

Aquatic Buffers Overview and Model Ordinance

Prepared by the Tool Box Subcommittee of the Water Resources Advisory Committee

Achieving Phase II Stormwater Minimum Controls: The Role of Aquatic Buffers

EPA Phase II Stormwater Best Management Practices refer to aquatic buffers in the following sections:

- Control 1: Public Education and Outreach on Storm Water Impacts
Public outreach programs for new development: low impact development
- Control 4: Construction Site Storm Water Runoff Control:
Runoff Control: Minimize clearing
Erosion Control: Protect waterways
- Control 5: Post Construction Storm Water Management in New Development and Redevelopment
Nonstructural BMPs: Better Site Design: Buffer, zones, open space design, conservation easements

Description – What is an Aquatic Buffer

An aquatic buffer is an area along a shoreline, wetland, or stream where development is restricted or prohibited. The primary function of aquatic buffers is to physically protect and separate a stream, lake, or wetland from future disturbance or encroachment. If properly designed, a buffer can provide storm water management and act as a right-of-way during floods, sustaining the integrity of stream ecosystems and habitats and protecting buildings and infrastructure from potential damage. Aquatic buffers are one type of conservation area that function as an integral part of the aquatic and terrestrial ecosystem.

The three types of buffers are:

- water pollution hazard setbacks -- areas that separate a potential pollution hazard from a waterway, reducing the potential for pollution.
- vegetated buffers -- natural areas that exist to divide land uses or provide landscape relief, and
- engineered buffers -- areas specifically designed to treat storm water before it enters into a stream, lake, or wetland.

Benefits

Aquatic buffers serve as natural boundaries between waterways and existing development. The benefits they provide include:

- protect water quality by filtering sediment, nutrients and other pollutants from runoff
- provide flood control and reduce storm water runoff by intercepting rain fall and promoting infiltration
- stabilize stream banks,
- provide tree canopy to maintain stream temperature and promote desirable aquatic organisms,
- provide room for natural lateral movement of the stream channel,
- provide visual and sound buffer,
- enhance aesthetics by providing scenic value,
- provides habitat and corridors for wildlife,
- requires less maintenance (e.g. fertilizer, irrigation, mowing) and
- increase adjacent property value
- provide recreational opportunity
- contribute organic matter, a food and energy source for the aquatic ecosystem

Applicability

Buffers can be used in new development and existing developed areas. In new development, buffers and their sustaining management can be established through easements or community associations. For existing developed areas, an easement may be needed from adjoining landowners. A local ordinance can help set specific criteria for buffers to achieve storm water management goals.

In most of the St. Louis region streams naturally existed in a forested condition. Therefore, buffers function best in a forested state. In some settings, buffers can remove pollutants traveling in storm water or ground water. Shoreline and stream buffers situated in flat terrain have been found to be effective in removing sediment, nutrients, and bacteria from storm water runoff and septic system effluent in a wide variety of rural and agricultural settings and with some limited capability in urban settings. Buffers also provide wildlife habitat and recreation, and can be reestablished in urban areas as part of an urban forest.

Limitations

Only a handful of studies have measured the ability of stream buffers to remove pollutants from storm water. Those studies show one limitation is that urban runoff concentrates rapidly on paved and hard-packed turf surfaces and often crosses the buffer as channel rather than sheet flow, effectively shortcutting through the buffer. To achieve optimal pollutant removal, the engineered buffer should be carefully designed with a storm water depression area, grass filter, and forested strip to slow the flow and allow pollutants to settle out before the stormwater enters the waterbody.

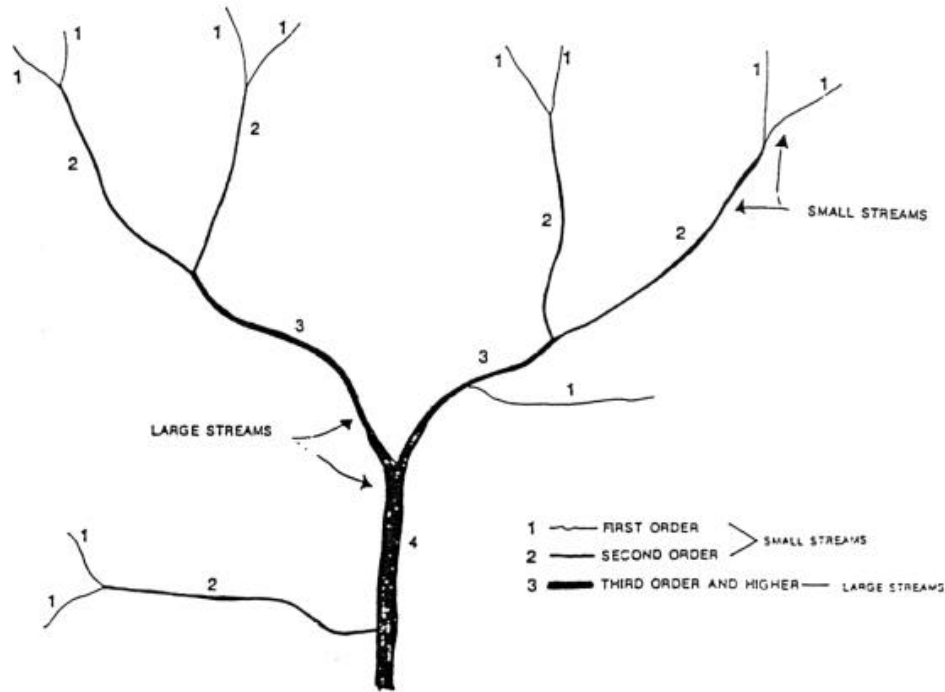
Siting and Design Considerations

There are ten key criteria to consider when establishing a stream buffer:

- Minimum total buffer width
- Three-zone buffer system
- Mature forest as a vegetative target
- Conditions for buffer expansion or contraction
- Physical delineation requirements
- Conditions where buffer can be crossed
- Integrating storm water and storm water management within the buffer
- Buffer limit review
- Buffer education, inspection, and enforcement
- Buffer flexibility.

In general, a minimum base width of at least 100 feet is recommended to provide adequate stream protection. In small streams, first or second order, buffers are measured from the center of the stream. In higher order streams, buffers are measured from the streambank. Stream order is diagrammed below.

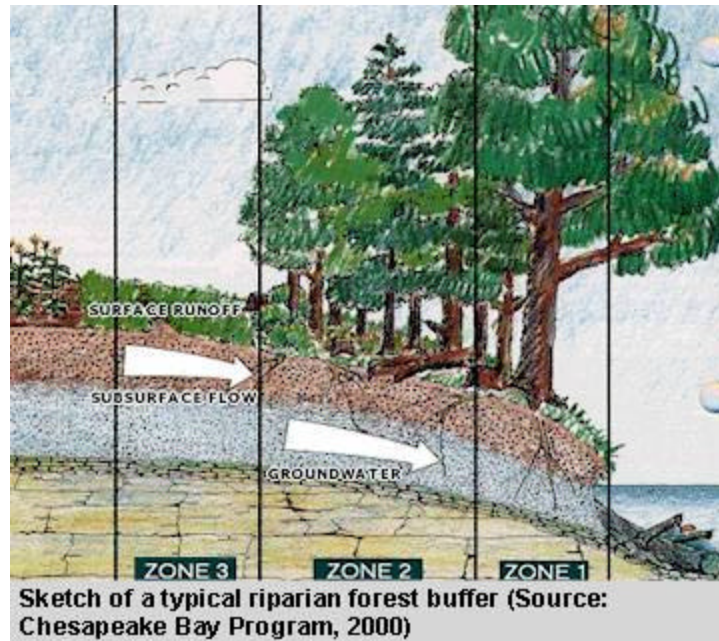
FIGURE 1
STREAM ORDER HIERARCHY



The three-zone buffer system, consisting of inner, middle, and outer zones, is an effective technique for establishing a buffer. The zones are distinguished by function, width, vegetative target, and allowable uses and are illustrated below. The inner zone protects physical and ecological integrity and is a minimum of 25 feet plus wetland and critical habitats. The vegetative target consists of mature forest, and allowable uses are very restricted (flood controls, utility right-of-ways, footpaths, etc.).

The middle zone provides distance between upland development and the inner zone and is typically 50 to 100 feet, depending on stream order, slope, and 100-year floodplain. The vegetative target for this zone is managed forest, and usage is restricted to some recreational uses, some storm water BMPs, and bike paths.

The outer zone functions to prevent encroachment and filter backyard runoff. The width is at least 25 feet and, while forest is encouraged, turfgrass can be a vegetative target. Uses for the outer zone are unrestricted and can include lawn, garden, compost, yard wastes, and most storm water BMPs.



For optimal storm water treatment, the following buffer designs are recommended. The buffer should be composed of three lateral zones: a storm water depression area that leads to a grass filter strip that in turn leads to a forested buffer. The storm water depression is designed to capture and store storm water during smaller storm events and bypass larger stormflows directly into a channel. The captured runoff within the storm water depression can then be spread across a grass filter designed for sheetflow conditions for the water quality storm. The grass filter then discharges into a wider forest buffer designed to have zero discharge of surface runoff to the stream (i.e., full infiltration of sheetflow).

Stream buffers must be highly engineered in order to satisfy these demanding hydrologic and hydraulic conditions. In particular, simple structures are needed to store, split, and spread surface runoff within the storm water depression area. Although past efforts to engineer urban stream buffers were plagued by hydraulic failures and maintenance problems, recent experience with similar bioretention areas has been much more positive (Claytor and Schueler, 1996). Consequently, it may be useful to consider elements of bioretention design for the first zone of an urban stream buffer (shallow ponding depths, partial underdrains, drop inlet bypass, etc).

Detailed design specifications are contained in the stormwater management chapter.

Maintenance Considerations

An effective buffer management plan should include establishment, management, and distinctions of allowable and unallowable uses in the buffer zones. Buffer boundaries should be well defined and visible before, during, and after construction. Without clear signs or markers defining the buffer, boundaries become invisible to local governments, contractors, and residents. Buffers designed to capture storm water runoff from urban areas will require more maintenance if the first zone is designated as a bioretention or other engineered depression area.

Effectiveness

The pollutant removal effectiveness of buffers depends on the design of the buffer; while water pollution hazard setbacks are designed to prevent possible contamination from neighboring land uses, they are not designed for pollutant removal during a storm. With vegetated buffers, some pollutant removal studies have shown that they range widely in effectiveness (Table 1). Proper design of buffers can help increase the pollutant removal from storm water runoff (Table 2).

Table 1: Pollutant Removal Rates in Buffer Zones

Reference	Buffer Vegetation	Buffer Width (meters)	Total % TSS Removal	Total % Phosphorous Removal	Total % Nitrogen Removal
Dillaha et al., 1989	Grass	4.6–9.1	63–78	57–74	50–67
Magette et al., 1987	Grass	4.6–9.2	72–86	41–53	17–51
Schwer and Clausen, 1989	Grass	26	89	78	76
Lowrance et al., 1983	Native hardwood forest	20–40	–	23	–
Doyle et al., 1977	Grass	1.5	–	8	57
Barker and Young, 1984	Grass	79	–	–	99
Lowrance et al., 1984	Forested	–	–	30–42	85
Overman and Schanze, 1985	Grass	–	81	39	67

Table 2: Factors that Enhance/Reduce Buffer Pollutant Removal Performance

Factors that Enhance Performance	Factors that Reduce Performance
Slopes less than 5%	Slopes greater than 5%
Contributing flow lengths <150 feet.	Overland flow paths over 300 feet
Water table close to surface	Ground water far below surface
Check dams/level spreaders	Contact times less than 5 minutes
Permeable but not sandy soils	Compacted soils
Growing season	Nongrowing season
Long length of buffer or swale	Buffers less than 10 feet
Organic matter, humus, or mulch layer	Snowmelt conditions, ice cover
Small runoff events	Runoff events >2 year event.
Entry runoff velocity less than 1.5 feet/sec	Entry runoff velocity more than 5 feet/sec
Swales that are routinely mowed	Sediment buildup at top of swale
Poorly drained soils, deep roots	Trees with shallow root systems
Dense grass cover, 6 inches tall	Tall grass, sparse vegetative cover

Cost Considerations

Several studies have documented the increase of property values in areas adjacent to buffers. At the same time, the real costs of instituting a buffer program for local government involve the extra staff and training time to conduct plan reviews, and to provide technical assistance, field delineation, construction, and ongoing buffer education programs. To implement a stream buffer program, a community will need to adopt an ordinance, develop technical criteria, and invest in additional staff resources and training. The adoption of a buffer program also requires an investment in training for the plan reviewer and the consultant alike. Manuals, workshops, seminars, and direct technical assistance are needed to explain the new requirements to all the players in the land development business. Lastly, buffers need to be maintained, and resources should include systematic inspection of the buffer network before and after construction and work to increase resident awareness about buffers.

