

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Waterways Engineering and Wetlands

DOCUMENT NUMBER: 310-2135-002

TITLE: Riparian Buffer or Riparian Forest Buffer Equivalency Demonstration

EFFECTIVE DATE: March 21, 2015

AUTHORITY: The Pennsylvania Clean Stream Law, as amended by Act 162 of 2014, 35 P.S. §§ 691.1—691.1001, and regulations at 25 *Pa. Code* Chapters 92(a), 93, 96 and 102.

POLICY: This policy provides guidance and procedures for meeting the requirements of Act 162 of 2014 as it relates to the riparian buffer or riparian forest buffer equivalency demonstration as required in 35 P.S. § 691.402(c)(1).

PURPOSE: This guidance outlines the equivalency demonstration criteria and process related to the riparian buffer or riparian forest buffer equivalency demonstration required by Act 162 at 35 P.S. § 691.402(c)(1).

APPLICABILITY: This guidance applies to applicants for individual National Pollutant Discharge Elimination System (NPDES) permits for stormwater discharges associated with construction activities who proceed under 35 P.S. § 691.402(c)(1)(ii) in utilizing alternatives to riparian buffer best management practices (BMPs) to address runoff from their project.

DISCLAIMER: The policies and procedures outlined in this guidance document are intended to supplement existing requirements. Nothing in the policies or procedures shall affect regulatory requirements.

The policies and procedures herein are not an adjudication or a regulation. There is no intent on the part of DEP to give these rules that weight or deference. This document establishes the framework within which DEP will exercise its administrative discretion in the future. DEP reserves the discretion to deviate from this policy statement if circumstances warrant.

PAGE LENGTH: 13 pages

1. INTRODUCTION

Land development activities that change the surface features of land may alter stormwater runoff characteristics. Unmanaged changes in stormwater runoff volume, rate and water quality resulting from land development activities can constitute potential pollution that is regulated under the federal Clean Water Act and the Pennsylvania Clean Streams Law because such changes can alter the chemical, physical or biological properties of receiving waters.

Pennsylvania regulations found in *25 Pa. Code* Chapter 102 (relating to erosion and sediment control) specify that such land development should be designed and best management practices (BMPs) should be implemented that mimic the natural systems in place prior to the development activity. Additionally, Chapter 102 specifies when permits may be required.

Erosion and sediment control and post construction stormwater management are addressed under several permitting programs administered by the Department (DEP) under the Chapter 102 regulations including: the National Pollution Discharge Elimination System (NPDES) Permit for stormwater discharges associated with construction activities (construction), the Erosion and Sediment Control General Permit for oil and gas activities (ESCGP), and the Erosion and Sediment Control Permit (E&S permit) for timber harvesting and road maintenance. These permits utilize narrative based effluent limitations in the form of BMPs to achieve the regulatory standard of preventing pollution. BMPs used to manage runoff changes - from land disturbance and increases in impervious area - in stormwater runoff volume, rate and quality must protect, maintain, and restore water uses for all surface waters.

For an earth disturbance activity that requires a permit under *25 Pa. Code* Chapter 102, where a receiving surface water of this Commonwealth is classified as High Quality (HQ) or Exceptional Value (EV) under *25 Pa. Code* Chapter 93, the person proposing the earth disturbance activity is required to use “nondischarge alternative” BMPs for both the Erosion and Sedimentation (E&S) (*25 Pa. Code* § 102.4(b)(6)) and Post Construction Stormwater Management (PCSM) BMPs (*25 Pa. Code* § 102.8(h)). If nondischarge alternatives do not exist for the project, the person must use Antidegradation Best Available Combination of Technologies (ABACT) BMPs and assure that any discharge maintains and protects the existing quality of receiving surface waters and protects existing baseflow.

A riparian buffer is a BMP that is an area of permanent vegetation along waterbodies that is left undisturbed to allow for natural succession of native vegetation. A riparian buffer may consist of grasses and forbs, or a combination of vegetation types to include grasses, forbs, shrubs and trees. A riparian forest buffer is a specialized type of riparian buffer consisting of permanent vegetation that is predominantly native trees and shrubs that provide at least 60% uniform canopy cover. Riparian forest buffers must be maintained in a natural state or sustainably managed to protect and enhance water quality, stabilize stream channels and banks, and separate land use activities from surface waters. Riparian forest buffers can be in place as newly established or existing, where protection is critical (Riparian Forest Buffer Guidance).

