Federal Guidance on the Use of Vegetated Buffers as Compensatory Mitigation Under Section 404 of the Clean Water Act

I. Purpose

This document provides guidance on the use of vegetated buffers as a component of compensatory mitigation plans undertaken to meet permit requirements under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. The permit program requires appropriate and practicable compensatory mitigation to offset unavoidable impacts to aquatic resources by replacing aquatic resource functions lost as a result of activities authorized by the U.S. Army Corps of Engineers (Corps).

For the purposes of this document the relevant terms are identified as follows:
<u>Buffer:</u> Buffers are upland and/or riparian areas that protect aquatic resource functions at mitigation sites from disturbances or adjacent land uses.

Buffers enhance or provide a number of important aquatic resource functions including:

- Sediment removal and erosion control
- Excess nutrient and metal removal
- Moderation of stormwater runoff
- Moderation of water temperature
- Maintenance of habitat diversity
- Wildlife species distribution and diversity
- Reduction of human impact[1]

II. Existing Policy and Guidance

The following documents provide guidance concerning the use of buffers as a component of compensatory mitigation:
1. The 2000 Nationwide Permits (2000 NWPs)[2]
2. The 2002 Corps Regulatory Guidance Letter 02-2, Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 (RGL 02-2)

The 2000 NWPs summarize the Corps' ability to require buffers as follows:

> "The Corps has the statutory authority to require vegetated buffers next to streams and other open waters because the goal of the Clean Water Act is to restore and maintain the chemical, physical and biological integrity of Nation's waters. This goal is stated in Section 101 of the Clean Water Act and is applicable to all sections of the Clean Water Act, including section 404. Vegetated buffers next to streams and other open waters help maintain the chemical, physical, and biological integrity of these waters. …..Discharges of dredged or fill material into waters of the United States, which the

[1] Castelle, et. al., 1994.
[2] Federal Register, March 9, 2000, Volume 65, Number 47, Pages 12818-12899.

> Corps regulates under section 404 of the Clean Water Act, result in the loss of aquatic resource functions and values. The establishment and maintenance of vegetated buffers next to streams and other open waters offsets losses of aquatic resource functions and values and reduces degradation of these aquatic resources."

Additionally, RGL 02-2 states that the Corps may require that compensatory mitigation projects include the establishment and maintenance of buffers to ensure that the overall mitigation project performs as expected. RGL 02-2 also notes that buffers typically consist of native plant communities that reflect the local landscape and ecology and enhance or provide a variety of aquatic habitat functions including habitat for wildlife and other organisms, runoff filtration, moderation of water temperature changes, and detritus for aquatic food webs.

III. Additional Recommendations

A. Buffer Design Considerations

Mitigation plans should include vegetated buffers when necessary to protect aquatic resource functions at the mitigation site from disturbances or adjacent land uses. The primary function of the buffer should be to protect the ecological integrity of the mitigation site. Width is typically the principal buffer design consideration and determinations of appropriate buffer width include an assessment of a number of site-specific conditions.

Width requirements of desired buffer function: As noted in Section I, buffers perform many functions, however, the minimum widths necessary to perform these functions varies. For example, buffer widths of 50 ft to 100 ft are recommended to prevent adverse water quality impacts to buffered aquatic resources while widths ranging from 95 ft to 330 ft or more may be necessary to maintain wildlife habitat functions depending upon specific species requirements.[3] If multiple functions are targeted, the function with the widest requirement should determine buffer width. The following site-specific conditions should be evaluated to determine whether a given mitigation site's minimum buffer width falls near the lower or higher end of these ranges.

- **Nature and severity of adjacent land use**: Mitigation sites adjacent to land uses associated with extensive construction (e.g., erosion, sedimentation and vegetation and debris removal, etc.) and post-construction impacts (e.g., noise, polluted runoff, domestic animal predation, debris deposition, vegetation removal and trampling, etc.) should have greater buffers. Conversely, mitigation sites adjacent to low impact land uses such as green spaces and low density residential development should have smaller buffers. A mitigation site buffer may be asymmetrical, for example, if one side of a mitigation project is adjacent to commercial development and the other side borders a wildlife park or other protected area.
- **Type of aquatic resource being buffered**: Aquatic resources that provide regionally important functions as well as those that are extremely sensitive to disturbance should have wider buffers to ensure lower risk of disturbance. Conversely, resilient aquatic resources or aquatic resources with low functional values could have smaller buffers.

[3] Castelle, et. al., 1994; Murphy, 1995; Spackman and Hughes 1995; Chase, et. al.,1997; Wenger 1999; Fisher and Fischenich, 2000; McMillan, 2000; and Tiner, 2003.

