

Aquatic Buffer Model Ordinance



This ordinance focuses primarily on stream buffers. Communities creating coastal buffers may wish to incorporate additional features. For an example of a coastal buffer ordinance, see the Rhode Island ordinance.

Section I. Background

Buffers adjacent to stream systems and coastal areas provide numerous environmental protection and resource management benefits that can include the following:

- 1) Restoring and maintaining the chemical, physical, and biological integrity of the water resources
- 2) Removing pollutants delivered from urban stormwater
- 3) Reducing erosion and sediment entering the stream
- 4) Stabilizing stream banks
- 5) Providing infiltration of stormwater runoff
- 6) Maintaining base flow of streams
- 7) Contributing the organic matter that is a source of food and energy for the aquatic ecosystem
- 8) Providing tree canopy to shade streams and promote desirable aquatic organisms



This benefit applies primarily to forested buffer systems. In some communities, such as prairie settings, the native vegetation may not be forest. See the example ordinance from Omaha, Nebraska, for an example.

- 9) Providing riparian wildlife habitat
- 10) Furnishing scenic value and recreational opportunity

It is the desire of the _____ (Natural Resources or Planning Agency) to protect and maintain the native vegetation in riparian and wetland areas by implementing specifications for the establishment, protection, and maintenance of vegetation along all stream systems and/or coastal zones within our jurisdictional authority.


Section II. Intent

The purpose of this ordinance is to establish minimal acceptable requirements for the design of buffers to protect the streams, wetlands, and floodplains of _____ (jurisdiction); to protect the water quality of watercourses, reservoirs, lakes, and other significant water resources within _____ (jurisdiction); to protect _____'s (Jurisdiction's) riparian and aquatic ecosystems; and to provide for the environmentally sound use of _____'s (jurisdiction's) land resources.

Section III. Definitions

Active Channel The area of the stream channel that is subject to frequent flows (approximately once per one and a half years) and that includes the portion of the channel below the floodplain.

Best Management Practices (BMPs) Conservation practices or management measures that control soil loss and reduce water quality degradation caused by nutrients, animal wastes, toxics, sediment, and runoff.

Buffer	A vegetated area, including trees, shrubs, and herbaceous vegetation, that exists or is established to protect a stream system, lake, reservoir, or coastal estuarine area. Alteration of this natural area is strictly limited.
Development	<ol style="list-style-type: none"> 1) The improvement of property for any purpose involving building 2) Subdivision or the division of a tract or parcel of land into two or more parcels 3) The combination of any two or more lots, tracts, or parcels of property for any purpose 4) The preparation of land for any of the above purposes
Nontidal Wetlands	Those areas not influenced by tidal fluctuations that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.
	<i>The definition of "nontidal wetland" here is adapted from the definition of "wetland" used by the USEPA and the US Army Corps of Engineers.</i>
Nonpoint Source Pollution	Pollution that is generated by various land use activities rather than from an identifiable or discrete source and is conveyed to waterways through natural processes, such as rainfall, stormwater runoff, or groundwater seepage rather than direct discharges.
One Hundred-Year Floodplain	The area of land adjacent to a stream that is subject to inundation during a storm event that has a recurrence interval of 100 years.
Pollution	<p>Any contamination or alteration of the physical, chemical, or biological properties of any waters that will render the waters harmful or detrimental to</p> <ol style="list-style-type: none"> 1) Public health, safety, or welfare 2) Domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses 3) Livestock, wild animals, or birds 4) Fish or other aquatic life
Stream Channel	<p>Part of a watercourse either naturally or artificially created that contains an intermittent or perennial base flow of groundwater origin. Base flows of groundwater origin can be distinguished by any of the following physical indicators:</p> <ol style="list-style-type: none"> 1) Hydrophytic vegetation, hydric soil, or other hydrologic indicators in the area(s) where groundwater enters the stream channel in the vicinity of the stream headwaters, channel bed, or channel banks 2) Flowing water not directly related to a storm event 3) Historical records of a local high groundwater table, such as well and stream gauge records.
Stream Order	A classification system for streams based on stream hierarchy. The smaller the stream, the lower its numerical classification. For example, a first-order stream

does not have tributaries and normally originates from springs and/or seeps. (See Figure 1.)

