,000 feet of a downstream municipality, the analysis of downstream impacts shall be submitted to the downstream municipality's engineer or designated representative for review and comment.

m . Non-storm water discharges which may be allowed to the Borough's separate storm sewer system, based upon a finding by the Borough Engineer that the discharges do not significantly contribute to pollution to surface waters of the Commonwealth are:

- Discharges from firefighting activities
- Potable water sources including dechlorinated water line and fire hydrant flushing
- Irrigation drainage
- Routine external building wash-down (which does not use detergents or other compounds)
- Air conditioning condensate
- Water from individual residential car washing
- Springs
- Water from crawl space pumps
- Uncontaminated water from foundation or from footing drains
- Flows from riparian habitats and wetlands
- Lawn watering
- 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 have not been used
- Dechlorinated swimming pool discharges
- Uncontaminated groundwater
- Diverted stream flow
- Uncontaminated pumped groundwater

n. The applicant shall provide the borough with all names and addresses of adjacent property owners. The property shall be posted in a conspicuous location of the potential development and copies of the notification shall be sent by the Borough via United States regular mail. Notification to include the following language: "A land development plan is being considered by the Borough of State College for Tax Parcel (insert parcel number) as shown on the attached exhibit. Written comments may be directed to the Borough of State College at 243 South Allen Street, State College, PA 16801."

o. Approved SWM Site Plans must be on site at all times during construction.

p. Use of Alternate and/or new Storm water Management Controls will be considered by the Borough. A description of the proposed alternate controls must be submitted to the Borough, the Centre County Conservation District, and to the PA DEP. The Borough will coordinate any approvals with the CCCD and/or PA DEP.

q. The SWM Site Plan must contain a proper long term Ownership, Operation and Maintenance Plan in accordance with Section 131 of this ordinance.

(Ordinance 1741, March 17, 2003, Section 111, as amended by Ordinance 1774, March 2, 2004, Section 3, and by Ordinance 2049, October 6, 2014.

Section 214. Sensitive Areas and Developments. Sensitive areas and water quality sensitive developments have been identified which require special consideration with regard to storm water management.

a. Sensitive areas are defined as those areas that, if developed, have the potential to cause catastrophic loss to a Water Authority well field. These areas consist of the delineated 1-year zone of contribution and direct upslope areas tributary to the wells (see Appendix B, Exhibit 1 of the Spring Creek Watershed Action 167 Storm Water Management Plan). Municipalities may update the sensitive area boundaries based on new research or studies as required.

b. Sensitive Recharge Areas are defined as those areas that in an undeveloped state provide significant benefit to the recharge of storm water.

c. Water Quality Sensitive (WQS) developments are defined as a land development project that has a high potential to cause catastrophic loss to local water quality, and could potentially threaten ground water reservoirs. The following is a provisional list of water quality sensitive developments. This list may be amended at the discretion of the Borough of State College.

Vehicle fueling stations
Industrial manufacturing sites*
Salvage yards
Recycling centers
Hazardous material storage areas*
Interstate highways

**The Borough Engineer will make the determination relative to what constitutes these classifications on a case-by-case basis. The Pennsylvania DEP wellhead protection contaminant source list shall be used as a guide in these determinations. Industrial manufacturing site and hazardous material storage areas must provide NPDES SIC codes.*

(Ordinance 1741, March 17, 2003, Section 112, as amended by Ordinance 2049, October 6, 2014.)

Section 215. Performance Standards.

a. General. Post-development rates of runoff from any regulated activity shall not exceed the peak release rates of runoff prior to development for the design storms specified.

b. Sensitive Area District Boundaries. The location of sensitive areas or sensitive area districts (SAD) within the watershed are illustrated on an official map, which is available for inspection at the municipal office. A reduced scale copy of this map is included as Exhibit 1 in Appendix B. The exact location of the boundaries of sensitive areas is set by drainage areas tributary to each of the points of interest as illustrated in Appendix B. The exact location of these boundaries as they apply to a given development site, shall be determined using mapping at a scale which accurately defines the limits of the sensitive area. If the project site is within the sensitive area (in whole or in part), 2-foot contour interval mapping shall be provided to define the limits of the sensitive area. If the project site is adjacent to but within 500 linear feet of a defined Sensitive Area, a 5-foot contour interval map defining the limits of the Sensitive Area shall be included in the SWM Site Plan to document the site's location relative to the sensitive area.

c. Sites Located in More Than One District. For a proposed development site which is traversed by a SAD boundary, the design criteria for sensitive areas must be applied if post-development runoff is directed towards the sensitive area.

d. Off-Site Areas. Off-site areas that drain from sensitive areas through a proposed development site that is located entirely in a non-sensitive area are not required to use or apply the sensitive area criteria.

e. Site Areas. Where the site area to be impacted by a proposed development activity differs significantly from the total site area, only the proposed impact area shall be subject to the design criteria.

f. "Downstream Hydraulic Capacity Analysis." Any downstream or off-site hydraulic capacity analysis conducted in accordance with these standards shall use the following criteria for determining adequacy for accepting increased peak flow rates:

(1) Natural or man-made channels or swales must be able to convey the post-development runoff associated with a 2-year return period event within their banks at velocities consistent with protection of the channels from erosion. Acceptable velocities shall be based upon criteria included in the PA DEP *Erosion and Sediment Pollution Control Program Manual*.

(2) Natural or man-made channels or swales must be able to convey the post-development 25-year return period runoff without creating any hazard to persons or property.

(3) Culverts, bridges, storm sewers or any other facilities which must pass or convey

flows from the tributary area must be designed in accordance with PA DEP, Chapter 105 regulations (if applicable) and, at a minimum, pass the post-development 25-year return period runoff.

(4) It must be demonstrated that the downstream conveyance channel, other storm water facilities, roadways, or overland areas must be capable of safely conveying the 100-year design storm without causing damage to buildings or other infrastructure.

(5) Where the downstream conveyance channel or other facility is located within a special flood hazard area (as documented on the municipal Flood Insurance Rate Map), it must be demonstrated that the limits of said flood hazard area are not increased by the proposed activity.

(6) Storm water management ponds that fall under the PA DEP Chapter 105 Criteria of a "Dam" must meet the criteria within Chapter 105.

(Ordinance 1741, March 17, 2003, Section 113, as amended by Ordinance 2049, October 6, 2016.)

Section 216. Calculation Methodologies. Design criteria and calculation methodologies have been classified by functional group for presentation as follows: peak runoff rate discharge requirements; storm water pond capture volumes; recharge volumes; storm drain design including conveyance, channel protection, and stability; and water quality standards.

These criteria and calculation methodologies have been developed to simplify storm water management designs, unify methods, remove model parameter subjectivity, remove improperly used methods, and to ensure storm water management decisions are based more realistically on hydrologic processes. In addition, common sense should always be used as controlling criteria.

These standards provide consistent and process oriented design procedures for application by land development professionals. It is recognized that in an attempt to generalize the computational procedures, assumptions have been made which on some occasions may be violated. If such a violation is identified, alternate standards and procedures may be applied. Both the violation and the alternate procedures to be applied must be documented by a hydrologist or hydrogeologist. Any request for use of alternate standards or procedures under this provision must be agreed to by the Borough Engineer prior to formal submission of plans for consideration by the Borough.

a. Peak Runoff Rate Control.

(1) Any site where the increase in post-development peak runoff rates is determined to be negligible by the Borough Engineer is exempt from the requirement to provide storm water detention. In support of this exemption, it must be shown that the downstream conveyance systems have adequate capacity to convey the additional discharge without adversely affecting downstream properties. This does not exempt the requirement for implementation of designs for

water quality, storm water conveyance, and/or recharge as required. A SWM Site Plan and report documenting these design elements is also required. The Borough Engineer shall use a 5 percent increase as a general benchmark for defining “negligible.” The final definition of "negligible" shall be at the Borough Engineer's discretion.

Prior to using this exemption (and prior to any land development plan submission), the Design Engineer must provide written documentation and computations as to why no peak runoff control should be required. The Borough Engineer has the right to reject any plan which uses this assumption without prior approval of the Borough Engineer. The intent of this exemption is to eliminate the need for multiple or "piggyback" detention facilities as a result of minor changes in imperviousness or land use upstream of existing storm water control facilities.

(2) Small sites (<5 acres) located directly adjacent to the main stem of creeks or within the floodplain are not required to provide storm water detention unless directed to do so by the Borough Engineer as a result of a documented drainage problem. All other storm water management standards must be implemented including water quality, adequate storm water conveyance, and/or recharge as required. The Borough Engineer has the right to reject any plan that uses this exemption without prior approval of the Borough Engineer.

(3) Storm water management analysis must be performed using the following models. The size criteria are based on drainage area size including site area and all off-site area draining across the development.

Up to 100 acres in size	NRCS’s TR-55 or TR-20
Over 100 acres in size	NRCS’s TR-20 or HEC-1 (HEC-HMS)

The Modified Rational Method using the Gert Aron Curves may be used for any site less than or equal to 2 acres in size without prior authorization from the Borough Engineer. The Modified Rational Method may also be used for sites between 2 and 5 acres in size where the Borough Engineer has approved the method's use. In this case the Design Engineer must make a written request to the Borough Engineer explaining why the use of the Modified Rational Method is more appropriate than the NRCS’s methods for the site in question. The Design Engineer should keep in mind that the Modified Rational Formula methodology was not calibrated to account for the karst nature of the Spring Creek Drainage Basin; and therefore, its use should be limited to the special cases identified above. In addition, since the minimum discharge criteria are based on a calibration of the NRCS runoff mode, their use is not appropriate if the Modified Rational Method is used for runoff computations.

The Borough Engineer has the right to reject any SWM design that uses hydrograph combinations with the Modified Rational Method where the designer has not validated that the effects of the timing differences are negligible. In addition, the Borough Engineer has the right to reject any SWM design that improperly uses the method for determining runoff volumes or does not properly apply the method.

More intensive physically based models may be used at the discretion of the Borough Engineer, but only for sites greater than 100 acres in size.

Commercial software packages that use the basic computational methods of TR-55 or TR-20 are permitted.

The NRCS models and methods recommended above are based on data collected from actual watersheds. In contrast to this, storm water management analysis for land development activities is often conducted using property lines to define drainage boundaries. Drainage areas based on property boundaries are not true watersheds and are referred to here as "hypothetical" drainage areas. It is known that these hypothetical drainage areas do not respond like natural watersheds. Peak runoff rates from hypothetical drainage areas are much smaller than comparable runoff rates from natural watersheds of the same size. Therefore, wherever possible, pre- and post-development storm water analysis should be conducted for watersheds that are as nearly natural as possible. Also, conducting storm water analysis for a lot by lot comparison, such as within residential developments is not permitted. Partitioning drainage areas into different sub-watersheds for the post-development scenarios is acceptable.

It is noted that natural watershed boundaries should not be used where the relative size of the watershed compared to the site size would inappropriately distort the pre- to post-development runoff comparison. In these cases a hypothetical drainage area defined by the property boundary should be used because it will allow for a better estimate of runoff changes directly downstream of the site. In addition, the designer should recognize that, within the Spring Creek Watershed, typical hypothetical drainage areas, in their pre-development or natural condition, do not produce surface runoff during minor to moderate rainfall events. Available hydrologic models do not accurately reflect this condition. This often results in post-development nuisance flooding since the models over-estimate the pre-development runoff magnitude.

(4) Major natural drainage divides may not be altered without the prior consent of the Borough Engineer.

(5) Pre- and post-development storm water management analysis shall be conducted using the following design storms:

1 year	2-year
10-year	100-year

For sites less than one acre in total area that connect directly to existing storm sewer systems, surface or subsurface (underground) storm water detention facilities only need to be designed to control storm events up to the design return period of the existing pipes (usually 10 years). However, it must be demonstrated that adequate conveyance capacity (overland or within the existing storm sewer system) exists to ensure that flooding or damage from proposed releases will not exceed the existing potential for the system. If warranted by historic flooding in the

tributary storm sewer system, the Borough may require more stringent criteria.

(6) The 24-hour precipitation depths as obtained from NOAA Atlas 14 shall be used for storm water management analysis.

(7) The NRCS's Type II precipitation distribution is required for all storm water management analyses.

(8) The NRCS's dimensionless unit hydrograph "k" factor shall be 484 for both pre- and post-development storm water analyses.

(9) All undeveloped areas are to be modeled as meadow or woods in good hydrologic condition. Existing impervious areas may be modeled as being impervious for pre-development conditions. The Borough may require a percentage of the existing impervious be modeled as meadow in areas where there are known existing storm water concerns downstream of the project area or where the site being developed has either deficient or non-existing storm water management facilities. Developers of sites with existing impervious areas are highly encouraged to meet with the Borough Engineer prior to design so that any additional requirements are identified prior to plan submission.

(10) The NRCS's curve number (CN) shall be used as the rainfall to runoff transformation parameter for all storm water management analyses.

(11) Curve numbers should be rounded to tenths for use in pre-packaged hydrologic models. It should be recognized that the CN is only a design tool with a large degree of statistical variability. For large sites, CN's should realistically be rounded to the nearest whole number.

(12) The NRCS's method to determine unconnected impervious area adjustments for CN can be used for distinctly defined impervious land areas that flow onto pervious areas in a dispersed manner. The method may only be used to calculate runoff from site impervious areas that actually flow across pervious areas. The method cannot be applied to the entire site using average weighted CN values.

(13) Soils underlain by carbonate geology (limestone or dolomite) shall have a hydrologic soil group (HSG) B used for both pre- and post-development conditions regardless of the NRCS or Soil Survey's description, except for the following two conditions:

(a) Compacted structural fill areas shall use a minimum of HSG C for post development conditions regardless of the NRCS or Centre County Soil Survey's description. For most developments compacted structural fill areas are under impervious surfaces, but may include islands within parking areas, fringe land, etc. A HSG C shall also be applied to large projects that clear and compact building pad areas for later phases of development under an initial phase. The Borough Engineer shall make the final determination as to what areas of a land development site constitute compacted structural fill. The intent is to account for large

compacted areas, and not minor grading within lawn areas.

(b) Soils identified as “on flood plains” or “on terraces above flood plains” in the Centre County Soil Survey will use the HSG as designated in the Soil Survey. Refer to Appendix A for a list of the soils.

(14) Soils not underlain by carbonate geology shall use the HSG as specified by the NRCS or Soil Survey’s description, except for the following two conditions:

(a) Wooded areas on HSG C and D soils shall be treated as HSG B for pre-development conditions. Disturbed post-development wooded areas shall carry the NRCS or Soil Survey's defined HSG with a minimum HSG of B.

(b) Highly compacted structural fill areas shall use a minimum of HSG C for post-development conditions regardless of the NRCS or Soil Survey’s description. For most developments these areas are normally covered with impervious surfaces, but may include islands within parking areas, fringe land, etc. A HSG of C shall also be used for large projects that clear and grade land for later phases of development. The Borough Engineer shall make the final determination as to what areas of a land development site constitute compacted structural fill. The intent is to account for large compacted areas, and not minor grading within lawn areas or small areas around buildings, etc.

(15) Areas draining to closed depressions must be modeled by removing the storage volume from the pre-development condition. The designer may assume that infiltration in the closed depression does not occur during a design runoff event. Areas draining to closed depressions may also be used to adjust peak runoff rates to storm water management ponds for the post-development analysis. This allowance has been developed to entice designers to intentionally design or leave in place small closed depressions that can reduce the total volume required from a storm water management pond. The site designer is responsible to document downstream impacts if the closed depression were removed.

(16) Drainage areas tributary to sinkholes shall be excluded from the modeled point-of-interest drainage areas defining pre-development peak flows. Assumptions that sinkholes spill-over during some storm events must be supported by acceptable documentation (as determined by the Borough Engineer). In addition, the design professional must be aware that bypassing or sealing sinkholes will frequently result in downstream flooding and should not be done if existing downstream flooding already occurs. The site designer is responsible to document downstream impacts if the sinkhole were to stop taking storm water runoff.

