

**U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
REGULATORY DIVISION**

**INTRODUCTION:
PERFORMANCE GUIDELINES AND SUPPLEMENTAL INFORMATION
ON THE
CHECKLIST FOR REVIEW OF MITIGATION PLAN
(Subject to periodic revision)**

GENERAL

Applicants should contact the Corps prior to initiation of site selection and mitigation plan development as mitigation requirements are project-specific. Applicants should also ensure that the mitigation plan is done in accordance with the most recent Corps checklist. However, the checklist is a guidance document, not policy. This document and the associated checklist are for use when the Corps determines mitigation is appropriate for a particular project.

The purpose of this document is twofold:

- 1) to provide a format for Corps Environmental Resource Section staff to use in reviewing mitigation plans as a means of providing technical assistance to the Corps Project Manager, and
- 2) to provide guidance to the regulated community on the requirements for mitigation plans for mitigation required by the Corps of Engineers, New England District.

It is important to note that there is some flexibility in the document. For example, it is not designed to be specific to tidal wetland creations and would therefore need to be modified for such situations. When modifications are needed, the plan should so state and should explain the rationale (which may be very simple). We acknowledge that absolutes are rare in mitigation design and that a successful site requires careful design and review and common sense oversight during construction by a person well versed in wetland science.

The items on the checklist should be included in the mitigation plan or there should be an explanation as to why something is not appropriate to include. After Corps review, items not marked with OK, N/A (Not Applicable), or NONE need to be addressed. A sample table to cross-reference the checklist and a mitigation plan is included below as Table 3.

Occasionally there are conflicting requirements between the Corps and state and/or local agencies. Notify the Corps that this is the situation and every effort will be made to avoid duplication of effort. Normally, use of the most rigorous standard will be acceptable to both/all agencies although the Corps prefers not to receive more than one monitoring report per project per year.

The  used throughout the checklist indicates text which should typically be part of the mitigation plan.

Plans should be on 8 ½ x 11" sheets. Large size sheets may be acceptable, and in some cases encouraged for clarity, but only as a supplement to the letter-sized sheets.

DEFINITIONS

These definitions were developed for use with this document. We recognize that somewhat different definitions may exist for some of these terms in other documents.

Mitigation in relation to S.404: Sequencing from avoidance to minimization to, finally, compensation.

Compensatory mitigation: created, restored, enhanced wetlands and preserved wetlands and/or uplands.

Wetlands creation: The transformation of upland to wetland at a site where upland was not created by human activity.

Wetlands restoration: returning a former wetland area, which had been filled or drained so that it no longer qualifies as a wetland, to wetland conditions.

Wetlands enhancement: restoring degraded FUNCTIONS of an existing wetland. Degradation may result from infestation by invasive species, filling but not to the point of creating upland, deliberate removal of woody species (flooding and subsequent demise of trees as a result of beaver activity is not degradation), partial draining, etc.

Invasive species: native and non-native species which aggressively move into areas, especially those that are disturbed.

Exotic species: Species not native to New England, and usually not native to North America.

Wetland scientist: The applicant should work with the Corps Project Manager to determine the appropriate expertise for the “wetland scientist” needed to oversee a particular project.

TEMPORAL LOSSES

Applicants should be aware that, when compensation is to offset the loss of scrub-shrub and/or forested wetlands, additional compensation will typically be required to offset temporal losses. Similarly, when compensation will occur after project construction, additional compensation will typically be required. Such compensation may be increased area for wetland creation, restoration, or enhancement or it may be solely additional preservation.

DATA PRESENTATION

Use of charts and/or tables to present data, such as for impact and mitigation areas, is encouraged as it is often the most concise method of conveying information and makes comparison easier. The attached Tables 1 and 2 are examples of useful presentations of data.

MONITORING WELLS

Note that monitoring wells may not be necessary if other data are adequate. Please discuss this issue with Corps staff prior to installation.

Many mitigation plans include monitoring well data. Note that there is an important difference between monitoring wells and piezometers, both of which provide useful information. Details on the uses for and installation of both of these types of wells are available in a document prepared by the Waterways Experiment Station entitled, “Installing Monitoring Wells/Piezometers in Wetlands”, WRP Technical Note HY-IA-3.1 dated August 1993. It can be found at: <http://www.wes.army.mil/el/wrap/pdf/tnwrap00-2.pdf>.

SOILS

Manmade topsoil shall consist of a mixture of equal volumes of organic and mineral materials. Clean leaf compost is the preferred soil amendment to achieve these standards. If other soil amendments are more readily available than clean leaf compost they can be used to meet the requirement for the appropriate percent organic carbon content (see item D.3 on the checklist). Note, however, that compost or other organic matter should be clean and free of weed seeds, specifically the seeds of the species listed below under “Vegetation”.

It is important to keep in mind the difference between organic *matter* and organic *carbon* both for meeting regulatory guidelines and when classifying the

surface horizons in soils as histic (organic soils), mucky modified or mineral. The organic *carbon* content of most upland topsoil is between 1 and 6 percent of dry weight. Soils with more than 20 to 30 percent organic *carbon* are known as organic soils or Histosols. The Field Indicators for Identifying Hydric Soils in New England (New England Hydric Soils Technical Committee, 1998, 2nd ed.) glossary defines the criteria for these classifications based on their organic *carbon* contents. This checklist requires a 4-12%, minimum organic *carbon* content on a dry weight basis for soils in wetland replication areas. The rule of thumb for conversion is to divide organic *matter* by 1.72 to get organic *carbon* content and multiply organic *carbon* by 1.72 to get organic *matter* content¹.