Stream System A stream channel together with one or both of the following:
1) 100-year floodplain
2) Hydrologically related nontidal wetland

Streams Perennial and intermittent watercourses identified through site inspection and US Geological Survey (USGS) maps. Perennial streams are those which are depicted on a USGS map with a solid blue line. Intermittent streams are those which are depicted on a USGS map with a dotted blue line.



Defining the term "stream" is perhaps the most contentious issue in the definition of stream buffers. This term determines the origin and the length of the stream buffer. Although some jurisdictions restrict the buffer to perennial or "blue line" streams, others include both perennial and intermittent streams in the stream buffer program. Some communities do not rely on USGS maps and instead prepare local maps of all stream systems that require a buffer.

Water Pollution A land use or activity that causes a relatively high risk of potential water pollution.

Hazard

Section IV. Applications

- A) This ordinance shall apply to all proposed development except for that development which meets waiver or variance criteria as outlined in Section IX of this regulation.
- B) This ordinance shall apply to all timber harvesting activities, except those timber harvesting operations which are implementing a forest management plan that has been deemed to be in compliance with the regulations of the buffer ordinance and has received approval from _____(state forestry agency).
- C) This ordinance shall apply to surface mining operations except that the design standards shall not apply to active surface mining operations that are operating in compliance with an approved _____(state or federal agency) surface mining permit.
- D) The ordinance shall not apply to agricultural operations that are covered by an approved Natural Resources Conservation Service (NRCS) conservation plan that includes the application of BMPs.



Communities should carefully consider whether exempt agricultural operations from the buffer ordinance because buffer regulations may take land out of production and impose a financial burden on family farms. Many communities exempt agricultural operations if they have an approved NRCS conservation plan. In some regions, agricultural buffers may be funded through the Conservation Reserve Program (CRP). For further information, consult the Conservation Technology Information Center (CTIC) at www.ctic.perdue.edu.



Livestock operations near and around streams may be regulated by communities. Livestock can significantly degrade the stream system and accelerate streambank erosion. The King County Livestock Management Ordinance is one example of a local livestock ordinance. For more information, contact the King County Department of Development and Environmental Services at (206) 296-6602.

- E) Except as provided in Section IX, this ordinance shall apply to all parcels of land, structures, and activities that are causing or contributing to

- 1) Pollution, including nonpoint source pollution, of the waters of the jurisdiction adopting this ordinance
- 2) Erosion or sedimentation of stream channels
- 3) Degradation of aquatic or riparian habitat

Section V. Plan Requirements

- A) In accordance with Section IV of this ordinance, a plan approved by the appropriate agency is required for all development, forest harvesting operations, surface mining operations, and agricultural operations.
- B) The plan shall set forth an informative, conceptual, and schematic representation of the proposed activity by means of maps, graphs, charts, or other written or drawn documents so as to enable the agency an opportunity to make a reasonably informed decision regarding the proposed activity.
- C) The plan shall contain the following information:



The ordinance can identify the scale of maps to be included with the analyses in items 2) through 7). A 1"=50' to 1"=100' scale will generally provide sufficient detail.

- 1) A location or vicinity map
- 2) Field-delineated and surveyed streams, springs, seeps, bodies of water, and wetlands (include a minimum of 200 feet into adjacent properties)
- 3) Field delineated and surveyed forest buffers
- 4) Limits of the ultimate 100-year floodplain



The limits of the ultimate floodplain (i.e., the floodplain under "built-out" conditions) might not be available in all locations.