(17) Ponds or other permanent pools of water are to be modeled by the methods established in the NRCS’s TR-55 manual (1986). However, more rigorous documented methods are acceptable (as determined by the Borough Engineer).

(18) The NRCS antecedent runoff condition II (ARC II, previously AMC II) must be

used for all simulations. The use of continuous simulation models that vary the ARC are not permitted for storm water management purposes. In addition, prior to any continuous simulation model being used in the Spring Creek Basin for any other purposes, the model unit hydrograph must be modified for common events in additional to extreme events based on an in depth analysis of historical data from the basin.

(19) The following Time of Concentration (Tc) computational methodologies shall be used unless another method is pre-approved by the Borough Engineer:

- Pre-development – NRCS's Lag Equation.
- Post-development; commercial, industrial, or other areas with large impervious areas (>20 percent impervious area) – NRCS's Segmental Method.
- Post-development; residential, cluster, or other low impact designs less than or equal to 20 percent impervious area – NCRS's Lag Equation.

The time of concentration is to represent the average condition that best reflects the hydrologic response of the area. For example, large impervious areas bordered by small pervious areas may not consider the effect of the pervious areas in the Tc computation. If the designer wants to consider the effect of the pervious area, runoff from the pervious and impervious areas must be computed separately with the hydrographs being combined to determine the total runoff from the area.

Under no circumstance will the post-development Tc be greater than the pre-development Tc for any watershed or sub-watershed modeling purposes. This includes when the designer has specifically used swales to reduce flow velocities. In the event that the designer believes that the post-development Tc is greater, it will still be set by default equal to the pre-development Tc for modeling purposes.

[Refer to item number 29 regarding impervious area flashing (IAF).]

(20) The following post-development minimum discharges are permitted for use with the NRCS (CN) runoff model*:

1-year return period	$Qp_{min} = 0.018\ (DA) + 0.2$
2-year return period	$Qp_{min} = 0.03\ (DA) + 0.4$
10-year return period	$Qp_{min} = 0.09\ (DA) + 1.0$

where: DA = the drainage area in acres
Qp_{min} = minimum allowable peak runoff rate in cfs

For return periods greater than 10 years, the minimum discharge shall be equal to the

computed pre-development peak runoff rate.

The minimum discharge criteria above are not appropriate for use with the Rational Method. This is because these values were developed based on NRCS model corrections and do not actually represent a true physical process or discharge. However, common sense should be used by both the designer and reviewer in the evaluation of acceptable minimum discharges for use with the Rational Method.

The intent of the minimum discharge is to allow reasonable runoff release from a site when a hydrologic model has produced a pre-development runoff rate close to zero. The method is NOT permitted for areas that previously drained completely to sinkholes in order to bypass the sinkhole after development.

These minimum discharge values include the total of all storm water management facilities discharges and undetained area discharges. Peak runoff rates for undetained fringe areas (where the designer has made a realistic effort to control all new impervious areas) will be computed using the pre-development time of concentration for the drainage areas tributary to them. Undetained areas are those portions of the site that cannot be routed to a storm water management facility due to topography and typically include lower pond berms, or small areas around entrance drives. The site drainage areas used shall represent the pre-development condition, even if drainage areas are altered following development.

(21) All lined storm water management ponds in carbonate and non-carbonate areas must be considered impervious and may not be used as pervious areas for storm water management computations. "Lined" here means lined with synthetic liners or bentonite. All other compacted soil liners will be considered to be HSG D for hydrologic computations.

(22) Storm water management ponds that have a capture depth for the purposes of water quality or volume capture shall assume a negligible discharge from these structures during design event routing. Only discharges from the primary principal spillway or emergency spillway need to be considered. Discharges from subsurface drains that tie into a principal spillway should not be considered during design event routing. All subsurface drains are to be equipped with a restrictor plate with a 1” opening in order to prevent the subsurface drain from functioning as a primary orifice.

(23) Storm water management ponds that have a pond capture, recharge or water quality component shall assume that the basin is full to the controlling component volume at the beginning of design event routing.

(24) Storm water management ponds must provide safe passage of the 100-year return period peak runoff rate assuming that all of the principal spillway orifices are fully clogged, and the principal spillway overflow is 50 percent clogged. A minimum of a 6-inch freeboard must also be maintained above the resulting "maximum" water surface elevations (W.S.E.). Any embankment emergency spillway can be assumed to be unclogged. SWM ponds with embankments completely made up of natural undisturbed soils (fully in “cut”) or where roadways act as the emergency spillway are permitted. However, the Design Engineer must verify downstream stability and control.

(25) All pre- and post-development comparisons of peak flows shall be rounded to tenths of a cfs. The intent here is to recognize the accuracy and precision limitations of hydrologic modeling procedures. Again, small differences between pre- and post-development discharge rates should be permitted when no negative downstream impacts will result.

(26) The full Modified Puls routing method must be used for storm water management pond analyses. Simplified methods of determining pond size requirements such as those in TR-55 (1986) can only be used for preliminary pond size estimates.

(27) Pre-packaged hydraulic programs are not approved for the analysis of underground storm water management facilities unless it can be verified that the program rounding subroutines used for the stage/storage data do not affect the results. This is because, for very small storage volumes, the program may round off the volume to a significant percentage.

(28) Full supporting documentation must be provided for all storm water management designs.

(29) Designs must be checked for Impervious Area Flash (IAF). This check is used to determine if flooding may occur due to poor modeling choices specifically related to the time of concentration. This analysis requires that the watershed impervious area be modeled without the pervious areas. The time of concentration should also be determined from the impervious areas only. If the IAF analysis results in a higher peak runoff rate at a culvert or discharge from a pond, this higher rate must be used for the final design/comparison. The check will frequently yield higher values if a watershed’s impervious area is located primarily near the watershed outlet or point of interest.

b. <u>Pond Capture Volumes (Cv)</u>. To minimize nuisance flooding from small precipitation events, a runoff capture volume is required for all storm water management ponds that do not discharge directly to natural, well-defined (with bed and banks) perennial streams. In general, natural well-defined streams in the Spring Creek Basin are limited to those delineated as USGS perennial streams. This should be treated as a guideline and not a steadfast rule. The final determination is at the discretion of the Borough Engineer. The pond capture volume is a volume of runoff that will be retained in a pond below the elevation of any free surface principal spillway orifice. No principal spillway orifice (except those connected to subsurface drains), regardless of how small, shall be below the pond elevation equivalent to this volume.

The Centre County Conservation District (CCCD) receives numerous complaints regarding ponds that are located at the downslope edge of a property that result in discharging runoff onto downstream properties in an uncontrolled manner or where no existing defined outlet channel exists. This is a very common problem in areas underlain by carbonate rock. These discharges can cause erosion and flooding downstream. While the Pond Capture volume is intended to minimize some of these negative effects, it cannot deter or reduce the impacts from poor design practices. Therefore, whenever possible, the CCCD recommends that the designer consider the downstream morphological changes that may occur and, when possible, consider constructing conveyance systems to a stable natural channel. In some cases this may require cooperation between land owners.

The capture volume is defined as a runoff depth of 0.25 inches from all impervious areas tributary to the storm water management facility. This volume will be allowed to infiltrate, evaporate, or dewater from a subsurface drain system connected directly to the facility's principal spillway. Supporting computations that show that 90 percent of the capture volume can dewater in a maximum of 72 hours must be provided. For surface ponds, the maximum depth of ponding for the capture volume shall be 3 feet (a health and safety precaution). However, in areas under karst influence, a limiting maximum ponding depth of 18 inches is recommended. Designers may always increase the capture volume to a value greater than the identified standard as long as the ponding depth criteria are met.

To simplify computational requirements for design event analysis, designers do not need to calculate discharges from subsurface drains related to the capture volumes if the filter media is sand, or smaller than AASHTO 57 stone. The capture volume is to control runoff rates from impervious areas and is not related to water quality. However, pond designs that include a water quality volume that is greater than the required capture volume are assumed to have also met the required capture volume as long as it dewaters as required.

Designs that rely on the natural infiltration of insitu soils must provide documentation supporting the infiltration rates used for analysis. Infiltration rates reported in the Soil Survey of Centre County or other published rates may be used at the discretion of the Borough Engineer.

The pond capture volume should always be used when up-slope areas are developed where the pond's design creates a point discharge that did not previously exist.

Storm water management detention facilities that connect directly to storm drain pipe networks that discharge to natural well-defined channels do not require a capture volume.

c. <u>Recharge Volumes (Rv)</u>. The purpose of the recharge portion of the ordinance is two-fold. First, the recharge requirement is to mitigate the loss of groundwater recharge associated with the creation of impervious surfaces. In addition the recharge criteria are to mitigate the increase in runoff volume associated with the creation of impervious surfaces. This increase in runoff volume has significant impacts on downstream landowners. These impacts are most often exhibited in the form of increased nuisance flooding and channel or drainage-way erosion and instability. According to local Municipal Engineers and representatives of the Centre County Conservation District, these problems are of significant local concern. The magnitude of these problems increases with the percentage of impervious coverage created on a site.

Recharge mitigation shall be provided for runoff from all proposed impervious areas. The required recharge volume shall be computed as 0.5" of runoff from all proposed impervious areas. It is noted that lined detention ponds and compacted fill areas are considered to be impervious when calculating site impervious area for recharge considerations. In addition, land areas covered by paver blocks, pervious pavement, and other structural surface treatments which permit surface infiltration can be treated as pervious areas when calculating the site impervious area for recharge considerations as long as the structural infiltration practice is supported by sound design and appropriate construction specifications. The Borough Engineer may require submission of supporting documentation prior to approving structural infiltration areas as pervious areas.

The following design practices can be used as credits to reduce the recharge volume requirement:

(1) Residential Roof Areas (detached, duplex, and town home dwellings) and commercial/industrial buildings with roof areas less than 5,000 square feet can be removed from the computed impervious area when these roof areas are sumped to dry wells designed in accordance with the following minimum standard:

> SUMP DESIGN CRITERIA: To meet the recharge criteria, sump storage or voids volume shall be equal to 0.04 cubic feet per square foot of roof area (0.5 inch rainfall depth). If sump stone has a voids ratio of 40 percent, the total sump volume will be 0.10 cubic feet per square foot of roof area. When designed only to meet this recharge criteria, the maximum size for a single sump is 100 cubic feet, and the minimum sump surface area (A) to depth (D) ratio (A/D) must be a minimum of 4/1. The sump depth less any freeboard should not exceed 24". This roof sump standard shall apply unless the municipality has a separate roof sump standard for water quantity or peak control.

(2) All or portions of driveways, roadways, and parking areas can be removed from

the impervious area calculation when sheet flow from these areas is directed to undisturbed natural buffer/filter areas or constructed filter strips. This flow must be dispersed as sheet flow as it crosses the buffer/filter area. Sheet flow velocities should be non-erosive as they cross the impervious area/filter interface.

To ensure proper infiltration characteristics the natural soil profile within natural buffer/filter areas cannot be disturbed during construction. Completely undisturbed natural recharge areas serve this function best. However, minor surface scaring, seeding, and landscaping are permitted in these areas as long as natural grades are not altered. In special cases, when approved by the Borough Engineer, minor grading, combined with soil profile reconstruction may be permitted in natural buffer/filter areas. In addition, the following standards apply to natural filter/buffer areas:

(a) Natural filter/buffer areas must have a minimum width of 5 feet or ½ of the impervious area drainage length immediately tributary to the buffer area, whichever is greater. This width is measured parallel to the direction of sheet flow.

(b) To qualify for a recharge volume credit, the surface slope of natural filter/buffer areas must be conducive to recharge, and not result in flow concentration or erosion. To meet this intent, the surface slope of the area tributary to the natural buffer/filter area, and the surface slope of the natural buffer/filter area itself may not exceed 5 percent. In special cases steeper slopes may be used if specifically authorized by the Borough Engineer.

(c) The total impervious area tributary to a natural buffer/filter area can not exceed twice the buffer/filter area.

To qualify for a recharge volume credit, constructed filter strips shall be designed to the following standards:

- The minimum filter strip width shall be 5 feet or ½ of the impervious area drainage length immediately tributary to the constructed filter strip, whichever is greater. This width is measured parallel to the direction of sheet flow.

- The total impervious area tributary to a constructed filter strip area can not exceed twice the constructed filter strip area.

- The surface slope of the area tributary to the constructed filter strip area, and the surface slope of the constructed filter strip area itself may not exceed 5 percent and 3 percent, respectively. In special cases steeper slopes may be used if specifically authorized by the Borough Engineer.

- The filter strip surface shall consist of a minimum of inches of natural or reconstructed topsoil with a stable grass surface treatment. Reconstructed topsoil designs must be approved by the Borough Engineer prior to

application. Reconstructed topsoil consists of soils augmented by tillage and the addition of soil amendments such as compost, lime, animal manures, crop residues, etc.

- To minimize erosion of the topsoil layer during construction, it is recommended that these areas be sodded. However, the Borough Engineer may permit the use of an acceptable erosion control seeding application. In this later case, any loss of topsoil and seed must be replaced until a permanent vegetative stand is achieved.

(3) Sidewalks separated from roadways and/or other impervious surfaces by a grass strip of equal or greater width than the sidewalk itself can be removed from the impervious area calculation when the sidewalks are graded so that sheet flow from the walk is directed to the grass strip. Sidewalks with steep longitudinal slopes that would act as channels during runoff events cannot take advantage of this credit. A 5 percent longitudinal sidewalk slope shall be used as the benchmark defining steep slopes.

(4) Impervious areas tributary to natural closed depressions can be subtracted from the total site impervious area used in the recharge volume calculation as long as a qualified geotechnical engineer or soil scientist certifies to the soundness of these site specific applications. Water quality pre-treatment may be necessary prior to the direct discharge of runoff to existing closed depressions or sinkholes.

(5) Impervious areas tributary to man-made closed depressions can be subtracted from the total site impervious area as long as a qualified geotechnical engineer or soil scientist certifies to the soundness of these site-specific applications. Man-made closed depressions can be created through the use of low head berms 1 foot or less in height.

(6) Additional credits may apply for undisturbed land areas that are known to have high infiltration capacity and that are maintained or enhanced. These areas must be defined and quantified from actual site data collection.

After credits, the remaining recharge volume shall be directed to a Recharge BMP such as infiltration trenches, beds, etc. These facilities can be located in open areas or under pavement structures. The appropriateness of the particular infiltration practice proposed, as well as the design parameters used, shall be supported by a geotechnical report certified by a qualified professional (soil scientist, geologist, hydrogeologist, geotechnical engineer, etc.).

Storm water recharge requirements or credits affect storm water management design requirements. For storm water management computations, the reduction of site CNs based only on a weighting type analysis, as is sometimes done for cluster type developments, is not permitted. However, for storm water management purposes, the CN for recharged areas can be computed using the NRCS method for disconnected impervious areas. The actual hydrologic process that occurs within the basin must be stressed in all recharge situations.

These recharge requirements must be met on all sites unless it can be demonstrated that recharge would be inappropriate. Any request for such a waiver from these recharge requirements must be accompanied by a supporting report certified by a qualified professional (soil scientist, geologist, hydrogeologist, geotechnical engineer, etc.).

Developers and site design professionals are encouraged to use a higher standard for recharge volume on sites where local site conditions do not restrict a higher standard.

Water Quality Sensitive (WQS) developments must use an acceptable pre-treatment BMP prior to recharge. Acceptable pre-treated BMPs for these developments include BMPs that are based on filtering, settling, or chemical reaction processes such as chemical coagulation.

Accounting for recharge within lined storm water management ponds is not permitted. However, if unlined, uncompacted ponds and/or depressed lawn areas are used to satisfy water quality or capture volume criteria, these areas and volumes can also be used to meet recharge requirements as previously defined. Additional recharge volume may be credited to these areas as long as it is demonstrated by a qualified professional that recharge processes can naturally occur in these areas.

