Appendix K

Draft Invasive Species Management and Post-

Construction Monitoring and Reporting Plan

Restoration of Northeast and Northwest Ponds Stormwater Remediation Project

Hempstead Lake State Park

DRAFT

Invasive Species Management and Post-Construction Monitoring and Reporting Plan

Prepared For:
New York Office of Parks Recreation and Historic Preservation

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Restoration of Northeast and Northwest Ponds Stormwater Remediation Project

Hempstead Lake State Park

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Invasive Species Management and Post-Construction Monitoring and Reporting Plan

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I. INTRODUCTION

The purpose of the Hempstead Lake State Park Restoration of Northeast and Northwest Ponds Stormwater Remediation Project (North Ponds Project) Post Construction Monitoring Plan (PCMP) is to address the methods to monitor success of the installation and the reestablishment of native species within the project area and address methods for removal of invasive species within the project planting areas. The monitoring plan has been developed to ensure achieving the goals and objectives of the proposed project including coastal resiliency, water quality improvements, native habitat restoration in the North Ponds section of Hempstead Lake State Park. The PCMP identifies monitoring methods to assess the success of the wetland and upland native plant establishment and control methods to remove invasive species from revegetated project areas in accordance with anticipated permit conditions. The PCMP has been developed to be used in conjunction with the Hempstead Lake State Park Invasive Species Management & Native Species Enhancement Plan (ISM&NSEP). Wetlands outside of the areas disturbed for the construction of this project are covered under the Park-wide ISM&NSEP.

A. PROJECT DESCRIPTION

Hempstead Lake State Park is located in the Town of West Hempstead, New York and is a state–owned recreational park facility. The North Ponds site is located north of the Southern State Parkway and west of Peninsula Boulevard.

Restoration improvements for Northeast Pond, including the stream segments flowing into the pond from Mill Creek to the north, include:

- installation of a floatables debris catcher,
- excavation for a wetland detention basin,
- limited pond dredging,
- pond fill and regrading to construct filtering wetland,
- shoreline and bank stabilization,
- pond discharge piping and overflows,
- construction area invasive plant removal; and,
- freshwater wetland, pond shoreline and upland revegetation with native species.

Northwest Pond restoration improvements include:

- development of a wetland detention basin at a major pipe outfall,
- floatables catcher system in the basin,
- dam replacement and pipe culvert removals,
- shoreline and bank stabilization,
- construction area invasive plant removal; and,
- freshwater wetland, pond shoreline and upland revegetation with native species.

B. PROJECT GOALS

The objective of the North Ponds Project is to provide an overall more resilient natural environment that will benefit the flora and fauna, as well as the local and downstream communities. Resiliency will increase by improving water quality in the pond through physical removal of debris and sediment, the filtering of pollutants through constructed and existing wetlands, as well removing floatables from around the pond shorelines to allow vegetation to regrow, wetland habitats and upland areas with native vegetation to enhance the native species diversity in the park.

The North Ponds Project goals are to:

- reduce the amount of floatables and sediment currently being carried into the ponds and provide a design that will allow for maintenance of the floatables and sediment deposits entering the pond and subsequently carried downstream;
- filter pollutants prior to entering the ponds and subsequently being carried downstream;
- stabilize eroding shorelines and banks within the project area to reduce future erosion, and improve native vegetative cover;
- remove invasive species within the project area that can outcompete native species, reducing habitat diversity; and,
- re-introduce native wetland and upland species to replace the invasive and non-native species removed and provide filtering of surface runoff into the pond.

C. PROJECT AREA

The project area for this PCMP encompasses the are within the limits of disturbance for the proposed construction work in the North Ponds area as shown on the following Site Plan.

II. INVASIVE SPECIES MANAGEMENT

The following section describes the management measures for control of invasive species and establishment of native plant materials where invasive species have been removed. An Invasive Species Management Practices Table is included as Table 2 at the end of this section. Table 2 describes the management practices to be undertaken by the Contractor during construction of the Project, during the Contractor's one-year maintenance period and by Parks following final acceptance after the Contractor maintenance period.

A. PARK-WIDE INVASIVE SPECIES MANAGEMENT

The New York Office of Parks, Recreation and Historic Preservation had developed a Draft Hempstead Lake State Park Invasive Species Management and Native Species Enhancement Plan (ISM&NSEP). This plan includes park-wide assessment and management of invasive vegetative species identified within the park boundary.

The ISM&NSEP includes mapping of invasive species by area, prioritizations and targets, preferred control methods and timetables. Following acceptance of the project site following the construction and maintenance periods, Parks shall manage invasive species in accordance with this plan.

B. PROJECT AREA CONSTRUCTION AND POST-CONSTRUCTION INVASIVE SPECIES MONITORING

1. Existing Vegetation

The project area consists of two ponds, Northeast Pond and Northwest Pond. Northeast Pond flows into Northwest Pond through two stream segments. The ponds are fed by groundwater, surface runoff, Mill Creek, and stormwater discharges via pipes from the upgradient drainage areas. The project area wetlands were delineated during the design of this project. The delineated wetland areas are shown on the project plans in Appendix C. The wetlands were delineated in accordance with both the United States Army Corp of Engineers (USACE) and New York State Department of Environmental Conservation (NYSDEC) regulations for freshwater wetlands.

Table 1 shows the inventory of vegetative species that were identified as present in the project area wetlands and nearby upland areas. The list does not represent a complete listing of species present, but rather those that were observed and identified during the multiple field visits made by project team members over the course of the site analysis conducted at Hempstead Lake State Park in 2016, 2017, 2018. The prevalent native species identified within the project areas are red maple, oak species, black cherry, sassafras and poison ivy. Table 1 includes the common and botanical names of each plant identified, and identifies the plant as native, non-native, or invasive.

