

CHAPTER 1 - REQUIRED E&S PLAN CONTENT

Pa. Code Title 25 Chapter 102.4 (b) requires the “implementation and maintenance of E&S BMPs” to minimize the potential for accelerated erosion and sedimentation, including those activities which disturb less than 5,000 square feet (464.5 square meters)” [102(b)(1)]. It also requires that “a person proposing earth disturbance activities shall develop and implement a written E&S Plan under this chapter if one or more of the following criteria apply [102.4(b)(2)]:

1. The earth disturbance activity will result in a total earth disturbance of 5,000 square feet (464.5 square meters) or more,
2. The person proposing the earth disturbance activities is required to develop an E&S Plan under this chapter or under other Department regulations, or
3. The earth disturbance activity, because of its proximity to existing drainage features or patterns, has the potential to discharge to a water classified as a High Quality or Exceptional Value water under Chapter 93 (relating to water quality standards)..”

§102.4(b)(3) requires that the E&S Plan “be prepared by a person trained and experienced in E&S control methods and techniques applicable to the size and scope of the project being designed.”

§102.4(b)(4) requires that “unless otherwise authorized by the Department or conservation district after consultation with the Department, earth disturbance activities shall be planned and implemented to the extent practicable in accordance with the following:

1. Minimize the extent and duration of the earth disturbance.
2. Maximize protection of existing drainage features and vegetation.
3. Minimize soil compaction.
4. Utilize other measures or controls that prevent or minimize the generation of increased stormwater runoff.”

Perhaps the most neglected and yet the most important aspect of designing an effective E&S plan is knowledge of the specific site in question. It is essential that the plan designer have as complete an understanding of the unique characteristics of the site as possible. Therefore, it is highly recommended that a site visit be scheduled at the earliest practical point in the development of the plan.

Site characteristics that will affect the plan design as well as the construction of the project (e.g., drainage patterns, seeps and springs, steepness and stability of slopes, sinkholes, etc.) should be noted and mapped. Sensitive and special value features (e.g., wetlands, woodlands, flow paths, riparian areas, etc.) should be identified, mapped, and protected as much as possible. A little time well spent in the field can save much time and money due to plan revisions, unforeseen hazards, penalties, and shutdowns. Only after the designer has a good working knowledge of the site should the designer proceed with developing the E&S plan.

The basic concept of providing effective, efficient and practical erosion and sediment control should be considered when determining the locations and types of BMPs. All off-site surface water should be diverted away from areas to be disturbed (wherever feasible); all runoff from disturbed areas should be collected and conveyed to a sediment basin, sediment trap, or other BMP for sediment removal. The extent of the disturbance, as well as the time period between initial disturbance and final stabilization, should be minimized. Existing vegetation, especially existing trees, should be preserved wherever possible (see Appendix I for more information regarding tree preservation). Temporary stabilization must be provided for earth-exposed areas where earthwork is delayed or stopped for a period of 4 or more days, and permanent stabilization must ultimately be provided for all disturbed areas (25 Pa Code § 102.22). Sediment removal treatment for water pumped from excavations is usually needed. Access to the site and removal of mud from vehicle tires before vehicles exit onto existing roadways — public or private — are also required.

25 Pa. Code § 102.4(b)(5) of the Pennsylvania Code requires that the following items be included in the drawings and narrative of an E&S plan for earth disturbance activities:

1. ***The existing topographic features of the project site and the immediate surrounding area.*** These features should be shown on a map or maps included with or part of the drawings. This requirement applies to off-site borrow and waste areas as well as the project site. Mapping should conform to the standards contained in Appendix D. Cross-sections and profiles are not an acceptable alternative since these do not adequately define existing level contour for sediment barriers or drainage areas for channels, basins, or traps.
2. ***The types, depth, slope, locations and limitations of the soils.*** The locations of the soils may be delineated on the map or drawing discussed above, or on a separate map of the site. A legible photocopy of a portion of the soil survey maps on which the proposed project can be clearly shown may also be used. The locations of all proposed sediment basins and traps should be shown on any separate or soil survey maps.

The types, depth, slope and limitations of the soils should be included in the narrative portion of the plan or on the plan drawings/maps. Data on the physical characteristics of the soils, such as their texture, resistance to erosion and suitability for intended use is to be included in the narrative report. This information is available from the tables on the USDA, Natural Resources Conservation Service website: <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>. Soils information is also available from the Penn State website at: <http://soilmap.psu.edu>. However, the data from the Penn State website might not be as current as that from the NRCS website, and, therefore, it should only be used if the county survey has not been updated.

