Public Notice

US Army Corps of Engineers
Fort Worth District

Action: Draft Mitigation Guidelines

Date Issued: December 24, 2003 (Revisions January 5, 2004)

Comments Due: February 9, 2004

SUBJECT: The U. S. Army Corps of Engineers, Fort Worth District announces to interested parties the availability of Draft Mitigation Guidelines. These guidelines are being developed in response to the National Wetlands Mitigation Action Plan (MAP) and in support of Regulatory Guidance Letter (RGL) No. 02-2. The MAP and RGL, both dated December 24, 2002, communicate national guidance on mitigation, particularly compensatory mitigation. The intent of these guidelines is to improve mitigation plans and resulting mitigation within the Fort Worth District and provide applicants and their consultants with information required for satisfying mitigation requirements associated with Department of the Army permits. The concepts embodied in the Fort Worth District, USACE, Mitigation Guidelines are intended to fully support the national guidance and to assist permit applicants in effectively and fully mitigating adverse impacts to aquatic resources such as streams and wetlands. The Fort Worth District may require that all of the information outlined in this guidance be provided prior to approval of any mitigation plan. Implementation of this mitigation policy will take into consideration the role of mitigation on a regional watershed basis and provide more predictability when mitigation is required. Once finalized, the mitigation guidelines would be applicable to all authorizations requiring mitigation within the Fort Worth District. The U. S. Army Corps of Engineers, including the Fort Worth District, is committed to improving the success of mitigation and increasing our efforts on mitigation compliance to meet the program policy of "no overall net loss" of wetlands and to protect aquatic resources.

SOLICITATION O F COMMENTS: This draft mitigation policy is on file and may be viewed during normal working hours at the Fort Worth District, USACE, 819 Taylor Street, Room 3A37, Fort Worth, Texas 76102. The draft mitigation policy is also available on the Fort Worth District, USACE, Regulatory Program website at: **http://www.swf.usace.army.mil/pubdata/regulatory/index.asp**. If you would like to have a copy of the draft mitigation policy mailed to you, please call (817) 886-1731. The USACE is soliciting comments from the public, federal, state, and local agencies and officials, Indian tribes, and other interested parties in order to evaluate and finalize these draft mitigation guidelines. Comments on the draft mitigation policy should be submitted to Mr. Presley Hatcher, Regulatory Branch, CESWF-PER-R, U. S. Army Corps of Engineers, P. O. Box 17300. Fort Worth, Texas 76102-0300. Comments must be received by this office on or before February 9, 2004, the close of the comment period. Any comments received will be considered by the Fort Worth District, USACE, in the finalization of these mitigation guidelines.

(Revisions in yellow highlight)

DISTRICT ENGINEER
FORT WORTH DISTRICT
CORPS OF ENGINEERS

US Army Corps
of Engineers
Fort Worth District

Mitigation Guidelines
Regulatory Program
Fort Worth District
U. S. Army Corps of Engineers

Draft – December 24, 2003

1. INTRODUCTION

The purpose of this paper is to provide mitigation guidelines for the Fort Worth District, U. S. Army Corps of Engineers (USACE), for adverse impacts to aquatic resources resulting from permits issued under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. This mitigation guidance applies to all Department of the Army permit applications evaluated by the Fort Worth District, USACE, within its Regulatory Program boundary within the states of Texas and Louisiana. See Appendix A – Fort Worth District, U. S. Army Corps of Engineers, Boundary Map for the district boundaries in the State of Texas. The Fort Worth District, USACE, includes the Sabine River watershed in Sabine, De Soto, and Caddo Parishes in the State of Louisiana.

Under Section 404, the USACE regulates the discharge of dredged and fill material into waters of the United States, including wetlands. Under Section 10, the USACE regulates work in, or affecting navigable waters of the United States. As a result, Department of the Army authorization is normally required to conduct ground-disturbing activities such as filling, grading, mechanized land clearing, and excavation that results in more than incidental fallback discharge of dredged or fill material in waters of the United States, and to conduct work, or place structures in, or affecting, the course, location, or condition of a navigable water of the United States. When the USACE reviews a project that would require Department of the Army authorization, its evaluation typically includes a determination of whether the applicant has taken sufficient measures to mitigate the project's likely adverse impact on the aquatic ecosystem.

Prior to issuing a Section 404 permit, the USACE must determine that a proposed ground-disturbing activity in waters of the United States would comply with the Section 404(b)(1) Guidelines ("Guidelines for Specification of Disposal Sites for Dredged or Fill Material", 40 CFR Part 230) and not be contrary to the public interest (33 CFR 320-331). The 404(b)(1) guidelines contain the substantive criteria used by the USACE to evaluate a proposed discharge and include several important restrictions on the discharge of dredged or fill material into waters of the United States, one of which prohibits the authorization of a discharge unless appropriate and practicable steps have been taken to minimize, or mitigate, the adverse impact of the proposed discharge on the aquatic ecosystem. Mitigation is also a very important consideration in the public interest review process. A general statement of mitigation policy is included in the Regulatory Programs of the Corps of Engineers at 33 CFR 320.4(r).

On February 6, 1990, the Department of the Army and EPA signed a memorandum of agreement (MOA) that provided guidance for determining the type and level of mitigation necessary to demonstrate compliance with the 404(b)(1) guidelines. The MOA describes mitigation as the sequential process of

Avoidance: Taking all appropriate and practicable measures to avoid those adverse impacts to the aquatic ecosystem that are not necessary.

Minimization: Taking all appropriate and practicable measures to minimize those adverse impacts to the aquatic ecosystem that cannot reasonably be avoided.

Compensation: Implementing appropriate and practicable measures to compensate for adverse project impacts to the aquatic ecosystem that cannot reasonably be avoided or further minimized. This step is referred to as compensatory mitigation. Compensatory mitigation is the replacement of the chemical, physical, and biological functions of wetlands and other aquatic resources that are lost or impaired as a result of USACE-authorized activities.

While this sequential mitigation process is normally applied only during the individual permit process, most nationwide, regional, and programmatic general permits require that discharges of dredged or fill material into waters of the United States be avoided and minimized to the maximum extent practicable, unless the USACE approves compensatory mitigation that is more beneficial to the environment than minimization or avoidance measures that could be undertaken at the project site. The USACE will normally require the implementation of all appropriate and practicable mitigation as a condition of any Department of the Army authorization.

On December 24, 2002, the USACE issued 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" to clarify and support the national policy of "no net loss" of wetlands and reinforce the USACE commitment to protect waters of the United States, including wetlands.

The purpose of compensatory mitigation is to replace those aquatic ecosystem functions that would be lost or impaired as a result of a USACE-authorized activity. The type and amount of compensatory mitigation required will be commensurate with the nature and extent of the activity's adverse impact on aquatic functions and practicable in terms of cost, existing technology, and logistics, in light of the overall project purpose. Aquatic functions, which are most simply defined as "the things that aquatic systems do," include sediment trapping and nutrient removal; erosion control; provision of habitat for fish and wildlife, including endangered species; flood storage and conveyance; groundwater recharge; water supply; production of food, fiber, and timber; and recreation. The number and extent of aquatic functions performed by the myriad aquatic sites found across the Fort Worth District, USACE, vary considerably.

2. MITIGATION CONSIDERATIONS

The Fort Worth District, USACE, will use watershed and ecosystem approaches when determining compensatory mitigation requirements, consider the resource needs of the watersheds and ecosystems where impacts will occur, and consider the resource needs of neighboring watersheds and ecosystems. When evaluating mitigation plans, we will consider the 2001 "Operational Guidelines for Creating or Restoring Wetlands that are Ecologically Self-Sustaining" of the National Research Council (see Appendix B - "Incorporating the National Research Council's Mitigation Guidelines into the Clean Water Act Section 404 Program"). The mitigation considerations are addressed in detail in RGL 02-2. Mitigation considerations include:

a. Application of a watershed and ecosystem approach;
b. Consistency and compatibility with local, state, tribal, and other federal requirements and watershed needs and land uses;
c. Determination of appropriate and practicable compensatory mitigation to replace the functional losses to aquatic resources identified considering availability of locations, constructability, overall cost, technical requirements, and logistics;

d. Use of functional assessment or acreage surrogate, or both for describing adverse impacts and proposed mitigation for wetlands, streams, and other waters of the United States;

e. Application of mitigation types:
   (1 Establishment (Creation)
   (2 Restoration (Re-establishment or Rehabilitation)
   (3 Enhancement
   (4 Protection/Maintenance (Preservation);

f. Appropriate credit for preservation;

g. On-site vs. off-site mitigation;

h. In-kind vs. out-of-kind mitigation;

i. Establishment of buffers to ensure full performance of mitigation;

j. Compensatory mitigation alternatives (mitigation banks, in-lieu fee arrangements, joint project mitigation;

k. Public review and comment;

l. Permit special conditions;

m. Timing of mitigation construction; and

n. General permits.