Table 1 notes as invasive (bold font) those species identified as being on the project site that are included on the *New York State Prohibited and Regulated Invasive Plants* list (NYCRR Part 575). The Prohibited Plant List is included in Appendix A of this Plan and includes plants that are identified as *Highly* or *Very Highly* invasive by the Long Island Invasive Species Management Area (LIISMA)'s scientific review committee. LIISMA ranks the presence and invasiveness of each identified species and assigned designations of VH - very high, H - high, M - moderate, L - low or I - insignificant. The predominant invasive species identified within the project area are Japanese honeysuckle, phragmites, Japanese knotweed, Oriental Bittersweet and English Ivy. Common weed species that are identified as invasive such as, but not limited to, garlic mustard, mugwort, and chicory were not specifically identified during the field assessment, as these types of plants are common on all sites.

Table 1
Park-wide Vegetative Species List

Common Name	***Scientific Name***	***Plant Type –*** native, non-native, invasive
Japanese Maple	*Acer palmatum*	Non-native,
Norway maple	***Acer platanoides***	***Invasive***
Red maple	*Acer rubrum*	*Native*
Silver maple	*Acer saccharinum*	*Native*
Northern water plantain	*Alisma triviale*	*Native*
Ragweed	*Ambrosia ssp.*	
Porcelainberry Vine	***Ampelopsis brevipedunculata***	***Invasive***
Bog rosemary	*Andromeda glaucophylla*	
Bushy brown	*Andropogon glomeratus*	*Native*
Pawpaw	*Asimina triloba*	*Native*
Barberry sp.	***Berberis vulgaris,thunbergii***	***Invasive***
Sweet birch	*Betula lenta*	*Native*
River birch	*Betula nigra*	*Native*
Beggar tick	*Bidens frondosa*	*Native*
Marsh marigold	*Caltha palustris*	*Native*
Sedge	*Carex ssp*	*Native*
Ironwood	*Carpinus caroliniana*	*Native*
Bitternut hickory	*Carya cordiformis*	*Native*
Northern catalpa	*Catalpa speciosa*	*Non-native*
Asian/Oriental bittersweet	***Celastrus orbiculatus***	***Invasive***
Sweet pepperbush	*Celthra alnifolia*	*Native*
Buttonbush	*Cephalanthus occidentalis*	*Native*
Gray dogwood	*Cornus racemosa*	*Native*
Manyspike flatsedge	*Cyperus polystachyos*	*Native*
Three-way sedge	*Dulichium arundinaceum*	*Native*
Barnyard grass	*Echinochloa crusgalli*	*Native*
Spikerush	*Eleocharis sp.*	*Native*

Common boneset	*Eupatorium perfoliatum*	*Native*
American beech	*Fagus grandifolia*	*Native*
Green ash	*Fraxinus pennsylvanica*	*Native*
American wintergreen	*Gaultheria procumbens*	*Native*
Honey locust	*Gleditsia triacanthos*	*Non-native*
English Ivy	***Hedera helix***	***Invasive (M)***
Inkberry	*Ilex glabra*	*Native*
American holly	*Ilex opaca*	*Native*
Winterberry	*Ilex verticillata*	*Native*
Jewelweed	*Impatiens capensis*	*Native*
Yellow iris	***Iris pseudacorus***	***Invasive***
Black walnut	*Juglans nigra*	*Native*
Rush	*Juncus sp.*	*Native*
Little duckweed	*Lemna obscura*	*Native*
Spicebush	*Lindera benzoin*	*Native*
Japanese honeysuckle	***Lonicera japonica***	***Invasive***
Marsh purselane	*Ludwigia palustris*	*Native*
Water horehound	*Lycopus spp.*	*Native*
Purple loosestrife	***Lythrum salicaria***	***Invasive***
Japanese stilt grass	***Microstengium vimineum***	***Invasive***
Musk flower	*Mimulus guttatus*	
Silver grass	***Miscanthus spp.***	***Invasive***
Red mulberry	*Morus rubra*	*Native*
Watercress	*Nasturtium officinale*	*Non-native*
Yellow pond lily	*Nuphar lutea*	*Native*
Black tupelo	*Nyssa sylvatica*	*Native*
Aster	*Oclemena spp.*	
Common evening primrose	*Oenothera biennis*	*Native*
Sensitive fern	*Onoclea sensibilis*	*Native*
Fall panicum	*Panicum dichotomiflorum*	*Native*
Virginia creeper	*Parthenocissus quinquefolia*	*Native*
Arrow arum	*Peltandra virginica*	*Native*
Mild water pepper	*Persicaria (Polygonum) hydropiperoides*	
Swamp smartweed	*Persicaria setacea*	
Common reed	***Phragmites australis***	***Invasive***
American pokeweed	*Phytolacca americana*	*Native*
Kentucky bluegrass	*Poa pratensis*	*Non-native*
Water smartweed	*Polygonum amphibium*	*Native*
Spotted lady's thumb	*Polygonum persicaria*	
Dotted smartweed	*Polygonum punctatum*	*Native*
Eastern cottonwood	*Populus deltoides*	*Native*
Black cherry	*Prunus serotina*	*Native*
White oak	*Quercus alba*	*Native*
Swamp white oak	*Quercus bicolor*	*Native*

Bear oak	*Quercus ilicifolia*	*Native*
Blackjack oak	*Quercus marilandica*	*Native*
Red oak	*Quercus rubra*	*Native*
Black oak	*Quercus velutina*	*Native*
Japanese knotweed	***Reynoutria (Fallopia) japonica***	***Invasive***
Winged sumac	*Rhus copallina*	*Native*
Black Locust	***Robinia pseudoacacia***	***Invasive***
Multiflora rose	***Rosa multiflora***	***Invasive***
Swamp rose	*Rosa palustris*	*Native*
Rasberry	*Rubus idaueus*	
Wineberry	***Rubus phoenicolasius***	***Invasive***
Weeping willow	*Salix babylonica*	*Non-native*
Black willow	*Salix nigra*	*Native*
Sassafras	*Sassafras albidum*	*Native*
Chairmakers rush	*Schoenoplectus americanus*	*Native*
Common three-square	*Schoenoplectus pungens*	*Native*
Softstem bulrush	*Schoenoplectus tabernaemont*	*Native*
Woolgrass	*Scirpus cyperinus*	*Native*
Bullrush	*Scirpus spp.*	*Native*
Wild senna	*Senna herbecarpa*	*Native*
Green briar	*Smilax rotundifolia*	*Native*
Bog goldenrod	*Solidago uliginosa*	*Native*
Meadowsweet	*Spirea latifolia*	*Native*
New York aster	*Symphyotrichum novi-belgii*	*Native*
Swamp aster	*Symphyotrichum puniceum*	*Native*
New York fern	*Thelpteris noveborancensis*	*Native*
Poison ivy	*Toxicodendron radicans*	*Native*
Common cattail	*Typha latifolia*	
Slippery elm	*Ulmus rubra*	*Native*
Mullein	*Verbascum thapsus*	
New York ironweed	*Vernonia noveboracensis*	*Native*
Grapevine	*Vitis spp.*	

Extensive plant assessment and mapping was not conducted for each invasive species identified within the entire project area. Species were identified during the delineation process as occurring within the wetland and upland areas anticipated to be impacted by the restoration project.

