Chicago District Regulatory Branch

CHICAGO DISTRICT PERMITTEE RESPONSIBLE MITIGATION REQUIREMENTS

(Revised October 2009)

INTRODUCTION

The purpose of these mitigation requirement and guidelines is to assist applicants and consultants in the development and implementation of compensatory mitigation proposals, including management and monitoring plans to offset unavoidable impacts to waters of the United States authorized through the issuance of Department of the Army (DA) permits pursuant to section 404 of the Clean Water Act (33 U.S.C. 1344) and/or section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

All DA Permits subject to section 404 of the Clean Water Act shall comply with the applicable provisions of the Section 404(b) (1) Guidelines at 40 CFR part 230, including those which require the permit applicant to take all appropriate and practicable steps to avoid and minimize adverse impacts to waters of the United States. Practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. Compensatory mitigation for unavoidable impacts may be required to ensure that an activity requiring a section 404 permit complies with the Section 404(b) (1) Guidelines. Compensatory mitigation may also be required to ensure that an activity requiring authorization under section 404 of the Clean Water Act and/or sections 9 or 10 of the Rivers and Harbors Act of 1899 is not contrary to the public interest.

Mitigation is frequently required as a condition for issuing DA Permits and is intended to replace lost natural functions and values. When evaluating compensatory mitigation options, the U.S. Army Corps of Engineers (Corps) will consider what would be environmentally preferable. In making this determination, the Corps shall assess the likelihood for ecological success and sustainability, the location of the compensation site relative to the impact site and their significance within the watershed, and the costs of the compensatory mitigation project. Compensatory mitigation requirements shall be commensurate with the amount and type of impact that is associated with a particular DA Permit. Permit applicants are responsible for proposing an appropriate compensatory mitigation option to offset unavoidable impacts. Due to the difficulty of precisely quantifying the functional value of aquatic systems, including wetlands, the Chicago District currently accepts acreage replacement of the impacted system.

DEFINITIONS

"Adaptive Management": The development of a management strategy that anticipates

likely challenges associated with compensatory mitigation projects and provides for the implementation of actions to address those challenges, as well as unforeseen changes to those projects. It requires consideration of the risk, uncertainty, and dynamic nature of compensatory mitigation projects and guides modification of those projects to optimize performance. It includes the selection of appropriate measures that will ensure that the aquatic resource functions are provided and involves analysis of monitoring results to identify potential problems of a compensatory mitigation project and the identification and implementation of measures to rectify those problems.

"Chicago District": The U.S. Army Corps of Engineers, Chicago District

"Compensatory Mitigation": Replacement of aquatic resources and its functions and values, for the purposes of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved. The replacement of the wetland functions and values is generally accomplished through wetland restoration (re-establishment or rehabilitation), creation (establishment), enhancement, or in exceptional circumstances, wetland preservation.

"Department of the Army Permits" or "DA Permits": Authorizations for the discharge of dredged or fill material into waters of the United States, including wetlands, issued by the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899.

"Enhancement": The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s) but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area. Because impacts associated with individual projects that propose mitigation will, in virtually all cases, be permanent, only enhancement that results in permanent improvement of functions and values of aquatic resources will be acceptable. .

"Establishment (Creation)": The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions.

"In-kind Mitigation": A resource of a similar structural and functional type to the impacted resource.

"Management": Actions taken within a mitigation site to establish and maintain desired habitat conditions. Representative management actions include, but are not limited to, water level manipulations, herbicide use, mechanical plant removal, and prescribed burning.

"Monitoring": A specific program of data collection which documents the physical, chemical, and biological characteristics of the Mitigation site, for the purpose of determining compliance with performance standards established.

"Off-site Mitigation": An area that is neither located on the same parcel of land as the impact site, nor on a parcel of land contiguous to the parcel containing the impact site.

"On-site Mitigation": An area located on the same parcel of land as the impact site, or on a parcel of land contiguous to the impact site.

"Out-of-kind Mitigation": A resource of a different structural and functional type from the impacted resource.

"Performance Standards": Observable or measurable physical (including hydrological), chemical and/or biological attributes that are used to determine if a compensatory mitigation project meets its objectives.

"Permittee-Responsible Mitigation": An aquatic resource restoration, establishment, enhancement, and/or preservation activity undertaken by the permittee (or an authorized agent or contractor) to provide compensatory mitigation for which the permittee retains full responsibility.

"Preservation": The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

"Restoration": The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories:

1. "Re-establishment": The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area.

2. "Rehabilitation": The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

"Standard Permit": A standard, individual permit issued under the authority of section 404 of the Clean Water Act and/or sections 9 or 10 of the Rivers and Harbors Act of 1899.

"Site Development Plan (Mitigation Plan)": A plan for the proposed mitigation site that identifies all actions that will be undertaken to generate mitigation. Representative elements of the site development plan include, but are not limited to, plans for site grading, re-vegetation, establishment of hydrology, erosion control, structures, proposed utilities, management, and monitoring.

"Temporal Loss": The time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the

compensatory mitigation site. Higher compensation ratios may be required to compensate for temporal loss. When the compensatory mitigation project is initiated prior to, or concurrent with, the permitted impacts, the Chicago District may determine that compensation for temporal loss is not necessary, unless the resource has a long development time.

"Waters of the United States"; Those areas subject to U.S. Army Corps of Engineers regulatory authority pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899, as defined at 33 C.F.R. Part 328.3(a).

"Watershed": A land area that drains to a common waterway, such as a stream, lake, estuary, wetland, or ultimately the ocean.

"Watershed Approach": An analytical process for making compensatory mitigation decisions that support the sustainability or improvement of aquatic resources in a watershed. It involves consideration of watershed needs, and how locations and types of compensatory mitigation projects address those needs. A landscape perspective is used to identify the types and locations of compensatory mitigation projects that will benefit the watershed and offset losses of aquatic resource functions and services caused by activities authorized by DA permits. The watershed approach may involve consideration of landscape scale, historic and potential aquatic resource conditions, past and projected aquatic resource impacts in the watershed, and terrestrial connections between aquatic resources when determining compensatory mitigation requirements for DA permits.

"Watershed Plan": A plan developed by federal, tribal, state and/or local government agencies or appropriate non-governmental organizations, in consultation with relevant stakeholders, for the specific goal of aquatic resource restoration, establishment, enhancement, or preservation. A watershed plan addresses aquatic resource conditions in the watershed, multiple stakeholder interests, and land uses. Watershed plans may also identify priority sites for aquatic resource restoration and protection. Examples of watershed plans include special area management plans, advance identification programs, and aquatic resource management plans.

"Wetlands": Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Examples of wetland types may be found in Classification of Wetlands and Deepwater Habitats of the United States, (December 1979), published by the United States Fish and Wildlife Service, or in Wetland Plants and Plant Communities of Minnesota and Wisconsin (1987), by Eggers and Reed.