VEGETATION

Irrigation:

The use of irrigation for woody plantings should be considered for the first one to two years after planting due to the unpredictability of short-term local hydrologic conditions and the need for additional care to establish new plantings. Note that irrigation is solely to enhance the success of vegetation establishment, not to provide hydrology. Equipment (e.g., pipes, pumps, sprinklers) must be removed and irrigation discontinued no later than the end of the second growing season unless the Corps concurs with extended irrigation. In this situation, the monitoring period shall be extended an equivalent time period.

The irrigation is typically the responsibility of the landscape contractor.

Two methodologies have been used successfully: water trucks and installation of irrigation systems. The former is limited to accessibility for the truck(s), a likely problem on large sites. The latter tends to be less expensive and more effective for large projects.

Use of Mulch:

The use of mulch around woody plantings is strongly encouraged, and may be required, to reduce the need for irrigation and to keep down herbaceous vegetation in the immediate vicinity of each plant for a couple of years. Note that the mulch should not be considered part of the organic content of the topsoil.

Mulch balled and burlap or container-grown trees and shrubs in a 3' diameter circle approximately 2" deep.

Mulch bare-root woody planting in an 18" diameter circle approximately 2" deep.

¹ Excerpted from Allen, Art, "Organic Matters", *AMWS Newsletter*, December 2001.

Woody planting densities may require adjustment depending upon the goals of the mitigation plan and the 'reference wetland' desired. For example, if the primary goal for a particular creation site is flood storage and there is minimal need for wildlife habitat but there is interest for a in developing a woody component in the flood storage area, the density may be reduced. Also, if the wetland type desired is a dense thicket, the density may need to be increased.

Non-native Species:

Although the use of non-native species is typically discouraged, there are situations where such use may be appropriate such as using *Secale cereale* (Annual Rye) to quickly stabilize a site. The species should be noted and the reason for their use explained.

The following species are not to be included as seed or planting stock in the overall project.² These species do not need to be actively removed from the site unless specified:

Invasive Plant Species³:

a. Herbs:

| | |
|------------------------------------|---------------------------|
| <i>Aegopodium podagraria</i> | Goutweed or Bishop's weed |
| <i>Aira caryophylla</i> | Silver hairgrass |
| <i>Alliaria petiolata</i> | Garlic mustard |
| <i>Allium vineale</i> | Field garlic |
| <i>Ampelopsis brevipedunculata</i> | Porcelain berry |
| <i>Anthoxanthum odoratum</i> | Sweet vernal grass |
| <i>Anthriscus sylvestris</i> | Chervil |
| <i>Arctium minus</i> | Common burdock |
| <i>Asparagus officinalis</i> | Asparagus |
| <i>Barbarea vulgaris</i> | Yellow rocket |
| <i>Butomus umbellatus</i> | Flowering rush |
| <i>Cabomba caroliniana</i> | Fanwort |
| <i>Callitriche stagnalis</i> | Water-starwort |
| <i>Calystegia sepium</i> | Japanese bindweed |
| <i>Cardamine impatiens</i> | Bushy rock-cress |
| <i>Cardamine pratensis</i> | Cuckoo-flower |
| <i>Centaurea biebersteinii</i> | Spotted knapweed |
| <i>Cirsium arvense</i> | Canada-thistle |

² This list is a compilation of state lists from New England and additional species recommended by regional botanical experts.

³ Scientific names are those used in Gleason, Henry and A. Cronquist, Manual of Vascular Plants of Northeastern United States and Adjacent Canada: Second Edition, The New York Botanical Garden: New York, 1991.

| | |
|---|------------------------------------|
| <i>Commelina communis</i> | Asiatic day-flower |
| <i>Coronilla varia</i> | Crown vetch |
| <i>Cyperus esculentus</i> | Yellow nutsedge |
| <i>Dactylis glomerata</i> | Orchard-grass |
| <i>Echinochloa crusgalli</i> | Barnyard grass |
| <i>Egeria densa</i> | Giant waterweed |
| <i>Eleusine indica</i> | Goosegrass |
| <i>Elsholtzia ciliata</i> | Elsholtzia |
| <i>Elytrigia repens</i> | Quack-grass |
| <i>Epilobium hirsutum</i> | Hairy willow-herb |
| <i>Euphorbia cyparissias</i> | Cypress spurge |
| <i>Euphorbia esula</i> | Leafy spurge |
| <i>Festuca filiformia</i> | Hair fescue |
| <i>Festuca ovina</i> | Sheep fescue |
| <i>Geranium nepalense</i> (<i>G. sibericum</i>) | Nepalese crane's-bill |
| <i>Glaucium flavum</i> | Sea- or horned poppy |
| <i>Glechoma hederacea</i> | Gill-over-the-ground |
| <i>Glyceria maxima</i> | Sweet reedgrass |
| <i>Hemerocallis fulva</i> | Tiger-lily |
| <i>Heracleum mantegazzianum</i> | Giant hogweed |
| <i>Hesperis matronalis</i> | Dame's rocket |
| <i>Hydrilla verticillata</i> | Hydrilla |
| <i>Hydrocharis morsus-ranae</i> | European frog-bit |
| <i>Hylotelephium telephium</i> (<i>Sedum telephium</i>) | Live-forever or Orpine |
| <i>Hypericum perforatum</i> | St. John's wort |
| <i>Iris pseudacorus</i> | Yellow iris |
| <i>Kochia scoparia</i> | Summer cypress |
| <i>Lamium</i> spp. (all) | Dead nettle |
| <i>Lepidium latifolium</i> | Tall pepperwort |
| <i>Lotus corniculatus</i> | Birdsfoot trefoil |
| <i>Lysimachia nummularia</i> | Moneywort |
| <i>Lysimachia vulgaris</i> | Garden loosestrife |
| <i>Lythrum salicaria</i> | Purple loosestrife |
| <i>Malva neglecta</i> | Cheeses or common malva |
| <i>Marsilea quadrifolia</i> | Water shamrock or Eu. water clover |
| <i>Mentha arvensis</i> | Field-mint |
| <i>Microstegium vimineum</i> | Japanese stilt-grass |
| <i>Miscanthus sinensis</i> | Eulalia |
| <i>Myosotis scorpioides</i> | True forget-me-not |
| <i>Myosoton aquaticum</i> | Giant chickweed |
| <i>Myriophyllum aquaticum</i> | Parrot feather |
| <i>Myriophyllum heterophyllum</i> | Variable water-milfoil |
| <i>Myriophyllum spicatum</i> | Eurasian water-milfoil |
| <i>Najas minor</i> | Lesser naiad |
| <i>Nymphoides peltata</i> | Yellow floating heart |

