APPENDIX A
HISTORIC AND ARCHAEOLOGICAL RESOURCES

Historic Wetlands Habitat

Milford Pond also supports extensive fringing emergent as well as open water aquatic bed wetlands. Extensive areas of emergent wetlands, composed largely of cattail (*Typha*) and sedge (*Carex*) are located on its southwestern shore, with smaller stands located on the northwest as well as on the southwest shores of the pond. These areas provide habitat for numerous avian wetland species, including four state listed threatened or endangered species. These are the king rail, common moorhen, pied billed grebe, and least bittern. Generally, these species all utilize extensive cattail and sedge emergent marshlands, adjacent to open water. Nests are generally built in the dense vegetative stands, and for some species (i.e. the common moorhen, and pied billed grebe), in areas on stands surrounded by and/or above areas of open water. Food items consist of wetland vegetation (i.e. seeds and/or plants) as well as aquatic invertebrates.

In addition to the four species noted above, these wetlands (with the open water) provide habitat for other waterfowl species, including mallard duck, Canada goose and great blue Heron. Although not specifically noted, it is also presumed that black duck inhabit Milford Pond, being common throughout Massachusetts during the spring and summer months and often closely associated with Mallard duck occupying similar habitats (Veit and Petersen, 1993, and Laughlin and Kibbe, 1985). It should be noted that the habitat requirements for all of these waterfowl (as well as the other avian species noted above) depend upon the presence of open water (for foraging/dabbling) as well as the emergent wetland (for cover, and/or nesting). Therefore, the reduction of open water shallow habitat by the filling in of the pond and excessive weed growth can negatively effect waterfowl habitat as well, particularly habitat for dabbling ducks such as mallards and black ducks.

Incremental Model

1. Application

In order to compare the habitat benefits gained from dredging the pond, it is necessary to compare the approximate habitat value of the pond without dredging (no action alternative) to the habitat value of the pond with dredging (with project alternative). Dredging is expected to improve the open and deepwater areas of Milford Pond, restoring it to more recent historic depths. This is expected to not only improve fish habitat, but may also increase the amount of open water habitat utilized by many wetland avian species including migratory waterfowl such as black and mallard duck. However, in some dredging alternatives, the amount of emergent and or aquatic bed vegetation may be reduced with resulting possible negative effects to some of the wetland/waterfowl habitat. In order to measure the benefits of the various restoration alternatives to the various habitat types, an evaluation of the quality and quantity of habitat suitable for various species (both aquatic and wetland) is necessary. The model presented below will be used to measure the overall changes in habitat that may occur incrementally with each of the various dredging alternatives. This includes effects on wetlands (measured by waterfowl habitat) and lacustrine habitat (measured by fish habitat).

2. Generic Model Design

a. Description

The U.S. Fish and Wildlife Service has developed Habitat Suitability Index Models for its Habitat Evaluation Procedures (HEP) Methodology, which measure the suitability of a given habitat for one or more species. These models use habitat criteria (variables) that are necessary to support various species (and their life stages) in a given habitat. These habitat criteria (variables) are generally measurable in a given area of habitat, and range in value from 0 (unsuitable) to 1 (optimal). By measuring each of these variables, summing and/or obtaining a geometric or arithmetic/weighted mean for them, an overall value of the habitat (i.e. Habitat Suitability Index or HSI) can be obtained for a given species in a given habitat. When comparing various alternatives, the individual habitat variables can be estimated as to their expected change under each of the alternatives. The final HSI obtained for each variable for a given species can then be multiplied by the acres of the restoration project to obtain another value, Habitat Units, which are a measure of the overall quality of the habitat (for that species) in the project area that will result from the restoration.

When evaluating an entire ecosystem, generally a group of species is selected which represent the various habitat types. The total Habitat Units calculated for each species are summed for each alternative and compared to determine which alternative provides the most effective restoration (based upon total habitat units gained by the project). When determining the habitat units for several species, it is possible for some of the same variables (which are essential to all species) to be measured and incorporated more than once (i.e. once for each target species). Therefore, a model, which can evaluate certain required habitat criteria common to more than one species, may be preferable to one that evaluates each individual species, and could provide a more general and/or alternative way of evaluating the overall quality and/or quantity of a habitat for a certain function.

The Habitat Suitability Index Models (noted earlier), published by the U.S. Fish and Wildlife Service, contain habitat suitability criteria necessary for all life stages of these species for a specific habitat. As noted earlier, many of the essential water quality (as well as physical habitat) criteria are common to several of the various freshwater lacustrine fish species. These include necessary water quality criteria (i.e. pH, turbidity, temperature, dissolved oxygen) and physical/morphological habitat components (i.e. forage, benthic invertebrates). By grouping specific life requisite criteria common to several target species into a single habitat component, a basic life requisite index for any body of water can be obtained. This can then be applied (by using a geometric mean) toward additional species-specific criteria necessary for a target species. For other nonfish species, a group of common wetland criteria can be developed as well, and then multiplied by target wetland species criteria (as well as the lacustrine component) output in the same manner.

For example, most warm water/lacustrine habitats in New England, support a warm water fish assemblage which includes species such as bluegill and pumpkinseed sunfish, yellow perch, brown bullhead, chain pickerel, black crappie, and largemouth bass. Generally, since these fish are typically found in lacustrine habitats, they have similar habitat requirements, which are common to more than one individual species. All of them (with the possible exception of brown bullhead) have similar dissolved oxygen requirements. Therefore, by measuring the range of dissolved oxygen levels in a specific habitat, the suitability of that habitat for a number of species that generally use this habitat and share similar dissolved oxygen requirements can be determined. Additional basic habitat requisites (such as forage habitat, pH, turbidity) that are common to a group of species can be measured, and then used as a general basic habitat model for a given type of habitat which supports a range of species. Species-specific habitat requirements can then be added, based upon target species, and weighted according to that species importance the ecosystem. The entire group of basic as well as species specific habitat requisites can then be either summed or multiplied (either to obtain a weighted and/or geometric mean) to obtain an overall habitat index which will rate the quality of the habitat to support a variety of species common to the area, as well as individual target species. The same approach can be applied to other ecosystem components in a given project (such as wetlands) to obtain a total value ranging between 0 and 1. The model presented below utilizes this method in order to obtain a measure of the habitat quality of Milford Pond under various restoration alternatives.

3. Methods for Generic Habitat Evaluation Model Used for Milford Pond

The differences between the model used below and the existing Habitat Suitability Index Models published by the Fish and Wildlife Service primarily have to do with the generalization and combination of several basic life requisites common to more than one species for the given habitat, with the addition of species specific criteria, to obtain a single overall suitability index either for a total ecosystem or for an individual ecosystem component; as opposed to using multiple species models and obtaining a suitability index for each species. However, the model below does rely upon the Habitat Suitability Index Models to determine the general life requisite variables as well as the species variables. Other literature is also used, as well as professional judgment. Also, where many of the Habitat Suitability Index Models generally incorporate a geometric mean to reflect the necessity of each of the individual variables, or life requisites (and to express their independence), the model presented below uses both a geometric mean and weighted (arithmetic) mean to obtain the habitat index value. This allows the essential life requisites to have the greatest effect on the overall output, in that if any one of them has an individual suitability index value of 0, the suitability index value of the entire habitat becomes 0 regardless of any non-0 values of the other requisites (i.e. the habitat model is "life requisite" limited).

For the model below a geometric mean is used for the essential life requisites necessary for more than one species, and the result is then multiplied by a weighted mean of the species specific variables for the target species. This causes the overall habitat suitability index to become 0 if any one of the essential life requisites is not met regardless if all of the species-specific habitat criteria are met. Conversely, if none of the species-specific criteria are suitable, and the general life requisites are suitable, then the total value of the habitat will still be above 0, indicating that it will support aquatic life at least temporarily even though some of the requirements for a particular target species may be absent. Also, since there is more than one component of the ecosystem that is being investigated (i.e. two in this case, the wetlands and the open water) a model can be developed for each of the ecosystem components characteristic to a particular project area (e.g. lacustrine, wetland or riverine) in order to obtain a value (index) for each between 0 and 1. Each of these individual indices can be multiplied by the total project area, or the total area (acres) of that particular habitat type within the proposed project area, that will become available with each of the alternatives in order to obtain the total habitat units for that habitat type (i.e. wetland or lacustrine, etc.). The general formula is as follows:

$$\{[(\mathbf{GRf}) * (\mathbf{TRf})]^{1/2}\} = \mathbf{I(f)} \ \textbf{and}$$

$$\{[(\mathbf{GRw}) * (\mathbf{TRw}))]^{1/2}\} = \mathbf{I(w)}$$

where

GRf = The geometric mean of each of the general fisheries habitat requisites
TRf = The sum of the species specific habitat requisites (weighted mean) for specific fish
GRw = The geometric mean of each of the general wetland habitat requisites
TRw = The sum of each of the species specific habitat requisites (weighted mean) for specific wetland species i.e. waterfowl
HI = Habitat Suitability Index for either open water or wetland habitat, ranging between 0 and 1.

The individual components are further defined as follows:

$\mathbf{GRf} = \{ \ ^{n}{}_{i} \quad \mathbf{grf}_i \}^{1/n}$

where

grf = each of the individual general essential habitat life requisites for fish; and

$\mathbf{TRf} = \{f\ ^{N}{}_{i} \quad \mathbf{trf}_i\}$

where

trf = each of the specific habitat requisites for target fish species (weighted according importance), and,

$\mathbf{GRw} = \{ \ ^{n}{}_{i} \quad \mathbf{grw}_i \}^{1/n}$

where

grw = each of the individual general essential habitat life requisites for selected wetland species
and,
TRw = $\{f^{N}_{i}$ **trw**$_i\}$
where
trw = each of the specific habitat requisites for target wetland species (weighted according importance).

Habitat Units are then obtained by the formula **HI(*n*) * A(*n*) = HU(*n*)**, where

HI= Habitat Index obtained for either the lacustrine or wetland component from the above formulae
(*n*)= The Specific habitat type (i.e. lacustrine or wetland/waterfowl)
A = Area of specific habitat type available for each proposed alternative within the project area
HU = Habitat Units

The total habitat Units available for each habitat component for each alternative can then be summed according to the formula:

HU (Total)= $\{f^{N}_{i}$. **HU**$_i\}$

Where

HU= the total Habitat Units from all habitat types

The application of the above general formula to Milford Pond will be described in the following sections.

Application of Generic Model to Milford Pond

In this incremental analysis, the overall habitat quality of the Milford Pond ecosystem will be evaluated under each of the proposed alternatives in order to determine the most effective restoration plan (i.e. the one which maximizes both the open water and wetlands habitat value). Comparison is made between the existing (shallow) fish habitat, which has been degraded by sediment deposition, and excessive vegetation growth, and the proposed restored (dredged) deeper water habitat without the excessive growth of aquatic vegetation, better suited for healthy and diverse warmwater fisheries. In addition, the effects to the associated fringing wetlands habitat will be examined since this may be affected by some of the proposed dredging alternatives.

Fisheries Habitat

Since smaller populations of many of the historic species still inhabit Milford Pond, habitat benefits to these species gained by the dredging will be specifically examined. Since there are several dredging alternatives, the habitat benefits to the target species associated with each of the dredging alternatives are examined. The target species selected for this comparison are largemouth bass, black crappie (i.e. Calico bass) and yellow perch. The reasons for their selection as well as their respective weightings in the model will be discussed in the following sections.

Milford Pond historically supported a warmwater fish assemblage. Also (as noted previously) recent sampling data has indicated that small reproducing populations of many of these historic species are still present in the pond (i.e. largemouth bass, bluegill, chain pickerel). Therefore, the basic habitat requirements necessary for their survival and reproduction are still being met, at least minimally. It is expected that these basic habitat requirements will improve with the dredging. As noted in the previous section, In order to measure these benefits a geometric mean was calculated by assigning individual values to each of a series of habitat components, which are necessary to generally support fish, and a weighted mean calculated to a series of habitat components essential to support target fish species. These components (including the target species) were weighted according to their importance in supporting fish and/or their function in the ecosystem (expected and existing). These were combined according to the general formula noted earlier. Values were assigned to each of the components for each of the various alternatives, and the total value was calculated for each alternative as an index. This index was then combined with the wetland/waterfowl component in order to obtain an overall habitat suitability index. This overall suitability index was then applied to the total number of acres of the proposed habitat to be restored.

Methods

Fisheries/Aquatic Habitat Component

General habitat criteria that are necessary to support lacustrine fish species that presently and historically occupied Milford Pond were selected (GRf). These include the basic requisites for fisheries and/or aquatic life, which will change in response to dredging and for which data sets are available. In addition, specific habitat requisites for several target lacustrine fish species were selected (TRf), which are also expected to change in response dredging. These were considered partially-independently of the basic habitat requisites that are necessary to support any type of fishery, in that they apply to an individual species, but also depend on the basic habitat requisites being met. This target fish grouping can consist of one or more target species, weighted according to their importance in the ecosystem and/or habitat restoration priority. As noted however, if any of the general requisites is unsuitable (value of 0), then the specific habitat requisites (for the target fish species) also become 0, due to their being multiplied by the index value obtained for the general requisites (which is a geometric mean of each of the individual variables necessary to support lacustrine fish). These requisites are listed below:

General Requisites for Fisheries Habitat (GRf)

1. Dissolved oxygen (grf_1)
2. Turbidity (grf_2)
3. Tempertature (grf_3)
4. Benthic invertebrates (grf_4)
5. Cover (grf_5)
6. Forage (grf_6)

Species Specific Requisites for Target Fish Species Habitat (TRf)

(Target Species include Largemouth bass, Calico bass, and Yellow Perch). Each of these requisites will be evaluated for the habitat as to its effect for each of target fish species.

1. Littoral Habitat (trf_1)
2. Spawning substrate (trf_2)
3. Deepwater Habitat (trf_3)

(A list of the assumptions on how each of the above general habitat requisites will change with the various dredging alternatives is presented in Table 1. Discussion of how these variables will change specific to Milford Pond dredging alternatives will follow in the next section).

A value was assigned to each of the requisites within each of the two functional groups ranging from 0 to 1, depending on its existing condition with the pond not dredged and its expected change for each of the dredging alternatives. A value of 0 is the poorest condition, and a value of 1 is optimal condition. The actual value for each requisite was determined by consideration of specific data obtained from Milford Pond and comparing it to established criteria published in scientific literature as well as using direct observation of the affected habitat (using professional judgement). Many of the criteria that were used for both the general habitat requisites (GRf) and the specific habitat requisites (TRf) were found in the specific habitat suitability models for that species (HEP models).

The above two functional groupings (i.e. GRf and TRf) were incorporated into the general formula discussed previously, and then multiplied by the total area of the open water that will become available for each of the dredging alternatives. The same was done for the wetland component, to obtain a total number of Habitat Units that will become available for each dredging alternative (Table 2).

Table 1. Assumptions for Variables that will Change with Dredging Alternatives

General Requisites for Lacustrine Fish Habitat

Variables

1. **Dissolved oxygen**- Will Change with
   a. Removal of organic sediments (reduction of BOD)
   b. Removal of aquatic weeds blocking surface (i.e. increased exposure to atmosphere (mixing))
   c. Improved flushing if channel is opened and connected by dredging

2. **Turbidity**- Will change with
   a. Removal of fine sediments
   b. Ratio of fine sediments to coarser sediments (depends on dredging plan)
   c. Will not significantly change if same dredging plan (i.e. same proportions) is used with only varying areas (i.e. 2 acres vs. 4 acres) unless one alternative removes more fine sediments than the other.

3. **Temperature** – will change with
   a. Decrease in surface to volume ratio (with dredging depth). Increased volume will increase temperature stability
   b. In areas of high groundwater infiltration, will change with exposure to sandy bottom (i.e. volume of material removed)
   c. Increased depths, will increase tendency to stratify and will maintain colder temperatures at depth during summer. Could provide colder water habitat if DO is sufficient (example is Hancock Brook Lake gravel pools)
   d. Removal of excess vegetation will increase open water exposed to atmosphere, will affect surface temperatures

4. **Benthic Invertebrates**- Will change with
   a. Sediment/substrate composition (i.e. removal of fines and exposure of more coarse, less silt).
   b. Will not necessarily change if the same proportions of materials are removed over a greater area (i.e. alternatives that differ only in acres dredged)
   c. Will change if different dredging plans are utilized which disproportionately remove different types

5. **Forage** –Will change with
   a. (If golden shiner) will change with reduction in turbidity (Lavett and Smith, 1985) i.e. need clear water.

b. Opening up of midwater habitat for feeding
c. Increase in zooplankton and invertebrate availability and/or accessibility to zooplankton and invertebrates (i.e. could result from thinning of excessive weed growth).
d. (if white sucker) then will improve with exposure to bottom with sufficient DO
e. (white sucker) need gravel to spawn, so will improve with exposure of gravel/sand in shallow areas

6. **Cover** – will change with
   a. if excess weed growth is removed (assumed to little is poor, and too much is poor)
   b. Optimized where there is enough in shallows, some at depth, and some open water

Discussion of Values for Lacustrine Habitat

General Requisites (GRf)

Dissolved Oxygen (grf_1)- Dissolved oxygen is required for all aquatic life. Water quality criteria for many freshwater fish species require a level of at least 5 mg/L, below which they begin to show signs of stress. Dissolved oxygen data collected in September and October of 2002 by BEC showed DO levels ranging from 1.4 - 9.2 mg/L. In September, the DO levels were only as high as 7.0 mg/L (76% saturation) near the water surface at a mid pond location. At the bottom of the pond just north of the dam, the highest DO level at the water surface was only 3.1 mg/L. Levels decreased with depth at both locations. In October, all measured levels were above 7.0 mg/L and slightly more uniform with depth, but the highest saturation achieved was 83%. While DO levels are sometimes adequate to support freshwater fish, there are times when the levels are severely depleted and are far below the minimum DO level of 5.0 ppm necessary for survival of aquatic life. Therefore, the dissolved oxygen requisite was given a value of 0.3 for existing conditions (i.e. no action alternative).

In summer months, the thermal stratification of water creates a barrier to oxygen replenishment in deeper waters from the atmosphere. The depletion of DO is principally due to the metabolic respiration associated with the aerobic decomposition of dead aquatic vegetation or animal biomass. Removal of the organic sediment which supportsthe excessive growth of aquatic weeds, as well as removing most of the excessive growth itself will help to increase the dissolved oxygen levels in the pond. By eliminating much of the BOD that occurs when these weeds die and decompose, the overall DO levels throughout the pond should improve. Dredging would eliminate the aquatic vegetation, thereby reducing the occurrence of excessive BOD during decomposition of these plants. Dredging would also remove the areas of shallow organic sediments within the photic zone, which promote the growth of the aquatic vegetation.

This action should make it less likely for the plants to re-infest the pond. While an oxygen deficient Thermocline is still expected to develop during summer months, reduced aquatic plants will promote increased vertical wind mixing, degrading the Thermocline and improving surface O_2 levels. Partial dredging of the pond would allow areas of vegetative growth to remain and would improve DO levels throughout limited areas of the pond. Therefore, the dissolved oxygen requisite was assigned a value of 0.6, 0.5, and 0.4 for the full dredging, 45-acre dredging, and 20-acre dredging alternatives, respectively.

Turbidity (grf_2)-Excessive turbidity in the form of suspended solids is detrimental to maintaining healthy aquatic life. Generally, excessive turbidity (resulting from high levels of suspended solids) can kill benthic organisms preyed upon by many fish species at various life stages by suffocation, as well as covering over their sandier habitat. This can negatively effect the fisheries by eliminating the food supply of many fish larvae and adults. In addition, high levels of turbidity in the form of suspended solids can directly suffocate fish eggs and larvae, as well as irritate the gills of all life stages of most fish species. This can also lead to stress and/or suffocation. Largemouth bass are adversely affected by high levels of turbidity, which interfere with reproductive processes and reduce growth (Stuber et al, 1982). Therefore, optimal lacustrine habitat would be that with low levels of turbidity.

Water quality sampling in 2002 by BEC revealed turbidity levels ranging from 3.2 to 15 NTU. Sediments in Milford Pond are loamy, loamy sands, sandy loamy and silty loamy with high organic content. Fine silty material is easily mobilized (i.e. by rain, increased currents, and/or anything that creates motion close to the substrate) creating clouds of turbidity. This fine material can adversely affect the aquatic habitat for the reasons noted above. The Secchi disk depth, a measure of water clarity related to turbidity, is approximately 3 feet in Milford Pond. This is less than the 4-ft transparency requirement for swimming beaches in Massachusetts, indicating degraded conditions. The turbidity in Milford Pond is moderate, but there is the potential for incidences of high turbidity due to the shallow depths and organic quality of the sediments. Therefore, this requisite was assigned a value of 0.5 for the no action alternative.

Dredging would remove the shallow fine sediments and restore the parent material consisting of coarser substrate with fewer fines, reducing the potential for occasions of high turbidity in the pond due to resuspension of shallow (<4') bottom materials. Fine organic sediments and shallow depths are present throughout the entire pond and dredging the entire pond as opposed to smaller portions would remove more of the fine sediments and impart a more significant effect on reductions in turbidity. However, leaving a well vegetated margin at the stormwater inlets will help capture turbidity prior to entering the main basin of the pond. The turbidity requisite value was thus given a value of 0.6, 0.7, and 0.6 for the full pond dredging, 45-acre dredging, and 20-acre dredging alternatives, respectively.

Temperature (grf_3)-Milford Pond is generally characterized as a warmwater fishery. It is a lacustrine environment with shallow areas exposed to the sun and atmosphere. During the summer, this exposure can warm the upper layers of the water column to temperatures generally not suitable for many coldwater/river dwelling fish species. The filling in of the pond has further reduced the overall water volume of the pond, and increased the surface area (i.e. increased the surface to volume ratio). This allows the pond to warm more rapidly, and to higher temperatures than if it were deeper (larger volume). The temperature in Milford Pond has been observed to exceed 20°C in the surface layers. Generally, these temperatures are favorable to the proliferation of many warmwater fish species, although as noted earlier, they can become unsuitable to support coldwater fish species such as trout. Also, as the water temperature increases, its ability to carry dissolved oxygen decreases. Therefore, in warmer water, (where there is an existing biochemical oxygen demand) it is possible For dissolved oxygen levels to more easily fall below the 5 mg/l criterion necessary to sustain healthy aquatic life. In addition, the higher temperatures will actually increase the biological biochemical activity associated with decomposition, and increase this demand, further depleting the available dissolved oxygen. This would be detrimental to all fish species.

Although these temperatures are generally favorable to the proliferation of warmwater fish species (i.e. largemouth bass, calico bass, etc.), they are not suitable for coldwater species such as trout, which can survive during the summer in the deeper layers of many lakes. The dredging of the pond would reduce the surface area and increase the volume, which would stabilize water temperatures and prevent them from warming so rapidly. The cooler- temperatures would slow the rates of biochemical activity (decomposition) taking place in the sediments, which would reduce the biochemical oxygen demand. Since small populations of historic fish species currently inhabit the pond, it is presumed that temperature is suitable to support them. However, as described above, it is expected that the dredging will improve the temperature stability in the pond and improve that component of the habitat. Therefore, the temperature requisite was assigned a value of 0.5 for the existing condition (no action), and a value of 0.8, 0.7, and 0.6 for the full pond dredging, 45-acre dredging, and 20-acre dredging alternatives, respectively.

Benthic Invertebrates-(grf_4)-Benthic invertebrates constitute a major food component of many fish species during one or more life stages. Therefore, they are important even to top predators, since many of the fishes that they prey upon (forage species) in turn prey upon smaller benthic invertebrates.A benthic analysis was conducted for the Milford Pond Diagnostic/Feasibility study in 1984 (IEP/CDM, 1986). Samples were taken at four sampling stations on May 9, 1984 and December 4, 1984. These sampling stations were located upstream of the Charles River, Huckleberry Brook, and Louisa Lake inflows and at the Milford Pond outflow, because samples within the mucky, anaerobic pond sediments were expected to be quite low. Macroinvertebrate communities found upstream of the Charles River and Huckleberry Brook inflows exhibited a good diversity of pollution intolerant, facultative, and pollution tolerant forms. Species found in these sampling location include blackflies, stoneflies, mayflies, midge larvae, *Asellus,* and *Hyalella.* The presence of these species indicates well-oxygenated unpolluted water. Macroinvertebrate communities recorded near the Louisa Lake inflow and the Milford Pond outflow exhibited a fair diversity of pollutant-tolerant and facultative forms. Species found in this area include *Asellus, Hyalella,* midge larvae, and mollusks. The presence of these species with the absence of pollution intolerant species is indicative of degraded water quality and benthic habitat. In addition, the fine silty consistency of the sediments which dominate the pond do not generally support a diverse benthic community characteristic of high quality aquatic ecosystems. Generally the organisms that would predominate in an environment such as Milford Pond's would be those most able to tolerate lower levels of dissolved oxygen. The fine sediments physically limit dissolved oxygen availability and the organic content of this sediment contributes to oxygen depletion through BOD. This habitat component was therefore assigned a value of 0.4 for the existing conditions (no action).

Removal of the fine sediments by dredging will, in some margins of the pond, expose the coarser parent material, characteristic of higher quality benthic habitat capable of supporting a more diverse benthic community in greater numbers. This will improve the numbers and species of benthic prey available for fishes, and have a positive effect upon the overall ecosystem. This benefit is more pronounced for dredging of the entire pond than for partial dredging, thus the requisite was given a value of 0.6 for full pond dredging alternative and a value of 0.5 for dredging 45 acres and 20 acres.

Cover (grf_5)-Cover is a necessary component for all types of fish habitat. Fish need cover (or structure) in order to hide/holdover during times of inactivity, and predator species will hide while waiting for prey. Smaller fish and/or juveniles need cover in order to hide from larger predators and feed, and spawning nests for largemouth bass and many other lacustrine fishes are built where there is cover. In addition, most areas of cover also provide substrate for aquatic invertebrates necessary as food items. In lacustrine systems, cover consisting of aquatic vegetation, submerged logs and/or other debris and rocks are used as nursery habitat for juvenile fish, where they can hide and feed.

Although cover is a necessary habitat component, in order for it to function effectively it needs to be accessible and available to the organisms that use it. Therefore, too much cover is detrimental to fish habitat because it cannot be penetrated by the fish that need to use it. Although dense stands of aquatic vegetation may provide habitat for many small invertebrate prey organisms as well as larval fish forms, larger juvenile fish that require these food items are physically prevented from feeding on them. Therefore, too much cover constitutes poor spawning and rearing habitat for largemouth bass (Stuber et. al., 1982) as well as many other lacustrine species.