3. MITIGATION PLANS

The Fort Worth District, USACE, will expect Department of the Army permit applicants to develop and submit an appropriate and practicable mitigation plan, when necessary. A mitigation plan specifies the measures that the permit applicant would take to minimize the project's adverse impact on the aquatic environment and to replace the aquatic functions that would be lost or impaired as a result of the authorized activity. It is important that each mitigation plan include sufficient detail to clearly express the expected ecological tradeoffs and to demonstrate the appropriateness of the proposed plan. An appropriate protective real estate arrangement, such as a deed restriction or conservation easement, is normally a necessary component of a mitigation plan. Successful implementation of all elements of the mitigation plan is normally a requirement of the Department of the Army permit.

Mitigation plan proposals are evaluated by Fort Worth District, USACE staff as part of the permit application evaluation process, often in consultation with other natural resource agencies including the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, Texas Commission on Environmental Quality, Railroad Commission of Texas, and Texas Parks and Wildlife Department. Mitigation plan proposals should thoroughly describe how the applicant would minimize and compensate for the project's likely adverse impact on the aquatic environment and normally include the following components (normally in the order presented):

a. **Title Page**. The title page should include the project name, applicant's name, mitigation plan preparer's name (if different from applicant), date of the plan or plan revision, and USACE project number.

b. **Baseline Information**. This section should include a description of the proposed project, location, type, functions, and amount of adverse and beneficial impacts on the aquatic and other resources, and an

outline of the measures that would be taken to minimize and compensate for those impacts. Baseline information should generally include the following components:

(1 a complete description of the measures the applicant proposes to avoid and minimize the adverse impact of the project on the aquatic environment, both on-site and off-site. Include a discussion of the measures proposed to avoid adverse impacts of the preferred alternative on the aquatic environment.

(2 a description of the direct and indirect permanent and temporary adverse impacts the proposed project would have on the aquatic environment after avoidance and minimization measures have been taken. This description should accurately detail the specific physical impacts that the project would have on waters of the United States and adjacent buffer areas and assess the nature and extent of loss in aquatic function that would likely occur as a result of the proposed activities. For projects that would affect multiple waters of the United States, include a table summarizing the project impacts by waterbody.

(3 a thorough description of the proposed mitigation area, including a vicinity map, site map, aerial (if available) and on-site photographs, and descriptions of the land use history, local hydrology, soils, and dominant vegetation. The location and direction of each submitted photograph should always be indicated on a site map.

(4 a preliminary jurisdictional determination (see also the Fort Worth District, USACE's "Procedures for Jurisdictional Determinations" dated March 24, 2003) of the proposed mitigation area that includes a wetland delineation, if appropriate, conducted in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual. The preliminary jurisdictional determination should include a detailed site description, field data sheets, summary of findings, photographs, and a detailed map showing the location and extent of all areas identified as waters of the United States, including streams, wetlands, lakes, ponds, and any other appropriate water features. The map must include a clear delineation of the mitigation area boundary, clearly marked waters of the United States, a north arrow, bar scale, and legend. Legends should include the project name, USACE project number, and date. Areas marked as waters of the United States on this map should be more specifically identified, for example, as stream, pond/lake, forested wetland, and emergent (or non-forested) wetland.

(5 identification of all existing liens and encumbrances on the mitigation area and discussion of how they would affect the mitigation project.

c. Site Selection. This section should describe the process for selection of the proposed mitigation site and the factors considered in that process. This should include:

(1 a summary of the alternatives that were considered in addition to the preferred and no-action alternatives, a discussion of their practicability in light of cost, existing technology, and logistics, and a clear rationale for the selection or rejection of each alternative, including any project design constraints;

(2 a discussion of the compatibility with hydrogeomorphic conditions, adjacent land uses and anticipated future land use trends, watershed management plans, and water quality and floodplain management goals; degree to which the mitigation area would be self-sustaining and not require extensive manipulation or maintenance after it is fully functioning; size and location of the site relative to other ecosystem features; potential for chemical contamination; hydrology; soils; vegetation; historic properties/cultural resources; endangered and threatened species and safety issues;

(3 a discussion of the contribution the proposed mitigation site makes to the aquatic resource needs of the watershed where the impact to be mitigated would occur, and if the proposed mitigation area is in a watershed other than where the impact is proposed, how the proposed site will be appropriate to reasonably offset the authorized adverse impacts to the aquatic environment.

(4 for projects that have the potential to attract waterfowl and other bird species that might pose a threat to aircraft, a discussion of the consistency of the plan with the Federal Aviation Administration Advisory Circular on Hazardous Wildlife Attractants on or near Airports (AC No: 150/5200-33. 5/1/97).

d. Goals and Objectives. This section should include a discussion of the goals and objectives of the mitigation plan. The goals should clearly define the intended result of the proposed compensatory mitigation in terms of hydrologic conditions, vegetational community, and aquatic ecosystem functions. The objectives should be a list of specific, measurable outcomes of the compensatory mitigation that can be used to demonstrate whether or not the goals of the mitigation plan have been achieved.

e. Mitigation Work Plan. The mitigation work plan should contain a detailed description of the proposed compensatory mitigation activities, with emphasis on documenting that the proposed mitigation work will achieve the stated ecological goals and objectives and support the enhancement or restoration of the desired aquatic resource functions, including the following:

(1 location, extent, and nature of all ground-disturbing activities and structures. Include information about land clearing, grading, site preparation, planting, road and trail construction, size and spacing of culverts and bridges, site protection and other fences, buildings, utility lines, intake and outfall structures, location of disposal and borrow areas, and mitigation project signage. Provide plan and cross-section drawings of all pertinent work and structures and the volume and type of material that would be discharged, either temporarily or permanently, into waters of the United States. All drawings and maps should contain a title, date, USACE project number, legend, bar scale, and north arrow, as appropriate. In general, all drawings and maps should be submitted on 8 2 -inch x 11-inch sheets. Include a table showing the extent of waters of the United States (acres and/or linear feet, as appropriate) that would be restored, enhanced, preserved, or created. Describe how the proposed activities are expected to benefit the aquatic environment. (As-built drawings may be required after construction is complete, especially in the case of created aquatic resources.)

(2 a description of the actions that would be taken to protect wetlands, streams, and other aquatic areas, adjacent to the construction area, including their buffer zones. Protective actions should include confining construction materials and debris to the construction site, protecting water quality, maintaining normal hydrology, preventing the movement of soil, and protecting vegetation from damage.

(3 recognizing the crucial role that hydrology often plays in determining the success or failure of a mitigation project, as appropriate, the following hydrologic information:

(a a description of the expected future hydrology of the mitigation area and demonstration that it would be sufficient to accomplish the goals of the mitigation plan. Hydrologic and/or hydraulic modeling may be required to show that the future frequency, duration, timing, volume, and velocity of flows, as well as the depth of saturation or inundation, would be appropriate for the mitigation plan. Both surface and groundwater components of hydrology should be described and

(b a demonstration that the proposed grading would allow water to flow within the mitigation area as expected and without adversely affecting the ecological functioning of the mitigation project or surrounding areas, such as by causing erosion or excessive impoundment of water. Include a detailed description of all water control structure that would be used and their invert elevations.

(4 a description of the substrate of the mitigation area and the source and type of any supplemental soil that would be used, demonstrating that it would support the proposed plantings and hydrology. Detailed soil profiles, chemical and physical analyses, and description of redoximorphic features may be required.

(5 a planting plan that includes a complete list of the species, by common and scientific name, that would be planted in each area, quantity and size of each species to be planted, planting density, planting method, planting schedule, and plans and drawings that specify the areas to be planted and the approximate number of each species that would be installed in each area. Normally, only native, locally adapted species appropriate for the site will be accepted. Generally, no less than 300 bare root tree seedlings and no less than 400 shrubs per acre should be planted. In cases where species diversity is important (most cases), at least four species should be planted and no species should represent more than 30 % of the plantings. The planting plan must include provisions for establishing temporary vegetation (either non-persistent or native species) on exposed soils to prevent soil erosion. Other methods of establishing a temporary vegetative cover, such as mulching and erosion control blankets, may be used individually, or in combination, as appropriate. The planting plan should also describe any proposed temporary vegetation management activities, such as irrigation or periodic control of competing vegetation.

(6 a discussion of how the proposed mitigation work will achieve the stated ecological goals and objectives and support the enhancement or restoration of the desired aquatic resource functions.

f. <u>Performance Standards and Success Criteria</u>. Mitigation plans should contain performance standards for determining if the mitigation is achieving the identified goals and objectives. This section should include a discussion of how the expected ecological benefits of the mitigation plan would balance the likely adverse environmental impact of proposed project. Adaptive management activities may be required to adjust to unforeseen or changing circumstances, and responsible parties may be required to adjust mitigation project elements or correct deficiencies. Performance standards should be based on quantitative or qualitative characteristics that can be practicably measured. Criteria and standards that should be addressed include:

(1 Planting success criteria. The following criteria are generally appropriate:

(a herbaceous plantings.

(1 exhibit an 80% ground cover three years after planting (or replant until an 80% ground cover is achieved three years after the most recent remedial planting) and

(2 none of the three most dominant species may be non-native, noxious, or invasive species.

(b tree and shrub plantings.