- 5) Hydric soils mapped in accordance with the NRCS soil survey of the site area
- 6) Steep slopes greater than 15 percent for areas adjacent to and within 200 feet of streams, wetlands, or other waterbodies



The ordinance may also explicitly define how slopes are measured. For example, the buffer may be divided into sections of a specific width (e.g., 25 feet) and the slope for each segment reported. Alternatively, slopes can be reported in segments divided by breaks in slope.

- 7) A narrative of the species and distribution of existing vegetation within the buffer
- D) The buffer plan shall be submitted in conjunction with the required grading plan for any development, and the forest buffer should be clearly delineated on the final grading plan.
 - E) Permanent boundary markers, in the form of signage approved by _____ (*natural resources or planning agency*), shall be installed prior to final approval of the required clearing and grading plan. Signs shall be placed at the edge of the middle zone (See Section VI.I).

Section VI. Design Standards for Forest Buffers

- A) A forest buffer for a stream system shall consist of a forested strip of land extending along both sides of a stream and its adjacent wetlands, floodplains, or slopes. The forest buffer width shall be adjusted to include contiguous sensitive areas, such as steep slopes or erodible soils, where development or disturbance may adversely affect water quality, streams, wetlands, or other waterbodies.

- B) The forest buffer shall begin at the edge of the stream bank of the active channel.
- C) The required width for all forest buffers (i.e., the base width) shall be a minimum of 100 feet, with the requirement to expand the buffer depending on
 - 1) Stream order
 - 2) Percent slope
 - 3) 100-year floodplain
 - 4) Wetlands or critical areas



The width of the stream buffer varies from 20 feet to 200 feet in ordinances throughout the United States (Heraty, 1993). The width chosen by a jurisdiction will depend on the sensitivity and characteristics of the resource being protected and the political realities in the community.

- B) In third-order and higher streams, 25 feet shall be added to the base width of the forest buffer.
- C) The forest buffer width shall be modified if steep slopes are within close proximity to the stream and drain into the stream system. In those cases, the forest buffer width may be adjusted.



Several methods may be used to adjust buffer width for steep slopes. Two examples ifollow:

Method A

Percent	Width of Buffer
15%-17%	add 10 feet
18%-20%	add 30 feet
21%-23%	add 50 feet
24%-25%	add 60 feet

Method B

Percent Slope	Type of Stream Use	
	Water Contact Recreational Use	Sensitive Stream Habitat
0% to 14%	no change	add 50 feet
15% to 25%	add 25 feet	add 75 feet
Greater than 25%	add 50 feet	add 100 feet

- D) Forest buffers shall be extended to encompass the entire 100-year floodplain and a zone with a minimum width of 25 feet beyond the edge of the floodplain.
- E) When wetland or critical areas extend beyond the edge of the required buffer width, the buffer shall be adjusted so that the buffer consists of the extent of the wetland plus a 25-foot zone extending beyond the wetland edge.
- H) Water Pollution Hazards
The following land uses and/or activities are designated as potential water pollution hazards

and must be set back from any stream or waterbody by the distance indicated below:

- 1) Storage of hazardous substances—(150 feet)
- 2) Aboveground or underground petroleum storage facilities—(150 feet)
- 3) Drainfields from onsite sewage disposal and treatment systems (i.e., septic systems)—(100 feet)
- 4) Raised septic systems—(250 feet)
- 5) Solid waste landfills or junkyards—(300 feet)
- 6) Confined animal feedlot operations—(250 feet)
- 7) Subsurface discharges from a wastewater treatment plant—(100 feet)
- 8) Land application of biosolids—(100 feet)



For surface water supplies, the setbacks should be doubled.



A community should carefully consider which activities or land uses should be designated as potential water pollution hazards. The list of potential hazards shown above is not exhaustive, and others may need to be added depending on the major pollutants of concern and the uses of water.

- l) The forest buffer shall be composed of three distinct zones, with each zone having its own set of allowable uses and vegetative targets as specified in this ordinance. (See Figure 2.)



Although a three-zone buffer system is highly recommended, the widths and specific uses allowed in each zone may vary between jurisdictions.