In addition, materials to be brought to the site, such as compost, topsoil, or mulch, have the potential to contain weed and invasive plant seeds that could become established in the project area. Project specifications for imported materials will require that the materials be tested for viable weed seeds and certified weed–free by a certified soil laboratory. The specification will also require that no material be brought to the site prior to submission of the results of a soil test that confirms the material is weed-free and the approval by the Engineer. The Contract will require that the Contractor maintain the site invasive species

and weed-free for the required maintenance period.

2. Invasive Wetland Species Removal

Invasive plants have the potential to colonize and crowd out native wetland plants, reducing marsh diversity and diminishing the ecological value of a wetland by displacing native ecological communities. In order to reestablish and maintain diverse wetland and upland communities, removal of all invasives within the project area is required. Without total removal, the spreading nature of the invasive species could allow for displacement of newly installed plants species before they can provide a dense cover that will minimize potential for reestablishment of the invasives.

Invasive species within the wetland and upland project areas will be fully removed. Recommendations for ongoing control during the Contractor's maintenance period and beyond include identification through monitoring and subsequent removal of any invasive species regrowth within the project area. The proposed project areas are within the greater Hempstead Lake State Park. This plan provides for monitoring and control within the project areas. Invasive species are known to exist outside of the project areas within the park and it is recommended that Parks undertake additional control measures as outlined in their ISM&NSEP to ensure that the invasives from outside the project areas do not travel back into the project areas.

Wetland restoration activities will be supervised by a wetland's ecologist. The management measures during construction include mechanically removing the phragmites plant and root system via excavation The Contractor will be required to submit his invasive species removal operations plan to Parks for approval prior to beginning work at the site. All removed plant materials will be disposed of off-site in a licensed landfill. Monitoring for regrowth or reestablishment of invasive plants in conjunction with providing associated control measures will be conducted by the Contractor during construction and during the one-year monitoring period following completion of construction. Successful establishment at the end of the one-year monitoring period will be 85% target vegetation survival and lack of presence of invasive species within the project areas. If the 85% vegetation survival rate is not achieved or invasive species are identified, the contract specification will require that the Contractor prepare and implement a revegetation and invasive control contingency plan for the second growing season. Table 2 Invasive Species Management Practices identifies the required management measures.

CONTROL MEASURES

The following control measures have been identified as appropriate for the removal of wetland invasives based on existing site conditions. The actual control measures utilized, and areas of use will be based on the requirements of this ISMP and the environmental permits issued for the project. At this time, it is anticipated that the Contractor will initially use mechanical controls during the construction period. Following excavation and final grading of the project site, if invasives are identified as growing within the areas to be

planted the Contractors will use hand pulling or chemical control measures discussed below. During the maintenance period, it is anticipated that if control measures are required, the Contractor will utilize hand pulling and or other mechanical means. If these methods are ineffective, the limited use of chemical control measures will be assessed. Environmental permits applications will identify the mechanical, physical and potential chemical control measures guidelines. If chemical use is considered, the Contractor will be required to apply for a NYSDEC permit to apply herbicides as part of the contract and it will be subject to all applicable permits other State and Federal regulation

Mechanical Controls

Bucket Excavation: This control measure will be used to remove plant materials along with sediment from the pond shoreline and wetland areas. The plants are lifted along with sediment from the area to be excavated. In areas of phragmites, the sediment must be removed to a maximum depth of 36" to remove the phragmites rhizomes with the soil. The materials must be dumped in a truck or roll-off in close proximity to the operation, transported to a dewatering location if required, and ultimately trucked to a disposal site. The excavation operations require a permit from the NYSDEC due to the project area location in proximity to wetlands or adjacent areas. This method is suitable for monocultural stands of vegetation or locations where the entire area will be excavated for the proposed design. This method is suitable for the construction phase of the project.

Chemical Control Strategies

In the event it is determined by Parks that limited chemical control strategies are needed, the following will be applicable.

Emergent Aquatic Herbicides: Emergent aquatic herbicides are chemical compounds in a formulation suitable for wetland environments that are used to kill undesired vegetation. In particular, Phragmites and purple loosestrife can be controlled with the use of specific emergent aquatic herbicides, particularly glyphosate or imazapyr, by spraying, swabbing or stump treatment depending on the plants that require control.

Herbicides must be registered by NYS and will require application by a NYS-licensed pesticide applicator in accordance with the manufacturer's recommended application rates and procedures for the targeted plant materials. The Contractor will be required to submit the Materials Data Safety Sheet and herbicide label for the specific product to be used prior to application. Use of herbicides in emergent aquatic environments and regulated adjacent areas requires a permit from the NYSDEC. The swabbing method is also suitable for removal of small areas or individual invasive plants that may resprout within revegetated areas during the maintenance phase of the project.

Physical Control Strategies

Hand Harvesting: This control measure involves removing plant materials by hand

pulling or digging to remove plants and their root systems from shallow wetlands and upland areas. The intent during hand harvesting is to remove the entire plant including the root. Due to the extensive effort required, this method is typically suitable for smaller scale operations such as maintenance weed removal after restoration. Due to its extensive root system, this removal method is not typically an option for phragmites or other invasive plants that have large or spreading root systems such as purple loosestrife or Japanese knotweed but may be suitable for other wetland invasives and weeds that require removal during the Contractor Maintenance period and the Post-Contractor Maintenance period. Hand weeding typically does not require a NYSDEC permit.