One way to relieve some of the significant financial hardships for developers is to provide flexibility through buffer averaging. Buffer averaging allows developers to narrow the buffer width at some points if the average width of the buffer and the overall buffer area meet the minimum criteria. Variances can also be granted if the developer or landowner can demonstrate severe economic hardship or unique circumstances that make compliance with the buffer ordinance difficult.

Common Objections and Responses

Common objections to buffer programs often include:

- Loss of developable land – Stream corridors were once viewed as developable, but experience demonstrates that this development comes at the cost of infrastructure and private property damage from storm events. Opportunity costs to the landowner can be mitigated by density bonuses can to ensure the total number of units in a development are unaffected and higher market prices for developments adjacent to natural areas.
- Public access to privately held stream buffers – Public access and aquatic buffers do not go hand in hand. This is a decision to be made by individual landowners, in the case of aquatic buffers in already developed areas, and by the community when developments are designed or aquatic buffer ordinances are implemented.
- Excessive nuisance species – Aquatic buffers provide habitat and a travel corridor for wildlife. Most nuisance species are well adapted to urban life - - that is what makes them a nuisance. Aquatic buffers provide little additional benefit to them.
- Additional demand on scarce local government resources – the short term cost of implementing an aquatic buffer system brings significant long term benefits. Aquatic buffers reduce maintenance costs for roads and bridges, administrative costs associated with streamside landowner complaints when erosion threatens yards and buildings, and construction and replacement costs for “hard fixes” to attempt to control streams. Increased property values associated the aesthetic benefits result in a higher tax base.

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Special Considerations

Construction Site Storm Water Runoff Control: Vegetated Buffer



Buffers at the perimeters of construction sites are similar to agricultural buffers in that they trap sediments and remove pollutants in runoff from exposed areas (Source: Nova Scotia Department of Agriculture and Fisheries, 2000)

Description

Vegetated buffers are areas of either natural or established vegetation that are maintained to protect the neighboring areas from sediment and erosion caused by construction site land disturbance. Buffer zones reduce the velocity of storm water runoff, provide an area for the runoff to permeate the soil, contribute to ground water recharge, and act as filters to catch sediment.

Applicability

Vegetated buffers can be used in any area that is able to support vegetation but they are most effective and beneficial on floodplains, near wetlands, along streambanks, and on steep, unstable slopes. They are also effective in separating land use areas that are not compatible and in protecting wetlands or waterbodies by displacing activities that might be potential sources of nonpoint source pollution.

Limitations

Vegetated buffers require plant growth before they can be effective, and land on which to plant the vegetation must be available. If the cost of the land is very high, buffer zones might not be cost-effective. Although vegetated buffers help to protect water quality, they usually do not effectively counteract concentrated storm water flows to neighboring or downstream wetlands.

Siting and Design Considerations

To establish an effective vegetative buffer, the following guidelines should be followed:

- Soils should not be compacted.
- Slopes should be less than 5 percent.
- Buffer widths should be determined after careful consideration of slope, vegetation, soils, depth to impermeable layers, runoff sediment characteristics, type and quantity of storm water pollutants, and annual rainfall.

- Buffer widths should increase as slope increases.
- Zones of vegetation (native vegetation in particular), including grasses, deciduous and evergreen shrubs, and understory and overstory trees, should be intermixed.
- Concrete lips or gravel spreaders should be considered to cause runoff to flow as a sheet, rather than concentrate as a channel, to increase pollutant removal and avoid erosion.
- In areas where flows are concentrated and velocities are high, buffer zones should be combined with other structural or nonstructural BMPs as a pretreatment.
- Buffers must be clearly marked on the plan and on the site, ensuring equipment operators do not mistakenly clear or compact that portion of the site.

Maintenance Considerations

Keeping vegetation healthy in vegetated buffers requires routine maintenance, which (depending on species, soil types, and climatic conditions) can include weed and pest control, mowing, fertilizing, liming, irrigating, and pruning. Inspection and maintenance are most important when buffer areas are first installed. Once established, vegetated buffers do not require much maintenance beyond the routine procedures listed earlier and periodic inspections of the areas, especially after any heavy rainfall and at least once a year. Inspections should focus on encroachment, gully erosion, density of vegetation, evidence of concentrated flows through the areas, and any damage from foot or vehicular traffic. If there is more than 6 inches of sediment in one place, it should be removed.

Effectiveness

Several researchers have measured greater than 90 percent reductions in sediment and nitrate concentrations. Buffer/filter strips do a reasonably good job of removing phosphorus attached to sediment, but are relatively ineffective in removing dissolved phosphorus (Gilliam, 1994).

References

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Special Considerations

Construction Site Storm Water Runoff Control: Temporary Stream Crossings

Description

A temporary stream crossing is a structure erected to provide a safe and stable way for construction vehicle traffic to cross a running watercourse. The primary purpose of such a structure is to provide streambank stabilization, reduce the risk of damaging the streambed or channel, and reduce the risk of sediment loading from construction traffic. A temporary stream crossing may be a bridge, a culvert, or a ford.

Applicability

Temporary stream crossings are applicable wherever heavy construction equipment must be moved from one side of a stream channel to the other, or where lighter construction vehicles will cross the stream a number of times during the construction period. In either case, an appropriate method for ensuring the stability of the streambanks and preventing large-scale erosion is necessary.

A bridge or culvert is the best choice for most temporary stream crossings. If properly designed, each can support heavy loads and materials used to construct most bridges, and culverts can be salvaged after they are removed. Fords are appropriate in steep areas subject to flash flooding, where normal flow is shallow or intermittent across a wide channel. Fords should be used only where stream crossings are expected to be infrequent.

Limitations

Bridges can be considered the greatest safety hazard of all temporary stream crossing structures if not properly designed and constructed. Bridges might also prove to be more costly in terms of repair costs and lost construction time if they are washed out or collapse (Smolen et al., 1988).

The construction and removal of culverts are usually very disturbing to the surrounding area, and erosion and downstream movement of soils is often great. Culverts can also create obstructions to flow in a stream and inhibit fish migration. Depending on their size, culverts can be blocked by large debris in a stream and are therefore vulnerable to frequent washout.

If given a choice between building a bridge or a culvert as a temporary stream crossing, a bridge is preferred because of the relative minimal disturbance to streambanks and the opportunity for unimpeded flow through the channel.

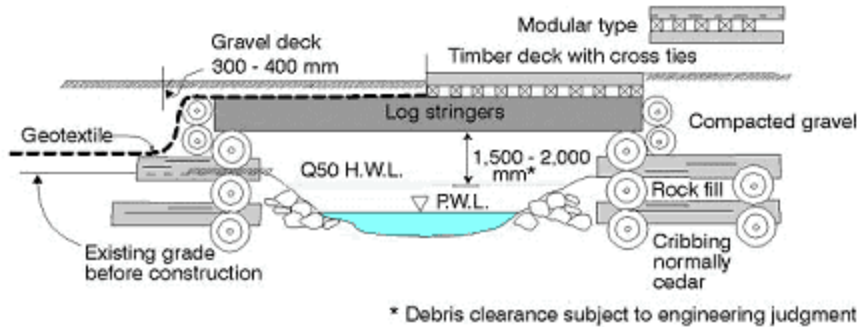
The approaches to fords often have high erosion potential. In addition, excavation of the streambed and approach to lay riprap or other stabilization material causes major stream disturbance. Mud and other debris are transported directly into the stream unless the crossing is used only during periods of low flow.

Siting and Design Considerations

Because of the potential for stream degradation, flooding, and safety hazards, stream crossings should be avoided on a construction site whenever possible. Consideration should be given to alternative routes to accessing a site before arrangements are made to erect a temporary stream crossing. If it is determined that a stream crossing is necessary, an area where the potential for erosion is low should be selected. If possible, the stream crossing structure should be selected during a dry period to reduce sediment transport into the stream.

If needed, over-stream bridges are generally the preferred temporary stream crossing structure. The expected load and frequency of the stream crossing, however, will govern the selection of a bridge as the correct choice for a temporary stream crossing. Bridges usually cause minimal disturbance to a stream's

banks and cause the least obstruction to stream flow and fish migration. They should be constructed only under the supervision and approval of a qualified engineer.



Properly installed stream crossings can prevent destruction of stream habitat (Source: British Columbia Ministry of Forests, no date)

As general guidelines for constructing temporary bridges, clearing and excavation of the stream shores and bed should be kept to a minimum. Sufficient clearance should be provided for floating objects to pass under the bridge. Abutments should be parallel to the stream and on stable banks. If the stream is less than 8 feet wide at the point a crossing is needed, no additional in-stream supports should be used. If the crossing is to extend across a channel wider than 8 feet (as measured from top of bank to top of bank), the bridge should be designed with one in-water support for each 8 feet of stream width.

A temporary bridge should be anchored by steel cable or chain on one side only to a stable structure on shore. Examples of anchoring structures include large-diameter trees, large boulders, and steel anchors. By anchoring the bridge on one side only, there is a decreased risk of downstream blockage or flow diversion if a bridge is washed out.

When constructing a culvert, filter cloth should be used to cover the streambed and streambanks to reduce settlement and improve the stability of the culvert structure. The filter cloth should extend a minimum of 6 inches and a maximum of 1 foot beyond the end of the culvert and bedding material. The culvert piping should not exceed 40 feet in length and should be of sufficient diameter to allow for complete passage of flow during peak flow periods. The culvert pipes should be covered with a minimum of 1 foot of aggregate. If multiple culverts are used, at least 1 foot of aggregate should separate the pipes.

Fords should be constructed of stabilizing material such as large rocks.

Maintenance Considerations

Temporary stream crossings should be inspected at least once a week and after all significant rainfall events. If any structural damage is reported to a bridge or culvert, construction traffic should stop use of the structure until appropriate repairs are made. Evidence of streambank erosion should be repaired immediately.

Fords should be inspected closely after major storm events to ensure that stabilization materials remain in place. If the material has moved downstream during periods of peak flow, the lost material should be replaced immediately.

Effectiveness

Both temporary bridges and culverts provide an adequate path for construction traffic crossing a stream or watercourse.

Cost Considerations

Generally speaking, temporary bridges are more expensive to design and construct than culverts. Bridges are also associated with higher maintenance and repair costs should they fail. Additional costs may accrue to the site team in terms of lost construction time if a temporary structure is washed out or otherwise fails.

References

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Model Ordinance

Aquatic buffer ordinances are a critical tool in protecting water quality. Good aquatic buffer ordinances specify the size and management of the stream buffer and are a specific planning tool to protect stream quality and aquatic habitat. Effective buffer ordinances provide guidelines for buffer creation and maintenance and should require:

- Buffer boundaries to be clearly marked on local planning maps
- Maintenance language that restricts vegetation and soil disturbance
- Tables that illustrate buffer width adjustment by percent slope and type of stream
- Direction on allowable uses and public education

The model ordinance provided here includes wording that can be used to establish stream buffer zones. Each of the ten sections provides suggested language or technical guidance to create the most effective stream buffer zones possible. Much of the model is based on Baltimore County, Maryland's regulations for the protection of water quality, streams, wetlands and floodplains. However, additional features and language have been added in certain sections to enhance the protective functions of the proposed stream buffer.

While the wording of buffer regulations is flexible, several features were determined to be integral in developing the most effective ordinance possible:

- The establishment of a minimum stream buffer width. A width of at least 100 feet is recommended in order to recognize all the benefits that the stream buffer can provide.
- The creation of a three-zone buffer system with the functions, widths, vegetative targets and management schemes for each zone explained in detail.
- Language that creates the ability to expand the buffer to include the 100-year floodplain, steep slopes, and any adjacent delineated wetlands or critical habitats.
- A thorough explanation of the limits and uses of the stream buffer system and the requirements expected for any development plan during the entire development process—from initial plan review, through construction.
- A system to permanently mark the buffer, both physically on-site and in the land records should be enacted.
- A designated management system for the buffer, detailing permitted and restricted uses within the buffer, and an educational program that ensures that future residents know about the buffer.
- Any waivers or variances which may be granted regarding the buffer should be explained in detail to avoid legal challenges.
- Maintenance guidelines and enforcement procedures for buffer violations should be included.

A strong buffer ordinance is only the first step to preserving stream buffers. In addition, communities will need an effective buffer program to manage buffers and enforce buffer regulations. During the construction phase, communities need to ensure that the clearing and grading permit is well-integrated with the forest buffer application. After construction, programs that educate citizens about the importance of the buffer and how to manage it can help preserve the buffer's integrity.

Along with a model ordinance for stream buffers, included on this site are sample stream buffer ordinances from various parts of the country selected because of applicability to local conditions:

Language from Baltimore County, MD: This includes language specifying the expansion of buffers for erodible soils and steep slopes.