- l) Zone 1, Streamside Zone
 - a) Protects the physical and ecological integrity of the stream ecosystem.
 - b) Begins at the edge of the stream bank of the active channel and extends a minimum of 25 feet from the top of the bank.
 - c) Allowable uses within this zone are highly restricted to
 - i) Flood control structures
 - ii) Utility right of ways
 - iii) Footpaths
 - iv) Road crossings, where permitted
 - d) Target for the streamside zone is undisturbed native vegetation.



This ordinance assumes that the native vegetation in the stream corridor is forest. In some regions of the United States, other vegetation such as prairie may be native. See the Omaha, Nebraska, buffer ordinance for an example of a stream buffer ordinance that protects nonforested systems.

- 2) Zone 2, Middle Zone
 - a) Protects key components of the stream and provides distance between upland development and the streamside zone.
 - b) Begins at the outer edge of the streamside zone and extends a minimum of 50 feet plus any additional buffer width as specified in this section.
 - c) Allowable uses within the middle zone are restricted to
 - i) Biking or hiking paths
 - ii) Stormwater management facilities, with the approval of _____ (local agency responsible for stormwater).

- iii) Recreational uses as approved by _____ (*planning agency*).
 - iv) Limited tree clearing with approval from _____ (*forestry agency or planning agency*).
 - d) Targets mature native vegetation adapted to the region.
- 3) Zone 3, Outer Zone
- a) Prevents encroachment into the forest buffer and filters runoff from residential and commercial development.
 - b) Begins at the outward edge of the middle zone and provide a minimum width of 25 feet between Zone 2 and the nearest permanent structure.
 - c) Restricts septic systems, permanent structures, or impervious cover, with the exception of paths.
 - d) Encourages the planting of native vegetation to increase the total width of the buffer.

Section VII. Buffer Management and Maintenance

- A) The forest buffer, including wetlands and floodplains, shall be managed to enhance and maximize the unique value of these resources. Management includes specific limitations on alteration of the natural conditions of these resources. The following practices and activities are restricted within Zones 1 and 2 of the forest buffer, except with approval by _____ (*forestry, planning or natural resources agency*)
- 1) Clearing of existing vegetation
 - 2) Soil disturbance by grading, stripping, or other practices
 - 3) Filling or dumping
 - 4) Drainage by ditching, underdrains, or other systems
 - 5) Use, storage, or application of pesticides, except for spot spraying of noxious weeds or non-native species consistent with recommendations of _____ (*forestry agency*)
 - 6) Housing, grazing, or other maintenance of livestock
 - 7) Storage or operation of motorized vehicles, except for maintenance and emergency use approved by _____ (*forestry, planning, or natural resources agency*)
- B) The following structures, practices, and activities are permitted in the forest buffer, with specific design or maintenance features, subject to the review of _____ (*forestry, planning, or natural resources agency*):
- 1) Roads, bridges, paths, and utilities:
 - a) An analysis needs to be conducted to ensure that no economically feasible alternative is available.
 - b) The right-of-way should be the minimum width needed to allow for maintenance access and installation.
 - c) The angle of the crossing shall be perpendicular to the stream or buffer to minimize clearing requirements
 - d) The minimum number of road crossings should be used within each subdivision, and no more than one fairway crossing is allowed for every 1,000 feet of buffer.
 - 2) Stormwater management:
 - e) An analysis needs to be conducted to ensure that no economically feasible alternative is available and that the project either is necessary for flood control or significantly improves the water quality or habitat in the stream.
 - f) In new developments, onsite and nonstructural alternatives will be preferred over larger facilities within the stream buffer.

- g) When constructing stormwater management facilities (i.e., BMPs), the area cleared will be limited to the area required for construction and adequate maintenance access as outlined in the most recent edition of _____ (refer to *stormwater manual*).



Rather than placing specific stormwater BMP design criteria in an ordinance, it is often preferable to reference a manual. With this approach, specific design information can be changed over time without going through the formal process needed to change ordinance language.