A survey in 1998 showed that Milford Pond is dominated by vegetative-macrophyte communities in all but a small area just north of Rosenfeld Park. Thick growths of eurasian water milfoil, bladderwort and white water lily from the sediment surface to the pond surface block fish passage and provide too much cover. Although fish inhabit the pond, optimal cover would consist of aquatic vegetation in lesser densities than currently exist. Dredging the pond is designed to significantly reduce this aquatic vegetation by physically removing it as well as removing the nutrient rich sediment, which supports it. It is expected that once the pond has been dredged, more diverse and natural revegetation of the littoral areas will occur, which will optimize this habitat component. Therefore, this requisite was assigned a value of 0.3 for the no action alternative; a value of 0.5 for the full dredging alternative; and a value of 0.7 and 0.5 for the 45 acre and 20 acre dredging alternatives, respectively.

Forage (grf_6)--Larger predator fishes require forage species for food supply. Predator species in Milford Pond include largemouth bass and chain pickerel. With the existing conditions, forage may include young of year bluegills and pumpkinseed, as well as other species (i.e. young of year yellow perch and white sucker). Other forage species include golden shiner, which inhabit more open water areas as well as littoral cover areas.Dredging the pond will open the habitat, making it more suitable for many of these forage species. In addition, the overall fish habitat is expected to improve, making it more suitable for a diverse fishery containing additional forage species. Striking a balance between dredged areas and undredged dense weed beds will optimize the habitat. Therefore, this component was assigned a value of 0.3 for the no action alternative; and a value of 0.5, 0.7, and 0.5 for the full pond dredging, 45-acre dredging, and 20-acre dredging alternatives, respectively.

Discussion of Target Lacustrine Fish Species Habitat Requisites (TRf)

As mentioned previously, the target fish species considered for evaluation were largemouth bass, black crappie and yellow perch. The three species-specific requisites that will be evaluated for each of these species are Littoral Habitat, Spawning Substrate, and Deepwater Habitat. These requisites were selected because they are necessary components for each target species in addition to the basic general habitat requisites noted above (which are necessary for all lake dwelling fish); and each of these can vary individually among species. In addition, each of these requisites is expected to change incrementally with dredging of the habitat. Although they are considered separately for each of the target species, they are combined with the general habitat requisites and factored into the total score.

The three target fish species were selected for this evaluation based upon their historical, existing and/or potential population in the pond, as well as their ecological importance. Based upon sampling efforts conducted by the MA DFWELE, known populations of these species are documented to be present within Milford Pond. These three species were chosen as the target species for this restoration project based on their importance as gamefish as well as their ecological significance. All three of these species were found to be present within the pond at varying densities.

Each of the three species-specific variables was evaluated for each target species with a score assigned between 0 and 1 (as done for the basic general requisites for lacustrine habitat described earlier). The three values for each species were totaled and weighted according to that species' importance in the ecosystem. These were then combined with the General Requisites values discussed above according to the formula described earlier (see formula description in section "Methods for Generic Habitat Evaluation Model Used for Milford Pond", pages 4-6). For this study, each of the target species was weighted equally since reproducing populations of these species historically and presently exist(ed) in the pond, and have ecological importance, as well as value for recreational fisheries. Since the entire component of the target species specific requisites (TRf) comprised by each of the individual requisites for each target species (trf) has a total value of 1, the assigned weighting factor for each of them is (0.111). The values of each of the three target species requisites (trf1-trf9) will be discussed below for each the three target species selected, for each alternative. The calculations of the Habitat Index for the lacustrine component is presented in Table 2.

Largemouth Bass *Micropterus salmoides* (Lacepede, 1802)

MassWildlife has been managing largemouth bass since they were introduced into the Commonwealth one hundred and twenty years ago. The initial introduction of largemouth bass was undertaken to provide angling opportunities during the summer months. The earliest reference to largemouth bass populations in Massachusetts occurred in 1879 when they were introduced from northern New York State into numerous ponds of Essex County. During this early period, management consisted of transplanting adult bass from pond to pond. Beginning in the early 1900's, hatchery culture, and stocking programs for black bass (largemouth and smallmouth bass collectively) began, which allowed widespread stocking of fingerlings. By the late 1960's, tagging studies, as well as surveys in Massachusetts and surrounding states showed that largemouth bass populations were self-sustaining. It was then determined that stocking bass into waters with these self-sustaining populations did not improve the fishery, therefore, the largemouth bass hatcheries, and stocking programs were phased out. Currently years round fishing season with a five fish per day creel limit of a 12-inch minimum size are management techniques employed for largemouth bass statewide *(MassWildlife)*.

The largemouth bass (4.7-38.2 inches) is the state's most common gamefish. The largemouth bass is also the largest sunfish. It prefers mud, or sand-bottomed ponds, lakes and slow-moving rivers with lots of aquatic vegetation and overhead cover. The largemouth bass eats fishes, frogs, snakes, small ducklings and almost anything alive that will fit into their mouths. They spawn in May. The males excavate big, platter-like nests in shallow water near shore and entice females to lay their eggs. The males fertilize, guard and fan the eggs until they hatch. (Sources: *Freshwater Fishes of the Carolinas, Virginia, Maryland, & Delaware, Massachusetts Wildlife, No. 2, 2000, Special Fishing Issue and AMC Guide to Freshwater Fishing in New England*

Littoral Habitat (trf_1)

Lacustrine environments are the preferred habitat of largemouth bass. Overhead cover in shallow water provides shade and cooler temperatures, allowing bass to remain all summer. Weedy edges provide points of ambush where bass can dart out to capture smaller fish. Optimal conditions are lakes with extensive (>25% of the surface area) shallow areas (<6 meters depth) that support submergent vegetation, yet deep enough (3-15 m mean depth) for the bass to successfully overwinter. This correlates into 40-60% of the lake area should be >6m depth to provide optimal overwintering habitat in northern latitudes (Robbins and MacCrimmon 1974; Carlander 1977; Winter 1977).
These littoral habitats (shallow areas) are required for spawning, growth and feeding areas. Nests are constructed in water depths ranging from 0.15 meters to 7.5 meters, with the mean water depths ranging from 0.3-0.9 meters (1-3 feet) (Stuber et al. 1982).
The majority of the littoral habitat present in Milford Pond meets the optimal habitat criteria for depth, but much of it is not optimized as largemouth bass habitat because of the density of nuisance aquatic vegetation and soft sediment loadings. For largemouth bass this requisite was assigned a value of 0.7 for the no action alternative because the littoral habitat is currently adequate to provide the primary functions for this species. A value of 0.8 was assigned for the 20 acre and 45 acre dredging alternatives since each will result in a slight improvement in habitat value for this target. The complete dredging alternative will result in the removal of littoral habitat; therefore this alternative was given a value of 0.6.

Spawning Substrate (trf_2)

Largemouth bass spawn in late spring to mid-summer in water temperatures of 16.718.3°C. The nest is built near aquatic vegetation, and the male protects it. Spawning grounds usually have firm bottoms of sand, gravel, mud or rock. The sticky eggs adhere to bottom and the roots of plants. Bass seldom nest on a thick layer of silt. Some spawning areas are in open water; others have sparse weeds, boulders or logs. Firm bottoms make the best nest sites. Bass can easily sweep away light silt. The male fans over the nest constantly to circulate oxygen-rich water over the eggs. Cover such as weeds, stumps, logs and rocks provides extra protection for the eggs and fry. Bass that build their nests next to these objects have less area to guard against sunfish and other predators (Numerous Citations, from Stuber et al, 1982).

Milford Pond, in its existing condition consists of a littoral zone with a large percentage of fine silty and highly organic material covering most of the bottom, which would border on being unsuitable spawning substrate for largemouth bass. The proposed dredging is expected to restore the substrate to a coarser, harder bottom material, with significantly less silt and fines, which is more suitable for largemouth bass spawning habitat. Therefore this requisite was assigned a value of 0.2 for the no action alternative (not 0 because there is a small reproducing population present indicating that these fish are still able to use some of the habitat). The dredging alternatives were assigned a value of 0.5 for this species based on the proposed improvement associated with the removal of the silty fines.

Deepwater Habitat (trf_3) -Warm, shallow, weedy lakes usually hold more largemouths than deep, cold, clear lakes with little vegetation. However, shallow, weedy bays of deep, cold lakes may hold good largemouth bass populations. Milford pond is a eutrophic lake with areas of shallow, fertile water of low to medium clarity. There are extensive stands of submerged and emergent weeds, commonly extending into mid-lake. The bottom is mainly soft, highly organic sediments. In this northern latitude, this type of lake may winterkill. Thick ice and snow cover block out sunlight, so plants can no longer produce oxygen. Decomposition continues, drawing all oxygen from even the shallowest water. Bass are one of the first to die in winterkill lakes. In deep, clear waters such as canyon reservoirs and strip pits, water fertility is usually low. The water contains ample oxygen from top to bottom, so bass can move wherever they want.

Largemouth bass require depths of at least 9 feet to successfully over winter (from Stuber et at, 1982). The existing mean depth of Milford Pond is less than two feet, with the greatest depths being approximately five feet. Dredging the entire pond is expected to increase the aerial extent of the deeper areas of the pond. This will open deeper areas for largemouth bass to over winter. The considerable acreage of shallow water depths in Milford Pond provides poor deepwater habitat for largemouth bass. However, the presence of these fish has been observed in the pond, therefore the existing condition was given a rating of 0.2. Dredging the pond will provide a greater extent of deepwater areas proportional to the area of dredging; thus the requisite was assigned a value of 0.9, 0.8, and 0.7 for the full pond dredging, 45-acre dredging, and 20-acre dredging alternatives, respectively.

Black Crappie *Pomoxis nigromaculatus* (Lesueur, 1829)

These fish, also known as the "calico bass", were first introduced to Massachusetts in 1910 and were extensively stocked until 1940. They are found in rivers and streams, usually in quiet backwaters or deeper areas, and in ponds and lakes. Black crappies are often associated with cover, such as overhanging trees, submerged brash, docks, and aquatic vegetation. They often form schools, but larger individuals are somewhat solitary (Hartel et. al, 2002).

Littoral Habitat (trf_4)

Black crappie require littoral areas for spawning and nursery habitat. In addition, common daytime habitat is shallow water (littoral areas) in dense vegetation and around submerged trees, brush or other objects (Edwards et. al, 1982). Nests are commonly built in water that is 1 to 9 feet in depth (Hartel et. al, 2002).
Milford Pond in its existing condition contains abundant littoral area, although the density of vegetation in many areas inhibits fish passage. Thus, the no action alternative has been rated as 0.7, while the dredge alternatives were assigned a value of 0.8 and 0.6 for the partial and entire pond dredging al temadues respectively.

Spawning Substrate (trf_5)

Spawning occurs from midspring to early summer when water temperatures are greater than 68°F. Black crappie males construct shallow spawning nests, 6 to 8 inches in diameter, in or near beds of vegetation, on a soft mud, sand, or gravel substrate (Hartel et. al, 2002; Edwards et. al, 1982). Extremely fine silts and organic mucks (as are present in Milford Pond) are not suitable for spawning of many fish species (including black crappie) for the reasons noted earlier. Dredging will remove the fine silts and mucks, exposing more suitable spawning substrates.
Therefore, the no action alternative has been rated as poor (0.2). The dredging alternatives were deemed to provide some relief from the existing condition and have been rated as 0.5.

Deepwater Habitat (trf_6)

Black crappie generally feed (forage) over deep/open water habitat (Edwards et. al, 1982). This is predominantly absent from Milford Pond in its existing condition, therefore, this requisite was assigned a value of 0.1 for the no action alternative, and a value of 0.9, 0.8, and 0.7 for the full pond dredging, 45-acre dredging, and 20-acre dredging alternatives, respectively.

Yellow Perch *Perca flavescens* (Mitchill, 1814)

Yellow perch is a very common warmwater species distributed statewide. They are important native panfish and a true perch that inhabits nearly every river, lake and pond in Massachusetts. They are relatively easy to catch and are often one of the first fish caught by children and new anglers. While yellow perch are found throughout the State in a variety of habitats, they prefer shallow, weedy protected sections of rivers, lakes, and ponds, but are most common in clear, open water habitats with moderate vegetation. They are generally intolerant of pollutants and heavy siltation. They gather in schools and usually swim very close to the bottom. They feed on small fish, insects, crustaceans, leeches and other invertebrates. They are not shy about feeding during the day when they pursue their prey with a keen visual sense, often cornering fish against a boulder or other obstruction.

Littoral Habitat- (trf_7)

Ideal perch habitat consists of cool, clear water with a rock, gravel, or sand bottom and some vegetation. In those lakes with soft bottoms and massive weed beds that provide hiding places from predators, the perch are often very small as a result of high survival rates among the young, which typically result in a loss of biodiversity and recreational value.

The majority of the littoral habitat present in Milford Pond is adequate to support yellow perch populations, although not optimized or ideal due to the density of nuisance aquatic vegetation and soft sediment loadings. For yellow perch this requisite was assigned a value of 0.5 as an assessment of the current condition under the no action alternative. The 20 acre and 45 acre dredging alternatives were each assigned a slight improvement at 0.8 based on the anticipated improved weed density throughout the littoral zone resulting from the removal of the soft sediments and the nutrients bound within. The complete dredging alternative will result in the removal of littoral habitat; therefore this alternative was given a value of 0.6.

Spawning Substrate- (trf_8)

Yellow perch spawn in April or May. Adults migrate into shallow weedy sections and randomly release long strings (up to seven feet) of transparent eggs. They broadcast their eggs in long, gelatinous strands that adhere to aquatic vegetation or settle to the bottom. Spawning takes place when water temperatures during spring reach 43 to 48 degrees Fahrenheit, usually at night and in weed, brush, or other cover, to which the ribbons of eggs will adhere. Yellow perch will remain in their spawning locations for a few weeks before moving into deeper water of 65 to 70 degrees Fahrenheit. (Sources: *Massachusetts Wildlife, No. 2, 2000, Special Fishing Issue and Freshwater Fishes of the Carolinas, Virginia, Maryland, & Delaware).* The current spawning substrate consists of significant soft sediments with dense macrophyte growth. A moderate amount of vegetation in littoral areas (either aquatic or flooded terrestrial) is important for spawning (Clady and Hutchinson 1975). The effect of these aquatic macrophyte species on habitat is often dramatic, with a thick growth from the sediment surface to the pond surface, occluding the water column and impeding vertical transport of oxygen and blocking fish passage. Both the surface and water column species densely shade the sediment surface, out-competing other bottom rooting aquatic macrophytes that would be more desirable in terms of less dense growth and adding to the vegetative and structural diversity of the habitat. Nevertheless, the no action alternative was rated as 0.6 depicting a fair habitat rating. The partial dredging a1temadues, providing the most long lasting benefit to this habitat component, were given a rating of 0.9, and the full dredging alternative will provide slightly less improvement for a rating of 0.8.

Deepwater Habitat-(trf_9)

Perch inhabit open areas of most lakes with large deep areas surrounded by shallow weedy areas (mostly natural glacial lakes left by the last Ice Age), but they are very adaptable. Smaller specimens inhabit weedy shallow areas, while the larger fishes school around deepwater structures up to 100 feet deep. In summer, they are often found near the thermocline or the water layer where the temperature suddenly changes drastically. The thermocline is especially attractive to the fish when it occurs near the bottom. In fall and winter, yellow perch are found in shallower water and offer a fishing bonanza for the ice-fisherman just before ice-out. The no action alternative is rated 0.2 based on the lack of deep-water habitat currently present in Milford Pond (not 0 because yellow perch have been observed in the pond). The dredging alternatives were deemed to have a detectable improvement in the deepwater habitats category and were promoted to 0.9, 0.8, and 0.7 for the complete, 45-acre, and 20-acre dredging alternatives, respectively.

Wetland Habitat Requisites

General Habitat Requisites for Wetland Avian Species/Waterfowl

As discussed previously, Milford Pond is bordered by extensive areas of fringing wetlands, with large stands of cattails located on its southeast shore, with lesser stands located on its northwest shore. These areas provide habitat for a number of avian species, which include pied billed grebe, common moorhen, least bittern, king rail, as well as mallard duck (and presumably black duck). The set of general habitat requisites (**GRw**) necessary for all of these species include:

1) **The percent of emergent and scrub shrub wetland vegetation containing cattail and sedges adjacent to open water (grw_1).** This is defined by the actual area of this type of habitat and its proximity to an area of open water, based upon the assumption that the cover for refuge and nesting habitat is as important as the open water is for feeding habitat. This is also a measure of the location of the wetland in relation to the body of water. Assumptions are that a long narrow edge of this type of habitat is less suitable than a circular or rectangular tract of habitat located near the body of water with its edge extending in the water, or a long narrow strip of water adjacent to

a larger area of emergent cattail marsh. Therefore those areas with long narrow edges would be less optimal than those that contain approximately equally sized areas. However, it also may be beneficial for these areas of the emergent cattail habitat to be divided into two or more larger areas surrounded by open water (i.e. islands), since some species nest in smaller areas of cattail marsh surrounded by open water i.e. King Rail and Pied Billed Grebe. The assumption is that the optimum ratio or percentage would be 50:50, with an assumed optimum distribution being arranged with a half of this habitat located on an edge of the water, and half surrounded by water.

2) **The percent of open water < 3 feet deep (grw_2).** (This is utilized by dabbling ducks as well as other avian wetland species). This is necessary for dabbling (feeding), in order for the various waterfowl noted above to reach the bottom, which contains food items. In addition, some of the above species feed in areas that are only several inches deep (King Rail). Others nest in these areas.

3) **Ratio of open water to emergent vegetation (grw_3)** (50:50 is optimal) (Waterfowl Management Handbook, 1992; Vermont Agency of Natural Resources, 1999). This measures the actual amounts of emergent vegetation in the water itself (i.e. the shallow and/or deeper areas inhabited by aquatic vegetation). It is the measure of the area of the open water itself occupied by emergent vegetation, as compared to the un-vegetated open water. This is generally used by most waterfowl species for most of life stages, i.e. nesting and refuge habitat would be in the emergent vegetation, and feeding habitat would be in or near the open water, or edge areas.

These three variables comprise the general wetland habitat requisites for Milford Pond as noted in the general formula on pages 5 and 6 (**GRw**). They will be discussed in further detail below, and also evaluated as to their degree of change with each of the dredging/restoration alternatives for Milford Pond to obtain individual values (**grw**).

Specific Habitat Requisites for Target Species (TRw) (Black Duck) (*Anas rubripes*).

The specific Habitat Requisites for this species include

1) **The density of the rooted (including emergent) vegetation present in the open water areas (trw_1).** Assume that a density if 50% is optimal, denser stands can interfere with swimming, feeding and can cause entanglement.

2) **Percent of backwater supporting insect larvae (trw_2)** (i.e. mosquitoes) and other invertebrates for feeding of young (assume that 50:50 is optimal). It would be measured by the amount of small shallow pools located or interspersed with the emergent wetland vegetation. Newly hatched black duck young feed on mosquito larvae, and other invertebrates (Environment Canada) as well as ducklings of most species. In addition, pre-nesting adults require additional

protein in the form of aquatic invertebrates found in shallow diverse wetland communities.

3) **Percent of nesting habitat (i.e. scrub shrub/emergent vegetation within 1 mile of water) (trw_3).** This would generally measure other types of habitat present (i.e. scrub shrub) wetland within one mile from the open water, in addition to the existing cattail/sedge habitat. This species can generally nest in sedge, scrub/shrub, or wooded habitats. However in Maine this species preferred sedge shrub marshland when available (Kibbe and Laughlin, 1985). These areas need to be within a reasonable distance from the water to minimize mortality of young during their migration from the nesting areas

Each of these specific habitat requisites (trw) for the target species (i.e. black duck) will be assigned a value for each dredging alternative and incorporated into the general formula noted above, in order to obtain the overall index value for the fish and waterfowl habitat in Milford Pond.

Discussion of General Habitat Requisites for Wetland Avian Species/Waterfowl

1. Percent of Cattail Marsh adjacent to open water:

As noted, several avian wetland/waterfowl species inhabit the extensive cattail habitat in Milford Pond. These include four state listed species which are 1) the **Least Bittern** (*Ixobrychus exilis*); 2) the Pied Billed Grebe (*Podilymbus podiceps*; 3) the King Rail; 4) the Common Moorhen. These are described below with their habitat requirements. It should be noted that all of these have the requirement of extensive areas of Cattail Marsh adjacent to open water.

The Least Bittern (*Ixobrychus exilis*) is **Restricted to Extensive cattail marshes** (Veit and Petersen, 1993) **for breeding, Cattail and sedge marshes** (Laughlin and Kibbe, 1985). Nests in emergent vegetation usually near open water. It is generally a wader but can also climb about on emergent vegetation so it therefore can nest and forage over water considerably deeper than would be accessible through wading (Laughlin and Kibbe, 1985). Therefore, the assumption is that ideal habitat includes areas of extensive cattail marsh, adjacent to open water.

Pied -billed Grebe (*Podilymbus podiceps*).This species prefers to nest in marshes, lakes, large ponds and other wetlands, which have an abundant **supply of cattails, reeds, and other vegetation, which can provide cover and nesting materials** (Pied-billed Grebe fact sheet). Nests are built with decayed reeds, sedges, grasses, and other vegetation. Nests are located in thick vegetation near to or surrounded by open water, which allows birds to travel to and from the nest underwater and undetected. Breeding territory generally comprises the area within 150 feet of the nest. They feed on aquatic vegetation, seeds, frogs, tadpoles, fish aquatic insects and crayfish (Pied billed Grebe fact sheet, Massachusetts).

King Rail *(Rallus elegans)*. This species inhabits large **freshwater and brackish marshes, dominated by cattails, and other emergent vegetation.** They are inclined to wander onto adjacent fields (King Rail fact sheet, Comonwealth of Massachusetts). Usually remain hidden among the dense vegetation. Small strips of freshwater marshland are used as breeding territories. Forage in shallow water 2-3" deep concealed by vegetation. Their diet includes insects, slugs, tadpoles, small frogs, crayfish, grains and seed from aquatic plants. **The nests are made of sedges and grasses in cattails or other dense vegetation.**

Common Moorhen (*Gallinula chloropus*). This species inhabits large **freshwater marshes and ponds with cattails** (*Typha* spp.) and other emergent vegetation. It feeds by wading or diving at the edges of open water. Its food is made up of grass **and sedge seeds and insects** (common moorhen fact sheet, Commonwealth of Massachusetts). **These birds forage on open water** swimming and diving in order to prey on vegetation and aquatic invertebrates, and therefore can often be mistaken for ducks. Nests are built of dead cattails sedges and reads, and **are located in dense emergent vegetation in water depths of 1-3 feet** (Laughlin and Kibbe, 1985).

In addition, many waterfowl species (i.e. black duck and/or mallard duck) utilize emergent cattail marsh habitat for cover and nesting. American Black Duck (*Anas rubripes*) habitat includes open marshes, to densely wooded swamps (Veit and Petersen, 1993); such as beaver ponds, glacial kettles, surrounded by bog mats, along creeks, and rivers, on lakes in swamps as well as **extensive sedge or cattail marshland**. However in Maine, this species preferred sedge-shrub marshland when available (Kibbe and Laughlin, 1985). It is assumed that the habitat requirements for mallard duck would be similar, since this species is often found associated with black duck, and is believed to interbreed with it.

For Milford Pond, it is assumed that the existing proportion of cattail marsh is optimal for the above species, since not only do they occupy that habitat, but this area is one of the relatively few locations in the State where they can be found.

2. The percent of open water less than 3 feet deep. Shallow water less than 3 feet deep is used by avian wetland and waterfowl species. Dabbling ducks including black duck require areas of open water less than 3 feet deep in order to forage (Fish and Wildlife Service, Habitat Suitability Index Model for Black Duck). In addition the Common moorhen, which occurs in Milford Pond nests in areas of water less than 3 feet deep. (Common Moorhen fact sheet, Commonwealth of Massachusetts).

3. Ratio of open water to emergent vegetation. In addition to the amount of cattail and sedge wetland noted in the first variable, the amounts of the open (either shallow or deep) occupied by emergent vegetation. Wetlands most attractive to dabbling ducks contain about a 50:50 ratio of open water to emergent vegetation. Patches of emergent plants, sparse enough to allow a duck to swim through a re more attractive than large blocks of thick, unbroken vegetation (Waterfowl Management Handbook, 1992; Vermont Pond Construction Guidelines, 1999).

Application of Variables to Milford Pond. These requisites with their values and functional grouping are discussed below. Habitat indices were calculated for four alternatives, i.e. 1) No action, 2) Complete dredging; 3) Dredging of 45 acres; and 4) Dredging of 20 acres.

General and Specific Wetland/Waterfowl Requisites for Each Alternative

1. The percent of emergent and scrub shrub wetland vegetation containing cattail and sedges adjacent to open water (grw_1).

As noted in its existing state, Milford Pond provides habitat for the four state listed species noted above, as well as other waterfowl. Extensive stands of Cattail Marsh are located on the southwest shore with lesser amounts on the northeast shore. Additional areas of emergent scrub shrub vegetation are located further north on the western shore. There is currently close to a 50:50 ratio between the amounts of this emergent marsh and the existing open water habitat (although after May, it becomes overgrown with weeds). Therefore for the No Action Alternative, this was given a value of 0.9. For the complete dredging alternative, it was given a value of 0, since the area of cattail marsh on all sides will be completely removed, and for the dredging of both 43 acres and the 20 acres alternatives, this was given a 0.9 for each, since these alternatives are not expected to encroach on the emergent and scrub shrub wetland areas.

2. The percent of open water less than 3 feet deep

This requisite was assigned a value of 0 9 for Milford Pond in its existing state, since most of the Pond is currently less than three feet deep. For the complete dredging alternative, it was assigned a value of 0.2, since most of it will be removed, with the exception of a small strip along the margins of the impoundment. For the two dredging alternatives, it was assigned a value of 0.7 and 0.8 for the 45 and 20 acre dredging alternatives respectively (note that the extent of area less than three feet deep is so extensive in Milford Pond that this depth in itself does not appear to be limiting. Therefore, this requisite is not expected to change significantly with either of the two partial dredging alternatives.

3. The percent area of vegetated open water to emergent vegetation

Currently, the area of open water occupied by emergent vegetation is assumed to be close to be over 50%, particularly in the summer. Dredging is expected to restore some of the open water habitat to a more optimal ratio, however complete dredging will remove too much of this vegetated area. Therefore, this was assigned a value of 0.5 for the no action alternative, 0.2 for the complete dredging alternative, and 0.7 and 0.6 for the 45 and 20 acre dredging alternatives respectively.

