

ARTICLE III
Stormwater Management Standards

§ 158-13. General requirements.

- A. For all regulated activities, unless preparation of an SWM site plan is specifically exempted in § 158-14:
- (1) Preparation and implementation of an approved SWM site plan is required.
 - (2) No regulated activities shall commence until the Township issues written approval of an SWM site plan which demonstrates compliance with the requirements of this chapter.
- B. SWM site plans approved by the Township, in accordance with § 158-24, shall be on site throughout the duration of the regulated activity.
- C. The Township may, after consultation with and approval by DEP, approve measures for meeting the state water quality requirements other than those in this chapter, provided that they meet the minimum requirements of, and do not conflict with, state law including, but not limited to, the Clean Streams Law.¹ The Township shall maintain a record of correspondence with DEP pursuant to this paragraph.
- D. For all regulated earth disturbance activities, erosion and sediment control BMPs shall be designed, implemented, operated, and maintained during the regulated earth disturbance activities, i.e., during construction, to meet the purposes and requirements of this chapter and to meet all requirements under Title 25 of the Pennsylvania Code and the Clean Streams Law. Various BMPs and their design standards are listed in the Erosion and Sediment Pollution Control Program Manual (E&S Manual) 2, No. 363-2134-008 (April 15, 2000), as amended and updated.
- E. For all regulated activities, implementation of the volume controls in § 158-15 is required, unless specifically exempted under § 158-13C or § 158-14A or exempted by an approved modification request as specified in § 158-21B of this chapter.
- F. Impervious areas:
- (1) The measurement of impervious areas shall include all of the impervious areas in the total proposed development even if development is to take place in phases.
 - (2) For development taking place in phases, the entire development plan must be used in determining conformance with this chapter.
 - (3) For projects that add impervious area to a parcel, the total impervious area on the parcel is subject to the requirements of this chapter; except that the volume controls in § 158-15 and the peak rate controls of § 158-16 do not need to be retrofitted to existing impervious areas that are not being altered by the proposed regulated activity.
- G. Stormwater flows onto adjacent property shall not be created, increased, decreased, relocated, or otherwise altered without written notification to the adjacent property owner(s),

1. Editor's Note: See 35 P.S. §§ 691.1 through 691.1001

a copy of which notice shall be provided to the municipality. Such stormwater flows shall be subject to the requirements of this chapter.

- H. All regulated activities shall include such measures as necessary to:
- (1) Protect health, safety, and property;
 - (2) Meet the water quality goals of this chapter, as stated in § 158-3, Purpose, by implementing measures to:
 - (a) Minimize disturbance to floodplains, wetlands, wooded areas, and existing vegetation.
 - (b) Maintain or extend riparian buffers.
 - (c) Avoid erosive flow conditions in natural flow pathways.
 - (d) Minimize thermal impacts to waters of this commonwealth.
 - (e) Disconnect impervious surfaces by directing runoff to pervious areas, wherever possible.
 - (f) Minimize soil disturbance and compaction. Topsoil, if removed, shall be replaced to a minimum depth equal to its depth prior to removal or a six-inch minimum depth, whichever is greater, with a maximum required depth of eight inches. (Additional topsoil may be needed for vegetation other than sod.)
 - (3) To the maximum extent practicable, incorporate the techniques for low-impact development practices described in the Pennsylvania Stormwater Best Management Practices Manual (BMP Manual).
- I. The design of all facilities in areas of carbonate geology or karst topography shall include an evaluation of measures to minimize adverse effects, including hydrogeologic studies if required by the Township.
- J. Infiltration BMPs shall be spread out, made as shallow as practicable, and located to maximize use of natural on-site infiltration features while still meeting the other requirements of this chapter. In addition, infiltration BMPs shall include pretreatment BMPs where appropriate.
- K. Normally dry, open-top storage facilities, designed as such, shall completely drain both the volume control and rate control capacities over a period of time not more than 96 hours from the end of the design storm. Infiltration facilities shall be designed to infiltrate in not less than 24 hours; however, any designed infiltration at such facilities is exempt from the minimum twenty-four-hour standard, i.e., may infiltrate in a shorter period of time, so long as none of the stormwater flowing into the infiltration facility is discharged directly into the surface waters of the Commonwealth. (Inordinately rapid infiltration rates may indicate the presence of large fractures or other conditions for which an additional soil buffer may be required.)
- L. The design storm volumes and precipitation intensities to be used in the analysis of discharge

or runoff shall be obtained from the Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 2, Version 3.0, U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Hydrometeorological Design Studies Center, Silver Spring, Maryland, as amended, updated, or replaced from time to time. NOAA's Atlas 14 can be accessed at:<http://hdsc.nws.noaa.gov/hdsc/pfds/>.