Finally, because this analysis is concerned with trying to adequately represent real processes that occur within the Watershed, there will be areas that cannot physically recharge storm water. These areas include exfiltration areas that are commonly found at the base of wooded hillsides where clay pans exist, and saturation areas near major streams or floodplains. These areas may not accept recharge during most runoff events. These areas are exempt from recharge requirements when these conditions are documented and certified by a qualified professional (soil scientist, geologist, hydrogeologist, or geotechnical engineer). In addition, storm water management techniques relying on infiltration techniques are not permitted in these areas.

The Borough Engineer may waive the recharge requirement in the following situations:

- The Borough Engineer may waive the recharge requirement in highly developed areas or areas undergoing redevelopment where the Borough Engineer has determined that forced recharge could have adverse impacts on adjacent landowner structures, property, or municipal infrastructure. These waivers should be limited to small land areas (generally less than 5 acres in size), where the ability to place recharge beds may be limited or may hinder redevelopment.

- The Borough Engineer may waive the recharge requirement in areas where a qualified soils scientist or geologist has determined that none of the site soils are suitable for recharge, or that the location of the suitable soils is such that harm to adjoining properties could occur as stated under item 1 above.

- The Borough Engineer may waive the recharge requirement in areas where recharge

cannot physically occur as documented by a qualified soil scientist, geologist, or hydrologist. These areas include:

- Exfiltration areas commonly found at the base of wooded hillsides where clay pans or fragipans exist; and
- Saturation areas near major streams or floodplains.

- Development and redevelopment within the Commercial District is exempt from the Recharge requirement if there is less than 5 percent increase in proposed impervious area.

As identified above, recharge analysis and/or waiver requests must be supported by a geotechnical report sealed by a qualified professional (soil scientist, geologist, hydrogeologist, or geotechnical engineer). The intent of this report will be to establish the suitability of a particular parcel of land or area for recharge, and to identify areas on a development site appropriate for recharge. It is recommended that the geotechnical/soils consultant discuss the extent and approach to the analysis with the Borough Engineer prior to initiating the field investigation. At a minimum this report should include the following information:

- A description of the geotechnical site investigation performed including the methods and procedures used;

- Data presentation;

- Analysis results including the following minimum information:

  - A map identifying site areas inappropriate for recharge along with supporting justification. In addition to illustrating topographic features, significant geologic and hydrologic features should be identified (rock outcrops, sinkholes, closed depressions, etc.
  - Determination of the permeability coefficient for potential recharge areas.
  - Determination of the infiltration capacity of natural site soils.
  - Location, depth, and permeability coefficient for any restrictive layers identified.
  - Soil uniformity.
  - Depth to bedrock in potential recharge areas, and a statement reflecting the uniformity of the depth to bedrock across the site.
  - A statement relating to the site's proximity to fracture zones within the bedrock.
  - Additional information deemed pertinent by the geotechnical engineer.

- Recommendations for any special design considerations necessary for the design of recharge systems on the site. For example, required soil depth over bedrock, appropriate surface grades over recharge areas, appropriate hydraulic head over recharge areas, etc.

- Justification as to why the site should be developed to a high impervious density if the site has adverse soil and geotechnical limitations, which prohibit the ability to induce natural recharge. Explain how these limitations will not create the potential for undue harm to the environment and the Spring Creek Watershed when the site is developed.

- Where it has been shown that recharge cannot be performed and a waiver of the recharge requirements is being requested, it shall be required that the first one inch (1") of runoff from all new impervious areas be treated through under-drained facilities. These facilities may include under-drained basins, rain gardens, and infiltration trenches. Treatment is to include use of an amended topsoil to provide filtration of the storm water. All under-drain outlets are to include a restrictor plate to prevent the underdrain system from functioning as a primary outlet.

The following guidelines are provided relative to the use of subsurface exfiltration BMP's (often incorrectly referred to as engineered infiltration BMPs):

- Soils should have a minimum percolation rate of 50 min/cm for effective operation of subsurface exfiltration BMPs. If no site soils have percolation rates of 50 min/cm, subsurface exfiltration BMPs should not be used.

- A minimum of 30 inches of soil must be maintained between the bottom of a subsurface exfiltration BMP and the top of bedrock or seasonally high groundwater table. This statement is subject to the recommendation of a qualified Geotechnical Engineer.

- If the minimum percolation rate is not met and/or the minimum soil depth can not be maintained on a site, recharge should be accommodated by directing shallow sheet flow from impervious areas across surface filter strips and/or undisturbed natural areas, or some other innovative surface infiltration feature should be used. Limiting subsurface percolation rates and/or depth to bedrock shall not by themselves warrant a recharge waiver.

- In addition, since recharge is intended as a volume control, innovative or new methods that address the significant increase in the volume of runoff from sites having large impervious areas are encouraged These volume control alternatives can be used only if they can be shown to function with the original intent through sound engineering and science. The final determination of "original intent" shall always be the right of the Borough Engineer.

d. <u>Storm Drain Conveyance System Design</u>. Storm drainage conveyance systems consist of storm sewer pipes, swales, and open channels. Computational methods for design of storm drain conveyance systems shall be as follows:

(1) Recommended computational methods (models) for storm drain design are based on site or watershed drainage area as follows:

Up to 200 acres in size Rational Method

Between 200 acres and 1.5 Square miles	HEC-1 PSRM TR-20
Over 1.5 square miles in size	PSU-IV with the carbonate adjustment factor at the discretion of the Borough Engineer
Other methods	as approved by the Borough Engineer such as SWMM, SWIRM-ROUTE, etc.

(2) Rational Coefficients used are to be from Rawls et al. (1981), PaDOT Design Manual 2-10 or using the Aron curves to convert CNs to C. If the Aron curves are used, all CNs must be applicable to the HSG as identified by the NRCS.

The Design Engineer may choose to use the following Rational C coefficients without regard to soil HSG for small sites. However, it is recommended that they be used only for storm drains up to 24 inches in diameter. The use of these conservative values shall fully be the choice of the Design Engineer.

All impervious areas: C = 0.95
All pervious areas: C = 0.30

(3) Storm drains shall be designed at a minimum using a 10-year runoff event without surcharging inlets. Storm drains tributary to a multiple site SWM facility or crossing other properties must convey, at a minimum, the following runoff event based upon the classification of municipal street:

Local, Residential, Residential access	25-year
Residential Collector, Collector	50-year
Arterial	100-year

Runoff events in excess of the indicated design event must be conveyed safely downstream.

(4) Inlets on grade cannot assume a sumped condition for hydraulic modeling (i.e., top of inlet casting set below pavement surface in parking areas).

(5) The Borough Engineer may require the analysis of the 100-year peak runoff rates for conveyance purposes in some instances where regional SWM facilities are employed.

(6) Any storm drain within State or Federal rights-of-ways or that falls under the design criteria of any higher authority must meet the requirements of that agency in addition to the minimum requirements of this ordinance.

(7) The time of concentration (Tc) can be computed by any method which best represents the subject watershed. However, the NRCS's segmental method is not recommended for use with drainage areas that are predominately undeveloped and are greater than 100 acres in size. The NRCS Lag Equation or another more appropriate method should be used under these conditions.

(8) For any drainage area smaller than 5 acres in size, a Tc of 5 minutes may always be assumed at the discretion of the Design Engineer (for the post-development condition), without needing to provide supporting documentation.

(9) Precipitation values applicable to the entire Spring Creek Drainage Basin are those reflected in the PaDOT's IDF curves for Region 2, regardless if the area was formerly considered in Region 3.

(10) Storm drain conveyance system stability (swales, open channels, and pipe discharge aprons) shall be computed using a 10-year return period peak runoff rate.

(11) Storm sewers, where required by zoning and land use densities, shall be placed under or immediately adjacent to the roadway side of the curb, or as directed by the Borough, when parallel to the street within the right-of-way.

(12) When located in undedicated land, they shall be placed within a drainage easement not less than 20 feet wide as approved by the Borough Engineer.

(13) The use of properly designed, graded and turfed drainage swales is encouraged in lieu of storm sewers in commercial and industrial areas and, where approved by the Borough Engineer, in residential areas.

Such swales shall be designed not only to carry the required discharge without excessive erosion, but also to increase the time of concentration, reduce the peak discharge and velocity, and permit the water to percolate into the soil, where appropriate.

(14) Inlet types and inlet assemblies shall conform to PaDOT Standards for Roadway Construction as approved by the Borough Engineer.

(a) Inlets shall, at a minimum, be located at the lowest point of street intersections to intercept the storm water before it reaches pedestrian crossing; or at sag points of vertical curves in the street alignment which provide a natural point of ponding of surface storm water.

(b) Where the Borough deems it necessary because of special land requirements, special inlets may be approved.

(c) The interval between inlets collecting storm water runoff shall be determined in accordance with DM-2, Chapter 10, Section 3, "Capacity of Waterway Areas."

In curbed sections, the maximum encroachment of water on the roadway pavement shall not exceed half of a through traffic lane or 1 inch less than the depth of curb during the 10-year design storm of 5 minute duration. Inlets shall be provided to control the encroachment of water on the pavement. When inlets are used in a storm system within the right-of-way limits of a street in lieu of manholes, the spacing of such inlets shall not exceed the maximum distance of 450 feet.

(15) Accessible drainage structures shall be located on a 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 5 degrees, and at all points of convergence of 2 or more influent storm sewer mains. The construction locations of accessible drainage structures shall be as indicated on the land development drainage plan or area drainage plan approved by the Borough.

(16) When evidence available to the Borough indicates that existing storm sewers have sufficient capacity as determined by hydrograph summation and are accessible, the subdivider may connect their storm water facilities to the existing storm sewers so long as the peak rate of discharge does not exceed the amount permitted by this ordinance.

(17) All other storm drain design methods are to be the same as specified in existing local ordinances.

(18) Computational procedures other than those indicated here should follow the methods of the Federal Highway Administration's Urban Drainage Design Manual [Hydraulic Engineering Circular No 22. (HEC-22)].

e. <u>Water Quality Standards</u>.

(1) <u>Water Quality Performance Standards</u>. To minimize adverse impacts to stream health resulting from storm water non-point source (NPS) pollution, standards are provided for the implementation of Water Quality Best Management Practices (BMPs) to reduce NPS pollutant loadings resulting from land development activities. The following performance standards and guidelines shall be addressed at all sites where storm water management is required.

(a) Site designs shall minimize the generation of storm water runoff through the use of low-impact design techniques.

(b) Storm water runoff from all land development activities should be treated through the use of non-structural and structural BMPs to effectively treat the adverse impacts of storm water runoff including NPS pollutants.

(c) Water Quality BMPs shall be incorporated into site designs to treat the

required Water Quality volume as defined below.

(d) The use of non-structural BMPs shall always take priority over the use of structural BMPs. The use of innovative BMPs and low-impact site planning is encouraged to reduce the generation of storm water runoff and effectively treat pollutants transported in storm water from the site.

(e) The use of multiple non-structural water quality techniques along with new, emerging, and innovative techniques is encouraged to improve the quality of storm water runoff to receiving areas and reduce and/or eliminate the need for structural BMPs. The Borough Engineer should be consulted to clarify the design concept for meeting or exceeding the intent of this section.

(f) Where non-structural BMPs are unable to effectively treat all of the storm water runoff generated from land development activities, structural BMPs shall be designed to capture and treat the computed water quality volume (WQ_v).

(g) The priority areas to be treated with BMPs are streets, parking lots, driveways, and roof areas.

(h) Due to the karst nature of the Watershed, storm water discharges from water quality sensitive developments and discharges to sensitive wellhead protection areas (defined in Appendix B, Exhibit-1 in the Spring Creek Watershed Action 167 Storm Water Management Plan) will require special consideration. In these instances the applicant shall provide water quality pre-treatment (use of a filtering BMP and/or special structural design features) to prevent the discharge of storm water contaminants to groundwater resources. In addition, hydrogeologic studies may be required to document potential karst related impacts.

(i) Prior to storm water management and water quality design, applicants should consult with the Borough Engineer to verify storm water quality criteria and present proposed features and concepts for the treatment of storm water runoff. Following this meeting, the Borough Engineer shall define any needed support studies or documentation.

(2) Water Quality Volume (WQv). The required water quality volume that must be treated for non-sensitive areas underlain by carbonate rock (see exhibits in Appendix B) within the Spring Creek Basin shall be computed as:

$$WQ_{depth} = 0.25+(0.012)2.9^{(0.044(SIA))}$$

$$WQ_v = WQ_{depth}(A)/12$$

Where:
- WQ_v = water quality volume in acre-feet
- WQdepth = depth in inches that must be captured for impervious areas
- SIA = percent of site impervious area (all paved areas and roof with asphalt-based roofs)

A = total of all paved areas and asphalt-based roofs on site in acres

The required water quality volume that must be treated for any WQS development, on sites in sensitive areas underlain by carbonate rock, and all areas not underlain by carbonate rock is to be computed within the entire Spring Creek Basin as:

$$WQ_{depth} = \text{the larger of } 0.5 \text{ inches or } 0.25+(0.012)2.9^{(0.044(SIA))}$$

$$WQ_v = WQ_{depth}(A)/12$$

Where:
- WQ_v = water quality volume in acre-feet
- WQ_{depth} = depth in inches that must be captured for impervious areas
- SIA = percent of site impervious area (all paved areas and roof with asphalt-based roofs)
- A = total of all paved areas and asphalt-based roofs on site in acres

For designs in which the final roof material is unknown, the Design Engineer must assume an asphalt-based roof.

The water quality volume must be captured and treated through a water quality BMP over an extended period of time as per the specific requirements of each structure. Credits to reduce the effective impervious area are applicable as presented in Chapter 4 of the Storm Water Management Plan.

(3) Water Quality Credits. Due to the karst nature of the Spring Creek Basin, the non-structural water quality credits and techniques identified below may be limited for suitability and use based on development type and location. These limitations for use are specified in the restrictions section for each credit. The Borough Engineer may require additional documentation or investigation prior to use of each specific credit to reduce the risks of sinkhole development or groundwater contamination for sensitive areas and development types. No area may be double counted for use with credits. The combined credits of natural area conservation and vegetated filter strips are limited to 50 percent of the site's impervious area. The drainage way credit is limited to 50 percent of the site's impervious area. The drainage way protection credit is limited to 50 percent of the site's impervious area. The maximum total water quality credit for any site may therefore be 100 percent of the site's impervious area.

Non-Structural Technique	Water Quality Credit
Drainage-way Protection (DWP)	Subtract Drainage-way Protection Areas from impervious site area in WQ_v computation.
Natural Area Conservation (NAC)	Subtract Conserved Natural Areas from impervious site area in WQ_v computation.
Filter/Buffer Area	Subtract impervious areas discharged over pervious areas from impervious site area in WQ_v computation.

(4) Drainage-way Protection. A water quality credit is given for the protection of natural drainage-ways on a development site. Natural karst drainage-ways within the Spring Creek Watershed often do not exhibit a defined channel bed and banks. More often, these drainage-ways appear as wide, shallow parabolic swales. These drainage-ways are an integral part of the natural drainage system, and often exhibit significant infiltration capacity. Protection of these drainage-ways is critically important to the health of the watershed.

The drainage-way protection (DWP) area is defined as an area centered on the drainage-way and having a maximum width of 300 feet. The Borough Engineer may modify the defined maximum width in cases where natural land forms define an appropriate alternate width.

The impervious area used in the WQ_v equation for the development site may be reduced by twice the area of the preserved drainage-way (2 to 1 ratio).

(a) Restrictions on the Credit:

(i) Drainage-way protection areas must remain in an undisturbed condition during and after construction activities. There can be no construction activity within these areas including temporary access roads or storage of equipment or materials. Temporary access for the construction of utilities crossing this protection area may be permitted at the Borough Engineer's discretion. However, the alignment of any such crossing must be perpendicular to the drainage-way.

(ii) These areas should be placed in a conservation easement or be permanently preserved through a similarly enforceable agreement with the Borough of State College.

(iii) The limits of the undisturbed DWP area and conservation easement must be shown on all construction plans.

(iv) The DWP area must be located on the development site.

(v) The maximum total DWPA credit is 100 percent of the site impervious area.

(vi) Water quality credits are not permitted for Water Quality Sensitive (WQS) developments.