Specific Habitat Requisites for Milford Pond (Black Duck)

1) The density of the rooted (including emergent) vegetation present in the open water areas (trw_1).

Milford Pond in its existing becomes overgrown with weeds during the summer months. It is clear of these weeds for only a brief period during the early to mid spring. During the summer months, all available open water becomes totally weed covered and un-useable by many dabbling waterfowl. Therefore, this was assigned a value of 0.2 for the no action alternative (since it is useable for some of the time), a value of 0.2 for the complete dredging alternative, and value of 0.9 and 0.7 for the two partial dredging alternatives, since they will both remove the dense vegetation which currently chokes the open water habitat.

2) Percent of backwater supporting insect larvae (trw_2)

The existing emergent vegetation in the project area is assumed to provide sufficient backwater for insect larvae, utilized by young of this species. Therefore it is assigned a value of 1 for the no action alternative. For the complete dredging alternative it was assigned a value of .1, since this will remove most of the emergent wetland and associated backwater from the area. For the 43 acre and 20 acre dredging alternatives this was assigned a value of 1 for each since each of them will not interfere with the existing sections of emergent and scrub shrub vegetation and associated backwaters.

3) Percent of nesting habitat (i.e. scrub shrub/emergent vegetation within 1 mile of water) (trw_3). This variable is only expected to change with the complete dredging alternative, which will effectively remove most of the existing emergent vegetation in the project vicinity. Therefore it was assigned values of 1 for the no action, .2 for the complete dredging, and 1 for each of the partial dredging alternatives.

Calculation of Habitat Units

Habitat Units for each of the Milford Pond dredging alternatives were calculated according to the formula noted above, where the Indices obtained for both the lacustrine (i.e. fisheries) habitat and wetland (i.e. waterfowl) habitat were applied to the total acres of each of these respective habitat types that will become available with each alternative. These acreages are:

1) No Action- Total acreage of project is 123. Existing open water boundaries of open water habitat as measured in 1998 is approximately 70 acres. Therefore the lacustrine Habitat Index HI was multiplied by 70 acres to obtain the lacustrine Habitat Units, and the Wetland/Waterfowl HI was multiplied by the total project acreage (123) to obtain the waterfowl Habitat Units.

2) Complete Dredging- This alternative will open up approximately 102 acres of Lacustrine Habitat, while leaving a very small edge of wetland around the perimeter of the pond. Therefore, the lacustrine component is multiplied by 102. Since the entire area is still useable to waterfowl, the waterfowl acres are still the total acres of the project, at 123, however the quality change is reflected in the HI.

3) Dredging of 45 Acres-This will create 45 acres of optimal lacustrine habitat, but will leave approximately 25 acres of open water habitat that is still unchanged. Therefore, 45 acres are multiplied by the HI calculated for that alternative, and 25 acres are multiplied by the HI obtained for the no action alternative. The waterfowl habitat component is still multiplied by the total of 123 since the entire project area is still useable for these species.

4) Dredging of 20 Acres-This will open up 20 acres of lacustrine habitat but will leave approximately 50 acres of open water unchanged. Therefore, the HI calculated for this alternative was multiplied by 20, and the HI obtained for the no action alternative was multiplied by 50. The waterfowl habitat component is still multiplied by the total of 123 acres.

These calculations are presented in the attached spreadsheet.

The total Habitat Units for each alternative are listed below

Alternative 1, No Action

Fisheries HU= 28.19
Wetland/Waterfowl HU=90.56
Total Habitat Units = 118.75

Alternative 2, Complete Dredging

Fisheries HU=63.90
Wetland/Waterfowl=0
Total Habitat Units = 63.90

Alternative 3, Dredging of 45 Acres

Fisheries HU = 40.42
Wetland/Waterfowl HU=101.75
Total Habitat Units = 142.17

Aternative 4, Dredging 20 Acres

Fisheries HU = 32.44
Wetland/Waterfowl = 97.58
Total Habitat Units = 130.01

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Table 2. Milford Pond Pond Habitat Restoration - Habitat Units of Optimal Restored Lacustrine Habitat Available Under Various Project Conditions

Alternative 1: No Action

General Habitat Requisites	Value	Weight Multplie	Adjusted Valu	Total Score	Total Possible Score	Habitat Inde	Habitat Units
DO	0.30	1	0.30			0.43	
Turbidity	0.50	1	0.50				
Temperature	0.70	1	0.70				
Benthic Inverts	0.40	1	0.40				
Cover	0.30	1	0.30				
Forage	0.50	1	0.50				
			0.45	0.43	1		
				0.43	1	0.43	
Specific Habitat Requisites							
Largemouth Bass							
Littoral Habitat	0.70	0.111	0.08				
Spawning Substrate	0.20	0.111	0.02				
Deepwater Habitat	0.20	0.111	0.02				
				0.12	0.333	0.12	
Black Crappie							
Littoral Habitat	0.70	0.111	0.08				
Spawning Substrate	0.20	0.111	0.02				
Deepwater Habitat	0.10	0.111	0.01				
				0.11	0.333	0.11	
Yellow Perch							
Littoral Habitat	0.50	0.111	0.06				
Spawning habitat	0.60	0.111	0.07				
Deepwater Habitat	0.20	0.111	0.02				
				0.14	0.333	0.14	
		0.999		0.38	0.999	0.38	
Total Habitat Index for Fisheries Component						**0.20**	28.19
Wetland Restoration							
General Requisites							
Emergent Vegetation/scrub shrub	0.90	1	0.90				
Percent Open water < 3 feet deep	0.90	1	0.90				
Percent vegetated open water	0.50	1	0.50				
				0.74	1	0.74	
Specific Habitat Requisites							
Black Duck							
Open Water:Emergent Vegetation, Dens	0.20	0.333	0.07				
Percent Backwater	1.00	0.333	0.33				
% Emergent/scrub shrub Within 1 mile o	1.00	0.333	0.33	0.73	0.999	0.73	
Total Habitat Index for Waterfowl component						**0.37**	90.56
Total Habitat Suitability Index for Habitat						**0.57**	118.75

Table 2 (continued). Milford Pond Pond Habitat Restoration - Habitat Units of Optimal Restored Lacustrine Habitat Available Under Various Project Conditions

Alternative 2: Complete Drdging of Pond Basin

General Habitat Requisites	Value	Weight Multplier	Adjusted Value	Total Score	Total Possible Score	Habitat Inde>	Habitat Units
DO	0.60	1	0.60			0.53	
Turbidity	0.60	1	0.60				
Temperature	0.50	1	0.50				
Benthic Inverts	0.60	1	0.60				#DIV/0!
Cover	0.50	1	0.50				
Forage	0.40	1	0.40				
			0.53	0.53	1		
				0.53	1	0.53	
Specific Habitat Requisites							
Largemouth Bass							
Littoral Habitat	0.80	0.111	0.09				
Spawning Substrate	0.50	0.111	0.06				
Deepwater Habitat	0.90	0.111	0.10				
				0.24	0.333	0.24	
Black Crappie							
Littoral Habitat	0.80	0.111	0.09				
Spawning Substrate	0.50	0.111	0.06				
Deepwater Habitat	0.90	0.111	0.10				
				0.24	0.333	0.24	
Yellow Perch							
Littoral Habitat	0.60	0.111	0.07				
Spawning habitat	0.80	0.111	0.09				
Deepwater Habitat	0.90	0.111	0.10				
				0.26	0.333	0.26	
				0.74	0.999	0.74	
Total Habitat Index for Fisheries Component						0.31	63.90
Wetland Restoration							
General Requisites							
Emergent Vegetation/scrub shrub	0.00	1	0.00				
Percent Open water < 3 feet deep	0.20	1	0.20				
Percent vegetated open water	0.20	1	0.20				
				0.00	1	0.00	
Specific Habitat Requisites							
Black Duck							
Open Water:Emergent Vegetation, Dens	0.20	0.333	0.07				
Percent Backwater	0.00	0.333	0.00				
% Emergent/scrub shrub Within 1 mile o	0.20	0.333	0.07	0.13	0.999	0.13	
Total Habitat Index for Waterfowl component						0.00	0.00
Total Habitat Suitability Index for Habitat						0.31	63.90

Table 2 (continued). Milford Pond Pond Habitat Restoration - Habitat Units of Optimal Restored Lacustrine Habitat Available Under Various Project Conditions

Alternative 3: Dredging of 45 Acres

General Habitat Requisites	Value	Weight Multiplier	Adjusted Value	Total Score	Total Possible Score	Habitat Index	Habitat Units
DO	0.50	1	0.50			0.65	
Turbidity	0.70	1	0.70				
Temperature	0.80	1	0.80				
Benthic Inverts	0.50	1	0.50				#DIV/0!
Cover	0.70	1	0.70				
Forage	0.80	1	0.80				
			0.67	0.65	1		
				0.65	1	0.65	
Specific Habitat Requisites							
Largemouth Bass							
Littoral Habitat	0.80	0.111	0.09				
Spawning Substrate	0.50	0.111	0.06				
Deepwater Habitat	0.80	0.111	0.09				
				0.23	0.333	0.23	
Black Crappie							
Littoral Habitat	0.60	0.111	0.07				
Spawning Substrate	0.50	0.111	0.06				
Deepwater Habitat	0.80	0.111	0.09				
				0.21	0.333	0.21	
Yellow Perch							
Littoral Habitat	0.80	0.111	0.09				
Spawning habitat	0.90	0.111	0.10				
Deepwater Habitat	0.80	0.111	0.09				
				0.28	0.333	0.28	
				0.72	0.999	0.72	
Total Habitat Index for Fisheries Component						0.34	40.42
Wetland Restoration							
General Requisites							
Emergent Vegetation/scrub shrub	0.90	1	0.90				
Percent Open water < 3 feet deep	0.70	1	0.70				
Percent vegetated open water	0.70	1	0.70				
				0.76	1	0.76	
Specific Habitat Requisites							
Black Duck							
Open Water:Emergent Vegetation, Dens	0.70	0.333	0.23				
Percent Backwater	1.00	0.333	0.33				
% Emergent/scrub shrub Within 1 mile o	1.00	0.333	0.33	0.90	0.999	0.90	
Total Habitat Index for Waterfowl component						0.41	101.75
Total Habitat Suitability Index for Habitat						0.76	142.17

Table 2 (continued).

Milford Pond Pond Habitat Restoration - Habitat Units of Optimal Restored Lacustrine Habitat

Available Under Various Project Conditions

Alternative 4: Dredging of 20 Acres

General Habitat Requisites	Value	Weight Multplier	Adjusted Value	Total Score	Total Possible Score	Habitat Index	Habitat Units
DO	0.40	1	0.40			0.57	
Turbidity	0.60	1	0.60				
Temperature	0.80	1	0.80				
Benthic Inverts	0.50	1	0.50				#DIV/0!
Cover	0.50	1	0.50				
Forage	0.70	1	0.70				
			0.58	0.57	1		
				0.57	1	0.57	
Specific Habitat Requisites							
Largemouth Bass							
Littoral Habitat	0.60	0.111	0.07				
Spawning Substrate	0.50	0.111	0.06				
Deepwater Habitat	0.70	0.111	0.08				
				0.20	0.333	0.20	
Black Crapple							
Littoral Habitat	0.60	0.111	0.07				
Spawning Substrate	0.50	0.111	0.06				
Deepwater Habitat	0.70	0.111	0.08				
				0.20	0.333	0.20	
Yellow Perch							
Littoral Habitat	0.80	0.111	0.09				
Spawning habitat	0.90	0.111	0.10				
Deepwater Habitat	0.70	0.111	0.08				
				0.27	0.333	0.27	
				0.67	0.999	0.67	
Total Habitat Index for Fisheries Component						0.31	32.44
Wetland Restoration							
General Requisites							
Emergent Vegetation/scrub shrub	0.90	1	0.90				
Percent Open water < 3 feet deep	0.80	1	0.80				
Percent vegetated open water	0.60	1	0.60				
				0.76	1	0.76	
Specific Habitat Requisites							
Black Duck							
Open Water:Emergent Vegetation, Dens	0.50	0.333	0.17				
Percent Backwater	1.00	0.333	0.33				
% Emergent/scrub shrub Within 1 mile o	1.00	0.333	0.33	0.83	0.999	0.83	
Total Habitat Index for Waterfowl component						0.40	97.58
Total Habitat Suitability Index for Habitat						0.70	130.01

Table 2 (continued).

Milford Pond Pond Habitat Restoration - Habitat Units of Optimal Restored Lacustrine Habitat Available Under Various Project Conditions

General Habitat Requisites	No Action	Complete Dredg	Dredging 45 Ac	Dredge 20 A	Dam Removal	Dam Rem/dredg	
DO	0.30	0.6	0.50	0.4			
Turbidity	0.50	0.6	0.70	0.6			
Temperature	0.70	0.5	0.80	0.8			
Benthic Inverts	0.40	0.6	0.50	0.5			
Cover	0.30	0.5	0.70	0.5			
Forage	0.50	0.4	0.80	0.7			
Specific Habitat Requisites							
Largemouth Bass							
Littoral Habitat	0.70	0.8	0.80	0.60			
Spawning Substrate	0.20	0.5	0.50	0.50			
Deepwater Habitat	0.20	0.9	0.80	0.70			
Black Crappie							
Littoral Habitat	0.70	0.8	0.60	0.60			
Spawning Substrate	0.20	0.5	0.50	0.50			
Deepwater Habitat	0.10	0.9	0.80	0.70			
Yellow Perch							
Littoral Habitat	0.50	0.6	0.80	0.80			
Spawning habitat	0.60	0.8	0.90	0.90			
Deepwater Habitat	0.20	0.9	0.80	0.70			
Total Habitat Index for Fisheries Component							0.00
Wetland Restoration							
General Requisites							
Emergent Vegetation/scrub shrub	0.90	0	0.90	0.90			
Percent Open water < 3 feet deep	0.90	0.2	0.70	0.80			
Percent vegetated open water	0.50	0.2	0.70	0.60			
Specific Habitat Requisites							
Black Duck							
Open Water:Emergent Vegetation, Dens	0.20	0.2	0.70	0.50			
Percent Backwater	1.00	0	1.00	1.00			
% Emergent/scrub shrub Within 1 mile o	1.00	0.2	1.00	1.00			
Total Habitat Index for Waterfowl component							
Total Habitat Suitability Index for Habi	0.57	0.31	0.76	0.70			0.00

Incremental Cost Analysis

In this section, the costs of the alternative restoration plans are compared with the environmental benefits, within the framework of an incremental cost analysis, to display the most cost effective alternatives. An incremental cost analysis examines how the costs of additional units of environmental output increase as the level of environmental output increases. For this analysis, the environmental outputs are measured in habitat units. The analysis is in accordance with IWR Report 95-R-1, Evaluation of Environmental Investments Procedures Manual-Interim: Cost Effectiveness and Incremental Cost Analyses, May 1995; and ER 1105-2-100, Planning Guidance Notebook, Section 3-5, Ecosystem Restoration, April 2000. The program IWR-PLAN, developed for the Institute for Water Resources (IWR), was used to conduct the analysis.

An incremental cost curve can be identified by displaying cost effective solutions. Cost effective solutions are those increments that result in same output, or number of habitat units, for the least cost. An increment is cost effective if there are no others that cost less and provide the same, or more, habitat units. Alternatively, for a given increment cost, there will be no other increments that provide more habitat units.

Management plans to improve environmental conditions at Milford Pond include different dredging scenarios. Project description, project cost, and the number of habitat units created by each plan are shown in Table 1. Costs are discounted at an interest rate of 5 3/8 %. This interest rate, as specified in the Federal Register, is to be used by Federal agencies in the formulation and evaluation of water and land resource plans for the period October 1, 2004 to September 30, 2005. The project economic life is considered to be 50 years.

Table 1. Alternatives Cost and Output

No	Description	Cost	HU
		($000)	
1	No Action	0.0	118.75
2	Dredge 120 Acres	18,530.9	63.90
3	Dredge 45 Acres	8,071.5	142.17
4	Dredge 20 Acres	4,460.7	130.01

Column 1 shows plan designators. Column 2 is a brief description of each plan. Plan 1 is the no action alternative for dredging. Plan 2 is dredging all, or 120 acres, of Milford Pond. Plan 3 is dredging 45 acres and Plan 4 is dredging 20 acres. Each of the dredging plans would dredge to a maximum depth of 12 feet. Dredging the entire pond would result in a total loss of waterfowl habitat resulting in an overall decline in habitat units. The other two alternatives would provide for both waterfowl and fisheries habitats.

Project cost derivation is shown in Table 2. First cost includes all contingencies, overheads, real estate and study costs (Plans & Specifications). Interest during construction (IDC) is then calculated assuming a construction period of 12 months for Alternatives 2 through 4. IDC is an economic cost and not a financial cost. It needs to be estimated for purposes of project justification, however it is not a financial cost that will need to be cost shared. Essentially, IDC represents the opportunity cost of funds tied up in investments, before these investments begin to yield benefit. Once project benefit starts IDC stops.

Table 2. Project Cost ($000)

No.	Description	First Cost	IDC	Project Cost	Construct. Period (months)
1	No Action	0.0	0.0	0.0	0
2	Dredge 120 Acres	17,118.4	1,412.5	18,530.9	36
3	Dredge 45 Acres	7,768.5	303.0	8,071.5	18
4	Dredge 20 Acres	4,351.9	108.8	4,460.7	12

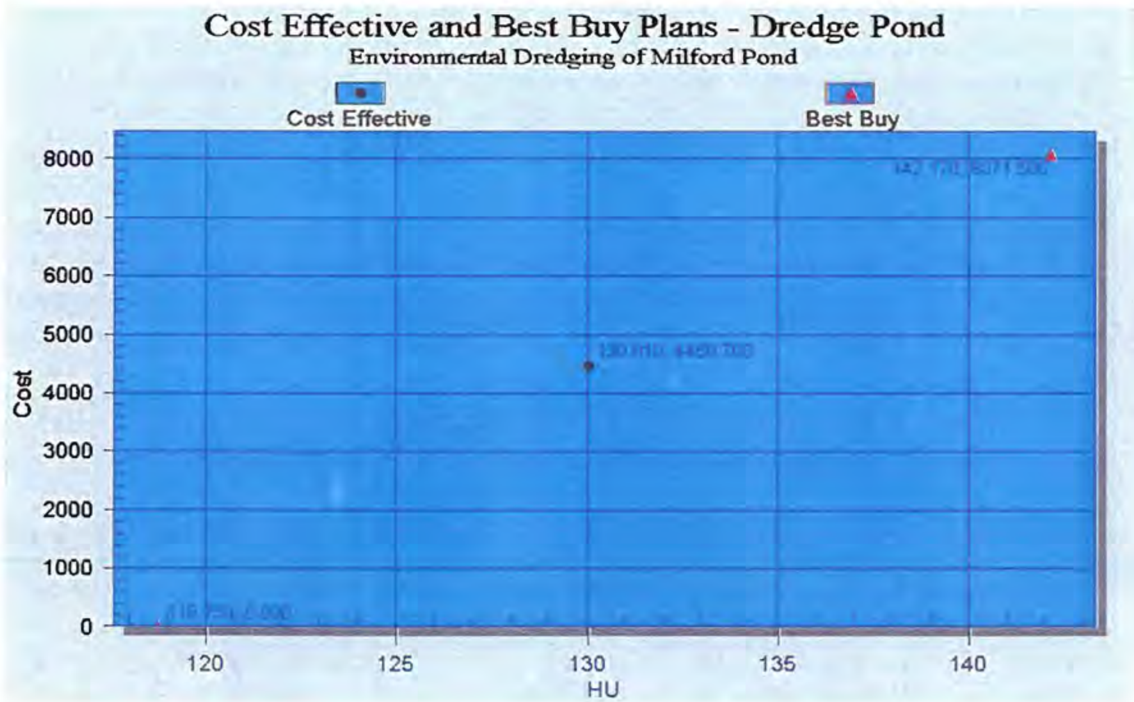


Figure 1

Figure 1 shows all cost effective plans and best buy plans. The vertical axis represents thousands of dollars. The incremental analysis identified three (out of a possible four) alternatives as cost effective plans. Alternative 2 is not cost effective because compared with Alternative 4 it provides fewer habitat units at a higher cost. Best buy plans are a subset of cost effective plans. For each best buy plan there are no other plans that will give the same level of output at a lower incremental cost. There are two best buy plans including the no action alternative.

Figure 2

Figure 2 shows best buy plans that comprise the incremental cost curve. As in Figure 1, the horizontal axis represents habitat units created by each project. However, the vertical axis represents the incremental cost per incremental output as output increases with project size. The units on the vertical axis are thousands of dollars. Best buy plans are a subset of cost effective plans. For each best buy plan there are no other plans that will give the same level of output at a lower incremental cost. There are two best buy plans.

Increments that comprise the best buy plan curve are alternatives 1 and 3, the without project, or no action alternative; and dredging 45 acres. Plan 4 is not a best buy plan because it results in less output at a higher incremental cost than Plan 3. The best buy plan curve is the incremental cost curve. Incremental cost and incremental output are the changes in cost and output when the cost and output of each successive plan in terms of increasing output are compared. Incremental cost per output is the change in cost divided by the change in output, or incremental output, when proceeding to plans with higher levels of output. Table 3 shows incremental cost for each best buy alternative.

Table 3. Incremental Cost Curve ($000)

No	Alternative	Cost	HU	Ave. Cost	Inc. Cost	Inc. HU	Inc. Cost per Inc. HU
1	No Action	0.0	118.75	0.0	0.0	0.0	0.0
3	Dredge 45 Acres	8,071.5	142.17	56.8	8,071.5	23.42	344.6

In the incremental cost curve (shaded area in Table 3), incremental cost per unit increases with output, or habitat units. Development of the incremental cost curve facilitates the selection of the best alternative. The question that is asked at each increment is: is the additional gain in environmental benefit worth the additional cost? In this study, the incremental cost curve consists of only two points represented by Alternative 1 and Alternative 3 (without project condition and dredging 45 acres. Alternative 3 would dredge 45 acres of Milford Pond. This increment would provide an additional 23.42 habitat units over the without project alternative at an incremental cost of $8,071,500. The incremental cost per habitat unit is $344,600.

APPENDIX C
PERTINENT CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

November 19, 2004

Reference: Project — Aquatic Habitat Restoration of Milford Pond; Location — Milford, MA

David Dulong
Engineering/Planning Division
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Dulong:

This is in response to your letter requesting a final Fish and Wildlife Coordination Act report, as well as information on the presence of federally-listed and/or proposed endangered or threatened species, in relation to the proposed subject project.

Endangered Species Comments

Based on information currently available to us, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service (Service) are known to occur in the project area. Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required.

This concludes our review of listed species and critical habitat in the project location and environs referenced above. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Fish and Wildlife Coordination Act Comments

We have reviewed the Draft Environmental Assessment (DEA) for the Aquatic Habitat Restoration of Milford Pond. While the Service does not oppose the project, our preferred course of action would have been to remove the dam and restore the area to its historic cedar swamp condition, or to allow the wetland successional process to occur, which would have eventually resulted in the conversion of Milford Pond to an emergent wetland community.

We understand those alternatives were considered during the project planning process, and we accept the reasons why they could not be implemented. Therefore, the Service concurs with your Finding of No Significant Impact.

This concludes our Final Fish and Wildlife Coordination Act Report. These comments do not preclude future evaluation and recommendations by the U.S. Fish and Wildlife Service, pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 et seq.), should project specifics change.

Thank you for your coordination. Please contact us at 603-223-2541 if we can be of further assistance.

Sincerely yours,

William J. Neidermyer

William J. Neidermyer
Acting Supervisor
New England Field Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

RE: Milford Pond Ecosystem Restoration
Milford, Massachusetts

May 13, 2002

David L. Dulong
Engineering/Planning Division
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Dulong:

This responds to your April 5, 2002 letter requesting information on the presence of federally-listed and proposed, endangered or threatened species in relation to the proposal to conduct an Aquatic Ecosystem Restoration project for Milford Pond in Milford, Massachusetts. Our comments are provided in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

Based on information currently available to us, no federally-listed or proposed threatened or endangered species under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area. Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required. Should project plans change, or additional information on listed or proposed species becomes available, this determination may be reconsidered.

Thank you for your cooperation. Please contact me at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Philip A. Morrison

Philip Morrison
Wildlife Biologist
New England Field Office

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

JANE SWIFT
Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

May 13, 2002

Mr. Tom Jenkins
Baystate Environmental Consultants, Inc.
296 North Main Street
East Longmeadow, MA 01028

Re: Sampling and Analysis for Milford Pond, MILFORD

Dear Mr. Jenkins:

I've reviewed the above referenced sampling plan, dated April 29, 2002, and the sampling locations and frequencies appear adequate. If you are considering upland placement of the sediment, it would be preferable to perform Extractable Petroleum Hydrocarbons (EPH) using Method for the Determination of Extractable Petroleum Hydrocarbons, developed by MA Dept. of Environmental Protection, January 1998, with a detection limit of 50 mg/kg, rather than using the EPA Method 418.1 method for TPH. You also may wish to consider adding analysis for Volatile Organic Compounds (VOCs), EPA method 8260, should the use or disposal of sediment at a Massachusetts landfill be a potential management option. Although the results of the preliminary sampling and analysis indicate that there only low levels of contaminants of concern, please be aware that Toxicity Characteristic Leaching Procedure (TCLP) is required to be performed when sediment concentrations of metals or organic compounds are equal to or greater than the theoretical concentration at which TCLP criteria may be exceeded, e.g., As > 100 mg/kg, Cd > 20 mg/kg, Cr > 100 mg/kg, Pb > 100 mg/kg, Hg > 4 mg/kg.

DEP's Water Quality Certification program determines sediment chemical suitability for upland placement using two sets of criteria. For metals (including arsenic) the Massachusetts Soil Background concentrations established by DEP's Office of Research and Standards (Interim Final Policy WSC/ORS-95-141) are used to ensure non-degradation of upland areas and to minimize ecological risk in the absence of site-specific chemistry and risk assessment data. For PAHs, PCBs and petroleum hydrocarbons DEP is using the Method 1 standards for S-1 from the MCP (Massachusetts Contingency Plan) to protect human health in the upland area where suitable sediments may be placed (see enclosure).

Should you wish to evaluate the sediment for potential reuse or disposal at a Massachusetts landfill, you may wish to review the Department's policy COMM-94-007, Interim

Policy for Sampling, Analysis, Handling and Tracking Requirements of Dredged Sediment Reused or Disposed at Massachusetts Permitted Landfills (see enclosure).