- M. For all regulated activities, SWM BMPs shall be designed, implemented, operated, and maintained to meet the purposes and requirements of this chapter and to meet all requirements under Title 25 of the Pennsylvania Code, the Clean Streams Law,² and the Storm Water Management Act.³
- N. Various BMPs and their design standards are listed in the BMP Manual.
- O. For any new development or redevelopment, to the maximum extent practicable, stormwater BMPs shall be utilized to reduce the discharge of nitrogen, phosphorus and sediment.

§ 158-14. Exemptions.

Any regulated activity that meets the following exemption criteria is exempt from the part(s) of this chapter as specified herein. However, the requirements of this chapter shall otherwise remain in effect. The criteria for exemption in this section apply to the total development proposed, including instances in which the development is proposed to take place in phases. The date of enactment of this chapter shall be the starting point from which future development and the respective proposed impervious surface computations shall be cumulatively considered and regulated. Exemption shall not relieve an applicant from implementing such measures as necessary to meet the intent of this chapter, or compliance with any NPDES Permit requirements.

- A. New impervious surface creation shall be based on impervious surfaces being created from and after the effective date of this chapter by past and present owners on the project site. New impervious surface created by owners of easements and rights-of-way located on the project site shall not be considered in the calculation.
- B. Regulated activities that create impervious areas equal to or less than those set forth on Table 158-14.1 (cumulative of all regulated activities from and after the effective date of this chapter) shall be exempt from the SWM site plan preparation requirements of this chapter, provided that the activity will not adversely affect downstream property owners and will not cause erosion. The Township reserves the right to have its designee make the determination of adverse effect after review of the application and review of the proposed site.
 - (1) Subject to the Requirements of § 158-111 of this chapter, and notwithstanding the provisions of this Subsection B and Table 158-14.1 activities that would otherwise be regulated activities pursuant to this chapter but are 100 square feet or less shall be exempt from the permitting, stormwater management site plan preparation, volume and peak rate control, and Township review and approval provisions of this chapter. The activities in this subsection are not cumulative.

2. Editor's Note: See 35 P.S. §§ 691.1 through 691.1001

3. Editor's Note: See 32 P.S. § 680.1 et seq.

- C. Regulated activities that create impervious areas less than or equal to 5,000 square feet (cumulative of all regulated activities from and after the effective date of this chapter) but do not qualify for an exemption from SWM site plan preparation requirements per § 158-14B of this chapter may qualify for submission of a simplified SWM site plan per § 158-19F of this chapter. The Township's designee shall determine if a simplified SWM site plan may be submitted in lieu of a full SWM site plan (per § 158-19 of this chapter) after review of the stormwater management permit application and the proposed site. The simplified SWM site plan must demonstrate that the proposed activity will not adversely affect adjoining property owners or cause erosion.
- D. Agricultural activity is exempt from the SWM site plan preparation requirements of this chapter, provided that the activities are performed according to the requirements of 25 Pa. Code Chapter 102, and no adverse impacts to adjoining property owners will occur because of stormwater runoff.
- E. Forest management and timber operations may be exempt from the SWM site plan preparation requirements of this chapter, provided that the activities are performed according to the requirements of 25 Pa. Code Chapter 102, and no adverse impacts to adjoining property owners will occur because of stormwater runoff.
- F. Domestic gardening and landscaping are exempt from specific approval and permitting under this chapter so long as those activities are associated with one, and only one, dwelling unit and the activities comply with all other applicable ordinances and statutes.
- G. Exemptions from certain provisions of this chapter shall not relieve the applicant from the requirements in § 158-13D through O of this chapter.
- H. The Township may deny or revoke any exemption pursuant to this section at any time for any project that poses a threat to public health, safety, property or the environment.

