

ORDINANCE 2020-03

AN ORDINANCE AMENDING THE RIPARIAN BUFFER OVERLAY ZONING DISTRICT OF HALFMOON TOWNSHIP, CENTRE COUNTY, PENNSYLVANIA

WHEREAS, the Township of Halfmoon, through its Board of Supervisors; under the authority of Article 1, Section 27 of the Pennsylvania Constitution, and the Act of 1968, P.L. 805, No. 247, as reenacted and amended, and may be cited as the Municipalities Planning Code as amended, other Commonwealth and Federal statutes, and in recognition of the fact that natural features contribute to the welfare of its residents; and

WHEREAS, the Township of Halfmoon previously adopted and enacted riparian buffer regulations to provide reasonable control governing the restoration, conservation, disturbance, and management of existing/new riparian corridors through the establishment of the Riparian Buffer Overlay Zoning District (RBOD) via Ordinance 6 of 2008 on December 11, 2008; and

WHEREAS, the Township of Halfmoon previously adopted and enacted a Zoning Ordinance, which Ordinance, as amended from time to time, is codified as Section 255-1, et seq., of the Halfmoon Township Code of Ordinances; and

NOW THEREFORE, the Township of Halfmoon, Centre County, Pennsylvania does amend the regulations for the restoration, conservations, disturbance, and management of existing/new riparian corridors by amending Chapter 255, Article IX, Riparian Buffer Overlay Zoning District (RBOD) in its entirety, as well as updating Section 255-7 (B), Definitions, regarding Riparian Buffer Overlay Zoning District, as follows:

§255-7 Definitions

RIPARIAN BUFFER OVERLAY ZONING DISTRICT

That are which borders any body of water on either or all side(s) from defined edges and which is 50 feet perpendicular to those defined edges as shown on the Official Zoning Map and/or, if applicable, the Official Map.

§255-37 Statement of Intent

- A. Halfmoon Township as to the adoption of this article does not grant public access to private property. Any grant of public access remains the prerogative of each individual property owner. This article shall apply to all subdivision plans, land development plans, redevelopment of existing properties, or any other improvements that require plan submission and/or zoning permits if they are within or abut an identified Riparian Buffer Overlay Zoning District.
- B. Any riparian buffer preservation and maintenance shall remain the sole responsibility of the property owner.
- C. The specific purposes and intent of this article are to:
 - 1. Conserve the natural features important to land and water resources (e.g., headwater areas, groundwater recharge zones, floodways, floodplains, springs, streams, wetlands, woodlands, and prime wildlife habitats).
 - 2. Work with floodplain, steep slope, and other municipal ordinances that regulate environmental sensitive areas to minimize hazards to life, property, and riparian features.
 - 3. Conserve natural, scenic, and recreation areas within or adjacent to riparian areas.

4. Reduce the amount of nutrients, sediment, organic matter, pesticides, and other harmful substances that reach watercourses, wetlands, groundwater aquifers, and surface water bodies by using scientifically proven processes, including filtration, deposition, absorption, adsorption, plant uptake, denitrification, and stabilization. Further, to minimize concentrated flows through the use of level spreaders and/or similar stormwater management devices used to disburse concentrated flow uniformly over the ground as sheet flow.
5. Improve and maintain the safety, reliability, and adequacy of the Centre Region's water supply for domestic, agricultural, commercial, industrial, and recreational uses, and sustain diverse populations of aquatic plants and animals.
6. Regulate the land use, siting, and engineering of all developments to be consistent with the intent and objectives of this chapter and accepted conservations practices, as well assure that the results of such uses remain within the carrying capacity of existing natural resources.
7. Assist in the implementation of pertinent state laws concerning erosion and sediment control practices, specifically Erosion Control, of the Pennsylvania Clean Streams Law, P.L. 1987, Act 394 of 1937, as amended (35 P.S. Section 691.1, et seq.), and any subsequent amendments thereto, as administered by the Pennsylvania Department of Environmental Protection (See 25 Pa. Code Chapter 102) and the Centre County Conservation District.

§255-38 Chesapeake Bay Tributary Strategy, Goals, and Objectives.

- A. In order for Pennsylvania to meet the goals of the Chesapeake Bay Tributary Strategy, communities located within this drainage area will need to implement best management practices (BMPs) to address point and nonpoint pollution sources; riparian buffers are one of the BMPs that will help the Centre Region meet these goals;
- B. The Centre Region is fortunate to contain high quality waterways which make significant contributions to our environment and quality of life; and
- C. Recent events have stressed the importance of local efforts to maintain and protect the Centre Region's waterways; and
- D. The Pennsylvania Department of Environmental Protection is moving forward with the implementation of the Chesapeake Bay tributary strategy which established aggressive goals for reductions in the amount of sediments and nutrients such as nitrogen and phosphorus;
- E. Our local streams contribute to the Susquehanna River drainage area and ultimately the Chesapeake Bay; and
- F. The potential exists for the Pennsylvania Department of Environmental Protection to establish maximum daily load regulations in order to prevent further increased sediment and nutrient loading to our waterways; and
- G. If local measures such as riparian buffers areas are not evaluated and implemented to reduce loadings to our streams, the community's environmental well-being could be permanently threatened; and
- H. Halfmoon Township is located at the top of the watershed and since there are no upstream communities discharging nutrients and sediments to our local waterways, the protection and preservation of water resources rests on Halfmoon Township; and
- I. These point to the need for a more coordinated effort at the local municipal level to protect our streams and waterways; and

- J. The Centre Region municipalities have evaluated and taken the opportunity to pursue the following riparian buffer measures that will help to ensure the future health of our valuable water resources. The implementation of a regional riparian buffer program is an important step in cooperative water management efforts.

§255-39 Establishment; Width Determination; Applicability; Interpretation.

A. Riparian Buffer Overlay Zoning District Establishment.

The establishment of a Riparian Buffer Overlay Zoning District applies to the following areas which shall be identified on the Municipal Official Zoning Map, and if applicable, the Halfmoon Township Official Map:

1. Lands adjacent to designated streams within Halfmoon Township.
2. Lands adjacent to designated intermittent watercourses within Halfmoon Township.
3. Lands at the margins of municipal, state, or federally designated lakes and wetlands or those encountered during the process of subdivision and land development.

B. Width determination.

The measurement of the Riparian Buffer Overlay Zoning District shall extend a minimum total width of fifty (50) feet from each defined upper edge of an identified intermittent, perennial, or surface water body at the top of bank, or shall equal the extent of the one hundred (100) year floodplain, whichever is greater.