Cover Method: The cover method entails covering the area of invasive vegetation for a period that will prevent the vegetation from growing due to lack or light or increased temperature. The cover must remain in place for an extended period to allow the invasive species to die off completely including the roots. Due to the limited schedule available for construction, the large areas and the scattered location expected for maintenance we do not anticipate that utilization of the cover method is suitable for this project

With all removal methods, plant material must be removed from the site and properly disposed of so that the plant material, roots and seeds do not re-infest the project site, wetlands or other areas of the park. Monitoring of regrowth of invasive plants with additional necessary control will be conducted during the one-year maintenance period provided by the construction contractor. At the end of the one-year maintenance period with successful removal of invasive from the project area, maintenance will be the responsibility of Parks or additional Contractor maintenance periods may be provided if funding is available.

3. Upland Invasive Species Removal

Upland invasive species were identified within or adjacent to the project area, including Norway maples, Japanese knotweed, multiflora rose, Japanese honeysuckle, oriental bittersweet, English Ivy and porcelainberry vine. The upland areas disturbed by the construction are to be revegetated with native species. Invasive species identified within the upland revegetation areas shall be removed using the following methods to allow the native plants the greatest chance for survival. All revegetation will be conducted in conjunction with erosion and sedimentation control and soil stabilization measures as provided in the construction documents.

Management measures shall include removal of large invasive trees, such as Norway maple, and shrubs and vines, such as honeysuckle, multiflora rose, English ivy, and Asiatic bittersweet. Most of these invasive species are aggressive species that can successfully out compete native plants and displace native ecological communities and new plantings. Most of the identified invasive species are non-native tree, shrub and groundcover species that have escaped cultivation. Common weed species and herbaceous groundcovers that are identified as invasive, such as but not limited to, garlic mustard, mugwort, and chicory, were

not specifically identified during the field assessment. As these types of plants are commonly found on most disturbed sites and can out compete newly installed plant materials, they should be removed from the project planting areas when encountered.

The actual control measures utilized, and area of use will be based on the requirements of this PCMP and the environmental permits issued for the project. During the maintenance period, it is anticipated that if control measures are required, the Contractor will utilize hand pulling and/ or mechanical control measures. Environmental permit applications will identify use of mechanical and physical control measures. Any use of chemical control methods is subject to additional Environmental Review and permitting requirements in accordance with applicable regulations and the agency pesticide use policy.

CONTROL MEASURES

The following control measures have been identified as appropriate for the removal of upland invasives plants based on the existing site conditions:

Mechanical Control

Vegetation Removal/Clearing and Grubbing: This control measure includes the physical removal of invasive large trees, shrubs, and vines. Trees and large shrubs can be removed during the clearing operation. The root systems of the removed trees and shrubs shall be grubbed as necessary to a minimum 1' below final grade and as necessary to prevent the resprouting of growth from the root system. Invasive small shrubs and woody groundcovers, such as honeysuckle, multiflora rose, and Asiatic bittersweet shall be cleared and grubbed in accordance with the specifications for the project and as necessary to prevent regrowth. This method is suitable for locations where the entire area will be cleared for the proposed design. This method is suitable for the construction phase of the project.

Bucket Excavation: This control measure will be used to remove plant materials along with soil from areas of excavation. The plants are lifted along with soil from the area to be excavated. The excavation operations require a permit from the NYSDEC for project area locations in regulated adjacent areas. This method is suitable for locations where the entire area will be excavated for the proposed design. This method is suitable for the construction phase of the project.

Physical Control Strategies

Hand Harvesting: This control measure involves removing plant materials by hand pulling or digging to remove plants and their root systems. The intent of hand harvesting is to remove the entire plant including the root to prevent regrowth. This type of removal method is not an option for removal of large plants. Due to the extensive effort required, this method is typically suitable for smaller scale plants or operations. It is anticipated that hand harvesting or pulling might be utilized during the maintenance phase for weed

removal. Hand removal typically does not require a NYSDEC permit.

For small areas of weed growth, hand pulling may be adequate. If larger quantities are encountered, use of an herbicide may be warranted to provide die back of the root system as discussed above.

Chemical Control Strategies

Herbicides: This control measure uses systemic herbicides to kill undesired vegetation. Control of invasives using herbicides, such as glyphosate, imazapyr, or triclopyr, will be by spraying, swabbing or stump treatment of the product, depending on the area and plant materials that require control. Glyphosate and imazapyr are broad spectrum, systemic, non-selective, post-emergent contact herbicides and can be applied to monocultural beds by an aerial spray application, can be selectively applied by swabbing individual plants or as stump treatment on cut plants. Triclopyr is similarly utilized but is a selective herbicide for control of woody and broadleaf plants. Spraying, swabbing and stump treatment methods are suitable for removal of suckering shrubs and ground covers during the construction phase of this project. The swabbing and stump treatment methods are also suitable for removal of shoots of invasive species and weeds that may sprout within revegetated areas identified during the maintenance phase of the project.

Herbicides must be registered by NYS and will require application by a NYS-licensed pesticide applicator in accordance with the manufacturer's recommended application rates and procedures for the targeted plant materials. The Contractor will be required to submit the Materials Data Safety Sheet and herbicide label for the specific product to be used prior to application. The timing of the growing season must be taken into consideration for herbicide application to be most effective. Use of herbicides in the adjacent areas of regulated wetland requires a permit from the NYSDEC. .

All removed invasive plant materials will be removed from the site and disposed of in a licensed landfill.

III. NATIVE PLANT REVEGETATION

The project will construct freshwater wetlands, pond shorelines and upland areas or revegetate existing areas. The removal and revegetation of areas where invasive species existed within the project limits requires the monitoring of the plantings for regrowth of the invasive species to prevent re-infestation during the post construction phase of the project. The following section describes the management measures for control of invasive species and establishment of native plant materials where invasive species have been removed. An Invasive Species Management Practices Table is included as Table 2 at the end of this section. Table 2 describes the management practices to be undertaken by the Contractor during construction of the North Ponds Project, during the Contractor's one-year maintenance period and by Parks following final acceptance after the Contractor maintenance period.