The Maryland Stormwater Design Manual is one example of an up-to-date stormwater design manual. For more information, go to www.mde.state.md.us. Under topics, choose "Stormwater Design Manual."

- h) Material dredged or otherwise removed from a BMP shall be stored outside the buffer.
- 3) Stream restoration projects, facilities, and activities approved by _____ (forestry, planning, or natural resources agency) are permitted within the forest buffer.
- 4) Water quality monitoring and stream gauging are permitted within the forest buffer, as approved by _____ (forestry, planning or natural resources agency).
- 5) Individual trees within the forest buffer that are in danger of falling, causing damage to dwellings or other structures, or causing blockage of the stream may be removed.
- 6) Other timber cutting techniques approved by the agency may be undertaken within the forest buffer under the advice and guidance of _____ (state or federal forestry agency) if necessary to preserve the forest from extensive pest infestation, disease infestation, or threat from fire.
- C) All plans prepared for recording and all right-of-way plans shall clearly
- 1) Show the extent of any forest buffer on the subject property
- 2) Label the forest buffer
- 3) Provide a note to reference any forest buffer stating: "There shall be no clearing, grading, construction or disturbance of vegetation except as permitted by the agency."
- 4) Provide a note to reference any protective covenants governing all forest buffer areas stating: "Any forest buffer shown hereon is subject to protective covenants that may be found in the land records and that restrict disturbance and use of these areas."
- D) All forest buffer areas shall be maintained through a declaration of protective covenant, which is required to be submitted for approval by _____ (planning board or agency). The covenant shall be recorded in the land records and shall run with the land and continue in perpetuity.



This protective covenant can be kept either by the local government agency responsible for management of environmental resources or by an approved nonprofit organization. An example conservation easement is included later in this section.

- E) All lease agreements must contain a notation regarding the presence and location of protective covenants for forest buffer areas and shall contain information on the management and maintenance requirements for the new property owner.
- F) An offer of dedication of a forest buffer area to the agency shall not be interpreted to mean that this automatically conveys to the general public the right of access to this area.
- G) _____ (responsible individual or group) shall inspect the buffer annually and immediately following severe storms for evidence of sediment deposition, erosion, or concentrated flow channels and corrective actions taken to ensure the integrity and functions

of the forest buffer.



A local ordinance will need to designate the individual or group responsible for buffer maintenance. Often, the responsible party will be identified in protective covenants associated with the property.

- H) Forest buffer areas may be allowed to grow into their vegetative target state naturally, but methods to enhance the successional process such as active reforestation may be used when deemed necessary by _____ (natural resources or forestry agency) to ensure the preservation and propagation of the buffer area. Forest buffer areas may also be enhanced through reforestation or other growth techniques as a form of mitigation for achieving buffer preservation requirements.



Explicit forestry management criteria are often included in a forestry or natural resources conservation ordinance. An example forest conservation ordinance from Frederick County, Maryland is included in the miscellaneous ordinances section of this site.