1. The overlay district will consist of one distinct zone designated as:
 - a) Riparian Buffer Zone: This zone will begin at the edge of an identified waterway (which shall include wetlands and intermittent watercourses) and occupy a margin of land with a minimum width of fifty (50) feet measured horizontally on a line perpendicular to the edge of water at bank full flow. The width of Zone One may be required to extend beyond the minimum fifty (50) feet depending upon existing topography, woodlands, or other natural conditions. This determination will be made by the Zoning Officer with assistance from the Township Engineer.
2. Isolated wetlands and water bodies. Wetlands and waterbodies not located along a stream, where the wetland or waterbody is greater than five thousand (5,000) square feet in area, shall have a minimum buffer width of fifty (50) feet from the outer edge of the wetland or waterbody around the entire perimeter.

C. Applicability.

The provisions of this article shall apply as follows:

1. The developer/applicant shall be responsible for the initial determination of the riparian buffer and identifying this area on any plan that is submitted to Halfmoon Township for the following:
 - a) Subdivision, land development, or redevelopment
 - b) Any other improvements that require a zoning and building permit for activities within the Riparian Buffer Overlay Zoning District
2. No new structures are permitted to be built within the Riparian Buffer Overlay Zone of Halfmoon Township.
3. The initial determination of the developer/applicant shall be subject to review and approval by the Zoning Officer
4. These requirements should not apply to the footprints of all existing primary or accessory uses, including but not limited to all agricultural uses and research related thereto, buildings, transportation facilities, fences, lawns, gardens, utility lines, roads, driveways, sidewalks, bikeways, decks, piers, water service, septic and sewage facilities and there related appurtenances (well houses, utility pumps and lift stations, manholes, etc.).

D. Interpretation of provisions.

In interpreting the language of the Riparian Buffer Overlay District and the extent of underlying zoning district regulations upon use of property, where doubt exists between regulations, the stricter regulation shall govern. Any challenges to any municipal interpretation shall be appealed in accordance with the requirements outlined in §255-44, Boundary interpretation and appeals procedure, and Article XVLL, Zoning Hearing Board, and other administrative proceedings of the Municipalities Planning Code (MPC), Act 247, 53 P.S. §10101, et seq., as amended.

§255-40 Uses permitted.

The following uses are permitted, either by right or as a conditional use, in the Riparian Buffer Overlay Zoning District. In addition, all uses permitted within the Riparian Buffer Overlay Zoning District must also be permitted, whether by right or through conditional use, within the underlying zoning district. However, within any riparian buffer, no construction, development, use, activity, or encroachment shall be permitted unless the activity is authorized by Halfmoon Township.

A. Riparian Buffer Zone.

1. Uses permitted by right. Uses that are primarily passive in character shall be permitted to extend in the area defined as the Riparian Buffer Zone, including:
 - a) Agricultural uses.
 - b) Forestry uses with a Centre County Conservation District approved erosion and sedimentation control plan and in accordance with the Best Management Practices for forestry found in the Pennsylvania Department of Environmental Protection's Chapter 93, Water Quality Standards.
 - c) Removal of trees where such removal is necessary as a means to eliminate dead, diseased, or hazardous stands of trees that jeopardize public safety, provided that such removal is compliance with the recommendations of Section 1500.9 and in Appendix C, Riparian Buffer Management, and in accordance with the Best Management Practices for Forestry found in Chapter 93 of the Pennsylvania Department of Environmental Protection's water quality standards.
 - d) Required yards. All of the required front, side, or rear yards on any private lots may be permitted to be within the Township designated Riparian Buffer Overlay District.
 - e) Wildlife sanctuaries, nature preserves, forest preserves, fishing areas, passive areas of public and private parklands, native planting, and reforestation in compliance with the recommendations of §255-42 and Appendix C, Riparian Buffer Management.
 - f) Stream bank stabilization and/or recommended native tree reforestation, in compliance with the recommendations of §255-42 and Appendix C, Riparian Buffer Management.
 - g) Stream crossings for farm vehicles and/or livestock if part of a federal, state or privately funded, Centre County Conservation District and/or local nonprofit riparian buffer improvement project.
 - h) Research and monitoring devices, such as staff gages, water recording, water quality testing, cross vanes, weirs and related demonstration facilities.
2. Uses permitted by conditional use:
 - a) New stream crossings for roads, railroads, centralized sewer and/or water lines, and public utility transmission lines and/or their related appurtenances (e.g., towers, well houses, pump and lift stations), provided that they: designed and installed in accordance with the stream crossing standards of §255-42.

§255-41 Management.

- A. Riparian buffer management. No development activities shall be permitted within the Riparian Buffer Overlay Zoning District unless specifically permitted with §255-40 of the chapter or as follows:
1. Subdivision and land development. Within any identified Riparian Buffer Overlay Zoning District, subdivision, land development, redevelopment shall only be permitted when the impacts of such actions are mitigated at a 1:1 square foot replacement ratio. Any disturbance shall follow the guidelines for improvements identified in this section, Appendix C, Riparian Buffer Management, and are to be graphically represented along with any required buffers on any formal subdivision or land development plan submission(s).
 2. Zoning and building permits. For any other improvements that require a zoning and/or building permit for activities within the Riparian Buffer Overlay Zoning District, riparian buffer replacement or restoration is recommended to be mitigated at 1:1 square foot replacement ratio for any disturbance and shall follow the guidelines for restoration improvements identified in this section and Appendix C, Riparian Buffer Management.
 3. Any riparian buffer replacement or restoration should be evaluated for the effects of any proposed uses on the Riparian Buffer Overlay Zoning District. Any mitigation should identify the existing conditions (vegetation, floodplain, wetlands, soils, slopes, etc.), all proposed activities, and if applicable, any proposed management techniques, including any measures necessary to offset disturbances to land within the Riparian Buffer Overlay Zoning District.
- B. Vegetation selection.
1. To function properly, dominant native vegetation in the riparian buffer should be selected from the list of native plants most suited to riparian areas as outlined in Appendix D, Selective Native Riparian Buffer Plantings List, Morris Arboretum of the University of Pennsylvania. Plants not included on this list may also be permitted by the Zoning Officer with assistance of the Township Engineer. The Township may also require planting species suitability to be verified by local qualified experts at the U.S. Fish and Wildlife Service, the Natural Resource Conservation Service, the Centre County Conservation District, the Pennsylvania State Cooperative Extension, ClearWater Conservancy, or other state and federal forest agencies.
 2. As part of riparian buffer restoration, all plants listed as noxious by the USDA shall be removed. Property owners and developers should ensure that invasive species are contained so as to not adversely impact any native species planted and protected as part of any required riparian buffer restoration. Refer to Appendix D, E, and F.
 3. For maximum effect, the riparian buffer should be composed of three layers of vegetation or more:
 - a) Canopy and understory trees to form a tree canopy;
 - b) Shrubs to support a dense, healthy, and diverse understory; and
 - c) Grasses, sedges, flowering perennials, and other groundcover.
 4. General recommendations for riparian buffer plantings. Canopy and understory trees should be two (2) inches in caliper in width, diameter at fifty-four (54) inches above the root collar, a minimum of eight (8) feet tall at planting. Canopy trees should be planted a minimum of twenty (20) to twenty-five (25) feet on center in staggered rows and understory trees should be planted a minimum of fifteen (15) feet on center, also in staggered rows. Shrubs should be planted in between canopy and understory trees at a minimum distance of between three to five feet apart. Grasses, sedges, flowering plants, and groundcovers should be planted one to three feet apart.
 5. Areas that cannot be revegetated shall be restored in compliance with the Township Engineer's recommendations.

