NORFOLK DISTRICT CORPS AND VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY RECOMMENDATIONS FOR WETLAND COMPENSATORY MITIGATION:

Including Site Design, Permit Conditions, Performance and Monitoring Criteria

These recommendations are intended to be a guide for the development of compensatory wetland mitigation plans. It is the decision of the Corps and/or DEQ project manager(s) whether a particular condition is appropriate for a given wetland mitigation project. These are suggestions only that may not be suitable in every situation, and do not guarantee the success of a mitigation project or the acceptance of a mitigation plan for a given permit application.

I. Some Definitions

Compensatory mitigation: An action taken that provides some form of substitute aquatic resource for the impacted aquatic resource. (9 VAC 25-210-10)

Wetland Creation: The manipulation of the physical, chemical, or biological characteristics of a site to develop a wetland on an upland or deepwater site, where a wetland did not previously exist. Successful wetland creation or establishment may result in a gain in wetland acreage.

Wetland Restoration: The manipulation of the physical, chemical, and/or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded wetland. Successful wetland restoration may result in a gain in wetland acreage and/or improvement in wetland functions. Restoration may be separated into re-establishment of wetlands and rehabilitation of existing wetlands.

a) **Re-establishment**: The manipulation of the physical, chemical, and/or biological characteristics of a site with the goal of returning natural/historic functions to a former wetland. Re-establishment results in rebuilding a former wetland and results in a net gain of wetland acreage.
b) **Rehabilitation**: The manipulation of the physical, chemical, and/or biological characteristics of a site with the goal of repairing natural/historic functions of a degraded wetland. Rehabilitation results in a gain of wetland functions, but **does <u>not</u> result in a net gain of wetland acreage**.

Wetland Enhancement: The manipulation of the physical, chemical, and/or biological characteristics of an existing wetland (disturbed or degraded) site to heighten, intensify, rehabilitate, or improve one or more specific function(s), or to change the growth stage or composition of the vegetation present. Enhancement is undertaken for a specified purpose(s) such as water quality improvement, floodwater retention, or wildlife habitat and does not result in a gain in wetland acreage.

Wetland Preservation: The removal of a threat to, or preventing the decline of wetland conditions in perpetuity by an action in or adjacent to a wetland. Preservation includes but may not be limited to purchase of land or easements, repairing water control structures or fences, recording restrictive covenants on land, or structural protection such as repairing a barrier island through the implementation of appropriate legal and physical mechanisms.

II. Necessary Information for Site Design - The Site Design should include or address the following items that may be provided in a mitigation narrative that accompanies conceptual and final design plans:

(Final design plans may precede "construction ready plans" which provide a level of detail and specificity that may be required to execute a contract with a contractor, but do not change the specifics of size, location, elevations, planting zones, etc.)

1. Site selection considerations – The 1990 Corps-EPA memorandum on mitigation establishes a hierarchy for compensatory mitigation site selection. Under this MOA, the preference is generally for selection of mitigation sites on or adjacent to the impact site, where feasible and practicable. If not feasible, then consideration may be given to compensatory mitigation sites that are not on or adjacent to the impact site.

Generally, an acceptable compensatory mitigation site should provide in-kind mitigation for project impacts. In other words, seek mitigation sites that following restoration or construction activities will provide a similar hydrologic regime, and enable develop of comparable soils, and vegetation communities as the impact site.

Wherever possible**,** select sites where wetlands previously existed or where nearby wetlands still exist. Restoration of wetlands is 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.

Whenever possible, locate the mitigation site in a setting of comparable landscape position and hydrogeomorphic class as the impacted wetland. Seek to duplicate the features of reference wetlands or enhance connectivity with adjacent natural upland and wetland landscape elements.

Select sites that are, and will continue to be, resistant to disturbance from the surrounding landscape, through the establishment or maintenance of large buffers and connections 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.

An effort should be made to establish naturally variable hydrology, with an 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. Reestablishment of natural hydrology should be encouraged rather than reliance upon active engineering devices designed to mimic natural hydroperiods. When restoration is not an option, the use of passive devices that have a higher likelihood to sustain the desired hydroperiod over long term is encouraged. Try to avoid designing a system dependent on water-control structures or other artificial infrastructure that must be maintained in perpetuity in order for wetland hydrology to meet the specified design. In situations where direct or in-kind replacement is desired, candidate mitigation sites should have the same basic hydrological attributes as the impacted site.

References: HQ USACE 2002,NRC 2001

2. Realistic/specific goals and objectives –Describe goals and objectives in terms of functions and values, such as education/research, erosion control, fisheries/wildlife habitat, flood conveyance/flood storage, open space/aesthetics, recreation, rare or threatened and endangered species, water quality, water supply, etc. Goals and objectives should be expressed as acres of wetlands, vegetation type, and wetland classes (Cowardin or HGM classifications). Similarly, the goals and objectives of any proposed buffer areas should be specified (to provide habitat, to filter sediments, and to protect the mitigation site from adjacent development, etc.).

(Project goals may include replacement of functions and values lost by the permitted wetland impact and establishment of a persistent, self-maintaining system.

The plan should specify those functions and/or values the permittee or mitigation banker is trying to achieve at the mitigation site.

Wetland mitigation is not an exact science and predictable results may not be obtainable. An adaptive management attitude is a necessity. The mitigation plan should incorporate experimentation when possible. This may mean using experimental plots within a mitigation site with different controls, treatments, and replication to determine if specific mitigation efforts are meeting the desired goals. This requires detailed planning, effective implementation of the mitigation project, close monitoring of the implemented plans, adjusting to intermediate results, and additional modifications to obtain long range wetland and watershed goals.

A mitigation site may not provide the full range of possible functions or values. Not all wetland functions may be compatible with one another.

Examples of wetland restoration or creation to provide specific functions or values might include: restoration of palustrine forested wetlands with an oak component on former agricultural lands (wildlife habitat); creation of freshwater tidal emergent wetlands that are subject to regular tidal inundation (shoreline stabilization, and habitat for rare & threatened plant species); creation of seasonally flooded forested wetlands in a riverine floodplain (flood water storage, water quality, habitat).

A degraded wetland, surrounded by a developed landscape, may only achieve its maximal functionality as an impaired system that requires active management to support natural processes and native species. 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 may promote alternative pathways of wetland development.

References: Clewell & Lea 1990, Cummings 2000, Eggers 1992, Haering et. al. 1992, HQ USACE 2002, Munro 1991, NRC 2001, Perry et al 2001, USACE New England District Regulatory Branch 2002, SCS 1992)

3. Location map (preferably depicted on a 7.5' USGS topographic map with the quadrangle name clearly labeled, in urbanizing areas, where USGS topographic maps are out of date, road maps may be submitted as well). The project boundaries should be clearly marked on the location map. Identify the site watershed (i.e. drainage basin or catchment area) and 8 digit Hydrologic Unit Code (HUC) Catalog Unit for the mitigation project site and the latitude and longitude (to the nearest second) at the center of the site.

4. Water budget based on expected monthly inputs and outputs, including a hydrograph showing monthly changes in water level.

For planned wetlands associated with riverine or stream-driven systems, the water budget should include numeric calculations (on a monthly basis) of the following hydrology inputs and outputs relative to the wetland system, and should depict the resulting water level elevations for a 'typical' year, a 'wet' year and a 'dry' year: At least 20 years of precipitation data is usually needed to reasonably identify wet, dry, and typical years.

Inputs:	Precipitation
	Direct surface flow runoff
	Overbank flooding
	Ground water inflow/discharge
Outputs:	Evapotranspiration
	Exfiltration (Groundwater Recharge)
	Outflow (spillway, sheetflow, etc.)

It is important for all types of planned wetland systems to demonstrate how all inputs and outputs are calculated to ensure that the water budget has been determined correctly. It is especially important to show that exfiltration has been calculated or measured based upon actual site soil characteristics. If the water budget is based on soil characteristics other than those exhibited on site (e.g. infiltration rates), then the budget must specify how those characteristics will be obtained (e.g. clay layer added 12" below soil surface). References should be provided for all data sources and assumptions based upon site-specific characteristics such as soil permeability.

Other conceptual approaches and types of calculations may be appropriate for systems driven by precipitation or groundwater. For groundwater- and precipitation-driven sites in non-riverine systems, it may be more effective to use methods that rely upon historic measures of groundwater levels, not calculations of these flux rates.

For systems driven by overbank flooding, gauging station data and a floodplain analysis (such as daily average flow) may be necessary. The water budget for overbank flow designs should be calculated using a minimum 10-year continuous simulation to account for variability in inputs and outputs under a variety of conditions. For example, there can be "dry" years with more overbank flooding than in "wet" years because of a few storms in a dry year. A continuous simulation over at least 10 years is necessary to evaluate a proposed mitigation site that relies on overbank flooding as a primary source of wetland hydrology.

(Care should be taken in using the depth to redoximorphic features as an indication of the depth or duration of seasonal saturation. Wherever possible, shallow monitoring wells and nested piezometers should be used for at least one fall to spring period to better identify seasonal fluctuations in the hydroperiod, to evaluate the potential groundwater component of a planned wetland, and to determine whether the site's hydrology is likely to be supported primarily by a groundwater or surface water component [endo- vs. epi-saturation].