(b) Sensitive Area and Development Restrictions:

(i) DWP areas may not be counted as a credit in sensitive areas unless the

impervious area actually flows across the area as sheet flow.

(ii) Untreated urban runoff from sensitive development types may not be directed to DWP areas without pretreatment.

(5) Natural Area Conservation. A water quality credit is given for natural areas that are conserved at the development site, thereby maintaining pre-development water quality characteristics. The impervious area used in the WQ_v equation for the development site may be reduced by the natural area conserved in the water quality volume computations. Natural area conservation is different than vegetated filter strip/recharge area and drainage way protection in that in some cases surface runoff may never be directed over the natural area (i.e., if upslope wooded areas are conserved).

(a) Restrictions on the Credit:

(i) Natural areas must remain in an undisturbed condition during and after construction activities. Temporary incidental land disturbance activities associated with utility construction may be permitted within the conservation area.

(ii) These areas should be placed in a conservation easement or similarly enforceable agreement with the Borough of State College.

(iii) The limits of the undisturbed area and conservation easement must be shown on all construction plans.

(iv) The area must be located on the development site.

(v) Water quality credits are not permitted for Water Quality Sensitive (WQS) developments.

(vi) The maximum total NAC credit is 50 percent of the site impervious area. However, the combination of NAC VFRS is also 50 percent.

(b) Sensitive Area and Development Restrictions:

(i) NAC areas may not be counted as a credit in sensitive areas unless the impervious area actually flows across the area as sheet flow.

(ii) Untreated urban runoff from sensitive development types may not be directed to natural areas without pretreatment.

(6) Filter/Buffer Area. A water quality credit is given when storm water runoff is effectively treated via a filter/buffer area or strip. A filter/buffer area is a vegetated boundary characterized by uniform mild slopes. Filter strips may be forested or vegetated with turf grass.

Effective treatment is achieved when impervious area runoff is directed as sheet flow across vegetative filter or buffer areas (i.e., concentrated flow discharged to a filter strip does not meet water quality reduction criteria).

The area draining via overland sheet flow to an undisturbed, natural, vegetated filter strip (natural unmaintained meadow or forested area) can be subtracted from the site impervious area (IA) on a 1:1 area ratio in the water quality volume computation. Impervious areas draining across constructed (disturbed or regarded) pervious areas can be subtracted from the site impervious area (IA) on a 1:1/2 area ratio in the water quality volume computation.

(a) Restrictions on the Credit:

(i) The maximum impervious area that can be included in this credit, shall be computed as follows:

$$IA_c = W_{IA}\ L_{IA}$$

Where:
- IA_c = Impervious area recharge credit (L^2).
- L_{IA} = Length of impervious area measured perpendicular to the sheet flow direction (L).
- W_{IA} = Width of impervious area (L). Maximum width permitted for credit is the smaller of 100 feet or twice the width of the vegetated filter strip.

(ii) To qualify for a water quality credit, natural and constructed filter areas or strips must meet the same restrictions identified for natural or constructed recharge areas with regard to width, length, slope, tributary drainage length, and construction. These restrictions are presented in Chapter 3 in the Spring Creek Watershed Action 167 Storm Water Management Plan.

(iii) Runoff shall enter the filter/buffer strip as overland sheet flow.

(iv) Filter/buffer areas shall remain undisturbed/unmanaged other than to remove accumulated trash and debris.

(v) Water quality credits are not permitted for Water Quality Sensitive (WQS) developments.

(vi) The maximum total water quality credit for vegetative filter/buffer areas is 50 percent of the site impervious area. However, the combination of NAC and filter/buffer areas is also 50 percent.

(b) Sensitive Area and Development Restrictions:

(i) Untreated urban runoff from WQS developments may not be directed to filter/buffer areas without pretreatment.

(7) Comments Related to Water Quality Credits. Concurrence of the Borough Engineer is required prior to the use of all water quality credits for the reduction of the water quality treatment volume. The Borough Engineer may approve the use of additional credits based upon sufficient documentation regarding suitability for sensitive development types and areas, pollutant removal effectiveness, and maintenance criteria. Multiple water quality credits cannot be claimed for the identical area of the site (i.e., a stream buffer credit and disconnecting roof recharge area cannot both be claimed for the same area).

Additional impervious coverage reduction using low impact development techniques (development practices which reduce the impact of urban runoff such as narrower residential road sections, smaller cul-de-sacs, smaller parking stalls, smaller building set-backs to reduce driveway lengths, etc.) will also reduce the required water quality treatment volume. Many of these techniques require prior approval by the Borough before implementation into land development design.

(Ordinance 1741, March 17, 2003, Section 114, as amended by Ordinance 2049, October 6, 2014.)

Section 217. Erosion and Sedimentation Requirements.

a. Whenever the vegetation and topography are to be disturbed, such activity must be in conformance with Chapter 102, Title 25, Rules and Regulations, Part I, Commonwealth of Pennsylvania, Department of Environmental Protection (DEP), Subpart C, protection of Natural Resources, Article II, Water Resources, Chapter 102, "Erosion Control", and in accordance with the Centre County Conservation District and the standards and specifications of the appropriate municipal government.

b. The Centre County Conservation District has been delegated the authority by the PA DEP to administer the Erosion and Sediment Control (E&SC) Proram in Centre County. It shall be the responsibility of the land developer to submit the E&SC Plan, application and other necessary material to the Conservation District for review and approval. A copy of the transmittal letter, plan, narrative and other necessary material shall be provided to the Borough.

c. The PA DEP has regulations that require an E&SC Plan for any earth disturbance activity of 5,000 square feet or more under 25 Pa. Code SS 102.4(b)

d. In addition, under 25 Pa. Code Chapter 92, a PA DEP "NPDES Construction Activities" permit is required for any earth disturbance of one acre or more with a point source discharge to surface waters or the Borough's storm sewer system, or 5 acres or more regardless of the planned runoff (herein collectively referred to as "Regulated Earth Disturbance Activities"). This includes earth disturbance on any portion or, part of, or during any stage of, a

larger common plan of development.

e. No regulated earth disturbance activities within the Borough shall commence until approval is obtained from the Centre County Conservation District and with notice of approval given to the Borough of an E&SC Plan for construction activities.

f. Comments shall be received and the E&SC Plan approval obtained from the Centre County Conservation District prior to issuance of any zoning permits for construction within the area covered by the SWM Site Plan.

g. Evidence of any necessary permit(s) for regulated earth disturbance activities from the appropriate PA DEP regional office or the Centre County Conservation District must be provided to the Borough. The issuance of an NPDES Construction Permit or permit coverage under the state-wide general permit (PAG-2) satisfies the requirements in subsection (e).

h. Additional erosion and sediment control design standards and criteria that must be applied where recharge or water quality BMPs are proposed include the following:

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

2) These BMPs shall not be constructed nor receive runoff until the entire contributory drainage area to the BMP has received final stabilization.

3) Adequate erosion protection shall be provided along all open channels and at all points of discharge.

i. A copy of the E&SC Plan and any permit, as required by PA DEP regulations shall be available at the project site at all times.

(Ordinance 1741, March 17, 2003, Section 115, as amended by Ordinance 1774, March 2, 2004, Section 4, and by Ordinance 2049, October 6, 2014.)

Section 218. Sinkhole Protection. The use of sinkholes for storm water management must be carefully planned, because discharging runoff directly into existing sinkholes is not an engineered storm water solution. Aside from potential water quality effects, cover collapse sinkholes that exist throughout the watershed can be unstable, and it should be assumed that they could stop taking water at any time. Numerous sinkholes throughout the region already flood during larger runoff events. Nonetheless, in the watershed there are large drainage areas that completely drain to existing sinkholes and all upslope development tributary to them cannot be realistically stopped. Therefore the following sections have been developed.

a. Storm water from roadways, parking lots, storm sewers, roof drains, or other concentrated runoff paths shall not be discharged directly into sinkholes without prior filtration in

accordance with Section 118. B, below.

b. Sinkholes capable of absorbing substantial amounts of storm water shall be protected by diverting such runoff around the sinkhole (refer to 117.F) or, upon recommended approval of the Borough Engineer, by planting and maintaining a dense filter path of suitable vegetative material in such a manner and location to disperse and slow the runoff to a sheet flow condition to promote the maximum possible filtration and sedimentation of impurities.

The filter path must be at least 100 feet in length and 20 feet in width. 10-foot wide filter paths are acceptable if land slope is less than 2 percent.

Filter paths shall be designed and installed so that they filter sheet flow rather than concentrated flow. If concentrated flow occurs, grading and shaping or the use of best management practices such as grass waterways or drop structures may be required.

Sedimentation basins designed to PA DEP Chapter 102 Standards or permanent storm water storage criteria, whichever is larger, and proposed vegetative filter paths, in conjunction with temporary stone filter check dams, shall be installed prior to subdivision or land development construction activities, where sinkholes are used to accept storm water discharges.

c. If increased runoff is to be discharged into a sinkhole, even in filtered conditions, a hydrogeologic assessment of the effects of such runoff on the increased risk of land subsidence and adverse impacts to existing sinkhole flood plains and groundwater quality shall be made by a qualified professional and submitted with the storm water management plan. Such discharge shall be prohibited if the Borough Engineer determines that such poses a hazard to life, property or groundwater resources.

d. All sinkholes shall be posted by permanent on-site notices clearly visible at the sinkhole prohibiting any disposal of refuse, rubbish, hazardous wastes, organic matter or soil into the sinkhole. Rock fill may be permitted in the sinkhole for the purpose of preventing dumping of said materials.

e. To protect sensitive Karst areas, the Borough Engineer may require basins to contain an impervious liner. The liner may be of the impervious membrane type, placed in accordance with the manufacturer's recommendations, or may be constructed by mixing bentonite, or an approved alternative, with existing soil available at the site as approved by the Borough Engineer.

f. If it is determined that runoff from upslope developing areas should be diverted around a sinkhole due to existing problems, the Borough Engineer may require additional upstream volume controls as required to protect downstream areas.

(Ordinance 1741, March 17, 2003, Section 116, as amended by Ordinance 2049, October 6, 2014.)

Section 219. Design Criteria for Storm Water Management Facilities. Materials, Workmanship and Methods: All materials, workmanship and methods of work shall comply at a minimum with the Pennsylvania Department of Transportation Form 408 specifications, as accepted and commonly used by the Borough of State College, and shall be considered to be incorporated into this article as if copied in full. In the event a conflict arises between the requirements of this article and the Form 408 Specifications, the Borough Engineer shall resolve the difference, and his opinion shall be binding.

a. General.

(1) Facilities in State Rights-of-Way. Any storm water facility located on State highway rights-of-way shall be subject to approval by PaDOT. Any storm water facility that discharges directly onto state highway rights-of-way shall be subject to review by the PaDOT.

(2) Water Obstructions. Any facilities that constitute water obstructions (e.g., culverts, bridges, outfalls, or stream enclosures), and any work involving wetlands as directed in PA DEP Chapter 105 regulations (as amended or replaced from time-to-time by PA DEP), shall be designed in accordance with Chapter 105 and will require a permit from PA DEP. Any other drainage conveyance facility that does not fall under Chapter 105 regulations must be able to convey, without damage to the drainage structure or roadway, runoff from the 25-year design storm with a minimum of 1.0-foot of freeboard measured below the lowest point along the top of the roadway. Roadway crossings located within designated floodplain areas must be able to convey runoff from a 100-year design storm with a minimum of 1.0-foot of freeboard measured below the lowest point along the top of roadway. Any facility that constitutes a dam as defined in PA DEP Chapter 105 regulations may require a permit under dam safety regulations. Any facility located within a PaDOT right-of-way must meet PaDOT minimum design standards and permit submission requirements.

(3) Conveyance Facilities. Any drainage conveyance facility and/or channel that do not fall under Chapter 105 Regulations, must be able to convey, without damage to the drainage structure or roadway, runoff from the return period design storm as specified in Section 115.D.3. Conveyance facilities to or exiting from storm water management facilities (i.e., detention basins) shall be designed to convey the design flow to or from that structure. Roadway crossings located within designated floodplain areas must be able to convey runoff from a 100-year design storm. Any facility located within a PaDOT right-of-way must meet PaDOT minimum design standards and permit submission requirements.

b. Storm Water Basin Design Considerations. Storm water management basins for the control of storm water peak discharges shall meet the following minimum requirements:

(1) The design of all facilities over limestone formations shall include measures to prevent groundwater contamination and where required, sinkhole formation. Soils used for the construction of basins shall have moderate to low erodibility factors (i.e., "K" factors of 0.32 or

less). Any basin greater than 4 feet in height, measured from the top of berm to the downslope toe of the abutment, must also contain:

(a) berm soil specifications;

(b) a determination if site soils are available for the construction of the berm or cutoff trench;

(c) an impervious cutoff trench, which extends the full length of the downstream berm located in fill.

(2) Energy dissipaters and/or level spreaders shall be installed at points where pipes or drainageways discharge to or from basins. Generally, outlet pipes designed to carry the pre-development, 1-year storm flow will be permitted to discharge to a stream with only an energy dissipater. Discharges to drainage swales shall be spread with a level spreader or piped to an acceptable point.

(3) Outlet structures:

(a) Outlet structures within detention/retention basins shall be constructed of reinforced concrete or an approved alternate. With the exception of those openings designed to carry perennial stream flows, design openings shall have childproof, non-clogging trash racks over all openings 9 inches or greater in any dimension. Outlet aprons shall be designed and shall extend at a minimum to the toe of the basin slope. Where spillways will be used to control peak discharges in excess of the 10-year storm, the control weirs shall be constructed to withstand the pressures of impounded waters and convey flows at computed outlet velocities without erosion.

(b) All metal risers, where approved for use, shall be suitably coated to prevent corrosion. A trash rack or similar appurtenance shall be provided to prevent debris from entering the riser. All metal risers shall have a concrete base attached with a watertight connection. The base shall be sufficient weight to prevent flotation of the riser. An anti-vortex device, consisting of a thin vertical plate normal to the basin berm, shall be provided on the top of all metal risers.

(4) Emergency Spillway:

(a) Any storm water management facility (i.e., detention basin) designed to store runoff and requiring a berm or earthen embankment required or regulated by this ordinance shall be designed to provide an emergency spillway to handle flow up to and including the 100-year post-development conditions. The height of embankment must be set as to provide a minimum 1 foot of freeboard above the elevation required to safely pass the 100-year post-development inflow. Should any storm water 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 a 100-year event.

Any underground storm water management facility (pipe storage systems) must have a method to bypass flows higher than the required design (up to a 100-year post-development inflow) without structural failure or causing downstream harm or safety risks.

Any storm water management facility that has a paved roadway as the lower berm, and therefore cannot provide a traditional berm emergency spillway, is not required to provide 0.5 feet of freeboard above the elevation required to safely pass the 100-year post-development inflow, but is required to show that the design is stable and no significant undermining, scour or erosion will occur.

(b) Emergency spillways shall be constructed of reinforced concrete, vegetated earth, or riprap in accordance with generally accepted engineering practices. All emergency spillways shall be constructed so that the detention basin berm is protected against erosion. The minimum capacity of all emergency spillways shall be the peak flow rate from the 100-year design storm. The dimensions of the emergency spillways can be determined from the Centre County Erosion and Sediment Control Handbook. Emergency spillways shall extend along the upstream and downstream berm embankment slopes. Protection should be provided on the upstream embankment a minimum of 3 feet below the spillway crest elevation. Protection at the downstream slope of the spillway shall, as a minimum, extend to the toe of the berm embankment. The emergency spillway shall not be located on or discharge over uncompacted earthen fill and/or easily erodible material.

(c) Rock-filled gabions may be used where combination berm and emergency spillway structures are required to prevent concentrated flows. The Borough Engineer may require the use of open concrete lattice blocks, stone riprap, or concrete spillways when slopes would exceed 4 feet horizontal to 1 foot vertical and spillway velocities might exceed Soil Conservation Service standards for the particular soils involved.