| | |
|--|-----------------------------------|
| <i>Ornithogalum umbellatum</i> | Star of Bethlehem |
| <i>Pastinaca sativa</i> | Wild parsnip |
| <i>Phalaris arundinacea</i> | Reed canary-grass |
| <i>Phragmites australis</i> | Reed grass, Phragmites |
| <i>Poa compressa</i> | Canada bluegrass |
| <i>Poa pratensis</i> | Kentucky bluegrass |
| <i>Poa trivialis</i> | Rough bluegrass |
| <i>Polygonum aubertii</i> | Silver lace-vine |
| <i>Polygonum cespitosum</i> | Cespitose knotweed |
| <i>Polygonum cuspidatum</i> | Japanese knotweed |
| <i>Polygonum perfoliatum</i> | Mile-a-minute vine |
| <i>Polygonum persicaria</i> | Lady's thumb |
| <i>Polygonum sachalinense</i> | Giant knotweed |
| <i>Potamogeton crispus</i> | Curly pondweed |
| <i>Puccinellia maritima</i> | Seaside alkali-grass |
| <i>Pueraria montana</i> | Kudzu |
| <i>Ranunculus ficaria</i> | Lesser celandine |
| <i>Ranunculus repens</i> | Creeping buttercup |
| <i>Rorippa nasturtium-aquaticum</i> | Watercress |
| <i>Rorippa sylvestris</i> | Creeping yellow cress |
| <i>Rumex acetosella</i> | Sheep-sorrel |
| <i>Rumex obtusifolius</i> | Bitter dock |
| <i>Setaria pumila</i> (<i>S. lutescens</i> , <i>S. glauca</i>) | Yellow foxtail or y. bristlegrass |
| <i>Solanum dulcamara</i> | Bittersweet nightshade |
| <i>Stellaria graminea</i> | Common stitchwort |
| <i>Tanacetum vulgare</i> | Tansy |
| <i>Thymus pulegioides</i> | Wild thyme |
| <i>Trapa natans</i> | Water-chestnut |
| <i>Tussilago farfara</i> | Coltsfoot |
| <i>Typha latifolia</i> ⁴ | Common or Broad-leaved cattail |
| <i>Typha angustifolia</i> ⁴ | Narrow-leaved cattail |
| <i>Verbascum thapsus</i> | Common mullein |
| <i>Vincetoxicum rossicum</i> (<i>V. nigrum</i>) | Black swallow-wort |
| <i>Xanthium strumarium</i> | Common cocklebur |

b. Woody Plants:

| | |
|----------------------------|----------------|
| <i>Acer ginnala</i> | Amur maple |
| <i>Acer platanoides</i> | Norway maple |
| <i>Acer pseudoplatanus</i> | Sycamore maple |
| <i>Actinidia arguta</i> | Kiwi vine |

⁴ *Typha* spp. are native species which provide good water quality renovation and other functions/values. However, they are aggressive colonizers which, given the opportunity, will preclude establishment of other native species. They are included in this list as species not to be planted, not because they are undesirable in an established wetland, but to provide opportunities for other species to become established. It is likely they will eventually move in without human assistance.

| | |
|--------------------------------|---------------------------------|
| <i>Ailanthus altissima</i> | Tree-of-heaven |
| <i>Berberis thunbergii</i> | Japanese barberry |
| <i>Berberis vulgaris</i> | Common barberry |
| <i>Catalpa speciosa</i> | Western catalpa |
| <i>Celastrus orbiculatus</i> | Oriental bittersweet |
| <i>Cynanchum louiseae</i> | Black swallow-wort |
| <i>Cytisus scoparius</i> | Scotch broom |
| <i>Elaeagnus angustifolia</i> | Russian olive |
| <i>Elaeagnus umbellata</i> | Autumn olive |
| <i>Euonymus alata</i> | Winged euonymus |
| <i>Euonymus fortunei</i> | Climbing euonymus |
| <i>Humulus japonicus</i> | Japanese hops |
| <i>Ligustrum obtusifolium</i> | Japanese privet |
| <i>Ligustrum vulgare</i> | Common/hedge privet |
| <i>Lonicera japonica</i> | Japanese honeysuckle |
| <i>Lonicera maackii</i> | Amur honeysuckle |
| <i>Lonicera morrowii</i> | Morrow's honeysuckle |
| <i>Lonicera tartarica</i> | Tatarian honeysuckle |
| <i>Lonicera x bella</i> | Morrow's X Tatarian honeysuckle |
| <i>Lonicera xylosteum</i> | European fly-honeysuckle |
| <i>Morus alba</i> | White mulberry |
| <i>Paulownia tomentosa</i> | Princess tree or empress tree |
| <i>Phellodendron japonicum</i> | Corktree |
| <i>Populus alba</i> | Silver poplar |
| <i>Rhamnus cathartica</i> | Common buckthorn |
| <i>Rhamnus frangula</i> | European buckthorn |
| <i>Ribes sativum</i> | Garden red currant |
| <i>Robinia pseudoacacia</i> | Black locust |
| <i>Rosa multiflora</i> | Multiflora rose |
| <i>Rosa rugosa</i> | Rugosa rose |
| <i>Rubus phoenicolasius</i> | Wineberry |
| <i>Salix purpurea</i> | Basket or purple-osier willow |
| <i>Sorbus aucuparia</i> | European mountain-ash |
| <i>Taxus cuspidata</i> | Japanese yew |
| <i>Ulmus pumila</i> | Siberian elm |
| <i>Wisteria floribunda</i> | Wisteria |

COARSE WOODY DEBRIS AND OTHER FEATURES

When mitigation requires a component of forest or scrub-shrub habitat, the design should include plans for a continuum of coarse woody debris.