Many water budgets for created wetlands assume no interaction between groundwater and the planned wetland. Unless the subsoil is compacted and sealed, this could be problematic. Placement of a created wetland in a groundwater discharge zone is likely to create a "wetter" system than planned and result in establishment of an emergent or scrub-shrub system rather than a forested community. On the other hand, excavation of a constructed wetland into a ground water recharge zone (e.g. flat interfluves or flats) can actually lead to increased actual transpiration rate, and deeper summer saturation levels, when the rooting zone is lowered into a previously shallower water table. For sites with a ground water component, groundwater elevation data and the location of existing and proposed groundwater observation wells will be required. If a groundwater study is necessary, we recommend that any such study include a thorough description of soils, including horizons, color, texture, redoximorphic features, typical or expected permeability rates, and any other hydric soil indicators. Any groundwater study should also address the potential presence of aquitards that may influence vertical shallow groundwater flow (see ERDC TN-WRAP-00-01; June 2000).

The water budget model detailed in Pierce 1993 is often an acceptable tool for estimating water budgets in surface water driven emergent-scrub-shrub systems with little ground water flux. It is based on the USDA TR 55 model, which was intended to be used for storm water management purposes and is designed to address maximum inputs into the system. The modification of the Pierce method prepared by Tom Westbrook in 1994 and often utilized by Norfolk District has been shown in some cases to under predict potential water storage volumes, where the assumption is made that there are no groundwater inputs. According to Daniels et al. 2000, a wetland design based on this modified Pierce model may be"wetter" than predicted [greater duration of flooding or inundation, etc.] because of the conservative estimates of potential water storage volumes within the planned wetland. Wetland designers utilizing modification to the "Pierce Method" may ignore or exclude ground-water inputs, and often rely upon on a "perching seal" to limit infiltration which then leads many engineers to specify high compaction within the normal rooting zone depths for woody species (1 m or so). In addition to directly limiting rooting depth for woody vegetation, this practice can lead to creation of mitigation sites that are either far wetter or far drier than the wetlands that they are intended to replace. We recommend incorporation of a flexible design that allows for minor adjustments to adjust for potentially wetter than predicted conditions.

Precipitation data may be obtained at sites such as the National Weather Service Forecast Office in Wakefield, Virginia (http://www.erh.noaa.gov/er/akq/climate/climate.htm) and the Southeast Regional Climate Center (http://water.dnr.state.sc.us/climate/sercc/products/monthly/monthly.html).

Be careful when planning wetlands that would be supported primarily by groundwater discharge because of the difficulty in calculating the size of the groundwater watershed and thus the amount of groundwater discharge.

References: Daniels, et. al. 2000, Daniels and Whittecar 2003, Fomchenko 1998, Garbisch 2002, HQ USACE 2002, NRC 2001, Pierce 1993; *Sprecher and Warne 2000*, *Whittecar and Lawrence, 1999)*

5. Conceptual grading plan - The conceptual grading plan should depict both existing and proposed topography, preferably with at least a minimum one foot contour interval, as well as the location and extent of any existing wetlands on the compensation site. Conceptual drawings (plan and profile views) should also be provided for water control structures. Final grading plans should present proposed contours within the wetland at one-foot intervals (preferably 0.5-foot), topographic high and low points within the site, structure locations and elevations, limits of disturbance, equipment access and staging areas, stock pile areas, and any other site constraints or requirements affecting constructability of the site. Drawings should include plan view and typical sections detail sheets and erosion and control measures. Plans should use the correct vertical datum, NOS in tidal mitigation areas and NGVD 88 in non-tidal areas.

(Final design plans will differ from conceptual plans in that more detail will be provided on design elevations, plan details, water control structures, etc.)

Plans (or the associated narrative) should specify expected seasonal depth, duration, and timing of inundation/saturation for each habitat type or hydrologic zone in the mitigation site during "typical" years. The plan should also include a summary of hydrologic calculations and/or hydrograph and indicate whether the hydrologic regime of the planned wetland is driven by groundwater or surface water and provide supporting data (including a confirmed delineation and a copy of the supporting data sheets).

Tidal mitigation sites should be designed to allow for adequate tidal exchange and graded to a maximum slope of 10:1 (H:V). Sites should be graded to ensure positive drainage and minimize areas of standing water at low tide.

Non-tidal mitigation sites should incorporate pit-and-mound microtopography to mimic natural wetland areas. In some forested wetlands in eastern Virginia, Daniels and Whittecar 2003 observed pits or small depressions approximately 10-15 inches deep and 30 to 60 feet apart. These shallow depressions increase surface water storage and provide for greater habitat diversity for flora and fauna.

Upland areas should grade gently into mitigation sites utilizing gentle side slopes (> 6:1) whenever possible.

Drawings should identify the location and extent of any inholdings, easements, or right-of-ways on or adjacent to the mitigation site, including ingress-egress, drainage, utility, and transmission lines. A mitigation site may be impacted by routine power line clearance activities. Similarly, it may not be possible to correct site hydrology because of a lack of drainage easement(s) associated with the mitigation site and prohibited installation of an outfall to convey water from the frequently ponded wetland.

(Water budgets predict or anticipate the hydrologic consequences of a given design. Specific design features should guide implementation but some flexibility in grading may be needed in order to adapt to actual field conditions.)

Design the system for minimal maintenance. 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 using approaches that require continual maintenance. Passive water control structures utilizing natural materials, especially earth and rock are favored over structures requiring regular and active management and maintenance or structures made of aluminum, plastic, steel, or

concrete which may pose maintenance concerns in 20 or more years. Avoid hydraulic control structures and other engineered structures that are vulnerable to chronic failure and require maintenance and replacement.

References: Daniels and Whittecar 2003, Dunne et al 1998, Garbisch 2002, Hayes et al. 2000, HQ USACE 2002, NRC 2001, Perry et al 2001, USACE New England District Regulatory Branch 1999)

6. Plant species list and planting plan *(The proposed plant list and planting plan depends on project goals and objectives such as wildlife habitat, flood flow attenuation, nutrient uptake; the size and configuration of mitigation site - small and narrow versus large and more than 300 feet wide; the potential for natural seeding (i.e., natural regeneration); the planned hydrologic regime, proposed functions/values, and the availability of plant materials. As a general guide, planting lists should include species present in local reference wetlands, and should be species indigenous to the area. Utilize native seed banks, and soil and plant material salvage whenever possible. Consider planting mature plants as supplemental material, depending on natural recruitment and invasive species occurrence. Evaluate on-site and nearby seed banks to ascertain their viability and response to hydrological conditions. When plant introduction is necessary to promote soil stability and prevent invasive species, the vegetation selected must be appropriate to the site rather than forced to fit external pressures for an ancillary purpose such as preferred wildlife food source or habitat.)*

Tidal Wetland Establishment: Planting zones should be based on species requirements and a tidal datum. Each species must be planted at the appropriate elevation for that species and at the proper depth. The potential for establishment of *Phragmites australis* is an important consideration in the design of tidal wetlands (http://www.dcr.state.va.us/dnh/invlist.htm). The elevation of the low marsh should be identified and considered in the design. The elevation of the low marsh should be provided in the plan. Low marsh plants should be planted between mean tide level and mean high water. High marsh plants should be planted between mean high water and spring high water. Salt hardened plants are most likely to survive. Plant storage on site should be kept short (less than 2 weeks). Planting densely (i.e. on 12 inch centers) will encourage the site to provide habitat and some water quality functions more quickly. The preferred planting time is March through June in Virginia. Replanting may be necessary for planting conducted outside that window. A nitrogen rich slow-release fertilizer should be added to each planting hole prior to closing.

Forest Establishment: There are a number of different ways to design a planned forested mitigation area: natural regeneration; direct seeding; bare root seedlings; cuttings; tubelings, other container stock; and ball and burlap plantings.

(Natural recruitment is an important and often overlooked component of vegetation establishment on mitigation sites. In regenerating forests, including former agricultural fields, tree seedlings and coppice sprouts typically number in the thousands to tens of thousands per acre. It may not be practical to plant seedlings at those densities, but those densities may be necessary to ensure adequate stand stocking and stand structure. Thus, recruitment from surrounding areas, especially by light-seeded and pioneer species (red maple, sweet gum, loblolly pine, black willow, sycamore, etc.) should be considered in any revegetation scheme.

When working with slow growing species like oaks or hickories, forest establishment may be accelerated through the use of faster growing nurse species [trainers] like loblolly pine, black willow, alder, wax myrtle, sycamore, or cottonwood. These nurse trees shade competing vegetation like allellopathic turf grasses [Bermuda grass and tall fescue], add organic matter to the soil, often fix atmospheric nitrogen, and increase vertical structural complexity. In some cases, nurse crops can create a scrub-shrub stage community within 3 years and a closed canopy within 10 years. This strategy promotes rapid colonization by birds and may enhance public perception of mitigation sites.

If one of the project objectives is establishment of a mast-component in a planned forested wetland, consideration should be given to extending planting of the mitigation site over a number of years, instead of front-loading the plantings in the first couple of years. This will allow the site to stabilize through natural succession, and provide more suitable conditions for establishment of many of the more shade-tolerant mast-producing species.)

a. Reliance upon natural regeneration may be appropriate when:

1) The site is narrow (no more than 100 yards wide and bordered by seed-bearing trees with wetland indicator status of FAC or wetter); or
2) The site is exposed to flood waters bearing seeds (i.e. overbank flooding); or
3) The original soils and hydrology have not been significantly altered; or
4) A viable seedbank dominated by non-invasive species is known to be present.

b. Direct seeding may be used to establish both heavy mast (oaks and hickories) and light seeded species (maple, sweet gum, beech, ash, and elm). Seeds from local sources, especially materials onsite or on adjacent properties should be considered when planning to vegetate mitigation sites by direct seeding.