(1 Method 1:

(a) a minimum five-year healthy survival rate (or replant as needed to achieve at least that survival rate overall five years following the most recent remedial planting. Survival rates should be based on the initial number of trees and/or shrubs planted). Volunteer individuals may be included if they meet all of the other requirements of the plan, e.g., species viability, etc.;

(b) the three most dominant species of trees and shrubs (three of each) must be native species typically dominant in a natural situation in the area; and

(c) no one species may constitute more than 30% of the surviving plantings.

(2 Method 2:

(a) Guarantee a minimum density of trees five years after planting. Eligible trees must be a species on a list of approved native, high-quality, locally-adapted tree species included in the mitigation plan, and must be at least 1 inch diameter at breast height or 6 feet tall. Eligible shrubs must be a species included on a list of approved native, high-quality, locally-adapted shrub species included in the mitigation plan, and stand at least 2 feet tall. If the density is less than the minimum five years after planting, the permittee would replant as necessary to achieve the minimum density five years after the most recent remedial planting. Volunteer growth that meets the species and size criteria is eligible for counting;

(b) the three most dominant species of trees and shrubs (three of each) must be native species typically dominant in a natural situation in the area; and

(c) no one species may constitute more than 30% of the surviving planting.

Variations may be appropriate according to local conditions, if justified. Plantings should be closely monitored and apparent deficiencies rectified as soon as possible. Rectification may involve replanting, controlling competing vegetation, guarding against herbivory, installing temporary water control structures, or irrigating.

(2 Performance Standards. Mitigation plans should include a set of function-related performance standards. Typically, the permittee is responsible for maintaining the mitigation area until it can demonstrate to the satisfaction of the USACE that those components of the mitigation area intended to become:

(a waters of the United States meet the definition of a waters of the United States under the Regulatory Program regulations applicable at the time the project is authorized;

(b both wetland and waters of the United States meet the definition of a wetland under the Regulatory Program regulations applicable at the time the project is authorized;

(c waters of the United States are functioning as the intended type of waters of the United States and at the level of ecological performance prescribed in the mitigation plan; and

(d buffer and riparian zones and other non-aquatic areas integral to the enhancement of the aquatic ecosystem are functioning as the intended type of ecosystem component and at the level of ecological performance prescribed in the mitigation plan.

g. Compliance with Other Legal Requirements. This section should include a discussion of local, state, tribal, or other federal requirements that must be met and an assessment of the effects of the proposed mitigation plan activities on the resources addressed by those requirements. The following should be included at a minimum:

(1 an assessment documenting whether any species listed, or proposed for listing, as threatened or endangered under the Endangered Species Act, or the critical habitat of such species, may be affected by, or found in the vicinity of, the proposed mitigation project and addressing the likely effect of the proposed mitigation project on the species and/or critical habitat.

(2 an assessment documenting whether any historic property listed, eligible for listing, or which the prospective permittee has reason to believe may be eligible for listing in the National Register of Historic Places may be affected by the proposed mitigation project and addressing the likely effect of the proposed mitigation project on the identified historic property.

h. Long-Term Management and Monitoring. This section should include the following:

(1 a long-term operation and management plan that supports the goals and objectives of the mitigation plan. Generally, the operation and management plan should include provisions for maintaining fences, roads, water control and conveyance structures, and other pertinent facilities in an acceptable condition for the life of the mitigation project. Maintenance activities should also include, as appropriate, trash removal, maintenance of sediment-trapping facilities, and removal of tree stakes and sediment control devices when no longer needed.

The long-term operation and management plan should also include a vegetation management plan that provides for avoiding disturbances to vegetation in the mitigation area to the maximum extent practicable, letting nature take its course in the development of the intended vegetative communities. However, as necessary to protect components of the intended vegetative community and achieve the goals and objectives of the mitigation plan, the vegetation management component of the plan may include provisions to control non-native, invasive, or noxious vegetation. Minimal-impact techniques, which could involve hand-clearing, chemical treatment, burning, shredding, and disking, should be used whenever practicable. Methods that would adversely affect the ability of the mitigation project to achieve its goals will generally not be approved. Any vegetative control technique not included in the USACE-approved mitigation plan will generally require USACE approval prior to its use.

(2 a preliminary schedule for implementing and completing each element of the mitigation plan.

(3 a plan for monitoring the progress of the mitigation project towards achieving the goals stated in the plan. Monitoring typically involves periodically measuring the development of hydrology, vegetation, soils, and habitat for aquatic and terrestrial wildlife. Monitoring should employ standard sampling methods; standard statistical methods should demonstrate that the results of the monitoring are valid and accurately describe the conditions in the mitigation area. Monitoring may also include conducting wetland delineations, collecting hydrologic data, and developing a photographic record of the progress of the project. Photographs, periodically taken at permanent stations, are an important tool for documenting the progress of a mitigation project. Typical monitoring techniques include:

(a for vegetation, mapping the vegetative communities of the mitigation area, conducting plant inventory, noting any problem species, establishing and using transects or permanent sampling stations, measuring species and spatial diversity, measuring relative cover for the total vegetative stratum and for each dominant species in the stratum, determining the total number of species (similar to 1987 manual), importance value of dominant species. Snags, coarse woody debris and other features should be described. Consider using a standard habitat assessment method, such as Texas Parks and Wildlife's "Wildlife Habitat Assessment Procedure" or "An approach for assessing wetland functions using hydrogeomorphic classification, reference wetlands, and functional indices," (Smith, R. D., Ammann, A., Bartoldus, C., and Brinson, M. M., 1995, Technical Report WRP-DE-9, U. S. Army Engineer Waterways Experiment Station, Vicksburg, MS.);

(b for soils, monitoring changes in the soil profile (color, texture, redoximorphic features, etc.). Monitor the development of hydric soil characteristics where applicable. Dig and collect data from representative soil pits for each vegetation community type. Subsequent assessments should be near, but not in, previously dug pits; and

(c for hydrology, note changes in hydrology and results of monitoring frequency, duration, and depth of inundation or saturation.

(4 a plan for implementing a reporting program to provide information to the USACE and other appropriate entities on monitoring results, mitigation success, and general compliance with the terms and conditions of the permit. Written compliance reports would typically include the following:

(a designation of the party responsible for coordinating with the Regulatory Branch, Fort Worth District, USACE, concerning written compliance reports, on-site inspections, and compliance with permit conditions;

(b notification to the USACE of the final schedule for implementing and completing each element of the mitigation plan at least 30 days prior to the start of soil-disturbing activities;

(c notification to the USACE of the date of the pre-construction meeting held by the permittee for appropriate contractor(s) to explain the terms and conditions of the permit, provisions of the mitigation plan, and the contractor's responsibility in ensuring compliance with the permit. Within two weeks following the meeting, the permittee should confirm to the USACE that the meeting was held;

(d submission of annual written compliance reports to the USACE, generally due on October 1 each year. Compliance reports are required even if no work is conducted during the reporting period. Compliance reports are submitted to the USACE until the USACE verifies that the permittee has successfully completed all mitigation plan components, the mitigation areas have met the performance standards, including planting success requirements included in the plan, and all authorized construction activities have either been completed or deleted from the project. Each compliance report will normally include, at a minimum, the following information:

(1) a description of any changes in the construction or mitigation plan implementation schedule;

(2) a summary of the activities that occurred during the reporting period, including demonstration of the permittee's compliance with the permit conditions, and documentation of the progress

and/or completion of all authorized work, including mitigation plan activities in meeting performance standards and planting success;

(3) a description of pre-construction (baseline) conditions of the project area, including mitigation area, in the initial compliance report;

(4) documentation that the permittee is in compliance with all permit conditions;

(5) documentation of the progress and/or completion of all authorized work, including mitigation plan activities;

(6) a description of the project's actual impact to waters of the United States;

(7) documentation that disturbed areas, such as borrow ditches, road embankments, stream banks, road crossings, and temporary impact areas are revegetating adequately and not suffering erosion damage;

(8) documentation that adjacent aquatic areas are adequately protected from construction activities; and

(9) photographs, maps, and drawings to support the written components of the mitigation plan.

i. Contingency Plan. Each mitigation plan should include a contingency plan that identifies the procedures for identifying and addressing unanticipated problems that arise in the implementation of the mitigation plan. This should include remedial measures to correct problems identified in regular monitoring, USACE site inspections, or other means. Remedial measures should include flexibility to ensure that they are appropriate for the problem that arises. Provisions should be included to allow for review and approval by the USACE, and other natural resource agencies, as appropriate. Contingency plans should allow for modifications to performance standards if mitigation projects are meeting mitigation goals in unanticipated ways. Finally, contingency plans should address the circumstances beyond the control of the responsible parties that might result in no requirement for remedial action.

j. Project Success/Responsible Parties. Normally, Department of the Army permits will include a special condition(s) requiring completion of all elements of the mitigation plan. In most cases, the USACE will require the compensatory mitigation elements of the plan to be perpetual. All mitigation plans should include the name, affiliation(s), qualifications, and contact information of the qualified mitigation specialist (biologist, ecologist, or other specialist qualified in aquatic ecosystem restoration, enhancement, and/or creation) retained to oversee project construction and mitigation plan implementation, including planting, monitoring, and reporting provisions. All plans should also identify all parties responsible for accomplishing, maintaining, monitoring, and managing all of the short and long-term mitigation plan provisions.