When a tree dies, after growing in New England for one hundred years, it may continue to provide habitat for another century or more. The speed of the recycling processes depends on many factors, but the main point is that big

woody materials are relatively durable. They remain important ecological features both below- and aboveground for a considerably long time. Long after the last needles or leaves fall to the forest floor, a tree persists, parceling itself out in bits and pieces.

In the first years, if the plant remains upright, the greatest volume of its litter may consist of bark, twigs, and small branches. Later, as insects and fungus weaken the aerial framework, larger limbs and sections of the trunk tumble to the ground where decay occurs under quite different conditions. On the forest floor, well-decomposed logs may sustain greater faunal richness; however, in an ideal situation, there is an uninterrupted supply of woody litter in various sizes and stages of decay providing a diverse range of habitats. Decomposition is one of the natural successions in a forest. If one link of the chain is lacking, the process falters. Wetland builders should factor coarse woody debris into most habitat mitigation strategies.

Frequently the inclusion of scattered various- sized boulders, as well as woody debris is an appropriate method of increasing structure and habitat in a site. Note of caution: if not properly screened by a wetland scientist, such debris can be a source of invasive species.

Table 1
Summary of Proposed Wetland Mitigation

| MITIGATION SITE | TYPE OF MITIGATION | SIZE |
|-----------------|--|---|
| 1 | Wetland Enhancement (E), Restoration (R), and Creation (C) | E = 15,600 s.f. R = 49,560 s.f. C = 15,900 s.f. |
| 2 | Wetland Creation | 42,100 s.f. |
| 3 | Wetland Preservation (note: sites 1 and 2 to be preserved as well) | 13.5 acres |
| 3 | Upland Preservation | 6.3 acres |

Table 2
Wetland Impact Area Function-Value Summary

| Wetland Impact Area # | Area (s.f.) | Wetland Type (Cowardin) | WETLAND FUNCTIONS AND VALUES | | | | | | | | | | | | |
|-----------------------|-------------|-------------------------|------------------------------|-------------|------------------|------------------|--------|-------------|------------------|-------------|-------------|-------------|------------------|-------------|------------------|
| | | | G W R / D | F F A | S & T R | N R & T | P E | S & S | F & S H | W L H | T & E | R E C | E D / S | U / H | V Q / A |
| 1 | 31,350 | PFO1/ PSS1B | X | X | | | | | | P | | | | | X |
| 2 | 14,190 | PEM1/ PSS1B | X | P | | X | | | | X | X | | | | |
| 3 | 23,600 | PFO1 | X | | | | | | | P | | X | | | |
| 4 | 49,010 | PSS1B | X | X | | X | | | | P | | | | | X |
| 5 | 2,350 | PEM1 | | X | X | X | | | P | | X | | | | |

Table 3
 Cross-reference Between Mitigation Plan and
 New England District, U. S. Army Corps of Engineers
Checklist for Review of Mitigation Plan, 3/02 version (ERS, 2002).

| Check-list Item | Description | Relevant Section | Page Number |
|-------------------------------|--|------------------|-------------------|
| A. General Information | | | |
| 1. | One complete document | | |
| 2.a | Site location map | Figure 1 | |
| 2.b | Lat/Long | Figure 1 | |
| 3.a | Impact area - wetland acreages and stream lengths | Section A | p.2, Table 1 |
| 3.b | Impact area - wetland classes | Section A | p.3, Table 1 |
| 3.c | Impact area - wetland functions and values | Section A | p.3, Table 1 |
| 3.d | Impact area - type and purpose of work | Section A | p. 3 |
| 4.a | Mitigation area - wetland acreages at each site | Section B | p. 5, Table 2 |
| 4.b | Mitigation area - wetland classes at each site | Section B | p. 5, Table 2 |
| 4.c | Mitigation area - wetland functions and values proposed at each site | Section B | p. 6, Table 2 |
| 5. | Design Constraints | Section F | |
| 6. | Wetland scientist to monitor construction and compliance | Section F | |
| 7. | Timing of mitigation | Section F | |
| 8. | Party responsible | Section F | |
| B. Hydrology | | | |
| 1. | Seasonal depth, duration, and timing of inundation/ saturation for each zone | Section C | p. 8, Tables 3, 4 |
| 2. | Groundwater or surface water driven, substantiation | Section C | p. 8 |
| 3. | If vernal pool, evidence of adequate hydrology for at least one obligate species | Section C, G | p. 9, 23 |
| C. Grading Plan | | | |
| 1.a | Plan View - existing 2' contours, proposed wetlands 1' contours plus spot elevations | Appendix A | Figures 2-5 |
| 1.b | Plan View - microtopography max. and min. elevations and typical section(s) | Appendix A | Figures 2-5 |
| 1.c | Plan View - Scale 1"=20' to 1"=100' | Appendix A | |
| 1.d | Plan View - legible 8-1/2 x11" sheets | Appendix A | |
| 2. | Section View(s) with seasonal water level range(s) | Appendix A | Figures 2-5 |
| 3. | Other grading comments (if any) | N/A | |
| D. Topsoil | | | |
| 1. | Proposed source | Section D | p. 10 |
| 2. | 6-12" or more natural or man-made soil | Section D | p. 10 |
| 3. | Natural soil with 4-12% o.m. (specify), or amended/created soil 50-50 o.m./mineral mix | Section D | p. 12 |
| 4. | Identify subsurface soil conditions | Section A | p. 4 |
| 5. | Include specific language regarding soil source, thickness and composition | Section D | p. 11 |