Oaks and hickories have been established on extensive areas of seasonally saturated soils in the southern U.S. through direct seeding. If the site has been cultivated for a long time, it should be disked or chisel plowed at least twice prior to planting in order to break up any plow pan or compacted soil and to reduce herbaceous and woody competition. The site should be tilled, preferably to a depth of 8-15 inches. Any tillage should be done when the soil is drier than field capacity (freely drained but still moist). Tillage on moist to wet soils will either lead to a subsequent traffic pan beneath the tillage depth or "slurping around" of the surface if its at or approaching saturation. Acorns should be planted at a depth of 1-6 inches anytime from late fall until late April. Acorns can be planted by hand or using a modified 1 or 2 row bean planter. A conservative germination rate of 35% can be expected. At that rate, planting 1000-1500 acorns/acre would result in 300-500 seedlings/acre. Plant more acorns if competition is expected.

Consideration should also be given to planting an annual cover crop (i.e. buckwheat, annual rye, wheat, or millet) concurrently with seeding operations to stabilize soils and delay establishment of weedy competition.

Carefully evaluate any perennial species present in wetland seed mixes that will be used to stabilize sites prior to planting those sites in woody species. Some herbaceous perennials (for instance, *Juncus effusus*) can inhibit establishment of bare root woody plants.

When authorizing seeding of tree species specify:
- the quantities of pure live seed (including numbers of acorns per acre);
  (It may not be possible to determine the percentage of pure live seed from locally collected [field collected materials], except acorns.)
- the seeding window (dates for seeding);
- use of filler (such as sand) to dilute small or light seeds for uniform coverage;
- seeding technique including equipment and implements;

Any seeds should conform to the Virginia Seed Law (Sections 3.1-262 Code of Virginia) and Virginia Seed Regulations (2 VAC 5-290-10 et seq).

(Wetland plant materials are in demand for compensatory mitigation, reforestation, as well as restoration activities conducted by federal and state agencies. Seed sources/suppliers should be identified and material reserved early. If plant materials are not reserved in advance in the desired sizes, the planting contractor may be forced to submit a list of suggested substitutions because of difficulty locating some of the specified species or sizes. These substitutions may affect the nature of the planned community and may not be acceptable to the Corps/DEQ.)

c. Bare root seedlings: The common practice of planting 300-500 stems/acre is one that tends to maximize production of large stems with small crowns, such as is associated with timber production. For tree species that are poor competitors, like Atlantic white cedar (*Chamaecyparis thyoides*) much higher planting densities may be necessary in order to establish viable stands. Similarly, lower densities may be more appropriate for certain species like black willow, bald cypress, or black gum.

For wildlife purposes, the objectives are often development of broad crowned trees capable of greater mast production, gaps between trees allowing for growth/development of understory species and invasion of lighter-

seeded trees (sweet gum, sycamore, maple, ash, and elm), and horizontal and vertical structural complexity. For these purposes, bare root seedlings (oaks, ashes, hickories, and sweet gum) may be successfully planted or established at a density of 110-300/acre, provided seed rain from nearby sites allows for establishment of lighter-seeded pioneer species (sweet gum, red maple, box elder, etc.).

(Some have suggested that seedling mortality due to depredation, particularly from rodents can be reduced through the use of tree shelters that extend 2 inches or more into the ground. Tree shelters should be removed within 2-3 years of planting. Others have attempted to offset depredation losses by planting additional seedlings. Neither approach seems foolproof.

Planting crews with experience in planting hardwoods should be used. This will reduce the amount of supervision of planting crews required and may increase survival of plantings. Examples of planting contract specifications may be found at http://www.wes.army.mil/el/wrtc/wrp/tnotes/wgrs3-5.pdf)

d. Cuttings and tubelings may be used to establish fast growing early successional species like willows, cottonwood, and alder.

Fast growing and short-lived native tree species (e.g. some willows and cottonwoods) may be planted as cover crops or nurse trees with slower growing more shade tolerant tree species interplanted. The nurse trees will provide shade to promote establishment of some shade tolerant species (e.g. oaks and hickories), contribute organic matter to recently disturbed soils, help loosen or turnover the soils within the rooting zone, and provide scrub-shrub habitat for many neotropical migratory bird species.

e. Nursery grown container stock can be planted later in the season than bare root seedlings. Container stock, and balled and burlap plantings have higher survival rates in heavy clay soils than bare root seedlings. Thus, smaller numbers of containerized plants may be needed per acre to establish woody species than bare root seedlings. Container stock is also more tolerant of long duration saturation or inundation than bare root seedlings. Do not specify wet-acclimated plant materials. Such materials are expensive to obtain, are grown under stress, have less well-developed roots, and may be at a competitive disadvantage. Specifications for containerized stock should match industry standards (1, 2, 6, and 10 gallon containers). The root ball of containerized and balled & burlap stock should be loosened/broken up before placement in the ground. Corps/DEQ preference is for the use of plant materials that are acclimated to similar climate conditions as the location of the mitigation site (within the same or an adjacent NRCS Land Resource Region or USDA growth zone).

f. Understory development: Establishment of a wetland understory is often overlooked in mitigation. This understory diversity can be increased through:

- transplanting trees and shrubs from areas that will be filled or cleared;
- use of nursery raised plant materials (on average, 10 species/acre)
- addition of topsoil from a donor site where invasive or undesirable species are not a concern;
- transplanting blocks of topsoil from areas that will be impacted to the mitigation site.

References - Clewell & Lea 1990, Garbisch 2002, HQ USACE 2002, Kennedy 1993, McIninch et al. 1994, McKevlin 1992, Munro 1991, NRC 2001, NRCS 2000, Perry et al. 2001, Spencer et al. 2001, Schweitzer 1998, Stanturf et al. 1998, Twedt et al 1997, Twedt et. al. 2002, Virginia Department of Forestry 1993

7. Soil preparation and amendments – When site preparation entails excavation of the A and/or B-horizon, the topsoil should be stockpiled separately from the subsoil and protected for use in the created wetland. That will reduce the need for additional organic amendments. If that is not possible, the site may need to be over excavated 6-12 inches (depending on site hydrology/groundwater inputs) and a comparable amount of high quality topsoil, organic soil, muck, or composted organic material added. Where the site has been graded down to the original subsoil (B or C horizon), sufficient organic matter (topsoil, compost, leaf mold, etc.) should be added to bring soil organic matter content to at least 5% (this could be as much as several inches of material). This will provide a rooting medium and a source of organic material to support the microbial activity necessary to establish a reducing environment. Mulch can be difficult to mix into clayey soils, where disking may be possible to a depth of only 6-8

inches. If mulch is added, it should be mixed into the soil very well and should not be added in such quantities that herbaceous growth will be inhibited.

The actual soil amendment prescription should involve a standard agricultural analysis of the existing site soil, and an equivalent analysis of the properties of the proposed organic amendment source.

Unless the objective is to create a system supported solely by precipitation (a "perched" or epi-saturated system), the subsoil should be ripped or chisel-plowed to a bulk-density of less than 85 lbs/cubic foot (1.35 g/cc) for loamy and finer textured soils and less than 107 lbs/cubic foot (1.70 g/cc) in sands prior to adding organic matter or topsoil to the site. This will facilitate groundwater interchange and the rooting of many woody species. Restoration scientists don't generally advocate deliberate compaction of soils and subsoils because compacted soils can inhibit establishment of vegetation.

(It may be more practical to conserve organic matter, woody debris, and topsoil on site, than to import organic matter. A soil management strategy should be developed for each mitigation proposal. Wide track low ground pressure equipment is preferred on "soft" or moist soils. If heavy equipment is operated repeatedly on wetland restoration/creation soils, compaction will likely result and measures will need to be taken to reduce compaction and soil bulk density.)

Once organic matter has been added to the soil in a created wetland, the surface should be tilled with a chisel-plow or heavy disk to loosen the soil to a bulk density of less than 85 lbs/cubic foot. This reduces compaction from final grading, mixes the organics in the surface horizon and will promote establishment of vegetation on the site. Clayey soils should be disked to a depth of 6-8 inches in place of ripping or chisel plowing.

The application of 1-3" of wood chips or leaf mulch on non-tidal created wetland sites will act as a litter layer, which will help moderate soil temperatures and retain soil moisture in the summer.

Seedbank studies should be conducted on any donor soils, particularly soils from other wetlands, to ensure that invasive species are not introduced (procedures are discussed in DeBerry & Perry 2000a and 2000b).

Wetland creation sites should be evaluated for sulfidic materials. These compounds are particularly abundant in lower tertiary deposits in the lower Coastal Plain of Virginia (such as the Tabb formation). Soils that will be exposed to the atmosphere by wetland creation activities may need to be tested for sulfides or pyritic sulfur. Oxidation of sulfides can result in acidification of mitigation sites, inhibiting plant establishment. Orndorff and Daniels 2002 includes statewide maps of risk zones and testing methods.

A supply of coarse woody debris (> 2" in diameter including logs and/or stumps) is recommended to cover at least 1–2% of the overall acreage of the wetland creation/restoration site. This material will provide wildlife cover; introduce a source of slowly decomposing organic material; and inoculate the site with some plant propagules such as giant cane (*Arundinaria gigantea)*, forest ectomycorrhizae, and invertebrates. This may be especially useful in wetland creation sites and in wetland restoration on agricultural fields.

In tidal systems, it is important to identify and evaluate so-called cation-rich soils and soils comprised of mostly clay ("blue marl" soils). These soils may limit vegetation establishment, particularly native woody species. Cation-rich soils occur naturally and on previously drained marshes. These soils are generally not sulfidic, but may be at certain locations, particularly when associated with the Chesapeake group of sediments (see Orndorff and Daniels 2002). If there are high levels of sulfur in the subsoil, when rehydrated, hydrogen sulfides may form, pH may decrease, and it may be difficult to establish vegetation. Blue marl provides a poor planting medium, reducing plant survival.