k. Site Protection. Mitigation plans should include a description of the legal means for protecting any mitigation areas. Streams, wetlands, and other aquatic resources, as well as riparian areas and other upland buffer areas that are important to the functioning of the aquatic areas, should be permanently protected in most cases with an appropriate real estate instrument, e.g., deed restriction, conservation easement, transfer of title to another federal or state natural resource agency or non-profit conservation

organization, to ensure long-term protection of the resource. Generally conservation easements or title transfers to appropriate agencies or organizations are preferable to deed restrictions, but deed restrictions are acceptable if an appropriate entity is not willing or able to accept the easement or title. It is critical to ensure that the existence of the mitigation area and provisions and restrictions of the mitigation plan will be known to any entity that may be involved in a future real estate action concerning the mitigation area. Appropriate protective covenants will normally be perpetual and include the following provisions:

(1 the area shall be protected in perpetuity under the provisions of the mitigation plan as the type of aquatic resource specified in the plan (e.g., wetland, stream and buffer zone, etc.);

(2 the area shall not be disturbed, except by those activities that would not adversely affect the intended extent, condition, and function of the mitigation area or those activities specifically provided for in the USACE-approved mitigation plan or in the special conditions of the Department of Army authorization;

(3 the area to be restricted shall be surveyed;

(4 the restriction shall not be modified or removed from the deed without the written approval of the U.S. Army Corps of Engineers; and

(5 conveyance of any interest in the property shall be subject to the restriction.

For example, a deed restriction provision might read: "The permittee will dedicate in perpetuity, as a stream and stream buffer zone preserve, the approximately 12.9-acre mitigation area identified in the mitigation plan, 'Mitigation Plan for the Shady Acres Residential Development, Tarrant County, Texas,' dated February 28, 1999. The only exceptions to the deed restriction shall be easements in existence on January 1, 1999. The mitigation area will not be disturbed, except by those activities that would not adversely affect the intended extent, condition, and function of the mitigation area or by those activities specifically provided for in the approved mitigation plan or in the special conditions for this permit. Unless otherwise specified, livestock grazing, logging, mowing, and similar activities will not be allowed in the mitigation area. The permittee will survey the mitigation area, develop an appropriate deed restriction for the surveyed area, submit the draft deed restriction to the USACE for review and approval, and then record the USACE-approved deed restriction with the Tarrant County Clerk. The permittee will provide a copy of the recorded deed restriction to the USACE by October 1, 1999. The restriction will not be modified or removed from the deed without the written approval of the USACE. The conveyance of any interest in the property shall be subject to this deed restriction." Sample deed restriction formats may be obtained upon request from the Fort Worth District, USACE.

l. Financial Assurances. Mitigation plans should include a discussion of the financial instruments in place or planned that would cover contingency actions in the event of mitigation project default or failure. Financial assurances should be commensurate with the level of impact and the level of compensatory mitigation required. Financial assurances should be sufficient to cover contingency actions such as a default by the responsible party, or a failure to meet performance standards. Financial assurances should be adequate to maintain the mitigation project throughout its operating life, as well as beyond its operating life if the project is not self-sustaining. The mitigation plan should identify the party or parties responsible for providing and managing the financial assurances and contingency funds. This should include the party or parties that will provide for long-term management, monitoring, and protection of the mitigation project. (See also sections h. on "Long-Term Management and Monitoring", i. on Project Success/Responsible Parties", and k. on "Contingency Plan" above.)

Financial assurances may be in the form of irrevocable trusts or letters of credit, performance bonds, escrow accounts, casualty insurance, legislatively enacted dedicated funds for government-operated mitigation projects, or other financial instruments approved by the USACE as long as the proposed financial instrument will function for the purpose intended. Provisions may be included in the mitigation plan that allow financial assurances to be phased-out or reduced when the mitigation sponsor has demonstrated that the project is functionally mature and self-sustaining in accordance with the performance standards.

4. ADDITIONAL INFORMATION ON MITIGATION AND MITIGATION PLANS

For further information about preparing compensatory mitigation plans or the USACE regulatory program, contact the Regulatory Branch, Fort Worth District, USACE, at: U.S. Army Corps of Engineers; Regulatory Branch, CESWF-PER-R; P.O. Box 17300; Fort Worth, Texas 76102-0300. You may visit the Regulatory Branch in Room 3A37 of the Fritz Lanham Federal Building at 819 Taylor Street in Fort Worth between 8:00 A.M. and 3:30 P.M., Monday through Friday. Telephone inquiries should be directed to (817) 886-1731. On the Internet, visit the Fort Worth District's Regulatory Branch homepage at *http://www.swf.usace.army.mil/regulatory/* and the national Regulatory Program homepage at *http://www.usace.army.mil/inet/functions/cw/cecwo/reg/*. Supplemental mitigation guidance may be developed in the future and posted for public use on the Fort Worth District, USACE website.

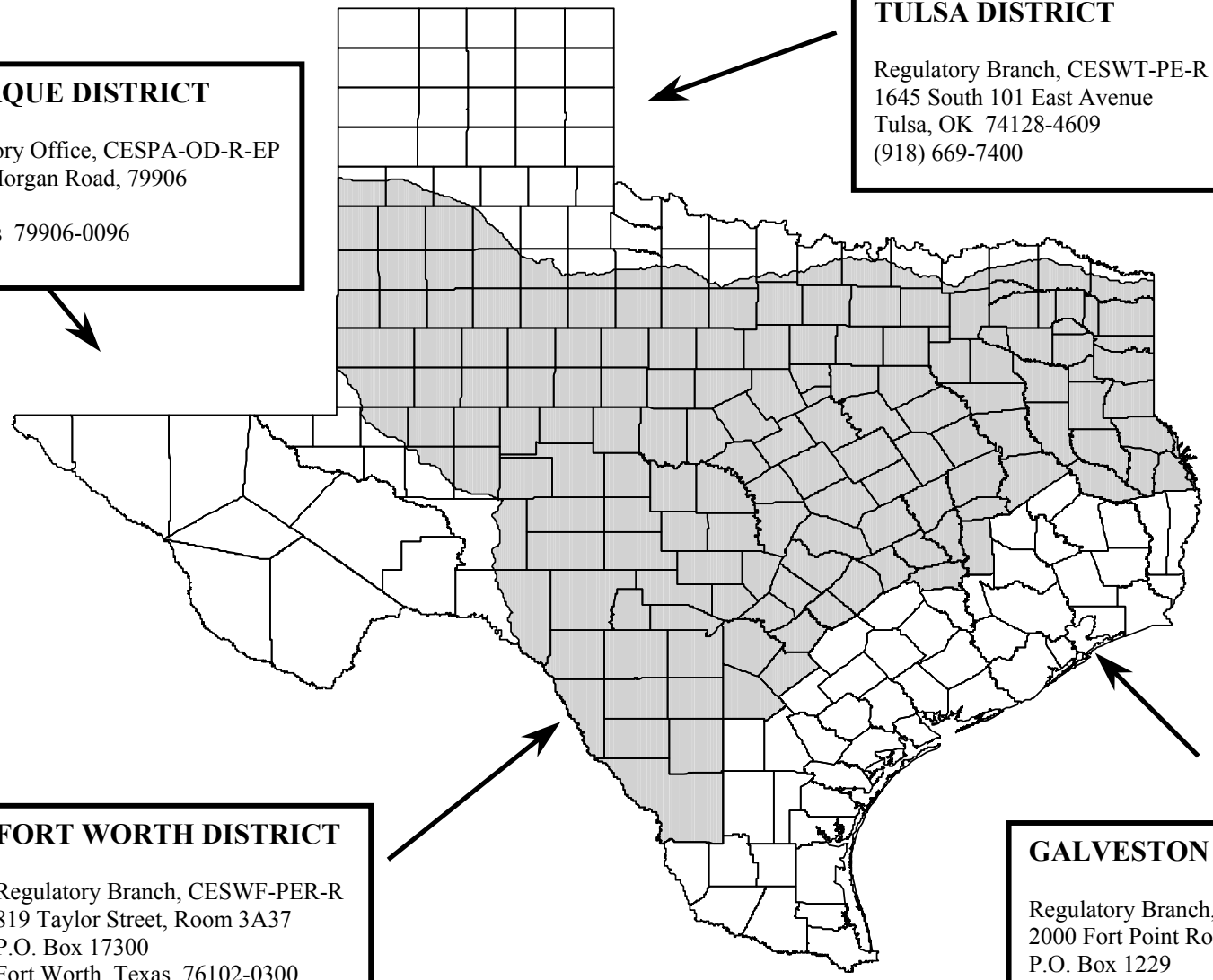
APPENDICES

Appendix A – Fort Worth District, U. S. Army Corps of Engineers, Boundary Map

Appendix B – Multi-Agency Compensatory Mitigation Plan Checklist and Supplement

Appendix C – Incorporating the National Research Council's Mitigation Guidelines into the Clean Water Act Section 404 Program