| | | | |
|--|---|------|--|
| E. Planting Plan | | | |
| 1. | Use scientific names | ETC. | |
| 2. | Native and indigenous plant materials | | |
| 3. | Classify plant communities according to Cowardin et al. (1979) or similar | | |
| 4. | Plan view shows proposed locations of plantings or uniform planting areas | | |
| 5. | More than 50% in each planting zone are structural determinants for the community type, unlikely to volunteer | | |
| 6. | Where appropriate, at least 600 trees and shrubs per acre, including 400 trees in forested types | | |
| 7. | Herbaceous stock at 3' o.c. (spreading) or 2' o.c. (clumping) | | |
| 8. | Provide seed mix composition, no undesirable species | | |
| 9. | Representative cross-section(s) | | |
| 10. | Include language re: native and indigenous, no unauthorized substitutions, no invasives | | |
| 11. | Include language re: allowance for/limits on relocation due to as-built conditions | | |
| 12. | Other planting comments (if any) | | |
| F. Coarse Woody Debris | | | |
| | At least 2% coverage with various sizes and stages of decomposition | | |
| G. Erosion Controls | | | |
| | Removal of erosion control devices | | |
| H. Invasive and Noxious Species | | | |
| 1. | Discuss/assess risk of invasion | | |
| 2. | Discuss/assess regulatory and ecological constraints that influence plan to control invasives | | |
| 3. | Control plan | | |
| I. Off-Road Vehicle Use | | | |
| 1. | No use in vicinity, or control measures addressed | | |
| 2. | If ORV potential, barriers planned/access limited to prevent damage | | |
| J. Preservation | | | |
| | Include specified language | | |
| K. Monitoring Plan | | | |
| | Include specified language | | |
| L. Assessment Plan | | | |
| | Include specified language | | |
| M. Other Comments (if any) | | | |

**U.S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DISTRICT
REGULATORY DIVISION**

CHECKLIST FOR REVIEW OF MITIGATION PLAN

(Subject to periodic revision)

Project: _____ File No: _____ PM: _____
City: _____ State: _____
Plan Title, Preparer, Date: _____

TABLE OF CONTENTS

- A. General Information**
- B. Hydrology**
- C. Grading Plan**
- D. Topsoil**
- E. Planting Plan**
- F. Coarse Woody Debris and Other Features**
- G. Erosion Controls**
- H. Invasive and Noxious Species**
- I. Off-Road Vehicle Use**
- J. Preservation**
- K. Monitoring Plan**
- L. Assessment Plan**
- M. Other Comments**

A. General Information:

1. Mitigation plan is submitted as one complete document.
2. Site location:
 - a. Map - Include a map depicting the geographic relationship between the impact site(s) and the proposed mitigation site(s), and a vicinity map of greater than or equal to a scale of 1 inch equals 2,000 feet.
 - b. Latitude/Longitude of mitigation site(s) in decimal format (for GIS use).
3. Impact area:
 - a. Describe wetland acreage at each impact site and length of any streams at the impact sites.

- b. Describe wetland classes (e.g., Cowardin, et. al. - see footnote 1 on page 4, HGM, etc.) at each impact site.
 - c. Describe both site specific and landscape level wetland functions and values at each impact site. For wildlife habitat, provide indicator species for the habitat type such as forest-dwelling migratory birds or mole salamanders and/or woodfrogs for a vernal pool.
 - d. Describe type and purpose of work at each impact site.
4. Mitigation area:
- a. Describe wetland acreage proposed at each mitigation site.
 - b. Describe wetland classes proposed at each mitigation site.
 - c. Describe both site specific and landscape level functions and values proposed at each mitigation site.
5. Design Constraints - Project, landscape features, or public issues that control or otherwise influence the design of the mitigation area. (State if none.)
6. The following language is included in the narrative portion of the mitigation plan:
- ➔ A wetland scientist will be on-site to monitor construction of the wetland mitigation area(s) to ensure compliance with the mitigation plan.
7. The following language is included in the narrative portion of the mitigation plan:
- ➔ Compensatory mitigation shall be initiated within 90 days of project initiation and completed not later than the completion of the permitted project
8. The party responsible for planning, accomplishing, and maintaining the mitigation project is specified.

B. Hydrology:

- 1. The expected seasonal depth, duration, and timing of both inundation and saturation must be described for each of the proposed habitat zones in the mitigation area (particularly related to root zone of the proposed

plantings). If shallow monitoring wells are used to develop this rationale, the observations must be correlated to local soil morphologies, rooting depths, water marks or other local evidence of flooding, ponding or saturation, and reflect rainfall conditions during monitoring.

2. Plan indicates if system is groundwater or surface water (provide source, e.g., overland flow, stream or river overflow) driven and provides substantiation (e.g., well data, adjacent wetland conditions, stream gauge data, precipitation data).

3. If vernal pool creation attempts are included as part of the mitigation plan, indicates evidence that adequate hydrology will be provided to support at least one obligate vernal pool species (mole salamanders, woodfrogs, or fairy shrimp).

C. Grading Plan:

1. Plan View:

- a. Plan provides existing and proposed grading plans for mitigation area. Existing contours to at least 2' intervals. Proposed contours to 1' intervals in the wetlands portion of the mitigation with spot elevations for intermediate elevations. All other areas may have 2' contours.
- b. Where microtopographic variation is planned, the proposed maximum differences in elevation should be specified. The plan does not need to show the locations of each pit and mound as long as a typical cross-section and approximate number of pits and mounds is given for each zone.
- c. The scale should be in the range of 1"=20' to 1"=100', depending on the size of the site.
- d. All items on the plan must be legible (i.e., no smaller than a 9 font) on 8 ½ x 11" sheets. Large size sheets may be encouraged for clarity but only as a supplement to the letter-sized sheets.