Only those limitations relevant to the proposed project should be cited (e.g. suitability for corn production would not be appropriate for a housing project, but soil erodibility, slope stability, suitability for winter grading, piping tendencies, and potential trench caving would be appropriate). Appendix E lists some of the most common soil use limitations for many of the soils in Pennsylvania. The means to address the identified soils limitations should be included on the drawings. For example, a note to use only certain areas of the site as sources for embankment material for sediment basins or traps, or special fertilization requirements for portions of the project, etc. The intent of Appendix E is to alert designers to potential problems that could arise during construction and afford an opportunity to avoid or minimize those problems by proper design. Simply copying Appendix E into the narrative is not sufficient to meet the requirements of this section.

3. ***The characteristics of the earth disturbance activity, including the past, present and proposed land uses and the proposed alteration to the project site.*** Past land uses are the actual land use(s) of the project site for the past 50 years or longer if known, not just the zoning of the land. Present land uses are the dominant land uses of the project site for the 5 years preceding the planned project, not just the zoning of the land. For sites requiring a National Pollutant Discharge Elimination System (NPDES) permit, this information is contained in the completed Notice of Intent (NOI). For non-permitted sites, it should be included in the narrative. Site design and layout should employ an environmentally sensitive approach that minimizes the effect of the development on water, land, and air to the maximum extent practicable. The guidelines for Non-Structural BMPs set forth in Chapter 5 of the Department's Pennsylvania Stormwater Best Management Practices Manual (Document No. 363-0300-002) should be incorporated prior to design of the E&S plan. The proposed alteration to the project area and the limits of the project area should be shown on maps or drawings. These maps should be at the same scale as the original topographic map. The use of the original contour map as a base map, with the new contours superimposed and identified in the legend, should be used to depict the alteration to the area. Such information as the limits of clearing and grubbing, the areas of cuts and fills and the locations of roads, paved areas, buildings and other structures are to be included. Final contours of the project area at an interval that will adequately describe the

topography of the site should be included on these maps. Final contours should tie into existing contours. Separate maps/drawings, or inserts on the main project drawings should be included for off-site borrow or disposal areas which are part of the project. These drawings or inserts should include all information required on the main drawings. A legend that describes all of the alterations and BMPs to be used for erosion and sediment control should be shown on the maps or drawings. Proposed grading should conform to the standards provided in Chapter 16 of this manual.

4. ***The volume and rate of runoff from the project site and its upstream watershed area.*** The area draining to a particular BMP should be determined. Acceptable methods to calculate runoff are described in Chapter 5 of this manual and Chapter 8 of the Pennsylvania Stormwater Best Management Practices Manual. In some instances the drainage areas will increase or decrease as the site grading proceeds. In either case, the maximum drainage area to the BMP should be used to determine the design capacity. Design capacity requirements are included in the descriptions for the various BMPs. It should be noted that “due to the limitations of the Rational Method itself, as well as assumptions in the Modified Rational Method about the total storm duration, this method may not be used to calculate water quality, infiltration, or capture volumes for Post Construction Stormwater Management BMPs” (Pennsylvania Stormwater Best Management Practices Manual, 2006).

For many projects, alterations to drainage patterns, impervious coverage or other watershed characteristics may necessitate an Off-Site Stability Analysis. This analysis is necessary where stormwater discharges are proposed to be directed to off-site areas that are not Surface Waters (i.e. uplands) or to areas unsuitable for carrying storm event flows. This can include overland flows that discharge to an open area, or follow an existing swale or other natural flow path lacking clearly defined bed and banks. For more guidance on these discharges, see Appendix G - Technical Paper: “Level Spreaders and Off-site Discharges of Stormwater to Non-surface Waters”. Specific guidance for determining adequacy of discharge can be found under the section on *Legal Considerations*. Further guidance can be obtained from the Department’s factsheet regarding “Off Site Discharges of Stormwater to Areas that are not Surface Waters” (Document No. 3930-FS-DEP4124).

A stream stability analysis is necessary where discharges are anticipated to overburden a receiving stream, most notably headwater streams which are typically the least tolerant to increases in magnitude, duration or frequency of discharges. Wherever a proposed discharge will result in a discernible increase in rate or volume to a receiving waterway, a stream stability analysis should be included in the narrative stating the impact of the discharge on the watercourse’s ability to resist erosion. Design computations for all proposed protective measures for downstream watercourses should be included. (See Chapter 6 for guidance on calculating channel capacity and checking the stability of existing or proposed linings). Additional guidance and information regarding stream channel stability analysis may also be obtained from Technical Bulletin No. 1 - “Stream Channel Erosion Control Policy Guidance” from Virginia Department of Conservation and Recreation (http://www.dcr.virginia.gov/stormwater_management/documents/tecbtln1.PDF).