AUTHORITIES

The use of permittee responsible compensatory mitigation, as described in this document, shall be in accordance with all applicable statutes, regulations, and policies, including, but not limited to the following:

1. Final Rule for Regulatory Programs of the Corps of Engineers (33 C.F.R. Parts 320-332, as amended);

2. Guidelines for Specification of Disposal Sites for Dredged and Fill Material (40 C.F.R. Part 230, as amended) (Section 404 (b) (1) Guidelines);
3. Clean Water Act (33 U.S.C. §§ 1251 et seq.);
4. Rivers and Harbors Act of 1899 (33 U.S.C. § 403);
5. Fish and Wildlife Coordination Act (16 U.S.C. §§ 661 et seq.);
6. Endangered Species Act (16 U.S.C. §§ 1531 et seq.);
7. National Environmental Policy Act (42 U.S.C. §§ 4321 et seq.);
8. National Historic Preservation Act of 1966 (16 U.S.C. §§ 470 et seq.)

GENERAL GUIDELINES

Using normal review procedures prescribed by regulation, the Chicago District will conduct project evaluations and will determine the level of mitigation required, and whether a project is eligible to use permittee responsible compensatory mitigation. The following general guidelines will be used in determining whether use of permittee responsible mitigation is appropriate:

1. All appropriate and practicable steps to avoid and minimize adverse impacts to aquatic resources, as determined by the Chicago District, shall be reflected in an applicant's project plan before authorization to use any type of compensatory mitigation will be granted.

2. Permittee responsible compensatory mitigation should utilize a watershed approach and fully consider the ecological needs of the watershed. Where an appropriate watershed or sub-watershed plan is available, mitigation site selection should be based on recommendations in the plan. The applicant shall describe in detail how the site was chosen and will be developed, including mitigation based on the specific resource need of the impacted watershed.

3. A good mitigation design selects an appropriate site and takes into consideration all-important multi-disciplinary factors that affect self-sustaining ecological systems, such as wetlands and associated uplands. If the whole landscape design is not integrated with site water management, mitigation efforts may not achieve the performance standards.

4. Mitigation relying on groundwater is more likely to be successful in supporting diverse native communities. In all cases, the Chicago District will consider the information supplied by the applicant in determining the acceptability of a project and its proposed mitigation.

TYPE AND LOCATION OF COMPENSATORY MITIGATION

The applicant shall provide a description of the resource type(s) and amount(s) that will be provided, the method of compensation (i.e., restoration, establishment, enhancement, and/or preservation), and the manner in which the resource functions of the compensatory mitigation project will address the needs of the watershed, ecoregion, physiographic province, or other geographic area of interest. Compensatory mitigation projects may be

sited on public or private lands.

Compensatory mitigation can include wetlands that are restored (re-established or rehabilitated), created (established), enhanced, or preserved. Restoration should generally be the first option considered because the likelihood of success is greater and the impacts to potentially ecologically important uplands are reduced compared to establishment, and the potential gains in terms of aquatic resource functions are greater, compared to enhancement and preservation. Full credit will be given for re-establishment of former wetlands and may be given for wetland establishment (creation) from upland. Partial credit can be given for permanent enhancement or rehabilitation of degraded wetlands or in exceptional circumstances, preservation of existing wetlands. The appropriateness of enhancement, rehabilitation, and preservation, and the corresponding credit ratio will be determined by the Chicago District.

Certain types of enhancement or rehabilitation of existing wetland can be an acceptable mitigation if the enhancement or rehabilitation actions are scientifically sound and result in a substantial, measurable, and permanent increase in the level of wetland function. The mitigation plan shall specifically state which aspects of wetland function would be increased as a result of the enhancement or rehabilitation actions, the level to which they would be increased, and the scientific basis for expecting the increase. It shall also include a narrative description of how the enhancement would be accomplished, a schedule of completion, explicit performance standards, and performance milestones for enhancement actions to be carried out over a defined period of time.

Examples of compensatory mitigation include: Improvement of wetland hydrology at sites that have been significantly modified through tile drainage or ditch drainage. Re-establishment of diverse native plant communities where the original plant community has been totally destroyed, and the site is currently farmed or has re-vegetated with aggressive and/or exotic species such as reed canary grass, cattails, purple loosestrife or other species. The removal of exotic or aggressive species, and the introduction and establishment of a diverse assemblage of native species appropriate for the site considering geographic location, soils, hydrology, and other factors.

The Chicago District will give consideration to the preservation of existing high quality wetlands as mitigation for the loss of lower quality wetlands under certain circumstances. Preservation alone will be considered only upon a clear demonstration by the applicant that the preserved wetlands and/or uplands are regionally important and are under demonstrable threat of loss or substantial degradation from human activities that might not otherwise be avoided. Applicants shall also demonstrate that the existing wetlands/uplands are likely to remain of high quality (e.g., a land stewardship organization has agreed to accept responsibility, funding for management is provided, etc.). When preservation is used in conjunction with restoration, creation, or enhancement of additional wetlands, credit will be considered only when the preserved resource will augment the functions of newly established, restored, or enhanced aquatic resources. Unregulated, high quality isolated wetlands that are under demonstrable threat may be suitable candidates for preservation credit as mitigation for loss of lower quality jurisdictional wetlands.

Preservation may be used to provide compensatory mitigation for activities authorized by DA permits when all the following criteria are met:

1. The resources to be preserved provide important physical, chemical, or biological functions for the watershed;
2. The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the Chicago District shall use appropriate quantitative assessment tools, where available;
3. Preservation is determined by the Chicago District to be appropriate and practicable;
4. The resources are under threat of destruction or adverse modifications; and
5. The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

Where preservation is used to provide compensatory mitigation, to the extent appropriate and practicable the preservation shall be done in conjunction with aquatic resource restoration, establishment, and/or enhancement activities. This requirement may be waived by the Chicago District where preservation has been identified as a high priority using a watershed approach, but compensation ratios shall be higher.

The Chicago District may require the restoration, establishment, enhancement, and preservation, as well as the maintenance, of riparian areas and/or buffers around aquatic resources where necessary to ensure the long-term viability of those resources. Buffers may also provide habitat or corridors necessary for the ecological functioning of aquatic resources. If buffers are required by the Chicago District as part of the compensatory mitigation project, compensatory mitigation credit may be provided for those buffers.

WATERSHED APPROACH

Where a watershed plan is available, the Chicago District will determine whether the plan is appropriate for use in the watershed approach for compensatory mitigation. In cases where the Chicago District determines that an appropriate watershed plan is available, the watershed approach should be based on that plan. Where no such plan is available, the watershed approach should be based on information provided by the project sponsor or available from other sources. The ultimate goal of a watershed approach is to maintain and improve the quality and quantity of aquatic resources within watersheds through strategic selection of compensatory mitigation sites.