2. Section View:

- Plan provides representative cross sections showing the existing and proposed grading plan, expected range of shallow groundwater table elevations or surface water level consistently expected.

3. Other - Specific staff recommendations related to grading.

D. Topsoil:

1. [] Proposed source of topsoil in mitigation area.
2. [] Six to twelve inches (specify), preferably at least 12 inches, of natural or manmade topsoil, depending on site conditions, in all wetland mitigation areas.
3. [] Natural topsoil proposed to be used for the creation/restoration/enhancement of wetlands consists of at least 4-12%, with the percentage specified, organic carbon content (by weight) (or 9-20% organic matter content). Manmade topsoil used for the creation/restoration/ enhancement of wetlands consists of a mixture of equal volumes of organic and mineral materials. This may be accomplished by adding a specific depth of organic material and disking it in to twice that depth.
4. [] Plan identifies subsurface soil conditions (sand, clay, bedrock, etc.).
5. [] The following language is included in the mitigation plan, either in the drawings or in the narrative portion of the plan:



At least [from item D.2] inches of natural or manmade topsoil shall be installed in wetland mitigation areas. Natural topsoil shall consist of at least [from item D.3] organic carbon content (or organic matter content if that is the measure proposed) by weight.

E. Planting Plan:

Planting may or may not be appropriate for a mitigation site, as determined through consultation with the Corps. When planting is proposed as part of the plan, the guidelines noted below should be followed.

1. [] Plans use scientific names.
2. [] Plant materials are native and indigenous to the area of the site(s). Native planting stock from the immediate vicinity of the project is ideal. Whenever possible, plants should be salvaged from wetlands and uplands cleared by the project. In some circumstances, local "scavenging" of wetlands may be permissible, but care is necessary to avoid jeopardizing established natural habitats or to unintentionally transplant invasive species . Be aware that state or local permits may be required to "scavenge" natural wetlands for planting stock. No cultivars shall be used.

3. [] Vegetation community types or zones are classified in accordance with Cowardin, et al. (1979)⁵ or other similar classification system.
4. [] Plan View – shows proposed locations of planted stock. This may be illustrated with areas of uniform species composition (“polygons” in GIS usage) and the number of plants or rate of seeding within the polygon. The scale should be in the range of 1”=20’ to 1”=100’, depending on the size of the site.
5. [] More than 50% of the plantings in each zone are structural determinants for the community type designated for that zone with emphasis on species unlikely to “volunteer”.
6. [] Woody stock is proposed to be planted in densities not less than 600 trees and shrubs per acre, including at least 400 trees per acre in forested cover types.
7. [] Where uniform coverage is anticipated, herbaceous stock is proposed to be planted in densities not less than the equivalent of 3 feet on center for species which spread with underground roots; 2 feet for species which form clumps.
8. [] Seed mix composition is provided. The list of species does not include any species in the attached list of invasives.
9. [] Section View – shows representative cross section plans showing vegetative community (e.g., forested, shrub swamp, etc.) zones. Show on same plan as C.2. information.
10. [] During the first few years, while the designed wetland vegetative zones become established, they are susceptible to colonization by invasive species. A number of plants are known to be especially troublesome in this regard. The following language is included in the mitigation plan, either in the plan view or in the narrative portion of the plan:

➔ To reduce the immediate threat and minimize the long-term potential of degradation, the species included on the invasive plant species list in the current Corps mitigation “Introduction: Performance Standards and Supplemental Information” are not included as planting stock in the overall project. Only plant materials native and indigenous to the region shall be used (with the exception of [specify]). Species not specified in the mitigation plan shall not be used without written approval from the Corps.

⁵ Cowardin, et. al. (1979) “Classification of wetlands and deepwater habitats of the United States,” Office of Biological Services, FWS/OBS-79/31, December 1979.

11. [] The following language is included in the mitigation plan, either in the drawings or in the narrative portion of the plan:

➔ During planting, a qualified wetland professional may relocate up to 50 percent of the plants in each community type if as-built site conditions would pose an unreasonable threat to the survival of plantings installed according to the mitigation plan. The plantings shall be relocated to locations with suitable hydrology and soils and where appropriate structural context with other plantings can be maintained.

12. [] Other - Specific staff recommendations related to planting.

F. Coarse Woody Debris and Other Features:

[] Coarse woody debris includes such materials as logs, stumps, smaller branches, and standing snags. Placement of this material is inappropriate in tidal or floodplain environments. As much as possible, these materials will be in various stages of decomposition and salvaged from natural areas cleared for the other elements of the project. The following language is included in the mitigation plan, either in the drawings or in the narrative portion of the plan:

➔ A supply of dead and dying woody debris shall cover at least 2% of the ground throughout the mitigation sites after the completion of construction of the mitigation sites. These materials should not include species shown on the attached list of invasive species.

G. Erosion Controls:

[] The following language is included in the mitigation plan, either in the drawings or in the narrative portion of the plan:

➔ Temporary devices and structures to control erosion and sedimentation in and around mitigation sites shall be properly maintained at all times. The devices and structures shall be disassembled and properly disposed of no later than November 1 three full growing seasons after planting. Sediment collected by these devices will be removed and placed upland in a manner that prevents its erosion and transport to a waterway or wetland.