Appendix A
U.S. Army Corps of Engineers Districts within the State of Texas



ALBUQUERQUE DISTRICT

El Paso Regulatory Office, CESPA-OD-R-EP
Building 6380 Morgan Road, 79906
P.O. Box 6096
Fort Bliss, Texas 79906-0096
(915) 568-1359

TULSA DISTRICT

Regulatory Branch, CESWT-PE-R
1645 South 101 East Avenue
Tulsa, OK 74128-4609
(918) 669-7400

FORT WORTH DISTRICT

Regulatory Branch, CESWF-PER-R
819 Taylor Street, Room 3A37
P.O. Box 17300
Fort Worth, Texas 76102-0300
(817) 886-1740

GALVESTON DISTRICT

Regulatory Branch, CESWG-PE-R
2000 Fort Point Road
P.O. Box 1229
Galveston, Texas 77553-1229
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February 5, 2002

Appendix B

MULTI-AGENCY COMPENSATORY MITIGATION PLAN CHECKLIST[1]

- ☐ Mitigation Goals and Objectives
  - o Describe functions lost at impact site
  - o Describe functions to be gained at mitigation site
  - o Describe overall watershed improvements to be gained

- ☐ Baseline Information for Impact and Proposed Mitigation Sites
  - o Provide data on physical attributes of sites (soils, vegetation, hydrology)
  - o Describe historic and existing land uses and resources impacted
  - o Describe reference site attributes if available

- ☐ Mitigation Site Selection and Justification
  - o Describe process of selecting proposed site
  - o Likelihood of success, future land use compatibility, etc.

- ☐ Mitigation Work Plan
  - o Location
  - o Construction Plan
  - o Describe planned hydrology, vegetation, soils, buffers, etc.

- ☐ Performance Standards
  - o Identify success criteria
  - o Compare functions lost and gained at impact and mitigation sites
  - o Describe soils, vegetation and hydrology parameter changes

- ☐ Site Protection and Maintenance
  - o List parties and responsibilities
  - o Provide evidence of legal protective measures
  - o Maintenance plan and schedule

- ☐ Monitoring Plan
  - o Provide monitoring schedule, identify party (ies) and responsibilities
  - o Specify data to be collected, including assessment tools and methodologies

- ☐ Adaptive Management Plan
  - o Identify party (ies) and responsibilities
  - o Remedial measures (financial assurances, management plan, etc.)

- ☐ Financial Assurances
  - o Identify party (ies) responsible for assurances
  - o Specify type of assurance, contents and schedule

[1] Refer to "Supplement: Compensatory Mitigation Plan Checklist" for further explanation of specific checklist items.

SUPPLEMENT: COMPENSATORY MITIGATION PLAN CHECKLIST

This document is intended as a technical guide for Clean Water Act (CWA) Section 404 permit applicants[2] preparing compensatory mitigation plans. Compensatory mitigation is required to offset impacts that cannot be avoided and minimized to the extent practicable. The purpose of this document is to identify the types and extent of information that agency personnel need to assess the likelihood of success of a mitigation proposal. Success is generally defined as: a healthy sustainable wetland/water that – to the extent practicable – compensates for the lost functions of the impacted water in an appropriate landscape/watershed position. This checklist provides a basic framework that will improve predictability and consistency in the development of mitigation plans for permit applicants. Although every mitigation plan may not need to include each specific item, applicants should address as many as possible and indicate, when appropriate, why a particular item was not included (For example, permit applicants who will be using a mitigation bank would not be expected to include detailed information regarding the proposed mitigation bank site since that information is included in the bank's enabling instrument). This checklist can be adapted to account for specific environmental conditions in different regions of the U.S.

1. Mitigation Goals and Objectives

Impact Site

a. Describe and quantify the aquatic resource type and functions that will be impacted at the proposed impact site. Include temporary and permanent impacts to the aquatic environment.

b. Describe aquatic resource concerns in the watershed (e.g. flooding, water quality, habitat) and how the impact site contributes to overall watershed/regional functions. Identify watershed or other regional plans that describe aquatic resource objectives.

Mitigation Site

c. Describe and quantify the aquatic resource type and functions for which the mitigation project is intended to compensate.

d. Describe the contribution to overall watershed/regional functions that the mitigation site(s) is intended to provide.

2. Baseline Information - for proposed impact site, proposed mitigation site & if applicable, proposed reference site(s).

a. Location

1. Coordinates (preferably using DGPS) & written location description (including block, lot, township, county, Hydrologic Unit Code (HUC) number, as appropriate and pertinent.
2. Maps (e.g., site map with delineation (verified by the Corps), map of vicinity, map identifying location within the watershed, NWI map, NRCS soils map, zoning or planning maps; indicate area of proposed fill on site map).
3. Aerial/Satellite photos.

b. Classification – Hydrogeomorphic as well as Cowardin classification, Rosgen stream type, NRCS classification, as appropriate.

[2] The checklist may be used in other federal or state programs as well; however, additional information may be needed to satisfy specific program requirements. For example, Attachment A indicates additional information needed by the Natural Resources Conservation Service (NRCS) to satisfy the Swampbuster provisions of the Food Security Act.

c. Quantify wetland resources (acreage) or stream resources (linear feet) by type(s).
d. Assessment method(s) used to quantify impacts to aquatic resource functions (e.g., HGM, IBI, WRAP, etc.); explain findings. The same method should be used at both impact and mitigation sites.
e. Existing hydrology
    1. Water budget. Include water source(s) (precipitation, surface runoff, groundwater, stream) and losses(s). Provide budgets for both wet and dry years.
    2. Hydroperiod (seasonal depth, duration, and timing of inundation and/or saturation), percent open water.
    3. Historical hydrology of mitigation site if different than present conditions
    4. Contributing drainage area (acres).
    5. Results of water quality analyses (e.g., data on surface water, groundwater, and tides for such attributes as pH, redox, nutrients, organic content, suspended matter, DO, heavy metals).
f. Existing vegetation
    1. List of species on site, indicating dominants.
    2. Species characteristics such as densities, general age and health, and native/non-native/invasive status.
    3. Percent vegetative cover; community structure (canopy stratification).
    4. Map showing location of plant communities.
g. Existing soils
    1. Soil profile description (e.g., soil survey classification and series) and/or stream substrate (locate soil samples on site map).
    2. Results of standard soils analyses, including percent organic matter, structure, texture, permeability.
h. Existing wildlife usage (indicate possible threatened and endangered species habitat).
i. Historic and current land use; note prior converted cropland.
j. Current owner(s)
k. Watershed context/surrounding land use.
    1. Impairment status and impairment type (e.g., 303(d) list) of aquatic resources.
    2. Description of watershed land uses (percent ag, forested, wetland, developed).
    3. Size/Width of natural buffers (describe, show on map).
    4. Description of landscape connectivity: proximity and connectivity of existing aquatic resources and natural upland areas (show on map).
    5. Relative amount of aquatic resource area that the impact site represents for the watershed and/or region (i.e., by individual type and overall resources).

3. Mitigation Site Selection & Justification

a. Site-specific objectives: Description of mitigation type(s)[3], acreage(s) and proposed compensation ratios.
b. Watershed/regional objectives: Description of how the mitigation project will compensate for the functions identified in the Mitigation Goals section 1(c).
c. Description of how the mitigation project will contribute to aquatic resource functions within the watershed or region (or sustain/protect existing watershed functions) identified in the Mitigation

[3] That is, restoration, enhancement, creation or preservation: see Regulatory Guidance Letter (RGL) 02-2, Mitigation RGL, for definitions for these terms.

Goals section 1(d). How will the planned mitigation project contribute to landscape connectivity?

d. Likely future adjacent land uses and compatibility (show on map or aerial photo).

e. Description of site selection practicability in terms of cost, existing technology, and logistics.

f. If the proposed mitigation is off-site and/or out-of-kind, explain why on-site or in-kind options[4] are not practicable or environmentally preferable.

g. Existing and proposed mitigation site deed restrictions, easements and rights-of-way. Demonstrate how the existence of any such restriction will be addressed, particularly in the context of incompatible uses.

h. Explanation of how the design is sustainable and self-maintaining. Show by means of a water budget that there is sufficient water available to sustain long-term wetland or stream hydrology. Provide evidence that a legally defensible, adequate and reliable source of water exists.

i. USFWS and/or NOAA Fisheries Listed Species Clearance Letter or Biological Opinion.

j. SHPO Cultural Resource Clearance Letter.

4. Mitigation Work Plan

a. Maps marking boundaries of proposed mitigation types; include DGPS coordinates.

b. Timing of mitigation: before, concurrent or after authorized impacts; if mitigation is not in advance or concurrent with impacts, explain why it is not practicable and describe other measures to compensate for the consequences of temporal losses.

c. Grading plan

1. Indicate existing and proposed elevations and slopes.
2. Describe plans for establishing appropriate microtopography. Reference wetland(s) can provide design templates.

d. Description of construction methods (e.g., equipment to be used)

e. Construction schedule (expected start and end dates of each construction phase, expected date for as-built plan).

f. Planned hydrology

1. Source of water.
2. Connection(s) to existing waters.
3. Hydroperiod (seasonal depth, duration, and timing of inundation and saturation), percent open water, water velocity.
4. Potential interaction with groundwater.
5. Existing monitoring data, if applicable; indicate location of monitoring wells and stream gauges on site map.
6. Stream or other open water geomorphic features (e.g., riffles, pools, bends, deflectors).
7. Structures requiring maintenance (show on map) Explain structure maintenance in section 6(c).

g. Planned vegetation

1. Native plant species composition (e.g., list of acceptable native hydrophytic vegetation).
2. Source of native plant species (e.g. salvaged from impact site, local source, seed bank) stock type (bare root, potted, seed) and plant age(s)/size(s).
3. Plant zonation/location map (refer to grading plan to ensure plants will have an acceptable hydrological environment).