Portland Metro Floodplain Preservation Ordinance: This model ordinance focuses on management of the floodway.

Ordinance on Riparian Habitat Areas, City of Napa, California: this model ordinance includes language for areas where forest is not the native riparian vegetation.

Model Land Trust Agreement (Natural Lands Trust) Land trust agreements, or similar documents, are often needed to ensure the long-term integrity of the buffer.

Buffer Model Ordinance

Define what is in each section and write each section

Section I. Background

Whereas, buffers adjacent to stream systems and coastal areas provide numerous environmental protection and resource management benefits which can include the following:

- a) restoring and maintaining the chemical, physical and biological integrity of the water resources
- b) removing pollutants delivered in urban stormwater
- c) reducing erosion and controlling sedimentation
- d) stabilizing stream banks
- e) providing infiltration of stormwater runoff
- f) maintaining base flow of streams
- g) contributing the organic matter that is a source of food and energy for the aquatic ecosystem
- h) providing tree canopy to shade streams and promote desirable aquatic organisms

The benefit applies primarily to forested buffer systems. In some areas, such as in prairie settings, the native vegetation may not be forest. See the example ordinance from Napa, California for an example.

- i) providing riparian wildlife habitat
- k) 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 vegetated 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 (Jurisdiction's) riparian and aquatic ecosystems; and to provide for the environmentally sound use of (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 where the floodplain flattens.

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

Buffer: A vegetated area, including trees, shrubs and herbaceous vegetation, which exists or is established to protect a stream system, lake, reservoir or coastal estuarine area. Alteration of this natural area is strictly limited.

Development: 1) The improvement of property for any purpose involving building; 2) Subdivision, or the division of a tract or parcel of land in to 2 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.

Non-Tidal Wetland: Those areas not influenced by tidal fluctuations that are inundated or saturated by surface 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.

The definition of "non-tidal wetland" here is adapted from the definition of "wetland" used by the US EPA and the Army Corps of Engineers. Other definitions will also be acceptable. See the Croton-on-Hudson Wetlands and Watercourses ordinance for an example.

Non-point Source Pollution: Pollution which 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, storm runoff, or ground water seepage rather than direct discharge.

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 one hundred (100) years.

Pollution: Any contamination or alteration of the physical, chemical, or biological properties of any waters that will render the waters harmful or detrimental to: public health, safety or welfare; domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; livestock, wild animals, or birds; fish or other aquatic life.

Stream Channel: Part of a water course either naturally or artificially created which 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:

- 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. At the confluence of two first order streams, a second order stream begins, and so on. (See Figure 1)

Stream System: A stream channel together with one or both of the following:

- 1) 100-year floodplain and/or
- 2) Hydrologically-related non-tidal wetlands

Streams: Perennial and intermittent watercourses identified through site inspection and 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. While 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 Hazard: A land use or activity that causes a relatively high risk of potential water pollution.

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 which 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 all surface mining operations except that the design standards shall not apply to active surface mining operations which 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 NRCS conservation plan that includes the application of best management practices.

Communities should carefully consider whether or not to 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). 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 which are causing or contributing to:

- 1) Pollution, including non-point 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 two hundred (200) feet into adjacent properties).
- 3) Field delineated and surveyed forest buffers
- 4) Limits of the ultimate one hundred year floodplain
The limits of the ultimate floodplain (i.e., the floodplain under "built-out" conditions) may 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 fifteen (15) percent for areas adjacent to and within two hundred (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., twenty five 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.E).

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 one hundred 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 twenty feet to up 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 political realities in the community.

1) In third order and higher streams, add twenty five feet to the base width.

2) Forest Buffer width shall be modified if there are steep slopes which are within a close proximity to the stream and drain into the stream system. In those cases, the forest buffer width can be adjusted.

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

Method A:

Percent Slope	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
0% - 14%	No change	Add 50 feet
15% - 25%	Add 25 feet	Add 75 feet
>25%	Add 50 feet	Add 100 feet

3) Forest buffers shall be extended to encompass the entire 100 year floodplain and a zone with minimum width of 25 feet beyond the edge of the floodplain.

4) 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.

D) 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) above or below ground petroleum storage facilities (150 feet)
- 3) drainfields from on-site sewage disposal and treatment system (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.

E. 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.

1) Zone 1 Streamside Zone

- a) The function of the streamside zone is to protect the physical and ecological integrity of the stream ecosystem.
- b) The streamside zone will begin at the edge of the stream bank of the active channel and extend 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 rights of way
 - iii) footpaths
 - iv) road crossings, where permitted.
- d) The vegetative target for the streamside zone is undisturbed native vegetation.

2) Zone 2 Middle Zone

- a) The function of the middle zone is to protect key components of the stream and to provide distance between upland development and the streamside zone.
- b) The middle zone will begin at the outer edge of the streamside zone and extend a minimum of 50 plus any additional buffer width as specified in Section VI C.
- 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) The vegetative target for the middle zone is mature native vegetation adapted to the region.

3) Zone 3 Outer Zone

- a) The function of the outer zone is to prevent encroachment into the forest buffer and to filter runoff from residential and commercial development.
- b) The outer zone will begin 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) There shall be no septic systems, permanent structures or impervious cover, with the exception of paths, within the outer zone.
- d) The vegetative target for the outer zone may vary, although the planting of native vegetation should be encouraged 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 the 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 in order 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:
 - a) An analysis needs to be conducted to ensure that no economically feasible alternative is available, and that the project is either necessary for flood control, or significantly improves the water quality or habitat in the stream.
 - b) In new developments, on-site and non-structural alternatives will be preferred over larger facilities within the stream buffer.
 - c) 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 place specific stormwater BMP design criteria in an ordinance, it is often preferable to reference a manual. Therefore, specific design information can change 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".

- d) 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 may be removed which are in danger of falling, causing damage to dwellings or other structures, or causing blockage of the stream.
 - 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 plats prepared for recording and all right-of-way plats shall clearly:
- 1) Show the extent of any forest buffer on the subject property by metes and bounds
 - 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 buffers areas stating: "Any forest buffer shown hereon is subject to protective covenants which may be found in the land

records and which 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 non-profit 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 which shall contain information on the management and maintenance requirements for the forest buffer 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 any 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 portion of this site.](#)

Section VIII Enforcement Procedures

A) (Director of Responsible Agency) 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 which 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 which has been violated, and what penalty, if any, is proposed to be assessed. The person charged has thirty (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 designee. At the conclusion of this hearing, the director or his designee will issue a final order, subject to appeal to the appropriate authority. If, within thirty (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.

D) 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.

E) Penalties which may be assessed for those deemed to be in violation may include:

- 1) A civil penalty not to exceed one thousand dollars (\$1,000.00) for each violation with each days continuance considered a separate violation.

- 2) A criminal penalty in the form of a fine of not more than one thousand dollars (\$1,000.00) for each violation or imprisonment for not more than ninety (90) days, or both. Every day that such violations shall continue will be considered a separate offense.
- 3) Anyone who knowingly makes any false statements in any application, record, plat, or plan required by this ordinance shall upon conviction be punished by a fine of not more than one thousand dollars (\$1,000.00) for each violation or imprisonment for not more than thirty (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/Variations

A) This ordinance shall apply to all proposed development except for that development which prior to the effective date of this ordinance:

- 1) Is covered by a valid, unexpired plat in accordance with development regulations
- 2) Is covered by a current, executed public works agreement
- 3) Is covered by a valid, unexpired building permit
- 4) Has been accepted to apply for a building permit
- 5) Has been granted 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 where it can be demonstrated that strict compliance with the ordinance would result in 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) For 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 relaxed and the buffer permitted to become narrower 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 narrowing, and no new structures are built within the one hundred (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 alternatives 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, the placement of signs, and the establishment of water quality best management practices in order 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.

References

Heraty, M. 1993. Riparian buffer programs: a guide to developing and implementing a riparian buffer program as an urban best management practice. Metropolitan Washington Council of Governments. US EPA Office of Wetlands, Oceans and Watersheds. Washington, DC.

Schueler, T. 1995. [Site planning for urban stream protection](#). Metropolitan Washington Council of Governments. US EPA Office of Wetlands, Oceans and Watersheds. Washington, DC.

Welsch, D. 1991. Riparian forest buffers. US Department of Agriculture, Forest Service. Forest Resources Management. FS Pub. No. NA-PR-07-91. Radnor, PA.

FIGURE I
STREAM ORDER HIERARCHY

FIGURE 1
STREAM ORDER HIERARCHY

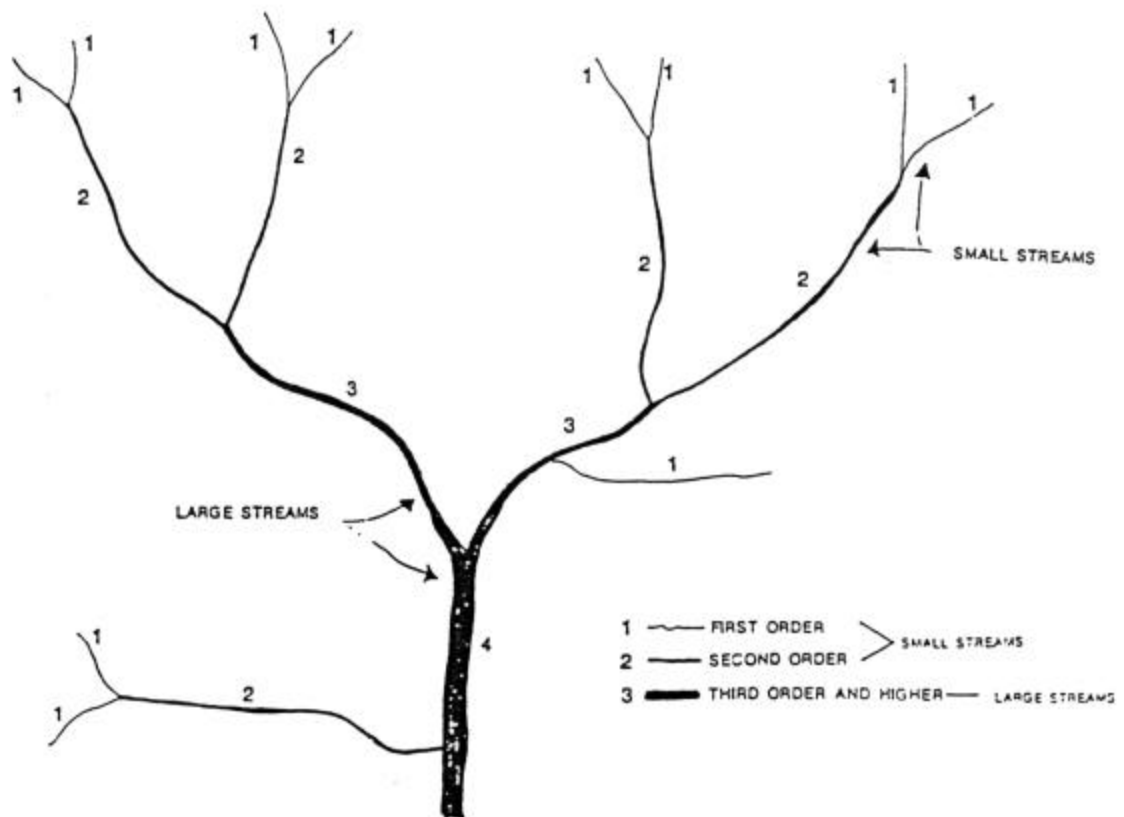
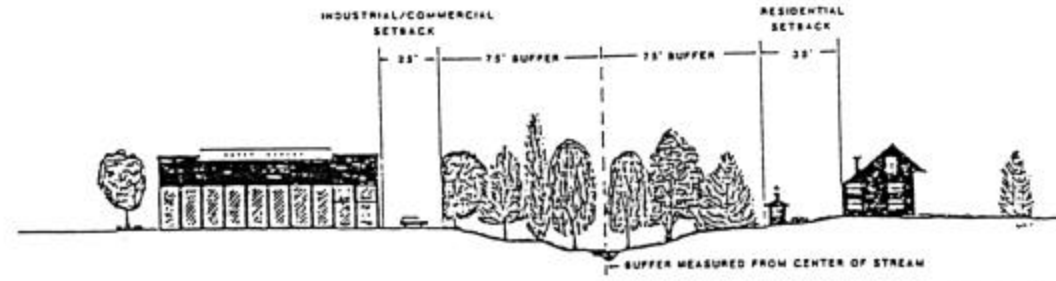