Specifically, Pennsylvania regulations at *25 Pa. Code* Chapter 102.14(a)(1) (relating to erosion and sediment control) specify that “persons proposing or conducting earth disturbance activities when the activity requires a permit under this chapter may not conduct earth disturbance activities within 150 feet of a perennial or intermittent river, stream, or creek, or lake, pond or reservoir when the project site is located in an exceptional value or high quality watershed

attaining its designated use as listed by the Department at the time of application and shall protect any existing riparian buffer in accordance with this section.”

Further, Chapter 102.14(a)(2) states that persons proposing or conducting earth disturbance activities when the activity requires a permit under this chapter where the project site is located in an exceptional value (EV) or high quality (HQ) watershed where there are waters failing to attain one or more designated uses as listed in Category 4 or 5 on Pennsylvania’s Integrated Water Quality Monitoring and Assessment Report (as amended and updated) at the time of the application, and the project site contains, is along or within 150 feet of a perennial or intermittent river, stream, or creek, lake, pond or reservoir shall, in accordance with the requirements of the section, do one of the following:

- (i) Protect an existing riparian forest buffer.
- (ii) Convert an existing riparian buffer to a riparian forest buffer.
- (iii) Establish a new riparian forest buffer.

The 2010 amendments to Chapter 102 established riparian forest buffer BMPs as the only BMP that is afforded the antidegradation presumption under *25 Pa. Code* § 102.14(e)(1). The antidegradation presumption specifies that a properly installed and maintained riparian forest buffer functions as a non-discharge alternative and also functions to prevent thermal impacts. This presumption, along with a technically sound designed, implemented and maintained post construction stormwater management plan, affords a high level of water quality protection to the special protection waters to which this guidance applies, and therefore a bright line for applicants implementing antidegradation requirements in these waters. Riparian forest buffers are complex ecosystems that help provide nutrients and habitat for stream communities as well as mitigate or control point and nonpoint source pollution by both keeping pollutants out of waterways and increasing the level of instream pollution processing. Scientific literature supports the riparian forest buffer (with stormwater entering the buffer as sheet flow or shallow concentrated flow) as the only best management practice that can do all of the following: capture and hold stormwater runoff from the majority of Pennsylvania storms in a given year; infiltrate most of that water and/or transport it as shallow flow through the forest buffer soils where contaminant uptake and processing occurs; release excess storm flow evenly, further processing dissolved and particulate substances associated with it; sequester carbon at significant levels; improve the health of the stream; and increase the stream’s capacity to process organic matter and nutrients generated on the site or upstream of the site. Because riparian forest buffers protect surface waters from the effects of runoff by providing filtration of pollutants, bank stability, groundwater recharge, rate/attenuation and volume reduction, credit may be granted when stormwater is effectively treated by an existing riparian forest buffer (including in the post development condition), that is predominantly native trees and shrubs that provide at least 60% uniform canopy cover. Because riparian forest buffers are the only BMP that can provide such an exceptionally high level of water use protection and ecosystem function, projects that implement them according to regulation and guidance are afforded the antidegradation presumption as detailed in Chapter 102.

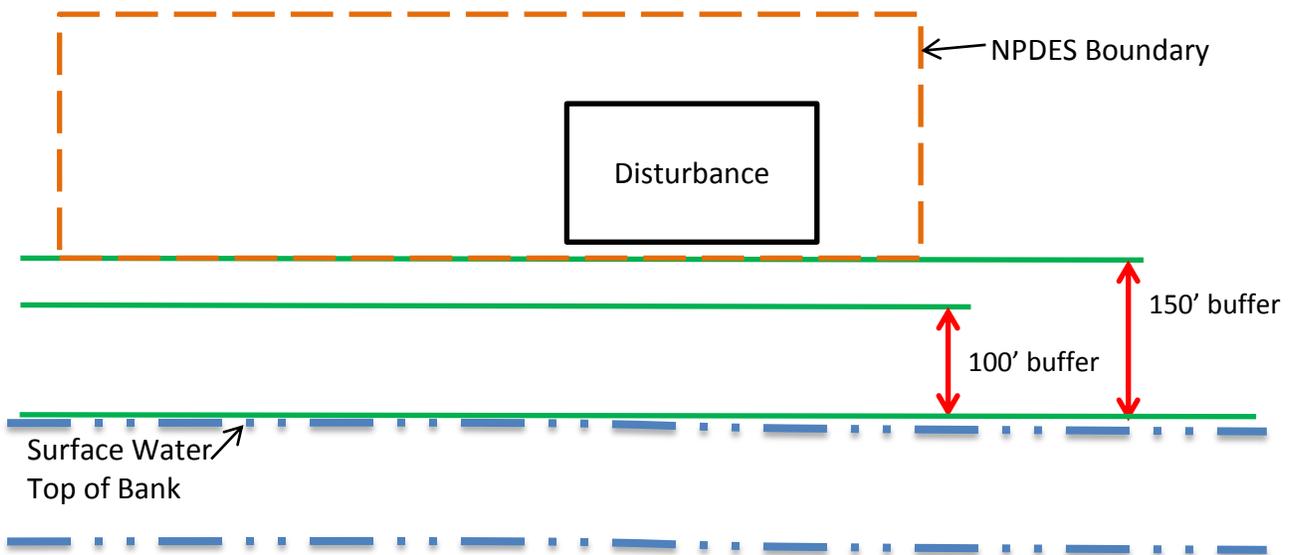
Act 162, signed into law on October 22, 2014 and effective for implementation on December 21, 2014, amends the Pennsylvania Clean Streams Law (35 P.S. §§ 691.1—691.1001). Section 402(c)(1) of the Act provides that for persons proposing or conducting earth disturbance activities when the activity requires a National Pollutant Discharge Elimination System Permit