A watershed approach to compensatory mitigation considers the importance of landscape position and resource type of compensatory mitigation projects for the sustainability of aquatic resource functions within the watershed. Such an approach considers how the types and locations of compensatory mitigation projects will provide the desired aquatic resource functions, and will continue to function over time in a changing landscape. It also considers the habitat requirements of important species, habitat loss or conversion trends, sources of watershed impairment, and current development trends, as well as the requirements of other regulatory and non-regulatory programs that affect the watershed, such as storm water management or habitat conservation programs. It includes the protection and maintenance of terrestrial resources, such as non-wetland riparian areas and uplands, when those resources contribute to or improve the overall ecological

functioning of aquatic resources in the watershed. Compensatory mitigation requirements determined through the watershed approach should not focus exclusively on specific functions (e.g., water quality or habitat for certain species), but should provide, where practicable, the suite of functions typically provided by the affected aquatic resource.

A watershed approach to compensatory mitigation should include, to the extent practicable, inventories of historic and existing aquatic resources, including identification of degraded aquatic resources, and identification of immediate and long-term aquatic resource needs within watersheds that can be met through permittee-responsible mitigation projects. Planning efforts should identify and prioritize aquatic resource restoration, establishment, and enhancement activities, and preservation of existing aquatic resources that are important for maintaining or improving ecological functions of the watershed. The identification and prioritization of resource needs should be as specific as possible, to enhance the usefulness of the approach in determining compensatory mitigation requirements.

MITIGATION RATIOS

The Chicago District will typically require a minimum of 1.5 acres for every 1.0-acre of waters of the U.S., including impacted wetland. Higher mitigation ratios for after-the-fact authorizations, enhancement and preservation of existing wetlands and impacts to higher quality wetlands will be required. If the functions and values of the aquatic resource to be impacted are high, but the project is in compliance with the Section 404 (b) (1) Guidelines, and is found not to be contrary to the public interest, the project may be permitted but this minimum ratio will be substantially increased and justification for the decision will be provided. This is because a majority of mitigation efforts to date have produced aquatic systems poor in diversity and water quality and not well integrated into their landscapes and watersheds. In addition, there exists much uncertainty in the engineering and scientific communities regarding procedures likely to result in the creation of a functioning aquatic system. The mitigation ratio also accounts for temporal loss of the aquatic resources

The functions and values of many high-quality areas may be considered un-mitigatable under the Section 404 (b) (1) Guidelines; therefore, impacts to these areas will not typically be permitted. Examples of these areas include but are not limited to: endangered and threatened species habitat, lands with high-quality or rare plant communities, streams with natural channels and stream segments of high biological value, areas providing habitat for uncommon animals or breeding habitat, or a site identified as unsuitable for fill in an Advanced Identification (ADID) area.

SUBMITTAL OF MITIGATION PLANS

Potential applicants for standard permits are encouraged to participate in pre-application meetings with the Corps and appropriate agencies to discuss potential mitigation requirements and information needs, prior to site plan preparation.

It is highly recommended that the applicant request a pre-application meeting with the Corps and other resource agencies prior to submitting an application. This meeting, which

may include a site visit, will help the Corps decide if the site meets the site selection criteria and if the plan is appropriate for the proposed site. At a minimum, the following information should be submitted to the Corps with the request for a pre-application meeting:

a. Maps (site location, USGS topographic map, NWI map, soil survey, aerial photographs)
b. Existing vegetation
c. How hydrology will be established
d. What vegetative communities will be established
e. Likely future adjacent land uses
f. Connectivity to other natural areas
g. Existing drainage patterns of site and surrounding properties

Regional Permits (RP), Regional General Permits (RGP), Nationwide Permits (NWP): When an applicant prepares a request for confirmation of a RP, RGP or NWP authorization, which could require wetland mitigation, a detailed mitigation, management, and monitoring plan shall be submitted with the request to ensure an expeditious review. Any mitigation plan submitted should contain enough detail to enable adequate review and evaluation, but be considered preliminary pending receipt of comments.

If compensatory mitigation is required, the Chicago District may approve a conceptual or detailed compensatory mitigation plan to meet required time frames for general permit verifications, but a final mitigation plan incorporating all required elements, at a level of detail commensurate with the scale and scope of the impacts, shall be approved by the Chicago District before the permittee commences work in waters of the United States.

Individual Permits: For an individual permit, the application should include a preliminary mitigation plan. The final mitigation plan, as well as the management and monitoring plan, should be completed following the public review period and Chicago District review of the preliminary plan.

Any mitigation plan submitted should contain enough detail to enable adequate review and evaluation, but be considered preliminary pending receipt of comments. The permittee shall clearly identify any information being claimed as confidential in the mitigation proposal when submitted. In such cases, the Corps' Public Notice shall still provide enough information to enable the public to provide meaningful comment on the proposed mitigation. The applicant(s) should anticipate that mitigation plans may need to be revised based upon comments received during the Public Notice period or during the Notification period.

The permittee shall prepare a draft mitigation plan and submit it to the Chicago District for review. After addressing any comments provided by the Chicago District, the permittee shall prepare a final mitigation plan, which shall be approved by the Chicago District prior to issuing the individual permit. The approved final mitigation plan shall be incorporated into the individual permit by reference. The final mitigation plan shall include all required items, but the level of detail of the mitigation plan should be commensurate with the scale and scope of the impacts.

SITE SELECTION CRITERIA

In general, the required compensatory mitigation should be located within the same watershed as the impact site, and should be located where it is most likely to successfully replace lost functions and services, taking into account such watershed scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources (including the availability of water rights), trends in land use, ecological benefits, and compatibility with adjacent land uses. The Chicago District may require on-site, off-site, or a combination of on-site and off-site compensatory mitigation to replace permitted losses of aquatic resource functions and services.

Compensatory mitigation projects should not be located where they will increase risks to aviation by attracting wildlife to areas where aircraft-wildlife strikes may occur (e.g., near airports).