[4] See Federal Guidance on the Use of Off-Site and Out-of-Kind Compensatory Mitigation under Section 404 of the CWA.

4. Plant spatial structure – quantities/densities, % cover, community structure (e.g., canopy stratification).

5. Expected natural regeneration from existing seed bank, plantings, and natural recruitment.

h. Planned soils

1. Soil profile

2. Source of soils (e.g., existing soil, imported impact site hydric soil), target soil characteristics (organic content, structure, texture, permeability), soil amendments (e.g., organic material or topsoil).

3. Erosion and soil compaction control measures.

i. Planned habitat features (identify large woody debris, rock mounds, etc. on map).

j. Planned buffer (identify on map).

1. Evaluation of the buffer's expected contribution to aquatic resource functions.

2. Physical characteristics (location, dimensions, native plant composition, spatial and vertical structure.

k. Other planned features, such as interpretive signs, trails, fence(s), etc.

5. Performance Standards

a. Identify clear, precise, quantifiable parameters that can be used to evaluate the status of desired functions. These may include hydrological, vegetative, faunal and soil measures. (e.g., plant richness, percent exotic/invasive species, water inundation/saturation levels). Describe how performance standards will be used to verify that objectives identified in 3(b) and 3(c) have been attained.

b. Set target values or ranges for the parameters identified. Ideally, these targets should be set to mimic the trends and eventually approximate the values of a reference wetland(s).

6. Site Protection and Maintenance

a. Long-term legal protection instrument (e.g. conservation easement, deed restriction, transfer of title).

b. Party(ies) responsible and their role (e.g. site owner, easement owner, maintenance implementation). If more than one party, identify primary party.

c. Maintenance plan and schedule (e.g. measures to control predation/grazing of mitigation plantings, temporary irrigation for plant establishment, replacement planting, structure maintenance/repair, etc.).

d. Invasive species control plan (plant and animal).

7. Monitoring Plan

a. Party(ies) responsible for monitoring. If more than one, identify primary party.

b. Data to be collected and reported, how often and for what duration (identify proposed monitoring stations, including transect locations on map).

c. Assessment tools and/or methods to be used for data collection monitoring the progress towards attainment of performance standard targets.

d. Format for reporting monitoring data and assessing mitigation status.

e. Monitoring schedule

8. Adaptive Management Plan

a. Party(ies) responsible for adaptive management.

b. Identification of potential challenges (e.g., flooding, drought, invasive species, seriously degraded site, extensively developed landscape) that pose a risk to project success. Discuss how the design accommodates these challenges.
c. Discussion of potential remedial measures in the event mitigation does not meet performance standards in a timely manner.
d. Description of procedures to allow for modifications of performance standards if mitigation projects are meeting mitigation goals, but in unanticipated ways.

9. Financial Assurances

a. For each of the following, identify party(ies) responsible to establish and manage the financial assurance, the specific type of financial instrument, the method used to estimate assurance amount, the date of establishment, and the release and forfeiture conditions:
   1. Construction phase
   2. Maintenance
   3. Monitoring
   4. Remedial measures
   5. Project success
b. Types of assurances (e.g., performance bonds, irrevocable trusts, escrow accounts, casualty insurance, letters of credit, etc.).
c. Schedule by which financial assurance will be reviewed and adjusted to reflect current economic factors.

ATTACHMENT A
NATURAL RESOURCES CONSERVATION SERVICE (NRCS) PROGRAM REQUIREMENTS[5]

- ☐ NRCS conservation practice standards and specifications
- ☐ NRCS Environmental Evaluation
- ☐ Mitigation agreement
- ☐ Federal/State/Local required permits
- ☐ Compatible use statement:
  - Allowable uses (e.g. hunting, fishing)
  - Prohibited uses (e.g. grazing, silviculture)
  - Uses approved by compatible use permit
- ☐ Copy of recorded easement
- ☐ Subordination waiver on any existing liens on mitigation site
- ☐ Statement of landowner's tax liability
- ☐ Copy of Warrantee Deed from landowner's attorney (no encumbrances, if so list)
- ☐ Copy of certified wetland determination:
  - NRCS-CPA-026 Highly Erodible Land and Wetland Conservation Certification
  - Wetland label map
- ☐ Copy of FSA Good Faith Waiver
- ☐ Copy of easement(s) ingress/egress granted to USDA employees for gaining legal access to mitigation site
- ☐ Copy of NRCS-CPA-38 Request for Certified Wetland Determination/Delineation

[5] For a complete list of the program requirements needed by NRCS to satisfy the Swampbuster provisions of the Food Security Act see the National Food Security Act Manual.

Appendix C

Incorporating the National Research Council's Mitigation Guidelines
Into the Clean Water Act Section 404 Program

BACKGROUND

In its comprehensive report entitled *"Compensating for Wetland Losses Under the Clean Water Act,"* the National Research Council (NRC) provided ten guidelines to aid in planning and implementing successful mitigation projects ("Operational Guidelines for Creating or Restoring Wetlands that are Ecologically Self-Sustaining"; NRC, 2001). Please note that these guidelines also pertain to restoration and enhancement of other aquatic resource systems, such as streams. Each of the ten guidelines can generally be described as A) basic requirement for mitigation success, or B) guide for mitigation site selection. The following sections include both the original text of the NRC guidelines, in italics, as well as a discussion of how applicants and field staff can incorporate these guidelines into the development and review of mitigation projects.

A. **Basic Requirements for Success**

When considering mitigation sites it is important to note that wetland mitigation is not a precise, exact science and predictable results are not always obtainable. Having an adaptive management attitude is a necessity. One should incorporate experimentation into the mitigation plan when possible. This may mean using experimental plots within a mitigation site with different controls, replication, different treatments, inputs, etc., to determine if specific mitigation efforts are effectively meeting the desired goals. This requires detailed planning, effective implementation of the mitigation project, close monitoring (both short and long term) of the implemented plans and finally adjusting to intermediate results with an adaptive attitude and additional modifications to obtain long range wetland and watershed goals. In addition, researchers have found that restoration is the most likely type of mitigation to result in successful and sustainable aquatic resource replacement. Moreover, numerous studies in a variety of landscapes and watershed types have shown that of all factors contributing to mitigation success, attaining and maintaining appropriate hydrological conditions is the most important. The following NRC guidelines should be considered basic requirements for mitigation success.

A.1. **Whenever possible, choose wetland restoration over creation**.

Select sites where wetlands previously existed or where nearby wetlands still exist. Restoration of wetlands has been observed to be more feasible and sustainable than creation of wetlands. In restored sites the proper substrate may be present, seed sources may be on-site or nearby, and the appropriate hydrological conditions may exist or may be more easily restored.

The U.S. Army Corps of Engineers (Corps) and Environmental Protection Agency (EPA) Mitigation Memorandum of Agreement states that, "because the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, restoration should be the first option considered" (Fed. Regist. 60(Nov. 28):58605). The Florida Department of Environmental Regulation (FDER 1991a) recommends an emphasis on restoration first, then enhancement, and, finally, creation as a last resort. Morgan and Roberts (1999) recommend encouraging the use of more restoration and less creation.

The applicant proposes the type of mitigation. However, the Corps and other agencies will evaluate proposals based on the ease of completion and the likelihood of success. Therefore, pure wetland creation will be evaluated using very stringent criteria before being approved for use as compensatory mitigation for project impacts. Some projects may include creation as part of an overall mitigation effort that involves restoration, enhancement, and/or preservation (e.g., as in a proposed mitigation bank). In these cases, evaluation will be based on the entire proposal and its location in the watershed.

A.2. **Avoid over-engineered structures in the wetland's design**

> *Design the system for minimal maintenance. Set initial conditions and let the system develop. Natural systems should be planned to accommodate biological systems. The system of plants, animals, microbes, substrate, and water flows should be developed for self-maintenance and self-design. Whenever possible, avoid manipulating wetland processes using approaches that require continual maintenance. Avoid hydraulic control structures and other engineered structures that are vulnerable to chronic failure and require maintenance and replacement. If necessary to design in structures, such as to prevent erosion until the wetland has developed soil stability, do so using natural features, such as large woody debris. Be aware that more specific habitat designs and planting will be required where rare and endangered species are among the specific restoration targets.*
>
> *Whenever feasible, use natural recruitment sources for more resilient vegetation establishment. Some systems, especially estuarine wetlands, are rapidly colonized, and natural recruitment is often equivalent or superior to plantings (Dawe et al. 2000). Try to take advantage of native seed banks, and use soil and plant material salvage whenever possible. Consider planting mature plants as supplemental rather than required, with the decision depending on early results from natural recruitment and invasive species occurrence. Evaluate on-site and nearby seed banks to ascertain their viability and response to hydrological conditions. When plant introduction is necessary to promote soil stability and prevent invasive species, the vegetation selected must be appropriate to the site rather than forced to fit external pressures for an ancillary purpose (e.g., preferred wildlife food source or habitat).*

The use of over-engineered structures and maintenance intensive plans for mitigation is not recommended and will be evaluated using very stringent criteria. If these types of plans are ultimately approved, they must include a comprehensive remedial plan and financial assurances [note that all mitigation projects should have remedial plans and financial assurances], along with a non-wasting endowment to insure that proper maintenance occurs.