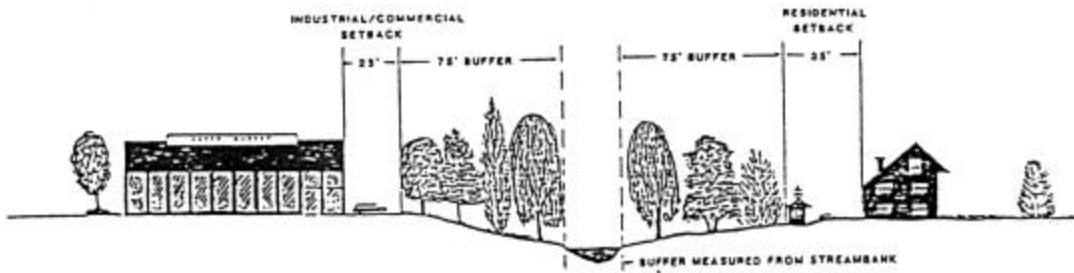
Figure 2
Stream Buffer

**FIGURE 2
STREAM BUFFER**

SMALL STREAMS (FIRST OR SECOND ORDER)
BUFFER IS MEASURED FROM CENTER OF STREAM



LARGER STREAMS (THIRD ORDER AND HIGHER)
BUFFER IS MEASURED FROM STREAMBANK



NOTE: FOR TROUT STREAMS (CLASS III & IV), STREAM BUFFER IS INCREASED FROM 75' TO 100'

Figure 3
Wetland Buffer

FIGURE 3
WETLAND BUFFER
FOR A SMALL, CLASS I STREAM
BUFFER CONSISTS OF EXTENT OF WETLAND PLUS 25'
OR 75' (WHICHEVER IS GREATER)

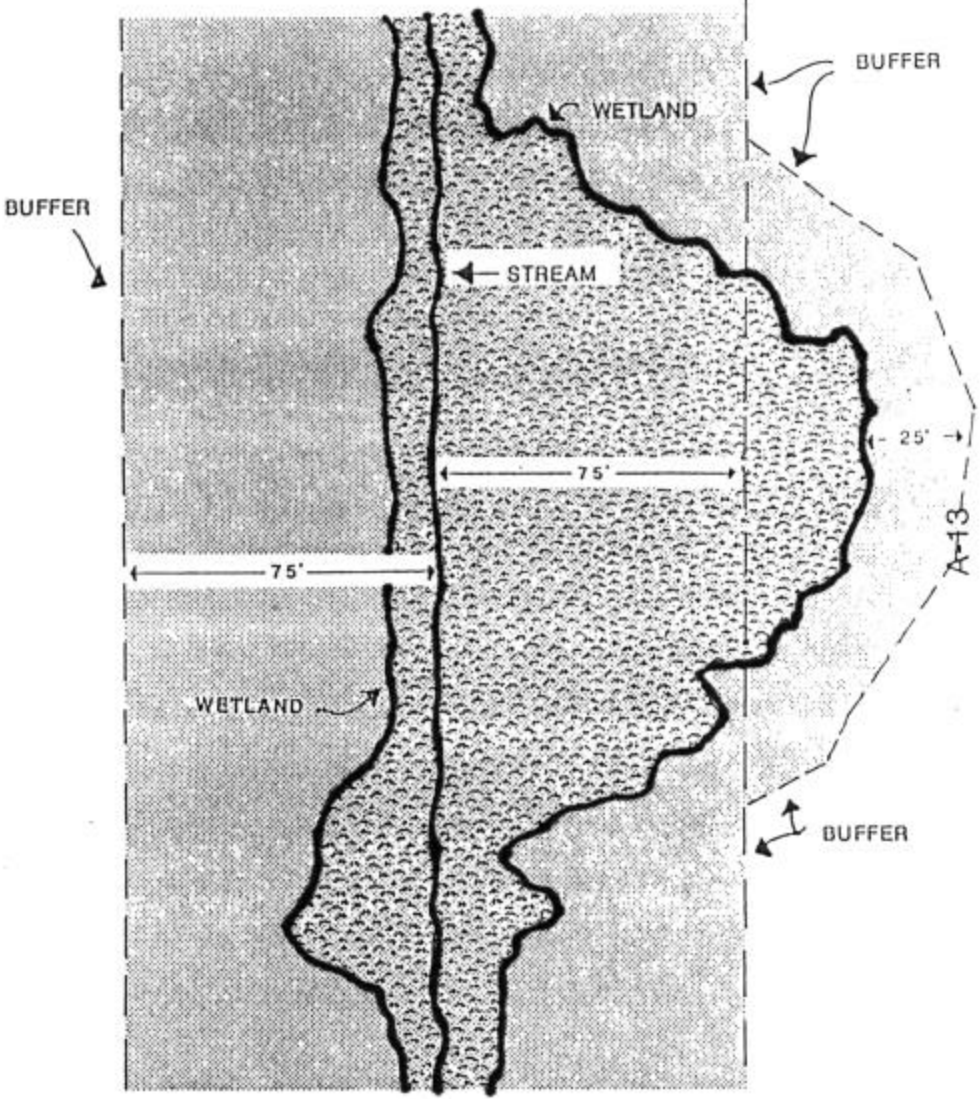


Figure 4
Floodplain Buffer

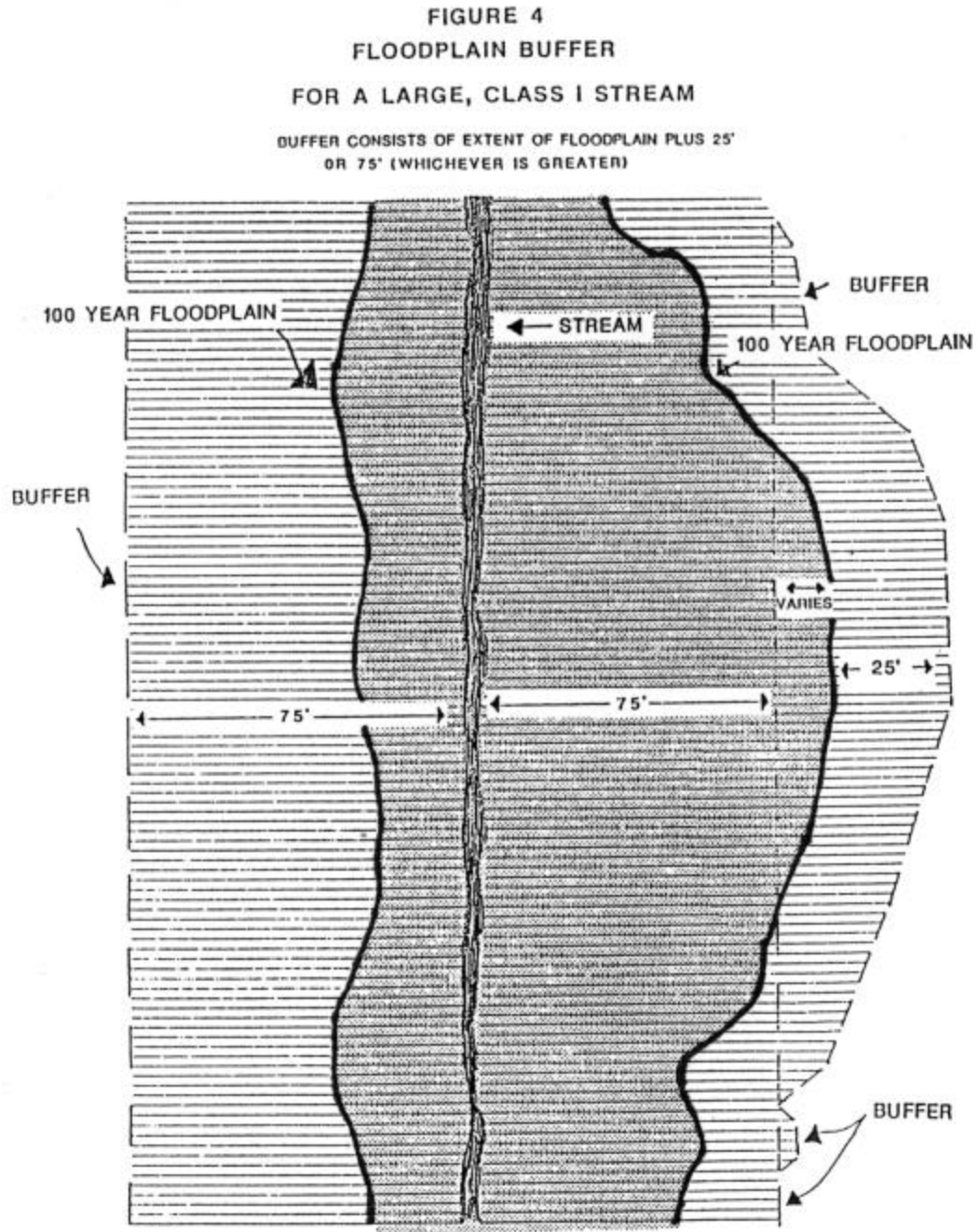
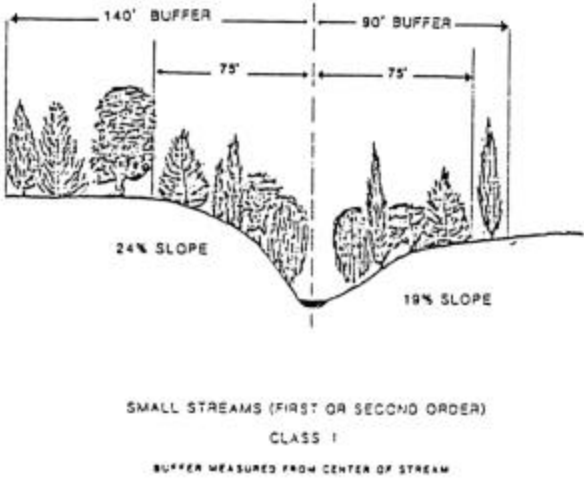


Figure 5
Buffer Expansion for Steep Slopes

FIGURE 5
BUFFER EXPANSION FOR STEEP SLOPES



AVERAGE SLOPE %	CLASS I BUFFER WIDTH	CLASS III & IV BUFFER WIDTH
18	80	100
19	90	100
20	100	100
21	110	110
22	120	120
23	130	130
24	140	140
25	150	150

- NOTE: 1) FOR LARGER STREAMS (THIRD ORDER AND HIGHER), THE BUFFER IS MEASURED FROM THE STREAMDANK.
2) FOR SLOPES GREATER THAN 25%, THE DIRECTOR OF THE DEPARTMENT SHALL DETERMINE THE BUFFER WIDTH ON A CASE-BY-CASE BASIS.

BUFFER PROTECTION AND MANAGEMENT ORDINANCE

Baltimore County, MD

Environmental Protection and Resource Management

(410) 887-5683

Sec. 14-341. Design standards for forest buffers and building setbacks.*(a) General requirements.*

- (1) 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, floodplain, and 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. This adjustment shall be accomplished by evaluating the potential of a site for impacts that result from runoff, soil erosion, and sediment transport.
- (2) For those sites where forest vegetation does not exist, it is acceptable to allow the forest buffer to succeed naturally to a wooded state. However, if channel erosion, stream pollution, or habitat degradation exists at that site or has been caused downstream from that site, the director may require planting of the forest buffer and any additional water quality protection measures.

*(b) The department may post the forest buffer.**(b) Forest buffer standards for streams, wetlands, and floodplains.*

- (1) For a first or second order stream, the forest buffer shall be measured from the centerline. For all higher order streams, the forest buffer shall be measured from the stream bank of the active channel (bank-full flow).
- (2) For a use I or IP stream, the forest buffer shall be the greater of the following:
 - a. Seventy-five (75) feet,
 - b. Twenty-five (25) feet from the outer wetland boundary, or
 - c. Twenty-five (25) feet from the one hundred-year floodplain reservation or easement boundary.
- (3) For a use III, III-P, IV or TV-P stream (natural and recreational trout waters), the forest buffer shall be the greater of the following:
 - a. One hundred (100) feet,
 - b. Twenty-five (25) feet from the outer wetland boundary, or
 - c. Twenty-five (25) feet from the onehundred-year floodplain reservation or easement boundary

(c) Adjusted forest buffer standards and requirements for streams and wetlands with adjacent steep slopes and erodible soils.