The mitigation site will be reviewed with respect to the following site selection criteria. Failure to meet any of these criteria may be, depending on circumstances, grounds for rejection of a compensatory mitigation site. The site shall:

1. Be owned and/or under the full control of the permittee and/or mitigation sponsor. The sponsor shall provide documentation of this in the form of deed, agreements between sponsor and legal owner of the property regarding use of property and protection in perpetuity;

2. Contain a majority of drained or hydrologically modified hydric soils, recognizing that re-establishment of former wetlands are the preferred form of mitigation;

3. Have no high quality wetlands that would be adversely affected by the construction or restoration work;

4. Contain adequate perimeter upland areas to buffer the wetlands from potentially incompatible land uses on adjacent parcels;

5. Be so situated that adequate hydrology can be ensured (e.g., be located on a floodplain or possess a high groundwater table);

6. Contain no known hazardous waste, which shall be confirmed by an environmental assessment conducted by a qualified person or firm;

7. Be in the position such that the development of the site shall not adversely affect federal or state listed endangered or threatened species, or their habitat, or other high quality habitats or natural areas such as oak groves, prairies, or savannas;

8. Although each site should be selected and managed to utilize the natural water storage functions of wetlands, flood control shall not be the primary purpose. Specifically, mitigation shall not be used to satisfy local or regional stormwater detention requirements;

9. Be proximate or adjacent to public land holdings so as to create contiguous, large-scale habitat areas and;

10. Be inclusive of (but not limited to) an adopted or accepted watershed plan, open space plan, conservancy district, protected riparian corridor, or other local or regional conservation land use plan. This criterion has been established in order to help implement local and regional conservation and watershed plans, and to ensure maximum consistency and compatibility with future surrounding land uses;

The compensatory mitigation project site shall be ecologically suitable for providing the desired aquatic resource functions. In determining the ecological suitability of the compensatory mitigation project site, the Chicago District will consider, to the extent practicable, the following factors:

1. Hydrological conditions, soil characteristics, and other physical and chemical characteristics;
2. Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions;
3. The size and location of the compensatory mitigation site relative to hydrologic sources and other ecological features;
4. Compatibility with adjacent land uses and watershed management plans;
5. Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., fens, mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species; and
6. Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

The applicant shall provide a description of the factors considered during the site selection process. This should include consideration of watershed needs, on-site alternatives where applicable, and the practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the compensatory mitigation project site.

MITIGATION PLAN DEVELOPMENT

The mitigation plan shall contain, but is not limited to:

1. The proposed mitigation location and size;
2. A discussion on how the proposed mitigation will be established. A plan that details the goals, objectives, the general need for and the technical feasibility of the

proposed mitigation;

3. Success criteria for the compensatory mitigation, including wetland types and their respective acreages;
4. A discussion of the ecological suitability of the proposed site, and how that site will support the planned types of aquatic resources and functions, including the assurance of sufficient hydrology to support the long-term sustainability of the mitigation;
5. A delineation of any wetlands or other jurisdictional areas that may exist at the proposed mitigation location;
6. A legal description of the property;
7. A general site plan showing the location of all existing and proposed aquatic resources and upland habitats, roads, trails, structures, utilities, and any other existing or proposed site improvements;
8. An outline of the proposed ownership arrangements and long-term management strategy and responsibilities which, at this stage, should include a signed and executed agreement or letter of intent from the long-term owner/manager, and the acceptance of a conservation easement or similar instrument for site protection;
9. A preliminary construction plan and schedule of completion, preliminary planting plan, and preliminary administrative, management, monitoring, and financial plans;
10. Locations of all hydrological monitoring wells and vegetative monitoring transects for the site;
11. Inclusion of a soil erosion and sediment control plan (SESC). Any erosion control plan may require review by the appropriate Soil and Water Conservation District/Stormwater Management Commission before final approval of the mitigation;
12. A site development plan which shall identify and incorporate to the extent practicable and appropriate:
    a. Diverse aquatic and supporting landscapes (e.g., shallow open water, riparian wetlands, deep and shallow marshes, floodplain forests, sedge meadows and prairies, upland buffers, etc.) which are interrelated, so as to maximize wetland functions and values;
    b. Diverse wildlife habitats;
    c. Associated upland buffer areas contiguous to the wetlands to protect the wetlands from potential adverse effects of adjacent land uses, specifying the width and area of all such zones;
    d. Species native to the area;
    e. The use of native soils on the site;
    f. The means for establishing the appropriate hydrology, and;
    g. Design, maintenance, and monitoring procedures which minimize energy needs, human intervention, and costs. Ideally the procedures should require only periodic weed and pest control and prescribed burns, where appropriate;
13. A site protection instrument. A description of the legal arrangements and instrument, including site ownership that will be used to ensure the long-term protection of the compensatory mitigation project site.
14. A mitigation work plan. Detailed written specifications and work descriptions for the compensatory mitigation project, including, but not limited to, the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water, including connections to existing waters and uplands; methods for establishing the desired plant community; plans to control invasive plant species; the proposed grading plan, including elevations and slopes of the substrate; utility

plans identifying all existing and proposed structures above and below the Ordinary High Water Mark (OHWM) and/or Normal Water Level (NWL);soil management; and erosion control measures. For stream compensatory mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel form (e.g., typical channel cross-sections), watershed size, design discharge, and riparian area plantings.

15. A maintenance plan. A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.
16. Performance standards. Ecologically-based standards that will be used to determine whether the compensatory mitigation project is achieving its objectives.
17. Monitoring requirements. A description of parameters to be monitored in order to determine if the compensatory mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting on monitoring results to the Chicago District shall be included.
18. Long-term management plan. A description of how the compensatory mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management.
19. Adaptive management plan. A management strategy to address unforeseen changes in site conditions or other components of the compensatory mitigation project, including the party or parties responsible for implementing adaptive management measures. The adaptive management plan will guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success.
20. Financial assurances. A description of financial assurances that will be provided and how they are sufficient to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with its performance standards and;
21. Other information. The Chicago District may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the proposed compensatory mitigation

FINANCIAL ASSURANCES

The permittee is responsible for securing sufficient funds or other financial assurances to cover contingency actions in the event of mitigation default or failure and to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with applicable performance standards. The permittee is responsible for securing adequate funding to monitor and maintain the mitigation throughout its operational life, and to make provision for long-term management through financial assurances or through agreements with land management organizations or agencies. Total funding requirements should reflect realistic cost estimates for land acquisition, planning, engineering, mobilization, construction, monitoring, long-term maintenance, contingency and remedial actions, as well as the cost of replacement mitigation. Financial assurance(s) shall be in place prior to commencing the permitted activity. Verification of financial assurances shall be made annually as a part of the review.

Formats of financial assurances may be in the form of irrevocable letters of credit, irrevocable trusts, escrow accounts, and non-wasting endowments. It is required that the written format for the financial documents be approved by the Chicago District before they are finalized. These assurances shall be held by financial institutions and/or public entities, not other private concerns, and shall avoid all foreseeable conflicts of interest. The permittee shall insure that adequate funds are available to ensure land acquisition, planning, engineering, mobilization, construction, management, monitoring, long-term maintenance for the mitigation and associated uplands, contingency and remedial actions, as well as the cost of replacement mitigation. The financial assurances shall be maintained until the Chicago District determines the mitigation is self-sustaining. The amount of the financial assurance will be reviewed annually based on the results of the monitoring report. A financial assurance shall be in a form that ensures that the Chicago District will receive notification at least 120 days in advance of any termination or revocation. For third party assurance providers, this may take the form of a contractual requirement for the assurance provider to notify the Chicago District at least 120 days before the assurance is revoked or terminated All financial assurances shall be payable at the Chicago District's direction to a specified designee or to a standby trust. If a standby trust is utilized, all amounts paid by the assurance provider shall be deposited directly into the standby trust fund for distribution by the trustee in accordance with the Chicago District's instructions.