It should also be noted that aggressive soil and planting plans using introduced plants and soil from outside sources must be closely monitored to prevent invasive plant takeovers and monotypic plant communities. Such failures can be minimized by undertaking both short-term and long-term monitoring, and having contingency plans in place.

A. 3. **Restore or develop naturally variable hydrological conditions**.

Promote naturally variable hydrology, with emphasis on enabling fluctuations in water flow and level, and duration and frequency of change, representative of other comparable wetlands in the same landscape setting. Preferably, natural hydrology should be allowed to become reestablished rather than finessed through active engineering devices to mimic a natural hydroperiod. When restoration is not an option, favor the use of passive devices that have a higher likelihood to sustain the desired hydroperiod over long term. Try to avoid designing a system dependent on water-control structures or other artificial infrastructure that must be maintained in perpetuity in order for wetland hydrology to meet the specified design. In situations where direct (in-kind) replacement is desired, candidate mitigation sites should have the same basic hydrological attributes as the impacted site.

Hydrology should be inspected during flood seasons and heavy rains, and the annual and extreme-event flooding histories of the site should be reviewed as closely as possible. For larger mitigation projects, a detailed hydrological study of the site should be undertaken, including a determination of the potential interaction of groundwater with the proposed wetland. Without flooding or saturated soils, for at least part of the growing season, a wetland will not develop. Similarly, a site that is too wet will not support the desired biodiversity. The tidal cycle and stages are important to the hydrology of coastal wetlands.

Natural hydrology is the most important factor in the development of successful mitigation. Wetlands and other waters are very dynamic, and dependent on natural seasonal and yearly variations that are unlikely to be sustainable in a controlled hydrologic environment. Artificial structures and mechanisms should be used only temporarily. Complex engineering and solely artificial mechanisms to maintain water flow normally will not be acceptable in a mitigation proposal. In those sites where an artificial water source (irrigation) has been used to attempt to simulate natural hydrology there are several problems that lead to reduced likelihood of success. First, artificial irrigation does not provide the dynamic and variable nature of water flow normally found in wetlands or riparian systems. Second, the lack of seasonal flows limits the transport of organic matter into and out of the wetland or riparian system. Without any inflow, the net result of artificial irrigation is transport of organic material out of the system. Third, depending on the timing, the use of flood or sprinkler systems on newly created or restoration sites often promotes the germination and growth of exotic plant species.

Note that this changes the Corps' past policy of accepting artificial irrigation as the sole source of hydrology for mitigation projects. If permitted at all, these projects will require substantial financial assurances and a higher mitigation ratio to offset their risk of failure. Applicants must weigh the potential investment costs of acquiring land suitable for restoration versus creation projects in upland environments that will likely involve higher long-term costs and greater risks of mitigation site failure.

The Corps may approve exceptions dealing with hydrologic manipulations, on a case-by-case basis in highly unusual circumstances. It should be noted, however, that even minor engineering or hydraulic manipulation requiring long-term maintenance will only be approved after the applicant posts a non-wasting endowment, performance bond, or other financial assurance.

A.4. **Consider complications associated with creation or restoration in seriously degraded or disturbed sites**

> *A seriously degraded wetland, surrounded by an extensively developed landscape, may achieve its maximal function only as an impaired system that requires active management to support natural processes and native species (NRC 1992). It should be recognized, however, that the functional performance of some degraded sites may be optimized by mitigation, and these considerations should be included if the goal of the mitigation is water- or sediment-quality improvement, promotion of rare or endangered species, or other objectives best served by locating a wetland in a disturbed landscape position. Disturbance that is intense, unnatural, or rare can promote extensive invasion by exotic species or at least delay the natural rates of redevelopment. Reintroducing natural hydrology with minimal excavation of soils often promotes alternative pathways of wetland development. It is often advantageous to preserve the integrity of native soils and to avoid deep grading of substrates that may destroy natural belowground processes and facilitate exotic species colonization (Zedler 1996).*

When considering restoration options it is necessary to determine the spatial and temporal scale of the damage: is the damage limited to the water body itself, or is it a predominant characteristic of the watershed or the surrounding landscape? On-site damage may be restorable, whereas regional-scale damage may be more difficult, or impossible, to reverse or obtain historic conditions. Alternate goals may be necessary in order to determine specific goals of the restoration project. Those desired wetland mitigation goals will depend on the resources needed, the level of degradation and realistic mitigation targets as reflected by the watershed and surrounding landscape. This issue points to the importance of evaluating mitigation plans from a broader watershed perspective.

A.5. **Conduct early monitoring as part of adaptive management**

> *Develop a thorough monitoring plan as part of an adaptive management program that provides early indication of potential problems and direction for correction actions. The monitoring of wetland structure, processes, and function from the onset of wetland restoration or creation can indicate potential problems. Process monitoring (e.g., water-level fluctuations, sediment accretion and erosion, plant flowering, and bird nesting) is particularly important because it will likely identify the source of a problem and how it can be remedied. Monitoring and control of nonindigenous species should be a part of any effective adaptive management program. Assessment of wetland performance must be integrated with adaptive management. Both require understanding the processes that drive the structure and characteristics of a developing wetland. Simply documenting the structure (vegetation, sediments, fauna, and nutrients) will not provide the knowledge and guidance required to make adaptive "corrections" when adverse conditions are discovered. Although wetland development may take years to decades, process-based monitoring might provide more sensitive early indicators of whether a mitigation site is proceeding along an appropriate trajectory.*

There are many factors that may positively or negatively influence aquatic resources and the functions they provide, such as urbanization, farming or grazing. Wetlands and other aquatic resources are often subject to a wide range and frequency of events such as floods, fires and ice storms. As with all natural systems, some things are beyond control. Well-crafted mitigation plans, however, recognize the likelihood of these events and attempt to plan for them, primarily through monitoring and adaptive

management. In addition, it is important to realize the mobile nature of wetlands and streams. They change over time and over the landscape in response to internal and external forces.

Monitoring and adaptive management should be used to evaluate and adjust maintenance (e.g., predator control, irrigation), and design remedial actions. Adaptive management should consider changes in ecological patterns and processes, including biodiversity of the mitigation project as it evolves or goes through successional stages. Trends in the surrounding area must also be taken into account (i.e., landscape/watershed context). Being proactive helps ensure the ultimate success of the mitigation, and improvement of the greater landscape. One proactive methodology is incorporation of experimentation into the mitigation plan when possible, such as using experimental plots within a mitigation site with different controls, replication, different treatments, inputs, etc., to determine if specific mitigation efforts are meeting the desired goals.

B. **Mitigation Site Selection**

The selection of an appropriate site to construct a mitigation project is one of the most important, yet often under-evaluated, aspects of mitigation planning. In many instances, the choice of the mitigation site has been completed by the applicant based solely on economic considerations with minimal concern for the underlying physical and ecological characteristics of the site. While economic factors are important in determining the practicability of site selection, current technology and the following NRC guidelines should also factor into the selection of a mitigation site.

B.1. **Consider the hydrogeomorphic and ecological landscape and climate**

Whenever possible, locate the mitigation site in a setting of comparable landscape position and hydrogeomorphic class. Do not generate atypical "hydrogeomorphic hybrids"; instead, duplicate the features of reference wetlands or enhance connectivity with natural upland landscape elements (Gwin et al. 1999).

Regulatory agency personnel should provide a landscape setting characterization of both the wetland to be developed and, using comparable descriptors, the proposed mitigation site. Consider conducting a cumulative impact analysis at the landscape level based on templates for wetland development (Bedford 1999). Landscapes have natural patterns that maximize the value and function of individual habitats. For example, isolated wetlands function in ways that are quite different from wetlands adjacent to rivers. A forested wetland island, created in an otherwise grassy or agricultural landscape, will support species that are different from those in a forested wetland in a large forest tract. For wildlife and fisheries enhancement, determine if the wetland site is along ecological corridors such as migratory flyways or spawning runs. Constraints also include landscape factors. Shoreline and coastal wetlands adjacent to heavy wave action have historically high erosion rates or highly erodible soils, and often-heavy boat wakes. Placement of wetlands in these locations may require shoreline armoring and other protective engineered structures that are contrary to the mitigation goals and at cross-purposes to the desired functions

Even though catastrophic events cannot be prevented, a fundamental factor in mitigation plan design should be how well the site will respond to natural disturbances that are likely to occur.