Table 158-14.1

Existing Lot Size	Maximum New Impervious Area Cumulative per § 158-14B
0 to 0.25 acres	250 square feet
Greater than 0.25 to 0.50 acres	500 square feet
Greater than 0.50 to 0.75 acres	750 square feet
Greater than 0.75 acres	1,000 square feet

§ 158-15. Volume controls.

The low-impact development practices provided in the BMP Manual shall be utilized for all regulated activities to the maximum extent practicable. Water volume controls shall be implemented using the Design Storm Method in Subsection A or the Simplified Method in Subsection B below. For regulated activity areas equal or less than one acre that do not require hydrologic routing to design the stormwater facilities, this chapter establishes no preference for either methodology; therefore, the applicant may select either methodology on the basis of

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

- A. The Design Storm Method (CG-1 in the BMP Manual) is applicable to any size of regulated activity. This method requires detailed modeling based on site conditions.
- (1) No plan shall increase the post-development total runoff volume for all storms equal to or less than the two-year, twenty-four-hour duration precipitation to more than the predevelopment total runoff volume.
 - (2) For modeling purposes:
 - (a) Existing (predevelopment) nonforested pervious areas must be considered meadow.
 - (b) Twenty percent of the existing impervious area of a project site, when present, shall be considered meadow in the model for existing conditions, if the existing impervious area is being altered by the proposed regulated activity.
- B. The Simplified Method (CG-2 in the BMP Manual) provided below is independent of site conditions and should be used if the Design Storm Method is not followed. This method is not applicable to regulated activities greater than one acre or for projects that require design of stormwater storage facilities.

For new impervious surfaces:

- (1) Stormwater facilities shall capture at least the first two inches of runoff from all new impervious surfaces.
- (2) At least the first one inch of runoff from new impervious surfaces shall be permanently removed from the runoff flow, i.e., it shall not be released into the surface waters of this commonwealth. Removal options for the first one inch of runoff include reuse, evaporation, transpiration, and infiltration.
- (3) Wherever possible, infiltration facilities should be designed to accommodate infiltration of the entire permanently removed runoff; however, in all cases at least the first 0.5 inch of the permanently removed stormwater runoff shall be infiltrated.

§ 158-16. Rate controls.

- A. For computation of predevelopment peak discharge rates, 20% of the existing impervious area of a project site, when present, shall be considered meadow, if the existing impervious area is being altered by the proposed regulated activity.
- B. Post-development discharge rates shall not exceed the predevelopment discharge rates for the one-, two-, five-, ten-, twenty-five-, fifty-, and one-hundred-year twenty-four-hour storms. If it is shown that the peak rates of discharge indicated by the post-development analysis are less than or equal to the peak rates of discharge indicated by the predevelopment analysis for one-, two-, five-, ten-, twenty-five-, fifty- and one-hundred-year, twenty-four-hour storms, then the requirements of this section have been met. Otherwise, the applicant

shall provide additional controls as necessary to satisfy the peak rate of discharge requirement.

§ 158-17. Stormwater management facilities for Pennsylvania Department of Transportation and Pennsylvania Turnpike Commission roadways and associated facilities.

- A. For the purposes of the Act 167 Stormwater Management (Plan) elements contained within the York County Integrated Water Resources Plan and this chapter, design policy pertaining to stormwater management facilities for Pennsylvania Department of Transportation (PennDOT) and Pennsylvania Turnpike Commission (PTC) roadways and associated facilities is provided in Section 13.7 (Antidegradation and Post-Construction Stormwater Management Policy) of PennDOT Publication No. 13M, Design Manual Part 2 (August 2009), as developed, updated, and amended in consultation with the Pennsylvania Department of Environmental Protection (DEP). As stated in DM-2.13.7.D (Act 167 and Township ordinances), PennDOT and PTC roadways and associated facilities shall be consistent with Act 167 Plans. DM-2.13.7.B (Policy on Antidegradation and Post-Construction Stormwater Management) was developed as a cooperative effort between PennDOT and DEP. DM-2.13.7.C (Project Categories) discusses the anticipated impact on the quality, volume, and rate of stormwater runoff.
- B. Where standards in the Act 167 elements of the IWRP and this chapter are impractical, PennDOT or the PTC may request assistance from DEP, in consultation with the county, to develop an alternative strategy for meeting state water-quality requirements and the goals and objectives of the Act 167 elements within the IWRP.
- C. For the purposes of the Act 167 elements in the IWRP and this chapter, road maintenance activities are regulated under 25 Pa. Code Chapter 102.