References – Cummings 2000,Daniels and Whittecar 2003, DeBerry & Perry 2000a, 2000b, Eggers 1992, Garbisch 2002, Haering et al 1992, Orndorff and Daniels 2002. Perry et al 2001, Sauer 1998, USACE New England District Regulatory Branch 2002; Whittecar and Daniels, 1999

8. Surrounding land use/plans, including probable future land use - Consider current and future landscape features or public issues that may control or influence design. Consider the effect of the mitigation site on roads, rights-of-way, site access, and utilities, as well as on drainage, including the potential for flooding both upstream and downstream of the site. Also consider the potential effect of adjoining land uses, including agriculture, residential, and industrial uses, roads, rights-of-way, utilities, and drainage easements on the mitigation site and its success and functions. Identify the location and approximate extent of any existing, adjacent wetland areas. Consider whether there are riparian waterways where water quality may be enhanced, or the presence of adjacent woodlands that may buffer wetlands from less compatible land uses.

Consider whether the mitigation site is located near airports and if so, whether it will have the potential to attract avian species that might pose a threat to aircraft. In accordance with Federal Aviation Administration Advisory Circular 150/5200-33, dated 5/1/97, land uses that are attractive to wildlife species that are potentially hazardous to aircraft must be located at least 5,000 feet from airports serving piston-powered aircraft and 10,000 feet from airports serving turbine-powered aircraft. The mitigation plan must certify that the site is in compliance with FAA Advisory Circular 150/5200-33.

When siting tidal mitigation areas, avoid areas exposed to heavy wave activity, areas with high erosion rates or highly erodible soils, or areas receiving heavy boat wakes. Protective engineered structures (breakwaters, tombolas, etc.) may need to be considered for sites with fetch greater than 0.35 miles.

References – Eggers 1992, FAA 1997, Hayes et al. 2000, HQ USACE 2002, NRC 2001, Perry et al. 2001, USACE New England District Regulatory Branch 2002, SCS 1992)

9. Abatement/control plan for undesirable plant and animal species – May include control of competing vegetation such as volunteer herbaceous and woody species. Weed control (selective mowing, use of weed barriers or tree mats, discing, or use of herbicides) is strongly recommended to reduce competition from weedy herbaceous species, and thus ensure survival and speed early growth of hardwood species (Rick Hamilton NC State Dept of Forestry pers. Comm. 2002, Ron Myers NC Forest Service pers. Comm. 2002). Mowing, herbiciding, and discing do increase growth of hardwood species by at least 10-20% after 5 years (Doug Frederick NC State Dept Forestry pers. Comm. 2002).

Only herbicides that are specifically labeled for aquatic applications should be used, unless other herbicides that are free of damaging surfactants are suitable.

Undesirable plant species are those that impede or prevent development of target plant communities or functional classes (such as emergent, scrub-shrub, or forested communities) and include many of those species on the Virginia Department of Conservation and Recreation's Invasive Alien Plant List. This list of invasive plants may be found at http://www.dcr.state.va.us/dnh/pdflist.htm. Additional information on invasive plant species may be found in the USDA Plants Database located at http://plants.usda.gov/.

Plans should include requirements for assessing the threat, effect and opportunity for control of undesirable plant species that are likely to occur in restored or created wetlands and that may impede or prevent the development of proposed plant communities. Plans should specify the threshold percentage of invasive species that would trigger remedial action. That percentage may vary depending upon the goals and objectives of the mitigation site. For instance, 50% cover of cattail (Typha sp.) may be unacceptable in a forested wetland restoration, but may be acceptable in a wetland intended for polishing previously treated stormwater.

Herbivory by white tailed deer, rodents, and rabbits can adversely impact forest stand development. Rodents girdled and killed between 25 and 65% of 5-year-old planted Atlantic white cedar in a number of field blocks on a southeastern Virginia mitigation bank. Herbivory by Canada geese has impaired establishment of both herbaceous and woody communities in agricultural and old field settings. Measures that have been used to address herbivory, with mixed success include the use of tree tubes, fencing, nurse crops, trapping, hunting, chemical deterrents, attracting predators, removing cover for herbivores, etc.

References – Garbisch 2002, HQ USACE 2002, Perry et al. 2001, Stanturf et al. 1998

10. A construction timetable, including construction methods and a list of likely equipment should be provided in addition to the plans and specifications. This timetable should identify those elements critical to project success and reflect approval based on demonstrated wetland hydrology on the mitigation site.

(The construction timetable may change substantially during the permitting process, depending in part on regulatory review and approval, and will ultimately be dependent upon construction contracts, relation to proposed impacts, site conditions encountered and climate. Care should be made to focus not on the dates, but the relationship between key points in the construction process (staking limits of disturbance, dewatering the site, installing silt fence, etc. In the case of mitigation banks, the actual construction of the mitigation bank site, once approved, may depend on securing adequate financing.)

References Eggers 1992, Garbisch 2002, Hayes et al. 2000, HQ USACE 2002

11. Identify potential reference wetland areas adjacent to or near the planned wetland restoration/creation site that can be used as models for the proposed hydrologic regime, soils, and/or plant community to guide monitoring and help evaluate success.

(When identifying reference areas, it may not be valid to compare primary successional systems [such as wetland creation sites or wetland restoration/creation on cropland] to secondary successional systems [such as clearcut or recently timbered sites]. Be careful to select a reference area with similar hydrologic characteristics to the mitigation creation site. Reference areas that have a hydrologic regime supported at least partially by ground water discharge should not be used as reference areas for wetland creation sites that rely upon a "perching seal" to ensure that wetland hydrology is present.)

References: Eggers 1992, Munro 1991, NRC 2001, USACE New England District Regulatory Branch 2002, Spencer et al. 2001.

12. Provide a written description of the legal means used to protect the compensatory mitigation site in perpetuity (i.e. deed restriction, restrictive covenants, easement, natural area dedication, etc.). Generally, conservation easements held by state or local governments, other federal or state agencies, or non governmental groups such as land trusts are preferable to deed restrictions. Homeowners' associations should be used for these purposes only in exceptional circumstances, such as when the association is responsible for community open spaces with restrictive covenants.

Reference: HQ USACE 2002

13. A contingency plan for dealing with unanticipated site conditions or changes. For example, a contingency plan may identify financial assurance mechanisms that could be used to implement remedial measures to correct unexpected problems (drought, fire, disease outbreak, etc.). There should be an allowance (perhaps as much as a 10% deviation) from the plan's specifications to allow for unforeseen site conditions.

Reference: HQ USACE 2002

14. Monitoring and long-term management responsibilities should be identified in the plan. Methods should be identified for measuring success criteria in terms of the project's goals and objectives, plant survival, presence or absence of invasive species, and verification of the planned wetland hydrologic regime. The party or parties responsible for accomplishing, maintaining, and monitoring the mitigation should be identified, as well, as the type, frequency, and duration of monitoring.

(A thorough monitoring plan is part of an adaptive management program that provides an early indication of potential problems and possible correction actions. 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 may identify the source of a problem and remedial measures. Monitoring and control of nonindigenous species should be a part of any effective adaptive management program. Assessment of wetland performance must be integrated with adaptive management. Both require understanding the processes that drive the structure and characteristics of a developing wetland. Simply documenting the structure [vegetation, sediments, fauna, and nutrients] will not provide the knowledge and guidance required to make adaptive "corrections" when adverse conditions are discovered. Although wetland development may take years to decades, process-based monitoring may provide more sensitive indicators of whether a mitigation site is proceeding along an appropriate trajectory.)

Reference: HQ USACE 2002, NRC 2001, Perry et al. 2001

III. Example Permit Conditions for Wetlands Compensation - Some examples of permit conditions that may be applicable to wetland mitigation sites are listed below. These conditions may be altered or adjusted to reflect site-specific circumstances or information provided by a given applicant. We do not expect that all of these conditions will be incorporated into every permit that requires wetland mitigation. Some conditions conflict (e.g. conditions 2 and 3 below). Conflicting conditions should not be incorporated into a given permit. An alternative would be to include many of these provisions in the mitigation plan, which could be cited in the permit. Another alternative would be to modify conditions to fit mitigation site conditions.

1. The permittee is responsible for meeting all of the components of the compensatory mitigation requirements associated with this permit. This responsibility can only be transferred if and when the permit is transferred to another party and then only to the new permit recipient. (*This condition does not apply to compensatory mitigation provided by an approved mitigation bank or in-lieu fee fund. Approved mitigation banks and in-lieu fee funds are responsible for the success of wetland restoration/creation that they provide.)*

2. Construction of compensatory mitigation shall be conducted prior to or concurrent with the impacts authorized under this permit. *(Advance or concurrent wetland restoration or creation can reduce the temporal losses of wetland functions and values and facilitate permit compliance. Note that DEQ general permit regulations stipulate that compensation site construction commence within 180 days of initiating the authorized impact(s).*

OR

3. A conceptual mitigation plan has been approved for this project, before any work may be conducted in wetlands, you must provide the following: a) A detailed compensatory mitigation plan approved by the Corps/DEQ; b) Proof of having secured the mitigation site (deed, easement, etc.); and c) appropriate financial assurances guaranteeing that the approved mitigation will be completed. Initial physical and biological improvements (i.e. site improvements including grading) associated with the mitigation plan should be completed not later than the end of the first full growing season following the impacts from the authorized activities. *(This condition is an alternative to # 2 and would be employed when impacts to wetlands are authorized to commence before mitigation is initiated. DEQ general permit regulations stipulate that compensation site construction commence within 180 days of the authorized impact(s).)*

4. A boundary survey of the limit of planned wetlands within the wetland mitigation site is required once grading and planting are completed. This survey should be prepared by a licensed surveyor and certified by the licensed surveyor or by a registered professional engineer or licensed landscape architect to conform to the design plans and specifications. (*This is useful for evaluating permit compliance and mitigation success. This requirement could be waived by the regulatory agency where the limits of wetlands are clearly defined or associated with readily identifiable features such as berms.)*

5. The project site soils should be described in situ before and after site construction, with the soil profile carefully described for redoximorphic features and USDA-NRCS hydric soil indicators immediately after final grading and addition of topsoil. This will allow identification of relict redoximorphic features.