§255-42 Stream Crossing Standards.

A. Criteria

1. All stream crossings permitted under §255-40-A(1) and §255-40-A(2), permitted and conditional uses and/or associated with the optional use of Appendix G. Riparian Buffer Averaging Option,

Example and Calculation, shall comply with and incorporate, as required, the following minimum standards:

- a) Any stream crossings requiring any activity in, under, and/or above any body of water should first consult the Pennsylvania Department of Environmental Protection's North-Central Regional Office, Watershed Management Permitting and Technical Services Section, at (570) 327-3636.
- b) The width of any right-of-way should not be greater than the minimum right-of-way width required by Chapter 215, Subdivision and Land Development, of the Code of the Township of Halfmoon, unless additional right-of-way is offered for dedication.
- c) Stream crossings should be designed to cross at direct right angles to minimize any disturbance.
- d) Stream crossings should be separated by a minimum of one thousand (1,000) feet stream length on the same property.
- e) Bridges and culverts constructed as part of any road intended to be dedicated to the Township must be designed in accordance with applicable Federal and State bridge standards in place at the time of design. Prior to design, the developer must meet with the Township Engineer to establish the design criteria that must be followed. For private roads the bridge or culvert must be designed to carry the anticipated loading which must include emergency vehicles. Drawings and calculations sealed by a qualified professional must be submitted to the Township for review.

§255-43 Nonconforming structures and uses.

All nonconforming structures and uses will continue to be permitted in accordance with nonconforming provision so noted in Article XII.

§255-44 Boundary interpretation and appeals procedure.

- A. When a landowner or applicant disputes the riparian buffer zone boundary or the defined edge of a watercourse, surface water body, or wetland, the landowner or applicant shall submit evidence to Halfmoon Township that describes the boundary, presents the landowner or applicant's proposed boundary, and presents all justification for the proposed boundary change.
- B. The Zoning Officer, with assistance of the Township Engineer, shall evaluate all material submitted and shall make a written determination within 45 days.
- C. Any party aggrieved by any such determination or other decision under this section may appeal to the Zoning Hearing Board under the provisions of Article XVII. The party contesting the location of the district boundary shall have the burden of proof in the case of any such appeal.

§255-45 Inspection.

- A. Lands within or adjacent to the identified Riparian Buffer Overlay Zoning District will be inspected by the Zoning Officer and Township Engineer when:
 - 1. A subdivision or land development plan is submitted.
 - 2. A zoning and/or building permit is requested, if applicable.
- B. The Riparian Buffer Overlay Zoning District may also be inspected periodically by the Zoning Officer and/or Township Engineer for compliance with any required riparian buffer restoration in accordance with recommendations for improvement identified in §255-41 and Appendix C, Riparian Buffer Management,

and when excessive or potentially problematic erosion, sedimentation, hazardous trees, or an unauthorized activity or structure is brought to the attention of the Township.

- APPENDIX A:** Halfmoon Township Riparian Buffer Overlay Zoning District Map
APPENDIX B: Hold for Future Use
APPENDIX C: Riparian Buffer Management Plan
APPENDIX D: Selective Native Buffer Plants List
APPENDIX E: Invasive Plants of Pennsylvania
APPENDIX F: Noxious Weed Control List of Pennsylvania
APPENDIX G: Riparian Buffer Averaging Options, Example and Calculations

ENACTED AND ORDAINED by the Board of Supervisors of Halfmoon Township this 9th day of July 2020, at a meeting duly and legally held at which a quorum was present.

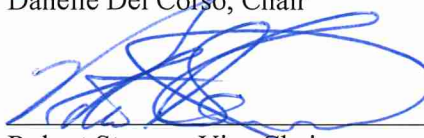
ATTEST:

[SEAL]


Denise Gembusia, Secretary


**TOWNSHIP OF HALFMOON
BOARD OF SUPERVISORS:**


Danelle Del Corso, Chair


Robert Strouse, Vice Chair


Patricia Hartle


David Piper


Charles Beck

ZONING

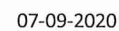
255 Attachment 9

Township of Halfmoon

Riparian Buffer Overlay

Zone Appendices

Halfmoon Township Riparian Buffer Overlay Zoning District Map



ZONING

Appendix B

Hold for Future Use

Appendix C
Riparian Buffer Management Plan

Riparian buffer management is essential for ensuring a healthy and successful riparian corridor environment. While wooded riparian corridors provide the greatest water quality benefits, there are other management alternatives that contribute to water quality. Therefore, the goal of buffer management in either small or large applications shall balance the intent of the riparian buffer with a site's existing conditions and the landowner or developer's desire for the property. When completed, applicable riparian buffer restoration shall clearly define the landowner's goals for the riparian buffer and what specific actions will be taken to achieve those goals. For example, the landowner may intend to allow an existing meadow to revert to a woodland over 20 years. To ensure this happens, specific management techniques will need to be implemented. Similarly, if the effectiveness of a portion of the riparian buffer is reduced, mitigation measures will need to be identified that will offset the disturbance at a ratio of 1:1 restoration for each square foot of riparian buffer impact. Restoration shall clearly define what actions will need to be taken to fulfill any specific goals and objective, and who is responsible for implementing and maintaining them.

Anyone proposing formal subdivision, land development or redevelopment (or any other property improvements that require any plan submission or need for permit) within the riparian buffer shall both graphically show the required riparian buffer area on any plans and then restore any areas that may be impacted within the defined riparian buffer. Individual or smaller landowners with no plans for subdivision or land development while recommended to also do riparian buffer restoration, are encouraged to do so on a more informal and voluntary basis not requiring any form plan submission and review at the municipal level.



A portion of this meadow has been managed to allow for natural succession

Formal subdivision, land development or redevelopment (or any other property improvements that require any plan submission or need for permit) shall include scaled drawings, details, explanatory text and shall be prepared by a Pennsylvania licensed landscape architect, engineer, or other qualified professional. These plans

shall be submitted and approved as part of any normal municipal subdivision and/or land development review process. Riparian buffer restoration shall include the following four elements when formal subdivision, land development or redevelopment is involved.