Section VIII. Enforcement Procedures

- A) _____ (director of responsible agency) or his/her designee is authorized and empowered to enforce the requirements of this ordinance in accordance with the procedures of this section.
- B) If, upon inspection or investigation, the director or his/her designee is of the opinion that any person has violated any provision of this ordinance, he/she shall with reasonable promptness issue a correction notice to the person. Each such notice shall be in writing and shall describe the nature of the violation, including a reference to the provision within this ordinance that has been violated. In addition, the notice shall set a reasonable time for the abatement and correction of the violation.
- C) If it is determined that the violation or violations continue after the time fixed for abatement and correction has expired, the director shall issue a citation by certified mail to the person who is in violation. Each such notice shall be in writing and shall describe the nature of the violation, including a reference to the provision within this ordinance that has been violated and what penalty, if any, is proposed to be assessed. The person charged has 30 days within which to contest the citation or proposed assessment of penalty and to file a request for a hearing with the director or his/her designee. At the conclusion of this hearing, the director or his/her designee will issue a final order, subject to appeal to the appropriate authority. If, within 30 days from the receipt of the citation issued by the director, the person fails to contest the citation or proposed assessment of penalty, the citation or proposed assessment of penalty shall be deemed the final order of the director.
- B) Any person who violates any provision of this ordinance may be liable for any cost or expenses incurred as a result thereof by the agency.
- C) Penalties that may be assessed for those deemed to be in violation may include the following:
- 1) A civil penalty not to exceed \$1,000.00 for each violation. Every day that such violation(s) continue will be considered a separate offense.
 - 2) A criminal penalty in the form of a fine of not more than \$1,000.00 for each violation, imprisonment for not more than 90 days, or both. Every day that such violation(s) continue will be considered a separate offense.
 - 3) Anyone who knowingly makes any false statements in any application, record, or plan required by this ordinance shall upon conviction be punished by a fine of not more than \$1,000.00 for each violation, imprisonment for not more than 30 days, or both.



Specific penalties will vary between communities, and should reflect realistically enforceable penalties given the political realities of a jurisdiction.

- F) In addition to any other sanctions listed in this ordinance, a person who fails to comply with the provisions of this buffer ordinance shall be liable to the agency in a civil action for damages in an amount equal to twice the cost of restoring the buffer. Damages that are recovered in accordance with this action shall be used for the restoration of buffer systems or for the administration of programs for the protection and restoration of water quality, streams, wetlands, and floodplains.

Section IX. Waivers/Variances

- A) This ordinance shall apply to all proposed development except for activities that were completed prior to the effective date of this ordinance and had received the following:
- 1) A valid, unexpired permit in accordance with development regulations
 - 2) A current, executed public works agreement
 - 3) A valid, unexpired building permit
 - 4) A waiver in accordance with current development regulations.
- B) The director of the agency may grant a variance for the following:
- 1) Those projects or activities for which it can be demonstrated that strict compliance with the ordinance would result in a practical difficulty or financial hardship
 - 2) Those projects or activities serving a public need where no feasible alternative is available
 - 3) The repair and maintenance of public improvements where avoidance and minimization of adverse impacts to nontidal wetlands and associated aquatic ecosystems have been addressed
 - 4) Those developments which have had buffers applied in conformance with previously issued requirements
- C) Waivers for development may also be granted in two additional forms, if deemed appropriate by the director:
- 1) The buffer width may be reduced at some points as long as the average width of the buffer meets the minimum requirement. This averaging of the buffer may be used to allow for the presence of an existing structure or to recover a lost lot, as long as the streamside zone (Zone I) is not disturbed by the reduction and no new structures are built within the 100-year floodplain.
 - 2) _____ (*planning agency*) may offer credit for additional density elsewhere on the site in compensation for the loss of developable land due to the requirements of this ordinance. This compensation may increase the total number of dwelling units on the site up to the amount permitted under the base zoning.
- D) The applicant shall submit a written request for a variance to the director of the agency. The application shall include specific reasons justifying the variance and any other information necessary to evaluate the proposed variance request. The agency may require an alternative analysis that clearly demonstrates that no other feasible alternatives exist and that minimal impact will occur as a result of the project or development.
- E) In granting a request for a variance, the director of the agency may require site design, landscape planting, fencing, signs, and water quality best management practices to reduce adverse impacts on water quality, streams, wetlands, and floodplains.

Section X. Conflict With Other Regulations

Where the standards and management requirements of this buffer ordinance are in conflict with other laws, regulations, and policies regarding streams, steep slopes, erodible soils, wetlands, floodplains, timber harvesting, land disturbance activities, or other environmental protective measures, the more restrictive shall apply.