Please call if you have any questions. I can be reached at 617-292-5893.

Sincerely,

Yvonne L Unger

Yvonne Unger
Environmental Analyst

Cc: files

Upland Placement within 100-Year Floodplain at Project Location

DEP's 401 Water Quality Certification program determines sediment suitability for upland placement using two sets of criteria. The Massachusetts Soil Background concentrations established by DEP's Office of Research and Standards (Interim Final Policy WSC/ORS-95-141) are used to ensure non-degradation of upland areas and to minimize ecological risk in the absence of site-specific chemistry and risk assessment data. DEP is using RCS-1 standards from the MCP (Massachusetts Contingency Plan) to protect human health in the upland area where suitable sediments may be placed. The contaminant limits are summarized in the following table.

Contaminant	MA Background Soil Concentrations or RCS-1 Standards from 310 CMR 40.1600 mg/kg (dry wt.)
Arsenic	17
Cadmium	2
Chromium	29
Copper	38
Lead	99
Mercury	0.3
Nickel	17
Zinc	116
Polycyclic Aromatic Hydrocarbons (PAHs)	
Naphthalene	4
2-Methylnaphthalene	4
Acenaphthylene	100
Acenapthene	20
Fluorene	400
Phenanthrene	100
Anthracene	1000
Fluoranthene	1000
Pyrene	700
Benzo(a)anthracene	0.7
Chrysene	7
Benzo(b)fluoranthene	0.7
Benzo(k)fluoranthene	7
Benzo(a)pyrene	0.7
Indeno(1,2,3-cd)pyrene	0.7
Dibenzo(a,h)anthracene	0.7
Benzo(g,h,I)perylene	1000
Polychlorinated Biphenyls (PCBs)	2
Extractable Petroleum Hydrocarbons	
C_9 through C_{18} Aliphatic	1000
C_{19} through C_{36} Aliphatic	2500
C_{11} through C_{22} Aromatic	200

Off-site, Upland Placement

Upland, off-site placement of sediment requires that a Beneficial Use Determination (BUD) be issued from the Region's Buearu of Waste Prevention staff.

Off-site, Upland Disposal at Location other than a Landfill

Upland disposal of sediment requires that the site be regulated under the MA Site Assignment Regulations for Solid Waste Facilities at 310 CMR 16.00 and the Solid Waste Management Regulations at 310 CMR 19.000.

Landfill Reuse

The requirements regarding the reuse or disposal of sediment at a Massachusetts' permitted landfill is outlined in the Department's policy, COMM-94-007, Interim Policy for Sampling, Analysis, Handling and Tracking Requirements for Dredged Sediment Reused or Disposed at Massachusetts Permitted Landfills. The contaminant limits are summarized in the following table.

Contaminant	Contaminant Maximums for Sediment Reuse at Lined Landfills mg/kg (dry wt.) from COMM-94-007
Arsenic	40
Cadmium	80
Chromium	1000
Copper	--
Lead	2000
Mercury	10
Nickel	--
Zinc	--
Polycyclic Aromatic Hydrocarbons (PAHs)	Must sum to less than 100
Polychlorinated Biphenyls (PCBs)	Must sum to less then 2
Petroleum Hydrocarbons	Extractable petroleum hydrocarbons must sum to less than 5000, or TPH must be less than 5000
Toxicity Characteristic Leaching Procedure (TCLP)	Required to be performed when sediment concentrations of metals or organic compounds are equal to or greater than the theoretical concentration at which TCLP criteria may be exceeded: As > 100 mg/kg, Cd > 20 mg/kg, Cr > 100 mg/kg, Pb > 100 mg/kg, Hg > 4 mg/kg.
Volatile Organic Compounds (VOCs)	Must sum to less than 10

The entire policy can be downloaded from the Department's website - the URL is

http://www.state.ma.us/dep/bwp/dswm/files/dredge.htm

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

March 5, 2003

Rosalie T. Fauteux
Environmental Engineer
Baystate Environmental Consultants, Inc.
296 North Main Street
East Longmeadow, MA 01028

RE: Milford Pond Restoration Project, Milford, MA. MHC #RC.27205. EOEA #12369.

Dear Ms. Fauteux:

Thank you for your inquiry to the Massachusetts Historical Commission (MHC) requesting information concerning the proposed project referenced above. The MHC has reviewed our files and the information that you submitted, including the location of the two sediment disposal areas.

After review of these materials, MHC has determined that the project as presently proposed is unlikely to affect any significant historic or archaeological resources. No further MHC review is required of the proposed project as planned.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800), MGL c. 9, ss. 26-27C (950 CMR 71), and MEPA (301 CMR 11). Please contact me if you have any questions or need additional information.

Sincerely,

Edward L. Bell
Senior Archaeologist
Massachusetts Historical Commission

xc:
Secretary Ellen Roy Hertzfelder, EOEA/MEPA Unit
DEP-CERO
Crystal Gardner, USACOE-NED-Regulatory
Kate Atwood, USACOE-NED
Milford Historical Commission

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.state.ma.us/sec/mhc

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

DV

RECEIVED
DEC 12 2000
MEPA

December 8, 2000

Secretary Bob Durand
Executive Office of Environmental Affairs
Attn.: Doug Vigneau, MEPA Unit EOEA #12369
251 Causeway Street, Suite 900
Boston, MA 02114

RE: Milford Pond Restoration Plan, Milford. MHC #RC.27205. EOEA #12369.

Dear Secretary Durand:

Staff of the Massachusetts Historical Commission have reviewed the Environmental Notification Form submitted for the project referenced above. Review of MHC's files indicates that we recently commented on the project, and a copy of MHC's letter (10/27/200) was included with the ENF within Attachment 1.

Review of the Inventory of Historic and Archaeological Assets of the Commonwealth indicates that the project area is located in the vicinity of a recorded historical archaeological site (MIL-HA-2), the structural foundation remains of the Louisa Lake Ice Company that appear to be located on the northwest side of Dilla Street, adjacent to Louisa Lake. The project area is also located in the vicinity of Pine Grove Cemetery (MIL.801) at Cedar and Dilla Streets. Based on the favorable environmental setting of the project area, unrecorded archaeological sites may be present in the project area. In New England, archaeological sites are usually buried and thus require systematic archaeological investigation to be located and identified. The archaeologically sensitivity of the project area is principally defined by the project area's location in proximity to wetlands resources associated with the Charles River drainage and the discovery of ancient Native American archaeological sites in the project area vicinity, and within identical environmental settings within the Charles River drainage. Because the locations of several aspects of the project have not yet been described, presently the MHC cannot determine if any of Milford's previously identified historic and archaeological resources are in proposed project impact areas.

Additional information is required by the MHC to evaluate the proposed project. Depending on the location and design of aspects of the project that have not yet been selected or described, the project has the potential to affect historic and archaeological resources. Activities that could affect cultural resources include site preparation and placement of mechanical dewatering equipment at an upland dewatering site; the restoration of the dewatering site following the project for an improved boat launch and area of public access; and stormwater management facilities. As early as possible, and well in advance of implementing the project, detailed project plans and original, representative photographs of the project locations should be submitted to the MHC for our review and comment to determine whether or not an intensive (locational) archaeological survey (950 CMR 70) should be conducted in project impact areas. The goal of the survey, if necessary, is to locate, identify, and evaluate any significant historic or archaeological resources that could be affected by the project, and to provide information so that MHC can

220 Morrissey Boulevard, Boston, Massachusetts 02125 · (617) 727-8470
Fax: (617) 727-5128 · TTY: (617) 878-3889
www.state.ma.us/sec/mhc

consult with project planners to avoid, minimize, or mitigate impacts to significant cultural resources, prior to implementing the project. The ENF indicates that the project planners will coordinate with the MHC to assist in this regard.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800), MGL c. 9, ss. 26-27C (950 CMR 71), and MEPA (301 CMR 11). Please contact me if you have any questions or need additional information.

Sincerely,

Edward L. Bell
Senior Archaeologist
Massachusetts Historical Commission

xc:
Paul G. Davis, Baystate Environmental Consultants, Inc.
Michael Santora, Milford Town Engineer
Milford Historical Commission
DEP-CERO-Wetlands
DEP-DWWR
Karen Kirk Adams, USACOE-NED-Regulatory
Kate Atwood, USACOE-NED

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

October 27, 2000

Jacob Masenior
Environmental Scientist
Baystate Environmental Consultants, Inc.
296 North Main Street
East Longmeadow, MA 01028

RE: Milford Pond (formerly Cedar Swamp Pond) Restoration Plan, Milford.
MHC #RC.27205.

Dear Mr. Masenior:

Thank you for your inquiry to the Massachusetts Historical Commission (MHC) requesting preliminary information on the presence of historic and archaeological resources in the project area referenced above, received by the MHC on October 4, 2000. I understand that you are preparing an Environmental Notification Form (ENF) for the project. When available, please submit a copy of the ENF to the MHC.

Review of the Inventory of Historic and Archaeological Assets of the Commonwealth indicates that the project area is located in the vicinity of a recorded historical archaeological site (MIL-HA-2), the structural foundation remains of the Louisa Lake Ice Company that appear to be located on the northwest side of Dilla Street, adjacent to Louisa Lake. The project area is also located in the vicinity of Pine Grove Cemetery (MIL.801) at Cedar and Dilla Streets. Based on the favorable environmental setting of the project area, unrecorded archaeological sites may also be present. In New England, archaeological sites are usually buried and thus require systematic archaeological investigation to be located and identified. The archaeologically sensitivity of the project area is principally defined by the project area's location in proximity to wetlands resources associated with the Charles River drainage and the discovery of ancient Native American archaeological sites in the project area vicinity.

MHC understands that the proposed hydraulic dredging project will not impact any areas outside the existing pond basin footprint, except for an approximately 2 acre dewatering site, the location of which has not yet been determined. When available, please submit to the MHC a copy of the appropriate section of the USGS quadrangle map and larger-scale project plans for the proposed dewatering site and current, original, representative photographs of the proposed dewatering site. Please determine whether Milford Pond (formerly Cedar Swamp Pond) has ever been previously subject to hydraulic dredging, and if so the previous dredging locations and depths in relation to the proposed dredging locations and depths. Review of this information will assist the MHC to determine whether or not the proposed project is likely to affect any significant historic or archaeological resources.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800), MGL c. 9, ss. 26-27C (950 CMR 71), and MEPA (301 CMR 11). Please contact me if you have any questions or need additional information.

Sincerely,

Edward L. Bell
Senior Archaeologist
Massachusetts Historical Commission

xc:
Milford Historical Commission
DEP-CERO-Wetlands
DEP-DWWR
Karen Kirk Adams, USACOE-NED-Regulatory
Kate Atwood, USACOE-NED

220 Morrissey Boulevard, Boston, Massachusetts 02125 · (617) 727-8470
Fax: (617) 727-5128 · TTY: (617) 878-3889
www.state.ma.us/sec/mhc

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS. 02114-2023

May 29, 2002

David L. Dulong, P.E., Chief
Engineering/Planning Division
New England District, Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742-2751

Dear Mr. Dulong:

Thank you for your April 5, 2002 letter to Linda Murphy concerning the Milford Pond Ecosystem Restoration Project in Milford, Massachusetts. We appreciate the opportunity to participate in the recent site visit and to provide comments on the proposed project.

The upper Charles River is a valuable resource used both for recreation and as a habitat for fish, other aquatic life and wildlife. Unfortunately, the upper Charles River has significant water quality and water quantity issues that prevent full attainment of uses designated within the Massachusetts Water Quality Standards. Of particular concern to EPA in connection with this project is the river's aquatic life habitat use, defined as a native, naturally diverse, community of aquatic flora and fauna. Full attainment of the aquatic life use will require significant reductions in phosphorus loadings in order to reduce eutrophication. Eventually, it also may require changes to existing hydrologic modifications and physical habitat impairments such as those caused by dams.

While the proposal for dredging will likely result in improved control of macrophyte growth within the pond, without adequate controls on phosphorus inputs the macrophytes likely will be replaced by water column and floating aquatic plant species. As little as 10 ug/l of phosphorus can stimulate plant growth. A more complete evaluation of phosphorus sources and control alternatives for preventing continued eutrophication of the pond should be completed before resources are spent on dredging. Water column algae blooms and floating aquatic species would continue to impair the uses desired by the Town and would over time undermine the benefits of dredging as the result of the accumulation of decaying vegetation on the bottom of the pond.

This section of the Charles River was impounded for flood control purposes in 1936, but it is our understanding that the flood controls at the dam have not been in use for over 20 years. Removing the dam and restoring the natural wetland system and the free flowing nature of the river should be fully evaluated. Such an alternative may also be more effective in addressing the existing aesthetic issues associated with the eutrophic pond. This alternative is consistent with the goals of the Water Resources Development Act relative to reestablishing the attributes of a natural functioning and self regulating system. Maintaining an artificial pond within a river system results in displacement of the natural fluvial species of fish and the replacement of a naturally diverse wetland plant community with a cattail dominated community.

Alternatives that involve maintaining the dam should, in addition to considering the eutrophication concerns described above, fully evaluate impacts to stream flow, alternatives for restoring natural flow regimes downstream of the dam, and alternatives for providing fish passage. Such an analysis should include an assessment of the cumulative alterations to the natural stream flow regime that occur now.

We look forward to working with the Corps of Engineers and the Town of Milford to address the aesthetic and water quality issues in Milford Pond. If you have any questions regarding our comments please contact me at (617) 918- 1791 or David Pincumbe at (617) 918-1695.

Sincerely,

David M. Webster

David M. Webster, Director
Massachusetts State Program Office

cc: Robert Golledge, DEP-CRO
Glenn Haas, DEP-Boston
Nancy Thorton, DEM

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

April 12, 2002

David L. Dulong
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Re: Milford Pond Ecosystem Restoration Project
Milford, MA
NHESP File: 02-10344

Dear Mr. Dulong,

Thank you for contacting the Natural Heritage and Endangered Species Program for information regarding state-protected rare species in the vicinity of the above referenced site. I have reviewed the site and would like to offer the following comments.

Our database indicates that the site is within Priority/Estimated Habitat PH 983/WH 3090, which has been delineated for the Common Moorhen (*Gallinula chloropus*), a species of special concern, the Pie-billed Grebe (*Podilymbus podiceps*), an endangered species, the Least Bittern (*Ixobrychus exilis*), an endangered species, and the King Rail (*Rallus elegans*), a threatened species. These species are protected under the Massachusetts Endangered Species Act (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00) as well as the state's Wetlands Protection Act (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.00). Fact sheets for these species can be found on our website at www.state.ma.us/dfwele/dfw. If you are required to submit a Notice of Intent to the local conservation commission, please forward a copy of the filing to our office at the same time for review.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. Should your site plans change, or new rare species information become available, this evaluation may be reconsidered.

Please do not hesitate to call me at (508)792-7270 x154 if you have any questions.

Sincerely,

Christine Vaccaro

Christine Vaccaro
Environmental Review Assistant

Natural Heritage & Endangered Species Program
Route 135, Westborough, MA 01581 **Tel:** (508) 792-7270 x 200 • **Fax:** (508) 792-7821
An Agency of the Department of Fisheries, Wildlife & Environmental Law Enforcement
http:/www.state.ma.us/dfwele/dfw/nhesp

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

22 July 1999

Daniel M. Nitzsche
Baystate Environmental Consultants, Inc.
296 North Main St.
East Longmeadow, MA 01028

Re: Milford Pond Dredging
Milford, MA
NHESP File: 99-5546

Dear Mr. Nitzsche,

Thank you for contacting the Natural Heritage and Endangered Species Program for information regarding state-protected rare species in the vicinity of the above referenced site. I have reviewed the site and would like to offer the following comments.

Our database indicates that the following rare species occur in the vicinity of the above-mentioned site:

Species	Status
Pied-billed Grebe (*Podilymbus podiceps*)	Endangered
Least Bittern (*Ixobrychus exilis*)	Endangered
King Rail (*Rallus elegans*)	Threatened
Common Moorhen (*Gallinula chloropus*)	Special Concern

These species are protected under the Massachusetts Endangered Species Act (M.G.L. c.131A) and its implementing regulations (321 CMR 10.00) as well as the Wetlands Protection Act (M.G.L. c.131, s.40) and its implementing regulations (310 CMR 10.00). I have enclosed fact sheets for your information.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. Should your site plans change, or new rare species information become available, this evaluation may be reconsidered.

Natural Heritage & Endangered Species Program

Route 135, Westborough, MA 01581 Tel: (508) 792-7270 x 200 Fax: (508) 792-7275
An Agency of the Department of Fisheries, Wildlife & Environmental Law Enforcement
http://www.state.ma.us/dfwele

Please do not hesitate to call me at (508)792-7270 x154 if you have any questions.

Sincerely,

Cindy L. Campbell
Environmental Review Assistant

M. .FORD BOARD OF S. .LECTMEN

Room 11, Town Hall, 52 Main St. (Route 16), Milford, Massachusetts 01757-2679
508-634-2303 Fax 508-634-2324

Salvatore P. Cimino, Chairman
Dino B. DeBartolomeis
Brian W. Murray, Esq.

Louis J. Celozzi
Town Administrator

September 10, 2001

Colonial Brian Ostendorf
District Engineer
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

Dear Col. Ostendorf:

Recent discussions with members of your staff have identified a potential opportunity for an aquatic habitat restoration project for the Milford Pond in Milford, Massachusetts. We have received the Initial Project Restoration Plan, dated 8/29/01, that identifies a likely restoration scenario as well as the projected costs and schedule of the required feasibility investigation, development of plans and specifications and construction.

The Town of Milford concurs with the Project Restoration Plan, and wishes to act as the non-Federal sponsor of this project. I request that the New England District initiate a feasibility investigation under its Section 206 Environmental Restoration Program that will evaluate various alternatives of aquatic ecosystem restoration in the Milford Pond. These alternatives include, but are not limited to, the complete or partial dredging of Milford Pond. Removing the sediments would reduce the nutrient load in the pond and decrease light penetration, reducing the growth of emergent aquatic vegetation and improving fish habitat.

I understand our obligations as local sponsor under the Section 206 Program, including the cost-sharing requirement of thirty-five (35) percent of the proposed project (including all study costs). The Preliminary Restoration Plan estimates the required non-Federal cost sharing at $2.1 million. I understand that the Town will be responsible for the operation and maintenance of the completed project. I have read and understood the Information regarding project costs, including estimated operation and maintenance costs. We intend to pursue budgetary actions so that funds will be available to meet out cost sharing requirements as outlined in the PRP and prior to the Corps advertisement for a construction contact.

The Town of Milford has designated Michael Santora, Town Engineer as the point of contact for this project.

Sincerely,

Dino DeBartolomeis
Milford Board of Selectmen
Chairman Milford Pond Committee

BAYSTATE ENVIRONMENTAL CONSULTANTS INC.

Civil Engineers
Environmental Scientists

February 27, 2003

Ms. Brona Simon
State Archaeologist
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

Dear Ms. Simon:

The Town of Milford, Massachusetts is proposing a project to restore aquatic habitat in Milford Pond. Baystate Environmental Consultants, Inc. is currently preparing a draft Environmental Assessment, funded by the US Army Corps of Engineers, presenting several restoration options, including dredging of the pond bottom and dam removal. The preferred alternative is hydraulically dredging approximately 45 acres of the pond, which has never been previously subject to hydraulic dredging.

In September of 2000, MHC was contacted regarding the presence of historic and archaeological resources in the vicinity of Milford Pond in the Town of Milford, Massachusetts, as research for the Environmental Notification Form (ENF) process. The response to the September, 2000 letter, dated October 27, 2000, as well as the response to the ENF (December 8, 2000), stated that the project area is located in the vicinity of a recorded archaeological site (MIL-HA-2), the structural foundation remains of the Louisa Lake Ice Company located on the northwest side of Dilla Street, adjacent to Louisa Lake; and Pine Grove Cemetery (MIL.801). MHC requested that further information regarding the proposed dewatering site be submitted when available for the evaluation of the presence of any significant historic or archaeological resources there.

Enclosed is a section of the USGS quadrangle map and larger-scale project plans, which describes the proposed dewatering site. An aerial photograph is also included. Any written input the Massachusetts Historical Commission could provide regarding historical or archaeological resources within the project area would be greatly appreciated. Should you have any questions regarding this project, please feel free to contact our office at your earliest convenience.

Very truly yours,

BEC, Inc.

Rosalie Fauteux

Rosalie T. Fauteux
Environmental Engineer

Enclosures

Cc: Michael Tuttle, US ACOE

296 North Main Street
Longmeadow, MA 01028
Tel (413) 525-3822
Fax (413) 525-8348

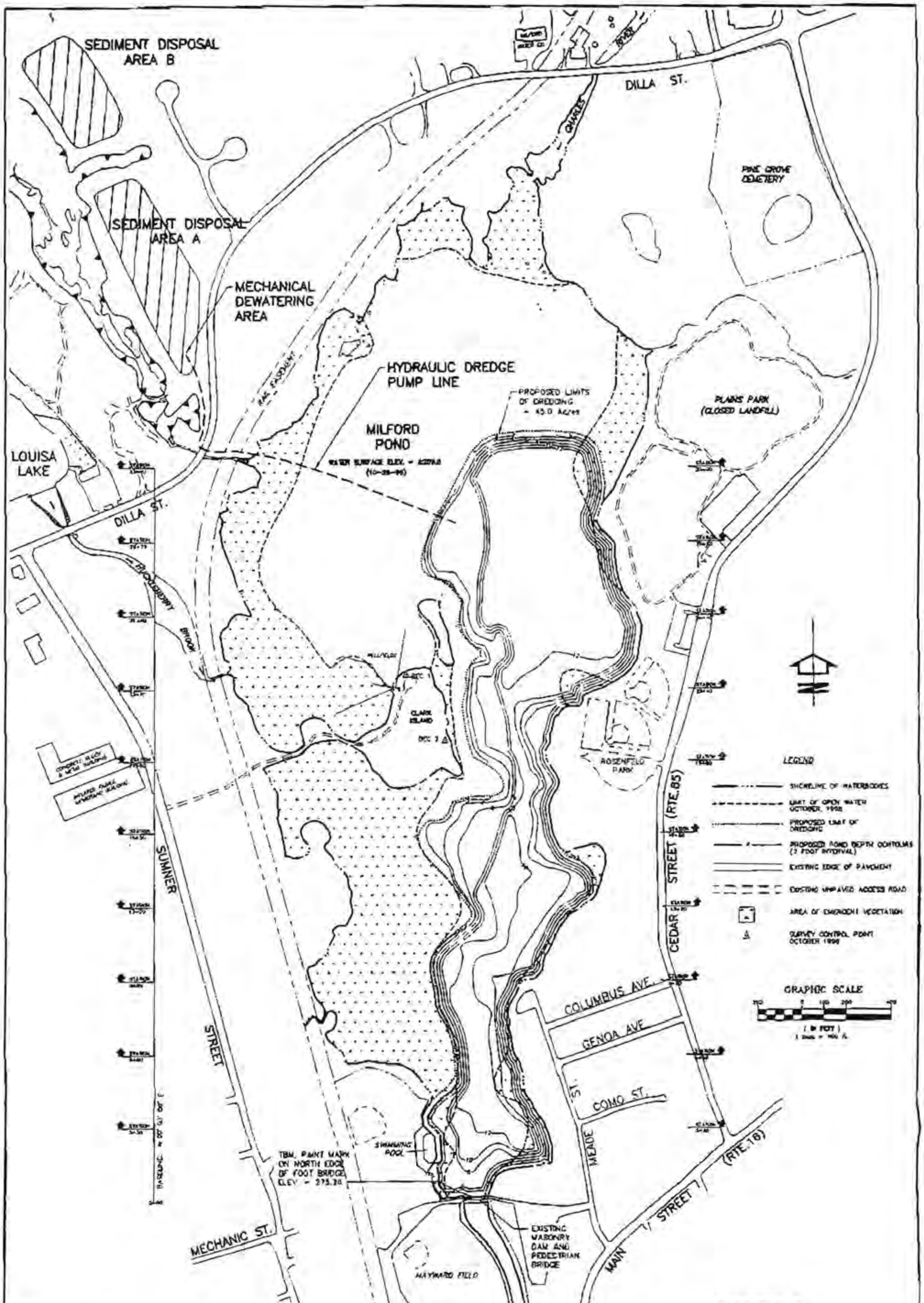
Other Office:
East Hartford, CT

MILFORD POND HABITAT RESTORATION PROJECT
MILFORD, MASSACHUSETTS

USGS TOPOGRAPHIC QUADRANGLE MAPS
MILFORD, 1982 &
HOLLISTON, 1987

BAYSTATE ENVIRONMENTAL CONSULTANTS, INC.
EAST LONGMEADOW, MASSACHUSETTS 01028

FIGURE 1: LOCUS MAP



NOTES

1. Horizontal and vertical control by BEC, Inc., October – November, 1998.

2. Shoreline and other existing features have been digitized from aerial photographs taken April 10, 1995.

3. Proposed water depths reflect the goal of obtaining a water depth of 12 feet or reaching the mineral base beneath the organic materials, whichever is first obtained. Maximum dredged slopes shall be 5 horizontal : 1 vertical.

FIGURE 2
PROPOSED DREDGING PLAN & SEDIMENT DISPOSAL AREA
Milford Pond Restoration Project
Milford, Massachusetts
JUNE, 2001

MILFORD POND HABITAT RESTORATION PROJECT
MILFORD, MASSACHUSETTS

MASSGIS DIGITAL AERIAL PHOTO
APRIL 2001

BAYSTATE ENVIRONMENTAL CONSULTANTS, INC.
EAST LONGMEADOW, MASSACHUSETTS 01028

FIGURE 3: DISPOSAL LOCATION MAP

BAYSTATE ENVIRONMENTAL CONSULTANTS INC.

Civil Engineers
Environmental Scientists

September 19, 2000

Massachusetts Historical Commission
The MA Archives Building
Attn: Brona Simon
220 Morrissey Boulevard
Boston, MA 02125

Re: Milford Pond Restoration Plan
Environmental Notification Form
Milford, Massachusetts

Dear Ms. Simon,

The Town of Milford, Massachusetts is proposing a project to restore open water areas to Milford Pond, which is currently densely overgrown with aquatic vegetation. This densely overgrown aquatic vegetation has degraded the recreational value and wildlife habitat potential of this resource area. The restoration of Milford Pond will require the hydraulic dredging of approximately 45± acres of this 120± acre pond. The Town's project objective is to restore approximately one-third of the Pond to an open water state so as to provide recreational opportunities for the residents of the community and to provide a diversity of wildlife habitat value.