- (1) A steep slope and erodible soils evaluation shall be conducted in accordance with the evaluation procedures and criteria specified herein or a comparable method approved by the director for sites containing or adjacent to streams, wetlands, or other waterbodies where:
 - a. Slopes exceed ten (10) percent within five hundred (500) feet of the streams, wetlands, or waterbodies;
 - b. Soil erodibility K values exceed .24 within five hundred (500) feet of the streams, wetlands, or waterbodies; or
 - c. The vegetative cover within one hundred (100) feet of the streams, wetlands, or waterbodies is: bare soil; fallow land; crops; active pasture in poor or fair condition; orchard-tree farm in poor or fair condition; brush-weeds in poor condition; or woods in poor condition.
- (2) An evaluation report shall be submitted for review to the department. This report shall include, as

a minimum, the following:

- a. A plan, at a scale not smaller than 1" = 100', that shows:
 1. Existing topography with contour intervals no greater than five (5) feet. County photogrammetric maps are an acceptable source for preparing existing topography.
 2. Mapped soils as shown in the county soil survey,
 3. Field delineated, marked, and surveyed streams and wetlands,
 4. Existing vegetation,
 5. Existing subdrainage areas of the site, and
 6. Slopes in each subdrainage area segmented into sections of slopes less than or equal to ten (10) percent; eleven (11) to nineteen (19) percent; and greater than or equal to twenty (20) percent;
 - b. All slope analysis data forms;
 - c. A summary of findings including information pertinent to the evaluation of the site; and
 - d. A mitigation plan that describes the proposed additional protective measures for those areas where development is allowed with restrictions.
- (3) The site shall be evaluated by assessing each segment of each subdrainage area using the evaluation criteria in Table 1. Each segment shall be given a score for slope, slope length, soil erodibility, vegetative cover, and sediment delivery. A total score shall be assigned for each segment. A segment of a subdrainage area with a total score of thirty-Five (35) or greater shall be designated as part of the forest buffer and no development shall be approved in that segment. A segment with a total score of twenty-five (25) or thirty (30) shall require the application of additional protective measures; however, development shall not be prohibited and that area shall not be part of the forest buffer. A segment with a score of twenty (20) or less shall be developed with standard protective measures and that area shall not be part of the forest buffer.

Table 1
Evaluation Criteria for Steep Slopes and Erodible Soils

Factors	Scores		
	High (10)	Medium (5)	Low (0)
Slope (S)	S ≥ 20%	10% < S < 20%	S < 10%
Slope length (SL)	SL ≥ 200'	50' < SL < 200'	SL < 50'
Soil erodibility (K)	K ≥ 0.32	0.24 < K < 0.32	K < 0.24
Vegetative cover	Bare soil, fallow land, crops, active pasture in poor condition, orchard-tree farm in poor condition	Active pasture in fair condition, brush-weeds in poor condition, orchard-tree farm in fair condition, woods in poor condition	Active pasture in good condition, undisturbed meadow, brush-weeds in fair condition, orchard-tree farm in good condition, woods in fair condition
Sediment delivery (distance from downslope limit of disturbance to outer edge of wetlands or top of streambank)	Adjacent to water-courses or wetlands (< 100' buffer)	Adjacent to water-courses or wetlands (100'-300' buffer)	Not adjacent to water-courses or wetlands (>300' buffer)

(a) *Standards for building setbacks.*

- (1) At a minimum, the primary or principal structure on a parcel or lot shall be set back from the outer edge of the forest buffer as follows:
 - a. Residential dwellings, thirty-five (35) feet;
 - b. Commercial structures, twenty-five (25) feet;
 - c. Industrial structures, twenty-five (25) feet.

- (2) The setback can include either private or public land or both. Appurtenant or accessory structures including roads and driveways, utilities, recreational facilities, patios, etc., are permitted within the setback area. (Bill No. 224, 1990, § 1(38-33))

Sec. 14-342. Management requirements for forest buffers.

- (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 the forest buffer, except as provided for in forest harvesting operations which are implementing a forest management plan approved by the department, the state department of natural resources, the county forest conservancy district board, or the county soil conservation district, as provided for in surface mining operations which are operating in compliance with a state surface mining permit or as provided for in agricultural operations in accordance with a soil conservation and water quality plan approved by the county soil conservation district:
- (1) The existing vegetation within the forest buffer shall not be disturbed except as provided in (b) below. This includes, but is not limited to, disturbance by tree removal, shrub removal, clearing, mowing, burning, spraying, and grazing.
 - (2) Soil disturbance shall not take place within the forest buffer by grading, stripping of topsoil, plowing, cultivating, or other practices.
 - (3) Filling or dumping shall not occur within the forest buffer.
 - (4) Except as permitted by the department, the forest buffer shall not be drained by ditching, underdrains, or other drainage systems.
 - (5) Pesticides shall not be stored, used, or applied within the forest buffer, except for the spot spraying of noxious weeds consistent with the recommendations of the University of Maryland Cooperative Extension Service.
 - (6) Animals shall not be housed, grazed, or otherwise maintained within the forest buffer.
 - (7) Motorized vehicles shall not be stored or operated within the forest buffer, except for maintenance and emergency use approved by the department.
 - (8) Materials shall not be stored within the forest buffer.
- (b) The following structures, practices, and activities are permitted in the forest buffer:
- (1) Roads, bridges, trails, storm drainage, stormwater management facilities, and utilities approved by the department are permitted within the forest buffer provided that an alternatives analysis has clearly demonstrated that no other feasible alternative exists and that minimal disturbance will take place. This alternatives analysis shall be submitted to the department in accordance with section 14-334 of these regulations. These structures shall be located, designed, constructed, and maintained to provide maximum erosion protection, to have the least adverse effects on wildlife, aquatic life, and their habitats, and to maintain hydrologic processes and water quality. Following any disturbance, the impacted area shall be restored.
 - (2) Stream restoration projects, facilities and activities approved by the department are permitted

within the forest buffer.

- (3) Scientific studies approved by the department, including water quality monitoring and stream gauging, are permitted within the forest buffer.
- (4) Horticulture practices may be used to maintain the health of individual trees in the forest buffer.
- (5) Individual trees in the forest buffer may be removed which are in danger of falling, causing damage to dwellings or other structures, or causing the blockage of streams.
- (6) Other timber cutting techniques approved by the department may be undertaken within the forest buffer under the advice and guidance of the state departments of agriculture and natural resources, if necessary to preserve the forest from extensive pest infestation, disease infestation, or threat from fire.

(Bill No. 224, 1990, § 1(38-39))

Sec. 14-343. Conflict with other regulations.

(a) Where the standards and management requirements for forest buffers are in conflict with other laws, regulations, and policies regarding streams, steep slopes, erodible soils, wetlands, floodplains, forest harvesting, surface mining, land disturbance activities, development in the Chesapeake Bay Critical Area, or other environmental protection measures, the more restrictive shall apply.

(b) In addition to compliance with the regulations herein, all proposed activities, projects, and developments within a one-hundred-year riverine floodplain or one-hundred-year tidal flood area shall also comply with the regulations and requirements of the departments of public works and permits and licenses.

(Bill No. 224, 1990, § 1(38-40))

Sec. 14-344. Public and private improvements of development.

(a) In addition to the provisions of article V of title 26 and in accordance with the provisions of section 14-337 of the regulations herein:

- (1) The applicant shall provide improvements to the forest buffer and stream system in order to abate and correct:
 - a. Water pollution,
 - b. Erosion and sedimentation of stream channels, and
 - c. Degradation of aquatic and riparian habitat; and

(2) The county may participate in the cost of any such improvement.

(b) For any forest buffer or forest buffer easement:

(1) Access easements shall be dedicated by the applicant to the county, of which the number, locations, and design standards shall be determined by the department; and

(2) Permanent boundary markers, in the form of monuments, shall be installed by the applicant upon request of the department.

(Bill No. 224, 1990, § 1(38-41))

Sec. 14-345. Enforcement procedures.

- (a) The director of the department is authorized and empowered to enforce these regulations in accordance with the procedures of this section.
- (b) If, upon inspection or investigation, the director or his designee is of the opinion that any person has violated any provision of these regulations, order, or permit condition promulgated or issued under these regulations, he shall with reasonable promptness issue a correction notice to the person, on such form as prescribed and approved by the director. Each such notice shall be in writing and shall describe with particularity the nature of the violation, including a reference to the provision of these regulations, order, or permit condition alleged to have been violated. In addition, the notice shall fix a reasonable time for the abatement and correction of the violation.
- (c) If, after the time fixed for abatement and correction of the violation has expired pursuant to (b) above, an inspection by the director or his designee determines that the violation or violations continue, the director shall issue a citation by certified mail to the person who is in violation on such form as prescribed and approved by the director. Each citation shall be in writing and shall describe with particularity the nature of the violation, including a reference to the provision of

Problem with the file as posted on the www.stormwatercenter.net

FIGURE I
STREAM ORDER HIERARCHY

FIGURE 1
STREAM ORDER HIERARCHY

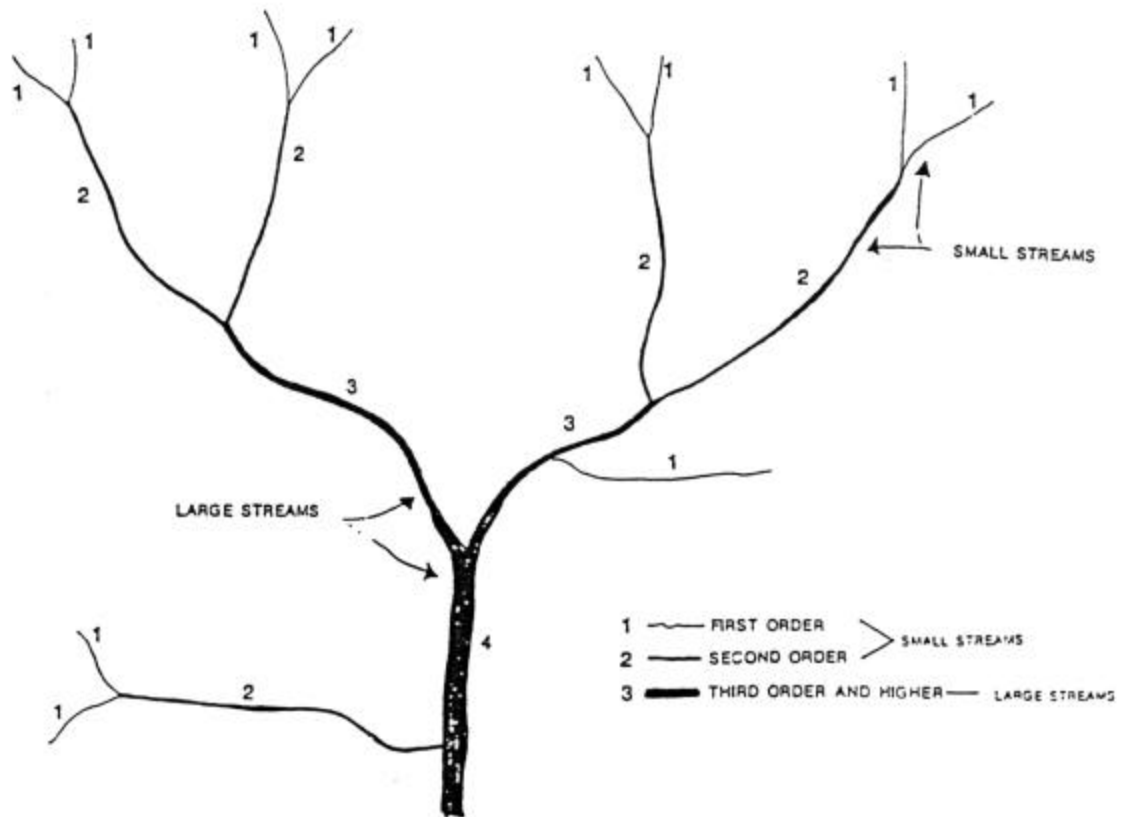
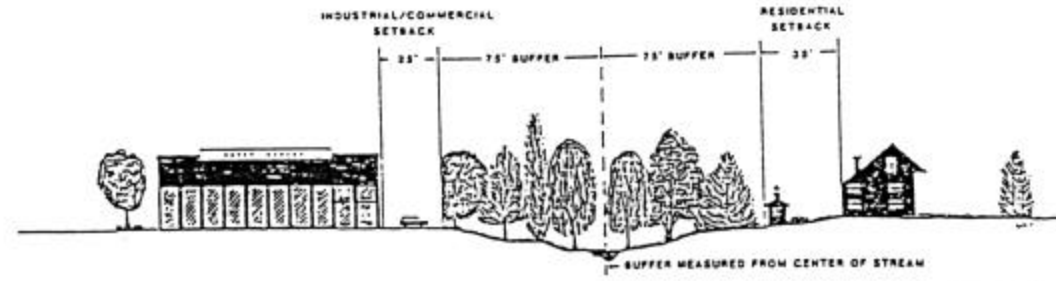