As several of the invasives species removed from the project area will continue to exist in surrounding areas, NYS Parks should conduct the removal of invasive plants in the project vicinity on a regular basis into the future. Parks should monitor invasives species park-wide in accordance with their ISM&NSEP discussed earlier. Once the project areas native plant materials have fully established and filled the planting areas, the non-native invasives will have fewer opportunities to re-infest these areas, and efforts required to monitor and control a re-infestation may be able to be reduced.

The wetland plantings include species that are appropriate to the water regime of the ponds and surface waters and are known to establish readily to ensure the greatest chance of success. The actual species installed are shown on the project plans and plant lists in Appendix C.

The shoreline and wetland elevations necessary for plant establishment will be achieved through filling of the pond, excavation, minor dredging and recontouring of the shoreline. The wetland planting elevations range from saturated soil at the pond edge to an 18" water depth. Cross sections are shown on the project plans. To reduce the potential for bank erosion of regraded and/or fill material and to stabilize the planting edges, a fiber log and/or coir mat is to be staked into place along the waterside of the wetland and at steep slopes where indicated on the plans. The plant materials will be installed as shown on the project plans. Native vegetation along existing upland slopes will be maintained whenever possible to reduce potential erosion of these areas. Existing invasive species on upland slopes disturbed as part of this project will be removed and replanted with appropriate native upland species. The restoration component of this project is limited to the planting that is shown on the project plans.

During the construction phase, the Contractor shall remove vegetation and install the proposed plant materials in accordance with the project plans and methods for invasive removal detailed in Section II of this Plan. Following completion of the project work and soil stabilization, the native species

will be planted and/or seeded within the areas as shown on the project plans. Species and sizes will be as provided on the project plans and planted in accordance with the procedures contained in the construction documents. Soil will be improved, and fertilizers and soil amendments applied in accordance with contract specifications. As-built drawings of the installed planting areas are to be submitted by the Contractor prior to final acceptance of the construction project.

Any plant materials that require replacement at the end of the one–year maintenance period shall be provided in accordance with the as-built drawings included in Appendix C, unless Parks approves a substitution. The ISM&NSEP include trees, shrubs and herbaceous plants native species associated with the ecological communities found at the site and can be used for species substitution if required. In addition, the plant materials in the ISM&NSEP can be used to select plant materials for locations around the ponds and park if additional habitat restoration or plant replacement projects are undertaken in the future.

Section IV of this Plan includes methods for wetland and upland restoration monitoring following construction to assess the success of the restoration. The USACE and NYSDEC can require that wetland restoration projects be monitored annually for a period of up to five years to ensure an 85% establishment rate for the wetland plant materials and 85% cover provided by native plants. Actual monitoring requirements will be determined during the USACE and NYSDEC wetland permitting process and will adopted as part of this Plan.

TABLE 2
INVASIVE SPECIES MANAGEMENT PRACTICES WITHIN PROJECT CONSTRUCTION SITES
CONSTRUCTION PHASE

AREA	PLAN OBJECTIVE	TIME	MANAGEMENT TECHNIQUE	DURATION	NOTES
WETLAND	Remove invasive plants within areas of project disturbance limit to allow native vegetation to be reestablished within the project area.	At start of construction operations	Inspect site prior to beginning operation and identity all plant materials to be cleared and grubbed and areas outside of disturbance. Remove invasives thru excavation and/or where excavation is not proposed other treatment in accordance with the contract documents and the HLSP ISM&NSEP. Temporarily stabilize exposed soils as necessary to prevent erosion into surface waters and wetlands.	During Construction period	All invasive species shall be eradicated from project revegetation areas prior to replanting with native species. Contractor shall inspect site with Park representatives to review all invasive species requiring removal.
	Install native plants and stabilize exposed soils to prevent soil erosion into wetlands and surface waters and prevent reinfestation of invasive species.	Planting Seasons	Inspect site to confirm that final grades are at correct elevations and soil is ready to be planted or seeded. Install erosion control fabrics and soil stabilization materials. Revegetate cleared areas with native seed mixes, plugs or plants in accordance with the contract documents.	During Construction period	Maintain erosion control fabrics, reset plant materials that are disturbed, and replace plant materials that do not survive.
	Prevent waterfowl from eating or disturbing recently installed wetland plants until adequate root systems develop and dense cover can be established.	After planting	Install Waterfowl Deterrence Fencing with center grid and ties in accordance with the contract document at all new wetland planting to remain in place for a period of one year to allow root systems to develop.	During Construction period	Install fencing completely around the wetland plantings. Deterrence system shall remain in place from time of planting during construction phase through contractor maintenance phase.
UPLAND	Remove invasives species within the project areas to be revegetated.	At start of construction operations	Identify and remove invasive plants in project areas for vegetation restoration. Means for removal shall include clearing and grubbing of plant and root system or other methods included in the this PCMP.	During Construction period	All invasive species shall be removed from project revegetation areas prior to replanting with native species. Contractor shall confer with Parks representatives to identify invasive species.
	Install native plants in accordance with the contract documents. Stabilize exposed soils to prevent erosion into ponds.	Planting Seasons	Install erosion control fabrics and materials and revegetate cleared areas with native seed mixes, plugs or plants in accordance with the contract documents.	During Construction period	Inspect site. Maintain erosion control fabrics, reset plant materials that are disturbed, and replace materials that do not survive.
ALL	Maintain installed plant materials	During construction period	Maintain all installed plant material as necessary to prevent damage during the construction period.	During Construction period	Provide additional control where invasive species resprout or regrow within the proeject area. Contractor is required to maintain plant materials and prevent invasives growth or regrowth within his disturbance limits until project acceptance by the Parks and for a maintenance period of 1-year following project acceptance.