6. An as-built ground survey (or an aerial survey provided by a firm that specializes in aerial surveys and includes documentation of the variation from actual ground conditions such as +/- 0.2 feet) should be conducted for the entire mitigation site, including invert elevations for all water elevation control structures and spot elevations throughout the site. This survey should be prepared by a licensed surveyor and certified by the licensed surveyor or by a registered professional engineer to conform to the design plans and specifications. Any changes or deviations in the as-built plans should be red lined and an explanation provided for the deviation. Submission of this survey is required prior to release of that portion of the performance bond allocated to design and excavation costs. Surveys and submission of surveys to the Corps/DEQ should be done within no more than seven days of grading. The site should be seeded immediately after completion of grading (i.e. within 7 calendar days) with an approved wetland seed mix to stabilize the site and to minimize invasion of undesirable species. The portion of the financial assurances

allocated to design and excavation will not be released unless and until the Corps and/or DEQ approve the as-built plan. (NOTE: For larger sites, this may require that grading, surveying, submittal to the Corps and DEQ, and seeding is occurring on a concurrent basis across the site.).

OR

6. Alternate. An as-built ground survey (or an aerial survey provided by a firm that specializes in aerial surveys and includes documentation of the variation from actual ground conditions such as +/- 0.2 feet) should be conducted for the entire mitigation site, including invert elevations for all water elevation control structures and spot elevations throughout the site. This survey should be prepared by a licensed surveyor and certified by the licensed surveyor or by a registered professional engineer to conform to the design plans and specifications. Any changes or deviations in the as-built plan should be red lined and an explanation provided for the deviation. Submission of this survey is required prior to release of that portion of the performance bond allocated to design and excavation costs. Surveys and submission of surveys to the Corps/DEQ should be done within no more than 7 days of grading. Following review by the Corps &/or DEQ of the as-built grading plan (within 15 days of receipt of the drawings), the site should be seeded immediately with an approved wetland seed mix to stabilize the site and to minimize invasion of undesirable species. (NOTE: For larger sites, this may require that grading, surveying, submittal to the Corps and DEQ, and seeding is occurring on a concurrent basis across the site.).

(These conditions may be especially appropriate for palustrine, estuarine, & riverine wetland creation sites or sites involving extensive grading, especially where hydrologic tolerances are critical to success. In addition, the project managers might require pre-grading and/or post-grading conferences with the appropriate contractors. As built surveys may not be necessary for wetland restorations in agricultural or forested lands or tidal restorations where grading is not required.).

7. Unless given written approval by the Corps and/or DEQ, the applicant **shall not plant the compensation site** before it has been demonstrated and accepted by the Corps/DEQ that the site has free water at or within 12" of the soil surface for a minimum of 12.5% of the region's killing frost-free growing season (as defined in the local soil survey) following grading. The permittee shall submit hydrological information for that period for Corps &/or DEQ evaluation using groundwater wells constructed and installed pursuant to a plan accepted by the Corps/DEQ. That information should be keyed to a site plan such that hydrologic conditions across the site can be evaluated and appropriate vegetation can be selected which is compatible with the projected water elevations and duration. In the event that acceptable hydrology has not been demonstrated, the Corps and/or DEQ may require waiting through an additional spring growing season in order to ascertain whether hydrology is sufficient to meet the site's goals.

(The purpose of this condition is to ensure that a wetland hydrologic regime has been established on the mitigation site prior to planting. The objective is to ensure that the site is neither too dry nor too wet. Failure to demonstrate that suitable wetland hydrology is present can result in: 1) increased costs to the permittee associated with correcting the site's hydrologic regime [additional grading, planting, or water control structure installation]; 2) difficulty in enforcing mitigation compliance due to resistance to additional grading following site planting; 3) a less successful mitigation site [drier than planned and thus non-jurisdictional or wetter than planned which results in planting mortality]. At a minimum, no less than 3 groundwater wells should be installed per site. This condition may be unnecessary for those sites where the primary source of wetland hydrology is tidal inundation or overbank flooding.)

8. Wetland seed mixes and seed mixes used for control of soil erosion or to stabilize disturbed areas anywhere in the vicinity of the mitigation site shall be free of tall fescue, Bermuda grass, and other allelopathic turf grass species, as well as plant species on the Virginia Department of Conservation and Recreation's Invasive Alien Plant List.

(These species are typically not considered hydrophytic species and can inhibit growth and establishment of desirable hydrophytic herbaceous and woody species)

9. The permittee shall contact the Corps and/or DEQ to discuss any changes to the planting plan that would result in a change in species dominance (i.e., the relative ranking of planted species) or changes in plant zonation that would deviate from the original planting plan prior to implementing those changes. Acceptance of any changes must be confirmed in writing (e.g. letter, fax, or e mail).

In the event that substantive changes have been made to the approved planting plan, the permittee shall submit to the Corps and/or DEQ a site plan or drawing (not necessarily a survey) depicting actual plant zonation and a narrative documenting reasons for any changes from the approved final design.

(This is especially appropriate when several different community types or hydrologic regimes are planned for the site. It may not be necessary when a monotypic community (i.e. Atlantic white cedar or Spartina alterniflora) is planned or when topography on the finished site is uniform.)

10. The permittee will provide financial assurances, conditioned upon performance of the required mitigation and all required monitoring. The financial assurances must be irrevocable for the period of performance. An example of a suitable financial assurance would be posting of a performance bond in favor of the United States Army Corps of Engineers, or an irrevocable bank letter of credit, or escrow account in the amount of $ _____. A draft of the performance bond, letter of credit, or escrow agreement should be forwarded for approval to the Norfolk District's Office of Counsel prior to execution. This office must receive the executed performance bond within (*select one of the following*) a) 60 days of permit issuance; b) not less than 60 days before initiation of work in waters of the US (including wetlands); c) prior to the commencement of any work associated with an enforcement or permitted action. Financial assurances may be released in annual increments upon attainment of specific restoration objectives or milestones (completion of grading, planting, replanting, first year monitoring, etc.).

For mitigation banks, financial assurances (e.g. escrow account) shall be required sufficient to cover any advance credits that are released as well as long-term maintenance of the site and to address catastrophic impacts (flood, fire, drought, etc.) to the bank site. That portion of the assurances covering the advance release of credits shall be released once the advance credits are paid back (i.e. the equivalent acreage is successfully restored).

(Financial assurances are especially suitable for large mitigation sites.)

11. A real estate instrument shall be recorded in the chain of title to the subject property that will require the preservation of the mitigation site on the property in its post-construction/post-restoration condition in perpetuity except for the work permitted herein.

(Suitable real estate instruments may include restrictive covenants, conservation easements, open space easements, natural area dedication, etc. The objective is protection of the mitigation site in perpetuity.)

12. The Corps/DEQ must approve the real estate instrument that would be used to protect the mitigation site in perpetuity prior to recordation. Proof of recordation must be submitted to the Corps/DEQ within 60 (sixty) days of the date of this permit / nationwide permit verification. Use of the attached Restrictive Covenant template will facilitate review and approval.

13. No work may be conducted in wetlands until the real estate instrument used to protect the mitigation site in perpetuity is approved by the Corps/DEQ and proof of its recordation submitted to the Corps/DEQ.

(This condition is an alternative to Condition 11. One or the other may be used, **not both**. *In many instances, it may be appropriate to restrict work in waters of the US, including wetlands, until proof of preservation is provided.)*

14. The site shall meet the following performance criteria (These criteria may vary from year 1 to year 10, and those variations should be specified in this condition of the permit):

a. Hydrology: The site shall meet the hydrology criteria for a wetland under the 1987 Corps of Engineers Wetland Delineation Manual and associated guidance. Soils shall have free water at or within 12 inches of the

surface for a duration equal to a minimum of 12.5% of the region's killing frost free growing season (that part of the year where ambient temperatures remain above 28° F for 5 out of 10 years) as defined in the local soil survey or current NRCS WETS table, measured in consecutive days under "typical precipitation conditions". The Corps/DEQ must approve any deviation or variation on a case-by-case basis. For the design, the normal growing season based on soil temperature or killing frost-free days in the local soil survey soil shall be from _____ to _____, or a total of _____ days, indicating a minimum saturation/inundation to within 12 inches of the surface of _____ days during the growing season.

Visual observation of standing water (as opposed to well data) **MAY**, under certain circumstances, be considered a positive indicator of wetland hydrology (i.e., saturation to the surface) as stated in the 1987 Corps of Engineers Wetland Delineation Manual. When using water table within 12" of the surface as an indicator of hydrology, care **MUST BE USED TO CONSIDER CONDITIONS AND THE SOIL TYPES**.