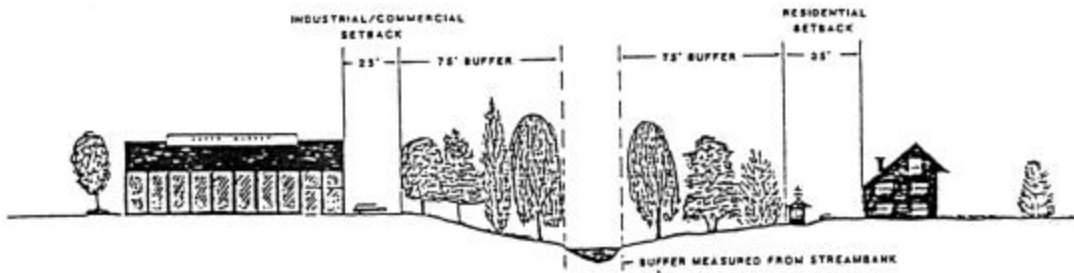
Figure 2
Stream Buffer

**FIGURE 2
STREAM BUFFER**

SMALL STREAMS (FIRST OR SECOND ORDER)
BUFFER IS MEASURED FROM CENTER OF STREAM



LARGER STREAMS (THIRD ORDER AND HIGHER)
BUFFER IS MEASURED FROM STREAMBANK



NOTE: FOR TROUT STREAMS (CLASS III & IV), STREAM BUFFER IS INCREASED FROM 75' TO 100'

Figure 3
Wetland Buffer

FIGURE 3
WETLAND BUFFER
FOR A SMALL, CLASS I STREAM
BUFFER CONSISTS OF EXTENT OF WETLAND PLUS 25'
OR 75' (WHICHEVER IS GREATER)

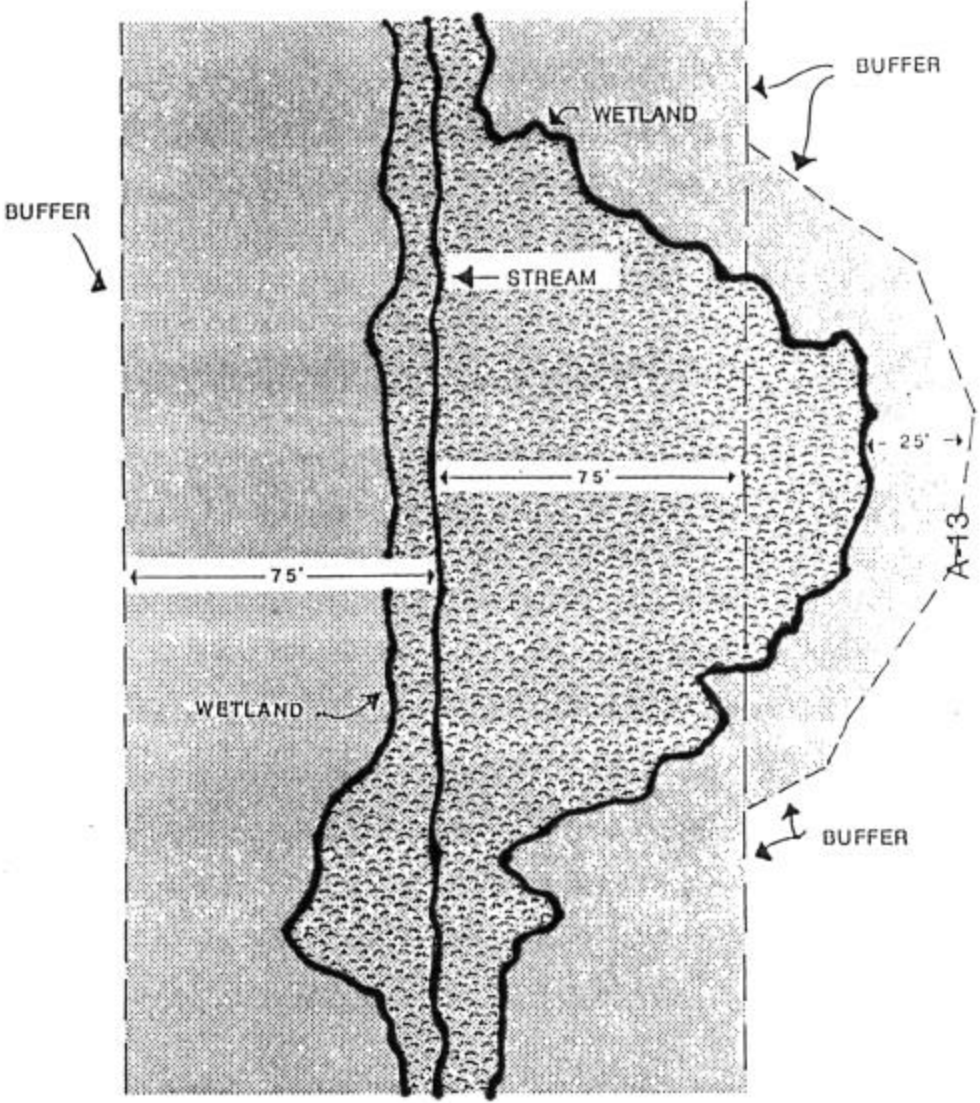


Figure 4
Floodplain Buffer

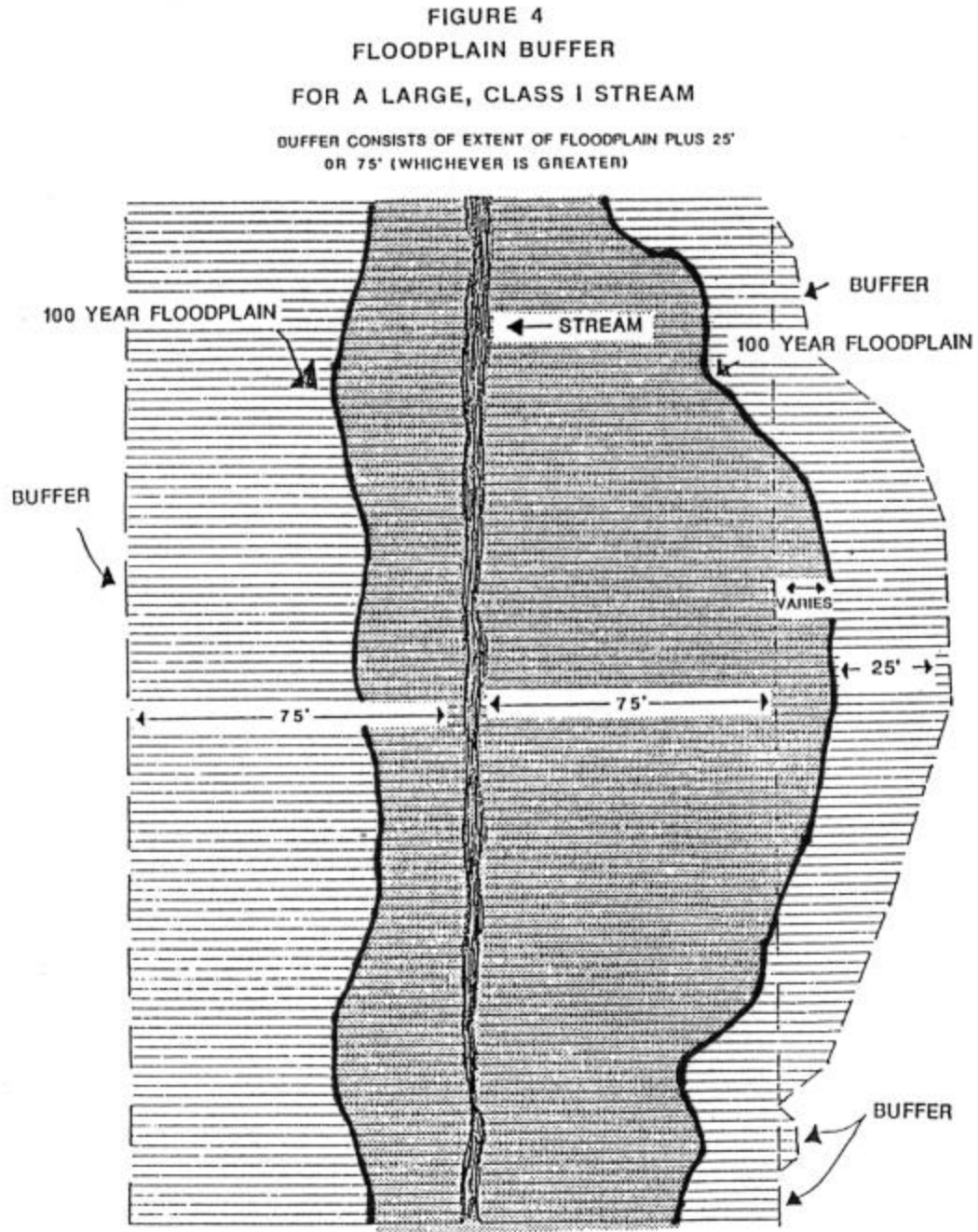
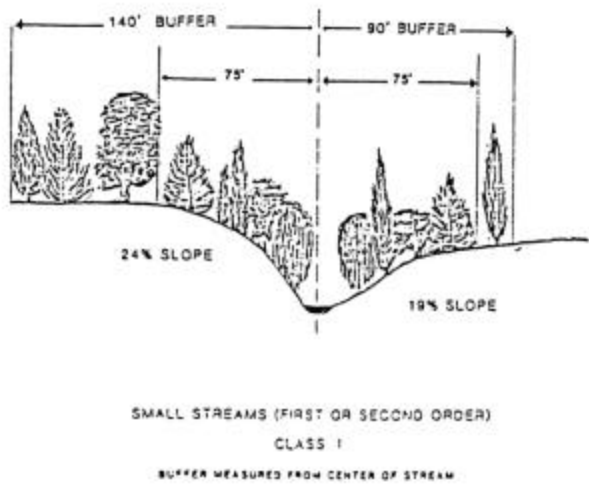


Figure 5
Buffer Expansion for Steep Slopes

FIGURE 5
BUFFER EXPANSION FOR STEEP SLOPES



AVERAGE SLOPE %	CLASS I BUFFER WIDTH	CLASS III & IV BUFFER WIDTH
18	80	100
19	90	100
20	100	100
21	110	110
22	120	120
23	130	130
24	140	140
25	150	150

- NOTE: 1) FOR LARGER STREAMS (THIRD ORDER AND HIGHER), THE BUFFER IS MEASURED FROM THE STREAMDANK.
2) FOR SLOPES GREATER THAN 25%, THE DIRECTOR OF THE DEPARTMENT SHALL DETERMINE THE BUFFER WIDTH ON A CASE-BY-CASE BASIS.

FLOODPLAIN PRESERVATION MANAGEMENT

Portland Metro

Growth Management Services

(503) 797 - 1839

Flood Management

- A. The purpose of these standards is to reduce the risk of flooding, prevent or reduce risk to human life and property, and maintain the functions and values of floodplains, such as allowing for the storage and conveyance of stream flows through existing and natural flood conveyance systems.
- B. This ordinance establishes a Flood Management Area Overlay Zone, which is delineated on the Water Quality and Flood Management Area Map attached and incorporated by reference as a part of this ordinance.
- C. The Flood Management Areas mapped include:
 - 1. Land contained within the 100-year floodplain, flood area and floodway as shown on the Federal Emergency Management Agency Flood Insurance maps and the area of inundation for the February 1996 flood; and
 - 2. Lands that have physical or documented evidence of flooding within recorded history. Jurisdictions shall use the most recent and technically accurate information available to determine the historical flood area, such as the aerial photographs of the 1996 flooding and digitized flood elevation maps.
 - 3. The standards that apply to the Flood Management Areas apply in addition to local, state or federal restrictions governing floodplains or flood hazard areas.
- D. Uses Permitted Outright:
 - 1. Excavation and fill required to plant any new trees or vegetation.
 - 2. Restoration or enhancement of floodplains, riparian areas, wetland, upland and streams that meet federal and state standards.
- E. Conditional Uses:

All uses allowed in the base zone or existing flood hazard overlay zone are allowed in the Flood Management Overlay Zone subject to compliance with the Development Standards of subsection G.
- F. Prohibited Uses:
 - 1. Any use prohibited in the base zone or existing flood hazard overlay zone.
 - 2. Uncontained areas of hazardous materials as defined by the Department of Environmental Quality.
- G. Development Standards

All development, excavation and fill in the floodplain shall conform to the following balanced cut and fill standards:

 - 1. No net fill in any floodplain is allowed. All fill placed in a floodplain shall be balanced with at least an equal amount of soil material removal.
 - 2. Excavation areas shall not exceed fill areas by more than 50 percent of the square footage.
 - 3. Any excavation below bankfull stage shall not count toward compensating for fill.

(Note: These areas would be full of water in the winter and not available to hold stormwater.)