5. ***The location of all surface waters, which may receive runoff within or from the project site and their classification under Chapter 93.*** All streams in Pennsylvania are classified based on their designated and existing water uses and water quality criteria. Designated uses for surface waters are found in 25 Pa. Code §§ 93.9a—93.9z. Existing uses of surface waters are usually the same as the designated use, except where information has been provided to or obtained by the Department, which indicates that a particular water body actually attains a more stringent water use than the designated use. Existing uses are protected pursuant to 25 Pa. Code §§ 93.4a—93.4c. Existing uses may be obtained from DEP’s website at: <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=553974&mode=2>. If the runoff from a permitted project site discharges to a stream that is classified for special protection (High

Quality [HQ] or Exceptional Value [EV]), more stringent criteria are to be used to design the BMPs for that site. Nondischarge alternatives are to be used wherever possible. If during a 2-year/24-hour storm event it is not possible to avoid increasing the rate or volume of runoff from disturbed areas to a special protection watershed, Antidegradation Best Available Combination of Technologies (ABACT) BMPs must be used to the fullest extent possible. BMPs with low sediment removal efficiencies (e.g. rock filters) are not ABACT. BMPs with moderate sediment removal efficiencies (e.g., barrel/riser sediment traps) are ABACT for HQ watersheds, but not EV watersheds. BMPs with high sediment removal efficiencies (e.g. compost filter socks) are ABACT for HQ and EV watersheds. The BMPs contained in this manual are rated in the sections where those BMPs are addressed. A list of acceptable ABACT is provided in Chapter 17. Some of the criteria for common erosion control BMPs to meet ABACT requirements are listed here for emphasis:

- (i) Special Sediment Basin Requirements
 - (a) Principal spillways should be designed to skim water from the top 6 inches of the dewatering zone, or have permanent pools greater than or equal to 18 inches deep.
 - (b) The basin should be designed with a flow length to average basin width ratio of 4L:1W or greater.
 - (c) The basin should be designed such that the settling volume dewateres in no less than 4 days and no more than 7 days when at full capacity (i.e. top of the settling volume, elevation 3 on Standard E&S Worksheet # 13 to top of sediment storage elevation, elevation 2 on Standard E&S Worksheet # 13).
- (ii) Channels, collectors, and diversions should be lined with permanent vegetation, rock, geotextile, or other non-erosive material.
- (iii) Temporary BMPs that divert or carry surface water should be designed to have a minimum capacity to convey the peak discharge from a 5-year frequency storm.
- (iv) Upon completion or temporary cessation of the earth disturbance activity, or any stage thereof, the project site shall be immediately stabilized.
- (v) The Department may approve alternate BMPs that will maintain and protect existing water quality and existing and designated uses.

Where it can be shown that the use of flocculants can help to meet effluent standards, and that the use of such flocculants, consistent with the manufacturer's recommendations, does not in itself pose a threat to water quality, their use can be approved on a case-by-case basis.

6. *A narrative description of the location and type of perimeter and on site BMPs used before, during, and after the earth disturbance activity.*

For permitted sites, this description is provided when the NOI is properly completed. Otherwise it should be included in the narrative.

7. *A sequence of BMP installation and removal in relation to the scheduling of earth disturbance activities, prior to, during and after earth disturbance activities that ensure the proper functioning of all BMPs.*

The plan drawings should include a complete schedule of installation and removal of erosion control BMPs as they relate to the various phases of earthmoving activities. A good sequence will minimize the time of disturbance without unnecessarily restricting the construction process. The sequence should be site-specific and address all proposed erosion control and stabilization BMPs. Appropriate BMPs for sediment pollution control should be in place and functional

before earth disturbance occurs within a given drainage area. All of the steps to be taken from the initial site clearing through the final stabilization of the site should be included. A stabilized construction entrance is often installed as a first item of work on a given site. Other BMPs are constructed when needed to accommodate the planned sequence of project installation. Chapter 2 provides additional guidance on BMP sequencing.