for storm water discharge under 25 Pa. Code Chapter 102 (relating to erosion and sediment control), the person may use or install either: 1) a riparian buffer or riparian forest buffer; or 2) another option or options among best management practices, design standards and alternatives that collectively are substantially equivalent to a riparian buffer or riparian forest buffer in effectiveness to minimize the potential for accelerated erosion and sedimentation and to protect, maintain, reclaim and restore water quality; and for existing and designated uses of a perennial or intermittent river, stream, creek, lake pond or reservoir to ensure compliance with 25 Pa. Code Chapter 93 (relating to water quality standards). Act 162 allows applicants with projects within 150 feet of special protection waters flexibility in addressing the mandatory riparian buffer requirements given in Chapter 102.14.

This technical guidance outlines the equivalency demonstration and process related to the riparian buffer or riparian forest buffer equivalency demonstration required by Act 162 Section 402(c)(1). If the applicant chooses not to implement a riparian forest buffer, the applicant does not benefit from the antidegradation presumption. No waivers of the equivalency requirement are provided. The equivalency demonstration will be reviewed as part of the individual NPDES application review process and not independent from that review.

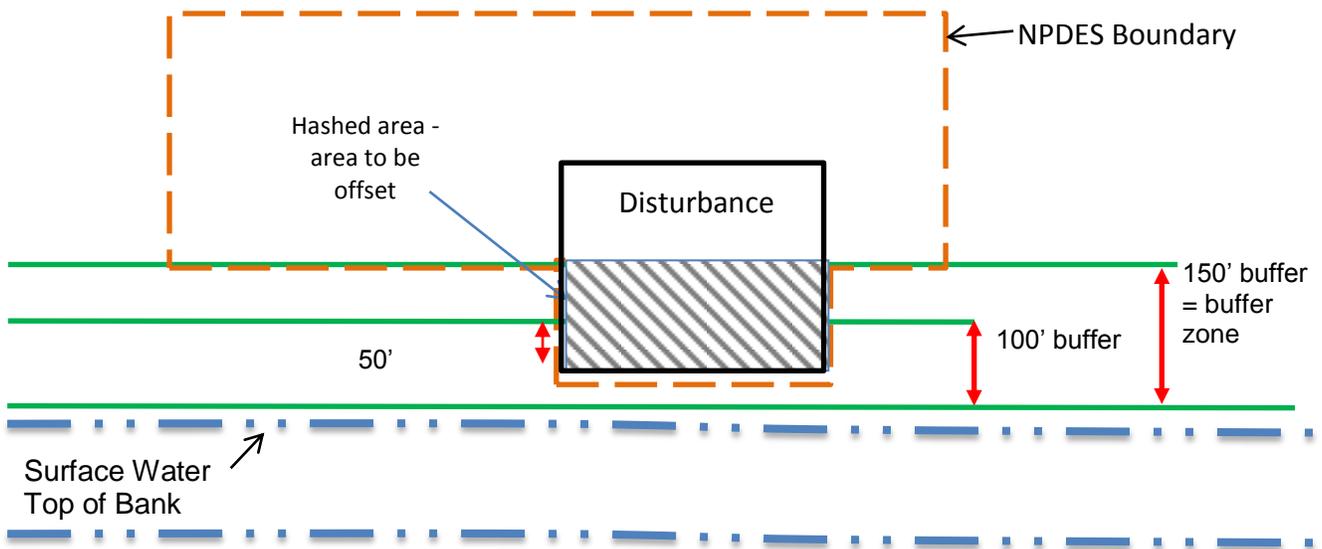
In addition, if an earth disturbance activity is proposed within 100 feet of a surface water as defined by Chapter 102, under Section 402(c)(2), any earth disturbance within the riparian buffer or riparian forest buffer will have to be offset in accordance with Act 162. No waivers of the offsetting requirement are provided. Guidance for offsetting is addressed in DEP’s *Riparian Buffer and Riparian Forest Buffer Offsetting* guidance document (310-2135-003). Examples of when the equivalency demonstration and offsetting are not required, when only the equivalency demonstration is required, and when both the equivalency demonstration and offsetting are required are shown in Figures 1 through 3, respectively.