Figure 1: Stream Order (Source: Schueler, 1995)

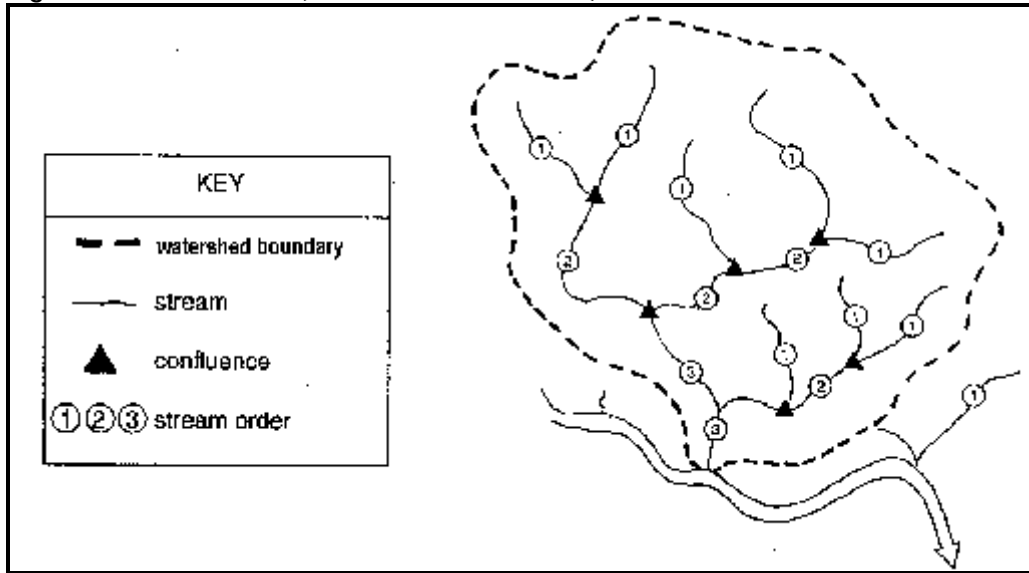
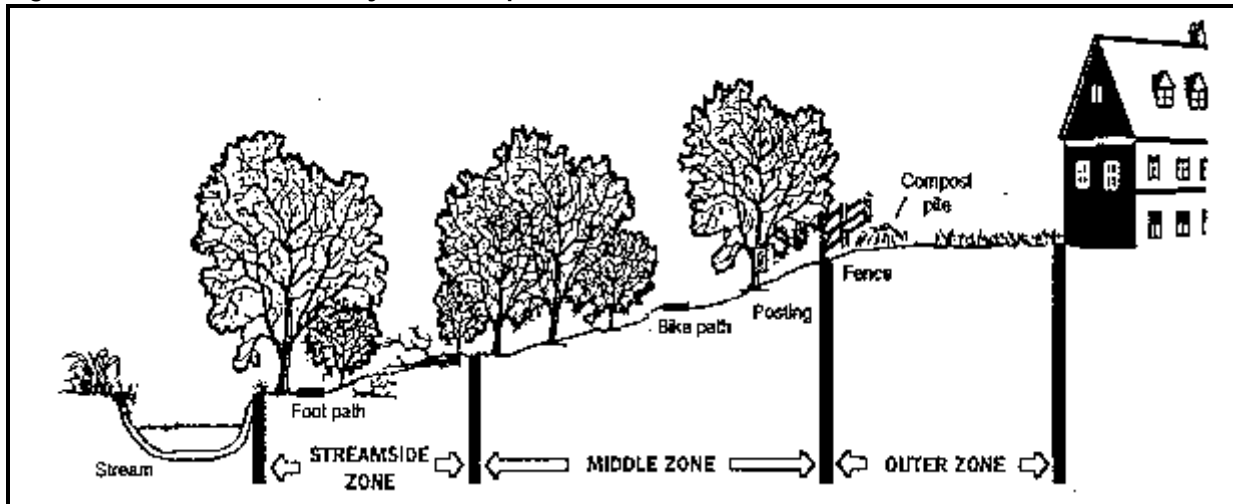


Figure 2: Three Zone Buffer System (Adapted from Welsch, 1991)



References

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