4. Excavation to balance a fill shall be located on the same parcel as the fill unless it is not reasonable or practicable to do so. In such cases, the excavation shall be located in the same drainage basin and as close as possible to the fill site, so long as the proposed excavation and fill will not increase flood impacts for surrounding properties as determined through hydrologic and hydraulic analysis.
5. For excavated areas identified by the city or county to remain dry in the summer, such as parks or mowed areas, the lowest elevation of the excavated area shall be at least 6 inches above the winter "low water" elevation, and sloped at a minimum of two percent towards the Protected Water Feature. One percent slopes will be allowed in smaller areas.
6. For excavated areas identified by the city or county to remain wet in the summer, such as a constructed wetland, the grade shall be designed not to drain into the Protected Water Feature.
7. Minimum finished floor elevations must be at least one foot above the design flood height or highest flood of record, whichever is higher, for new habitable structures in the Flood Area.
8. Short-term parking in the floodplain may be located at an elevation of no more than one foot below the ten-year floodplain so long as the parking facilities do not occur in a Water Quality Resource Area. Long-term parking in the floodplain may be located at an elevation of no more than one foot below the 100-year floodplain so long as the parking facilities do not occur in a Water Quality Resource Area.
9. Temporary fills permitted during construction shall be removed.
10. New culverts, stream crossings and transportation projects shall be designed as balanced cut and fill projects or designed not to significantly raise the design flood elevation. Such projects shall be designed to minimize the area of fill in Flood Management Areas and to minimize erosive velocities. Stream crossings shall be as close to perpendicular to the stream as practicable. Bridges shall be used instead of culverts wherever practicable.
11. Excavation and fill required for the construction of detention facilities or structures, and other facilities, such as levees, specifically shall be designed to reduce or mitigate flood impacts and improve water quality. Levees shall not be used to create vacant buildable lands.

Ordinance on Riparian Habitat Areas

City of Napa, California

17.60.80 Riparian Habitat Areas

The following provisions shall apply to all lots which are contiguous with or directly adjoin an intermittent or perennial stream or river identified in and consistent with the conservation element of the general plan (portions of the Napa River, Napa Creek, Redwood Creek, Browns Valley Creek, Milliken Creek, Sarco Creek, and Tulocay Creek). Lots to which the provisions of this section apply shall be indicated on the zoning map as "CR-6."

- H. A protective streamside buffer fifty feet in width measured from the top of a stream, creek or riverbank landward shall be observed. Top of the bank shall mean the highest elevation of land which confines to their channel waters flowing in an intermittent or perennial stream or river. Except as provided in subsection F of this section, a riparian habitat management plan, prepared by a registered civil engineer or landscape architect shall be required for development including grading, dredging, and filling within the protective streamside buffer. The riparian habitat management plan shall be submitted to the planning director and public works director for review and approval.
- I. The protective streamside buffer required by subsection A of this section is a minimum and may be increased if necessary to mitigate the impact of the proposed development on riparian habitat areas.
- J. A riparian habitat management plan shall address the following requirements:
 - 1. Site development shall be fitted to the topography and soil so as to create the least potential for vegetation loss and site disturbance;
 - 2. Vegetation removal shall be limited to that amount necessary for the development of the site. Protection of tree crowns and root zones shall be required for all trees planned for retention;
 - 3. Vegetation indigenous to the site or plan community shall be restored in areas affected by construction activities. Temporary vegetation, sufficient to stabilize the soil, may be required on all disturbed areas as needed to prevent soil erosion. New planting shall be given sufficient water, fertilizer and protection to insure reestablishment. Plants which minimized fire hazards should be utilized adjacent to buildings and structures;
 - 4. If proposed development including grading, dredging and filling within the protective streamside buffer would affect the banks of the stream or river, bank stabilization using techniques acceptable to the public works director shall be required to prevent erosion;
 - 5. The riparian habitat management plan shall be developed in consultation with the Department of Fish and Game and/or United States Army Corps of Engineers;
 - 6. A discussion of site design to minimize the disturbance and loss of vegetation.
- K. A riparian habitat management plan shall be drawn to scale and shall be of sufficient clarity to indicate the nature and extent to the work, bank stabilization and revegetation efforts proposed. A riparian habitat management plan shall include the following information:
 - 1. Name and address of owner;
 - 2. Name, address, professional status, license number, and phone number of the person who prepared the plan;
 - 3. Location and assessor's parcel number of the proposed site;
 - 4. North arrow, scale, and the name and location of the nearest public road intersection;
 - 5. Existing contours of the site, as well as finished contours to be achieved by grading. Contours shall be sufficiently detailed to define the topography over the entire site (generally at two-foot intervals);

6. Detailed plans of all bank stabilization and erosion control measures
 7. Delineation of areas to be cleared during development activities;
 8. Restoration vegetation proposed for all surfaces exposed to be exposed during development activities, including any dredged, filled or graded areas;
 9. The location and extent of open space buffers and method implementation; any use restrictions and method of implementation.
- L. All approved measures to mitigate the loss or impact to riparian habitat shall become conditions or approval of the project. In addition all approved riparian habitat management measures shall be carried out prior to final clearance of the building permit or concurrently with the installation of site improvements in the case of a subdivision map.
- M. The planning director may waive the requirement for a riparian habitat management plan for projects which will not result in disturbance to the land or where on-site conditions clearly demonstrate that the site is not now occupied by riparian habitat vegetation and would not effectively respond to riparian revegetation. An applicant requesting such a waiver shall submit sufficient information to substantiate the waiver. Such projects may include, but are not limited to the following:
1. A change of use or status of the property (i.e. rezoning) which will not directly result in construction or land-disturbing activities;
 2. An accessory building less than five hundred square feet in size;
 3. Construction within an existing structure;
 4. A lot line adjustment. (Prior code 30-337).

MODEL CONSERVATION EASEMENT

Natural Lands Trust

(610) 353 - 5587

Source:

Diehl, J. and T. Barrett. "The Conservation Easement Handbook". For: the Trust for Public Land and the Land Trust Alliance. Washington, DC.

Model Conservation Easement

Note: The boxed numbers inserted in the text of the easement correspond with the subheading numbers in the commentary that follows.

DEED OF CONSERVATION EASEMENT 1

THIS GRANT DEED OF CONSERVATION EASEMENT is made this _____ day of _____, 19____, by _____ and _____, husband and wife, having an address at _____ (“Grantors”), in favor of _____ a non profit [state of incorporation] corporation [qualified to do business in _____ (state where property is located)], having an address at _____ (“Grantee”). 2

WITNESSETH:

WHEREAS, 3 grantors are the sole owners in fee simple of certain real property in _____ County, _____ [state], more particularly described in Exhibit A attached hereto and incorporated by this reference (the “Property”); 4 and

WHEREAS, the property possesses [e.g., natural, scenic, open space, historical, educational, and/or recreational] values (collectively, “conservation values”) of great importance to Grantors, the people of _____ [county, locale, or region]. And the people of the State of _____; 5 and

WHEREAS, in particular, _____ [describe specific conservation values]; 6 and

WHEREAS, the specific conservation values of the Property are documented in an inventory of relevant features of the Property, dated _____, 19____, _____ [on file at the offices of Grantee—or—attached hereto as Exhibit B] and incorporated by this reference (“Baseline Documentation”), which consists of reports, maps, photographs, and other documentation that the parties agree provide, collectively, an accurate representation of the Property at the time of this grant and which is intended to serve as an objective information baseline for monitoring compliance with the terms of this grant; and 7

WHEREAS, Grantors intend that the conservation values of the Property be preserved and maintained by the continuation of land use patterns, including, without limitation, those relating to _____ [e.g., farming, ranching, or timber production]. Existing at the time of this grant, that do not significantly impair or interfere with those values; and 8

WHEREAS, Grantors further intend, as owners of the Property, to convey to Grantee the right to preserve and protect the conservation values of the Property in Perpetuity; and 9

WHEREAS, Grantee is a publicly supported, tax-exempt nonprofit organization, qualified under Section 501(c)(3) and 170(h) of the Internal Revenue Code, whose primary purpose is [e.g., the preservation, protection, or enhancement of land in its natural, scenic, historical, agricultural, forested, and/or open space condition]; and 10

WHEREAS, grantee agrees by accepting this grant to honor the intentions of Grantors stated herein and to preserve and protect in perpetuity the conservation values of the Property for the benefit of this generation and

the generations to come; 11

NOW, THEREFORE, in consideration of the above and the mutual covenants, terms, conditions, and restrictions contained herein, and pursuant to the laws of [state where property is located] and in particular [specific state statutory authority] , Grantors hereby voluntarily grant and convey to Grantee a conservation easement in perpetuity over the Property of the nature and character and to the extent hereinafter set forth ("Easement"). 12

1. Purpose. It is the purpose of this Easement to assure that the Property will be retained forever [predominantly] in its [e.g., natural, scenic, historic, agricultural, forested, and/or open space] condition and to prevent any use of the Property that will significantly impair or interfere with the conservation values of the Property. Grantors intend that this Easement will confine the use of the Property to such activities, including, without limitation, those involving [e.g., farming, ranching, timber production, public recreation, or education] , as are consistent with the purpose of this Easement. 13

2. Rights of Grantee. To accomplish the purpose of this Easement the following rights are conveyed to Grantee by this Easement:

- a. To preserve and protect the conservation values of the Property;
- b. To enter upon the Property at reasonable times in order to monitor Grantors' compliance with and otherwise enforce the terms of this Easement; provided that such entry shall be upon prior reasonable notice to Grantors, and Grantee shall not unreasonably interfere with Grantors' use and quiet enjoyment of the Property; and
- c. To prevent any activity on or use of the Property that is inconsistent with the purpose of this Easement and to require the restoration of such areas or features of the Property that may be damaged by any inconsistent activity or use, pursuant to paragraph 6. 14

3. Prohibited Uses. Any activity on or use of the Property inconsistent with the purpose of this Easement is prohibited. Without limiting the generality of the foregoing, the following activities and uses are expressly prohibited: 15

[Insert Express Restrictions] 16

4. Reserved Rights. Grantors reserve to themselves, and to their personal representatives, heirs, successors, and assigns, all rights accruing from their ownership of the Property, including the right to engage in or permit or invite others to engage in all uses of the Property that are not expressly prohibited herein and are not inconsistent with the purpose of this Easement. [Without limiting the generality of the foregoing, the following rights are expressly reserved:] 17

[Insert Express Reservations, if desired] 18

5. Notice of Intention to Undertake Certain Permitted Actions. The purpose of requiring Grantors to notify Grantee prior to undertaking certain permitted activities, as provided in paragraphs _____, is to afford Grantee an opportunity to ensure that the activities in question are designed and carried out in a manner consistent with the purpose of this Easement. Whenever notice is required Grantors shall notify Grantee in writing not less than [e.g., sixty (60)] days prior to the date Grantors intend to undertake the activity in question. The notice shall describe the nature, scope, design, location, timetable, and any other material aspect of the proposed activity in sufficient detail to permit Grantee to make an informed judgement as to its consistency with the purpose of this Easement.

5.1 Grantee's Approval. Where Grantee's approval is required, as

set forth in paragraphs _____, Grantee shall grant or withhold its approval in writing within [e.g., sixty (60)] Days of receipt of Grantors' written request therefor. Grantee's approval may be withheld only upon a reasonable determination by Grantee that the action as proposed would be inconsistent with the purpose of this Easement. 19

6. Grantee's Remedies. If Grantee determines that Grantors are in violation of the terms of this Easement or that a violation is threatened, Grantee shall give written notice to Grantors of such violation and demand corrective action sufficient to cure the violation and, where the violation involves injury to the Property resulting from any use or activity inconsistent with the purpose of this Easement, to restore the portion of the Property so injured. If Grantors fail to cure the violation within [e.g., thirty (30)] Days after receipt of notice thereof from Grantee, or under circumstances where the violation cannot reasonably be cured within a [thirty (30)] Day period, fail to begin curing such violation within the [thirty (30)] Day period, or fail to continue diligently to cure such violation until finally cured, Grantee may bring an action at law or in equity in a court of competent jurisdiction to enforce the terms of this Easement, to enjoin the violation, *ex parte* as necessary, by temporary or permanent injunction, to recover any damages to which it may be entitled for violation of the terms of this Easement of injury to any conservation values protected by this Easement, including damages for the loss of scenic, aesthetic, or environmental values, and to require the restoration of the Property to the condition that existed prior to any such injury. Without limiting Grantors' liability therefor, Grantee, in its sole discretion, may apply any damages recovered to the cost of undertaking any corrective action on the Property. If Grantee, in its sole discretion, determines that circumstances require immediate action to prevent or mitigate significant damage to the conservation values of the Property, Grantee may pursue its remedies under this paragraph without prior notice to Grantors or without waiting for the period provided for cure to expire. Grantee's rights under this paragraph apply equally in the event of either actual or threatened violations of the terms of this Easement, and Grantors agree that Grantee's remedies at law for any violation of the terms of this Easement are inadequate and that Grantee shall be entitled to the injunctive relief described in this paragraph, both prohibitive and mandatory, in addition to such other terms of this Easement, without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies. Grantee's remedies described in this paragraph shall be cumulative and shall be in addition to all remedies now or hereafter existing at law or in equity. 20

6.1 Costs of Enforcement. Any costs incurred by Grantee in enforcing the terms of this Easement against Grantors, including, without limitation, costs of suit and attorneys' fees, and any costs of restoration necessitated by Grantors' violation of the terms of this Easement shall be borne by Grantors. If Grantors prevail in any action to enforce the terms of this Easement, Grantors' costs of suit, including, without limitation, attorneys' fees, shall be borne by Grantee. 21

6.2 Grantee's Discretion. Enforcement of the terms of this Easement shall be at the discretion of Grantee, and any forbearance by Grantee to exercise its rights under this Easement in the event of any breach of any term of this Easement by Grantors shall not be deemed or construed to be a waiver by Grantee of such term or of any subsequent breach of the same or any other term of this Easement or of any of Grantee's rights under this Easement. No delay or omission by Grantee in the exercise of any right or remedy upon any breach by Grantors shall impair such right or remedy or be construed as a waiver.