As part of the Environmental Notification Form (ENF) process, we are conducting research on the project area to determine the presence of archaeological and historical resources in the project vicinity. The proposed project will not impact any areas located outside of the current pond basin footprint, except for a 2± acre dewatering site. The final location of this dewatering site is yet to be determined, but will be located directly adjacent to the pond edge. Additionally, the pond bottom is not anticipated to contain potential historic or archaeological resources. We currently know of no known historic or cultural resources located either within the pond basin or on any of the potential dewatering sites.

Enclosed is a locus map for the project. Any input the Massachusetts Historical Commission could provide regarding historical or archaeological resources within the project area would be greatly appreciated. Should you have any questions regarding this project, please feel free to contact our office at your earliest convenience.

Very Truly Yours

BEC, Inc.

Jacob Masenior
Environmental Scientist

enclosures

296 North Main Street
East Longmeadow, MA 01028
Tel (413) 525-3822
Fax (413) 525-8348

Other Office:
East Hartford, CT

BAYSTATE
ENVIRONMENTAL
CONSULTANTS
INC.

Civil Engineers
Environmental
Scientists

July 2, 1999

MA Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
West borough, MA 01581

Re: Milford Pond Dredging Project
Milford, Massachusetts
BEC Project No. 98-0216

Dear Environmental Review Staff,

The Town of Milford is proposing to hydraulically dredge portions of Milford Pond to alleviate the weed-choked condition that presently prevails in all portions of the lake. The intent will be to limit dredge activity to open water areas. There is no dredging proposed within the marsh areas of the pond.

BEC is aware that the American Bittern may utilize the marsh habitat and pond shallows contained within Milford Pond. As part of the Environmental Notification Form (ENF) process, we would your input relative to the presence of rare, threatened, or endangered species, or habitat that may support these species within the project area. We would be pleased to design the project to avoid any sensitive areas or time periods, if you could offer guidance in this regard. A review of the 1997-1998 Natural Heritage Atlas revealed that the project area is within **S.USMAHP*429** and **WH 3090**

Enclosed are a locus map and the relevant page from the Natural Heritage Atlas. Should you have any questions regarding this project, please contact this office at your earliest convenience.

Very truly yours,

BEC, Inc.

Daniel M. Nitzsche

Daniel M. Nitzsche
Environmental Scientist

enc.

296 North Main Street
East Longmeadow, MA 01028
Tel (413) 525-3822
Fax (413) 525-8348

Other Office:
East Hartford, CT

Milford Pond Restoration
Meeting 3/28/02

Name	Organization	Phone
Mike Santora	Milford Town Eng	508 634 2317
Tom JENKINS	BEC	413 525 3822
MIKE TUTTLE	COE	978 318 8677
CHRISTINE PLAYER	DEM - WATERWAYS	(781) 740-1600 x 117
John Kennelly	COE	(978) 318-8505
Raimo Liias	USACE	(978) 318-8712

Coordination Site Visit May 7, 2002

Milford Pond Restoration

Attendee	Agency	Telephone & Fax	
Mike Tuttle	Corps	978 318-8677	8080
Greg Billings	Corps	978-318-8295	8867
Mike Santora	Milford Town Engineer	508 634 2317	
Ken Levitt	Corps	978-318-8114	8540
Bob Buckley	Conservation Commission	508-366-0560	
Dave Pincumbe	U.S. EPA	617-918-1695	
Ed Reiner	US EPA	617 918 1692	
Rinaldi	DEM-WATERWAYS	781-740-1600 x119	
Peg Savage	CRWA	617-965-5975 x221	
Anthony A Grillo	Citizen	473 2737	
Achille Distalevi	Citizen	473-9404	
Tom Jenkins	Baystate Environmental	413 525-3822	
Ben Piteo	Corps of Engineers	978-318-8424	
Siamac Vaghar	" "	978-318-8133	
John Kennelly	" "	978-318-8505	
John Seaver	Milford Selectman	508 482-9443	
Larry Dunkin	Milford Town Planner	508-634-2317	
Shelly Leclaire	Milford Highway Surveyor	508-473-1274	
Robert Andreano	Milford Tax Collector (Retired)	508-634-5375	
Louis Pedrotti	Milford Cap. Planning	508 473-8305	
Emilio E. Distalevi	Committee Member	508-478-4131	
~~Denise [illegible]~~	~~Milford Daily News~~	~~508 634-7538~~	
Anthony DeLuca	Milford Building Commissioner	508-634-2313	
Reno DeLuzio	Committee Member	508-473-7790	

Attendee	Agency	Tele
Frank R. Andrews Sr.	Comm. Member	508 473-1716
Dino DeBartolomeis	Selectman	508-634-2303
Debra Atherton	Office of Senator Moore	617-722-1420
Robert N DeMarco Jr	Comm/Member	508-473-1984
State Rep Marie Parente		

July 12, 2002 Milford Pond

11AM @ Town Hall @ Milford

Nancy Thornton, DEM Waterways, 781-740-1600x10

Larry Dunkin Milford Town Planner 508-634-2317

Michael Tuttle Corps of Engineers 978-318-8677

John Kennelly Corps of Engineers 978 318-8505

Frank Andreotti Sr Member 508-473-1716

Achille Diotalevi - member 508-473-9409

Emilio E Diotalevi - COMM.-MEMBER 508-478-4131

Mike Santora Milford Town Engineer 508 634 2317

Dino DeBartolomeis Town Selectman 508-634-2303

Tom Jenkins BEC 413-525-3822

Liias, Raimo A NAE

From: French, Elizabeth A NAE
Sent: Friday, September 07, 2001 2:53 PM
To: Liias, Raimo A NAE
Subject: Milford PRP

The PRP has been sent to Mike Santora at the Town of Milford (8/30/01), and we are just waiting for his letter of support before sending it to Division.

Milford Pond PRP.doc

48
9.20.01

District: New England

9/19/01

Section 206 Preliminary Restoration Plan
Milford Pond, Milford, Massachusetts

1. Project: Milford Pond, Aquatic Ecosystem Restoration, Milford, Massachusetts
   Massachusetts Congressional District: 2nd

2. Location: The Milford Pond Aquatic Ecosystem Restoration site is located in the center of the Town of Milford, in Worcester County. The pond is located less than 1 mile south of I-495, near the headwaters of the Charles River.

3. Description of Proposed Restoration Project:

   a. Existing Conditions.

This proposal is to investigate and identify a project to restore the ecology and health of a 120-acre degraded freshwater pond. The maximum depth of the pond has decreased from approximately 5 feet when originally formed in the late 1930's to approximately 2 feet. The shallow water and thick organic sediments from decomposition of vegetation contribute to eutrophication of the pond and extensive growth of emergent vegetation. There is a high diversity and density of vegetation, including cattail (*Typha latifolia* and *T. angustifolia*), milfoil (*Myriophyllum heterophyllum*), duckweed (*Lemma minor*) and water lilies (*Nymphaea oderata* and *Nuphar variegatum*). Emergent vegetation is decreasing open water habitat, and the pond is slowly reverting to a marsh. As well, the growth of emergent vegetation has impacted the warm-water fishery found in the pond. The low flow through most of the pond as well as thick ice and snow in the winter contributes to annual winter fish kills, and summer fish kills occur due to decomposition of organic matter creating anoxic conditions.

   b. Proposed Project.

The major feature of the proposed restoration project is to remove accumulated sediment. Approximately 45 acres of the pond will be dredged to a depth of around 12 feet, which is adequate to prevent the growth of rooted aquatic vegetation. Removal of sediment to 12 feet will, in most cases, be above the bottom of peat deposits found in much of the historic submerged pond bottom. The local community suggested an area of forty-five acres to avoid impacts to emerging wetlands on the west and north sides of the pond and to maximize open water ecosystem benefits while keeping costs reasonable. Hydraulic dredging is likely the best method to remove the sediments because of the deep, unconsolidated peat deposits. As additional information is gained on material characteristics, other construction methods may be further evaluated, including use of cofferdams to allow for mechanical dredging. Lack of a suitable dewatering/detention site makes dewatering via a belt-filter press the most practical option for dredge material consolidation prior to off-site disposal/reuse.

A study done by Baystate Environmental Consultants, Inc (BEC) in July 2000 estimated the amount of material to be removed at about 400,000 cubic yards over a three-year construction season. In 1999 some initial screening of the sediments was done by BEC for volatile organics and heavy metals. No problems were detected in the samples taken from the pond. This corresponds with the fisheries toxicity test by MDWPC that found only mild contamination by metals in top-level predators. As part of the Corps Section 206 effort, 10-15 additional samples will be collected and analyzed for contaminants to insure that the material can be deposited in an approved upland site. A limited water quality sampling program will also be undertaken to test for existing water quality conditions within the pond.

c. Additional Information.

Milford Pond covers about 120 acres with water inflow primarily from the upper reaches of the Charles River. Other inflow comes from Louisa Lake from the west and from 18 storm overflow pipes. The Town is investigating installing end-of-pipe Best Management Practice devices on the overflow pipes to reduce sediment and nutrient inputs. The outlet stream that flows over a small masonry dam continues as the main channel of the Charles River and flows through the Town of Milford. The pond has a watershed area of approximately 5066 acres, which the northern half being light residential development and wooded, while the southern half is urban. Currently, the town is investigating implementation of watershed education program to reduce non-point source pollution sources. Numerous parks surround the pond, and there is an island, Clark Island, located in the middle, with access from the east shore.

Milford Pond is man-made, with a small, low-head masonry dam placed in 1938 for flood control. Originally the area was a swamp with some open water with American White Cedars (*Chamaecyparis thyoides*). A small grove of cedars may still exist in the northeast corner of the pond, according to a 1986 report. The pond has probably always been shallow and weedy.

Thick peat deposits, reaching 25-30 feet deep in some areas, underlie the pond. Below the peat is a saturated sand/gravel layer 10-15 feet thick, from which the Milford Water Company extracts drinking water from several wells at a rate of 380 gallons per minute (gpm). The peat is relatively impermeable to contaminants, protecting the water source. Leachate from the nearby landfill (recently closed) was found to enter the pond and Charles River, but did not impact the aquifer. Dredging may remove this filtering media, leaving the aquifer vulnerable to contamination from pollution entering the pond.

The largest surface water source for Milford Pond is Louisa Lake, and the detention time of the pond is 4.75 days. Additional studies need to be performed to determine the role of groundwater in the Milford Pond hydrologic budget. It appears that the thick peat deposit is relatively impermeable to water, and that flow only occurs due to the pumping at the Clarke Island wellfield. Sixty-five percent of the phosphorous in the pond is from storm runoff, and the rest is from Louisa Lake, other surface inflows and groundwater. Even without external inputs, the pond would be expected to be eutrophic due to resuspension of the nutrients from the sediments under anoxic conditions. Therefore, dredging will both reduce plant growth along the bottom by decreasing the amount of light that can reach the sediment and will remove a significant fraction of the phosphorous in the sediment.

Fish samples were taken by the Massachusetts Department of Water Pollution Control (MDWPC) in 1989 to assess metal and PCB contamination in Milford Pond. Gill nets were used to sample the pond every two hours. When the sample size was too small, the nets were left overnight. However, this still resulted in a marginal sample, so boat electroshocking was also performed. Gill netting resulted in capture of yellow perch (*Perca flavescens*), brown bullhead (*Ictalurus nebulosus*), chain pickerel (*Esox niger*) and black crappie (*Pomoxis nigromaculatus*). Electroshocking also caught largemouth bass (*Micropterus* *salmoides*) and bluegill (*Lepomis macrochirus*) as well as additional perch, brown bullhead and black crappie. Total fish captured were 8 yellow perch, 4 brown bullhead, 1 chain pickerel, 3 black crappie, 3 largemouth bass and 2 bluegill. According to Mr. Lee McLaughlin of the Massachusetts Fish and Wildlife Department, the fishery is severely impacted by the vegetation.

d. Alternatives Discussion.

No Action (do nothing to restore the pond). Under this alternative, the pond will remain shallow and extensive weed growth will continue to choke the pond. Fish habitat will continue to be lost due to the density of the weeds. The do nothing alternative is not recommended because it results in the continued loss of fish habitat. In addition, the extensive weed growth and subsequent die off will continue to reduce the dissolved oxygen in the pond, further impacting the aquatic habitat.

Alternative for Ecosystem Restoration. There are two competing alternatives for ecosystem restoration of Milford Pond. The first is restoration of the pond to open water habitat through dredging. The major feature of this project is removing accumulated sediment from about 45 acres of the pond to a depth adequate to restore both open water habitat and provide shallow areas to create habitat suitable for spawning and breeding of fish and waterfowl. The depth recommended is 8 to 12 feet, such that the bottom of the pond is below the photic zone to inhibit emergent vegetation growth. Both the 1979 report by Carr Research Laboratory, Inc. and the 1986 report by IEP, Inc. state that a depth of 8 feet it adequate for habitat restoration benefits. Dredging to a depth of 12 feet would serve to reduce the amount of milfoil growing on the bottom of the pond, leaving the area as open water to pond bottom. The 45 acres to be dredged are along the east side of the pond, and would require removal of approximately 400,000 cubic yards of sediment. Hydraulic dredging has been proposed, due to the thick (up to 20 feet) peat depositions. Conventional dewatering would require an area of approximately 10 acres for a containment basin. Due to the lack of potential containment sites that would be large enough, mechanical dewatering using a belt-filter press has been proposed. There is a potential 1-acre dewatering site at the public boat ramp, which would then be converted to a park after construction.

The other alternative involves restoration of the pond to its initial condition as a cedar swamp. Prior to damming, the area was a swamp with cedar trees. A remaining grove of these trees may exist on the northeast side of the pond. American Cedars have been shown to have purifying characteristics, improving water quality, and are currently rare. Restoration of the cedar swamp would involve lowering the water level through most of the area, reducing channelization of the water to increase sheet flow, and creating conditions favorable to the growth of emergent wetland vegetation.

These two alternatives do not have to be exclusionary, and in fact, restoration of the cedar swamp along the shores of the pond may provide significant water quality and habitat benefits. There appears to be a stand of cedars still standing on the north east bank of the pond, and any dredging operations should take care to avoid damage to this section of the pond.

e. Project Benefits

Dredging the pond is expected to restore the open water habitat and depth of the pond. Ecosystem restoration benefits will be measured in terms of acres of habitat restored. Based on a site visit, it appears that dredging can restore about 45 acres of degraded pond habitat and possibly result in the creation of several acres of cedar swamp wetlands. Additional research on restoration of cedar swamp wetlands needs to be undertaken. An incremental analysis will be undertaken to compare restoration increments and associated costs to the expected fish and wildlife benefits.

The completed project will contain both deep-water habitat (12 feet deep) and shallow littoral and emergent wetland areas. It is expected that the project will result in restoration of habitat suitable to support warm water fish species such as largemouth bass, chain pickerel and black crappie. The shallow areas will provide suitable spawning and nursery habitat for largemouth bass, black crappie, bluegill and pumpkinseed, while the deeper areas will provide open water habitat for adults of these and other warmwater species (i.e. yellow perch). The resulting removal of nutrients as well as the greater depths will reduce the amount of emergent aquatic vegetation. Overall water quality is expected to improve. With the elimination of the effects of excessive plant die off resulting in anoxia, deeper layers of the water column will be available as fish habitat, thereby increasing the overall capacity of the system to support fish. The project will investigate and recommend any opportunities to improve waterfowl habitat.

f. Resource Significance.

The loss of freshwater ponds due to eutrophication and sedimentation has increased greatly in Massachusetts. This pond is an important resource for the town, providing significant aquatic habitat areas. Restoration of the deeper areas of the pond will complement adjacent shallow pond and emergent wetland areas as well as upstream and downstream stream habitats. Cedar swamps are increasingly rare habitats, and may be valuable as a goal of the restoration.

Public Recognition – Milford Pond is the largest impoundment of water in the upper reaches of the Charles River, a recognized regional water resource. Several Corps projects have already addressed other areas along the river. The town recognizes the site as an important natural resource to the area, and has formed the Milford Pond Restoration Committee to research restoration options.

Technical Recognition – As discussed above, the overall health of this resource has declined dramatically. The proposed restoration project should restore the health of the pond ecosystem, and possibly restore a segment of locally rare cedar swamp.

Institutional Recognition – The Diagnostic/Feasibility Study performed by IEP, Inc. in 1984 was funded by a grant from the Massachusetts Clean Lakes Program. As well, the health of the Charles River has been a focus for many federal and regional organizations, such as the Charles River Watershed Association. Improving the health of Milford Pond, at the head of the Charles River, will help improve the water quality in the rest of the river.

g. Methodology for the Feasibility Study

The Feasibility Study (FS) will examine the existing conditions at the site and recommend improvements to restore the pond. Analysis will be at a level of detail sufficient to characterize the benefits, impacts and costs of the proposed project.

Specifically, it is envisioned that the FS will include the following items:

Sediment Assessment – Test sediments further to characterize their suitability for disposal and dredging/excavation. Preliminary tests indicate no contamination of the sediments.

Bathymetric Survey – Conduct a survey of the sediment and bottom elevations of the pond to assess the amount of material to excavate.

Water Quality and Hydrology and Hydraulics – Provide a discussion of existing water quality conditions and expected improvements with the project. Provide an estimate of the watershed area and flow through the pond. As well, qualitatively discuss the effect of dredging on the wellfield. If potential contamination of the aquifer supplying the wellfield would pose a major problem to the town, coordinate with the USGS to develop groundwater modeling of the area.

Geotechnical Engineering – Assist in evaluation of alternatives for sediment removal and disposal.

Engineering Design and Cost Estimates – Provide preliminary design and analysis for sediment removal and any dewatering areas or disposal areas required for project construction. Estimate the amount of sediment to be removed from the pond and outline the construction method. Evaluate both mechanical and hydraulic options.

Ecological Evaluation – Use existing information to characterize the existing habitats and predict future habitat characteristics and value with and without the project. Use an incremental analysis of project benefits and costs based on alternative excavation amounts and acres to be restored to select the proposed project. In addition, prepare an Environmental Assessment of the proposed project as required by the Federal National Environmental Policy Act requirements (NEPA).

Cultural Resources Coordination – Coordinate the proposed project with the Massachusetts State Historic Preservation Office.

Real Estate – Identify any real estate requirements for project implementation and prepare a Real Estate Plan for the proposed project.

h. <u>LERRD.</u>

The local sponsor is responsible for acquiring any lands, easements, rights of way, relocations, and excavation/disposal sites (LERRD) needed for the project. The following outlines what LERRD might need to be obtained by the sponsor. This is based on preliminary information provided by the local sponsor and may change as the project is further investigated.

Land and Construction Easements. The Town of Milford owns Milford Pond. It is assumed that the Town also owns the parks that surround the pond, which may then be used for construction staging and sediment dewatering containment areas. If this is not possible, then private land may need to be acquired by the town for these purposes. Also, depending on the actual location used for construction access, a construction easement across private land to the pond may be needed.

Flowage Rights for Pond Drawdown during Construction. If hydraulic dredging is pursued, flowage rights are not a concern, except for concerns regarding downstream water quality. However, if mechanical dredging or restoration to a cedar swamp is the preferred option, the downstream rights to the water should be investigated as well as how changing the ecosystem will affect the downstream flow.

Disposal Site. The local sponsor is responsible for obtaining a site to dispose of the material removed from the pond. Results of sediment testing will determine the type of disposal site that will be required. Preliminary tests indicate no contamination of the sediments.

4. <u>Consistency Statement (for Section 1135):</u> N/A.

5. <u>Views of the Sponsor:</u>

The Town of Milford strongly supports the project to restore Milford Pond and recognizes the benefits from both the ecological and community resource aspects.

6. <u>Views of Federal, State, and Regional Agencies:</u>

The project would restore a degraded freshwater pond in central Massachusetts by removing accumulated sediment to restore the depth of the pond and the diversity of aquatic vegetation and habitat. The Massachusetts Department of Environmental Management provided funding for the design and permitting phases of the Restoration/Reclamation of Milford Pond project. The report prepared by Baystate Environmental Consultants in July 2000 recommended dredging as the preferred option, which reaffirmed the results of two previous studies on Milford Pond. Funding from the Massachusetts Clean Lakes Program provided for the 1986 Diagnostic/Feasibility Study of Milford Pond by IEP, Inc.

7. <u>Status of Environmental Compliance:</u>

It is anticipated at an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for this project will be prepared during the study phase.

The COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
251 Causeway Street, Suite 900, Boston, MA 02114

ARGEO PAUL CELLUCCI
Governor

JANE SWIFT
Lieutenant Governor

BOB DURAND
Secretary
http://www.state.ma.us/envir

Tel. (617) 626-1000
Fax (617) 626-1181

Memorandum

TO: Mike Santora, Town of Milford
Paul G. Davis, Ph.D. - BEC, Inc.
FROM: Doug Vigneau, Environmental Analyst
DATE January 2, 2001
SUBJECT: Restoration of Milford Pond.
EOEA# 12369

Please replace page #2 of the recently issued Certificate for the above referenced project with the enclosed. Thank you for bringing that error to my attention.

MILFORD BOARD OF SELECTMEN

Room 11, Town Hall, 52 Main St. (Route 16), Milford, Massachusetts 01757-2679
508-634-2303 Fax 508-634-2324

John J. Speroni Jr., Chairman
Salvatore P. Cimino
Dino B. DeBartolomeis

Louis J. Celozzi
Town Administrator

DV

November 29, 2000

Bob Durand, Secretary
Executive Office of Environmental Affairs, Attn: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street, Suite 900
Boston, Massachusetts 02114

RECEIVED
DEC 6 2000
MEPA

RE: Environmental Notification Form
Milford Pond Restoration Project
Milford, Massachusetts

Dear Secretary Durand:

Under separate cover, the Town of Milford has submitted the above-referenced Environmental Notification Form (ENF) for the proposed Milford Pond Restoration Project. This project was the subject of a presentation made before you at the Riverbend Farm in Uxbridge on October 14, 1999. The Board of Selectmen whole-heartedly supports this important project and looks forward to its successful implementation. Senator Richard T. Moore and Representative Marie J. Parente have been involved in this project since day one and have been very supportive at all times. They have provided valuable assistance to the committee throughout the years.

Milford Pond is a 120-acre waterbody located near the central business district in Milford and is one our most beloved natural resources. The Town of Milford has witnessed a groundswell of public support for the restoration of Milford Pond and considerable time and effort has been mustered in the study and diagnostic phases of the project and in the development of the conceptual restoration program. We have established the Milford Pond Restoration Committee, chaired by Selectman Dino B. DeBartolomeis, to coordinate and spearhead the restoration effort. Much has been accomplished to date and as we enter the environmental review phase of the project preparation, we look to you to conduct your review in a manner which ultimately facilitates the environmental review and permitting of the project and helps us achieve our goal of pond restoration in a sound, expeditious, and prudent manner.

Milford Pond is on the Charles River, and serves as a focal point of local interest. The pond is surrounded by public lands which includes Rosenfeld Park, Fino Field, Pine Grove Cemetery, Hayward Field, and Votolato Field. Plains Park, one of Milford's most recent and striking accomplishments, was created atop our closed and capped landfill and now offers our residents twenty acres of open space directly on the banks of Milford Pond. All of these parks are heavily used by the residents of Milford. Further, the planned Milford Upper Charles River Trail, a three-mile multi-use pedestrian and bicycle trail, is proposed to skirt along the westerly shore of Milford Pond thus enhancing its standing as a recreational destination and amenity in the town of Milford.

The Milford Board of Selectmen is energized by the financial support for the Milford Pond Restoration Project received to date from the Department of Environmental Management-Office of Waterways. We look forward to the continued synergy generated when local and state agencies work together to achieve our mutual project goals and maintain, restore, and protect our natural resources.

The Milford Pond Restoration Project is a critical component in the revitalization of our community. The Milford Board of Selectmen would be pleased to sponsor a meeting between yourself, the participating agencies, and any concerned citizens and groups to discuss this important project in detail. Your participation and leadership in this matter is most appreciated, and we trust your review of this ENF will result in a balanced scope for the required Environmental Impact Report.

Sincerely,

The Milford Board of Selectmen

John J. Speroni, Jr., Chairman

Salvatore P. Cimino

Dino B. DeBartolomeis

cc: Senator Richard T. Moore
Representative Marie J. Parente
Files

DV

TOWN OF MILFORD
52 MAIN STREET, MILFORD, MASSACHUSETTS 01757
508-634-2317 FAX 508-473-2394

OFFICE OF PLANNING
AND ENGINEERING

Michael Santora, P.E
Town Engineer

November 29, 2000

Robert Durand, Secretary
Executive Office of Environmental Affairs, Attn: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street, Suite 900
Boston, MA 02114

RE: Environmental Notification Form
Milford Pond Restoration Project EOEA No. 12369

Dear Secretary Durand:

The purpose of the letter is to strongly support the proposed Milford Pond Restoration Project. I have been involved with this project for over 15 years but unfortunately for a variety of reasons, the effort to restore the pond has always fallen short of fruitition.

However, there now appears to be an excellent opportunity to move this project forward. In addition to strong local support, Congressman Neal has now indicated his full support of the project.

And judging from your remarks at an event at the Blackstone Visitor Center, it appears that you are also supportive as long as the project is environmentally sound.

To that end, the town has employed a top notch environmental consultant with extensive experience in pond restoration demonstrating a commitment to do whatever is necessary to protect all of the various associated environmental interests.

I look forward to your continuing support of this important project.

Sincerely,

Michael Santora, P.E.
Town Engineer

MS/lc

Michael J. Bresciani
Director of Parks & Recreation

Milford Park Department

DV

Bob Durand, Secretary
Executive Office of Environmental Affairs, Attn: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street, Suite 900
Boston, Ma. 02114

Re: Environmental Notification Form
Milford Pond Restoration Project
Milford, Ma. 01757

Dear Secretary Durand: December 5, 2000

The Milford Park Commissioners and Park and Recreation Director respectfully request you support the proposed Milford Pond Restoration Project, EOEA No. 12369.

Park Commission Chairman Arthur Morin, and members Al Inglesi and Reno Baci grew up in Milford and in great detail, remember their positive childhood experiences playing on and around the pond. From skating to boating and fishing, the pond was a focal point of daily activity for them and their friends.

I have been Milford's Park Director for thirteen years. Without exception, at our weekly Park Department meetings, the existing deplorable condition of Milford Pond is discussed. The Commissioners have always indicated a strong desire to see the pond returned to its former pristine condition.