(5) Antiseep Collars. Antiseep collars shall be installed around the principal pipe barrel within the normal saturation zone of the detention basin berms. The antiseep collars and their connections to the pipe barrel shall be watertight. The antiseep collars shall extend a minimum of 2 feet beyond the outside of the principal pipe barrel. The maximum spacing between collars shall be 14 times the minimum projection of the collar measured perpendicular to the pipe.

(6) Slope of Detention Basin Embankment. The top or toe of any slope shall be located a minimum of 10 feet from any property line. Whenever possible the side slopes and basin shape shall be amenable to the natural topography. Straight side slopes and rectangular basins shall be avoided whenever possible.

(i) Exterior slopes of compacted soil shall not exceed 3 feet horizontal to 1foot vertical, and may be further reduced if the soil has unstable characteristics.

(ii) Interior slopes of the basin shall not exceed 3 feet horizontal to 1 foot vertical, except with approval of the Borough of State College.

(7) Width of Berm. The minimum top width of detention basin berms shall be 10 feet.

(8) Slope of Basin Bottom. In order to ensure proper drainage of the detention basin, a minimum grade of 2 percent shall be maintained for all basins used exclusively for peak runoff control. Water quality or recharge basins with filtration systems incorporated into them may have a minimum grade of ½ (0.5) percent.

(9) The lowest floor elevation of any structure constructed adjacent to a detention or retention basin or other storm water facility shall be 2 feet above the highest water surface elevation. The distance between any residential or non-residential structure and any swale or open channel storm water facility shall be a minimum of 25 feet.

(10) Landscaping and planting specifications must be provided for all storm water management basins and be specific for each type of basin.

(i) A minimum of 6 inches of topsoil material shall be placed on all areas affected by the basin construction (bottom of basin, side slopes, top of berm, etc.) and all other vegetative areas, unless waived by Borough Engineer. The material must meet the minimum requirements of the PaDOT Form 408, specifications, as amended.

(11) Basins should be lined with impervious liners only in areas with a high risk of sinkhole formation or potential groundwater contamination as determined by a geotechnical engineer. However, where a liner is deemed necessary or appropriate, the use of controlled, compacted natural clay liners, for SWM basins should be considered. Locally available clay, when properly installed, can provide near impervious conditions (approximately E-6 cm/s or less). Some of the advantages of using controlled, compacted, natural clay soil liners are:

(i) Can offer better long-term solution as a basin liner versus geosynthetics because of greater thickness and the ability to withstand settlement;

(ii) Can be constructed to allow relatively uniform leakage rates to facilitate ground-water recharge but not to an excessive degree that overloads karst bedrock;

(iii) When properly constructed in two or more 8- to 10-inch thick lifts, rapid movement of surface water through the clay liner is eliminated (rapid leaks can occur in geosynthetic lined basins due to poor seaming, punctures, or other factors);

(iv) Cleaning/maintenance of clay-lined storm water basins will be easier/safer versus geosynthetic liners which could easily be damaged during maintenance operations; and

(v) The abundance of clayey soils (derived from limestone residuum) within the Spring Creek Watershed can provide adequate, cost effective, soil resources for construction of clay liner systems at most development projects.

However, the installation of any low permeability clay liner system needs to be carefully controlled and the designer needs to ensure that specifications meet standards to ensure integrity.

c. Construction of Basins.

(1) Basins shall be installed prior to or concurrent with any earthmoving or land disturbances, which they will serve. The phasing of their construction shall be noted in the narrative and on the plan. Basins that include water quality or recharge components shall have those components installed in such a manner as to not disturb or diminish their effectiveness.

(2) Construction specifications in accordance with the minimum criteria of the Borough of State College must be provided for all embankments pursuant to Section B.1.b of Section 118.

(3) Compaction test reports shall be kept on file at the site and be subject to review at all times with copies being forwarded to the Borough Engineer upon request.

(4) When rock is encountered during the excavation of a pond, it shall be removed to an elevation of at least 12 inches below the proposed basin floor (for a manufactured liner, 24 to 30 inches). All exposed cracks and fissures are to be structurally filled.

(5) Temporary and permanent grasses or stabilization measures shall be established on the sides and base of all earthen basins within 15 days of construction.

(6) A quality control program is critical for embankment fills. Therefore, whenever embankment fill material in excess of 3 feet is to be used, each layer of compacted fill shall be tested to determine its density per ASTM D2922. The density of each layer shall be 90 percent of a Standard Proctor analysis for ASTM 698.

d. Construction Inspection. Inspections may be conducted by the Borough Engineer during the construction of the storm water management basin and facilities. Such inspections do not constitute approval of construction methods or materials. The design professional shall perform site inspections as may be necessary to ensure that all stormwater management facilities are constructed in accordance with the approved plans.

e. Special Use Basins.

(1) The design and construction of multiple use storm water detention facilities are strongly encouraged. In addition to storm water management, facilities should, where

appropriate, allow for recreational uses including: ball fields, play areas, picnic grounds, etc. Provision for parking facilities within basins and permanent wet ponds with storm water management capabilities may also be appropriate. Prior approval and consultation with the Borough are required before design. Multiple use basins should be constructed so that potentially dangerous conditions are not created.

Water quality basins or recharge basins that are designed for a slow release of water or other extended detention ponds are not permitted for recreational uses, unless the ponded areas are clearly separated and secure.

(2) Multiple Development Basins. Storm water management facilities designed to serve more than one property or development in the same watershed are encouraged. Staged construction of existing or proposed multiple-use detention facilities by several developers in conjunction with watershed development is encouraged. Each developer shall be responsible for the incremental increase in runoff generated by the respective development and incremental construction improvements necessary for the overall detention facility. Prior approval and consultation with the Borough is required before design of such facilities.

(3) Alternative Detention Facilities. Alternative storm water detention facilities including rooftop, subsurface basins or tanks and in-pipe detention storage, or other approved alternative designs are permitted as determined by the Borough Engineer.

(Ordinance 1741, March 17, 2003, Section 117, as amended by Ordinance 2049, October 6, 2014.)

Section 220. Easements. Storm water management facilities located outside of existing or proposed rights-of-way shall be located within and accessible by easements as follows:

a. Drainage Easements. Where a tract is traversed by a watercourse, drainage-way, channel or stream, there shall be provided a drainage easement paralleling the line of such watercourse, drainage-way, channel or stream. The width of the drainage easement will be adequate to preserve the unimpeded flow of natural drainage in the 100-year flood plain, in accordance with computed top widths for water surface elevations determined under Section 116.a(3).

b. Access Easements. Where proposed storm water management facilities are not adjacent to proposed or existing public rights-of-way or are not accessible due to physical constraints, as determined by the Borough Engineer, a 20-foot wide passable access easement specifying rights of entry shall be provided. Access easements shall provide for vehicle ingress and egress on grades of less than 10 percent for carrying out inspection or maintenance activities.

c. Maintenance Easements. A maintenance easement shall be provided which encompasses the storm water facility and appurtenances and provides for access for maintenance purposes. The maintenance easement must be located outside of 100-year surface elevation and

the storm water facility and appurtenances.

d. Easements shall stipulate that no trees, shrubs, structures, excavation or fill be placed and no regrading be performed within the area of the easement without written approval from the Borough upon review by the Borough Engineer. Upon approval of the Borough Engineer, such landscaping may be placed in maintenance easements, provided it does not impede access.

e. Whenever practicable, easements shall be parallel with and conjunctive to property lines of the subdivision.

f. All easement agreements shall be recorded with a reference to the recorded easement indicated on the site plan. The format and content of the easement agreement shall be reviewed and approved by the Borough Engineer and Solicitor. (See Section 132)

g. When storm water conveyance pipes or channels are located in undedicated land, they shall be placed within a drainage easement not less than 20 feet wide as approved by the Borough Engineer.

(Ordinance 1741, March 17, 2003, Section 118, as amended by Ordinance 2049, October 6, 2014.)

Section 221. General Requirements. From and after the date of enactment of this ordinance, a storm water management site plan and other information specified herein shall be submitted to the Borough of State College for all lands subdivided or for which land development plans are prepared after the enactment of this ordinance, unless the project qualifies for an exemption as noted in Section 110. A storm water management site plan and other information specified herein shall be submitted at the same time and together with submission of a preliminary subdivision or final land development plan, along with a completed checklist supplied by the Borough indicating the items contained within the submission.

Such plans and information shall be considered part of said zoning and subdivision documents and shall be reviewed in accordance with procedures established thereunder. Preliminary approval or final approval of a subdivision or land development plan, or the issuance of a zoning permit, shall be contingent upon submission of a storm water management site plan and other materials specified herein, and approval of the storm water management plan in accordance with provisions of this ordinance.

All storm water management site plans shall be submitted to the Borough for review and comment. Such review shall include a statement by the Borough Engineer specifying the provisions of this ordinance, which have not been met by the plan as submitted.

Once a storm water management site plan has been approved together with a subdivision or land development plan approval, or together with the issuance of a zoning permit, said storm water management site plan shall be valid only for the subdivision, land development, or zoning permit

approved. Any further development on the lot or lots requiring a revision of the approved plan or other construction or activities as defined by State College Borough Zoning or Subdivision and Land Development Regulations shall require the submission of a new, amended, or revised storm water management site plan and other information specified herein.

(Ordinance 1741, March 17, 2003, Section 119, as amended by Ordinance 2049, October 6, 2014.)

Section 222. SWM Site Plan Contents. The SWM Site Plan shall consist of all applicable calculations, maps, and plans. A note on the maps shall refer to the associated computations and erosion and sediment pollution control plan by title and date. The cover sheet of the computations and erosion and sediment pollution control plan shall refer to the associated maps by title and date. All SWM Site Plan materials shall be submitted to the Borough in a format that is clear, concise, legible, neat, and well organized; otherwise, the SWM Site Plan shall be disapproved and returned to the applicant.

Said plan shall be prepared by a registered professional land surveyor, qualified geologist, landscape architect, architect, or engineer licensed in the State of Pennsylvania, with said preparer's seal and registration number affixed to the plan.

The following items shall be included in the SWM Site Plan:

a. Storm Water Management Report.

(1) General description of project, including address of project site.

(2) General description of permanent storm water management techniques, including construction specifications and materials to be used for storm water management facilities.

(3) Complete hydrologic, hydraulic, and structural computations for all storm water management facilities.

(4) A written maintenance plan for all storm water features including detention facilities and other storm water management elements.

(5) Identification of ownership and maintenance responsibility for all permanent storm water management facilities.

(6) The storm water management report must include a narrative which clearly discusses the project and summary tables which, at a minimum, provides the following information:

(a) Narrative:

(i) The overall storm water management concept;
(ii) The expected project schedule;
(iii) Location map;
(iv) Total site area, pre- and post-, which must be equal or have an explanation as to why it is not;
(v) Total site impervious area;
(vi) Total off-site areas;
(vii) Number of storm water management facilities (ponds), if applicable;
(viii) Type of development;
(ix) Pre-development land use;
(x) Whether site is underlain by carbonate geology;
(xi) Whether site is a water quality sensitive (WQS) development;
(xii) Whether site is in a defined sensitive area;
(xiii) Types of water quality and recharge systems used, if applicable;
(xiv) Other pertinent information, as required.

(b) Summary Tables.

(i) Pre-development:
- Hydrologic soil group (HSG) assumptions, curve numbers, (CN)
- Computation of average slope, hydraulic length, computed time of concentration
- Required peak rate of runoff

(ii) Post-development:
- Undetained areas, areas to ponds
- Land use for each subarea
- Hydrologic soil group (HSG) assumptions, curve numbers (CN)
- Time of concentration computed for each subarea
- Post-development peak rate of runoff routed to ponds and out
- Pond maximum return period design data including: maximum water surface elevation, berm elevation, and emergency spillway elevation
- Water quality depth and volume requirements
- Recharge volume requirements
- Morphology requirements
- Capture volumes required

(7) Reports that do not clearly indicate the above information may be rejected for review by the Borough Engineer or representative and will be returned to the applicant.

b. Plans for tracts of less than 20 acres shall be drawn at a scale of 1 inch equals no more than 50 feet; for tracts of 20 acres or more, plans shall be drawn at a scale of 1 inch equals no more than 100 feet. Plans shall be submitted on the following sheet sizes: 18' x 24", 24" x 36",

or 36" x 42". All lettering shall be drawn to a size to be legible if the plans are reduced to half size. All sheets comprising a submission shall be on one size.

The following information, unless specifically exempted in writing by the Borough Engineer, must be shown on the plans, prepared in a form which meets the requirements for recording in the Office of the Recorder of Deeds of Centre County, Pennsylvania. The contents of the map(s) shall include, but not be limited to:

(1) The name of the development, the name and address of the owner of the property, and the name of the individual or firm preparing the plan.

(2) The date of submission and revision.

(3) The location of the project relative to highways, municipalities or other identifiable landmarks.

(4) Existing contours at intervals of one foot. In areas of steep slopes (greater than 15 percent), 5-foot contour intervals may be used.

(5) Existing streams, lakes, ponds, or other bodies of water within the project area.

(6) Other physical features including flood hazard boundaries, sinkholes, closed depressions, wetlands, streams, existing drainage courses, areas of natural vegetation to be preserved, and the total extent of the upstream area draining through the site. In Addition, any areas necessary to determine downstream impacts, where required for proposed storm water management facilities must be shown.

(7) The locations of all existing and proposed utilities, sanitary sewers, and water lines within 20 feet of property lines.

(8) An overlay showing soil names and boundaries, including rock outcrops.

(9) Total area of impervious surfaces proposed.

(10) Proposed structures, roads, paved areas, and buildings.

(11) Final contours at intervals of one foot. In areas of steep slopes (greater than 15 percent), five-foot contour intervals may be used.

(12) A graphic and written scale.

(13) A North arrow.

(14) The total tract boundary and size with distances marked to the nearest foot and

bearings to the nearest degree.

(15) Existing and proposed land use(s).

(16) A key map showing all existing man-made features beyond the property boundary that would be affected by the project and the extent of the watershed or sub-area that drains through the project site.

(17) Horizontal and vertical profiles of all open channels, including hydraulic capacity.

(18) Overland drainage paths.

(19) Access easements around all storm water management facilities that would provide ingress to and egress from a public right-of-way.

(20) A note on the plan indicating the location and responsibility for maintenance of storm water management facilities that would be located off-site. All off-site facilities shall meet the performance standards and design criteria specified in this ordinance.

(21) A construction detail of any improvements made to sinkholes and the location of all notes to be posted, as specified in this ordinance.

(22) Complete drainage systems for the site, including details for construction. All existing drainage features, which are to be incorporated in the design, shall be so identified. If the site is to be developed in stages, a general drainage plan for the entire site shall be presented with the first stage and appropriate development stages for the drainage system shall be indicated.

(23) Location and selected plan material used for vegetative filter paths to sinkholes, and the location of all notices to be posted.

(24) A statement, signed by the landowner, acknowledging the storm water management system to be a permanent fixture that can be altered or removed only after approval of a revised plan by the Borough of State College.

(25) A note indicating that As-Built drawings in electronic format in accordance with State College Zoning Requirements will be provided by the Developer for all storm water facilities prior to occupancy, or the release of the surety bond.

(26) The following signature block for the registered professional preparing the Storm Water Management Site Plan: *"I, _____, hereby certify that the Storm Water Management Site Plan meets all design standards and criteria of the State College Borough Storm Water Management Ordinance."*

(27) The following signature block for the Borough Engineer reviewing the Storm Water Management Site Plan: *"I, _____, have reviewed this Storm Water Management Site Plan in accordance with the Design Standards and Criteria of the State College Borough Storm Water Management Ordinance."*

(28) The location of all erosion and sedimentation control facilities.

c. <u>Supplemental Information</u>:

(1) A soil erosion and sediment pollution control plan, where applicable, including all reviews and approvals, as required by PA DEP.

(2) Soils investigation report, including boring logs, compaction requirements, and recommendations for construction of detention basins.

(3) Karst Features Identification and Analysis Reports and a hydrogeologic assessment of the effects of runoff on sinkholes.

(4) The effect of the project (in terms of runoff volumes and peak flows) on adjacent properties and on any existing Borough storm water collection system that may receive runoff from the project site.