- **Size and shape of the aquatic resource being buffered:** Small aquatic resources may need proportionally large buffers. For example, a one-acre wetland may need a half-acre buffer. Conversely, the ecological benefits of buffers around large mitigation sites may not outweigh their additional costs.
- **Buffer soil conditions:** Soil characteristics of the buffer may require larger or smaller buffers depending on the wetland functions targeted for the mitigation site. Soil types in the buffer affect the infiltration of precipitation and runoff, high infiltration rates reduce overland flow volumes but may also leave little time for plant and soil absorption of nutrients and suspended sediments.[4] However, soil texture should also be considered since clayey soils with low porosity will require a wider buffer to protect against sediment and bound pollutants from overland flow then sandy soils with high porosity.[5] In addition, buffers characterized by channelized flow have a dramatically reduced capacity to provide water quality protection benefits.[6] Soil conditions will interact closely with buffer slope and plant communities to determine the appropriate buffer width. For example, a low slope with dense herbaceous vegetation and sandy soils will slow down the velocity of surface flow, allow for the greatest infiltration and subsequent evapotranspiration and filtration of water by the vegetation but few nutrients will be absorbed directly by the soil. Overall this situation would require only a modest buffer.
- **Buffer slope:** As slope increases so does runoff velocity and its ability to carry sediment and associated pollutants.[7] In addition, steep slopes increase the risk of large soil disturbances such as landslides. The density of vegetation and increasing buffer width, on the order of an additional 2 feet of width for every percentage point in slope, can effectively counter balance the influence of steep slopes[8]. Slopes steeper than 25% generally do not effectively act as buffers, while dense vegetation cover on slopes less than 15% is most effective for providing water quality protection functions.[9]
- **Buffer vegetation:** Smaller buffers are appropriate when the buffer is in good condition, e.g., characterized by dense native vegetation and undisturbed soils.[10] Buffers dominated by invasive species have a significantly reduced functional capacity. Vegetation types and specific genera can address specific functional concerns differently; especially under varying site conditions (see Appendix A). For example, specific water quality functions may need grass buffers for sediment trapping while wildlife habitat functions may need specific plant communities.[11]

In order to assure that buffers serve their intended use in perpetuity, they should be permanently protected with the appropriate real estate instrument (e.g., conservation easements, deed restrictions, transfers of title to Federal or state resource agencies or non-profit conservation organization), typically the same one that protects the associated mitigation site.

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[4] Chase, et. al., 1997.
[5] Brady, 1999 and Tiner, 2003.
[6] Osborne and Kovacic 1993.
[7] Brady, 1999.
[8] Wenger, 1999.
[9] Castelle, et. al., 1992 and Wenger, 1999.
[10] Castelle, et. al., 1994.
[11] Osborne and Kovacic 1993; Fischer and Fischenich, 2000; and Tiner 2003.

B. Crediting Buffers

RGL 02-2 states that riparian areas and, under limited circumstances, upland areas (see Federal Mitigation Banking Guidance and Nationwide Permit General Condition 19) may receive credit within a compensatory mitigation project to the degree that the protection and management of such areas is an enhancement of aquatic functions and increases the overall ecological functioning of the mitigation site, or of other aquatic resources within the watershed. Such enhancement may be reflected in the amount of credit attributed to the mitigation project. Corps Districts will evaluate and document the manner and extent to which riparian and/or upland areas augment the functions of wetland or other aquatic resources.

The establishment of buffers in riparian and upland areas may only be credited as mitigation if the Corps District determines that this is best for the aquatic environment on a watershed basis. In making this determination, Corps Districts will consider whether the wetlands, streams or other aquatic resources being buffered: 1) perform important physical, chemical, or biological functions, the protection and maintenance of which is important to the region where those aquatic resources are located; and 2) are under demonstrable threat of loss or substantial degradation from human activities that might not otherwise be avoided. However, credits for buffers or portions of buffers may be limited or excluded if they have compromised or questionable protection value due to shape, condition, location, or diminished functional value resulting from excessive width or excessive proportion of the total mitigation area.

IV. Relationship of This Guidance to Other Mitigation Guidance under Development

The best tool for planning compensatory mitigation is a holistic watershed plan[12] incorporating mitigation or restoration priorities. Without such a plan, there may be many diverging opinions about what is "best" for a watershed. In the absence of a holistic watershed plan, a watershed-based approach to mitigation should be used to develop mitigation proposals. Such an approach takes into account a wide range of factors such as: site conditions that favor or hinder success; the needs of sensitive species; chronic environmental problems such as flooding or poor water quality; current trends in habitat loss or conversion; current development trends; and the long-term benefits of available options. As part of the Mitigation Action Plan released in December of 2002, the agencies[13] plan to publish guidance regarding making compensatory mitigation decisions in a watershed context in 2005. The Watershed Context Guidance will likely incorporate the recommendations contained in this Buffer Guidance, as well as other guidance documents that have been or will be issued.