§ 158-18. Design criteria.

- A. Stormwater collection system. The stormwater collection system shall be designed and approved based upon the following criteria:
- (1) Peak discharge shall be computed using the Rational Formula:

$$Q = CIA$$

Where:

Q = Peak discharge in cubic feet per second.

C = Runoff factor expressed as a percent of the total water falling on an area.

I = The rate of rainfall for the time of concentration of the drainage area in inches per hour for a given storm frequency (rainfall intensity).

A = The drainage area expressed in acres.

The runoff factor "C" is a percentage factor which represents the proportion of the total quantity of water falling on the area that remains as runoff.

- (2) The runoff factors for various types of drainage areas, as presented in the following table, shall be used for design.

Runoff Factors for the Rational Equation

Type of Drainage Area or Surface	Runoff Factor "C"
Impervious surfaces, such as but not limited to roof surface, pavement, concrete or bituminous concrete, gravel	0.95
Cultivated field	0.40
Lawn	0.25
Meadow	0.20
Wooded	0.15

NOTES:

1. Consideration should be given to future land use changes in the drainage area in selecting the "C" factor.
2. For drainage area containing several different types of ground cover, a weighted value of "C" factor must be used.
3. In special situations where sinkholes, stripped abandoned mines, etc., exist, careful evaluation shall be given to the selection of a suitable runoff factor with consideration given to possible reclamation of the land in the future.

- (3) Rainfall intensity "I" shall be per § 158-13L according to the following:

- (a) Storm frequency.

[1] The following storm frequency shall be used for design:

[a] Local streets: ten-year; see storm duration.

[b] Culvert cross drains: twenty-five-year, rural; fifty-year, suburban; one-hundred-year, urban.

[c] Swales: one-hundred-year.

[2] When a pipe or culvert is intended to convey the discharge from a stormwater management facility, its required capacity shall be computed by the Rational Method and compared to the peak outflow from the stormwater management facility for the one-hundred-year storm. The greater flow shall govern the

design of the pipe or culvert.

- [3] A one-hundred-year design storm frequency may be required for design of the stormwater collection system to insure that the resultant stormwater runoff from the post-development design storm is directed into the stormwater management facility.
- [4] In all cases where drainage is collected by means of a head wall or pipe end, the pipe shall be designed as a culvert. The minimum diameter of the culvert shall be 18 inches. The minimum diameter of storm sewer shall be 15 inches, when located in a public right-of-way or easement.
- [5] Where the collection system may be under inlet or outlet control, the Township Engineer may request additional calculations, such as but not limited to hydraulic grade lines.

(b) Storm duration.

- [1] A five-minute storm duration shall be used if this duration does not result in a maximum expected discharge that exceeds the capacity of a thirty-inch pipe.
- [2] If a five-minute storm duration results in a pipe size exceeding 30 inches, the time of concentration approach shall be used in determining storm duration.

(4) Inlet placement. In general, catch basins shall be placed as required by hydraulic capacity. For design purposes, a capture ratio (intercepted flow/design flow) of 70% or greater is required. However, the width of flow in a street cannot exceed 1/2 of the travel lane. In any event, the maximum distance between conveyed inlets shall not exceed 400 feet.

(5) Pipe and swale capacity.

- (a) Manning's equation shall be used for the design of all storm sewer pipes and for open channel design:

$$V = \frac{1.486 R^{2/3} S^{1/2}}{n}$$

Where:

V = Velocity of the water in feet per second.

R = Hydraulic radius which is equal to the net effective areas (A) divided by the wetted perimeter (W.P.):

$$R = \frac{A}{W.P.}$$

The wetted perimeter is the lineal feet of the drainage facility cross-section which is wetted by the water.