(If the design is for a permanently flooded shallow water emergent pond, then the performance criterion might be 'At a minimum, the water table shall occur at the ground surface throughout the year except for July and August, or a similar hydroperiod is established, to ensure that a sustainable emergent system is established. For wetlands that are planned to be forested at maturity, consideration should be given to ultimate drawdown of the water table in establishing the performance criteria.)

b. Vegetation:

i. Woody Plants: **More than** 50% of all dominant woody plants expressed either by plant stems or canopy coverage shall be facultative (FAC) or wetter (FACW or OBL). A minimum woody stem count of _____/acre must be achieved on average in the sample plots across the site by year _____ until the canopy cover is thirty percent (30%) or greater. (NOTE: On 15-foot centers, woody plants equal approximately 200/acre).

(Required stem counts or percent canopy cover may be modified based on a rationale submitted by the permittee and accepted by the Corps/DEQ.)

ii. Herbaceous Plants: **More than** 50% of all dominant herbaceous plant species shall be facultative (FAC) or wetter (FACW or OBL). Areal coverage shall be a minimum of 50% in emergent wetland areas after 1 growing season. In planned emergent wetlands, shrub/scrub or sapling/forest vegetation is not included in coverage or stem count for herbaceous vegetation.

(This permit condition should be made project specific. Depending on project objectives and site characteristics [including potential for establishment of volunteer woody species], a minimum woody stem count of 200 to 400 stems/acre or more may be acceptable.

If the mitigation site is intended to replace seasonal wetlands, the site should typically "dry out" during the summer and fall months. Monitoring throughout the growing season for at least one year may be necessary to determine when draw down occurs and if the compensation site is required to replicate the hydrologic regime of the impacted wetlands. This may be especially problematic when the source of hydrology in the mitigation site is groundwater or stormwater runoff.)

c. Soils: Positive indicators must be demonstrated within 12 inches of the soil surface. When utilizing ground water monitoring as the field indicator, wells must demonstrate a free water table from **0-12 inches** below the soils surface for **15 consecutive days.** Consideration can be given to soil texture in determining the depth to free water that is an acceptable indicator of hydric soil conditions.

For wetland creation areas located on non-hydric soils, the following criteria should be used:

(1) For coarse textured (sandy) surface soils, positive indicators of hydric soil formation must be demonstrated within 6 inches of the soil surface. Groundwater monitoring may be used as the positive indicator for the first 2 years after reaching

the final grade, in which case, wells must demonstrate free water within 6 inches of the surface for 15 consecutive days during the growing season.

(2) For fine textured soils (silts, clays, loams), positive indicators of hydric soil formation must be demonstrated within 12 inches of the soil surface. Groundwater monitoring may be used as the positive indicator for the first 2 years after reaching the final grade, in which case, wells must demonstrate free water within 12 inches of the surface for 15 consecutive days during the growing season.

(3) Positive indicators of hydric soil formation may include redoximorphic features including, but not limited to redox concentrations, redox depletions, reduced matrices, positive tests with α,α, diperydyl, or other field indicators contained in the Field Indicators of Hydric Soils of the U.S.

(4) A complete soil morphologic description shall be documented pre and post construction and at the 3rd year following construction and each subsequent mandatory monitoring year to document changes in overall soil morphology, particularly the development of redoximorphic features over time (such as a reduction in matrix chroma or development of redox depletions), to demonstrate that soils at the site are progressing towards hydric soil conditions. At a minimum, soil profiles shall be described within 30 feet of each well.

(The purpose of these standards is to ensure that the restored or created wetland meets the wetland criteria specified in the Corps of Engineers 1987 Wetland Manual. Additional performance standards may be appropriate for some mitigation projects. For instance, if the mitigation project entails construction of a wetland for water quality improvement, standards may be required to determine whether the constructed wetland satisfies that objective.)

15. The Corps/DEQ or the permittee may, at any time during the monitoring period, require removal, treatment or management of undesirable plant or animal species, including physical removal, use of herbicides, live trapping, confining wires or nets, etc. Herbicide applications must be conducted in accordance with all State/Federal application laws and regulations and accepted by the Corps/DEQ.

16. If the performance criteria outlined above are not met at any time during the monitoring period, the permittee must provide the Corps/DEQ with a proposal detailing corrective actions and/or maintenance actions proposed (if any) and an implementation schedule for those actions. The permittee shall implement the necessary corrective measures following review and approval/modification of those measures by the Corps/DEQ. Upon completion of the corrective measures, the permittee shall provide a written summary of the work to the Corps/DEQ. Additional remedial actions may be required if the corrective measures do not result in satisfaction of performance criteria during the next subsequent growing season. Should the permittee fail to take corrective action, the Corps/DEQ may use the performance bond to fund the corrective actions or require alternative compensatory mitigation.

17. Monitoring reports are required. See Section IV Compensation Site Monitoring, below. Monitoring reports should show that minimum requirements of special conditions and project plan have been met. The Corps/DEQ should receive these reports no later than November 30 of the monitoring year. Monitoring reports must be reviewed and the permittee provided comments within 90 days of submittal or the monitoring plans may be considered approved.

18. A pre-construction meeting between the Corps/DEQ project manager, the contractor/sub-contractors, and equipment operators responsible for mitigation site preparation shall be held. The purpose of this meeting is to review the mitigation plans, including staging of site preparation; identify areas to be avoided, handling of topsoil, etc. You should contact _____ at (____) ___-_____ to schedule this meeting.
(This condition is important for large or complex restoration/creation sites, especially those involving extensive grading or earthwork and those with adjacent wetland resources that could be inadvertently impacted by restoration/creation activities. However, it may be deemed unnecessary by the project manager.)

19. The permittee will schedule a post-construction (post-grading) meeting to be attended by the Corps/DEQ project. This meeting should take place after submittal of as-built plans. Any difficulties in construction will be identified during this meeting. Any apparent problems will be corrected following the meeting.
(See comments under condition 18 above.)

20. A wetland professional, provided by the permittee must conduct inspections at key milestones (i.e. grading, arrival of plant materials, during planting, etc.). Said wetland professional must also conduct at least weekly inspections of the mitigation site during construction to ensure that construction complies with plan design. It is recommended that this wetland professional remain on site throughout wetland construction operations. The name and contact information (telephone number, e mail address, etc.) for this designated wetland professional shall be provided to the Corps/DEQ prior to commencement of work on the mitigation site. Any deviations in the plan (excluding items such as plant substitutions, changing the orientation or location of features or structures provided these changes do not affect site hydrology, etc.) shall be coordinated with and approved by the Corps/DEQ project manager prior to implementation.
(See comments under condition 17 above.)

21. The permittee shall assume all liability for accomplishing corrective work for any action permitted by the Corps or DEQ, should the Corps/DEQ determine that the compensatory mitigation has not been completed satisfactorily. Remedial work may include regrading and/or replanting the mitigation site. This responsibility shall extend for a period of ___ years beginning upon completion of mitigation site construction.

(The permittee is responsible for the success of the compensatory mitigation, unless the permittee relies upon an approved mitigation bank or in-lieu fee mitigation as compensatory mitigation for a given permit. Typically monitoring for 6 years over the course of a 10-year period [typically years 1, 2, 3, 5, 7, and 10] is recommended for forested wetland restoration and forested wetland creation. This is because of the difficulty in ensuring that wetland hydrology is maintained as transpiration from the site increases as woody species attain scrub-shrub and/or sapling stage.)

22. The permittee shall be required to identify a reference wetland to be used for monitoring the success or failure of the mitigation plan. The reference wetland shall be accepted by the Corps/DEQ and shall not be subject to any alterations during the monitoring period. Baseline data concerning vegetation, soils, and hydrology shall be provided to the Corps/DEQ. The elevation of all wells in reference wetlands shall be surveyed.

(Reference wetlands are useful for restoration sites where the permittee is seeking to duplicate nearby soil, hydrology and/or vegetation conditions. Reference wetlands may not be useful when wetland creation is attempted in landscape positions where wetlands did not occur.)

23. The final monitoring report shall include an assessment of the condition of the mitigation site following completion of mitigation site monitoring. To ensure an objective evaluation, the Corps and/or DEQ may require an independent post-construction assessment. The assessment should include:

1) Summary of the original or modified mitigation goals and a discussion of the level of goal attainment.

2) Characterization of the planned wetlands including Cowardin classification, physiographic province, hydrologic regime and hydroperiod.

3) An assessment (quantitative or qualitative) of functions and values performed by the site (HEP, HGM, EPW, New England Highway Methodology, or Best Professional Judgement.).

4) A calculation of the area of wetlands on site using the Corps 1987 Wetland Manual; a scale drawing of wetland boundaries; and supporting data sheets.

5) A comparison of the area and extent of delineated wetlands in the mitigation area and extent of wetlands required in the mitigation plan (i.e. post construction survey).

6) Photographs of the mitigation site taken from the same locations as the monitoring photographs.

7) A description of any significant problems and any solutions during construction and monitoring of the mitigation site.

8) Identification of agency policies and procedures that encumbered implementation of the mitigation plan. Note should be made of any policies or procedures that contributed to less success or effectiveness than anticipated.

9) Recommendations of measures to improve efficiency, reduce cost, or improve effectiveness of future projects.

(This is more than a compliance report; it is an evaluation of the success of the mitigation site. It includes an assessment of problems encountered and how those problems were addressed. It also identifies agency policies & procedures that may have complicated mitigation efforts. This assessment may not be necessary for small mitigation sites and those sites where success is certain. It may be especially important for mitigation sites larger than 1 acre in size or unique or unusual mitigation sites.)