Section I: Existing Conditions

The boundaries of the riparian buffer at a minimum shall be graphically represented and existing environmental conditions (such as five-foot contours, steep slopes, swales and other drainage features highlighted, wetlands, floodplains, woodlands and other vegetation, and any existing structures). A written description of unusual or other "site specific" significant conditions should also be included, if applicable.

Section II: Goals

The landowner's goals for the entire property should consider the intent of the Riparian Buffer Overlay Zoning District. For example, the goal of the riparian buffer may be to just preserve existing tree canopy, woodland with little or no disturbance and to convert an existing pasture into a wildflower meadow. The goals outside the Riparian Buffer Zone may be to construct a house and a barn. For those riparian areas that include improvements, there should be a narrative of how any disturbance to the riparian buffer will be mitigated and offset with the applicant's proposed riparian buffer improvements and restoration.

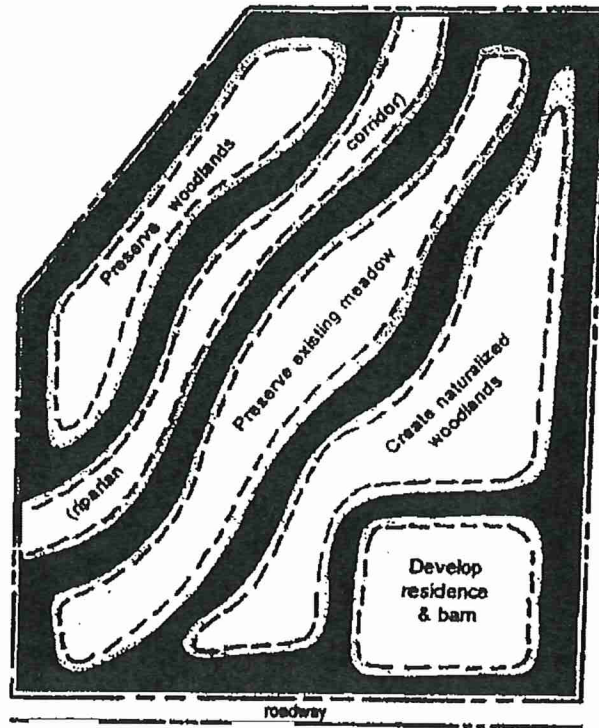
Section III: Proposed Activities

A scaled drawing and a discussion of all development activities proposed for land in the riparian buffer zone and land directly adjacent to the riparian buffer should be provided. Any plans shall clearly show the areas that will be disturbed and those which will be protected and preserved. Any plans shall identify which proposed activities are permitted by right, which will require any conditional use approval(s), and which will require mitigation and restoration measures as a result of the actions proposed and/or activities planned in the Riparian Buffer Overlay Zoning District.

Section IV: Management

The final section of the riparian buffer management shall include a discussion of how the goals identified in Section II will be met, given the proposed activities from Section III. Any plans shall be very specific in terms of when the construction, planting, or other activities are to begin and end and shall address long and short-term maintenance and improvement activities necessary for preservation of the riparian buffer.

Details for management measures for existing vegetation could include application of herbicides, identification of invasive and noxious plants to be removed, number/species of native stock to be planted, and spacing required for newly planted species. All other activities necessary to reach the goals stated in the schematic plan should be referenced. These may include moving schedules, farming practices, other plantings, renovations to structures, and all other related functions.



Riparian Buffer Management shall include a schematic plan that illustrates the landowner's goals for the riparian buffer.

There are some basic guidelines both large and small landowners should consider prior to deciding how to manage their riparian buffer areas. They are as follows:

- If possible, maintain and provide three distinct layers of vegetation to protect stream resources. The three "layers" include trees that form an overhead canopy, shrubs that provide an understory and herbaceous plants that serve as groundcover. The three layers provide specific water quality benefits and a diversity of animal habitat and function.
- Maintaining land is one of the most expensive methods for managing land on a suburban property.
- Native Pennsylvania species are recommended to be used, since they will adapt the best to existing site conditions. Removing invasive species is also recommended.
- The creation of additional edges (berms, banks, walls, curbs) should be minimized, and a reduction in existing edges should be sought.
- The importance of continued maintenance of the riparian buffer should always be balanced with a landowner's financial resources.
- No concentrated stormwater flow should be introduced into the Riparian Buffer Overlay Zoning District unless that flow is minimized to the extent possible with a level spreader or similar stormwater best management practice structure or improvement.

ZONING

Appendix D Selective Native Buffer Plants List University of Pennsylvania, Morris Arboretum

NOTE: All riparian buffer plantings must be approved by Pennsylvania Department of Environmental Protection and the Department of Conservation of Natural Resources at the time of buffer restoration.

KEY:

- ☐, ☐, ☐ Full sun, light shade, shade
 OBL consistently wet or saturated soils (obligate in wetlands)
 FACW wet to moist soils (facultative wetland)
 FAC moist soils (facultative)
 FACO moist to dry soils (facultative upland)
 UPL dry soils (upland)

Common Name	Botanic Name	Flower	Bloom Time	Sunlight	Moisture	Notes
FERNS						
Cinnamon fern	Osmunda cinnamomea			☐-☐	FACW	Cinnamon-colored fertile fronds; moist acid soils
Interrupted fern	Osmunda claytoniana			☐-☐	FAC	Grows in clumps; distinctive fertile fronds. Common in woods, seeps, swamps and bogs
Sensitive fern	Onoclea sensibilis			☐-☐	FACW	Sunny or shaded swamps, marshes, moist meadows. Forms colonizing masses
GRASSES AND SEDGES						
Big blue stem	Andropogon gerardii		Aug-Sep	☐	FAC	Tall clump forming; streambanks and moist meadows
Broom sedge	Carex scoparia		Summer	☐	FACW	Moist open ground
False nut sedge	Cyperus strigosus		Summer	☐-☐	FACW	Moist fields, woods, swamps and streambanks
Lurid sedge	Carex lurida		Jun-Oct	☐	OBL	Common in swamps, wet meadows and bogs
Riverbank wild rye	Elymus riparius		July-Sep	☐	FACW	Alluvial flats, meadows and streambanks
Sedge	Carex vulpinoidea		Summer	☐	OBL	Swampy areas
Soft rush	Juncus effusus		Summer	☐	OBL	Swamps, moist fields and floodplains
Switch grass	Panicum virgatum		Aug-Sep	☐	FAC	Clump grass; can help to control erosion, sandy and river soils
Tussock sedge	Carex stricta		May-Aug	☐-☐	OBL	Forms a hummocky mound; swamps, streambanks and wet meadows
Virginia wild rye	Elymus virginicus		Jun-Sep	☐-☐	FACW	Moist woods, meadows, streambanks
Wool grass	Scirpus cyperinus		Jul-Sep	☐	FACW	Tall clump forming, wooly seed head. Marshes, moist meadows, swales and shorelines