Figure 1. Equivalency demonstration and offsetting not required



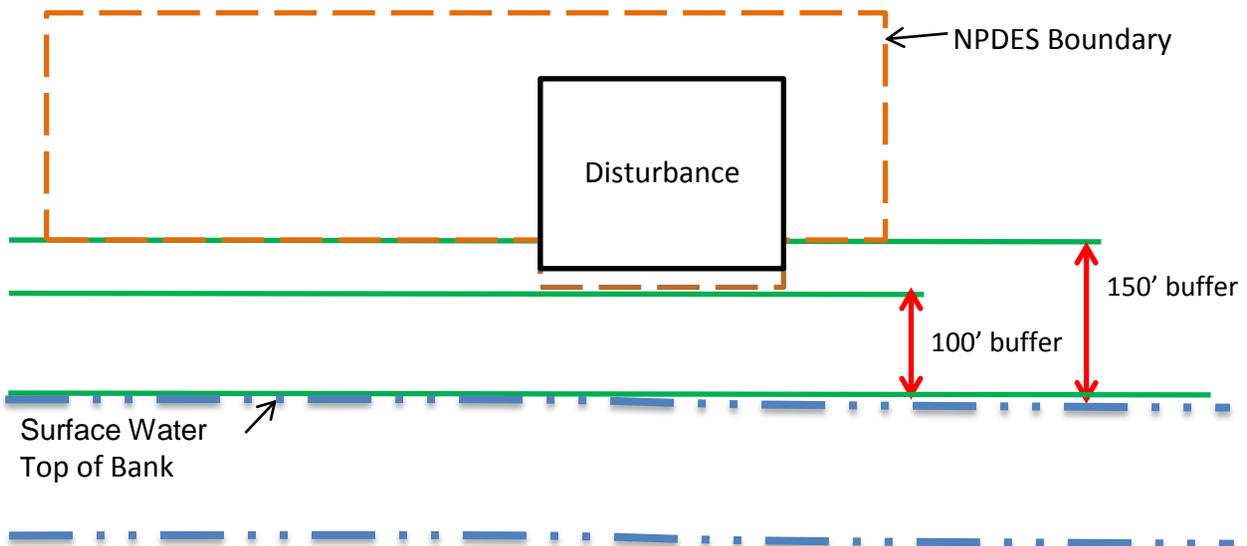
In this example, the project involves one acre or greater of earth disturbance and requires an NPDES stormwater construction permit. The applicant has chosen to keep the NPDES project boundary and the limit of disturbance both outside of the 150 feet closest to the stream. Because of this choice, neither offsetting nor an equivalency demonstration is required.

Figure 2. Both equivalency demonstration and offsetting required



In this example, the project involves one acre or greater of earth disturbance and requires an individual NPDES stormwater construction permit. The applicant has chosen to conduct earth disturbance within 50 feet of the surface water. In this case, both the demonstration of equivalency and the offsetting must be completed as part of the NPDES application. The area that is hashed in the diagram is that area that must be offset, either onsite or offsite, at a ratio of 1 to 1.

Figure 3. Equivalency demonstration required but offsetting not required



In this example, the project involves greater than or equal to one acre of earth disturbance and requires an individual NPDES stormwater construction permits. The applicant has chosen to conduct earth disturbance between 150 and 100 feet of the surface water. In this case, only the demonstration of equivalency must be completed as part of the NPDES permit application. Offsetting is not required.

2. DEFINITIONS

The words and terms in this policy, unless defined herein, have the meanings as identified in the Pennsylvania Clean Stream Law, as amended by Act 162 of 2014, 35 P.S. §§ 691.1—691.1001, and regulations at 25 Pa. Code Chapters 92(a), 93, 96 and 102, as applicable.