IV Monitoring Report Criteria – Monitoring reports provided by the permittee are critical in evaluating the success of a mitigation site. It is often impossible for representatives of the Corps or DEQ to conduct repeated site evaluations of every compensatory mitigation site. Monitoring reports provide information on the development of the mitigation site that cannot be obtained from a single site visit. The level of complexity and detail in a monitoring plan depends upon the project. For some small restoration/creation projects photographic documentation of site conditions from permanent points and a brief narrative may be sufficient. For larger restoration/creation projects or those with multiple planned communities or those with complex hydrologic requirements monitoring reports may be more comprehensive and include documentation of the condition of soils, vegetation, and hydrologic regimes on site. For wetlands constructed for water quality improvement, documentation of improvement (or adherence to design standards) may be required

The conditions below may be incorporated into permits on a case-by-case basis. It may be necessary to modify, drop, or even to create additional measures to address site-specific conditions.

1. Reports shall be required for the first five years following the end of the first growing season after planting herbaceous/tidal wetlands. For planned forested wetlands, reports shall be required for six of the first ten years following the end of the first growing season after planting (e.g. 1, 2, 3, 5, 7, & 10).

(Herbaceous wetlands should be well established in terms of hydrologic and vegetation conditions within 5 years. Within 10 years, it should be apparent whether a forested wetland community may develop on a site. Under some circumstances, [such as sustained attainment of performance criteria] the Corps and DEQ may agree to drop the requirement for monitoring of 1 or more wetland criteria over all or part of a mitigation site.)

2. At a minimum, mitigation site data should be collected during the killing frost-free period as defined in the local soil survey. Vegetation data may be collected anytime between the spring and fall. At a minimum, hydrologic data should be collected early in the growing season (i.e. late February to June). Reports may be prepared between **June 1 and November 1.** The report will indicate dates at which all information in the report was collected.

(It may be necessary to adjust the dates for collection of vegetation data in order to address site-specific conditions such as identification/detection of plantings.)

3. Each report shall include:

a. Wetland boundaries plotted on the site plan based on results of hydrology and vegetation data, and calculation of total wetland acreage based on that boundary.

b. Photographs showing a view of the wetland area taken from fixed-point stations from a height of approximately five to six feet from each monitoring well. We recommend that photos be taken in each of the four cardinal directions (north, east, south, and west). Permanent markers shall be established to ensure that the same locations on the site are monitored in each monitoring period; fewer photos may be provided if as an alternative, an aerial photo is provided as described in 3. c. below.

c. One true color or infrared aerial photograph (8" x 10" or larger) depicting the entire site. An aerial photograph should be taken during the growing season and once the site has been graded, planted, and stabilized (preferably in the 3rd or 5th year following final grading).

d. Hydrologic information, including both raw data and a hydrograph established using these data for the mitigation and reference area(s).

i. Groundwater data (The permittee's plans for well design and installation shall be consistent with current Corps guidance [such as Sprecher 2000 http://www.wes.army.mil/el/wrap/pdf/tnwrap00-2.pdf] and must be accepted by the Corps/DEQ prior to installation):

The number of groundwater wells should be based on the acreage of each type of planned wetland on a given site (palustrine emergent, palustrine forest, etc.). Wells in a given wetland cover type should be placed at roughly the same elevation to provide more detailed data for different wetland types or landscape positions. (This may not be practical in a site with an elevation gradient within one community type) The minimum numbers of monitoring wells, based upon design acreage, are:

- <10.0 acres: 1 monitoring well / 1.0 acre (rounded to the next whole acre); every site should have a minimum of 3 monitoring wells.
- 10.0 acres to 20.0 acres: 1 monitoring well / 1.0 acre (rounded to the next whole acre) for the first 10.0 acres, then 1 monitoring well / 2.0 acres for the remaining acreage.
- >20.0 acres: 1 monitoring well / 1.0 acre (rounded to the next whole acre) for the first 10.0 acres, then 1 monitoring well /2.0 acres for the next 10 acres and 1 monitoring well/ 5.0 acres for the remaining acreage.
- For sites larger than 100 acres, the maximum number of monitoring wells should be left to the discretion of the Corps/DEQ project manager, after considering input from the permittee.

Every site using groundwater wells should have at least 3 wells to evaluate static groundwater levels on site. Installation of a well at or above the planned wetland/upland interface is recommended to facilitate delineation of the actual wetland boundary. This is particularly important in site with little topographic relief or relatively flat topographic gradient. Additional wells may be necessary when the mitigation plan identifies a number of wetland zones or areas with different intended hydrologic regimes. Monitoring wells should be calibrated against test pits. Nested piezometers may be needed if the planned wetland relies upon determination of groundwater movement and/or vertical gradients.

(*Distinct differences in reading between adjacent wells may indicate faulty installation of one or more wells*.)

- The wells will be monitored weekly for ten consecutive weeks beginning at the initiation of the region's growing season (see Condition 14 a above for definition of growing season for the region). For sites designed to be seasonally or temporarily saturated, at least one full year of monthly data (taken every two weeks except for the first ten weeks of the growing season) is recommended. Well data should be correlated to precipitation data over the same period. This can help identify and address overly compacted soils, perched water tables, etc.

- Invert elevations of the wells (bottom of the wells) and surface elevations beside each well are required, particularly for problematic wetland restoration/creation sites. Well locations should be accurately mapped (including survey located or use of GPS).

ii. Surface water depths observed during well monitoring will be reported. Riverine wetland mitigation sites (or sites subject to over bank flooding) should utilize a mechanism for recording stream stage data. The use of a data logger and transducer or graduated staff gauge is recommended particularly for complex or problematic sites.

e. Vegetation data for the mitigation and reference area(s). Sample plots for herbaceous and woody vegetation sampling should be selected randomly using the following guidelines:

If the site is < 5 acres, then a minimum of 3 plots/acre is necessary

If the site is > 5 acres but less than 20 acres, then a minimum of 3 plots/acre is required for the first 5 acres, then 2 plots/acre is required for the remaining acreage.

If the site is > 20 acres, a minimum of 2 plots/acre is required for the first 20 acres (or equivalent), then 1 plot/acre is required for the remaining acreage.

A targeted vegetation monitoring approach that correlates monitoring stations with vegetative signatures on aerial photography may be useful for larger mitigation sites.

i. For woody plants, density (stem) counts by species are recommended. We recommend a plot with a 30-foot radius or 20 feet by 20 feet square. Belt transects or other accepted methodologies (such as line intercept methods) may be used in lieu of plots, but should be identified prior to conducting sampling and accepted by the Corps/DEQ. *For example, the line intercept method conducted in a wetland planted on 15-foot centers could yield skewed data*.

If vegetation establishment was based upon planting of bare root stock, cuttings, containerized, or ball and burlap material, specify survival of planted materials in each field, cell, or zone in the mitigation site. Describe each species in terms of health and vigor of surviving plantings. What is the prognosis for survival? Diagnose (if possible) the cause(s) of mortality.

ii. For herbaceous plants, measurements of percent cover are recommended. As an alternative that may entail fewer sampling points, a species-area curve could be generated from the species list collected from sample plot data. Recommended plot size is 18-inch radius or 40 inches by 40 inches square. Transects or other accepted methodologies (such as line intercept methods) can also be used in lieu of plots.

In the case of planned herbaceous wetlands (low marsh, freshwater tidal marshes, etc.) estimate the survival of planted materials in each cell or zone in the mitigation site. As an alternative, estimate the percent cover of the planted species. Describe each species in terms of health and vigor of the individuals. What is the prognosis for survival? Diagnose (if possible) the cause(s) of mortality.

iii. Identify zone(s) where each sample plot is located.

e. Soil data must be collected for the mitigation and reference area(s) following the third year of monitoring. A comparison of year three soil features with pre and post construction soil features will allow one to determine whether the redoximorphic features are relicts or associated with active processes. This information will be used to determine whether hydric soil conditions are present or whether the soils are becoming progressively "more hydric" with time. At a minimum, within 30 feet of each well site, the soil shall be profiled and classified as hydric or not using both the Corps 1987 Wetland Manual and the NTCHS Field Indicators of Hydric Soils.

f. Identify any invasion by species that may be undesirable at the site such as *Phragmites*, purple loosestrife, cattails, reed canary grass, fescue or animal species such as Canada geese, deer, and rodents, including beaver. Quantify the extent of invasion of undesirable plants; either by stem counts or percent cover, whichever is appropriate. Describe and/or quantify damage done by animal species. Specify percent cover of invasive species for each field or cell in the mitigation site.

g. Wildlife observations, recording actual use of wildlife. For casual observations, record the date of observation, number of individuals, presence of juveniles, and use of the site for each animal observation. A list of wildlife species using the site and the nature of that use (breeding, foraging, etc.) may be sufficient.

h. Describe remedial actions conducted since the last monitoring report (modification, relocation of water control structures, control of invasives, grading, soil amendments, deep ripping or chisel plowing of soils, additional planting, etc.).

(Each of the items above is intended to provide adequate information for the Corps/DEQ to determine whether the mitigation site complies with permit conditions and may be considered to be successful compensatory mitigation

Determination of success for a specific mitigation project depends upon the specific project objectives. For instance, a successful seasonally saturated forested wetland with a substantial oak component would satisfy all 3 wetland criteria by the final monitoring interval, exhibit seasonal saturation, and have a vigorous component of oak species. For wetlands constructed for water quality improvement, documentation of water quality improvement [reduction in BOD, TSS, ammonia, etc.] may be needed).

V Mitigation Site Compliance

This Mitigation Site Compliance Data form may be useful to regulators in evaluating compliance of mitigation sites with associated permits.