Common Name	Botanic Name	Flower	Bloom Time	Sunlight	Moisture	Notes
FLOWERING PERENNIALS						
Beard-tongue	Penstemon digitalis	White	May-Jul	☐	FAC	Attracts hummingbirds; moist meadows
Bottle gentian	Gentiana andrewsii	Blue	Apr-Oct	☐-☐	FACW	Bottle-shaped flowers; moist meadow species
Blue vervain	Verbena hastata	Blue	Jun-Sep	☐-☐	UPL	Bright flowers; herbal uses; streambanks and most meadows
Blue-eyed grass	Sisyrinchium angustifolium	White	Jun-Jul	☐-☐	FACW	Tiny blue flowers above grassy foliage; dry to moist meadows and fields
Boneset	Eupatorium perfoliatum	White	Jul-Aug	☐-☐	FACW	Wet meadow species
Cardinal flower	Lobelia cardinalis	Scarlet	Jul-Sep	☐-☐	FACW	Long bloom time; attracts butterflies and hummingbirds; streambanks and pond margins
Cut-leaf coneflower	Rudbeckia laciniata	Yellow	Jul-Sep	☐-☐	FACW	Herbal uses; streambanks
Ironweed	Veronia noveboracensis	Purple	Aug-Sep	☐	FACW	Tall plant with brilliant late summer flowers
Jack-in-the-pulpit	Arisaema triphyllum	Green-purple	Apr-Jun	☐-☐	FACW	Unusual flower; bright red berries; moist woods, swamps and bogs
Joe-pye weed	Eupatorium fistulosum	Purple	Aug-Sep	☐	FACW	Attracts beneficial insects; herbal uses
New England aster	Aster novae-angliae	Purple	Aug-Oct	☐-☐	FACW	Showy and frequently cultivated — dry to moist meadows
Partridgeberry	Mitchella repens	White	Jun-Jul	☐-☐	FACU	Evergreen; ground cover; edible berry; moist woods
Purple stemmed aster	Aster puniceus	Blue	Aug-Sep	☐-☐	OBL	Does well in moist meadows; deep green foliage
Smooth goldenrod	Solidago gigantea	Yellow	Jul-Nov	☐-☐	FACW	Tall; purplish stem with smooth leaves; dry to moist fields
Swamp milkweed	Asclepias incarnata	Rose	July-Aug	☐	OBL	Attracts butterflies; moist meadows
Tall meadowrue	Thalictrum pubescens	White	Jun-Jul	☐-☐	FACW	Tall plant with cloudy clusters of tiny flowers; bluish foliage; moist meadows and swales
Wingstem	Verbesina alternifolia	Yellow	Aug-Oct	☐	FAC	Moist riverbanks, shaded lowlands
Wood geranium	Geranium maculatum	Rose-pink	Apr-May	☐-☐	FACU	Woods and fields

Common Name	Botanic Name	Flower	Bloom Time	Sunlight	Moisture	Notes
SHRUBS						
American elderberry	Sambucus Canadensis	White	Jun-Jul	☐	FACW	Edible berries and flowers; multistemmed; very high wildlife value
Arrowwood	Viburnum dentatum	White	May	☐-☐	FAC	Dark blue fruits in fall, high wildlife value: streambanks, pastures
Black chokeberry	Aronia melanocarpa	White	Mar-Jul	☐	FAC	White flowers; black berries; tall color
Buttonbush	Cephalanthus occidentalis	White	Jun-Sep	☐	OBL	Multistemmed; tolerates inundation
Dangleberry	Gaylussacia frondosa	White	May	☐-☐	FAC	Edible fruits; high wildlife value; acid soils
Highbush blueberry	Vaccinium corymbosum	White	May-Jun	☐	FACW	Multistemmed; edible berries; fall color; very high wildlife value
Maleberry	Lyonia ligustrina	White	June	☐	FACW	Dry to wet woods and thickets; acid soils
Ninebark	Physocarpus opulifolius	White	May-Jul	☐-☐	FACW	Wet woods, sandy or rocky streambanks
Northern arrowwood	Viburnum recognitum	White	May	☐-☐	FACW	Dark blue fruits in fall; high wildlife value; streambanks, swamps, wet pastures
Pussy willow	Salix discolor	Yellow-green	April	☐	FACW	Swamps and wet woods
Red chokeberry	Aronia arbutifolia	White	May	☐	FACW	Red berries; high value for wildlife
Rosebay	Rhododendron maximum	Pink	Jun-Jul	☐	FAC	Showy flowers: evergreen; multistemmed; acid soils
Silky dogwood	Cornus anomum	White	May-Jul	☐	FACW	Flowers in summer; blue berries; multistemmed; very high wildlife value
Silky Willow	Salix sericea	Yellow-green	May	☐-☐	OBL	Good wildlife value; needs wet conditions
Spice bush	Lindera benzoin	Yellow	Mar-May	☐-☐	FACW	Bright red berries in fall; herbal uses; wildlife value
Swamp dogwood	Cornus racemosa	White	May-Jun	☐	FAC	Colonizer; high wildlife value
Swamp rose	Rosa palustris	Pink	May-Jun	☐	OBL	Showy and fragrant
Winterberry holly	Ilex verticillata	White	May-Jun	☐	FACW	Showy berries in winter; high wildlife value; good colonizing shrubs low streambanks
Witch-hazel	Hamamelis virginiana	Yellow	Sep-Nov	☐-☐	FAC	Bright yellow flowers fragrant; medicinal uses