(5) A Declaration of Adequacy and Highway Occupancy Permit from PaDOT District Office when utilization of a PaDOT storm drainage system is proposed.

(6) All permits required by the Pennsylvania Department of Environmental Resources and Army Corps of Engineers and other regulatory agencies.

d. <u>Storm Water Management Facilities</u>.

(1) All storm water management facilities must be located on a plan and described in detail.

(2) When groundwater recharge methods such as seepage pits, beds or trenches are used, the locations of existing and proposed septic tank infiltration areas and wells must be shown.

(3) All calculations, assumptions, and criteria used in the design of the storm water management facilities must be shown.

(a) A sketch of the berm embankment and outlet structure indicating the embankment top elevation, embankment side slopes, top width of embankment, emergency spillway elevation, perforated riser dimensions, pipe barrel dimensions and dimensions and

spacing of antiseep collars.

(b) Design computations for the pipe barrel and riser.

(c) A plot or table of the stage-storage (acre-feet versus elevation) and all supporting computations.

(d) Flood routing computations.

(e) A detailed plan of the trash rack and anti-vortex device.

(4) Record Set (As-Built) Plans: At the completion of the project, and as a prerequisite for the release of the guarantee or issuance of an occupancy permit, the owner or his representative shall:

(a) Provide certification of completion from a registered professional verifying that all permanent facilities have been constructed according to the plans and specifications and approved revisions thereto; and

(b) Provide a set of approved storm water management plan drawings in electronic format in accordance with State College Borough Zoning Requirements showing all approved revisions and elevations and inverts to all manholes, inlets, pipes, and storm water control facilities.

(Ordinance 1741, March 17, 2003, Section 120, as amended by Ordinance 2049, October 6, 2014.)

Section 223. Plan Submission. For all activities regulated by this ordinance, the steps below shall be followed for submission. For any activities that require a PA DEP Joint Permit Application and regulated under Chapter 105 (Dam Safety and Waterway Management) or Chapter 106 (Floodplain Management) of PA DEP's Rules and Regulations, require a PaDOT Highway Occupancy Permit, or require any other permit under applicable state or federal regulations, the permit(s) shall be part of the plan.

a. The SWM Site Plan shall be submitted by the Developer as part of the Final Plan submission for the Regulated Activity.

b. 5 copies of the SWM Site Plan and Storm Water Management Report shall be submitted.

c. Distribution of the SWM Site Plan will be as follows:

(1) 2 copies to the Borough accompanied by the requisite Review Fee.
(2) 1 copy to the Borough Engineer.

(3) 1 copy to the County Planning Commission/Department.
(4) 1 copy to the Centre Regional Planning Agency.

(Ordinance 1741, March 17, 2003, Section 121, as amended by Ordinance 2049, October 6, 2014.)

Section 224. SWM Site Plan Review.

a. The Borough Engineer or designee shall review the SWM Site Plan for consistency with the approved Spring Creek Watershed Act 167 Storm Water Management Plan. The Borough shall require receipt of a complete plan, as specified in this ordinance.

b. The Borough Engineer shall ensure that all other ordinances applicable to storm water management are complied with.

c. For activities regulated by this ordinance, the Borough Engineer or designee shall notify the Borough Planning Department in writing, within 30 calendar days, whether the SWM Site Plan is consistent with the Storm Water Management Plan. Should the SWM Site Plan be determined to be consistent with the Storm Water Management Plan, the Borough Engineer or designee will forward an approval letter to the Developer with a copy to the Borough Planning Department.

d. Should the SWM Site Plan be determined to be inconsistent with the Storm Water Management Plan, the Borough Engineer or designee will forward a disapproval letter to the Developer with a copy to the Borough Planning Department citing the reason(s) for the disapproval. Any disapproved SWM Site Plans may be revised by the Developer and resubmitted consistent with this ordinance.

e. For Regulated Activities requiring a PA DEP Joint Permit Application, the Borough Engineer shall notify PA DEP whether the SWM Site Plan is consistent with the Storm Water Management Plan and forward a copy of the review letter to the Borough and the Developer. PA DEP may consider the Borough Engineer's review comments in determining whether to issue a permit.

f. The Borough shall not approve any subdivision or land development for Regulated Activities specified in Sections 104.A and 104.B of this ordinance if the SWM Site Plan has been found to be inconsistent with the Storm Water Management Plan, as determined by the Borough Engineer or designee. All required permits from PA DEP must be obtained prior to approval.

g. The Borough Planning Department shall not issue a zoning permit for any Regulated Activity specified in Section 104 of this ordinance if the Drainage Plan has been found to be inconsistent with the Storm Water Management Site Plan, as determined by the Borough Engineer, or without considering the comments of the Borough Engineer. All required permits from PA DEP must be obtained prior to issuance of a zoning permit.

h. The Developer shall be responsible for completing an "As-Built Survey" of all storm water management facilities included in the approved SWM Site Plan. The As-Built Survey and an explanation of any discrepancies with the design plans shall be submitted in electronic format in accordance with State College Borough Zoning Regulations to the Borough Engineer for final approval. In no case shall the Borough approve the As-Built Survey until the Borough receives a copy of an approved Declaration of Adequacy, Highway Occupancy Permit from the PaDOT District Office, and any applicable permits from PA DEP.

i. The Borough's approval of a SWM Site Plan shall be valid for a period not to exceed 5 years. This 5-year time period shall commence on the date that the Borough signs the approved SWM Site Plan. If storm water management facilities included in the approved SWM Site plan have not been constructed, or if an As-Built Survey of these facilities has not been approved within this 5-year time period, then the Borough may consider the SWM Site plan disapproved and may revoke any and all permits unless a time extension is granted by the Borough. SWM Site Plans that are considered disapproved by the Borough shall be resubmitted in accordance with Section 126 of this ordinance.

(Ordinance 1741, March 17, 2003, Section 122, as amended by Ordinance 2049, October 6, 2014.)

Section 225. Modification of Plans. A modification to a submitted SWM Site Plan for a development site that involves a change in storm water management facilities or techniques, or that involves the relocation or re-design of storm water management facilities, or that is necessary because soil or other conditions are not as stated on the SWM Site Plan as determined by the Borough Engineer, shall require a resubmission of the modified SWM Site Plan consistent with Section 123 of this ordinance and be subject to review as specified in Section 124 of this ordinance.

A modification to an already approved or disapproved SWM Site Plan shall be submitted to the Borough, accompanied by the applicable review. A modification to a SWM Site Plan for which a formal action has not been taken by the Borough shall be submitted to the Borough, accompanied by the applicable Review Fee.

(Ordinance 1741, March 17, 2003, Section 123, as amended by Ordinance 2049, October 6, 2014.)

Section 226. Resubmission of Disapproved SWM Site Plans. A disapproved SWM Site Plan may be resubmitted, with the revisions addressing the Borough Engineer's concerns documented in writing, to the Borough Engineer in accordance with Section 123 of this ordinance and is subject to review as specified in Section 124 of this ordinance. The applicable Fee must accompany a resubmission of a disapproved SWM Site Plan. (Ordinance 1741, March 17, 2003, Section 124, as amended by Ordinance 2049, October 6, 2014.)

Section 227. Schedule of Inspections.

a. The Borough Engineer or designee shall inspect all phases of the installation of the permanent storm water management facilities.

b. During any stage of the work, if the Borough Engineer determines that the permanent storm water management facilities are not being installed in accordance with the approved Storm Water Management Plan, the Borough shall revoke any existing permits until a revised SWM Site Plan is submitted and approved, as specified in this ordinance.

(Ordinance 1741, March 17, 2003, Section 125, as amended by Ordinance 2049, October 6, 2014.)

Section 228. Storm Water Management Review Fee. The applicant shall pay all costs associated with the review, approval and inspection of the SWM Site Plan. The costs, at a minimum, shall include:

a. Administrative Costs.

b. The review of the SWM Site Plan by the Borough Engineer, consultant or designee.

c. The site inspections.

d. The inspection of storm water management facilities and drainage improvements during construction.

e. The final inspection upon completion of the storm water management facilities and drainage improvements presented in the SWM Site Plan.

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

g. Meetings

The applicant shall deposit escrow as established by resolution to cover all costs incurred by the Borough associated with the review, approval and inspection of the SWM Site Plan, as noted in Section 128.

(Ordinance 1741, March 17, 2003, Section 126, as amended by Ordinance 2049, October 6, 2014.)

Section 229. Storm Water Management Controls and Facilities. Storm water management controls and facilities as defined here include all structural and non-structural storm water conveyance and management controls including water quantity and quality Best Management Practices. (Ordinance 1741, March 17, 2003, Section 127, as amended by Ordinance 2049, October 6, 2014.)

Section 230. Performance Guarantee. The applicant should provide a letter of credit, surety, or provision for security interest acceptable to the Borough of State College for the timely installation and proper construction of all storm water management controls as required by the approved storm water plan and this ordinance equal to the full construction cost of the required controls. (Ordinance 1741, March 17, 2003, Section 128, as amended by Ordinance 2049, October 6, 2014.)

Section 231. Maintenance Responsibilities.

a. The SWM Site Plan for the development site shall contain an operation and maintenance plan prepared by the developer and approved by the Borough Engineer. The operation and maintenance plan shall be submitted in two parts. The first shall outline required routine maintenance actions and schedules necessary to ensure proper operation and function of the facility(ies). The second shall outline a proposed plan for an extensive rebuild in the event of failure of the structure.

b. The responsible party or entity responsible for the maintenance must also be identified. The SWM Site Plan for the development site shall establish responsibilities for the continuing operation and maintenance of all proposed storm water control facilities and temporary permanent erosion control facilities, consistent with the following principals:

(1) If a development consists of structures or lots that are to be separately owned and in which streets, sewers and other public improvements are to be dedicated to the Borough, storm water control facilities may also be dedicated to and maintained by the Borough.

(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 storm water control facilities shall be the responsibility of the owner or private management entity.

Facilities may be incorporated within individual lots so that the respective lot owners will own and be responsible for maintenance in accordance with recorded deed restriction. A description of the facility or system and the terms of the required maintenance shall be incorporated as part of the deed to the property.

Ownership and maintenance may be the responsibility of a Property Owners Association. The stated responsibilities of the Property Owners Association in terms of owning and maintaining the storm water management facilities shall be submitted with final plans for

determination of their adequacy, and upon their approval shall be recorded with the approved subdivision plan among the deed records of Centre County, Pennsylvania. In addition, the approved subdivision plan and any deed written from said plan for a lot or lots shown herein shall contain a condition that it shall be mandatory for the owner or owners of said lot to be members of said Property Owners Association.

For storm water management facilities that are proposed as part of the site development plan, the developer will be required to execute a developer agreement and a maintenance agreement with the Borough for the construction and continued maintenance of the facilities prior to the signature approval on the final plan. Access for inspection by the Borough of all such facilities deemed critical to the public welfare at any reasonable time shall be provided.

c. The governing body, upon recommendation of the Borough Engineer, shall make the final determination on the continuing maintenance responsibilities prior to final approval of the storm water management plan. The governing body reserves the right to accept the ownership and operating responsibility for any or all of the storm water management controls.

(Ordinance 1741, March 17, 2003, Section 129, as amended by Ordinance 2049, October 6, 2014.)

Section 232. Storm Water Access and Maintenance Agreement for Privately Owned Storm Water Facilities.

a. Prior to final approval of the site's storm water management site plan, if the stormwater management facility is not dedicated to the Borough, the property owner shall sign and record a Storm Water Access and Maintenance Agreement (SWAME) covering all storm water control facilities that are to be privately owned. The SWAME shall contain the following elements:

1. Name and address of the property owner.

2. Name of Land Development for which the SWAME is required.

3. Statement noting that as a condition of approval that a SWAME is required.

4. Statement noting that the SWAME shall run in perpetuity with the land.

5. Statement that the property owner allow access to the Borough for the purpose of access to the storm water facilities for ingress, egress, and regress.

6. Metes and bounds description of any required Storm Water Access and Maintenance Easement.

7. Statement that heirs and assigns of the owner, by accepting a deed from the owner, agree to be subject to the conditions of the SWAME.

8. Statement that any storm water easement shall be a permanent easement and that the storm water management facilities located within the easement will be maintained by the owner, their heirs and assigns and shall be responsible for repairs as may be required in accordance with the approved Storm Water Management Site Plan.

9. The creation of the storm water agreement shall be deemed an agreement by the Owner to maintain the storm water management facilities with all costs of maintenance to be the responsibility of the Owner. The agreement shall also state that no alteration of the facilities is permitted without formal plan approval by DEP, the Centre County Conservation District and the Borough.

10. Statement noting that no structures are permitted within an easement and that no grading that will adversely impact the function of storm water facilities within an easement.

11. A statement noting that no barriers, fences or other obstructions that may impede storm water flow are permitted.

12. A statement noting that Owner will be responsible for maintenance of the Stormwater Management Facilities including mowing and annual upkeep.

13. Statement noting that in case any provisions contained in this SWAME are for any reason declared invalid, that such invalidity shall not affect any other provision hereof.

14. Statement that the Owner their heirs, successors, and assigns agree to indemnify and hold harmless the Borough, Centre County, and the Borough Engineer from any and all claims, costs, damages, and expenses legally and reasonably incurred as a result of this SWAME and the easements hereby created.

15. Statement noting the following: "The Owner hereby acknowledges the Borough's right to access the site to inspect the storm water management facilities. The Owner also acknowledges the Borough's right, upon notice to the Owner, to repair and or maintain the storm water facilities in accordance with the Storm Water Access and Maintenance Plan. All costs, including materials, labor, engineering, and legal costs of such repair or maintenance activities shall be the sole responsibility of the Owner." In the event of non-payment by the Owner, the Borough shall seek legal options for receipt of payment including placement of a Municipal Lien on the property.

(Ordinance 1741, March 17, 2003, Section 130, as amended by Ordinance 2049, October 6, 2014.)

Section 233. Post-Construction Maintenance Inspections.

a. Storm water facilities should be inspected by the land owner or responsible entity (including the Borough Engineer for dedicated facilities) on the following basis:

(1) Annually
(2) During or immediately after every 10-year or greater storm event.

b. The entity conducting the inspection should be required to submit a report to the Borough regarding the condition of the facility and recommending necessary repairs, if needed.

c. Maintenance inspections may be performed by the Borough to ensure proper functioning of all storm water facilities. These inspections may, at a minimum, be performed annually and/or following major storm events. If the Borough determines at any time that any permanent storm water facility has been eliminated, altered or improperly maintained, the owner of the property shall be advised of corrective measures required and given three (3) days to initiate appropriate action in accordance with a time schedule dictated by the Borough. If such action is not taken by the property owner, the Borough may cause the work to be done and backcharge all costs to the property owners.

(Ordinance 1741, March 17, 2003, Section 132, as amended by Ordinance 2049, October 6, 2014.)

Section 234. Right Of Entry. Upon presentation of proper credentials, duly authorized representatives of the Borough of State College may enter, at reasonable times, upon any property within the Borough to inspect the condition of the storm water structures and facilities in regard to any aspect regulated by this ordinance. Access easements will be required to enable the Borough to inspect or repair structures. Easements shall be a minimum width of 20 feet or a width determined by the Borough Engineer to be adequate and shall be shown on the plan. (Ordinance 1741, March 17, 2003, Section 133, as amended by Ordinance 2049, October 6, 2014.)

Section 235. Notification.

a. In the event that a person fails to comply with the requirements of this Ordinance, or fails to conform to the requirements of any permit issued hereunder, the Borough shall provide written notification of the violation. The notice will direct the responsible party to comply with all the terms of this Ordinance within seven (7) days, or such additional period, not to exceed thirty (30) days, as the designated Borough representative shall deem reasonable. In addition, the designated Borough representative shall give notice to the owner, applicant, developer, property manager or other person responsible for the property or the violation that if the violation is not corrected, the Borough may correct the same and charge the landowner or other person responsible the cost thereof plus penalties as specified herein for failure to comply.

b. Such notice may be delivered by the United States mail, first class, postage prepaid, by certified or registered mail; by personal service; or, if the property is occupied, by posting the notice at a conspicuous place upon the affected property.

c. Such notification shall set forth the nature of the violations(s) and establish a time limit for correction of these violation(s). Failure to comply within the time specified shall subject such person to the penalty provision of this ordinance. All such penalties shall be deemed cumulative and shall not prevent the Borough from pursuing any and all other remedies available in law or equity. 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.