CONTRACTOR MAINTENANCE PHASE (1-YEAR POST CONSTRUCTION)					
AREA	PLAN OBJECTIVE	TIME	MANAGEMENT TECHNIQUE	DURATION	NOTES
ALL	Maintain the revegetated upland and wetland plantings areas of the project free of the invasive species removed from areas during construction and any other weeds or invasive species identified.	NA	Inspections of project planting areas shall be conducted at the end of the maintenance period to identify invasive species regrowth and establishment of any additional invasive or weed species. Remove any identified regrowth including roots systems through mechanical, chemical or physical means in accordance with the PCMP.	1 year from project acceptance by Parks	Contractor is required to maintain all installed measures of this project during the 1- year maintenance period and shall repair any disturbances or failed plantings prior to release of the maintenance bond.
	Maintain the newly installed plant materials in a healthy form.	NA	Inspections of project planting areas shall be conducted at the end of the maintenance period. When necessary based on weather and site conditions, plant materials shall be watered, fertilized and/or treated for pests. If stabilization materials are disturbed or slopes have eroded those measures shall be repaired. Replace plant materials that have not survived.	1 year from project acceptance by Parks	Contractor is required to maintain all installed measures during the 1- year maintenance period and shall repair any disturbances or failed plantings prior to release of the maintenance bond.
WETLAND	Maintain waterfowl deterrence system to protect wetland plantings	NA	Maintain the waterfowl deterrence system in accordance with the contract documents and permit.	1 year from project acceptance by Parks	Condition of system and maintenance conducted shall be noted on monitoring reports. Contractor shall remove and dispose of deterrence system at the end of the maintenance period unless requested to remain in place by Parks, at which time maintenance shall be transferred to Parks.

POST-CONSTRUCTION/ POST-CONTRACTOR MAINTENANCE PHASE					
AREA	PLAN OBJECTIVE	TIME	MANAGEMENT TECHNIQUE	DURATION	NOTES
ALL	Maintain project planting areas free of invasive species and weeds.	Quarterly	Inspect planting for invasive species and weeds and remove in accordance with the PCMP, HLSP ISM&NSEP and environmental permits.	Ongoing	This inspection may be reduced or increased dependent on successful removal of invasive and weed species and establishment of native plantings.
	Encourage removal of invasive species located in adjacent area outside the scope of the construction project	See HLSP ISM&NSEP	Select and remove invasive plants in area undergoing improvements or in proximity to new planting areas and replace with native plant materials in accordance with the HLSP ISM&NSEP and environmental permits.	On-going	When improvements are made in area surrounding ponds or wetland areas, remove invasive species and replace with native vegetative species in accordance with the HLSP ISM&NSEP.
WETLAND	Assess the success of the wetland restoration	Annually	Monitor post-construction success of the wetland restoration and wetland construction in accordance with the wetland monitoring section of this Plan.	per permit	NYSDEC requires an 85% success rate for planting.
	If deterrence fencing installation was extended past Contractor maintenance period, Parks shall continue to maintain waterfowl deterrence system to protect wetland plantings.	Monthly	Parks shall maintain the waterfowl deterrence system in accordance with the contract documents.	Up to 2 years following end of Contractor maintenance.	Deterrence system maintenance transferred to Parks. Parks shall maintain or remove and disposeof at their discretion.
UPLAND	Assess the success of the upland habitat restoration	Annually	Monitor post-construction success of the upland restoration in accordance with the upland habitat restoration monitoring section of this Plan.	On-going	Replace plant materials that have not survived with plant materials in accordance with the project plans or the HLSP ISM&NSEP.
POND	Ensure that ponds are not infested with invasive species.	Summer	Assess pond for potential invasive species infestation.	Ongoing	Review results and develop management procedures in accordance with the HLSP ISM&NSEP for any identified invasive species.

LEGEND
HLSP ISM&NSEP - Hempstead Lake State Park Invasive Species Management and Native Species Enhancement Plan
Parks - New York State Office of Parks Recreation and Historic Preservation

IV. POST CONSTRUCTION MONITORING

The purpose of post-construction monitoring is to assess the progress towards and success or failure of the invasive species removal and habitat restoration effort and the achievement of acceptable standards of habitat character and function. This monitoring plan requires one-year of monitoring of invasive species removal and native plant establishment with an 85% target vegetation survival rate. Monitoring will include an initial site inspection within approximately five weeks of completion of construction and an annual site inspection of vegetative development and establishment following the one-year maintenance period. If the target vegetation survival rate is not achieved at the end of the one-year monitoring period, Parks may require that the Contractor develop and implement a contingency plan for replacing plant materials and continued maintenance of the vegetation for an additional growing season.

The contract documents include the provision that the Contractor provide a maintenance bond issued by a surety company for a period of one year from the completion of the contract work for all contract work of this project. At a minimum, the monitoring will include an initial site inspection within approximately five weeks of completion of construction and two documented site inspections per year of vegetative development. Parks anticipates two additional years of monitoring at the site if funding is available.

A. WETLAND REVEGETATION MONITORING

1. Purpose

The purpose of wetland habitat post-construction monitoring is to assess the progress towards and success or failure of invasive species removal, the restoration of native wetland habitat and the achievement of acceptable standards of marsh character and function.

2. Principal Parties

The Responsible Party (RP) is responsible for carrying out all restoration requirements, including development and implementation of monitoring protocols to assess progress of the restoration during, and evaluate the success or failure of the restoration at the conclusion of the monitoring period.

The RP for North Ponds Project is New York State Office of Parks, Recreation and Historic Preservation, PO Box 247, Babylon, NY 11703.

Additional parties involved in the restoration and monitoring activities are as follows:

The Designer was responsible for preparation of this monitoring plan, including quadrat locations, permanent fixed-point photo stations and other features. The Designer for this project is Cashin Associates P.C., 1200 Veteran's Memorial Highway, Hauppauge, NY 11788.

An Ecologist will assist in planning and implementing a site-specific monitoring protocol. The ecologist for this project will be Cashin Associates P.C., 1200 Veteran's Memorial Highway, Hauppauge, NY 11788 or an alternate selected by Parks at the end of construction.

The Contractor will be in charge of construction of the project and maintenance during the first year of establishment. The Contractor for this project will be determined following development of contract documents and a public bidding process.

The Regulators will approve the restoration designs and monitoring protocol and issue required permitting for restoration activities. The Regulators for this project are the NYSDEC and the USACE.

Note: Parks will be responsible for ensuring fulfillment of all monitoring requirements, including those of the Designer, Ecologist, and Contractor(s), as specified in project permits and is responsible for reporting to the Regulator(s), when applicable The Designer and the Ecologist may be the same person or from the same agency, and may be retained by Parks to represent Parks.