Common Name	Botanic Name	Flower	Bloom Time	Sunlight	Moisture	Notes
TREES						
American beech	Fagus grandifolia	Yellow	Apr-May	☐-☐	FAC	Large tree with smooth gray bark; moist, but well-drained soils, high wildlife value
Basswood	Tilia Americana	Yellow	May-Jun	☐-☐	FACU	Flowers aromatic; with herbal uses
Black ash	Fraxinus nigra	Purple	April	☐-☐	FACW	Large tree in wet woods and bottomlands
Black gum	Nyssa sylvatica	Green-white	Apr-May	☐-☐	FAC	Tall tree with outstanding fall color; high wildlife value
Black walnut	Juglans nigra	Yellow	May-Jun	☐	FACU	Fast growing tall tree; high wildlife value
Black Willow	Salix nigra	Yellow	Apr-May	☐	FACW	Catkins in spring, very fast grower
Green ash	Fraxinus pennsylvanica	Purple	Apr-May	☐	FACW	Fast growth; good fall color
Hornbeam	Carpinus caroliniana	Red	Apr-May	☐-☐	FAC	Small tree with sinuous gray bark; moist woods
Pagoda dogwood	Cornus alternifolia	White	May-Jun	☐	FAC	Small tree for moist woods and shaded ravines; dark blue fruit
Pin oak	Quercus palustris	Yellow	Apr-May	☐	FACW	Ornamental street tree; fall color; very high wildlife value
Red maple	Acer rubrum	Red	Mar-Apr	☐-☐	FAC	Adapts to range of moisture conditions; good fall color
River birch	Betula nigra	Yellow-green	May	☐-☐	FACW	Notable for its peeling bark; floodplains, streambanks, wet woods and swamps
Shadbush	Amelanchier arborea	White	Apr	☐	FAC	Small tree with early spring flowers; delicious edible berries in summer
Shagbark hickory	Carya ovata	Yellow	May	☐-☐	FAC	Shaggy gray exfoliating bark; very high wildlife value
Silver maple	Acer saccharinum	Yellow-red	Apr-May	☐-☐	FACW	Moist woods, streambanks, alluvial soils
Swamp white oak	Quercus bicolor	Yellow	May	☐	FACW	Large tree with very high wildlife value; good wetland oak
Sweet birch	Betula lenta	Yellow-green	May	☐-☐	FACU	Wintergreen scented bark and foliage; streambanks and woodlands
Sycamore	Platanus occidentalis	Yellow	April	☐	FACW	Large tree with showy mottled bark; riverbanks, floodplains and alluvial soils
Tulip tree	Liriodendron tulipifera	Yellow	May-Jun	☐-☐	FAC	Large tree with green/orange flowers; fast growth; moist, but well-drained soils

ZONING

Appendix E Invasive Plants of Pennsylvania

Invasive plants displace naturally occurring native vegetation and, in the process, upset nature's balance and diversity. Invasive plants share the following common characteristics:

- Rapid growth and prolific reproductive capabilities
- Highly successful seed dispersal, germination, and colonization processes
- Rampant spreading that takes over native species
- Very costly to control

In general, aggressive, nonnative plants have no enemies or controls to limit their spread. If any of the following species are found in any designed stream buffer areas required to be restored and replanted in accordance with a municipality approved riparian buffer management plan, they are recommended to be removed and should never be planted within a defined stream buffer zone. These invasive plant species are:

Botanic Name	Common Name
TREES	
<i>Acer ginnala</i>	Amur maple
<i>Acer platanoides</i>	Norway maple
<i>Acer pseudoplatanus</i>	Sycamore maple
<i>Alnus glutinosa</i>	European black alder
<i>Ailanthus altissima</i>	Tree-of-heaven
<i>Albizia julibrissin</i>	Mimosa
<i>Aralia elata</i>	Japanese angelica tree
<i>Broussonetia papyfera</i>	Paper mulberry
<i>Morus alba</i>	White mulberry
<i>Paulownia tomentosa</i>	Princess-tree, Empress-tree
<i>Phellodendron amurense</i> , <i>P. japonicum</i> , <i>P. lavalleyi</i>	Cork tree
<i>Pyrus calleryana</i>	Callery or Bradford pear
<i>Tetra dium daniellii</i>	Bee-bee tree
<i>Ulmus pumila</i>	Siberian elm
SHRUBS	
<i>Berberis vulgaris</i> and <i>B. thunbergii</i>	European and Japanese barberries
<i>Buddleja davidii</i>	Butterfly bush
<i>Elaeagnus angustifolia</i> and <i>E. umbellata</i>	Russian olive and Autumn olive
<i>Euonymus alatus</i>	Winged euonymus or Burning bush
<i>Lespedeza cuneata</i> and <i>L. bicolor</i>	Chinese and Shrubby bushclovers
<i>Ligustrum</i> species	Privets
<i>Lonicera</i> species (5)	Shrub honeysuckles
<i>Rhamnus cathartica</i> and <i>R. frangula</i>	Common buckthorn and Glossy buckthorn
<i>Rhodotyposcandens</i>	Jetbead
<i>Rosa multiflora</i>	Multiflora Rose
<i>Rubus phoenicolasius</i>	Wineberry
<i>Spiraea japonica</i>	Japanese spiraea
<i>Viburnum plicatum</i> , <i>V. dilatum</i> , <i>V. sieboldii</i>	Doublefile viburnum, Linden viburnum, Siebold viburnum
<i>Viburnum opulus</i>	Guelder rose

VINES	
<i>Akebia quinata</i>	Chocolate Vine
<i>Ampelopsis revidpedunculata</i>	Porcelain-berry
<i>Celastrus orbiculatus</i>	Oriental bittersweet
<i>Euonymus fortune</i>	Wintercreeper
<i>Hedera helix</i>	English ivy
<i>Humulus japonicus</i>	Japanese hops
<i>Lonicera japonica</i>	Japanese honeysuckle
<i>Persicaria perfoliate</i>	Mile-a-minute weed
<i>Pueraria lobate</i>	Kudzu
<i>Vinca minor</i> and <i>V. major</i>	Common and Bigleaf periwinkle
<i>Vincetoxicum nigrum</i> and <i>V. rossicum</i>	Black and Pale swallowwort
<i>Wisteria sinensis</i> and <i>W. floribunda</i>	Chinese and Japanese wisteria
GRASSES	
<i>Anthraxon hispidus</i>	Small carpetgrass
<i>Bromus tectorum</i> and <i>B. sterilis</i>	Cheatgrass and Poverty brome
<i>Holcus lanatus</i>	Common velvet grass
<i>Microstegium vimineum</i>	Japanese stiltgrass
<i>Oplismenus undulatifolius</i>	Wavyleaf Basketgrass
<i>Phalaris arundinacea</i>	Reed canary grass
<i>Phragmites australis</i>	Common reed
<i>Phyllostachys aurea</i>	Golden bamboo
<i>Poa trivialis</i>	Rough bluegrass
<i>Saccharum ravennae</i>	Ravenna grass
<i>Schedonorus arundinaceus</i>	Tall fescue
<i>Sorghum bicolor</i>	Shattercane
<i>Sorghum halepense</i>	Johnsongrass
HERBS	
<i>Aegopodium podagraria</i>	Goutweed
<i>Alliaria petiolate</i>	Garlic-mustard
<i>Anthriscus sylvestris</i>	Wild chervil
<i>Cardamine impatiens</i>	Narrowleaf bittercress
<i>Carduus nutans</i>	Musk thistle
<i>Centaurea nigra</i> , <i>C. jacea</i> , <i>C. stoebe</i> , <i>C. micranthos</i>	Black, Brown, and Spotted knapweeds
<i>Chelidonium majus</i>	Greater celandine
<i>Cirsium arvense</i>	Canada thistle
<i>Cirsium vulgare</i>	Bull thistle
<i>Conium maculatum</i>	Poison hemlock
<i>Coronilla varia</i>	Crown-vetch
<i>Datura stramonium</i>	Jimsonweed
<i>Epilobium parviflorum</i>	Smallflower and hairy willow herb
<i>Galega officinalis</i>	Goats rue
<i>Hemerocallis fulva</i>	Orange daylily
<i>Heracleum mantegazzianum</i>	Giant hogweed
<i>Hesperis matronalis</i>	Dame's-rocket
<i>Iris pseudacorus</i>	Yellow flag iris
<i>Lysimachia nummularia</i>	Moneywort
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Ornithogalum nutans</i> and <i>O. umbellatum</i>	Star-of-Bethlehem
<i>Pachysandra terminalis</i>	Japanese pachysandra