Wetland Mitigation Compliance Site Inspection Data Sheet

Permittee:_____ Permit Number:_____
Locality:_____ Date Issued:_____
USGS QUAD:_____ HUC:_____
Inspection Date:_____ Corps/DEQ Project Manager:_____

Weather conditions preceding and at time of site visit:_____
_____

Impacted Area

Waterway:_____ Dominant Plant Species:
Cowardin Classification:_____ _____
Authorized Impacts: _____acres _____
Hydrologic Source:_____ _____
_____

Description of the impacted area(s):_____
_____

Mitigation Area

Acreage required:_____ acres; Observed acreage created/restored_____ acres (if available)
Date restoration/creation started:_____On-site:__ Off-site:__ Date Completed:_____
Locality of compensation area(s):_____ Lat/Long of each:_____
Distance from impacted areas:_____ miles
Previous review dates:_____ Previous reports submitted:_____
Stated Mitigation Goals:_____
_____

Hydrology

Source:_____ Type of water control structures used:_____
Were monitoring wells installed? __yes __no If so, number____ & type:_____
Site hydrology: Ponding: ____inches: How much of site is ponded _____%
How much of site is saturated within 12 inches of the surface _____%
Hydrology indicators present: Water marks__ Drift Lines___
Drainage patterns__ Sediment deposits__ Water stained leaves__
Oxidized root channels__ Other_____
Well data available: __yes __no
Conclusions:_____
_____

How much of the site meets permit requirements for hydrology? _____% What if anything needs to be done to correct the situation?

_____

Vegetation

Treatment: Planted__ Natural revegetation__ Seeded__ Combination__

Required Plantings

Dominant Species	Strata	Required % Survival	% Coverage
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Assessment of Vegetation

Dominant Species	Strata	% Survival	% Coverage	% of growth since previous review
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Volunteer Species	Strata	% Survival	% Coverage	% of growth since previous review
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Presence of Invasive Species: __yes __no

Species	% of mitigation site affected
_____	_____
_____	_____

Has invasive species control been implemented? __yes __no
If so, what are your recommendations:_____
_____

Does site meet permit requirements for vegetation: __yes __no, if not, what needs to be done?_____

Soils

Soil Series:_____
Was the soil treatment installed per the permit requirements? __yes __no
If no, what corrections need to be made?_____
_____

Is the soil surface treated? Is the soil surface new (undeveloped structure)? _____
_____

Soil amendments: __yes __no

Describe the soil profile

Depth	Horizon	Matrix Color	Redox Feature Color	Redox Feature Abundance

Field Indicators of Hydric Soils present: ___ yes ___ no
Describe: _____
Redoximorphic features present: __yes __no Describe:_____
_____
Does site meet permit requirements for soils: __yes __no, if not, what needs to be done?_____
_____

<u>Other Permit Conditions Met:</u>

Coarse Woody Debris __yes __no Mulch/leaf litter __yes __no

Microtopography: __yes __no

Wildlife Use
List species and describe observations (sightings, tracks, scat, etc.)
_____
_____

Findings

Does the compensation site satisfy the performance standards contained in the permit conditions? __yes __no

If less than 100% of the mitigation site satisfies the permit requirements, what corrective measures need to be taken to achieve permit compliance?_____

EXAMPLES OF PERFORMANCE BOND CALCULATIONS:

EXAMPLE #1: Require a Bond Estimate as part of the plans (simple example - more detail needed for real project);

ITEM	AMOUNT
Land cost	80,000
Design	25,000
Earthwork	500,000
Planting	150,000
Monitoring	25,000
Maintenance	25,000
Subtotal	**805,000**
Contingency (20%)	161,000
COE Admin. (10%)	80,500
Total Bond	**$1,465000**

Scenario #1: If applicant impacts wetlands prior to mitigation design and construction, applicant posts bond of $1,046,500 with requirement to commence grading prior to ____ years after bond posting (otherwise he loses bond).

Scenario #2: If applicant constructs earthwork and submits certified survey, bond is reduced by $525,000 (i.e., Design & Earthwork), for a bond amount of $465,000.

Scenario #3: Mitigation was built and monitored for three years (all successful). Thus the bond amount is now reduced to 2/5ths of the monitoring, contingency and COE administration costs (40% x $266,500) or $106,600.

EXAMPLE #2:

Minimal Requirements:

Land
Design
Limits of Disturbance and Survey, and Groundwater Well Installation
Sediment Control
Grading and Soil Amendments (if not backfilled with organic topsoil)
Regrading Contingency Cost (+ 30% Original Grading Cost)
Planting Costs
Replanting Costs (+30% Original Planting Cost)
Competition Control
As Built Survey
Environmental Consultant Supervision and Monitoring (5 years)
Land Acquisition and/or Conservation Easement Acquisition Cost (If not already acquired by the applicant)
Corps Administrative Costs (10% of the Total Estimated Costs)

EXAMPLE OF RESTRICTIVE COVENANT:

DECLARATION OF RESTRICTIONS
OF

_____
(Owner)
_____ , VIRGINIA

THIS DECLARATION OF RESTRICTION COVENANTS, is made this _____day of _____, 2003, by _____, Owner.

WHEREAS, (_____) is the owner of the Property more fully described on Exhibit A attached hereto; it being the same property conveyed to _____, by deed from _____, dated _____, and duly recorded in the Clerk's Office of the _____ of _____ in Deed Book ____, at page ____).

WHEREAS, (_____) desires to impose on said Property restrictive covenants expressing (_____) 's intent to preserve _____acres of said property as shown on Exhibit B and as described as _____ (e.g. "wetlands subject to restrictive covenants") in perpetuity in its natural state as detailed below. The Owner imposes these covenants freely and voluntarily, in order to assure that the aquatic impacts pursuant to permit #_____ shall be minimal.

NOW THEREFORE THIS DECLARATION WITNESSETH: (_____) does hereby declare, covenant and agree, for itself and its successors and assigns, that said Property described as _____ shown on Exhibit B shall be hereafter held, leased, transferred, and sold subject to the following conditions and restrictions which shall run with the land and be binding on all parties and persons claiming under them.

Covenants and Restrictions.

The Property described as _____ shown on Exhibit B attached hereto shall be preserved in perpetuity in its natural state, by prohibiting the following activities:

1. Destruction or alteration of the preservation area shown on Exhibit B other than those alterations authorized by the Norfolk District, U.S. Army Corps of Engineers (USACE) and/or the Virginia Department of Environmental Quality (DEQ) under Permit Number _____;

2. Construction, maintenance or placement of any structures or fills including but not limited to buildings, mobile homes, other than those which currently exist. *(OPTIONAL EXCEPTION: However, boardwalks, wildlife management structures, observation decks, one informative sign, and unpaved foot trails may be placed within the preservation area provided that any such structure permits the natural movement of water and preserves the natural contour of the ground and subject to prior written approval by the USACE);*

3. Ditching, draining, diking, damming, filling, excavating, grading, plowing, flooding/ponding, mining, drilling, placing of trash and yard debris or removing/adding topsoil, sand, or other

materials (except as may be necessary on a case-by-case basis with prior written approval by USACE);

4. Permitting livestock to graze inhabit or otherwise enter the preservation area.

5. Cultivating, harvesting, cutting, logging, planting, and pruning of trees and plants, or using fertilizers and spraying with biocides (except as may be necessary on a case-by-case basis with prior approval by USACE);

Amendment

The covenants contained herein shall not hereafter be altered in any respect without the express written approval and consent of the Owner or its successor in interest and the USACE and DEQ. The Owner or its successor may apply to the USACE and DEQ for vacation or modification of this declaration; however, after recording, these restrictive covenants may only be amended or vacated by a recorded document signed by the USACE and DEQ and the Owner or its successor in interest.

Compliance Inspections and Enforcement

The USACE, DEQ, and its authorized agents shall have the right to enter and go upon the Property to inspect the Property and take actions necessary to verify compliance with these restrictive covenants. The restrictive covenants herein shall be enforceable by any proceeding at law or in equity or administrative proceeding by the USACE or DEQ, *[or any owner of a lot within the _____subdivision]*. Failure by any agency (or owner) to enforce any covenant or restriction contained herein shall in no event be deemed a waiver of the right to do so thereafter.

Separability Provision

The provisions hereof shall be deemed individual and severable and the invalidity or partial invalidity or unenforceability of any one provision or any portion thereof shall not affect the validity or enforceability of any other provision thereof.

Consent of Lender and Trustee (if applicable)

Owner is the maker of a note dated_____, secured by, among other things, a deed of trust dated _____, from Owner to _____, as trustee, recorded in the Clerk's office at Deed Book_____, Page ____. For the benefit of _____Bank (the "Deed of Trust"), _____, trustee joins herein for the sole purpose of subordinating the lien, dignity and priority of the Deed of Trust to these restrictive covenants. _____Bank joins herein for the sole purpose of consenting to trustee's action.

WITNESS the following signature the day and year first above written.

[_____]
BY: Its General Partner

BY: _____

TITLE: _____

Commonwealth of Virginia, City of _____, to wit:

I, _____, a notary public for the state and city aforesaid, do certify that [Name] [Title] whose name was signed on _____, 20__ in his capacity on that date to the foregoing document has acknowledged said document and signature before me in the city aforesaid.

Given under my hand and notarial seal this _____ day of _____, 20__.

_____
Notary Public

My commission expires _____.

Signature block for Bank and Trustee, if applicable.

Exhibit A

Legal description of property.

Exhibit B

Plat Map and /or Legal description of preserved area. If the Plat is oversized, it will be recorded separately. Exhibit B should contain a description that includes the reference to the Plat Book and Page number where the plat is recorded.

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These mitigation recommendations were approved by:

7/12/04
Date

J. Robert Hume, III
Chief, Regulatory Branch
Norfolk District Corps of Engineers

7/12/04
Date

Ellen Gilinsky, PhD., PWS
Director; Office of Wetlands, Water Protection and Compliance
Department of Environmental Quality