The Park Commissioners have built and operate several parks, recreation areas and manage the Municipal Pool, all which abut the pond. For example, Plains Park, once the town's landfill, was recently developed into an 18 acre recreational facility featuring baseball and softball fields, walking track, playground, and exercise center. The Municipal Pool at the Fino Field complex is always a popular spot for residents and nonresidents. Fino and Votolato Fields are topnotch baseball facilities that host local and regional teams and tournaments. Fino Field Annex and Rosenfeld Park represent quality recreation acres used by athletic teams and the general public.

Restoration of Milford Pond will greatly enhance the aesthetic value of the area and will dramatically increase recreational opportunities for fishing, boating, and bird watching for residents.

Michael J. Bresciani
Director of Parks & Recreation

Milford Park Department

The Milford Park Department strongly urges you to support this worthwhile and important project. Please feel free to contact me at (508) 634-2391 if you have any questions.

Sincerely,

Michael J. Bresciani
Park Director

52 Main Street
Milford, Ma. 01757

cc: Dino DeBartolomeis
Park Commissioners

Town of Milford
Department of Inspections
52 Main Street Milford, MA 01757

Tel (508) 634-2313
Fax (508) 473-2358
adeluca@110.net

Anthony F. De Luca, Jr.
CBO
Building Commissioner
Zoning Officer

Michael Ruscitti
Electrical Inspector

Vincent W. Mancini, Sr.
Plumbing Inspector

Philip W. Morin
Gas Inspector

17✓

December 4, 2000

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DEC 6 2000
MEPA

Mr. Robert Durand, Secretary
Executive Office of Environmental Affairs, Attn.: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street, Suite 900
Boston, MA 02114

Re: _Milford Pond Restoration Project_
Milford, Massachusetts

Dear Secretary Durand:

I am the present Building Commissioner for the town of Milford and strongly support the Milford Pond Restoration Project.

I was born, brought up, and intend to stay in Milford. I have many childhood memories of fishing and skating at this pond and would like to see it brought back to it's previous pristine state.

Residents enjoy many recreational past times at Fino Field, Rosenfeld Park and now the new Plains Park which overlooks Milford Pond. Let us better serve the townspeople by also restoring that pond.

Very truly yours,

Anthony F. DeLuca, Jr.
CBO/Building Commissioner
Town Hall, 52 Main Street
Milford, MA 01757

AFD:vmd

TOWN OF MILFORD
52 MAIN STREET, MILFORD, MASSACHUSETTS 01757
508-634-2317 FAX 508-473-2394

OFFICE OF PLANNING
AND ENGINEERING

Reno DeLuzio
Town Planner

DV

Robert Durand, Secretary
Executive Office of Environmental Affairs, Attn: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street Suite 900
Boston, Massachusetts 02114

RECEIVED
DEC 6 2000
MEPA

RE: Environmental Notification Form
Milford Pond Restoration Project
Milford, Massachusetts

Dear Secretary Durand:

I write this letter in support of the Milford Pond Restoration Project.

As a lifelong resident of the Town of Milford and as an avid outdoorsman, I can say that Milford Pond has played a major role in my life. Not only have I lived in Milford for the past 61 years but also most of my Mother and Father's family have lived in Milford since the early 1900's. My paternal grandfather and his 3 sons (my uncles) were also avid outdoorsmen who spent much of their leisure time both hunting and fishing. Milford pond was one of their favorite spots to fish for bass, yellow perch and horned pout. My maternal grandparents lived on Columbus Avenue which is in close proximity to Milford Pond. As a young boy, I spent many pleasurable days on or around Milford Pond exploring the shoreline, fishing and boating in the summer and ice fishing and skating in the winter. It was a real treat for me to spend a few days at my grandmother's house on Columbus Avenue because of the ready access to the pond.

The character of the pond 50 years ago was quite different than it is today. There was ample open water area where one could develop boating and fishing skills and enjoy the esthetic beauty of this water body. Over time the pond has become highly eutrophic and much of what was so inviting in the early years has become a blight on Milford's landscape.

In addition to being a lifelong resident in Milford, I have also been involved in municipal affairs for more than 30 years serving as an elected Town Meeting Member (1972 – present), Planning Board Member (1969), Member of the Board of Selectmen (1970), Conservation Commission Member (1973 – 1979) and Chairman. Milford Pond Restoration Committee Member, Milford Upper Charles Trail Committee Chairman (1996 – present), Town Land Use Committee Chairman (1990) and member (1999 – present). For the past 4.5 years I have been serving as the Town Planner in Milford. I mention my background because in all of these positions I have been involved, in varying degrees, with the issue of the reclamation of Milford Pond. During my tenure on the Conservation Commission a study was commissioned to explore reclamation options. This study and other studies were never pursued because of fiscal constraints and other more pressing community needs and priorities.

However in recent years there has developed an increasing awareness of the loss of this precious resource and what it meant to the community. The deteriorated condition of the pond has gotten to the point where action to reclaim at least part of the pond is being raised to a high priority. Although the cost is high now, it will rise more rapidly with every passing year and we may be approaching a point in time where it may no longer be feasible.

The Milford Pond area is also becoming a significant passive and active recreation area in the community. The recently completed Plains Park (reclaimed land fill site) on the easterly shore of the pond compliments existing ball fields and the municipal swimming pool on the westerly shoreline. The 6.4-mile Milford Upper Charles Trail corridor will run along the westerly side of the pond. It will create an important link to the pond that will afford easy access for both Milford walkers and bikers and eventually to walkers and bikers from neighboring towns when other segments of the Upper Charles Trail are completed.

The Milford Pond is also in close proximity to the Senior Center and two senior citizen housing complexes (Birmingham Court and Maher Court). The senior citizen population has many fond memories of the days when the Milford Pond was at its best. I am sure it would give them a great deal of satisfaction and enjoyment to see it reclaimed.

Milford Pond is one of only two water bodies in town. The other is Louisa Lake, a shallow lake just north of Milford Pond. The Town has recognized the importance of the Louisa Lake recreation area and has initiated a weed control program to preserve its diminishing open water feature. Both water bodies are located near the geographic center of the community and are easily accessible to all residents of the town. As traffic and fuel prices increase, local recreation areas will become increasingly important in the future. It is therefore imperative that the Milford Pond Reclamation project moves forward before the eutrophication process converts the entire pond to a swamp and eventually to upland.

The neglect of the pond by this generation should be corrected so that future generations will have the same opportunity to enjoy the pond as I and many of my friends and family enjoyed it in the past.

Sincerely

Reno DeLuzio

Reno DeLuzio

cc: Dino DeBartolomeis
Louis Celozzi
Mike Santora

DV

12-1-2000

RECEIVED

DEC 4 2000

MEPA

Robert Durand, Secretary
Environmental Affairs
Douglas Vigneau, EOEA 12369
251 Causeway Street, Suite 900
Boston, Ma 02114

RE: ENF, Milford Pond Restoration Project

Dear Mr. Secretary,

I totally support and advocate for the restoration of Milford Pond. I have been a selectman in Milford for 18 years and am presently the Chairman of the Pond Restoration Committee.

The committee is comprised of 27 active members who have been deliberating on this project since 1993. We were appointed by the Milford Board of Selectmen.

The town of Milford has devoted town monies and state funds to renovate fields and recreational areas near and adjacent to Milford Pond. Thousands of people from Milford and the area now utilize this location for recreational activities and for passive sport. The Pond Restoration will be an extension of Milord's efforts to provide fishing, boating to the residents. It will also allow this 110-acre body of water to remain open and clean for many generations into the future.

Open space and available bodies of water will be essential to local communities for recreation and for the preservation of water supplies as we enter the new millennium.

The people of Milford want this project to be completed. The children will be the major benefactors of our efforts.

With increased congestion and traffic, residents, I believe, will be spending more time at home and will be frequenting recreational areas for enjoyment and relaxation. For all these reasons and more, I strongly ask you to be considerate of this project for the people of Milford.

I thank you for your support and assistance.

Sincerely,

Dino DeBartolomeis
11 Otis Street
Milford, Ma 01757
(508-473-5275)

December 8, 2000

Mr. Robert Durand, Secretary
Executive Office of Environmental Affairs, Attn. MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street Suite 900
Boston, Massachusetts 02114

RECEIVED
DEC 11 2000
MEPA

DV

RE: Environmental Notification Form
Milford Pond Restoration Project
Milford, Massachusetts

Dear Secretary Durand:

My name is Mr. Frank Andreotti , I am 83 years old and a life long resident of Milford. I am writing this letter in hopes of asking for your support on this very important project for Milford presently and the future significance to the town of Milford.

As a active member of the Cedar Swamp Committee for over 50 years and currently the Milford Pond Restoration committee we have been diligently trying to clean up the pond. It was always an item put on the bottom of the town dockets, because the town lacked the financial ability, and was much too large a task for a small town to take on by itself.

The time has come for action , as more and more Milfordians realize the importance of this landmark attraction and the value this natural resource was and the role it can play again to the town's future growth and development.

In the Mid 60's the Army Core of Engineers was call in to take on a small portion of the clean up task , but the many years have all but erased this now. In the early 80's , the pond was drained of water , in an effort to dry out the silt bottom , hopefully making it deeper, to slow down weed growth. Once drained, the scheduled timetable elapsed and pond was allowed to sit dormant. Just the opposite happened , weeds and Cat- O- Nine tails grew up everywhere. Leaving only a 50 foot wide channel down the middle rendering it useless for any beauty or pleasure.

I have enclosed pictures for your reference of the types of beautiful events and activities which once took place for numerous children as well as adults in the area. It was these family events and community gatherings which have made Milford a wonderful place for me to raise a family and want me to stay in Milford. All my children currently reside in the immediate Milford area and would like to pass what wonderful memories and values of Milford they experience on to their children.

In the most recent years, Milford has seen enormace growth and development through the help of its planners and selectmen in the School System , Policing, Businesses etc. Just this past year Milford has invested in reclaimed acres of land along the Milford Pond banks for recreational purposes such as walking trails, soccer fields, baseball etc.

The Milford Pond is the logical next step to completing what the town has started, but we need your help!!! Please.

Sincerely,

Frank Andreotti

Frank Andreotti

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Central Regional Office, 627 Main Street, Worcester, MA 01608

ARGEO PAUL CELLUCCI
Governor

JANE SWIFT
Lieutenant Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

December 18, 2000

Secretary Robert Durand
Executive Office of Environmental Affairs
251 Causeway Street, Suite 900
Boston, MA 02114

Attention: MEPA Unit – Doug Vigneau

Re: Environmental Notification Form
EOEA # 12369
Restoration of Milford Pond

Dear Secretary Durand,

The DEP Central Regional Office offers the following comments on the *Restoration of Milford Pond Environmental Notification Form* (ENF) submitted by the Town of Milford, Milford Pond Restoration Committee and prepared by Baystate Environmental Consultants, Inc. November, 2000.

The town of Milford is proposing to dredge nearly one-third of the 120+ acre Milford Pond to achieve a maximum depth of 12 feet. A 45-acre area of land-under-water will be hydraulically dredged - the slurry produced will be dewatered using flocculents and filters and the filtrate returned to the pond. It is proposed that the eutrophication rate of the pond will be decreased due to increased water depth, decreased sunlight reaching the pond bottom and removal of phosphate-laden muck. The de-watering site will require approximately 2 acres of land to process the 400,000 cubic yards of muck. The de-watered soil is expected to be used as an additive or topsoil. Testing of samples seems to indicate that there should be no prohibitions regarding the re-use of the soil due to contamination. The dredging will remove organic soil, leaving the indigenous sandy subsoil. The applicant claims that the well fields will not be impacted due to no change in the water level and no dredging in the proximity of the wellheads.

The applicant proposes to request permits from the Milford Conservation Commission (Order of Conditions), the 401 WQC under DEP-Boston, and the 404 WQC under the Corps of Engineers and a Wetlands Variance and Permit. The town has submitted plans for an improvement to the stormwater system. As there are endangered species listed within the area, the applicant expects review by the Natural Heritage and Endangered Species Program as part of the local Order of Conditions. The applicant is claiming enhancement to wildlife. DEM has contributed planning and permitting money and has requested some additional work for dam safety reasons. Massachusetts Historical Commission has requested that the applicant provide plans showing the location of the de-watering site and any available information on prior dredging projects of Milford Pond (formerly Cedar Swamp Pond).

There is considerable information available from numerous reports generated by more than one engineering firm. In a brief review of *Cedar Swamp Pond* by IEP in February 1986 the following issues were discussed:

1. Cedar Swamp Pond was a shallow swamp filled with cedar trees, lining the banks of the Charles River. In 1938, after the cedars were cut, a small dam was constructed above low waterfalls on the Charles. The pond was never very deep and in 1986 it had an average depth of approximately 1.5 feet. In 1985 an unexplained storage change occurred and 18 inches was added to the depth. Estimates of up to 25 feet of peat under the pond were given. The peat is underlain by sands estimated to be up to 15 feet deep.
2. Although the soils of the watershed are generally composed of till, the land adjacent to the pond are typically Class A soils and thus with high permeability may exert a greater influence on the pond than the other till acreage.
3. The wetland communities within the pond were given a high rating (91 out of 98) for potential to attenuate contaminants and thus to protect water quality.
4. Considerable information regarding water quality testing was shown in the report. The high values for average color led IEP to recommend only an 8-foot depth for dredging as required to decrease the re-growth of aquatics. Sewage from both human and animal wastes were indicated in the inflows.
5. There was evidence of seepage of leachate from the then uncapped landfill adjacent to the pond and the report indicates that the level of groundwater under the landfill was not known. Contaminated leachate generated by the uncapped landfill was not penetrating the peat layer but moving over the peat surface and exiting the area via the Charles River.
6. Sediment sampling near the landfill found a high percentage of volatile solids, high lead and moderate mercury concentrations and some organics.
7. No contamination from the leachate was found at the Clark Island wellfield or in groundwater from the underlying aquifer.
8. In 1983 the pond was drained for one year to kill the then prevalent aquatic plants.
9. Over 12 storm drainage inlets were identified.
10. The pond annual residence time was 0.013 years or a replacement volume of 75 times each year. Other estimates are 41 and 85 times per year.
11. Groundwater inflows contribute 1/3 of the water to the pond. There is evidence that 5% of the losses from the pond are due to intake from the Clark Island Wellfield.

Another study conducted by Baystate Environmental Consultants, Inc. in July 2000 reported on possible improvements to the stormwater systems in nine of the approximately 18-stormwater discharge sites. Moreover, a GIS review of this site indicates that there are numerous public drinking water wells adjacent or near the pond sharing the common Zone II that includes the pond, the old landfill site and some highly developed areas.

The public water wells appear to be as follows:

- Dilla Street
- Charles River
- Clarks Island
- Cedar Swamp

The Department of Environmental Protection has specific concerns on the following issues that should be addressed in the preparation of the EIR:

1. The application stated that a variance from the Wetlands Protection Act would be required but during a conversation with the engineer, he believed a variance is inappropriate but would be applying to the Conservation Commission under the following provisions:

- Limited project: 10.53 (3) (l): "...maintenance of water dependent uses..." The EIR should address how this project will protect the interests as stated within this regulation, as well as present alternatives to the impacts and mitigation offered.
- 10.53 (4)"...will improve the natural capacity of a resource area to protect the interest.." The applicant must provide information as to how this dredging project will improve the capacity of the resource area to protect the interests within Chapter 131, Section 40.

2. Historic information, prior to the capping of the landfill, indicated movement of leachate into the pond. The reports indicated that wells were protected by the thick underlying muck. As the current proposal would remove 12 feet of muck, data should be analyzed and provided to ensure that the wells will not be impacted by the loss of overlying organic soils. Additionally, monitoring data on the capped landfill should be evaluated to ensure that leachate will not flow into the pond once this barrier is removed.
3. If data is unavailable to ensure protection of the surface and groundwater, alternatives to a full depth removal of 12 feet (IEP had recommend that 8 feet would be sufficient due to the high color of the incoming water.) should be considered.
4. As there is considerable historic information on water analysis from inlet sources into the pond, additional testing would reveal where improvements or decreases to water quality have occurred and how these changes might impact the future use of the pond. It appears that only sediment testing has been done by this most recent report. The applicant should address the impact on residence time during low flow of the Charles. The applicant should develop a complete analysis of stormwater impacts to the inlets/pond, mitigation measures and expected improvements to the water quality.
5. The Natural Heritage and Endangered Species Program will be requested to review the work for impacts to Rare and Endangered Species listed within this site. The Wetlands Protection Act further presumes that any project that removes more than 5000 square feet of land-under-water is significant to wildlife habitat. Above this threshold the applicant must address wildlife habitat impacts as required under 310 CMR 10.60.
6. The applicant should provide engineering expertise to ensure that the dam will not be undermined by removal of nearby muck.

The DEP Central Regional Office appreciates the opportunity to comment on this proposed project. If you have any questions regarding these comments, please do not hesitate to contact me at (508) 849-4033.

Sincerely,

Eric Worrall
Deputy Regional Director

Cc: Robert Golledge Jr., Regional Director, CERO
Paul Anderson, Municipal Coordinator, CERO
Doug Fine, BRP Deputy Regional Director. CERO

Charles River Watershed Association

DV

RECEIVED
DEC 12 2000
MEPA

December 12, 2000

Bob Durand, Secretary
Executive Office of Environmental Affairs
Attention: MEPA Unit
251 Causeway Street, 9th Floor
Boston MA 02114-2150

RE: EOEA No. 12369, Environmental Notification Form, Restoration of Milford Pond

Dear Secretary Durand:

Thank you for the opportunity to comment on this Environmental Notification Form. In general, the Charles River Watershed Association (CRWA) is in favor of this project. Restoring some areas of open water in Milford Pond and improving recreational potential is important both for the community and for the watershed.

CRWA also is in favor of the Stormwater Management plans to retrofit ten sites that discharge stormwater into Milford Pond. We hope the EIR will include more detail on the site locations, the choice of BMPs, and the related catchment areas for this plan. CRWA does have some concerns regarding the coordination of the timing of dredging to minimize the adverse effects to wildlife and aquatic organisms and hopes this will be addressed in the EIR as well.

Thank you for the opportunity to comment on this project. The Charles River Watershed Association looks forward to seeing the EIR for the Restoration of Milford Pond.

Sincerely,

Peg Savage

Peggy Savage
Environmental Scientist

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

DV

RECEIVED
DEC 12 2000
MEPA

December 8, 2000

Secretary Bob Durand
Executive Office of Environmental Affairs
Attn.: Doug Vigneau, MEPA Unit EOEA #12369
251 Causeway Street, Suite 900
Boston, MA 02114

RE: Milford Pond Restoration Plan, Milford. MHC #RC.27205. EOEA #12369.

Dear Secretary Durand:

Staff of the Massachusetts Historical Commission have reviewed the Environmental Notification Form submitted for the project referenced above. Review of MHC's files indicates that we recently commented on the project, and a copy of MHC's letter (10/27/200) was included with the ENF within Attachment 1.

Review of the Inventory of Historic and Archaeological Assets of the Commonwealth indicates that the project area is located in the vicinity of a recorded historical archaeological site (MIL-HA-2), the structural foundation remains of the Louisa Lake Ice Company that appear to be located on the northwest side of Dilla Street, adjacent to Louisa Lake. The project area is also located in the vicinity of Pine Grove Cemetery (MIL.801) at Cedar and Dilla Streets. Based on the favorable environmental setting of the project area, unrecorded archaeological sites may be present in the project area. In New England, archaeological sites are usually buried and thus require systematic archaeological investigation to be located and identified. The archaeologically sensitivity of the project area is principally defined by the project area's location in proximity to wetlands resources associated with the Charles River drainage and the discovery of ancient Native American archaeological sites in the project area vicinity, and within identical environmental settings within the Charles River drainage. Because the locations of several aspects of the project have not yet been described, presently the MHC cannot determine if any of Milford's previously identified historic and archaeological resources are in proposed project impact areas.

Additional information is required by the MHC to evaluate the proposed project. Depending on the location and design of aspects of the project that have not yet been selected or described, the project has the potential to affect historic and archaeological resources. Activities that could affect cultural resources include site preparation and placement of mechanical dewatering equipment at an upland dewatering site; the restoration of the dewatering site following the project for an improved boat launch and area of public access; and stormwater management facilities. As early as possible, and well in advance of implementing the project, detailed project plans and original, representative photographs of the project locations should be submitted to the MHC for our review and comment to determine whether or not an intensive (locational) archaeological survey (950 CMR 70) should be conducted in project impact areas. The goal of the survey, if necessary, is to locate, identify, and evaluate any significant historic or archaeological resources that could be affected by the project, and to provide information so that MHC can

220 Morrissey Boulevard, Boston, Massachusetts 02125 · (617) 727-8470
Fax: (617) 727-5128 · TTY: (617) 878-3889
www.state.ma.us/sec/mhc

consult with project planners to avoid, minimize, or mitigate impacts to significant cultural resources, prior to implementing the project. The ENF indicates that the project planners will coordinate with the MHC to assist in this regard.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800), MGL c. 9, ss. 26-27C (950 CMR 71), and MEPA (301 CMR 11). Please contact me if you have any questions or need additional information.

Sincerely,

Edward L. Bell
Senior Archaeologist
Massachusetts Historical Commission

xc:
Paul G. Davis, Baystate Environmental Consultants, Inc.
Michael Santora, Milford Town Engineer
Milford Historical Commission
DEP-CERO-Wetlands
DEP-DWWR
Karen Kirk Adams, USACOE-NED-Regulatory
Kate Atwood, USACOE-NED

DV

December 4, 2000

RECEIVED
DEC 6 2000
MEPA

Bob Durand, Secretary
Executive Office of Environmental Affairs,
Attn: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street, Suite 900
Boston, Massachusetts 02114

RE: Environmental Notification Form
Milford Pond Restoration Project
Milford, Massachusetts

Dear Secretary Durand:

I am a member of the Milford Conservation Commission, Milford Pond Restoration Committee and a resident of the Town of Milford. My parents, grandparents, aunts, uncles were born and raised in the Town on Milford.

The Milford Pond area of town is a magnet for recreational activities with several acres of public land. Recently, the area has undergone many projects and cleanup campaigns to bring to the town an attractive, safe place for residents to enjoy outdoor activities.

Unfortunately, Milford Pond itself has been neglected over several years. The pond has been choked with vegetation and pollutants from its surroundings. Storm water runoff from major roadways, including Route 495, has also contributed to its deterioration.

Milford Pond can be brought back to have fish, waterfowl and plant life thrive and to become an attractive place for activities such as boating, fishing, swimming as it once was when my parents were children.

I am asking for your support in my effort as a committee member, Conservation Commission member and resident of the Town of Milford in the Milford Pond Restoration Project EOEA No. 12369.

Sincerely yours,

Michael A. Giampietro
12 Lawrence Street
Milford, MA 01757

DV

December 4, 2000

RECEIVED
DEC 06 2000
MEPA

Bob Durand, Secretary
Executive Office of Environmental Affairs, Attn: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street, Suite 900
Boston, Massachusetts 02114

RE: Environmental Notification Form
Milford Pond Restoration Project
Milford, Massachusetts

Dear Secretary Durand:

The purpose of this letter is to lend strong support to the proposed Milford Pond Restoration Project, EOEA No. 12369.

I have lived in the Town of Milford my entire life and I have many fond memories of Milford Pond. As a child, I spent many hours both fishing and ice skating at Milford Pond. Unfortunately, as the years have gone by, fishing at this location is impossible and ice skating is becoming more difficult. I strongly believe that this former public treasure should be rehabilitated for the future generations.

As you may know, the former Cedar Swamp area, including the former landfill, has been capped and rehabilitated. Just this past September, the new Plains Park was unveiled to the delight of our citizens. The restoration of the adjacent Milford Pond would be a fitting complement to this project.

I trust that your office will complete a thorough review of this project and discover for yourselves the uniqueness and worthiness of this project. Thank you for your consideration as well as your anticipated support.

Very truly yours,

Louis J. Celozzi
13 Larson Road
Milford, MA 01757

DV

21 East Wood Street
Milford, MA 01757
December 5, 2000

Mr. Robert Durand, Secretary
Exec. Office of Environmental Affairs
MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street, Suite 900
Boston, MA 02114

Dear Mr. Durand:

Re: Environmental Notification Form – Milford Pond Restoration

This is to inform you of my concern for and support of the Milford Pond Restoration Project. I have been a member of the Restoration Task Force for a number of years and have learned much about the history of the pond – its original natural state and its recent deterioration.

It is very important to the residents of the entire town, not only the residents of the immediate proximity of the pond, to see that this restoration project goes forward. Not only was the pond a wonderful natural resource – serving as a place for boating and fishing – it also offers a beautiful setting to surrounding areas, such as the new recreational area of Plains Park, Fino Field and Rosenfeld Park.

Not only is the _current_ condition of much of Cedar Pond an eyesore, the odor from the Pond has been offensive to the neighbors.

I strongly urge you to support this project.

Yours truly,

Donna Horrigan

Donna Horrigan

DV

December 1, 2000

Bob Durand, Secretary
Executive Office of Environmental Affairs, Attn: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street, Suite 900
Boston, MA 02114

RECEIVED
DEC 4 2000
MEPA

RE: Environmental Notification Form
Milford Pond Restoration Project
Milford, Massachusetts

Dear Secretary Durand:

The purpose of this letter is to lend strong support to the proposed Milford Pond Restoration Project, EOEA No. 12369.

As a lifelong resident of the town of Milford, I feel a need to express concern over the present condition of Milford Pond. I have been a coach in town for close to 25 years and have always taken great pride in the way surrounding public lands have been maintained. The surrounding public lands include: Fino Field, Rosenfeld Park and the recently completed Plains Park.

Milford's town officials are committed to the restoration and beautification of public lands throughout the town and I feel it is imperative to include the Milford Pond as a restored recreational area utilized by the children and adults of this community and surrounding towns.

My family, friends and I are totally supportive of the Milford Pond restoration efforts.

Sincerely,

Steven A. Matos

Steven A. Matos
28 Prospect St
Milford, MA 01757

DV

Bob Durand, Secretary
Executive Office of Environmental Affairs, Attn: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street
Boston, Ma. 02114

RE: Environmental Notification Form
Milford Pond Restoration Project
Milford, Ma.

Dear Secretary Durand: December 6, 2000

I'm writing to you, hoping you will understand what project EOEA No. 12369 means to me and my family.

I'm seventy five years old and as a youth I fished, skated and played hockey at Milford Pond. We rowed boats, caught frogs and most of our outdoor activities originated or ended at the pond.

I am and have been a Park Commissioner in Milford for more than 40 years. We've built two recreation areas adjacent to the pond- Rosenfeld Park, consisting of two little league ball fields, and, just this year opened a new 18 acre recreation area known as Plains Park. This consists of a walking trail, soccer and baseball fields, plus a pavilion, benches and picnic tables.