3. Monitoring Program Requirements

The conditions within the project area were assessed prior to the development of the construction documents for the project. The findings of the existing conditions assessment were used to design the project and are included in the existing conditions information in the construction documents.

Permanent fixed-point photo stations shall be used to record the overall progress and success of the habitat restoration and filtering wetland establishment. The fixed-point locations are shown in the Figure section. In addition, each quadrat shall also be photographed as part of the monitoring program.

4. Post-Construction Assessment - (Four-Five Weeks Post-Planting)

Representatives of Parks, the Designer, the Ecologist and the Contractor will walk the restoration site post-construction to assess compliance with submitted work plans.

- At this site meeting, the location of five to seven quadrats shall be determined and the locations provided for the permanent quadrat markers installation. Detail of quadrat size and collection information is shown on Figure 1 - Diagram of the Recommended Quadrat and Associated Variables for Marsh Restoration.
- Permanent fixed-point photo stations - A set of color photographs will be taken during the post-construction assessment at all permanent, fixed-point photo stations and of each quadrat. All photographs will be labeled with the location code, a reference bar for size (such as a clearly viewed meter stick), the direction of view, the date, and the time. All photographs will be in the form of prints no smaller than

5" x 7" and must be in color. In addition, the photographs will be submitted in digital format (JPEG) on CD-ROM disk.

- The Engineer and Ecologist will determine, based on the post-construction assessment, whether any additional work is required to achieve contract compliance.

5. Post-Construction Monitoring

The following parameters will be monitored at least once annually at the end of the maintenance period. The Field Reporting Forms included in Appendix D of this Plan shall be completed for submittal to the required agencies.

a. Overall Site Assessment

The entire site shall be inspected for the presence of any invasive species. The locations of any observed occurrences shall be reported in the monitoring report and corrective actions recommended and undertaken shall be noted. The entire project site shall be observed for the presence of birds and other macro fauna utilizing the site.

b. Fixed-Point Photo Station Photography

Color photographs will be taken from all designated locations shown on Figure 2 once annually for vegetation monitoring (during the last week in August or first three weeks in September). The overview photograph locations of the entire restoration site will be used consistently in all photo-monitoring. Photographs will be labeled with the location code, the direction of view, reference size bar (meter stick), the date, and the time. All photographs will be submitted in the forms discussed in Section 4 above.

Anticipated wetland fixed point monitoring locations are at the two filtering wetland locations on Northeast Pond, Northeast Pond wetland detention basin, Northwest Pond wetland detention basin, Northwest Pond dam, and Hempstead Lake kayak launch and the fishing pier shoreline.

The permanent quadrat marker stakes will be used as photo stations for the photographic monitoring. Photographs of each quadrat with the marker clearly shown shall be taken during each monitoring period as described above. The photographer shall utilize the same location for photographs of the quadrats throughout the monitoring period.

c. Waterfowl Deterrence Fence

It is recommended that the waterfowl deterrence system be maintained for the one-year monitoring period. The fencing shall be checked on a quarterly basis. Any loose or damaged fencing, string line and flagging should be reset, repaired or supplemented as necessary for the system to remain effective to preclude geese from the area. At the end of the 1-year period, the complete fencing system - including the

posts, fabric, string line and flagging - shall be removed and disposed of.

d. Contingency Inspections

In the event of severe winter storms or other destructive events, the project site should be inspected for damage. These visits should be conducted subsequent to such events and as an annual inspection in late March/early April to ensure that damage is documented and repairs or clean-up are made at the earliest opportunity. If repairs are required, photo-monitoring of the damage and the repair from fixed location points should be conducted.

6. Reporting Requirements

An annual monitoring report will be written and submitted to Parks and the appropriate Regulators, following the first post-construction growing season. All data and photographs, labeled as described above, will be included, as well as a brief summary of the collected data. The annual monitoring report shall include an analysis and discussion providing a basis for determination of success rates for vegetation establishment and improved habitat functions. Monitoring Reports will include a full overview and assessment of project success. The final report should include any difficulties, uncertainties, and suggested improvements for future projects, including any necessary discussion regarding planting strategy, the monitoring process, and the methodology for assessment of habitat function. If corrective actions or additional inspections were conducted during the year, those inspections and any resulting actions shall also be reported in the annual report.

The monitoring reporting submission deadline for this project will be one month following the end date of the one-year period monitoring period. If a contingency plan and extension of the monitoring period are required, a final monitoring report is required to be submitted one month after the end of the second growing season.

7. Recommendation for Monitoring after One Year

Photo-monitoring for all restoration sites should continue for an additional 2 to 3 years following the conclusion of the initial monitoring period. Parks or their sub-consultant will conduct photo-monitoring during this period. Photo-monitoring during subsequent years should occur at a minimum once annually during the last week of August or first three weeks of September and consist of the <u>same</u> site overview and photographs as described above at all of the same permanent photo-stations used during the initial monitoring period. The additional years of photo-monitoring records should also be labeled, stored, and distributed in the same manner as occurred during the initial monitoring period.

B. UPLAND REVEGETATION MONITORING

The upland post-construction monitoring shall follow similar monitoring procedures as the wetland monitoring including:

- Post-construction assessment
- Post-construction monitoring including
  - overall site assessment including overall plant density, growth rate and signs of disease, predation or other disturbances
  - fixed-point photo station photography
- Reporting Requirements
- Contingency Plan

Anticipated upland fixed-point monitoring location are at the three North Ponds construction staging locations, three infill revegetation locations (actual locations to be determined in the field), Hempstead Lake Dam reseeding area, and South Pond dam reseeding area.

The upland project site shall be reviewed, and the annual report shall include a description of the overall plant density and growth as well as an assessment of signs of disease, predation and other disturbances. No stem density or plant height measurements are required. Areas where plant materials have not survived or where invasive species are identified shall be included in the annual monitoring report along with photographs, recommended corrective actions and actions undertaken.