H. Invasive and Noxious Species:

Projects should avoid introducing or increasing the risk of invasion by unwanted plants (such as those listed in H.3. below) or animals (such as zebra mussels). Soils disturbed by projects are very susceptible to invasion by undesirable species. Be particularly alert to the risk of invasion on

exposed mineral soils. Exposed mineral soils may result from excavation or filling. Noxious species often get a foothold along project drainage features where the dynamics of erosion and accretion prevail. Along saltmarshes, be especially alert to the project's influence on freshwater runoff. Frequently, *Phragmites australis* invasion is an unanticipated consequence of freshwater intrusion into the saltmarsh.

1. Risk -- the discussion includes an assessment of the potential for invasion of the wetland by the species listed in H.3 or other problematic species.
2. Constraints - identifies regulatory and ecological constraints that influence the design of any plan to control invasive plants and animals by biological, mechanical, or chemical measures.
3. Control Plan - describes the strategy to control, or recognize and respond to the invasion of the mitigation site by Common Reed (*Phragmites australis*) and Purple Loosestrife (*Lythrum salicaria*). Any other species identified as a problem at the site should also have a control plan. Controls may be mechanical (pulling, mowing, or excavating on-site), chemical (herbiciding), and biological (planting fast-growing trees and shrubs for shading or releasing herbivorous insects).

I. Off-Road Vehicle Use:

1. No off-road vehicle use in immediate vicinity, or if so, control measures addressed.
2. If there is a potential for off-road vehicle access at the site, the mitigation plan shows the locations of barriers placed at access points to the mitigation sites to prevent vehicles from damaging the sites.

J. Preservation:

If preservation is part of the Corps mitigation package, the following language is included:



Compensatory mitigation sites that are to be set aside for conservation, shall be protected in perpetuity from future development. Before recording this document, a draft copy of the conservation easement or deed restriction must be sent to the Corps of Engineers. Once the Corps approves this document in writing, the permittee shall execute and record it with the Registry of Deeds for the Town of _____ and the State of _____ within 180 days of the date of permit issuance. A copy of the executed and recorded document must then be sent to the Corps of Engineers within 90 days

of the date it was recorded. The conservation easement or deed restriction shall enable the site or sites to be protected in perpetuity from any future development. The conservation easement or deed restriction shall expressly allow for the creation, restoration, remediation and monitoring activities required by this permit on the site or sites. It shall prohibit all other filling, clearing and other disturbances (including vehicle access) on these sites except for activities explicitly authorized by the Corps of Engineers in these approved documents.

K. Monitoring Plan:

Once the final mitigation plan is incorporated into the permit, the permit will require full implementation of the mitigation plan, including remedial measures during the first five growing seasons to ensure success. Typically, sites proposed to be emergent-only wetlands will be monitored for five years and sites proposed to be scrub-shrub and/or forested wetlands will be monitored for five to ten years, as extended periods for monitoring may be appropriate in some cases. Unsuccessful mitigation does not, in and of itself, constitute permit non-compliance. Failure to implement the plan and remedial measures, however, does.

[] The following language is included in the narrative portion of the mitigation plan:



MONITORING

If mitigation construction is initiated in, or continues throughout the year, but is not completed by December 31 of any given year, the permittee will provide the Corps, Policy Analysis and Technical Support Branch, a letter providing the date mitigation work began and the work completed as of December 31. The letter should be sent no later than January 31 of the following year. The letter must include the Corps permit number.

For each of the first [specify] full growing seasons following construction of the mitigation site(s), the site(s) shall be monitored and monitoring reports shall be submitted to the Corps, Regulatory Division, Policy Analysis and Technical Support Branch, no later than December 15 of the year being monitored. Failure to submit monitoring reports constitutes permit non-compliance. Each report coversheet shall indicate the report number (Monitoring Report 1 of 5, for example). The reports shall answer the following four success-standard questions and shall address in narrative format the items listed after the four questions. The reports shall also include the four monitoring-report appendices listed below. The first year of monitoring

shall be the first year that the site has been through a full growing season after completion of construction and planting. For these special conditions, a growing season starts no later than May 31. However, if there are problems that need to be addressed and if the measures to correct them require prior approval from the Corps, the permittee shall contact the Corps by phone (1-800-362-4367 in MA or 1-800-343-4789 in ME, VT, NH, CT, RI) or letter as soon as the need for corrective action is discovered.

Remedial measures shall be implemented to attain the four success standards described below within [specify] growing seasons after completion of construction of the mitigation site(s). Measures requiring earth movement or changes in hydrology shall not be implemented without written approval from the Corps.

1) Does the site have at least 500 trees and shrubs per acre, of which at least 350 per acre are trees for proposed forested cover types, that are healthy and vigorous and are at least 18" tall in 75% of each planned woody zone AND at least the following number of non-exotic species including planted and volunteer species? Volunteer species should support functions consistent with the design goals. To count a species, it must be well represented on the site (e.g., at least 50 individuals of that species per acre).

| # species planted | minimum # species required (volunteer and planted) |
|-------------------|---|
| 2 | 2 |
| 3 | 3 |
| 4 | 3 |
| 5 | 4 |
| 6 | 4 |
| 7 | 5 |
| 8 | 5 |
| 9 or more | 6 |

Vegetative zones consist of areas proposed for various types of wetlands (shrub swamp, forested swamp, etc.). The performance standards for density can be assessed using either total inventory or quadrat sampling methods, depending upon the size and complexity of the site.

2) Does each mitigation site have at least 80% areal cover, excluding planned open water areas or planned bare soil areas (such as for turtle nesting), by noninvasive species? Do planned emergent areas on each mitigation site have at least 80% cover by noninvasive hydrophytes? Do planned shrub-shrub and forested cover types have at least 60%

cover by noninvasive hydrophytes, of which at least 15% are woody species? For the purpose of this success standard, invasive species of hydrophytes are:

Cattails -- *Typha latifolia*, *Typha angustifolia*, *Typha glauca*;
Common Reed -- *Phragmites australis*;
Purple Loosestrife -- *Lythrum salicaria*; and
Reed Canary Grass -- *Phalaris arundinacea*
Buckthorn – *Rhamnus frangula*.