The restoration of Milford Pond will complete the renovation of this area. Thousands of my neighbors and friends, including myself, were born in that area and it seems terrible that the pond has become stagnant and polluted.

Please help us restore the pond to again be the focal point of Milford. With the two recreational areas, the Municipal Pool, and the Fino Field complex already in place, I look forward to seeing Milford Pond again being the beautiful place it once was.

Thank you and may your holidays be the best you have ever had.

Sincerely,
Nazzareno Baci

Nazzareno Baci
2 Harding Street

cc: Dino DeBartolomeis

PHYLLIS A. AHEARN
39 GODFREY LANE
MILFORD MA 01757-4035
(508)-473-6212

DV

December 9, 2000

RECEIVED

DEC 12 2000

MEPA

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
251 Causeway Street, Suite 900
Boston MA 02114

Attn: Robert Durand, Secretary/EOEA

Dear Mr. Secretary: RE: Milford Pond Restoration Project

I am writing to you to advocate for your support of the above-captioned Project.

Milford Pond, also known as Cedar Swamp Pond (or the Great Cedar Swamp), is woven into the fabric of this community and the lifestyles of successive generations of Milfordians. It is one of our most cherished resources, and I wholeheartedly support the efforts of the Milford Pond Restoration Committee and others to secure federal and state funding to bring it back to life.

My own family history serves as an example. My four grandparents, arriving here in the late 1800s as immigrants, built homes and raised families in the shadow of the pond. Their children (my parents, aunts and uncles) learned to fish and skate there. I spent my own childhood with my father fishing the pond. We seldom caught anything, but the time we spent together there is one of my most cherished memories. My two sons played ball at Votolato Park and Rosenfeld Park, two ballfields adjacent to the pond. We swam at Milford's municipal pool, located along the western perimeter of the pond. On October 5th, my granddaughter celebrated her first birthday at the picnic table my family donated to Plains Park, Milford's newest recreational area (the former landfill), also adjacent to the pond. Fino Field, named for Milford first casualty in World War II and also adjacent to the pond, has been the site of baseball and football games for over fifty years. Milford's annual July 4th celebration and fireworks display, drawing visitors from many surrounding towns, takes place at the water's edge. It is obvious that the pond is a magnet, drawing Milford's citizens of all ages to its shores for rest, recreation and entertainment.

Please lend your influence, expertise and support to this endeavor. Milford Pond deserves to recapture its rightful place in the history of our community, so that it will mirror the parks and pools which surround and complement it. I look forward eagerly to its restoration.

Sincerely,

Phyllis A. Ahearn

Phyllis A. Ahearn

Timothy R Sweeney
137 Purchase Street
Milford Massachusetts 01757-1110
508-478-6567

DY

12-12-00 03:32 RCVD

Ref: Milford Pond Restoration

December 10, 2000

RECEIVED
DEC 12 2000
MEPA

Dear Mr. Durand

I am writing to you in support for the restoration project submitted to your office concerning Milford Pond.

Although I am in support of this project I would like to voice my concern in regards to a tributary to Milford Pond, Louisa Lake and the upper run off retention basin from Shadowbrook apartments. Both of these bodies of water flow directly into Milford pond. As identified by Aquatic Control Technologies report (1) submitted with application for funding of Louisa Lake. This body of water suffers from the same entropy that currently plagues Milford Pond. I would pose this question "shouldn't we remedy both bodies of water at the same time?". If Louisa Lake is not properly addressed it will re-propagate Milford pond with new weeds, additional sediment, and continue to enrich the waters with nutrient loads.
During the summer of 1999 with good intention there was an attempt to clean Louisa Lake. I would like to outline some difficulties that occurred during that attempt that still need to be remedied.

Severe drought eliminated access to the northern end of the lake for chemical spraying. Unfortunately this is the most severely infested portion of the lake (1). Because the lake flows southerly there wasn't a carry over effect of the chemicals to the northern end. Weeds exist today as they did before spraying.

Weed extraction was performed along the western portion of lake, approximately ¼ of the lake area. Again the northern part of the lake was excluded because of its inaccessibility.

What began as a good intended restoration of Luisa Lake has done little more than clean areas least effected by weeds and change the perspective as you view the lake from the south. Over the last 4 years a small island has begun to form in the northern end because of sediment and vegetation deposits. Symptoms that the lake is in dire need of attention.

It is my hope that we can look at this watershed area comprehensively and find the best solutions to effectively manage problems associated with such a disproportional drainage basin 97:1 (1). By rectifying both bodies of water we will prolong the usefulness of these tax dollars being spent.

Thank you for your time and consideration of this relationship between the two bodies of water.

Sincerely

Tim Sweeney

Cc: Marie Parente, Dino DeBartolomeis, Richard Neal, Reno DeLuzio

(1) Aquatic Control Technologies, report dated October 5, 1998, in preparation of funding for Louisa lake restoration.

GERALD M. MOODY
8 Fern Street
Milford, MA 01757

DV

Bob Durand, Secretary
Executive Office of Environmental Affairs
251 Causeway Street - Suite 900
Boston, MA 02114

RECEIVED
DEC 1 2000
MEPA

Attention: Douglas Vigneau

Re: Environmental Notification Form
Milford Pond Restoration Project
Milford, MA
EOEA #12369

Dear Secretary Durand:

I write this letter as a longtime resident of Milford to express my strong support for the Milford Pond Restoration Project.

In the past, Milford Pond was an important water resource and outdoor recreation area serving all of the greater Milford community. That ended long ago as the pond became choked off. The Town of Milford has spent millions of dollars in recent years on its outdoor recreation facilities. Indeed, Louisa Lake which feeds Milford Pond and the former landfill which abuts Milford Pond, have been turned from hazardous eyesores to vibrant community fields and passive recreation areas. It is vital that the same be done for Milford Pond.

I strongly support and recommend approval of the Milford Pond Restoration Project.

Very truly yours,

Gerald M. Moody

GMM/sar

DV

December 7, 2000

RECEIVED
DEC 1 2000
MEPA

Bob Durand, Secretary
Executive Office of Environmental Affairs, Attn: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street, Suite 900
Boston, Massachusetts 02114

RE: Environmental Notification Form
Milford Pond Restoration Project
Milford, Massachusetts

Dear Secretary Durand:

The purpose of this letter is to lend strong support to the proposed Milford Pond Restoration Project, EOEA No. 12369.

As a lifelong resident of the town, it would mean a great deal to me, and the townspeople to see Milford Pond restored.

Several years ago, serving as a former scout of Troop 2, I was very proud to be part of a "Milford Pond Clean Up Day". It consisted of cleaning rubbish, leaves and debris from the perimeter of the pond. This turned out to be a very rewarding project. However, as time goes on, the over grown vegetation makes it difficult for its true charm and beauty to shine through.

I have memories of this beautiful pond as the background to Milford Pool where my brother and I spent many hot summer days swimming. The restoration of this pond would serve as a true picture to Milford's environmental restoration of not only a historical landmark to its residents but as a place that represents a quiet and beautiful spot to "ponder" in the town of Milford.

Sincerely,

Matthew J. DeTore

Matthew J. DeTore
2 Whip-o-Will Lane
Milford, MA 01757

DV

December 7, 2000

Bob Durand, Secretary
Executive Office of Environmental Affairs, Attn: MEPA Unit
Douglas Vigneau, EOEA No. 12369
251 Causeway Street, Suite 900
Boston, Massachusetts 02114

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DEC 1 1 2000
MEPA

RE: Environmental Notification Form
Milford Pond Restoration Project
Milford, Massachusetts

Dear Secretary Durand:

The purpose of this letter is to lend strong support to the proposed Milford Pond Restoration Project, EOEA No. 12369.

As a lifelong resident of the town, it would mean a great deal to me, and the townspeople to see Milford Pond restored.

Several years ago, serving as a former scout of Troop 2, I was very proud to be part of a "Milford Pond Clean Up Day". It consisted of cleaning rubbish, leaves and debris from the perimeter of the pond. This turned out to be a very rewarding project. However, as time goes on, the over grown vegetation makes it difficult for its true charm and beauty to shine through.

I have memories of this beautiful pond as the background to Milford Pool where I spent many hot summer days swimming. The restoration of this pond would serve as a true picture to Milford's environmental restoration of not only a historical landmark to its residents but as a place that represents a quiet and beautiful spot to "ponder" in the town of Milford.

Sincerely,

Michael J. DeTore

Michael J. DeTore
2 Whip-o-Will Lane
Milford, MA 01757

RECEIVED
DEC 11 2000
MEPA

Dec 7, 2000

DV

Bob Durand, Secretary
Executive Office of Environmental Affairs

Dear Secretary Durand:

The purpose of this letter is to support the Milford Restoration Project, EOEA # 12369

I have lived in Milford all my life. As a young boy I fished and enjoyed boating with my family and friends. Milford Pond was used and enjoyed by most all the townspeople.

Today Milford Pond is just about useless. Please help!

Sincerely
Richard Swift
196 Highland St

Note"
My printer needs repair.

FROM THE DESK OF

JOHN R. NIRO
11 DiAntonio Dr.
Milford, MA 01757

Dec 11, 2000

DV

Robert Durand, Secretary
Executive Office of Environmental Affairs
151 Causeway St., Suite 900
Boston, MA 02114

RECEIVED
DEC 12 2000
MEPA

Dear Secretary Durand,

Who is going to help us clean-up Cedar Swamp Pond?

Many studies have been done on this once clean waterway.

Milford has to help itself.

Plans are made to restore it to a recreational use.

We'd like to call on your help so that this Pond may have a bright new future and this is the reason that my family supports this Pond Project

Sincerely,

John R. Niro

December 10, 2000

DV

Robert Durand
251 Causeway St. Suite 900
Boston, MA. 02114

Re: Restoration of Mitford Pond

Dear Sir:

The conditions that the residents who live (for many years) along the Mitford Pond, have had to endure; (odors, insects and an unsightly eye-sore for many years) is deplorable.

We question, and are very concerned as to the health hazards concerning our well being.

As year long residents, tax payers, and voters of Precinct 2, we feel strongly that attention and concern merits priority consideration on the matter.

Thank you.

Respectfully,

(32 Meade St, Mitford, MA) Ceasar A. Luzi

ETAL

NOTE: The residents of Precinct 2 have held several meetings over the years with Town officials.

RECEIVED

DEC 12 2000

MEPA

9 Goodrich St.
Milford, Mass
Dec. 9 2000

Robert Durand Secretary office of Environmental Affa
251 Causeway St.
Suite 900
Boston, Mass-

Dear Robert,

Sixty Five years ago I would Go swiming and fishing in Cedar Swamp Pond. We would also go boating and Rafting. It was a beautiful body of Water then and with your help it could be restored to the way it once was. I Pray that you will give it your immediate attention.

Yours truly
Anthony G Grillo

RECEIVED
DEC 06 2000
MEPA

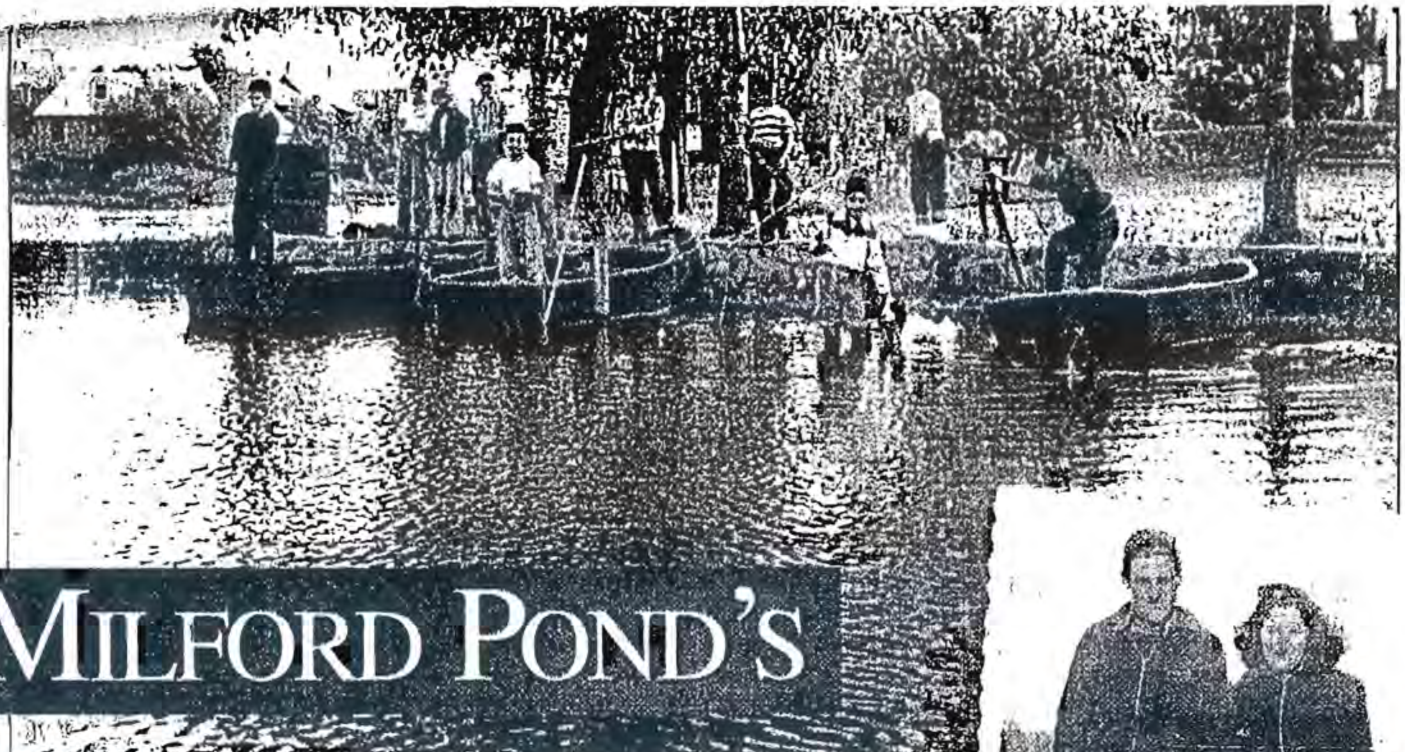
12349 OV

Mr. Steven Janock
53 Maher Ct.
Milford, MA 01757-1674

DEAR ~~DR~~, SECRETARY DURAND
WHEN I. WAS GROWING UP.
DURING THE 1960S LIKE
1968 MICROREO PONS got WORS to
you use to BE ABle to
Fish. Behind my uncle Joes House
~~a~~ then it through the YEAR got
All GROWN IN got WORST so you
coulont Fish it. then it got
so BAD you coulont Fish it
Behind the BATH House eather
where THE pool. Then When
I Moved BACK to Milford
IN 1989. It got WORST. So
BAD that you Coulont Fish
THE Whole pond. except ofe
THE BRidge DOWN BY
Find Field THE LAST
four YEARS. 97 + 2000.
It's gotten WORST. that
THE problem HAS GROWN. ~~FROM~~
~~MR~~ WORST

FROM Emilio Diotalevi's House ALL THE WAY to THE Bridge. FROM his House to the whole Length OF THE Bridge where the Dam is you cant even Fish the whole Length of that Bridge or put a Boat into it. Its gotten worst. But its not just the vegetation the pollution to years of Dumping from the town Dump. which is now capped. the Dump isnt a problem anymore. But other companies that have dumped into their during the years. that I would like to see it get cleaned up.

Sincerely
Steven Janick



MILFORD POND'S Glory Days

Community treasure now buried in weeds

By DENISE MARIE MIZE
Daily News Staff

MILFORD — "In the good old summertime," children frolicked in the pristine cool waters of Milford Pond.

Young people and their dads went fishing. They brought home a catch of "horn pout" that Mama would bread and fry in a cast iron skillet for supper.

On weekends, families and courting couples would pay 25 cents to rent a rowboat for the day.

They would pull the rowboats up on the shores of what is called "the first island" and pick wild strawberries.

In the winter, children strapped on double runner skates, fashioned hockey sticks out of bean poles and enjoyed a strenuous hockey game.

Couples skated hand-in-hand and young parents pulled their small children across the ice on sleds.

That is the Milford Pond long-time abutters remember.

They are distressed and saddened by its demise both environmentally and health wise.

The once popular destination hundreds of skaters glided over when it was covered with ice is only a pleasant memory.

The abutters have been trying to convince the town to take remedial action for years.

Instead, it has been allowed to deteriorate to its present state — a shallow, weed-clogged basin of rotting vegetation.

"In the middle of town, we have a dump," said Frank Andreotti of Hayward Field. "It used to be beautiful."

"I get sick to my stomach. All these years, we've been trying to do something," he said.

Voters will be asked to appropriate up to $50,000 as the town's match to a 75/25 percent state

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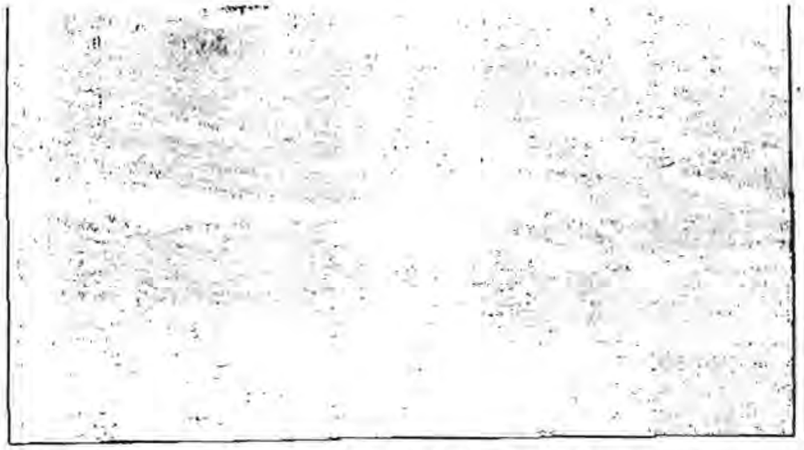
In its heyday, Milford Pond provided a source of outdoor entertainment no matter what the season. From top: a friendly game of pickup hockey; fishing derby at the rear of the Diotalevi property; Lideo Luzi and the former Antoinette Guadagnoli skated on the pond during their courtship; bathing beauties pose for the camera.

Photos courtesy of Frank Andreotti Sr. of Milford



Frank Andreotti Sr. at center, right photo, smiles at the camera during a hockey game on Milford Pond. At left top, former Milford Principal Anthony Bibbo. Charles Espanet, a former Milford High School teacher and coach practices his form.

Milford Pond's Glory Days

(Continued From Page One)

grant for the restoration of Milford Pond at the May 18 annual Town Meeting.

The 104-acre body of water was drained in the early 1980s and has remained a low-water, weed-filled area since that time.

Milford Pond sits on the edge of The Plains section of town – one of Milford's oldest neighborhoods.

The Charles River begins in Hopkinton and flows into Milford Pond, exits by means of a spillway and begins its winding long way to Boston Harbor.

An ice house did a brisk business on Hayward Field before three duplex houses were built in 1904. They have been occupied since that time by the Andreotti, Volpe and Diotalevi families.

Tola (Diotalevi) Scully of Hayward Field lives in the house she was born in 85 years ago.

She lives on one side and her brother, Achille Diotalevi, and his family live on the other side.

Diotalevi said his parents bought the house after they immigrated to this country.

He grew up with a love of Milford Pond and fiercely retains the feeling today.

It's a natural feeling "when you live around here all your life," he says.

Diotalevi, who retired from the Milford Fire Department in 1989, said the pond was a beehive of activity offering fishing, ice skating and swimming.

Diotalevi recalled its past days of grandeur when its water level was eight to 10 feet and safe to swim in.

"We'd go out in the boat, jump out and swim," he said.

His family and the Andreotti family rented rowboats to people wanting to take a leisurely ride around the pond.

"We had eight boats . . . now you couldn't put one in it," said Andreotti.

The swimming ended when children emerged from the pond covered by blood suckers.

Diotalevi admitted to being discouraged by its decline.

"We could see it was getting worse. We said we got to do something," he said.

"We made a little noise and got a little help," he said.

That "help" came in the form of the 27-member Milford Pond Restoration Committee.

Selectman Dino DeBartolomeis has chaired the committee since it was formed in 1994.

"If we don't do anything, then the window of opportunity closes. The pond is getting worse," he said last week.

"In the summer, the smell is awful. We think it is a health hazard," Andreotti said.

"On the north side, we have to keep the windows closed," Andreotti said.

When cat tails burst in late summer, "You think it is snowing," Andreotti said.

Andreotti said residents of the area have taken a back seat to other needs the town considered priorities – a new library, a new school, a new fire station, a newly renovated and expanded police station.

"There was always an excuse. The town needs something else," he said.

"Priorities are fine, but the time has come now. They have everything in town," Andreotti said.

"I don't think it will come all the way back because of environmental concerns," Andreotti said.

"I like fish and birds, but what is more important," he said.

APPENDIX D

MCACES COST ESTIMATE

Milford Pond Restoration Alt3
Milford Pond Restoration to
improve aquatic life.

Designed By: CENAE-Engineering and Planning
Estimated By: CENAE-E/P-MR

Prepared By: Mike Remy

Preparation Date: ~~12/17/03~~ 1/21/04
Effective Date of Pricing: ~~12/[illegible]/03~~ 1/21/04
Est Construction Time: 180 Days

Sales Tax: 0.0%

Currency in DOLLARS

ARY REPORTS SUMMARY PAGE

AILED ESTIMATE DETAIL PAGE

Backup Reports...

* * * END TABLE OF CONTENTS * * *

This alternative would involve full dredging of the 4[illegible] acres of the pond basin. This alternative requires site survey and investigation of the dam area, and removal of aquatic weeds prior to dredging. It also requires clearing and grubbing of 14 acres for a work and disposal area, and construction of a paved 14,000 SF dewatering area. The dewatering area is approximately 600 feet from the pond. Hydraulic dredging of 400,000 cubic yards of organic sediments will be required. Sediments will be disposed of in a designated area approximately [illegible],500 from the pond. Upon completion of the dredging, the paved 14,000 SF dewatering area will require demolition. The 14 acre cleared area will require grading and seeding. Mobilization and demobilization costs will be incurred for dredging, weed harvesting and dewatering site. The markups for this project will be as follows: 6% office overhead, 10% field overhead, 10% profit, 1.5% bond This project is at feasibility level, therefore a contingency of 25% is used. Also, 6.5% S&A and [illegible]% E&D are added to the estimate.

03. Wildlife Facilit & Sanctuary			QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
06. Fish and Wildlife Facilities									
06.03. Wildlife Facilities & Sanctuary									
06.03. 1. Engineering, Dam Inspection									
MIL 1	<01036 0550 >	Field personnel, civil engineer- assume field engineer to take one week to inspect existing pond and dam conditions and write up report. Assume one field personnel to maintain silt fencing and control dam flows for three months during construction period.	0.25 MO	5135.95 1,284	0.00 0	0.00 0	0.00 0	5135.95 1,284	5135.9
MIL 1	<01036 0680 >	Field personnel, remediation and maintenance. Assume three months duration during construction period.	2.00 MO	2910.43 5,821	0.00 0	0.00 0	0.00 0	2910.43 5,821	2910.4
		TOTAL Engineering, Dam Inspection		7,105	0	0	0	7,105	
06.03. 2. Mobilization									
AF 1	<01594 0350 >	Office trailer, rent per month, furnished, no hookups, 32' x 8' - assume trailer rental during assumed six month construction period.	6.00 MO	0.00 0	0.00 0	165.00 990	0.00 0	165.00 990	165.0
MIL 1	<02266 1110 >	Erosion control, fence only, silt fence, 3' high, polypropylene. Assume 14 acre area with perimeter silt fencing required= 3,123 LF.	3123.00 LF	1.20 3,754	0.00 0	0.50 1,562	0.00 0	1.70 5,315	1.7
AF 1	<01580 0010 >	Sign, hi-intensity reflectorized- Assume approximately 6 signs 4'x4'= say 100 SF, includes posts.	100.00 SF	0.00 0	0.00 0	13.98 1,398	0.00 0	13.98 1,398	13.9
B MIL 1	<01036 0690 >	Mobilization - hours include general mobilization -site set up, signs, trailers, dozer, dredge barge, grader, loader, chipper, grinder, generator.	300.00 HRS	35.00 10,500	2.00 600	5.00 1,500	0.00 0	42.00 12,600	42.0
		TOTAL Mobilization		14,254	600	5,450	0	20,303	

[illegible] Wildlife Facilit	[illegible]	QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
06.03. 3. C. [illegible] Dewatering Area								
L MIL 1 <02215 2360 >	Backfill, spread dumped		0.87	1.00	0.00	0.00	1.87	
	gravel/fill, dozer, 6" layers, no compaction - assume dewatering area to receive 12" of gravel base for pavement.	1555.00 SY	1,360	1,555	0	0	[illegible],915	1.8
L MIL 1 <02512 1100 >	Fine grade, for slab on grade,		1.23	0.60	0.00	0.00	1.83	
	machine fine grade base prior to paving dewatering area.	1555.00 SY	1,916	933	0	0	[illegible],849	1.8
L A[illegible] 1 <02110 1[illegible]60 >	Clearing and grub, dry, medium		2168.13	2500.88	0.00	0.00	[illegible].01	
	size brush, average grub & trees - 14 acre area to be cleared, includes brush and stump removal and grinding.	14.00 ACR	30,354	35,012	0	0	[illegible],366	4669.0
B RSM 1 <02216 2000 >	Provide and backfill, gravel or		1.14	0.56	10.00	0.00	[illegible]1.70	
	crushed stone base material, &	518.00 CY	592	290	5,180	0	[illegible],062	11.7
L MIL 1 <02224 7100 >	Excavating, bulk, dozer, small		3.00	1.47	0.00	0.00	4.47	
	area, open site, shaping w/small dozer	518.00 CY	1,554	762	0	0	2,316	4.4
B MIL 1 <0250[illegible] [illegible]613 >	Asphaltic conc pavement,		0.35	0.1[illegible]	2.00	0.00	2.49	
	highway, binder course, 4" thick [illegible] dewatering area.	14000 SF	4,900	1,091	28,000	0	[illegible],791	2.4
B A[illegible] 1 <01534 [illegible]910 >	Temp [illegible]ncing, 11 ga, chain		4.83	0.00	10.00	0.00	[illegible].83	
	link, [illegible] high	4000.00 LF	19,320	0	40,000	0	[illegible],320	14.8
[illegible] AF 1 <0223[illegible] [illegible]548 >	Hauling, hwy haulers, 12 CY, 6		2.05	4.00	0.00	0.00	6.85	
	mi round trip @ base wide rate - haul existing soil material away from dewatering site prior to constructing paved dewatering area.	518.00 CY	1,474	2,072	0	0	[illegible],546	6.0
	TOTAL Construct Dewatering Area	14000 SF	61,470	42,516	73,180	0	[illegible],166	12.6
06.03. 4. W[illegible] Harvesting								
AE 1 <02110 1650 >	Harvesting weeds - assume area of		701.45	809.11	0.00	0.00	[illegible].56	
	45 acres per A&E calculations.-assume wet area brush cutting equipment cost used.	45.00 ACR	31,565	36,410	0	0	[illegible],975	1510.5