Floods, droughts, muskrats, geese, and storms are expected natural disturbances and should be accommodated in mitigation designs rather than feared. Natural ecosystems generally recover rapidly from natural disturbances to which they are adapted. The design should aim to restore a series of natural processes at the mitigation sites to ensure that resilience will have been achieved.

Watershed management requires thinking in terms of multiple spatial scales: the specific wetland or stream itself, the watershed that influences the wetland/stream, and the greater landscape. The landscape in which a wetland or water exists, defines its hydrogeologic setting. The hydrogeologic setting in turn controls surface and sub-surface flows of water, while a variety of hydrogeologic settings results in biological and functional diversity of aquatic resources.

There are three aspects of watershed management that the applicant must address in a mitigation plan: hydrogeomorphic considerations, the ecological landscape, and climate. It should be noted that the overall goal of compensatory mitigation is to replace the functions being lost (functional equivalency) due to a permitted Section 404 activity. By evaluating the hydrogeomorphic setting, ecological landscape and climate, one can determine which attributes can be manipulated (i.e. hydrology, topography, soil, vegetation or fauna) to restore, create or enhance viable aquatic functions.

Hydrogeomorphic considerations refers to the source of water and the geomorphic setting of the area. For example, a riverine wetland receives water from upstream sources in a linear manner, whereas vernal pools exist as relatively closed depressions underlain by an impermeable layer that allows rainfall runoff from a small watershed to fill the pool during specific times of year. Applicants should strive to replicate the hydrogeomorphic regime of the impacted water to increase the potential that the mitigation site mimics the functions lost. Only as a last resort, should applicants prepare plans for constructing wetlands using artificial water sources or placing wetlands into non-appropriate areas of the landscape. In such cases, there should be a contingency plan to prepare for unanticipated events or failures.

Ecological landscape describes the location and setting of the wetland/water in the surrounding landscape. For example, attempting to place mitigation in a dissimilar ecological complex than that of the impacted water is expected to result in a wetland/water unlikely to replicate the functions of the wetland/water that was lost. In all cases, the applicant should evaluate the historical ecological landscape of the mitigation site; for example, if there had been large areas of forested wetland in an agricultural area, then replacement of a forested wetland may be appropriate given other factors that should be considered. In most cases, applicants should plan for a mitigation area that fits best within the ecological landscape of the watershed or region of the mitigation site. Applicants should also consider constructing mitigation sites with more than one type of wetland/water regime, if appropriate, to provide for landscape diversity.

Climate also affects mitigation and is clearly beyond the control of the applicant. Therefore, the mitigation site should be sited in an area supported by the normal rainfall, subsurface and/or groundwater in the region. Climate considerations also can impact other hydrologic issues, sediment transport factors and other factors affecting attainment of desired functions. While climate cannot be manipulated, applicants need to account for it in mitigation plans, including local and regional variability and extremes.

B. 2. **Adopt a dynamic landscape perspective**

> *Consider both current and future watershed hydrology and wetland location. Take into account surrounding land use and future plans for the land. Select sites that are, and will continue to be, resistant to disturbance from the surrounding landscape, such as preserving large buffers and connectivity to other wetlands. Build on existing wetland and upland systems. If possible, locate the mitigation site to take advantage of refuges, buffers, green spaces, and other preserved elements of the landscape. Design a system that utilizes natural processes and energies, such as the potential energy of streams as natural subsidies to the system. Flooding rivers and tides transport great quantities of water, nutrients, and organic matter in relatively short time periods, subsidizing the wetlands open to these flows as well as the adjacent rivers, lakes, and estuaries.*

Applicants should consider both current and expected future hydrology (including effects of any proposed manipulations), sediment transport, locations of water resources, and overall watershed functional goals before choosing a mitigation site. This is extremely critical in watersheds that are rapidly urbanizing; changing infiltration rates can modify runoff profiles substantially, with associated changes in sediment transport, flooding frequency, and water quality. More importantly, this factor encourages applicants to plan for long-term survival by placing mitigation in areas that will remain as open space and not be severely impacted by clearly predictable development. Consideration of the landscape perspective requires evaluation of buffers and connectivity (both hydrologic- and habitat-related). Buffers are particularly important to insure that changing conditions are ameliorated, especially in watersheds that have been, or are in the process of being, heavily developed. In addition, because wetlands are so dynamic, adequate buffers and open space upland areas are vital to allowing for wetlands to "breath" (expand and/or decrease in size and function) and migrate within the landscape, particularly in watersheds under natural and/or man-made pressures.

B.3. **Pay attention to subsurface conditions, including soil and sediment geochemistry and physics, groundwater quantity and quality, and infaunal communities**.

> *Inspect and characterize the soils in some detail to determine their permeability, texture, and stratigraphy. Highly permeable soils are not likely to support a wetland unless water inflow rates or water tables are high. Characterize the general chemical structure and variability of soils, surface water, groundwater, and tides. Even if the wetland is being created or restored primarily for wildlife enhancement, chemicals in the soil and water may be significant, either for wetland productivity or bioaccumulation of toxic materials. At a minimum, these should include chemical attributes that control critical geochemical or biological processes, such as pH, redox, nutrients (nitrogen and phosphorus species), organic content and suspended matter.*

Knowledge of the physical and chemical properties of the soil and water at the mitigation site is also critical to choice of location. For example, to mitigate for a saline wetland, without knowing the properties of the soil and water sources at the mitigation site, it is unlikely that such a wetland is restorable or creatable. Certain plants are capable of tolerating some chemicals and actually thrive in those environments, while others plants have low tolerances and quickly diminish when subjected to water containing certain chemicals, promoting monotypic plant communities. Planning for outside influences that may negatively affect the mitigation project can make a big difference as to the success of the mitigation efforts and meeting watershed objectives.

B.4 **Pay particular attention to appropriate planting elevation, depth, soil type, and seasonal timing**

> *When the introduction of species is necessary, select appropriate genotypes. Genetic differences within species can affect wetland restoration outcomes, as found by Seliskar (1995), who planted cordgrass (Spartina alterniflora) from Georgia, Delaware, and Massachusetts into a tidal wetland restoration site in Delaware. Different genotypes displayed differences in stem density, stem height, belowground biomass, rooting depth, decomposition rate, and carbohydrate allocation. Beneath the plantings, there were differences in edaphic chlorophyll and invertebrates.*
>
> *Many sites are deemed compliant once the vegetation community becomes established. If a site is still being irrigated or recently stopped being irrigated, the vegetation might not survive. In other cases, plants that are dependent on surface-water input might not have developed deep root systems. When the surface-water input is stopped, the plants decline and eventually die, leaving the mitigation site in poor condition after the Corps has certified the project as compliant.*

A successful mitigation plan needs to consider soil type and source, base elevation and water depth, plant adaptability and tolerances, and the timing of water input. When possible: a) use local plant stock already genetically adapted to the local environment; b) use stock known to be generally free from invasive or non-native species; c) use soil banks predetermined to have desirable seed sources; d) choose soil with desirable characteristics (e.g., high clay composition and low silt and sand

composition for compaction purposes); e) determine \final bottom elevations to insure that targeted water regimes are met and the planned plant community can tolerate the water depth, frequency of inundation and quality of water sources.

It is particularly helpful to examine reference wetlands and/or waters near the mitigation area, in order to identify typical characteristics of sustainable waters in a particular watershed or region. This allows one to determine the likelihood of certain attributes developing in a proposed mitigation site. It should be emphasized that wetland restoration is much more likely to achieve desired results than wetland creation, as evidence of a previously existing wetland or other aquatic resource is a strong indicator of what will return, given the proper circumstances Historical data for a particular site, if available, can also help establish management goals and monitoring objectives. Creating wetlands from uplands has proven to be difficult and often requires extensive maintenance.

B.5. **Provide appropriately heterogeneous topography**

> *The need to promote specific hydroperiods to support specific wetland plants and animals means that appropriate elevations and topographic variations must be present in restoration and creation sites. Slight differences in topography (e.g., micro- and meso-scale variations and presence and absence of drainage connections) can alter the timing, frequency, amplitude, and duration of inundation. In the case of some less-studied, restored wetland types, there is little scientific or technical information on natural microtopography (e.g., what causes strings*

and flarks in patterned fens or how hummocks in fens control local nutrient dynamics and species assemblages and subsurface hydrology are poorly known). In all cases, but especially those with minimal scientific and technical background, the proposed development wetland or appropriate example(s) of the target wetland type should provide a model template for incorporating microtopography.

Plan for elevations that are appropriate to plant and animal communities that are reflected in adjacent or close-by natural systems. In tidal systems, be aware of local variations in tidal flooding regime (e.g., due to freshwater flow and local controls on circulation) that might affect flooding duration and frequency.

While manipulations of natural water supply may not be possible or desirable, changes in topography are possible and should be incorporated in the design of a restored or created wetland/water when needed. Varying the depths of the substrate of the mitigation area ensures a heterogeneous topography, decreasing the likelihood of homogenous plant communities. Rather than plan on one water level or one elevation of the substrate, in hopes of establishing a specific plant community, it is best to vary the depth of the bottom stratum. This will increase the likelihood of success for a more diverse targeted plant community and desired functions.