[12] Holistic watershed plans are those that: 1) have been reviewed and approved by Federal and State agencies; 2) consider multiple stakeholder interests and competing land uses; and, 3) address issues of habitat, water quality, hydrology, cumulative impacts, and restoration priorities for a watershed. Holistic watershed plans could include, for example, a Special Area Management Plan, the “comprehensive conservation and management plans” created as part of the National Estuary Program, a comprehensive state planning effort such as the Louisiana Coast 2050 plan or a basin plan such as the Water Resources Plan being developed for the Delaware River Basin.

[13] The Corps, U.S. Environmental Protection Agency and the Departments of Agriculture, Commerce, Interior and Transportation.

V. General

A. Current Food Security Act (FSA) legislation (also known as "Swampbuster") limits the extent to which mitigation can be used for FSA purposes. Notwithstanding anything in this guidance, if a mitigation proposal is to be used for FSA purposes, it must meet the requirements of FSA.

This guidance does not alter or modify requirements of any Federal law or regulation, or modify any prior guidance. The signatory agencies will employ this guidance in concert with the 1990 MOA between the EPA and the Corps, the 1995 Federal Guidance on Mitigation Banking, the 2000 Federal Guidance on In-Lieu-Fee Arrangements, and the 2002 Corps RGL on Compensatory Mitigation Projects.

B. The statutory provisions and regulations mentioned in this document contain legally binding requirements. However, this guidance does not substitute for those provisions or regulations, nor is it a regulation itself. This guidance does not impose legally binding requirements on the signatory agencies or any other party, and may not apply to a particular situation in certain circumstances. The signatory agencies retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance when they determine that it is appropriate to do so. Such decisions will be based on the facts of a particular case and applicable legal requirements. Therefore, interested parties are free to raise questions and objections about the substance of this guidance and the appropriateness of its application to a particular situation.

C. This guidance does not and is not intended to alter any provisions of applicable state law or regulations. It is the responsibility of the applicant to comply with all applicable state laws and regulations.

D. As of the date of the last signature below, the agencies will take this guidance into account in their evaluation of compensatory mitigation proposals.

E. This guidance is based on evolving information and may be revised periodically with the agreement of all signatories, without public notice. The signatory agencies welcome public comments on this guidance at any time and will consider those comments in any future revision of this guidance.

For Further Information Contact: Ms. Katherine Trott (Corps) at (202) 761-5542; Mr. Palmer Hough (EPA) at (202) 566-1374; Ms. Jeanette Gallihugh (USFWS) at (703) 358-2183; Ms. Susan Marie Stedman (NMFS) at (301) 713-4300; Mr. David McKay (NRCS) at (202) 720-1835; and Mr. Fred Bank (FHWA) at (202) 366-5004.

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Appendix A[14]

Table 1. Recommended Widths of Buffer Zones and Corridors for Water Quality Considerations

Authors	State	Width	Buffer Type	Benefit
Woodard and Rock (1995)	Maine	≥15m	Hardwood buffer	The effectiveness of natural buffer strips is highly variable, but in most cases, a 15m natural, undisturbed buffer was effective in reducing phosphorus concentrations adjacent to single family homes
Young et al. (1980)		≥25m	Vegetated buffer	25m buffer reduced the suspended sediment in feedlot runoff was reduced by 92%
Horner and Mar (1982)		≥61m	Grass filter strip Vegetated buffer strip	Removed 80% of suspended sediment in stormwater
Lynch, Corbett, and Mussalem (1985)		≥30m		30-m buffer between logging activity and wetlands and streams removed an average of 75 to 80% of suspended sediment in stormwater; reduced nutrients to acceptable levels; and maintained water tempertures within 1°C of their former mean temperature.
Ghaffarzadeh, Robinson, and Cruse (1992)		≥9m	Grass filter strip	Removed 85% of sediment on 7 and 12% slopes
Madison et al. (1992)		≥5m	Grass filter strip	Trapped approximately 90% of nitrates and phosphates
Dillaha et al. (1989)		≥9m	Vegetated filter strip	Removed an average of 84% of suspended solids, 79% of phosphorus, and 73% of nitrogen
Lowrance et al. (1992)		≥7m		Nitrate concentrations almost completely reduced due to microbial denitrification and plant uptake
Nichols et al. (1998)	Arkansas	≥18m	Grass filter strips	Reduced estradiol (estrogen hormone responsible for development of the female reproductive tract) concentrations in runoff into surface water by 98%.
Doyle et al. (1977)		≥4m	Grass filter strips and forested buffers	Reduced nitrogen, phosphorus, potassium, and fecal bacteria from runoff.
Shisler, Jordan, and Wargo (1987)	Maryland	≥19m	Forested riparian buffer	Removed as much as 80% of excess phosphorus and 89% of excess nitrogen

[14] Fischer and Fischenich, 2000.