Act 162 - Amends Section 402 of the act of June 22, 1937 (P.L. 1987, No. 392), known as The Clean Streams Law.

Applicant - A person who applies for a permit. (*See also "Permittee" definition*)

BMPs - Best management practices - Activities, facilities, measures, planning or procedures used to minimize accelerated erosion and sedimentation and manage stormwater to protect, maintain, reclaim, and restore the quality of waters and the existing and designated uses of waters within this Commonwealth before, during, and after earth disturbance activities. (25 Pa. Code § 102.1)

Conservation District - A conservation district, as defined in Section 3(c) of The Conservation District Law (3 P.S. Section 851(c), as amended) that has the authority under a delegation agreement executed with the Department to administer and enforce all or a portion of the erosion, sediment, and stormwater management program in the Commonwealth. (25 Pa. Code § 102.1)

DEP - The Department of Environmental Protection of this Commonwealth.

Designated uses - Those uses specified in 25 Pa. Code §§ 93.4(a) and 93.9a–93.9z for each water body or segment whether or not they are being attained. (25 Pa. Code § 93.1)

Earth disturbance activity - A construction or other human activity which disturbs the surface of the land, including land clearing and grubbing, grading, excavations, embankments, land development, agricultural plowing or tilling, operation of animal heavy use areas, timber harvesting activities, road maintenance activities, oil and gas activities, well drilling, mineral extraction, and the moving, depositing, stockpiling, or storing of soil, rock or earth materials. (25 Pa. Code § 102.1)

Exceptional Value (EV) Waters - Surface waters of high quality which satisfy § 93.4b(b) (relating to antidegradation). (25 Pa. Code § 93.1)

High Quality (HQ) Waters - Surface waters having quality which exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water by satisfying § 93.4b(a). (25 Pa. Code § 93.1)

National Pollutant Discharge Elimination System Permit for Stormwater Discharges Associated with Construction Activities (NPDES Permit) - A permit required for the discharge or potential discharge of stormwater into waters of this Commonwealth from construction activities, including clearing and grubbing, grading and excavation activities involving 1 acre (0.4 hectare) or more of earth disturbance activity or an earth disturbance activity on any portion, part, or during any stage of, a larger common plan of development or sale that involves 1 acre

(0.4 hectare) or more of earth disturbance activity over the life of the project. (25 Pa. Code § 102.1)

NPDES Permit application - A request, on a form provided by DEP, for coverage under an Individual NPDES Permit.

NPDES - National Pollutant Discharge Elimination System.

PCSM - Post construction stormwater management. (25 Pa. Code § 102.1)

PCSM plan - A site-specific plan consisting of both drawings and a narrative that identifies BMPs to manage changes in stormwater runoff volume, rate and water quality after earth disturbance activities have ended and the project site is permanently stabilized. (25 Pa. Code § 102.1)

Permittee - Person who holds a permit (or stormwater discharge activity which may be either general or individual).

Pollutant - Any contaminant or other alteration of the physical, chemical, biological or radiological integrity of surface water which causes or has the potential to cause pollution as defined in Section 1 of The Clean Streams Law (35 P.S. § 691.1). (25 Pa. Code §§ 102.1, 96.1 and 92a.1)

Post construction stormwater - Stormwater associated with a project site after the earth disturbance activity has been completed and the project site is permanently stabilized. (25 Pa. Code § 102.1)

Project site - The entire area of activity, development, lease or sale including:

- (1) The area of an earth disturbance activity.
- (2) The area planned for an earth disturbance activity.
- (3) Other areas which are not subject to an earth disturbance activity. (25 Pa. Code § 102.1)

Replacement buffer - A newly established or installed riparian forest buffer located along special protection waters, in the same drainage list and as close as feasible to the area of disturbance that compensates for disturbance within 100 feet of the special protection surface water at a ratio of one to one.

Riparian buffer - A BMP that is an area of permanent vegetation along surface waters. (25 Pa. Code § 102.1)

Riparian forest buffer - A type of riparian buffer that consists of permanent vegetation that is predominantly native trees, shrubs and forbs along surface waters that is maintained in a natural state or sustainably managed to protect and enhance water quality, stabilize stream channels and banks, and separate land use activities from surface waters. (25 Pa. Code § 102.1)

Special Protection Waters - Water uses which shall be protected, and upon which the development of water quality criteria shall be based, are set forth, as High Quality Waters (HQ) and Exceptional Value (EV) Waters in § 93.3, Protected water uses.