(Ordinance 1741, March 17, 2003, Section 134, as amended by Ordinance 1774, March 2, 2004, Section 5, and by Ordinance 2049, October 6, 2014.)

Section 236. Enforcement. The Borough of State College is hereby authorized and directed to enforce all of the provisions of this ordinance. All inspections regarding verification of compliance with the SWM Site Plan shall be the responsibility of the Borough Engineer or other qualified persons designated by the Borough. Inspection frequency will be deemed as necessary by the Borough Engineer and will be based on past performance of the facility, compliance history of the owner of the facility with inspection and maintenance requirements and weather conditions.

a. A set of design plans approved by the Borough shall be on file at the site throughout the duration of the construction activity. Periodic inspections may be made by the Borough or designee during construction.

b. Adherence to Approved Plan. It shall be unlawful for any person, firm or corporation to undertake any regulated activity under Section 104 on any property except as provided for in the approved SWM Site Plan and pursuant to the requirements of this ordinance. It shall be unlawful to alter or remove any control structure required by the SWM Site Plan pursuant to this ordinance or to allow the property to remain in a condition which does not conform to the approved SWM Site Plan.

c. At the completion of the project, and as a prerequisite for the release of the performance guarantee, the owner or his representatives shall:

(1) Provide a certification of completion from an engineer, architect, surveyor or other qualified person verifying that all permanent facilities have been constructed according to the plans and specifications and approved revisions thereto.

(2) Provide a set of as-built drawings in electronic format in accordance with the Borough Zoning Regulations.

d. After receipt of the certification by the Borough, a final inspection shall be conducted by the Borough Engineer or designee to certify compliance with this ordinance.

e. Occupancy Permit. An occupancy permit shall not be issued until all storm water issues have been addressed to the Borough Engineer's satisfaction. The occupancy permit shall be required for each lot owner and/or developer for all subdivisions and land development in the Borough.

(Ordinance 1741, March 17, 2003, Section 135, as amended by Ordinance 2049, October 6, 2014.)

Section 237. **Suspension and Revocation of Permits.**

a. Any permit issued under this ordinance may be suspended or revoked by the Borough for:

(1) Non-compliance with or failure to implement any provision of the permit.

(2) A violation of any provision of this ordinance or any other applicable law, ordinance, rule or regulation relating to the project.

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

b. A suspended permit shall be reinstated by the Borough when:

(1) The Borough Engineer or his designee has inspected and approved the corrections to the storm water management and erosion and sediment pollution control measure(s), or the elimination of the hazard or nuisance;

(2) the violation of the ordinance, law, or rule and regulation has been corrected.

A permit that has been revoked by the Borough cannot be reinstated. The applicant may apply for a new permit under the procedures outlined in this ordinance.

(Ordinance 2049, October 6, 2014.)

Section 238. 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 $300.00 for each violation and recoverable with costs. Each day that the violation continues shall be a separate

offense.

b. In addition, the Borough, 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.

(Ordinance 1741, March 17, 2003, Section 136, as amended by Ordinance 2049, October 6, 2014.)

Section 239. Appeals.

a. Any person aggrieved by any action of the Borough, its engineer or its designee, relevant to the provisions of this ordinance, may appeal to the State College Zoning Hearing Board within 30 days of that action.

b. Any person aggrieved by any decision of the State College Zoning Hearing Board, relevant to the provisions of this ordinance, may appeal to the Court of Common Pleas of Centre County within 30 days of the Zoning Hearing Board's decision.

(Ordinance 1741, March 17, 2003, Section 137, as amended by Ordinance 2049, October 6, 2014.)

APPENDIX A

STORM WATER MANAGEMENT DESIGN CHARTS AND TABLES

TABLE A-1
IDF REGION 2DESIGN STORM RAINFALL

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

TABLE A-3
RATIONAL RUNOFF COEFFICIENTS
(ARON CURVES)

TABLE A-4
RATIONAL RUNOFF COEFFICIENTS
(RAWLS, WONG, McCUEN)

TABLE A-5
MANNING ROUGHNESS COEFFICIENTS
FOR OPEN CHANNELS AND MANNING N VALUES FOR SHEET FLOW

TABLE A-6
MANNING ROUGHNESS COEFFICIENTS
FOR PIPES

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TABLE A-8
SOILS IDENTIFIED IN THE CENTRE COUNTY SOIL SURVEY
AS ON FLOOD PLAINS OR ON TERRACES ABOVE FLOOD PLAINS

TABLE A-1
IDF REGION 2 DESIGN STORM RAINFALL

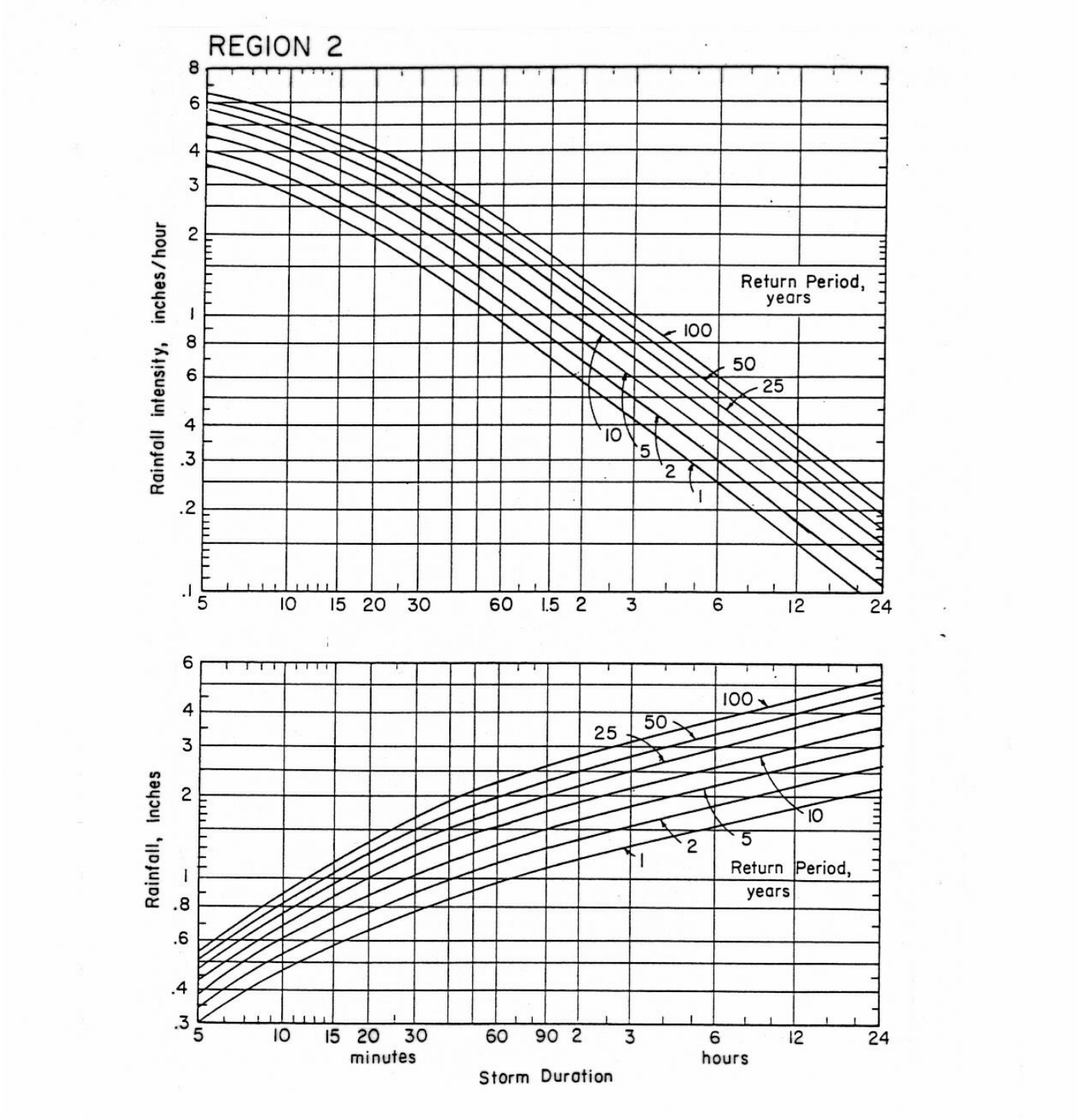

TABLE A-2
RUNOFF CURVE NUMBERS
(FROM NRCS (SCS) TR-55)

TR-55

Cover Description Land/Use Cover Type	Average Imperviousness (percent)	Curve Numbers For Hydrologic Soil Group A	B	C	D
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Good condition (grass cover greater than 75%	n/a[a]	39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	n/a	98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)	n/a	98	98	98	98
Paved; open ditches (including right-of-way)	n/a	98	98	98	98
Gravel (including right-of-way)		76	85	89	91
Urban Districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential Districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Woods:	n/a	30	55	71	77
Brush:		35	56	70	77
Meadow: (In good condition)		30	58	71	78

[a] Not applicable

Source: United States Department of Agriculture, Soil Conversation Service, Engineering Division, 1986, "Urban Hydrology for Small Watersheds," Technical Release 55, Washington, DC.

TABLE A-3
RATIONAL RUNOFF COEFFICIENTS
(ARON CURVES)

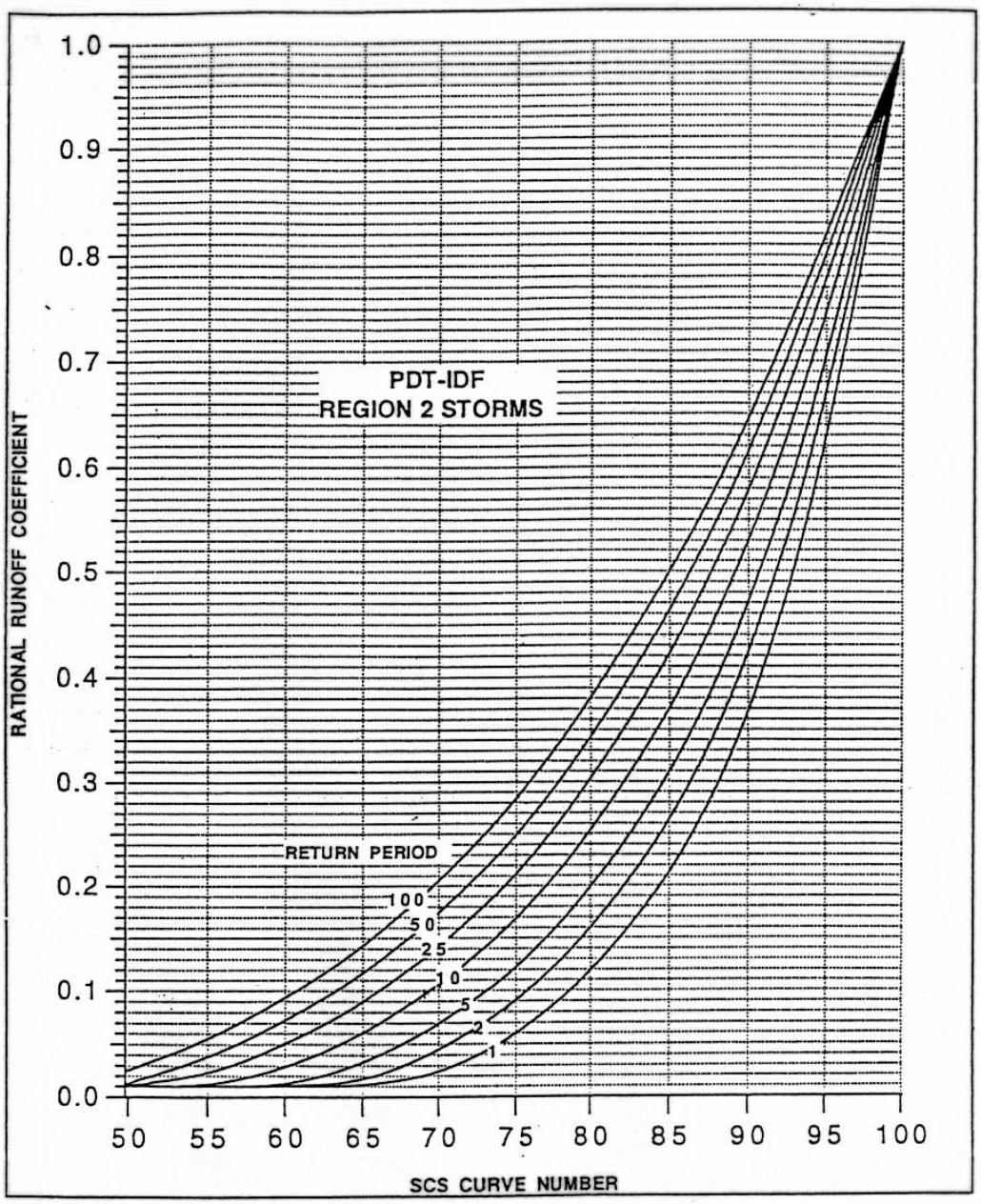

TABLE A-4
RATIONAL RUNOFF COEFFICIENTS
(RAWLS, WONG, McCUEN)

Runoff Coefficients for the Rational Formula
By Hydrologic Soil Group and Overland Slope (%)

	A			B			C			D		
Land Use	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
Cultivated Land	0.08[a] 0.14[b]	0.13 0.18	0.16 0.22	0.11 0.16	0.15 0.21	0.21 0.28	0.14 0.20	0.19 0.25	0.26 0.34	0.18 0.24	0.23 0.29	0.31 0.41
Pasture	0.12 0.15	0.20 0.25	0.30 0.37	0.18 0.23	0.28 0.34	0.37 0.45	0.24 0.30	0.34 0.42	0.44 0.52	0.30 0.37	0.40 0.50	0.50 0.62
Meadow	0.10 0.14	0.16 0.22	0.25 0.30	0.14 0.20	0.22 0.28	0.30 0.37	0.20 0.26	0.28 0.35	0.36 0.44	0.24 0.30	0.30 0.40	0.40 0.50
Forest	0.05 0.08	0.08 0.11	0.11 0.14	0.08 0.10	0.11 0.14	0.14 0.18	0.10 0.12	0.13 0.16	0.16 0.20	0.12 0.15	0.16 0.20	0.20 0.25
Residential Lot Size 1/8 Acre	0.25 0.33	0.28 0.37	0.31 0.40	0.27 0.35	0.30 0.39	0.35 0.44	0.30 0.38	0.33 0.42	0.38 0.49	0.33 0.41	0.36 0.45	0.42 0.54
Lot Size 1/4 Acre	0.22 0.30	0.26 0.34	0.29 0.37	0.24 0.33	0.29 0.37	0.33 0.42	0.27 0.36	0.31 0.40	0.36 0.47	0.30 0.38	0.34 0.42	0.40 0.52
Lot Size 1/3 Acre	0.19 0.28	0.23 0.32	0.26 0.35	0.22 0.30	0.26 0.35	0.30 0.39	0.25 0.33	0.29 0.38	0.34 0.45	0.28 0.36	0.32 0.40	0.39 0.50
Lot Size 1/2 Acre	0.16 0.25	0.20 0.29	0.24 0.32	0.19 0.28	0.23 0.32	0.28 0.36	0.22 0.31	0.27 0.35	0.32 0.42	0.26 0.34	0.30 0.38	0.37 0.48
Lot Size 1 Acre	0.14 0.22	0.19 0.26	0.22 0.29	0.17 0.24	0.21 0.28	0.26 0.34	0.20 0.28	0.25 0.32	0.31 0.40	0.24 0.31	0.29 0.35	0.35 0.46
Industrial	0.67 0.85	0.68 0.85	0.68 0.86	0.68 0.85	0.68 0.86	0.69 0.86	0.68 0.86	0.69 0.86	0.69 0.87	0.69 0.86	0.69 0.86	0.70 0.88
Commercial	0.71 0.88	0.71 0.88	0.72 0.89	0.71 0.89	0.72 0.89	0.72 0.89	0.72 0.89	0.72 0.89	0.72 0.90	0.72 0.89	0.72 0.89	0.72 0.90
Streets	0.70 0.76	0.71 0.77	0.72 0.79	0.71 0.80	0.72 0.82	0.74 0.84	0.72 0.84	0.73 0.85	0.76 0.89	0.73 0.89	0.75 0.91	0.78 0.95
Open Space	0.05 0.11	0.10 0.16	0.14 0.20	0.08 0.14	0.13 0.19	0.19 0.26	0.12 0.18	0.17 0.23	0.24 0.32	0.16 0.22	0.21 0.27	0.28 0.39
Parking	0.85 0.95	0.86 0.96	0.87 0.97	0.85 0.95	0.86 0.96	0.87 0.97	0.85 0.95	0.86 0.96	0.87 0.97	0.85 0.95	0.86 0.96	0.87 0.97

[a] Runoff coefficients for storm recurrence intervals less than 25 years.
[b] Runoff coefficients for storm recurrence intervals of 25 years or more.