In cases where an alternate mechanism is available to ensure a high level of confidence that the compensatory mitigation will be provided and maintained (e.g., a formal, documented commitment from a government agency or public authority) the Chicago District may determine that financial assurances are not necessary for that compensatory mitigation project.

SITE PROTECTION

The aquatic habitats, riparian areas, buffers, and uplands that comprise the overall compensatory mitigation project shall be provided long-term protection through real estate instruments or other available mechanisms, as appropriate. Long-term protection may be provided through real estate instruments such as conservation easements held by entities such as federal, tribal, state, or local resource agencies, non-profit conservation organizations, or private land managers; the transfer of title to such entities; or by restrictive covenants. For government property, long-term protection may be provided through federal facility management plans or integrated natural resources management plans. When approving a method for long-term protection of non-government property other than transfer of title, the Chicago District shall consider relevant legal constraints on the use of conservation easements and/or restrictive covenants in determining whether such mechanisms provide sufficient site protection. To provide sufficient site protection, a conservation easement or restrictive covenant should, where practicable, establish in an appropriate third party (e.g., governmental or non-profit resource management agency) the right to enforce site protections and provide the third party the resources necessary to monitor and enforce these site protections.

The real estate instrument, management plan, or other mechanism providing long-term protection of the compensatory mitigation site shall, to the extent appropriate and

practicable, prohibit incompatible uses that might otherwise jeopardize the objectives of the compensatory mitigation project.

The real estate instrument, management plan, or other long-term protection mechanism shall contain a provision requiring 60-day advance notification to the Chicago District before any action is taken to void or modify the instrument, management plan, or long-term protection mechanism, including transfer of title to, or establishment of any other legal claims over, the compensatory mitigation site.

For compensatory mitigation projects on public lands, where federal facility management plans or integrated natural resources management plans are used to provide long-term protection, and changes in statute, regulation, or agency needs or mission results in an incompatible use on public lands originally set aside for compensatory mitigation, the public agency authorizing the incompatible use is responsible for providing alternative compensatory mitigation that is acceptable to the Chicago District for any loss in functions resulting from the incompatible use.

A real estate instrument, management plan, or other long-term protection mechanism used for site protection of permittee-responsible mitigation shall be approved by the Chicago District in advance of or concurrent with, the activity causing the authorized impacts.

SUSTAINABILITY

Compensatory mitigation projects shall be designed, to the maximum extent practicable, to be self-sustaining once performance standards have been achieved. This includes minimization of active engineering features (e.g., pumps) and appropriate siting to ensure that natural hydrology and landscape context will support long-term sustainability. Where active long-term management and maintenance are necessary to ensure long-term sustainability (e.g., prescribed burning, invasive species control, maintenance of water control structures, easement enforcement), the responsible party shall provide for such management and maintenance. This includes the provision of long-term financing mechanisms where necessary. Where needed, the acquisition and protection of water rights shall be secured and documented in the permit conditions or instrument.

LONG-TERM MANAGEMENT

The permittee shall submit a financial plan that demonstrates that the mitigation can be maintained in perpetuity whether through continual ownership or by conveyance to a public or private agency that will assume the responsibilities of the mitigation site. Such a submittal shall outline a plan for the establishment of a fully funded endowment for long term site management activities. The submittal shall include a description of long-term management needs, annual cost estimates for those needs, and identify the funding mechanism that will be utilized to meet the needs. The provisions necessary for long-term financing shall be addressed.

ECOLOGICAL PERFORMANCE STANDARDS

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The approved mitigation plan shall contain performance standards that will be used to assess whether the project is achieving its objectives. Performance standards should relate to the objectives of the compensatory mitigation project, so that the project can be objectively evaluated to determine if it is developing into the desired resource type, providing the expected functions, and attaining any other applicable metrics (e.g., acres).

Performance standards shall be based on attributes that are objective and verifiable. Ecological performance standards shall be based on the best available science that can be measured or assessed in a practicable manner. Performance standards may be based on variables or measures of functional capacity described in functional assessment methodologies, measurements of hydrology or other aquatic resource characteristics, and/or comparisons to reference aquatic resources of similar type and landscape position. The use of reference aquatic resources to establish performance standards will help ensure that those performance standards are reasonably achievable, by reflecting the range of variability exhibited by the regional class of aquatic resources as a result of natural processes and anthropogenic disturbances. Performance standards based on measurements of hydrology should take into consideration the hydrologic variability exhibited by reference aquatic resources, especially wetlands. Where practicable, performance standards should take into account the expected stages of the aquatic resource development process, in order to allow early identification of potential problems and appropriate adaptive management.
At a minimum, any wetlands restored or created shall meet the criteria for wetlands detailed in the 1987 Corps of Engineers Wetlands Delineation Manual, and/or any regional supplement of the Delineation Manual utilized by the Chicago District at the time the mitigation was established.

Performance standards are predetermined goals for guiding and measuring mitigation success.
Since the goal of an important goal of compensatory mitigation is the restoration of native plant communities, the performance standards are based upon the importance and the quality of the native vegetation within the mitigation area.

If the restoration of a native plant community is not the principle goal of the compensatory mitigation, the applicant may propose other established assessment standards and techniques.

The performance standards that are normally accepted by the U.S. Army Corps of Engineers, Chicago District (District) are as follows:

Vegetation Performance Standards

1. A temporary cover crop shall be planted on all slopes immediately upon completion of any earthwork to prevent soil erosion. Soil erosion and sediment control measures shall be in place during all construction work. An erosion control blanket may also be required depending on site conditions and season of planting. Within three (3) months, at least 90% of this area, as measured by aerial coverage, will be vegetated. If the desired long-term slope vegetation is not planted with the temporary crop, it shall then be planted in the first available growing season appropriate for each plant community. All cover crop species shall be non-

persistent or native and not allelopathic.

2. Species selected for the planting shall be native to the county where the mitigation site is located (ref. Swink and Wilhelm, Plants of the Chicago Region, 1994), and shall be appropriate for the hydrologic zone to be planted. A minimum number of native perennial species proposed for establishment shall be present within each plant community to meet certification standards, as follows:

    - **Marsh**- minimum of 15 native perennial species
    - **Sedge meadow/wet prairie**- minimum of 35 native perennial species
    - **Mesic Prairie** (buffer) - minimum of 25 native perennial species

3. At least 50% of the required minimum number of species shall occur at a 10% frequency or greater, within each plant community zone or area. Multiple transects within a given plant community may be combined for this frequency analysis.