S = Slope of the hydraulic gradient (for approximation, use the water surface slope in a wetted stream and the stream bed slope in dry stream or the pipe slope).

n = The roughness coefficient. Roughness coefficients are as follows:

Value of Manning's Roughness Coefficient – n

Rip-rap	0.040
Grass-lined channel	0.035
Bare earth channel	0.020
Paved bituminous channel	0.016
Concrete	0.012
Turf reinforcement matting (TRM)	Per manufacturer's recommendation

- (b) The maximum permitted velocity in a lined or unlined swale shall be in accordance with the USDA Engineering Field Manual, Pennsylvania DEP, applicable Pennsylvania codes and state law, whichever is less.
- (c) The maximum permitted velocity in storm sewer pipe is 20 FPS. If 20 FPS is exceeded, the pipe must be anchored in accordance with the following table:

Velocity of Flow (feet per second)	Anchor Spacing (feet)
20-24.99	20
25-30	10

Under no circumstances shall flow velocity exceed 30 FPS.

B. Stormwater management facilities. The plan shall be designed and approved based upon the following criteria:

(1) General. For drainage areas 320 acres or larger the peak discharge and runoff shall be computed using the soil-cover complex method contained in "Urban Hydrology for Small Water Sheds," Technical Release No. 55, published by the Engineering Division, Soil Conservation Services, United States Department of Agriculture, dated June 1986 or latest revision, except as modified herein. For drainage areas less than 320 acres the Modified Rational Method may be utilized. Alternate methods of analysis may be considered if approved by the Township Engineer.

(2) Outflow determination.

(a) The maximum permitted stormwater discharge, in cubic feet per second, from any site shall not exceed the calculated peak discharge from the site at predevelopment

ground cover and soil conditions for all design storms specified in § 158-16B. For the purpose of this chapter, predevelopment groundcover conditions shall be assumed to be "meadow" for all nonforested pervious areas as defined in "Urban Hydrology for Small Water Sheds," Technical Release No. 55, published by Engineering Division, Soil Conservation Service, United States Department of Agriculture, dated June 1986 or latest revision; or if using the Modified Rational Method, a "C" factor of 0.20 shall be used for meadow conditions for all nonforested pervious areas. For existing impervious surfaces see § 158-16A. The maximum permitted stormwater discharge shall be calculated using the SCS method or alternative method approved by the Township Engineer for rainfalls having recurrence intervals of one, two, five, 10, 25, 50 and 100 years. Time of concentration (Tc) should be calculated using the SCS segmental approach in accordance with the current recommendations by SCS. For the purpose of this chapter, the rainfall depths shall be per § 158-13L.

- (b) Rainfall intensity shall be per § 158-13L for design if using the Modified Rational Method.
 - (c) If alternate methods of analysis are utilized, the design storms recurrence interval in years shall be the same as used in the SCS TR-55 Method.
- (3) Minimum required detention storage. The minimum required detention storage shall be determined by routing the approved post-development hydrographs through the stormwater management facility, using either manual methods or computerized routing. Routing shall be based upon the modified PULS method; other routing methodologies shall be subject to the approval of the Township Engineer.
 - (4) Emergency spillway. Emergency spillways or overflow structures shall be designed to pass the peak flow resulting from a one-hundred-year recurrence interval design storm computed at post-development conditions, assuming that the principal outlet structure is nonfunctional. All retention basins and detention basins shall provide an emergency spillway. Emergency spillways shall be located in cut where feasible; if not, adequate permanent stabilization is required. All emergency spillways shall be permanently stabilized for the design peak flow rate and velocity.
 - (5) Minimum bottom slope. All detention basins shall have a minimum bottom slope of 2% if not being utilized for infiltration purposes.
 - (6) Side slopes. The maximum side slopes for detention or retention basins shall be three horizontal to one vertical in cut and four horizontal to one vertical in fill.
 - (7) Freeboard. The stormwater management facility shall have a minimum 1/2 foot of freeboard determined after routing the one-hundred-year recurrence interval design storm per § 158-18B(4) or a minimum of one foot of freeboard above the normal one-hundred-year storm routing elevation, whichever is greater.
 - (8) Seepage trench. All stormwater management detention basins shall provide as a minimum a two-foot-wide by ten-foot-long by six-foot-deep seepage trench in the bottom of the basin near the outlet control structure in accordance with the stormwater

permit application, unless field conditions deem the seepage trench nonfunctional and concurred by the Township Engineer. This seepage trench is not required if the basin is being utilized for infiltration purposes.

- (9) Fencing, trash racks and installation of childproof facilities may be required by the Township.