Stormwater - Runoff from precipitation, snowmelt, surface runoff and drainage. (25 Pa. Code § 102.1)

Surface waters - Perennial and intermittent streams, rivers, lakes, reservoirs, ponds, wetlands, springs, natural seeps, and estuaries, excluding water at facilities approved for wastewater treatment such as wastewater treatment impoundments, cooling water ponds, and constructed wetlands used as part of a wastewater treatment process. (25 Pa. Code §§ 102.1, 93.1, 96.1 and 92a.1)

3. GUIDANCE AND APPLICATION

a. Projects for Which the Riparian Buffer/Riparian Forest Buffer Equivalency Demonstration Applies

The scope of the projects to which Act 162 applies is narrow. In Section 402(c)(1), the scope of the amendment is limited to projects that require an NPDES permit under 25 Pa. Code Chapter 102. The NPDES permit required under Chapter 102 is the NPDES Permit for Stormwater Discharges Associated with Construction Activities (NPDES Stormwater Construction). Section 402(c)(1) provides that applicants may utilize either riparian buffers, riparian forest buffers or alternative BMPs. Section 402(c)(1)(ii) in turn sets out requirements for the alternative BMPs, providing they must be equivalent to a riparian buffer or riparian forest buffer in function. Because the underlying Chapter 102 requirements relate to riparian buffers and riparian forest buffers provide that such buffers are mandatory only for certain projects in special protection waters, the equivalency demonstration provided in Section 402(c)(1) applies to projects requiring an individual NPDES permit in a designated special protection watershed that propose any earth disturbance within 150 feet of a river, stream, creek, lake, pond or reservoir. Under Pennsylvania's NPDES regulations, all NPDES permitted projects that drain to special protection waters must obtain an individual NPDES construction stormwater permit. Therefore, according to the construction of Act 162 and regulatory requirements in 25 Pa. Code § 102.14, Act 162 is in effect, limited in scope to only those individual NPDES construction stormwater permits which involve earth disturbance activities within 150 feet of a designated special protection river, stream, creek, lake, pond or reservoir.

Act 162 and the regulatory requirements in 25 Pa. Code § 102.14 when read together, provide that general NPDES stormwater construction permits and the E&S control permit for timber harvesting and road maintenance activities (E&S Permit) and the E&S Control General Permit for Earth Disturbance Associated with Oil and Gas Exploration, Production, Processing, or Treatment Operations or Transmission Facilities (ESCGP-2) are not covered by Act 162.

As a threshold matter, it is important to note that Act 162 did not otherwise modify the regulatory language in 25 Pa. Code § 102, but rather allowed for alternatives to demonstrate regulatory compliance. Therefore, the trigger for the riparian buffer requirements - and projects to which the Act is applicable - remains earth disturbance activities within 150 feet of a special protection river, stream, creek, lake, pond or reservoir.

b. Application Requirements

Applicants will need to choose if they will be implementing a 150 foot buffer area or if they will be making a demonstration of equivalency. If the applicant chooses to make the demonstration of equivalency, Worksheets 12, 13, 14 and 15 and a corresponding narrative should be completed and accompany the individual NPDES Permit application. Note that the equivalency demonstration is separate and supplemental to the requirements of *25 Pa. Code* § 102.8 regarding post construction stormwater management. While a pre-application meeting is not required for permit issuance, it is highly recommended with projects containing riparian buffers to allow for clear communication between applicants and DEP. In addition, it is not mandatory that applicants follow the process outlined in this guidance; however, DEP recommends following this guidance in order to successfully demonstrate compliance with the requirements. Additionally, all other application completeness items must be satisfied or the permit may be denied.

In addition to the equivalency demonstration, if the project proposes earth disturbance within 100 feet of the surface water, then an offset will be required. In these circumstances, in addition to the equivalency demonstration, applicant will also need to fulfill the offsetting requirements. Guidance on the offsetting requirements can be obtained in the *Riparian Buffer and Riparian Buffer Offsetting* guidance document (310-2135-003).

The recommended steps to follow for completing an application are included below and example calculations are shown in Appendix A:

Step 1: Estimate pollutant load from disturbed areas of the site using Worksheet 12 from the *Pennsylvania Stormwater Best Management Practices Manual*.

Step 2: Calculate the pollutant load reductions with the proposed structural BMPs using Worksheet 13 from the *Pennsylvania Stormwater Best Management Practices Manual*.

Step 3: Using Worksheet 14, estimate the increased pollutant load for the disturbed area within the riparian or riparian forest buffer.

Step 4: Calculate the pollutant load reductions with the proposed structural BMPs using Worksheet 15 from the *Pennsylvania Stormwater Best Management Practices Manual*.