4. A native mean coefficient of conservatism value (native mean C value) of greater than or equal to 3.5 shall be achieved in each separate vegetated plant community (e.g. wet prairie, marsh, mesic prairie buffer), and as measured over the entire mitigation site area. Native plant species coefficients of conservatism are designated in Swink, Floyd and Gerould Wilhelm, Plants of the Chicago Region (Indianapolis: Indiana Academy of Science, 4th edition, 1994).

5. The native floristic quality index value (native FQI) shall be greater than or equal to 20 in each separate vegetated community zone and as measured over the entire mitigation site. The floristic quality assessment method is described in Swink and Wilhelm, Plants of the Chicago Region.

    Steps # 4 and #5 are evaluated based upon the overall plant community inventories as well as transect summaries. If a portion of the site has achieved compliance with the performance standards, the standard shall be maintained in that portion until the final compliance sign off for the mitigation site.

6. No area over the entire mitigation site greater than 1 square meter shall be devoid of vegetation, as measured by aerial coverage, unless specified on approved mitigation plans. This standard does not apply to emergent and aquatic communities.

7. None of the three most dominant plant species in any of the wetland community zones may be non-native species or weedy species, including but not limited to *Typha angustifolia*, *Typha X glauca, Phragmites australis*, *Lythrum salicaria, Salix interior,* or *Phalaris arundinacea,* unless otherwise indicated on the approved mitigation plan. These species shall not cumulatively comprise more than 5% of the total percent cover (not relative cover) for each community.

8. The native perennial species within each wetland plant community shall represent at least 80% of the total dominance measure. A lower percent native perennial species of the total dominance measure may be acceptable if it is demonstrated with transect data that the remaining dominance percentage is by native annual and biennial wetland plant species and the FQI and mean C standards are exceeded.

9. A vegetation map of the mitigation site based on as-built drawings developed at the completion of implementation shall be submitted. This information shall be descriptive and define the limits of all vegetation areas by community type, based on field observations. The permanent transects shall be shown on this map. Representative photographs of each vegetation area by general community zone shall be submitted to the Corps.

Hydrology Performance Standards

Consistent with the Corps of Engineers Wetlands Delineation Manual (1987) and/or any appropriate regional supplements, all areas to receive credit as wetland plant communities shall have soils saturated within 12 inches or less of the ground surface for at least 12.5% of the growing season as defined in this ICA. To meet this standard the mitigation site shall demonstrate inundated or saturated soils for **23 consecutive days during the growing season**. In addition to this minimum, hydrology data should reflect a hydrologic regime that is appropriate to the native plant community proposed for establishment.

CONSTRUCTION AND IMPLEMENTATION

Correct implementation of the design, including clear guidance for the contractor and the use of specialized construction practices, is essential to establishing adequate hydrology as well as conditions suitable for the successful reintroduction of native plant and animal communities. A properly developed implementation plan can help ensure the success of the mitigation area and avoid potential remediation costs. Pre-construction meetings between contractors and environmental consultants may help prevent unnecessary damage and permit compliance violations.

MONITORING

Monitoring the compensatory mitigation project site is necessary to determine if the project is meeting its performance standards, and to determine if measures are necessary to ensure that the compensatory mitigation project is accomplishing its objectives. The submission of monitoring reports to assess the development and condition of the compensatory mitigation project is required, but the content and level of detail for those monitoring reports shall be commensurate with the scale and scope of the compensatory mitigation project, as well as the compensatory mitigation project type. The mitigation plan shall address the monitoring requirements for the compensatory mitigation project, including the parameters to be monitored, the length of the monitoring period, the party responsible for conducting the monitoring, the frequency for submitting monitoring reports to the Chicago District, and the party responsible for submitting those monitoring reports to the Chicago District.

The Chicago District may conduct site inspections on a regular basis (e.g., annually) during the monitoring period to evaluate mitigation site performance.

Monitoring period. The mitigation plan shall provide for a monitoring period that is sufficient to demonstrate that the compensatory mitigation project has met performance standards, but not less than five years. A longer monitoring period shall be required for aquatic resources with slow development rates (e.g., forested wetlands, bogs). Following

project implementation, the Chicago District may reduce or waive the remaining monitoring requirements upon a determination that the compensatory mitigation project has achieved its performance standards. Conversely the Chicago District may extend the original monitoring period upon a determination that performance standards have not been met or the compensatory mitigation project is not on track to meet them. The Chicago District may also revise monitoring requirements when remediation and/or adaptive management are required.

MONITORING STANDARDS

Monitoring and data collection are intended to assess whether the mitigation has attained the following performance standards for full credit release and certification. Monitoring is required for a minimum of five (5) years from the completion of planting of the wetland area. It shall also be recognized that monitoring may need to continue beyond the minimum five (5) year period until full performance standards are attained. This may be especially true for forested communities with a longer growing time to maturity.

Wetland Delineation

To meet full performance standards, a routine wetland delineation shall be performed to verify the total acreage of wetlands and waters achieved on site. Wetland areas shall be staked for final inspection by the Corps. Property boundaries for the mitigation site shall be marked as well. The delineation shall be included/reported in the final monitoring report, if not before. It is recognized that the actual acreage of aquatic resources/wetland will vary from that in the plans; however, it shall approach or exceed the acreage specified in the permit.

Vegetation Monitoring

Permanent straight line sampling transects shall be established, plotted onto project drawings and a current aerial photograph of the site, across each proposed plant community of the mitigation site. Sufficient transects shall be established to provide full representation of all plant communities within the site, which might include more than one of each type. Each transect shall consist of a series of 1.0 square meter quadrats (no fewer than 10) at regular or random intervals (5-10m suggested interval). The number of quadrats depends on system complexity and the size of each plant community for which credit is sought. A rough guideline is 2 quadrats per acre in each plant community as a minimum. The plant sampling shall be done in May/June and August/September each year following the initial planting, throughout the monitoring period. Data shall be reported by plant community, and by transect. A total plant species list should be compiled over the entire site for which credit is sought. Data may be summarized by plant community for which credit is sought in monitoring reports, however, the full sampling data should be provided in an appendix to the annual monitoring report. Species dominance shall be determined by calculating importance values, with at least the following two parameters: frequency and percent cover. Absolute percent aerial cover data should be reported, though the frequency and cover may be relativized to calculate Importance Values (e.g. RF + RC = IV).