8. **Supporting calculations and measurements.** All design information for all proposed BMPs (including outlet channels from proposed basins, traps, and stormwater outfall protection) should be included in the narrative report. This information will vary according to the BMP, but may include such information as the drainage area, anticipated flow rate, velocity and the proposed method of stabilization. The standard worksheets, included in Appendix B of this manual, give guidance for the design calculations and information required. Use of these standard worksheets is recommended in order to expedite plan reviews. Failure to provide all of the information requested by the appropriate worksheet(s) will constitute a plan that is administratively incomplete. These worksheets may not be altered in form or content unless prior approval is obtained from the reviewing agency.
9. **Plan drawings.** The locations of the BMPs should be shown on the map(s) described earlier. A legend, describing all symbols should be included on all plan maps or drawings. Proposed new contours should tie into existing contours. All construction details and specifications for the facilities should be included on the drawings. Typical sketches may be used. However, these sketches should provide sufficient detail to show critical dimensions and construction details.

Standard construction details may be copied from this manual and inserted into the E&S plan drawings of specific projects. It should be noted that many of these standard details have attached notes in bold type. These notes should be considered part of that detail and included on the plan drawings. Construction details that have been altered in form or content may not be labeled "Standard Construction Detail." Many of the standard construction details and standard worksheets contain tables of dimensions that should be copied onto the E&S plan drawings.

Appendix C contains standard notes that should be placed on the plan drawings. Optional notes are also provided and should be used where appropriate. Additional notes may be added as needed so long as they do not contradict the standard notes, details, sequence, or maintenance requirements.

10. **A maintenance program that provides for the operation and maintenance of BMPs and the inspection of BMPs on a weekly basis and after each stormwater event, including the repair or replacement of BMPs to ensure effective and efficient operation. The program must provide the completion of a written report documenting each inspection and all BMP repair or replacement and maintenance activities.** A maintenance program for both the temporary and permanent erosion and sediment control BMPs, including disposal of materials removed from the BMPs or project area, should be included on the plan drawings. The maintenance program should include a schedule for inspection of the various BMPs that provides for inspection after each runoff event as well as on a weekly basis. The type of maintenance, such as cleanout, repair, replacement, regrading, restabilizing, etc. for each of the BMPs should be included on the plan drawings. For sediment basins and traps, the elevation corresponding to top of sediment storage level should be specified and a means to identify this elevation should be identified. The means of disposal of the materials removed from the BMPs should also be specified. If materials removed from the BMPs are to be removed from the project area, the site and method of disposal should be indicated. Guidance on appropriate maintenance actions is provided for each BMP described in this manual.

11. ***Procedures which ensure that the proper measures for the recycling or disposal of materials associated with or from the project site will be undertaken in accordance with Department regulations.*** Individuals responsible for earth disturbance activities must ensure that proper mechanisms are in place to control waste materials. Construction wastes include, but are not limited to, excess soil materials, building materials, concrete wash water, sanitary wastes, etc. that could adversely impact water quality. Measures should be planned and implemented for housekeeping, materials management, and litter control. Wherever possible, recycling of excess materials is preferred, rather than disposal. A note requiring recycling of waste materials, where feasible, should be added to the drawings.
12. ***Identification of the natural occurring geologic formations or soil conditions that may have the potential to cause pollution during earth disturbance activities and include BMPs to avoid or minimize potential pollution and its impacts from such formations.*** Geologic formations containing minerals (e.g. pyrite) in sufficient quantities that could result in discharges which do not meet water quality standards for the receiving surface water(s) must be identified. The locations of the formations containing those minerals (if not site wide) should be shown on the plan maps. Appropriate measures to prevent such discharges (including but not limited to, proper handling, isolation, disposal, etc.) should be provided on the plan drawings along with typical details illustrating the procedures and/or BMPs to be used.

Bedrock or soil conditions which could result in significant slope failures resulting in mass soil movement into surface waters, property damage, or a public safety hazard should also be identified. The erosion control plan narrative should briefly state the methods incorporated into the plan which address such hazards. Plan maps should clearly mark the locations where potential for slope failures exist, and appropriate construction details and typical details should be provided on the plan drawings.
13. ***Identification of potential thermal impacts to surface waters of this Commonwealth from the earth disturbance activity including BMPs to avoid, minimize or mitigate potential pollution from thermal impacts.*** An analysis of how thermal impacts associated with the project will be avoided should be provided. If thermal impacts cannot be avoided, describe how impacts were minimized and the BMPs that will mitigate the impacts in a manner that will protect and maintain water quality in surface waters. Additional information on minimizing thermal impacts can be found in the Pennsylvania Stormwater Best Management Practices Manual.
14. ***The E&S Plan shall be planned, designed, and implemented to be consistent with the Post Construction Stormwater Management (PCSM) Plan under 25 Pa. Code § 102.8 (relating to PCSM requirements). Unless otherwise approved by the Department, the E&S Plan must be separate from the PCSM Plan and labeled "E&S" or "E&S Plan" and be the final plan for construction.*** The overall design of the project must support the management of stormwater for erosion and sediment control during earth disturbance activities in a manner that is compatible with — and can be integrated into— structural and non-structural PCSM practices and approaches.
15. ***Identification of existing and proposed riparian forest buffers.*** When riparian forest buffers will be incorporated into a project site in accordance with 25 Pa. Code § 102.14 as part of the PCSM Plan, the areas of existing buffers or the areas where buffers will be developed should be identified on the plan drawings. Certain restrictions on earthmoving within 150 feet in a special protection watershed and 100 feet in areas where a voluntary riparian buffer will be installed must be met for permitted sites. All proposed earthmoving, including installation of E&S BMPs, must comply with those restrictions.