If target load reductions are achieved for total suspended solids (TSS), total phosphorus (TP) and nitrate on Worksheets 13 and 15, then the water quality requirements are met.

Note: Applicants should not use Worksheet 10 when implementing this guidance as nitrate removal will be addressed directly in Worksheets 12 and 13; however, Worksheet 10 is still useful in instances where disturbance to the riparian buffers are not part of the application.

Step 5: If an applicant proposes earth disturbance within a riparian buffer or riparian forest buffer, they should also use the accompanying checklist to demonstrate in their narrative that the proposed BMP(s) utilized in the equivalency demonstration are

functionally equivalent to a riparian buffer or riparian forest buffer. The items in the checklist are specific to functions of the riparian buffer or riparian forest buffer and cannot be made up by the site as a whole but do not have to be implemented exclusively in the 150 foot buffer area. The items on the checklist should be addressed by the functioning BMP(s) and applicants should implement BMP(s) that exemplify all functions for each type of riparian buffer or riparian forest buffer. In addition, a description of how each pertinent function is being implemented through the project should be included in a post construction stormwater narrative. For projects located within 150 feet of an existing riparian forest buffer, applicants should reference the items listed in “Functions and Benefits of Riparian Forest Buffers” as found on pages 15-19 of DEP’s document *Riparian Forest Buffer Guidance* (394-5600-001) when writing the explanation of how the proposed BMP addresses the function that the buffer would have otherwise provided if it was not disturbed by the project.

Utilizing the buffer as a BMP is desirable. Choosing to disturb only a portion of the buffer and sending flow during storm events up to and including the 2-year/24-hour storm to the buffer can be utilized as part of the equivalency demonstration. However, a minimum distance of 100 feet between the entry of the stormwater into the riparian buffer (up-gradient of the riparian buffer and as sheet or shallow concentrated flow) and receiving waters is required to use the efficiencies in BMP 6.7.1: Riparian Buffer Restoration of the *Pennsylvania Stormwater Manual*.

Whether the demonstration is for a riparian buffer or riparian forest buffer; a stream analysis inclusive of the above and supported by site reconnaissance, should take into account the various characteristics of the stream and watershed including, but not limited to: stream order, stream slope, stream designation, current condition (i.e. impaired, eroded, etc.), watershed imperviousness, watershed infrastructure (i.e. dams, reservoirs, quarry pits, etc.) and existing and/or proposed discharge points. Proposals to use alternate criteria may be subject to additional evaluation during the permit review and must demonstrate their effectiveness through appropriate analysis. The burden of proof will be on the applicant.

4. MONITORING, INSPECTION AND REPORTING

Monitoring, inspection and reporting requirements remain as found in Chapter 102 at §§ 102.4(b)(5)(x), 102.8(f)(10), 102.8(k) and 102.8(m) and in DEP’s *Riparian Forest Buffer Guidance* (394-5600-001), if applicable. Additionally, monitoring, inspection and reporting requirements will also be found, if approved, in the conditions of the NPDES Permit, Part A - Effluent Limitations, Monitoring, and Reporting Requirements and Part C - Other Conditions.

5. APPENDIX A

An example of the water quality component which should be included in the equivalency demonstration.

Worksheet 14 – Water Quality Analysis of Pollutant Loading from Disturbance in Buffer Area

Total Disturbed Area (AC)	2
Disturbed Area Controlled by BMPs (AC)	2

Existing Condition

Land Cover Classification	Pollutant			Cover (Acres)	Runoff Volume (AF)	Pollutant Load		
	TSS EMC (mg/l)	TP EMC (mg/l)	Nitrate-Nitrite EMC (mg/l as N)			TSS** (LBS)	TP** (LBS)	NO ₃ (LBS)
Forest	39	0.15	0.17	2	0.1574	16.58	0.07	0.07
Meadow	47	0.19	0.3					
TOTAL LOAD						16.58	0.07	0.07