Hydrology Monitoring

Within each plant community for which credit is sought, wetland hydrology shall be independently demonstrated from data gathered from monitoring wells and/or peizometers placed throughout the mitigation site. The plans for well/peizometer placement shall be approved by the Corps prior to approval of the mitigation. Monitoring data should be collected from the wells/peizometers at a minimum on a weekly basis throughout the growing season. Automated continuous water level recorders are encouraged, and should be downloaded monthly to avoid more significant loss of data in the event of vandalism or other failure. For the hydrology standard, the growing season is defined as April 15 - October 20.

MONITORING REPORTS

1. The Chicago District shall determine the information to be included in monitoring reports. This information shall be sufficient for the Chicago District to determine how the compensatory mitigation project is progressing towards meeting its performance standards, and may include plans (such as as-built plans), maps, and photographs to illustrate site conditions. Monitoring reports may also include the results of functional, condition, or other assessments used to provide quantitative or qualitative measures of the functions provided by the compensatory mitigation project site.

2. The permittee or sponsor is responsible for submitting monitoring reports in accordance with the special conditions of the DA permit or the terms of the instrument. Failure to submit monitoring reports in a timely manner may result in compliance action by the Chicago District.

3. Monitoring reports shall be provided by the Chicago District to interested federal, tribal, state, and local resource agencies, and the public, upon request.

ADAPTIVE MANAGEMENT

1. If the compensatory mitigation project cannot be constructed in accordance with the approved mitigation plans, the permittee or sponsor shall notify the Chicago District. A significant modification of the compensatory mitigation project requires approval from the Chicago District.

2. If monitoring or other information indicates that the compensatory mitigation project is not progressing towards meeting its performance standards as anticipated, the responsible party shall notify the Chicago District as soon as possible. The Chicago District will evaluate and pursue measures to address deficiencies in the compensatory mitigation project. The Chicago District will consider whether the compensatory mitigation project is providing ecological benefits comparable to the original objectives of the compensatory mitigation project.

3. The Chicago District, in consultation with the responsible party (and other federal, tribal, state, and local agencies, as appropriate), will determine the appropriate measures. The measures may include site modifications, design changes, revisions to maintenance requirements, and revised monitoring requirements. The measures shall be designed to ensure that the modified compensatory mitigation project

provides aquatic resource functions comparable to those described in the mitigation plan objectives.

4. Performance standards may be revised in accordance with adaptive management to account for measures taken to address deficiencies in the compensatory mitigation project. Performance standards may also be revised to reflect changes in management strategies and objectives if the new standards provide for ecological benefits that are comparable or superior to the approved compensatory mitigation project. No other revisions to performance standards will be allowed except in the case of natural disasters.

LONG-TERM MANAGEMENT

1. The applicant shall submit a long term management strategy with an associated financial assurance plan for Chicago District approval prior to authorization. The strategy shall include a description of long-term management needs, annual cost estimates for those needs, and identify the funding mechanism that will be utilized to meet the needs. The applicant shall also identify the entity responsible (and provide supporting documentation, e.g. agreement or letter of intent) for the ownership and long-term management of the site. Identifying the responsible entity prior to permit issuance will aid in the processing of the instrument. It is preferred that the proposed long term manager or organization have expertise in executing adaptive management procedures. Applicants shall establish agreements for long-term management with public or private conservation organizations with final approval of the Chicago District.

2. All land, including associated uplands, which are part of the mitigation site shall be protected from future development by a permanent conservation easement, deed restriction or other real estate instruments as deemed appropriate by the Chicago District. This easement or deed restriction, along with a map of the site, shall be recorded with the appropriate county register of deeds, attached to the abstract of title, with a certified copy of the registration provided to the Chicago District prior to authorization.

COMPLIANCE SIGN-OFF

The Chicago District will issue final approval at the end of the management and monitoring period if the mitigation is in compliance and the Long Term Manager has been established for the site. The Long Term Manager shall provide supporting documentation stating their acceptance of the site in perpetuity. To be successful, the mitigation shall demonstrate the characteristics specified in the approved mitigation plan, the stated goals, and the Mitigation Requirements. Failure to comply with all the terms and conditions of a Department of the Army permit, including the mitigation plan and Mitigation Requirements, at any time may result in suspension and/or revocation of the permit and additional enforcement actions.

If the mitigation fails, the permittee will be required to determine the cause of the failure and to correct the error at the mitigation site, or to conduct additional mitigation activities.

CONTACTS

Persons wishing to inquire about permit application procedures and mitigation requirements should telephone the Chicago District at (312) 846-5530. If a permit application number has been assigned, call the project manager for that project. A telephone directory can be found on our website at http://www.lrc.usace.army.mil/co-r/contacts.htm.

APPENDIX A

COMPENSATORY MITIGATION PLAN CHECKLIST

1. Mitigation Goals and Objectives

- Describe functions lost at impact site
- Describe functions to be gained at mitigation site
- Describe overall watershed improvements to be gained

2. Baseline Information for Impact and Proposed Mitigation Sites

- Provide data on physical attributes of sites (soils, vegetation, hydrology)
- Describe historic and existing land uses and resources impacted
- Describe reference site attributes if available

3. Mitigation Site Selection and Justification

- Describe process of selecting proposed site
- Likelihood of success, future land use compatibility, etc.

4. Mitigation Work Plan

- Location
- Construction Plan
- Describe planned hydrology, vegetation, soils, buffers, etc.

5. Performance Standards

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

6. Site Protection and Maintenance

- List parties and responsibilities
- Provide evidence of legal protective measures
- Maintenance plan and schedule

7. Monitoring Plan

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

8. Adaptive Management Plan

- Identify party (ies) and responsibilities
- Remedial measures (financial assurances, management plan, etc.)
- Management in perpetuity, Endowment, Transfer to land stewardship organization or agency, and easily understood comprehensive management plan.

9. Financial Assurances

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

SUPPLEMENT: COMPENSATORY MITIGATION PLAN CHECKLIST

This document is intended as a technical guide for Clean Water Act (CWA) Section 404 permit applicants 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).

1. Mitigation Goals and Objectives

   Impact Site
   - 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.

   - 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

- Describe and quantify the aquatic resource type and functions for which the mitigation project is intended to compensate.
- 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).
   - Coordinates (preferably using differential global positioning system [DGPS]) & written location description (including block, lot, township, range and section, county, watershed, as appropriate and pertinent.
   - Maps (e.g., site map with delineation (verified by the Corps), map of vicinity, map identifying location within the watershed, USGS Quad, NWI map, NRCS soils map, zoning or planning maps; indicate area of proposed fill on site map).
   - Aerial/Satellite photos.
   - Classification - Hydrogeomorphic as well as Cowardin classification, Rosgen stream type, NRCS classification, as appropriate.
   - Quantify wetland resources (acreage) or stream resources (linear feet) by type(s).
   - Assessment method(s) used to quantify impacts to aquatic resource functions (e.g., FQA, IBI, etc.); explain findings. The same method should be used at both impact and mitigation sites.