E&S Antidegradation Implementation for Special Protection Waters - Chapter 102.4(b)(6) states, "In order to satisfy the Antidegradation implementation requirements of 25 Pa Code Section 93.4c(b) (relating to implementation of antidegradation requirements), for an earth disturbance activity that requires a permit under this chapter and for which any receiving surface waters of this Commonwealth

is classified as High Quality (HQ) or Exceptional Value (EV) under Chapter 93, the person proposing the activity shall in their permit application:

- (i) Evaluate and include nondischarge alternatives in the E&S plan, unless a person demonstrates that nondischarge alternatives do not exist for the project.
- (ii) If the person makes the demonstration in (i) that nondischarge alternatives do not exist for the project, the E&S plan shall include ABACT (Except as provided in §93.4C(b)(1)(iii)_(relating to Socio-Economic Justification).”

Section 102.1 defines a nondischarge alternative as “environmentally sound and cost-effective BMPs that individually or collectively eliminate the net change in stormwater volume, rate and quality for storm events up to and including the 2-year/24-hour storm when compared to the stormwater rate, volume and quality prior to the earth disturbance activities to maintain and protect the existing quality of the receiving surface waters of this Commonwealth.” Therefore, an applicant for an NPDES Permit or an ESCP (Erosion and Sediment Control Permit) permit should be able to show no net increase in volume or rate of discharge in the summary table of the NOI for pre- vs. post-construction conditions. This should be supported by Worksheets 1 through 5 from the Pennsylvania Stormwater Best Practices Manual. In addition, Worksheet 10 from the Pennsylvania Stormwater Best Management Practices Manual should show no degradation of water quality.

In HQ watersheds, socio-economic justification (SEJ) for degradation may be provided in accordance with Chapter 93. However, no SEJ is allowable in EV watersheds.

The chapters which follow evaluate specific BMPs as to whether they should be considered ABACT for HQ or EV watersheds. Those with low sediment removal potential are not rated as ABACT. Those with moderate sediment removal potential are rated as ABACT for HQ but not EV watersheds. Only those with high sediment removal potential are rated as ABACT for EV watersheds. It should be understood that a BMP that is not rated as ABACT for an HQ or an EV watershed is not prohibited from use in that watershed. However, it may not be the only BMP used. Non-ABACT BMPs may be used in conjunction with ABACT to increase their efficiency. The Department may also consider whether use of several non-ABACT in a treatment train may constitute an ABACT in effect. Chapter 17 addresses Special Protection Watersheds, Antidegradation, and ABACT in more detail.

While nondischarge alternatives and/or ABACT are not required for non-permitted sites, they are recommended. Site conditions such as proximity to the receiving surface water, steepness of slope, soil conditions, and nature of the project should be considered when determining whether to use these options.

Alternative BMPs - The Department may approve alternative BMPs (not contained in this manual, or using a different design method or standards than those described in this manual) that maintain and protect existing water quality and existing and designated uses. However, the burden of proof that the proposed BMPs are appropriate for the intended use lies with the plan designer. Sufficient supporting documentation (calculations, manufacturer’s specs, etc.) should be included with the application to allow the reviewer to make an informed decision. For more information regarding new products and procedures, see Chapter 12.

Riparian buffers - Section 102.14 requires persons conducting permitted activities in HQ or EV watersheds to protect, convert, or establish new riparian forest buffers within 150 feet of a perennial or intermittent river, stream, creek, lake, pond, or reservoir. See 25 Pa. Code § 102.14 for additional guidance.

Additional Information - The Department or conservation district, after consultation with the Department, may require other information necessary to adequately review a plan, or may require alternative BMPs on a case-by-case basis when necessary to ensure the maintenance and protection of water quality and existing and designated uses. In cases where the Department has already provided guidance regarding the need for additional information, a conservation district may require additional information in accordance with that guidance without consulting with the Department.