IV. CONTINGENCY PLAN FOR MAINTENANCE PERIOD

In the event that failure in excess of 15% of the planting area is observed, the contingency plan shall be undertaken to address the problem and provide a suitable solution. Further information on the contingency plan requirements will be developed with USACE and NYSDEC input during the permitting process and will become a part of the final PCMP.

The initial step in the development of the contingency plan shall be to conduct a site visit to observe the condition and determine the origin of the problem. Potential contingency measures may include but are not limited to:

- replanting of originally specified species,
- replanting with alternate species, and
- regrading of area of erosion or wash-out of the site, and
- installation of additional stabilization measures.

For conditions that are the result of unforeseen site events, such as vandalism or storm events, the site shall be restored by regrading, replanting, fencing repair, or other necessary measures in accordance with the original design. Minor design modifications may be required based on the observed damage.

For problems that are determined to be based on a plan deficiency such as unforeseen project conditions, incorrect elevations, plant materials or lack of adequate exclusion fencing, revised plans shall be developed, submitted to NYSDEC and USACE for approval (dependent on jurisdiction), and ultimately implemented.

The construction contractor is required to provide maintenance during the first year following installation to ensure establishment of the wetland, with the potential for an additional growing season if the 85% target vegetation survival is not achieved at the end of the one-year maintenance period. For maintenance beyond what is required the construction contract maintenance period, Parks can elect to contract with the original contractor to perform the on-going maintenance, undertake the work with Parks staff, or hire a new contractor.

If an Adaptive Management Plan is developed as part of the NYSDEC and USACE permitting process, the Adaptive Management Plan will be added to this plan as Appendix D and will take precedence over this Contingency Plan.

FIGURES

Fixed-Point Photo Station Plan and Photographs
(Locations for the fixed-point stations and photographs will be selected at completion of construction and plan updated at that time).

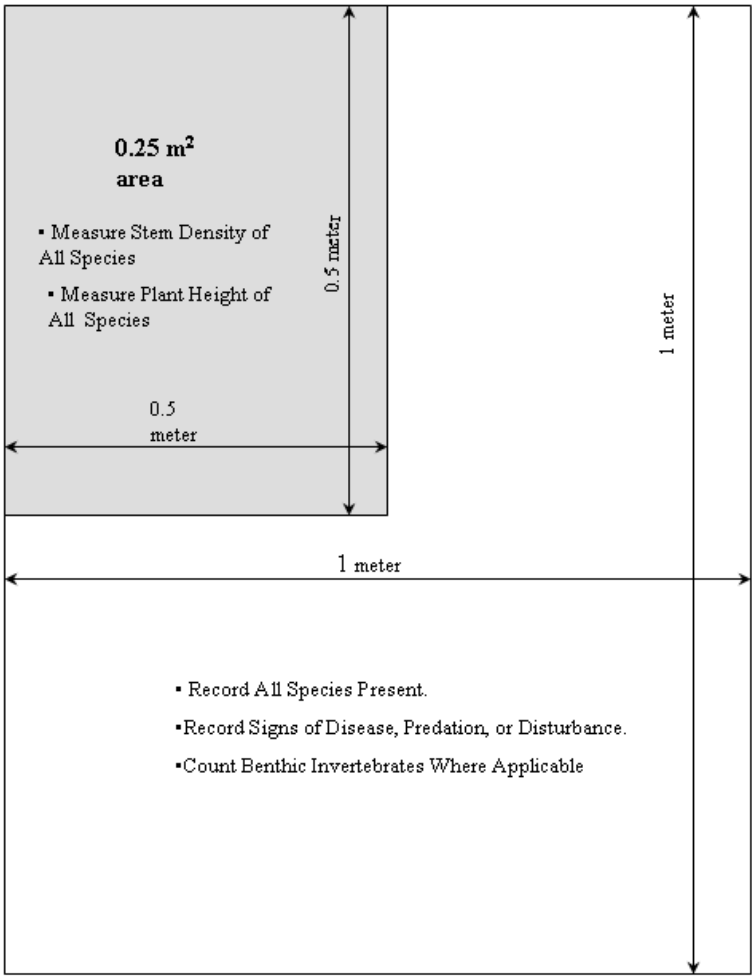

Figure 1

Diagram of the Recommended Quadrat and Associated Monitoring Variables for Marsh Restoration.

Insert site plan fixed photo-station plan with station locations shown
and
existing condition photos here at completion of construction

Sample Fixed Point Photograph Sheet

Photograph to be inserted at completion of construction

Station 1

Photograph to be inserted at completion of construction

Station 2

APPENDIX A
Nassau County Invasive Species List

APPENDIX B
HEMPSTEAD LAKE STATE PARK
INVASIVE SPECIES MANAGEMENT AND NATIVE SPECIES ENHANCMENT PLAN
(Under Separate Cover)

APPENDIX B
PROJECT PLANTING PLANS, PLANT LISTS AND DETAILS

As-built planting plans will be added here upon completion of construction

APPENDIX D
RESTORATION MONITORING
FIELD REPORTING FORMS

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation and Historic Preservation

DRAFT

Hempstead Lake State Park
North Ponds Restoration and Stormwater Remediation Project

MONITORING INFORMATION

Date of Monitoring:

Time of Monitoring	Began: _____ Concluded: _____
Weather (temperature, wind, precipitation)	
Monitor(s) (name, affiliation)	
Type of Monitoring (please circle one)	As-builts Annual Post-Construction: Year 1 / 2 / 3 / 4 / 5
Parameters Measured (Please circle all the apply)	Vegetation Benthic Invertebrates Birds Macro Fauns & Others (please describe):
Photo Monitoring Conducted? (Please indicate station codes)	Yes / No

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Hempstead Lake State Park
North Ponds Restoration and Stormwater Remediation Project

MONITORING PARAMETERS: QUADRATS

SAMPLE PAGE

Quadrat 1 (_____)
Stem Density
Mean Plant Height
Other (Please describe)

Quadrat 2 (_____)
Stem Density
Mean Plant Height
Other (Please describe)

Quadrat 3 (_____)
Stem Density
Mean Plant Height
Other (Please describe)

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Hempstead Lake State Park
North Ponds Restoration and Stormwater Remediation Project

FIELD NOTES

Cashin Associates, P.C.