Source: Rawls, W.J., S.L. Wong and R.H. McCuen, 1981, "Comparison of Urban Flood Frequency Procedures," Preliminary Draft, U.S. Department of Agriculture, Soil Conservation Service, Beltsville, MD.

TABLE A-5
MANNING ROUGHNESS COEFFICIENTS
FOR OPEN CHANNELS AND MANNING N VALUES FOR SHEET FLOW

	Manning's n range
I. Closed conduits:	
A. Concrete pipe	0.011-0.013
B. Corrugated-metal pipe or pipe arch:	
1. 2 1/2 by 1/2 inch corrugation (riveted) pipe:	
a. Plain or fully coated	0.024
b. Paved invert (range values are for 25 and 50 percent of circumference paved):	
(1) Flow full depth	0.021-0.018
(2) Flow 0.8 depth	0.021-0.016
(3) Flow 0.6 depth	0.019-0.013
2. 6 by 2-inch corrugation (field bolted)	0.030
C. Cast-iron pipe, uncoated	0.013
D. Steel pipe	0.009-0.011
E. Monolithic concrete:	
1. Wood forms, rough	0.015-0.017
2. Wood forms, smooth	0.012-0.014
3. Steel forms	0.012-0.013
F. Cemented rubble masonry walls:	
1. Concrete floor and top	0.017-0.022
2. Natural floor	0.019-0.025
II. Open channels, lined (straight alignment):	
A. Concrete, with surfaces as indicated:	
1. Formed, no finish	0.013-0.017
2. Trowel finish	0.012-0.014
3. Float finish	0.013-0.015
4. Float finish, some gravel on bottom	0.015-0.017
5. Gunite, good section	0.016-0.019
6. Gunite, wavy section	0.018-0.022
B. Concrete, bottom float finished, sides as indicated:	
1. Dressed stone in mortar	0.015-0.017
2. Random stone in mortar	0.017-0.020
3. Cement rubble masonry	0.020-0.025
4. Cement rubble masonry, plastered	0.016-0.020
5. Dry rubble (riprap)	0.020-0.030
C. Gravel bottom, sides as indicated:	
1. Formed concrete	0.017-0.020
2. Random stone in mortar	0.020-0.023
3. Dry rubble (riprap)	0.023-0.033
D. Asphalt	
1. Smooth	0.013
2. Rough	0.016
E. Concrete-lined excavated rock:	
1. Good section	0.017-0.020
2. Irregular section	0.022-0.027

	Manning's n range
III. Open channels, excavated (straight alignment, natural lining):	
A. Earth, uniform section:	
1. Clean, recently completed	0.016-0.018
2. Clean, after weathering	0.018-0.020
3. With short grass, few weeds	0.022-0.027
4. In gravely soil, uniform section, clean	0.022-0.025
B. Earth, fairly uniform section:	
1. No vegetation	0.022-0.025
2. Grass, some weeds	0.025-0.030
3. Dense weeds or aquatic plants in deep channels	0.030-0.035
4. Sides clean, gravel bottom	0.025-0.030
5. Sides clean, cobble bottom	0.030-0.040
C. Dragline excavated or dredged:	
1. No vegetation	0.028-0.033
2. Light brush on banks	0.035-0.050
D. Rock:	
1. Based on design section	0.035
2. Based on actual mean section:	
a. Smooth and uniform	0.035-0.040
b. Jagged and irregular	0.040-0.045
E. Channels not maintained, weeds and brush uncut:	
1. Dense weeks, high as flow depth	0.080-0.120
2. Clean bottom, brush on sides	0.050-0.080
3. Clean bottom, brush on sides, highest stage of flow	0.070-0.110
4. Dense brush, high stage	0.100-0.140
IV. Channels and swales w/maintained Vegetation (values shown are for velocities of 2 & 6 f.p.s.):	
A. Depth of flow up to 0.7 foot:	
1. Bermudagrass, Kentucky bluegrass, buffalograss	
a. Mowed to 2 inches	0.045-0.070
b. Length 4-6 inches	0.050-0.090
2. Good stand, any grass:	
a. Length about 12 inches	0.090-0.180
b. Length about 24 inches	0.150-0.300
3. Fair stand, any grass:	
a. Length about 12 inches	0.080-0.140
b. Length about 24 inches	0.130-0.250
B. Depth of flow 0.7-1.5 feet:	
1. Bermudagrass, Kentucky bluegrass, buffalograss:	
a. Mowed to 2 inches	0.035-0.050
b. Length 4 to 6 inches	0.040-0.060
2. Good stand, any grass:	
a. Length about 12 inches	0.070-0.120
b. Length about 24 inches	0.100-0.200
3. Fair stand, any grass:	
a. Length about 12 inches	0.060-0.100
b. Length about 24 inches	0.090-0.170

	Manning's n range
V. Street and expressway gutters:	
A. Concrete gutter, troweled finish	0.012
B. Asphalt pavement:	
1. Smooth texture	0.013
2. Rough texture	0.016
C. Concrete gutter with asphalt pavement	
1. Smooth	0.013
2. Rough	0.015
D. Concrete pavement:	
1. Float finish	0.014
2. Broom finish	0.015
E. For gutters with small slope, where sediment may accumulate, increase above values of x by	0.002
VI. Natural stream channels:	
A. Minor streams (surface width at flood stage less than 100 feet):	
1. Fairly regular section:	
a. Some grass & weeds, little or no brush	0.030-0.035
b. Dense growth of weeks, depth of flow materially greater than weed height	0.035-0.050
c. Some weeks, light brush on banks	0.035-0.050
d. Some weeks, heavy brush on banks	0.050-0.070
e. Some weeks, dense willows on banks	0.060-0.080
f. For trees within channel with branches submerged at high stage, increase all above values by	0.010-0.020
2. Irregular sections, with pools, slight channel meander; increase given in 1 a-e about	0.010-0.020
3. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stage	
a. Bottom of gravel, cobbles and few boulders	0.040-0.050
b. Bottom of cobbles, with large boulders	0.050-0.070
B. Floodplains (adjacent to natural streams):	
1. Pasture, no brush:	
a. Short grass	0.030-0.035
b. High grass	0.035-0.050
2. Cultivated areas:	
a. No crop	0.030-0.040
b. Mature row crops	0.035-0.045
c. Mature field crops	0.040-0.050
3. Heavy weeds, scattered brush	0.050-0.070
4. Light brush and trees:	
a. Winter	0.050-0.060
b. Summer	0.060-0.080
5. Medium to dense brush:	
a. Winter	0.070-0.110
b. Summer	0.100-0.160
6. Dense willows, summer, not bent over by current	0.150-0.200
7. Cleared land w/tree stumps, 100-150 per acre:	
a. No sprouts	0.040-0.050
b. With heavy growth of sprouts	0.060-0.080
8. Heavy stand of timber, a few down trees, little undergrowth:	
a. Flood depth below branches	0.100-0.120
b. Flood depth reaches branches	0.120-0.160
C. Major streams (surface width at flood stage more than 100 feet): Roughness coefficient is usually less than for minor streams of less effective resistance offered by irregular banks or vegetation on banks. Values of n may be somewhat reduced. Follows recommendation in publication cited if possible. The value of n for larger streams of most regular section, with no boulders or brush, may be in the range of	0.028-0.033

MANNING'S ROUGHNESS COEFFICIENTS FOR SHEET FLOW

SURFACE DESCRIPTION	n[1]
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover 20%	0.06
Residue cover 20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Source: Chow, V.T., 1959, "Open Channel Hydraulics," McGraw Hill, New York.

TABLE A-6
MANNING ROUGHNESS COEFFICIENTS
FOR PIPES

Description	"n"
Smooth-roll plastic pipe	0.011
Concrete pipe	0.012
Smooth-lined corrugated metal pipe	0.012
Corrugated plastic pipe	0.024
Annular corrugated steel and aluminum Alloy pipe (plain or polymer coated) 2 2/3" x 1/2' corrugations 3" x 1" corrugations 5" x 1" corrugations 6" x 2" corrugations	 0.024 0.027 0.025 0.033
Helically corrugated steel and aluminum Alloy pipe (plain or polymer coated) 3" x 1", 5" x 1" or 6" x 2" corrugations	0.024
Helically corrugated steel and aluminum Alloy pipe (plain or polymer coated) 2 2/3" x 1/2" corrugations a. lower coefficients● 18" diameter 24" diameter 36" diameter 48" diameter 60" diameter or larger b. Higher coefficients▲	 0.014 0.016 0.019 0.020 0.021 0.024
Annular or Hhlically corrugated steel or aluminum alloy pipe arches or other on-circular conduit (plain or polymer coated)	0.024
Vitrified clay pipe	0.012
Ductile iron pipe	0.013

●Use the lower coefficient if any one of the following conditions apply:

a. A storm pipe longer than 20 diameters, which directly or indirectly connects to an inlet or manhole, located in swales adjacent to shoulders in cut areas, shoulders in cut areas or depressed medians.

b. A storm pipe which is specially designed to perform under pressure.

▲Use the higher coefficient if any one of the following conditions apply:

a. A storm pipe which directly or indirectly connects to an inlet or manhole located in highway pavement sections or adjacent to curb or concrete median barrier.

b. A storm pipe which is shorter than 20 diameters long.

c. A storm pipe which is partly lined helically corrugated metal pipe.

In considering each factor more critical, judgement is necessary if it is kept in mind that any condition that causes turbulence and retards flow results in a greater value of "n."

Outlet velocity for bituminous paved invert shall be determined based on a 25% reduction in Manning's roughness coefficient, "n."

Source: Pennsylvania Department of Transportation Design Manual, Part 2, January 1990.

TABLE A-7
PERMISSIBLE VELOCITIES FOR CHANNELS

Maximum Permissible Velocities in Bare Earth Channels -For Straight Channels where slope < .02 ft/ft

Soil Materials	n*	Clear Water (V fps)	Water Transporting Colloidal Silts (V fps)
Fine sand, noncolloidal	.020	1.50	2.50
Sandy loam, noncolloidal	.020	1.75	2.50
Silt loam, noncolloidal	.020	2.00	3.00
Alluvial silts, noncolloidal	.020	2.00	3.50
Ordinary firm loam	.020	2.50	3.50
Stiff clay, very colloidal	.025	3.75	5.00
Alluvial silts, colloidal	.025	3.75	5.00
Shales and hardpan	.025	6.00	6.00
Fine Gravel	.020	2.50	5.00
Graded loam - cobbles (when noncolloidal)	.030	3.75	5.00
Graded silt - cobbles (when noncolloidal)	.030	4.00	5.50
Coarse gravel noncolloidal	.025	4.00	6.00
Cobbles and shingles	.035	5.00	5.50

* Listed n values assume good to excellent construction techniques which produce uniform channel dimensions. Values should be adjusted, by use of SCS Engineering Handbook #5, Supplement B, for other construction conditions.

TABLE A-5.2 Maximum Permissible Velocities for Channels Lines with Vegetation

Cover	Slope Range Percent	Permissible Velocity ft/sec. Erosion[1] Resistant Soil	Easily[2] Eroded Soil
Kentucky Bluegrass Tall Fescue	< 5 5-10 > 10	7[3] 6[3] 5	5 4 3
Grass Mixture Reed Canarygrass	< 5 5-10	5 4	4 3
Sericea Lespedeza Weeping Lovegrass Redtop Red Fescue	< 5	3.5	2.5
Annuals temporary cover only Sudangrass	< 5	3.5	2.5

[1] Cohesive (clayey) fine grain soils and coarse grain soils with a plasticity index of 10 to 40 (CL, CH, SC, & GC).
[2] Soils that do not meet the requirements for erosion resistant soils.
[3] Use velocities exceeding 5 ft./sec. only where good cover and proper maintenance can be obtained.

TABLE A-8
SOILS IDENTIFIED IN THE CENTRE COUNTY SOIL SURVEY
AS ON FLOOD PLAINS OR ON TERRACES ABOVE FLOOD PLAINS

Allegheny Series	Allegheny silt loam (AlB)
Atkins Series	Atkins silt loam (At)
Basher Series	Basher loam (Ba)
Chagrin Series	Chagrin Soils (Ch)
Dunning Series	Dunning silty clay loam (Du)
Lindside Series	Lindside soils (Lx)
Melvin Series	Melvin silt loam (Mm)
Monongahela Series	Monongahela silt loam (MoB)
Philo Series	Philo loam (Ph), Philo and Atkins very stony soils (Pk)
Pope Series	Pope soils (Po)
Purdy Series	Purdy silt loam (Pu)
Tyler Series	Tyler silt loam (Ty)

APPENDIX B
WATERSHED MAPS

Sensitive Land Areas for Well Head Protection Data Source

Well Fields 1 and 3: Harter and Thomas Well Fields
Municipality: Harris, Ferguson, and College Townships
Well Owner: State College Water Authority
Includes wells: H7, H8, H11, H14, H22, H25
Protection Area: One-year zone of contribution
Source: Nittany Geoscience, February 1992, Figure 4

Well Field 5
Municipality: Ferguson Township
Well Owner: State College Water Authority
Includes wells: F55, F57
Protection Area: One-year zone of contribution
Source: Nittany Geoscience, February 1992, Figure 4

Well Field 6
Municipality: Benner and Patton Townships
Well Owner: State College Water Authority
Includes wells: B62, B63, B64, B65
Protection Area: One-year zone of contribution + direct upslope lands
Source: Nittany Geoscience, February 1992, Figure 4

PSU Golf Course Well Field
Municipality: Ferguson Township and the Borough of State College
Well Owner: Penn State University
Includes wells: PS28A, PS 37
Protection Area: One-year zone of contribution
Source: Nittany Geoscience, January, Figure 5

PSU Big Hollow Well Field
Municipality: Patton, Ferguson, and College Townships
Well Owner: Penn State University
Includes wells: PS2, PS14, PS16, PS17, PS24, PS26
Protection Area: One-year zone of contribution
Source: Nittany Geoscience, January, Figure 5

PSU Houserville Well Field
Municipality: Ferguson Township
Well Owner: Penn State University
Includes wells: PS33, PS 34, PS35
Protection Area: One-year zone of contribution
Source: Nittany Geoscience, January, Figure 5

Existing Well and Spring
Municipality: Ferguson Township
Well Owner: State College Water Authority

Includes wells: F3
Protection Area: 400’ Radius + direct upslope lands

Ridgemont Wells
Municipality: Patton Township
Well Owner: Ridgemont Water Authority
Includes wells: P1, P2
Protection Area: 400’ Radius

Spring Creek Park, Lemont #4, Lemont #5,and Rogers Wells, and Bathgate Springs
Municipality: College Township
Well Owner: College Township Water Authority
Includes wells: C1, C2, C3, C4, C5
Protection Area: 400’ Radius

Spring Creek Watershed Storm Water
Management Plan Map
Included with Original Ordinance 1741