Pastinaca sativa	Wild parsnip
Perilla frutescens	Beefsteak plant
Persicaria longiseta	Bristled knotweed
Fallopia japonica and F. sachalinensis	Japanese and Giant knotweed
Ranunculus ficaria	Lesser celandine
AQUATIC PLANTS	
Cabomba caroliniana	Carolina fanwort
Didymoshenia geminate	Didymo
Egeria densa	Brazilian waterweed
Hydrilla verticellata	Hydrilla
Ludwigia peploides ssp. Glabrescens	Floating Primrose-willow
Myriophyllum aquaticum	Parrot feather watermilfoil
Myriophyllum spicatum	Eurasian Watermilfoil
Potamogeton crispus	Curly pondweed
Trapanatans	Water-chestnut
Typhaangustifolia	Narrow-leaved cattail
Typhaxglauca	Hybrid cattail

*NOTE: For the most current list of invasive plants, visit the Pennsylvania Department of Conservation and Natural Resources website at

<https://www.dcnr.pa.gov/Conservation/WildPlants/InvasivePlants/InvasivePlantFactSheets/Pages/default.aspx>

ZONING

Appendix F Noxious Weed Control List of Pennsylvania

In the Commonwealth of Pennsylvania, it is illegal to propagate, sell or transport the following weeds and so if found in any stream buffer area they are to be removed and immediately destroyed:

SYMBOL	SCIENTIFIC NAME	COMMON NAME
CASA3	Cannabis sativa*	Marijuana
CANU4	Carduus mutans	Musk thistle, nodding thistle
CIAR4	Cirsium arvense	Canadian thistle
CIVU	Cirsium vulgare	Bull thistle, spear thistle
DAST	Datura stramonium	Jimsonweed
GAOF	Galega officinalis	Goatsrue
HEMA17	Heracleum mantegazzianum (Sommier & Levier)	Giant hogweed
LYSA2	Lythrum salicaria	Purple loosestrife
POPE10	Polyfonum perforliatum	Mile-a-minute
PUMOL	Pueraria montana (Lour.) Merr. var. lobata (Willd.) Maesen & S.M. Almeida ex Sanjappa & Predeep	
PULO	Pueraria lobate	Kudzu-vine
ROMU	Rosa multiflora	Multiflora rose
SOB12	Sorghum bicolor	Shattercane
SOHA	Sorghum halepense	Johnsongrass

*This weed is also considered to be an illegal drug and is governed by the state's Controlled Substances Act. If found, please first contact your local and/or state police department.

HALFMOON CODE

Appendix G **Riparian Buffer Averaging Options, Example and Calculations**

§ 1. Riparian buffer averaging.

A. Allowance for Riparian Buffer Width Averaging

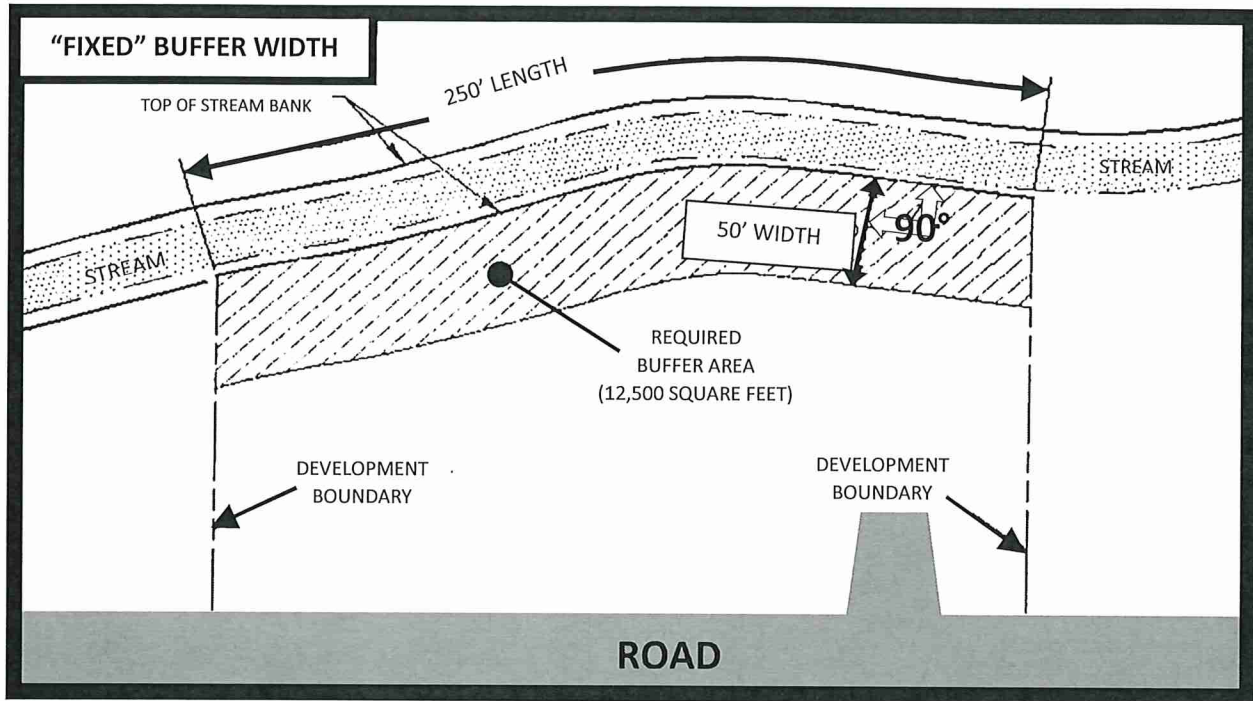
1. This section outlines the criteria for buffer averaging on new and redeveloped sites. Buffer averaging can be utilized to adjust the required total buffer width of 50 feet, allowing for some flexibility for site development. Using this method, the width can be varied following the criteria below, so long as the average total width of 50 feet is maintained within the property boundaries.
 - a. Buffer averaging is required for any buffers that have stream crossings and/or allowed where the Zoning Officer with assistance from the Township Engineer deems that a landowner can demonstrate severe economic hardship or unique circumstances that make strict compliance with the width determination requirement of the ordinance difficult.
 - b. The average width must be calculated based on the entire length of the streambank frontage of the property to be developed. When calculating the buffer length, the natural stream channel should be followed.
 - c. Stream buffer averaging shall be applied to each side of a stream independently. If a property encompasses both sides of a stream, buffer averaging can be applied to both sides, but must be independent of one another for calculation purposes.
 - d. The minimum total width of the buffer shall not be less than 50 feet at any one location, except at approved stream bank crossings and/or where deemed appropriate by the municipality. Those areas having a minimum total width of 50 feet (or less at approved stream crossings) can comprise no more than 50% of the entire buffer length.