6.3 Waiver of Certain Defenses. Grantors hereby waive any defense of laches, estoppel, or prescription. 22

6.4 Acts Beyond Grantors' Control. Nothing contained in this Easement

shall be construed to entitle Grantee to bring any action against Grantors for any injury to or change in the Property resulting from causes beyond Grantors' control, including, without limitation, fire, flood, storm, and earth movement, or from any prudent action taken by Grantors under emergency conditions to prevent, abate, or mitigate significant injury to the Property resulting from such causes. 23

7. Access. No right of access by the general public to any portion of the Property is conveyed by this Easement. 24

8. Costs and Liabilities. Grantors retain all responsibilities and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep, and maintenance of the Property, including the maintenance of adequate comprehensive general liability insurance coverage. Grantors shall keep the Property free of any liens arising out of any work performed for, materials furnished to, or obligations incurred by Grantors. 25

8.1 Taxes. Grantors shall pay before delinquency all taxes, assessments, fees, and charges of whatever description levied on or assessed against the Property by competent authority (collectively "taxes"), including any taxes imposed upon, or incurred as a result of, this Easement, and shall furnish Grantee with satisfactory evidence of payment upon request. [Grantee is authorized but in no event obligated to make or advance any payment of taxes, upon [e.g., three (3)] Days prior written notice to Grantors, in accordance with any bill, statement, or estimate procured from the appropriate authority, without inquiry into the validity of the taxes or the accuracy of the bill, statement, or estimate, and the obligation created by such payment shall bear interest until paid by Grantors at the lesser of ____ percentage points over the prime rate of interest from time to time charged by [designated bank] or the maximum rate allowed by law.]

8.2 Hold Harmless. Grantors shall hold harmless, indemnify, and defend Grantee and its members, directors, officers, employees, agents, and contractors and the heirs, personal representatives, successors, and assigns of each of them (collectively "Indemnified Parties") from and against all liabilities, penalties, costs, losses, damages, expenses, causes of action, claims, demands, or judgments, including, without limitation, reasonable attorneys' fees, arising from or in any way connected with: (1) injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition, or other matter related to or occurring on or about the Property, regardless of cause, unless due solely to the negligence of any of the Indemnified Parties; (2) the obligations specified in paragraphs 8 and 8.1; and (3) the existence or administration of this Easement. 27

9. Extinguishment. If circumstances arise in the future such as render the purpose of this Easement impossible to accomplish, this Easement can only be terminated or extinguished, whether in whole or in part, by judicial proceedings in a court of competent jurisdiction, and the amount of the proceeds to which Grantee shall be entitled, after the satisfaction of prior claims, from any sale, exchange, or involuntary conversion of all or any portion of the Property subsequent to such termination or extinguishment, shall be determined, unless otherwise provided by [state] law at the time, in accordance with paragraph 9.1. Grantee shall use all such proceeds in a manner consistent with the conservation purposes of this grant. 28

9.1 Proceeds. This Easement constitutes a real property interest immediately vested in Grantee, which, for the purposes of paragraph 9, the parties stipulate to have a fair market value determined by multiplying the fair market value of the Property unencumbered by the Easement (minus any increase in value after the date of this grant attributable to improvements) by the ratio of the value of the Easement at the time of this grant to the value of the Property,

without deduction for the value of the Easement, at the time of this grant. The values at the time of this grant shall be those values used to calculate the deduction for federal income tax purposes allowable by reason of this grant, pursuant to Section 170(h) of the Internal Revenue Code of 1954, as amended. For the purposes of this paragraph, the ratio of the value of the Easement to the value of the Property unencumbered by the Easement shall remain constant. 29

9.2 Condemnation. If the Easement is taken, in whole or in part, by exercise of the power of eminent domain, Grantee shall be entitled to compensation in accordance with applicable law. 30

10. Assignment. This Easement is transferable, but Grantee may assign its rights and obligations under this Easement only to an organization that is a qualified organization at the time of transfer under Section 170(h) of the Internal Revenue Code of 1954, as amended (or any successor provision then applicable), and the applicable regulations promulgated thereunder, and authorized to acquire and hold conservation easements under [state statute] (or any successor provision then applicable). As a condition of such transfer, Grantee shall require that the conservation purposes that this grant is intended to advance continue to be carried out. 31

11. Subsequent Transfers. Grantors agree to incorporate the terms of this Easement in any deed or other legal instrument by which they divest themselves of any interest in all or a portion of the Property, including, without limitation, a leasehold interest. Grantors further agree to give written notice to Grantee of the transfer of any interest at least [e.g., twenty (20)] days prior to the date of such transfer. The failure of Grantors to perform any act required by this paragraph shall not impair the validity of this Easement or limit its enforceability in any way. 32

12. Estoppel Certificates. Upon request by Grantors, Grantee shall within [e.g., twenty (20)] days execute and deliver to grantors any document, including an estoppel certificate, which certifies Grantors' compliance with any obligation of Grantors contained in this Easement and otherwise evidences the status of this Easement as may be requested by Grantors. 33

13. Notices. Any notice, demand, request, consent, approval, or communication that either party desires or is required to give to the other shall be in writing and either served personally or sent by first class mail, postage prepaid, addressed as follows:

To Grantors: _____

To Grantee: _____

or to such other address as either party from time to time shall designate by written notice to the other. 34

14. Recordation. Grantee shall record this instrument in timely fashion in the official records of _____ County, [state]. And may re-record it at any time as may be required to preserve its rights in this Easement. 35

15. General Provisions.

1. Controlling Law. The interpretation and performance of this Easement shall be governed by the laws of the State of [state].

2. Liberal Construction. Any general rule of construction to the contrary notwithstanding, this Easement shall be liberally construed in favor of the grant to effect the purpose of this Easement and the policy and purpose of, [state statute]. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the purpose of this Easement that would render the

provision valid shall be favored over any interpretation that would render it invalid.

3. Severability. If any provision of this Easement, or the application thereof to any person or circumstance, is found to be invalid, the remainder of the provisions of this Easement, or the application of such provision to persons or circumstances other than those as to which it is found to be invalid, as the case may be, shall not be affected thereby.

4. Entire Agreement. This instrument sets forth the entire agreement of the parties with respect to the Easement and supersedes all prior discussions, negotiations, understandings, or agreements relating to the Easement, all of which are merged herein. [No alteration or variation of this instrument shall be valid or binding unless contained in an amendment that complies with paragraph ____ (see supplementary provisions re: Amendment.)]

1. No Forfeiture. Nothing contained herein will result in a forfeiture or reversion of Grantor's title in any respect.

a. Joint Obligation. The obligations imposed by this Easement upon Grantors shall be joint and several.

(3) Successors. The covenants, terms, conditions, and restrictions of this Easement shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall continue as a servitude running in perpetuity with the Property.

h. Termination of Rights and Obligations. A party's rights and obligations under this Easement terminate upon transfer of the party's interest in the Easement or Property, except that liability for acts or omissions occurring prior to transfer shall survive transfer.

(2) Captions. The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon construction or interpretation.

(a) Counterparts. The parties may execute this instrument in two or more counterparts, which shall, in the aggregate, be signed by both parties; each counterpart shall be deemed an original instrument as against any party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling. 36

TO HAVE AND TO HOLD unto Grantee, its successors, and assigns forever. 37

IN WITNESS WHEREOF Grantors and Grantee have set their hands on the day and year first above written.

Grantors

Grantee
By _____

its [Official Capacity] 38

[Acknowledgments]

SCHEDULE OF EXHIBITS

- (2) Legal Description of Property Subject to Easement
- [B. Baseline Documentation]
- B. or C. Site Descriptions/Map
- [C. or D. Identification of Prior Mortgage

Supplementary Provisions ³⁹

(Paragraph numbers indicate relative position in model.)

[5.2] Arbitration. If a dispute arises between the parties concerning the consistency of any proposed use or activity with the purpose of this Easement, and Grantors agree not to proceed with the use or activity pending resolution of the dispute, either party may refer the dispute to arbitration by request made in writing upon the other. Within [e.g., thirty (30)] days of the receipt of such a request, the parties shall select a single arbitrator to hear the matter. If the parties are unable to agree on the selection of a single arbitrator, then each party shall name one arbitrator and the two arbitrators thus selected shall select a third arbitrator; provided, however, if either party fails to select an arbitrator, or if the two arbitrators selected by the parties fail to select the third arbitrator within [e.g., fourteen (14)] days after the appointment of the second arbitrator, then in each such instance a proper court, on petition of a party, shall appoint the second or third arbitrator or both, as the case may be, in accordance with [state arbitration statute], or any successor statute then in effect. The matter shall be settled in accordance with the [state arbitration statute or other appropriate body of rules] then in effect, and a judgment on the arbitration award may be entered in any court having jurisdiction thereof. The prevailing party shall be entitled, in addition to such other relief as may be granted, to a reasonable sum as and for all its costs and expenses related to such arbitration, including, without limitation, the fees and expenses of the arbitrators and attorneys' fees, which shall be determined by the arbitrator(s) and any court of competent jurisdiction that may be called upon to enforce or review the award. ⁴⁰

[Between 9 and 10] Amendment. If circumstances arise under which an amendment to or modification of this Easement would be appropriate, Grantors and Grantee are free to jointly amend this Easement; provided that no amendment shall be allowed that will affect the qualification of this Easement or the status of Grantee under any applicable laws, including [state statute] or Section 170(h) of the Internal Revenue Code of 1954, as amended, and any amendment shall be consistent with the purpose of this Easement, and shall not affect its perpetual duration. Any such amendment shall be recorded in the official records of _____ County, [state]. ⁴¹

[10.1] Executory Limitation. If Grantee shall cease to exist or to be a qualified organization under Section 170(h) of the Internal Revenue Code of 1954, as amended, or to be authorized to acquire and hold conservation easements under [state statute], and a prior assignment is not made pursuant to paragraph 10, then Grantee's rights and obligations under this Easement shall become immediately vested in [designated back-up grantee]. If [designated back-up grantee] is no longer in existence at the time the rights and obligations under this Easement would otherwise vest in it, or if [designated back-up grantee] is not qualified or authorized to hold conservation easements as provided for an assignment pursuant to paragraph 10, or if it shall refuse such rights and obligations, then the rights and obligations under this Easement shall vest in such organization as a court of competent jurisdiction shall direct pursuant to the applicable [state] law and with due regard to the requirements

for an assignment pursuant to paragraph 10. 42

[Between 10 and 11] Subordination. At the time of conveyance of this Easement, the Property is subject to the mortgage identified in Exhibit [C or D] attached hereto and incorporated by this reference, the holder of which has agreed by separate instrument, which will be recorded immediately after this Easement, to subordinate its rights in the Property to this Easement to the extent necessary to permit the Grantee to enforce the purpose of the Easement in perpetuity and to prevent any modification or extinguishment of this Easement by the exercise of any rights of the mortgage holder. The priority of the existing mortgage with respect to any valid claim on the part of the existing mortgage holder to the proceeds of any sale, condemnation proceedings, or insurance or to the leases, rents, and profits of the Property shall not be affected thereby, and any lien that may be created by Grantee's exercise of any of its rights under this Easement shall be junior to the existing mortgage. Upon request, Grantee agrees to subordinate its rights under this Easement to the rights of any future mortgage holders or beneficiaries of deeds of trust to the proceeds, leases, rents, and profits described above and likewise to subordinate its rights under any lien and to execute any documents required with respect to such subordination, except that the priority of any lien created by Grantee's exercise of any of its rights under this Easement prior to the creation of a mortgage or deed of trust shall not be affected thereby, nor shall this Easement be subordinated in any other respect. 43