Post-Development

Land Cover Classification	Pollutant			Cover (Acres)	Runoff Volume (AF)	Pollutant Load		
	TSS EMC (mg/l)	TP EMC (mg/l)	Nitrate-Nitrite EMC (mg/l as N)			TSS** (LBS)	TP** (LBS)	NO ₃ (LBS)
Pervious Surfaces	Forest	39	0.15	0.17				
	Meadow	47	0.19	0.3				
	Fertilized Planting Area	55	1.34	0.73				
	Native Planting Area	55	0.40	0.33				
	Lawn, Low-Input	180	0.40	0.44				
	Lawn, High-Input	180	2.22	1.46				
	Golf Course Fairway/Green	305	1.07	1.84				
	Grassed Athletic Field	200	1.07	1.01				
Impervious Surfaces	Rooftop	21	0.13	0.32				
	High Traffic Street/Highway	261	0.40	0.83				
	Medium Traffic Street	113	0.33	0.58				
	Low Traffic/Residential Street	86	0.36	0.47				
	Res. Driveway, Play Courts, etc.	60	0.46	0.47				
	High Traffic Parking Lot	120	0.39	0.60				
	Low Traffic Parking Lot	58	0.15	0.39	2	0.48	75.89	0.20
TOTAL LOAD						75.89	0.20	0.51
Pollutant Load increase (LBS) =						59.31	0.13	0.44

Pollutant Load increase (LBS) = Post development load – Pre-development load

*Pollutant Load = [EMC, mg/l] X [Volume, AF] X [2.7, Unit Conversion]

Worksheet 15 – Pollutant Reduction Through BMP Applications*

*Fill this worksheet out for each BMP type with different pollutant removal efficiencies. Sum pollutant reduction achieved for all BMP types on final sheet.

BMP Type: Capture & Reuse

Disturbed Area Controlled by this BMPs (AC)	2
---	---

Disturbed Area Controlled by this BMPs:

	Land Cover Classification	Pollutant			Cover (Acres)	Runoff Volume (AF)	Pollutant Load**		
		TSS EMC (mg/l)	TP EMC (mg/l)	Nitrate-Nitrite EMC (mg/l as N)			TSS** (LBS)	TP** (LBS)	NO ₃ (LBS)
Pervious Surfaces	Forest	39	0.15	0.17					
	Meadow	47	0.19	0.3					
	Fertilized Planting Area	55	1.34	0.73					
	Native Planting Area	55	0.40	0.33					
	Lawn, Low-Input	180	0.40	0.44					
	Lawn, High-Input	180	2.22	1.46					
	Golf Course Fairway/Green	305	1.07	1.84					
	Grassed Athletic Field	200	1.07	1.01					
Impervious Surfaces	Rooftop	21	0.13	0.32					
	High Traffic Street/Highway	261	0.40	0.83					
	Medium Traffic Street	113	0.33	0.58					
	Low Traffic/Residential Street	86	0.36	0.47					
	Res. Driveway, Play Courts, etc.	60	0.46	0.47					
	High Traffic Parking Lot	120	0.39	0.60					
	Low Traffic Parking Lot	58	0.15	0.39	2	0.48	75.89	0.20	0.51
	TOTAL LOAD TO THIS BMP TYPE							75.89	0.20
POLLUTANT REMOVAL EFFICIENCIES FROM APPENDIX A. STORMWATER MANUAL (%)							100	100	100
POLLUTANT REDUCTION ACHIEVED BY THIS BMP TYPE (LBS)							75.89	0.20	0.51
POLLUTANT REDUCTION ACHIEVED BY ALL BMP TYPES (LBS)							75.89	0.20	0.51
REQUIRED REDUCTION from WS 14 (LBS)							59.31	0.13	0.44

*Pollutant Load = [EMC, mg/l] X [Volume, AF] X [2.7, Unit Conversion]

Checklist for Functional Equivalency of Riparian Buffers and Riparian Forest Buffers

	Riparian Buffer	Riparian Forest Buffer
Filtration of pollutants in runoff	<input type="checkbox"/>	<input type="checkbox"/>
Infiltration and maintenance of streamflow	<input type="checkbox"/>	<input type="checkbox"/>
Water quality maintenance	<input type="checkbox"/>	<input type="checkbox"/>
Habitat for wildlife and vegetation	<input type="checkbox"/>	<input type="checkbox"/>
Flood attenuation	<input type="checkbox"/>	<input type="checkbox"/>
Light control and water temperature moderation	<input type="checkbox"/>	<input type="checkbox"/>
Travel corridors for migration and dispersal	<input type="checkbox"/>	<input type="checkbox"/>
Ice damage control	<input type="checkbox"/>	<input type="checkbox"/>
Stream width		<input type="checkbox"/>
Food supply		<input type="checkbox"/>
Wood debris input		<input type="checkbox"/>
Support of aquatic food chains and webs as they relate to terrestrial food webs		<input type="checkbox"/>
Channel and shoreline stability/decrease in erosion		<input type="checkbox"/>
Reduced effects of storm events		<input type="checkbox"/>
Instream pollutant processing		<input type="checkbox"/>