B. Areas Where Buffer Averaging is Prohibited. Buffer width averaging is prohibited in developments that have or will have the following land uses.

1. Slope protection areas or slopes greater than 15% located within 50 feet of the stream to be buffered.
2. Developments proposing subsurface discharges from a wastewater treatment facility.
3. Junkyards
4. Commercial or industrial storage and/or service of motor vehicle facilities.
5. Storage tanks for fuel and fuel oil.
6. Commercial greenhouses or landscape supply facilities.
7. Any commercial or public pools.
8. Concentrated animal feed operations.

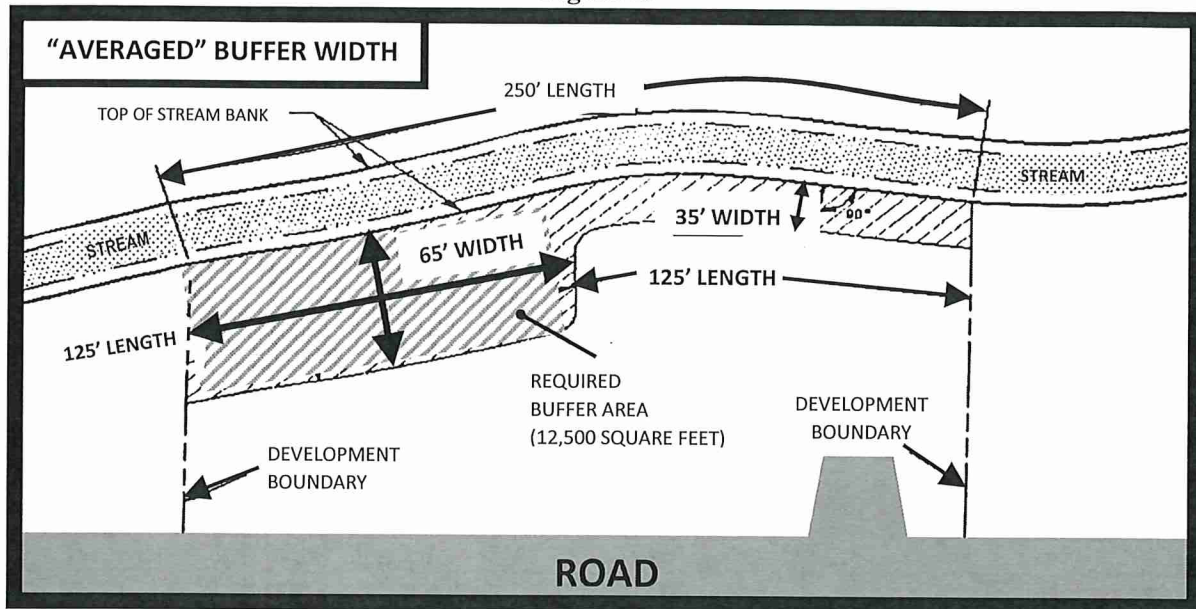
9. Veterinary hospitals, kennels, and/or similar operations.
10. Other uses deemed by the Zoning Officer and/or Township Engineer to have the potential to generate higher than normal sediment or pollutant loadings.

Figure 1. Stream Buffering Averaging “Before” and “After” Graphics.



Buffer averaging is usually used to accommodate stream crossings, existing structures and recover lost lots. Using buffer averaging, the total width of the 50-foot buffer can vary or narrow from point to point, as long as the average total width of the buffer and the overall buffer area meet the minimum criteria. Anything closer should not be encroached upon unless absolutely necessary and/or authorized by the municipality.

Figure 2.



Calculation of stream “buffer averaging.” Consider a development site that is bounded by 250 linear feet of stream frontage, measured following the stream channel. Only one side of the stream is located within the boundaries of the site to be developed in this example.

Constants: Total linear length of buffer: 250 feet Required width of buffer: 50 feet

Step 1. Calculate the total required area of the buffer.

Length of buffer (250 feet) x width of buffer (50 feet) = 12,500 square feet of stream buffer area required (See Figure 1)

Step 2: Calculate the maximum allowed length of buffer that has the minimum allowed buffer width.

A maximum of 50% of the total buffer length (250 feet) is allowed to be 35 feet wide. Step 2 will determine the maximum length of buffer that can have the minimum allowed buffer width of 35 feet. Maximum length of 35 foot buffer = length of buffer x 50% = 250 feet; 250 feet x 50% = 125 feet. Therefore, 125 feet of the buffer can have the minimum width of 35 feet (See Figure 2).

Step 3: Calculate total area of buffer that has the minimum allowed buffer width and determine the remaining buffer area required.

Total buffer area provided = Length of buffer @ 35 feet x 35-foot width = 125 feet x 35 feet = 4,375 square feet (See Figure 2)

Available buffer area remaining = Total required area of buffer – 4,375 square feet = 12,500 square feet – 4,375 square feet = 8,125 square feet (See Figure 2).

Step 4. Determine the width of the remaining buffer.

Length of remaining buffer = Total length of buffer – Length of buffer @ 35-foot width = 250 feet – 125 feet = 125 feet

Width of remaining buffer = 8,125 square feet/125 feet = 65 feet (See Figure 2).

Therefore, 125 linear feet of buffer will have a 35-foot wide buffer (4,375 square feet of area). An additional 125 linear feet will have a minimum buffer width of 65 feet (8,125 square feet of area) with an overall total buffer width of 100 feet (4,375 square feet + 8,125 square feet = 12,500 square feet total buffer area). See Figure 2.