3) Are Common Reed (*Phragmites australis*), Purple Loosestrife (*Lythrum salicaria*), Russian and Autumn Olive (*Eleagnus* spp.), Buckthorn (*Rhamnus frangula*), and/or Multiflora Rose (*Rosa multiflora*) plants at the mitigation site(s) being controlled?

4) Are all slopes, soils, substrates, and constructed features within and adjacent to the mitigation site(s) stabilized?

Items for narrative discussion:

Describe the monitoring inspections that occurred since the last report.

Soils data, commensurate with the requirements of the soils portion of the 1987 Delineation Manual New England District data form, should be collected after construction and every alternate year throughout the monitoring period. If monitoring wells or gauges were installed as part of the project, this hydrology data should be submitted annually.

Concisely describe remedial actions done during the monitoring year to meet the four success standards – actions such as removing debris, replanting, controlling invasive plant species (with biological, herbicidal, or mechanical methods), regrading the site, applying additional topsoil or soil amendments, adjusting site hydrology, etc. Also describe any other remedial actions done at each site.

Report the status of all erosion control measures on the compensation site(s). Are they in place and functioning? If temporary measures are no longer needed, have they been removed?

Give visual estimates of (1) percent vegetative cover for each mitigation site and (2) percent cover of the invasive species listed under Success Standard No. 2, above, in each mitigation site.

What fish and wildlife use the site(s) and what do they use it for (nesting, feeding, shelter, etc.)?

By species planted, describe the general health and vigor of the surviving plants, the prognosis for their future survival and a diagnosis of the cause(s) of morbidity or mortality.

What remedial measures are recommended to achieve or maintain achievement of the four success standards and otherwise improve the extent to which the mitigation site(s) replace the functions and values lost because of project impacts?

IF MITIGATION INCLUDES VERNAL POOL CREATION ATTEMPT(S):

Does the vernal pool creation attempt(s) take into account the critical need for unobstructed access to and from the pool, as well as an adequate extent of upland habitat to ensure success?

Pool(s) are monitored for obligate and facultative vernal pool species weekly for four weeks from the beginning of the vernal pool activity in the spring (will vary throughout New England) and then biweekly until the end of July for the entire monitoring period. The period of monitoring is specified. Data identify frog species, salamander genera, and the presence/absence of fairy shrimp. Macroinvertebrates can be to the order.

In addition, photographs of the pool(s) taken monthly during the pool monitoring period (March/April-July) from a set location(s) will be included. Photographs will include panoramas of surrounding habitat.

Other data required: pH and temperature of water at beginning and end of each monitoring cycle; pool depth at deepest point(s) (or state if >3') to nearest inch or centimeter; substrate of pool(s) (dead leaves, herbaceous vegetation, bare soil—organic or mineral, etc.); plant species noted in and around the perimeter of the pool(s).

If the state has a vernal pool register, the pool(s) is registered prior to the final monitoring report submission.

MONITORING-REPORT APPENDICES:

Appendix A -- A copy of this permit's mitigation special conditions and summary of the mitigation goals.

Appendix B -- An as-built planting plan showing the location and extent of the designed plant community types (e.g., shrub swamp).

Within each community type the plan shall show the species planted. This is only needed in the first monitoring report unless there are additional plantings of different species in subsequent years.

Appendix C – A vegetative species list of volunteer species in each plant community type. The volunteer species list should, at a minimum, include those that cover at least 5% of their vegetative layer.

Appendix D -- Representative photos of each mitigation site taken from the same locations for each monitoring event.

L. Assessment Plan:

[] The following language is included in the narrative portion of the mitigation plan:



ASSESSMENT

Following completion of the construction of the mitigation site(s), a post-construction assessment of the condition of the mitigation site(s) shall be performed after the first five growing seasons or by the end of the monitoring period, whichever is later. "Growing season" in this context begins no later than May 31st. To ensure objectivity, the person(s) who prepared the annual monitoring reports shall not perform this assessment without written approval from the Corps. The assessment report shall be submitted to the Corps by December 15 of the year the assessment is conducted.

The post-construction assessment shall include the four assessment appendices listed below and shall:

Summarize the original or modified mitigation goals and discuss the level of attainment of these goals at each mitigation site (include vernal pool creation if that is a component of the mitigation).

Describe significant problems and solutions during construction and maintenance (monitoring) of the mitigation site(s).

Identify agency procedures or policies that encumbered implementation of the mitigation plan. Specifically note procedures or policies that contributed to less success or less effectiveness than anticipated in the mitigation plan.

Recommend measures to improve the efficiency, reduce the cost, or improve the effectiveness of similar projects in the future.

ASSESSMENT APPENDICES:

Appendix A -- Summary of the results of a functions and values assessment of the mitigation site(s), using the same methodology used to determine the functions and values of the impacted wetlands.

Appendix B -- Calculation of the area of wetlands in each mitigation site using the 1987 Wetlands Delineation Manual (Technical Report Y-87-1). Supporting documents shall include (1) a scaled drawing showing the wetland boundaries and representative transects and (2) datasheets for corresponding data points along each transect.

Appendix C -- Comparison of the area and extent of delineated constructed wetlands (from Appendix B) with the area and extent of created wetlands proposed in the mitigation plan. This comparison shall be made on a scaled drawing or as an overlay on the as-built plan. This plan shall also show the major vegetation community types.

Appendix D -- Photos of each mitigation site taken from the same locations as the monitoring photos, including photos of vernal pools, if applicable.

M. Other Comments:

ERS Scientist: _____ Date Plan Reviewed: _____