   Existing hydrology
   - Water budget. Include water source(s) (precipitation, surface runoff, groundwater, stream) and losses(s). Provide budgets for both wet and dry years.
   - Hydroperiod (seasonal depth, duration, and timing of inundation and/or saturation), percent open water.
   - Historical hydrology of mitigation site if different than present conditions
   - Contributing drainage area (acres).

   Existing vegetation
   - List of species on site, indicating dominants.
   - Provide a floristic quality assessment (FQA).

- Approximate percent vegetative cover; community structure (canopy stratification).
- Map showing location of plant communities.
- Provide a survey of existing wetlands.

Existing soils

- A detailed soil profile description (or one for each area if different soils series exist within the proposed mitigation site) that is described to the series level and to a minimum depth of 40 inches . The soil profile description shall describe at a minimum the following for each horizon:
- horizon designation
- color (using the Munsell soil color charts)
- texture (using USDA textures)
- redoximorphic features, including their color, abundance (few, common or many), and contrast (faint, distinct or prominent)
- A detailed description of the stream substrate (for stream mitigation projects).
- provide a map showing the locations of the soil series and/or stream substrate descriptions.
- Existing wildlife usage (indicate possible threatened and endangered species habitat, migratory birds and other wildlife resources).
- Historic and current land use; note prior converted cropland.
- Current owner(s)
- Watershed context/surrounding land use.
- Description of watershed land uses (percent Ag, forested, wetland, developed).
- Size/Width of natural buffers (describe, show on map).
- Description of landscape connectivity: proximity and connectivity of existing aquatic resources and natural upland areas (show on map).

3. Mitigation Site Selection & Justification
   - Site-specific objectives: Description of mitigation type(s), acreage(s) and proposed compensation ratios.

- Watershed/regional objectives: Description of how the mitigation project will compensate for the functions identified in the Mitigation Goals section 1(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 Goals section. How will the planned mitigation project contribute to landscape connectivity?
- Likely future adjacent land uses and compatibility (show on map or aerial photo).
- Description of site selection practicability in terms of cost, existing technology, and logistics.
- If the proposed mitigation is off-site and/or out-of-kind, explain why on-site or in-kind options are not practicable or environmentally preferable.
- 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.
- 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.
- Project proponents should work with the Chicago District to ensure that they have complied with the Endangered Species Act. Project proponents may demonstrate compliance by providing the Chicago District with a copy of a letter from the U.S. Fish and Wildlife Service indicating that the project is not likely to adversely affect any federally listed species or their designated critical habitat. If a project may adversely affect a federally listed species or its designated critical habitat, then the Chicago District will request formal consultation from the Service. The formal consultation process often exceeds 3 months. Project proponents should include this time frame in their planning process.
- SHPO Cultural Resource Clearance Letter.

4. Mitigation Work Plan
   - Maps marking boundaries of proposed mitigation types; include DGPS coordinates.
   - 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. Non-concurrent mitigation is acceptable only when it can be clearly demonstrated that the mitigation is more likely to be successful by completing the mitigation after discharging the fill.

Grading plan

- Indicate existing and proposed elevations and slopes.
- Describe plans for establishing appropriate microtopography. Reference wetland(s) can provide design templates.
- Description of construction methods (e.g., equipment to be used)
- Desscription of soil erosion and sediment control measures.
- Construction schedule (expected start and end dates of each construction phase, expected date for as-built plan).

Planned hydrology

- Source of water.
- Connection(s) to existing waters.
- Hydroperiod (seasonal depth, duration, and timing of inundation and saturation), percent open water, water velocity. Provide hydrographs and a summary table with depth-duration data for the 1-, 2-, 5-, 10-, and 100-year, 24 hour storm events, at a minimum.
- Potential interaction with groundwater.
- Existing monitoring data, if applicable; indicate location of monitoring wells and stream gauges on site map.
- Stream or other open water geomorphic features (e.g., riffles, pools, bends, deflectors).
- Structures requiring maintenance (show on map) Explain structure maintenance.
- Representational cross sections that show planned normal water elevations and high water elevations.

Planned vegetation

- Native plant species composition (e.g., list of acceptable native hydrophytic vegetation).
- 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).
- Plant zonation/location map (refer to grading plan to ensure plants will have an acceptable hydrological environment).
- Plant spatial structure - quantities/densities, % cover, community structure (e.g., canopy stratification).

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

Planned soils

- Soil profile
- 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).
- Soil compaction control measures.

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

Planned buffer (identify on map).

- Evaluation of the buffer's expected contribution to aquatic resource functions.
- Physical characteristics (location, dimensions, native plant composition, spatial and vertical structure.
- Other planned features, such as interpretive signs, trails, fence(s), etc.

5. Performance Standards
   Performance standards are predetermined goals for guiding and measuring mitigation success. These performance standards are based upon the importance and the quality of the native vegetation within the mitigation area. The performance standards that are normally accepted by the U.S. Army Corps of Engineers, Chicago District (District) in Attachment C. Other established assessment standards and techniques may be proposed by the applicant if the restoration of a native plant community is not the principle goal of the mitigation.
   - 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.
   - 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
   - Long-term legal protection instrument (e.g. conservation easement, deed restriction, transfer of title).
   - Party(ies) responsible and their role (e.g. site owner, easement owner, maintenance implementation). If more than one party, identify primary party.
   - 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.).

- Invasive species control plan (plant and animal).
- Funding plan for management after District signs off.

7. Monitoring Plan
   - Party(ies) responsible for monitoring. If more than one, identify primary party.
   - Data to be collected and reported, how often and for what duration (identify proposed monitoring stations, including transect locations on map).
   - Assessment tools and/or methods to be used for data collection monitoring the progress towards attainment of performance standard targets.
   - Format for reporting monitoring data and assessing mitigation status.
   - Monitoring schedule
8. Adaptive Management Plan
   - Party(ies) responsible for adaptive management.
   - 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.
   - Discussion of potential remedial measures in the event mitigation does not meet performance standards in a timely manner.
   - Description of procedures to allow for modifications of performance standards if mitigation projects are meeting mitigation goals, but in unanticipated ways.
9. Financial Assurances

   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:
   - Construction phase
   - Maintenance
   - Monitoring
   - Remedial measures
   - Project success

Types of assurances (e.g., performance bonds, irrevocable trusts, escrow accounts, casualty insurance, letters of credit, etc.).

Schedule by which financial assurance will be reviewed and adjusted to reflect current economic factors.

Submit a long-term management plan with funding assurances. Identify funding source(s) for long-term management of the mitigation site.

APPENDIX B

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.

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.

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 shall 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 shall 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 shall 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.

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 shall 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 shall 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.

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.

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 shall 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 shall 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.

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 shall 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.

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.

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.

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.

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 shall 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.

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