06.03. Wildlife Facilities & Sanctuary	QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
L AF 1 <02234 0480 > Haul/disp, 16 CY truck, 2 mi rnd trip, at sed disp area. Assume that weed materials will be disposed of at same site as dredge sediments. Assume ten weeks for trucking & diposal cyle.			1201.31	1608.72	0.00	0.00	[illegible]	
	6.00	WK	7,208	10,132	0	0	[illegible],340	2090.0
MIL 1 <01036 0550 > mob and demob materials and equipment for weed havesting			5135.95	0.00	0.00	0.00	[illegible].95	
	1.50	MO	7,704	0	0	0	[illegible],704	5135.9
TOTAL Weed Harvesting	45.00	ACR	46,477	46,542	0	0	[illegible],019	2067.1
06.03. 5. Dredging								
L HTW 1 <02083 2116 > Hydraulic dredging - assume silty sediment material, includes sediment handling			2.59	6.00	0.00	0.00	3.59	
	400000	CY	1036000	2,400,000	0	0	3,[illegible],000	8.5
L MIL 1 <02766 9030 > Return Flow Piping, 10" poly, install & remove			5.00	0.85	7.78	0.00	13.63	
	600.00	LF	3,000	509	4,668	0	[illegible],177	13.6
TOTAL Dredging	400000	CY	1039000	2,400,509	4,668	0	3,[illegible],177	8.6
06.03. 6. Closeout Dewatering Area								
L CIV 1 <02224 3610 > Excavating pavement and base material, bulk, mdm matl,			2.00	2.04	0.00	0.00	[illegible].04	
	689.00	CY	1,378	1,405	0	0	[illegible],783	4.0
L MIL 1 <02226 4100 > Fine grade area, 3 passes w/grader - grade 14 acres			25.14	12.24	0.00	0.00	37.38	
	676.00	CSY	16,994	8,276	0	0	[illegible],270	37.3
& RSM 1 <02932 0010 > Seeding, athletic field mix, hydroseeding -14 acres area.			4.00	0.00	35.00	0.00	[illegible]9.00	
	609.00	MSF	2,436	0	21,315	0	[illegible],751	39.0
M MIL 1 <02241 0400 > provide and install 6" topsoil at dewatering area			1.95	0.98	30.00	0.00	[illegible]2.93	
	259.00	CY	505	254	7,770	0	[illegible],529	32.9
TOTAL Closeout Dewatering Area	14000	SF	21,313	9,935	29,085	0	60,333	4.3
06.03.07. Demobilization								
B HTW 1 <02083 2112 > Dredging, demobilization			640.00	400.00	200.00	0.00	[illegible].00	
	5.00	DAY	3,200	2,000	1,000	0	[illegible],200	1240.0
TOTAL Demobilization	1.00		3,200	2,000	1,000	0	6,200	6200.0

[illegible]. Wildlife Facili[illegible] [illegible] Sanctuary	QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Wildlife Facilities & Sanctuary	1.00		1192820	2,502,101	113,383	0	3,[illegible],303	380030
TOTAL Fish and Wildlife Facilities	1.00		1192820	2,502,101	113,383	0	3,[illegible],303	380030
TOTAL Milford Pond Restoration Alt3	1.00	EA	1192820	2,502,101	113,383	0	3,[illegible],303	380030

	QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	S&A	E&D	TOTAL COST	UNIT	NOTE
06 Fish and Wildlife Facilities										
06.03 Wildlife Facilities & Sanctuary										
06.03. 1 Engineering, Dam Inspection			9,249	2,312	0	752	246	12,559		
06.03. 2 Mobilization			26,432	6,608	0	2,148	704	35,891		
06.03. 3 Construct Dewatering Area	14000	SF	230,642	57,660	0	18,740	6,141	313,183	22.37	
06.03. 4 Weed Harvesting	45.00	ACR	121,096	30,274	0	9,839	3,224	164,434	3654.00	
06.03. 5 Dredging	400000	CY	4,483,763	1,120,941	0	364,306	119,380	6,088,390	15.22	
06.03. 6 Closeout Dewatering Area	14000	SF	78,544	19,636	0	6,382	2,091	106,653	7.62	
06.03.07 Demobilization	1.00		8,071	2,018	0	656	215	10,960	10960	
TOTAL Wildlife Facilities & Sanctuary	1.00		4,957,798	1,239,449	0	402,021	132,001	6,732,070	[illegible]2070	
TOTAL Fish and Wildlife Facilities	1.00		4,957,798	1,239,449	0	402,021	132,001	6,732,070	[illegible]2070	
TOTAL Milford Pond Restoration Alt3	1.00	EA	4,957,798	1,239,449	0	402,021	132,001	6,732,073	[illegible]2070	

	QUANTY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COST	UNI[illegible]
06 Fish and Wildlife Facilities									
06.03 Wildlife Facilities & Sanctuary									
06.03 1 Engineering, Dam Inspection			7,105	710	469	828	137	[illegible],249	
06.03 2 Mobilization			20,303	2,030	1,340	2,367	391	[illegible],432	
06.03. 3 Construct Dewatering Area	14000	SF	177,166	17,717	11,693	20,658	3,408	[illegible],042	16.4[illegible]
06.03 4 Weed Harvesting	45.00	ACR	93,019	9,302	6,139	10,846	1,790	1[illegible],096	2691.0[illegible]
06.03. 5 Dredging	400000	CY	3,444,177	344,418	227,316	401,591	66,263	4,[illegible],763	11.2[illegible]
06.0[illegible]. 6 Closeout Dewatering Area	14000	SF	60,333	6,033	3,982	7,035	1,161	78,544	5.6
06.0[illegible].07 Demobilization	1.00		6,200	620	409	723	119	[illegible],071	8071.4[illegible]
TOTAL Wildlife Facilities & Sanctuary	1.00		3,808,303	380,830	251,348	444,048	73,268	4,957,798	495779[illegible]
TOTAL Fish and Wildlife Facilities	1.00		3,808,303	380,830	251,348	444,048	73,268	4,[illegible]7,798	495779
TOTAL Milford Pond Restoration Alt3	1.00	EA	3,808,303	380,830	251,348	444,048	73,268	4,957,798	495779
Contingency								1,2[illegible]9,449	
SUBTOTAL								6,[illegible]7,247	
								[illegible],821	
SUBTOTAL								6,[illegible],068	
								[illegible],001	
TOTAL INCL OWNER COSTS								6,[illegible],070	

Milford Pond Restoration Alt2
Milford Pond Restoration to
improve aquatic life.

Designed By: CENAE-Engineering and Planning
Estimated By: CENAE-E/P-MR

Prepared By: Mike Remy

Preparation Date: ~~12/17/03~~ 1/21/04
Effective Date of Pricing: ~~12/17/03~~ 1/21/04
Est. Construction Time: 180 Days

Sales Tax: 0.04

SUMMARY REPORTS — SUMMARY PAGE

DETAILED ESTIMATE — DETAIL PAGE

backup Reports...

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This alternative would involve full-scale dredging of the entire 120 acre pond basin. The entire pond would be dredged to a depth of 12 feet. This alternative requires site survey and investigation of the dam area, and removal of aquatic weeds prior to dredging. It also requires clearing and grubbing of 14 acres for a work and disposal area, and construction of a paved 14,000 SF dewatering area. The dewatering area is approximately 600 feet from the pond. Hydraulic dredging of 1,000,000 cubic yards of organic sediments will be required. Sediments will be disposed of in a designated area approximately 1,500 from the pond. Upon completion of the dredging, the paved 14,000 SF dewatering area will require demolition. The 14 acre cleared area will require some grading and seeding. Mobilization and demobilization costs will be incurred for dredging, weed harvesting and dewatering site construction. The markups for this project will be as follows: 6% office overhead, 10% field overhead, 10% profit, 1.5% bond. This project is at feasibility level, therefore a contingency of 25% is used. An S&A of 6.5% and an ED of 2% are also included in the estimate.

[illegible] Wildlife Facilit.	Inctuary			QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT

06. Fish and Wildlife Facilities
06.03. Wildlife Facilities & Sanctuary

06.03. [illegible] Engineering, Dam Inspection

			QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
MIL [illegible]	<01036 0550 >	Field personnel, civil engineer- assume field engineer to take one week to inspect existing pond and dam conditions and write up report.		5135.95	0.00	0.00	0.00	[illegible].95	
			0.25 MO	1,284	0	0	0	1,284	5135.9[illegible]
[illegible] MIL [illegible]	<01036 0600 >	Field personnel, remediation and maintenance. One person to maintain silt fencing and control dam flows.		2910.43	0.00	0.00	0.00	[illegible].43	
			3.00 MO	8,731	0	0	0	[illegible],731	291[illegible].4
		TOTAL Engineering, Dam Inspection		10,015	0	0	0	[illegible],015	

06.03. 2. [illegible] [illegible]zation

			QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
AF [illegible]	<01594 0350 >	Office trailer, rent per month, furnished, no hookups, 32' x 8' - assume trailer rental during assumed six month construction period.		0.00	0.00	165.00	0.00	[illegible].00	
			6.00 MO	0	0	990	0	990	165.0
[illegible] 1	<02266 [illegible] >	Erosion control, fence only, silt fence, 3' high, polypropylene. Assume 14 acre area with perimeter silt fencing required= 3,123 LF.		1.70	0.00	0.50	0.00	[illegible].70	
			3123.00 LF	3,754	0	1,562	0	[illegible]315	1.7
AF 1	<01580 [illegible] >	Sign, hi-intensity reflectorized- Assume approximately 6 signs 4'x4'= say 100 SF, includes posts.		0.00	0.00	13.98	0.00	[illegible].98	
			100.00 SF	0	0	1,398	0	[illegible]398	13.9
[illegible] MIL 1	<01036 0690 >	Mobilization - hours include general mobilization -site set up, signs, trailers, dozer, dredge barge, grader, loader, chipper, grinder, generator.		35.00	10.00	5.00	0.00	[illegible].00	
			400.00 HRS	14,000	4,000	2,000	0	[illegible],000	50.0
		TOTAL Mobilization		17,754	4,000	5,950	0	27,703	

[illegible]. Wildlife Facilit[illegible] [illegible]ntractory		QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
06.03. [illegible] [illegible] Dewatering Ar[illegible]									
L [illegible] <02265 [illegible] >	Backfill, spread dumped gravel/fill, dozer, 6" layers, no compaction - assume dewatering area to receive 12" of gravel base for pavement.			0.87	1.00	0.00	0.00	[illegible].87	
		1555.00	SY	1,360	1,555	0	0	[illegible],915	1.8
L MIL 1 <02512 [illegible] >	Fine grade, for slab on grade, machine fine grade base prior to paving dewatering area.			1.23	0.60	0.00	0.00	1.83	
		1555.00	SY	1,916	933	0	0	[illegible],849	1.8
L A[illegible] 1 <0211[illegible] 1000 >	Clearing and grub, dry, medium size brush, average grub & trees 14 acre area to be cleared, includes brush and stump removal and grinding.			2169.13	2500.08	0.00	0.00	[illegible].01	
		14.00	ACR	30,354	35,012	0	0	[illegible],366	4669.0
[illegible] 1 <02216 [illegible] >	Provide and backfill, gravel or crushed stone base material, &			1.14	0.56	10.00	0.00	[illegible]1.70	
		518.00	CY	592	290	5,180	0	[illegible],062	11.7
L MIL [illegible] <02224 [illegible] >	Excavating, bulk, dozer, small area, open site, shaping w/small dozer			3.00	1.47	0.00	0.00	4.47	
		518.00	CY	1,554	762	0	0	2,316	4.4
B MIL [illegible] <0[illegible] 0813 >	Asphaltic conc pavement, highway, binder course, 4" thick for dewatering area.			0.35	0.14	2.00	0.00	2.49	
		14000	SF	4,900	1,891	28,000	0	[illegible],791	2.4
[illegible] <01534 [illegible] >	Fenc[illegible] 11 ga, chain link, 6' high			4.83	0.00	10.00	0.00	[illegible].83	
		4000.00	LF	19,320	0	40,000	0	[illegible],320	14.8
L [illegible] <0223[illegible] >	Hauling, hwy haulers, 12 CY, 6 mi round trip @ base wide rate - haul existing soil material away from dewatering site prior to constructing paved dewatering area.			2.85	4.00	0.00	0.00	6.85	
		518.00	CY	1,474	2,072	0	0	[illegible],546	6.8
	TOTAL Construct Dewatering Area	14000	SF	61,470	42,516	73,180	0	[illegible],166	12.6
06.03. 4. [illegible] Harvesting									
A[illegible] <02110 1050 >	Harvesting weeds- assume done with wet area brush cutter and loader area of 120 acres per A&E calculations.			701.45	809.11	0.00	0.00	1510.56	
		120.00	ACR	84,174	97,093	0	0	[illegible],267	1510.5

Wildlife Facilit[illegible]	Summary		QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
	L AP[illegible]	<02234 [illegible]480 > Haul/disp. 16 CY truck, 2 mi rnd trip. [illegible] sed disp area. Assume that [illegible] materials will be disposed of at same site as dredge sediments. Assume ten weeks for trucking & diposal cyle.	10.00 WK	1201.31 12,013	1688.72 16,887	0.00 0	0.00 0	[illegible].03 [illegible],900	2890.0
	MIL 1	<01036 [illegible]550 > mob and demob materials and equipment for weed havesting	0.30 MO	5135.95 1,541	0.00 0	0.00 0	0.00 0	[illegible].95 1,541	5135.9
		TOTAL Weed Harvesting	120.00 ACR	97,720	113,980	0	0	[illegible],709	1764.2
06.[illegible]									
	L [illegible] 1	<02003 [illegible] > Hydraulic dredging , silty sediment material, includes sediment handling costs	1000000 CY	2.59 2590000	6.00 6,000,000	0.00 0	0.00 0	[illegible].59 [illegible],000	8.5
	L MIL 1	<02765 9030 > Return Flow Piping, 10" poly, install & remove	600.00 LF	5.00 3,000	0.85 509	7.78 4,668	0.00 0	[illegible].63 [illegible],177	13.[illegible]
		TOTAL Dredging	1000000 CY	2593000	6,000,509	4,668	0	[illegible],177	8.6
06.03.[illegible] Closeout Dewatering Area									
	L [illegible] 1	<02224 [illegible] > Excavating pavement and base material, bulk, mdm matl,	689.00 CY	2.00 1,378	2.[illegible] 1,4[illegible]	0.00 0	0.00 0	[illegible].04 [illegible],783	4.0
	L M[illegible]	<02226 [illegible] > Fine grade area, 3 passes w/grader - grade 14 acres	676.00 [illegible]SY	25.14 16,994	12.[illegible] 8,276	0.00 0	0.00 0	[illegible].30 [illegible],270	37.3
	B KSM 1	<0293[illegible] [illegible]010 > Seeding, athletic field mix, hydroseeding -14 acres area.	609.00 MSF	4.00 2,436	0.00 0	35.00 21,315	0.00 0	[illegible].00 [illegible],751	39.[illegible]
	M MIL [illegible]	<02241 0400 > provide and install 6" topsoil at dewatering area	259.00 CY	1.95 505	0.98 254	30.00 7,770	0.00 0	[illegible]2.93 [illegible],529	32.9
		TOTAL Closeout Dewatering Area	14000 SF	21,313	9,935	29,085	0	[illegible],333	4.3
06.03.07. De[illegible]ilization									
	M MIL 1	<02003 [illegible] > Dredging, demobilization	10.00 DAY	640.00 6,400	400.00 4,000	200.00 2,000	0.00 0	[illegible]40.00 [illegible],400	1240.0
		TOTAL Demobilization		6,400	4,000	2,000	0	[illegible],400	

0..3. Wildlife Facilit. Sanctuary	QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
TOTAL Wildlife Facilities & Sanctuary	1.00		2607681	6,174,939	114,883	0	9,...,503	909750
TOTAL Fish and Wildlife Facilities	1.00		2607681	6,174,939	114,883	0	9,...,503	909750
TOTAL Milford Pond Restoration Alt2	1.00	EA	2607681	6,174,939	114,883	0	9,...,503	909750

		QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	S & A	E & D	TOTAL COST	UNIT	NOTE
06	Fish and Wildlife Facilities										
06.03	Wildlife Facilities & Sanctuary										
06.03. 1	Engineering, Dam Inspection			13,030	3,260	0	1,059	347	17,704		
06.03. 2	Mobilization			36,065	9,016	0	2,930	960	48,972		
06.03. 3	Construct Dewatering Ar	14000	SF	230,642	57,660	0	18,740	6,141	313,183	[illegible].37	
06.03. 4	Weed Harvesting	120.00	ACR	275,610	68,903	0	22,393	7,338	374,245	[illegible].70	
06.03. 5	Dredging	1000000	CY	11,193,442	2,798,360	0	909,467	298,025	15,199,294	[illegible].20	
06.03. 6	Cleanout Dewatering Area	14000	SF	79,544	19,636	0	6,382	2,091	106,653	[illegible].62	
06.03.07	Demobilization			16,143	4,036	0	1,312	430	21,925		
	TOTAL Wildlife Facilities & Sanctuary	1.00		11,843,484	2,960,871	0	962,283	315,333	16,081,971	[illegible]1971	
	TOTAL Fish and Wildlife Facilities	1.00		11,843,484	2,960,871	0	962,283	315,333	16,081,971	[illegible]1971	
	TOTAL Milford Pond Restoration Alt2	1.00	EA	11,843,484	2,960,871	0	962,283	315,333	16,081,971	[illegible]1971	

	QUANTY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
0[illegible] [illegible] and Wildlife Facilities									
06.[illegible] Wildlife Facilities & Sanctuary									
06.0[illegible] 1 E[illegible]ineering, Dam Inspection			10,015	1,002	661	1,168	193	[illegible],038	
0[illegible] 2 [illegible]lization			27,703	2,770	1,82[illegible]	3,230	533	[illegible],065	
06.0[illegible] 3 [illegible]struct Dewatering Area	14000	SF	177,106	17,717	11,693	20,658	3,408	[illegible],642	16.4
06.[illegible] 4 [illegible] Harvesting	120.00	ACR	211,709	21,171	13,973	24,685	4,073	[illegible],610	2296.7
06.0[illegible] 5 Dredging	1000000	CY	8,598,177	859,818	567,480	1,002,547	165,420	11,[illegible],442	11.1
06.0[illegible] 6 Closeout Dewatering Area	14000	SF	60,333	6,033	3,982	7,035	1,161	[illegible],544	5.6
06.03.07 Demobilization			12,400	1,240	818	1,446	239	[illegible],143	
TOTAL W[illegible]life Facilities & Sanctuary	1.00		9,097,503	909,750	600,435	1,060,769	175,027	11,[illegible],484	1184348
TOTAL [illegible] and Wildlife Facilities	1.00		9,097,503	909,750	600,435	1,060,769	175,027	11,[illegible],484	1184348
TOTAL Milford Pond Restoration Alt2	1.00	EA	9,097,503	909,750	600,435	1,060,769	175,027	11,[illegible],484	1184348
Contingency								[illegible],871	
SUBTOTAL								14,[illegible],355	
								[illegible],283	
[illegible]								1[illegible],638	
								[illegible],333	
[illegible] OWNER COSTS								1[illegible]971	

Milford Pond Restoration Alt4
Milford Pond Restoration to
improve aquatic life.

Designed By: CENAE-Engineering and Planning
Estimated By: CENAE-E/P-MR

Prepared By: Mike Remy

Preparation Date: ~~12/17/03~~ 1/21/04
Effective Date of Pricing: ~~12/17/03~~ 1/21/04
Est Construction Time: 180 Days

Sales Tax: 0.0%

Currency in DOLLARS

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...AILED ESTIMATE — DETAIL PAGE

No Backup Reports...

* * * END TABLE OF CONTENTS * * *

This alternative would involve full dredging of the [illegible] acres of the pond basin. This alternative requires site survey and investigation of the dam area, and removal of aquatic weeds prior to dredging. It also requires clearing and grubbing of 14 acres for a work and disposal area, and construction of a paved 14,000 SF dewatering area. The dewatering area is approximately 600 feet from the pond. Hydraulic dredging of 180,000 cubic yards of organic sediments will be required. Sediments will be disposed of in a designated area approximately 1,500 from the pond. Upon completion of the dredging, the paved 14,000 SF dewatering area will require demolition. The 14 acre cleared area will require grading and seeding. Mobilization and demobilization costs will be incurred for dredging, weed harvesting and dewatering site construction. The markups for this project will be as follows: 6% office overhead, 10% field overhead, 10% profit, 1.5% bond This project is at feasibility level, therefore a contingency of 25% is used. Also, 6.5% S&A and 2% L&D are added to the estimate.

06.03. Wildlife Facilities & Sanctuary		QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
06. Fish and Wildlife Facilities								
06.03. Wildlife Facilities & Sanctuary								
06.03. 1. Engineering, Dam Inspection								
MIL I <01036 0559 >	Field personnel, civil engineer-assume field engineer to take one week to inspect existing pond and dam conditions and write up report. Assume one field personnel to maintain silt fencing and control dam flows for three months during construction period.	0.25 MO	5135.95 1,284	0.00 0	0.00 0	0.00 0	5135.95 1,284	5135.9
L MIL 1 <01036 0600 >	Field personnel, remediation and maintenance. Assume three months duration during construction period.	2.00 MO	2910.43 5,821	0.00 0	0.00 0	0.00 0	2910.43 5,821	2910.4
	TOTAL Engineering, Dam Inspection		7,105	0	0	0	7,105	
06.03. 2. Mobilization								
AF 1 <01594 0350 >	Gicize trailer, rent per month, furnished, no hookups, 32' x 8' - assume trailer rental during assumed six month construction period.	6.00 MO	0.00 0	0.00 0	165.00 990	0.00 0	165.00 990	165.0
MIL 1 <02266 1113 >	Erosion control, fence only, silt fence, 3' high, polypropylene. Assume 14 acre area with perimeter silt fencing required= 3,123 LF.	3123.00 LF	1.20 3,754	0.00 0	0.50 1,562	0.00 0	1.70 5,315	1.7
AF 1 <01580 0010 >	Sign, hi-intensity reflectorized- Assume approximately 6 signe 4'x4'= say 100 SF, includes posts.	100.00 SF	0.00 0	0.00 0	13.98 1,398	0.00 0	13.98 1,398	13.9
B MIL 1 <01010 0890*>	Mobilization labores - general mobilization of equipment and	200.00 HRS	35.00 7,000	2.00 400	5.00 1,000	0.00 0	42.00 8,400	42.0
	TOTAL Mobilization		10,754	400	4,950	0	16,103	

06.03 Wildlife Facilities & Sanctuary		QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNI
06.03. 3. Construct Dewatering Area								
L MIL 1 <02215 2360 >	Backfill, spread dumped gravel/fill, dozer, 6" layers, no compaction - assume dewatering area to receive 12" of gravel base for pavement.	1555.00 SY	0.87 1,360	1.00 1,555	0.00 0	0.00 0	1.87 2,915	1.8
L MIL 1 <02512 1100 >	Fine grade, for slab on grade, machine - fine grade base prior to paving dewatering area.	1555.00 SY	1.23 1,916	0.60 933	0.00 0	0.00 0	1.83 2,849	1.8
L AF 1 <02110 1002 >	Clearing and grub, dry, medium size brush, average grub & trees - 14 acre area to be cleared, includes brush and stump removal and grinding.	14.00 ACR	2168.13 30,354	2500.88 35,012	0.00 0	0.00 0	4669.01 65,366	4669.0
B RSM 1 <02216 2000 >	Provide and backfill, gravel or crushed stone base material. &	518.00 CY	1.14 592	0.56 290	10.00 5,180	0.00 0	11.70 6,062	11.7
L MIL 1 <02224 7100 >	Excavating, bulk, dozer, small area, open site, shaping w/small dozer	518.00 CY	3.00 1,554	1.47 762	0.00 0	0.00 0	4.47 2,316	4.4
B MIL 1 <02505 0813 >	Asphaltic conc pavement, highway, binder course, 4" thick for dewatering area.	14000 SF	0.35 4,900	0.14 1,891	2.00 28,000	0.00 0	2.49 34,791	2.4
B AF 1 <01534 0019 >	Fencing, 11 ga, chain link, 6' high	4000.00 LF	4.83 19,320	0.00 0	10.00 40,000	0.00 0	14.83 59,320	14.8
L AF 1 <02234 0549 >	Hauling, hwy haulers, 12 CY, 6 mi round trip @ base wide rate - haul existing soil material away from dewatering site prior to constructing paved dewatering area.	518.00 CY	2.85 1,474	4.00 2,072	0.00 0	0.00 0	6.85 3,546	6.8
	TOTAL Construct Dewatering Area	14000 SF	61,470	42,516	73,180	0	177,166	12.6
06.03. 4. Weed Harvesting								
AF 1 <02110 1050 >	Harvesting weeds- assume area of 20 acres per A&E calculations- assum cost similar to wet area brush clearing.	20.00 ACR	701.45 14,029	809.11 16,182	0.00 0	0.00 0	1510.56 30,211	1510.5

06.03. Wildlife Facilities & Sanctuary	QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT
L AF 1 <02234 0400 > Haul/dump, 12 CY truck, 2 mi rnd trip, at sed dump area. Assume that weed materials will be disposed of at same site as dredge sediments. Assume ten weeks for trucking & dipsosal cyle			1201.31	1688.72	0.00	0.00	2890.03	
	2.00	WK	2,403	3,377	0	0	5,780	2890.0
MIL 1 <01036 0500 > Mob and demob materials and equipment for weed havesting			5135.95	0.00	0.00	0.00	5135.95	
	1.00	MO	5,136	0	0	0	5,136	5135.9
TOTAL Weed Harvesting	20.00	ACR	21,568	19,560	0	0	41,127	2056.3
06.03. 5. Dredging								
L HTW 1 <02083 2112 > Hydraulic dredging - assume silty sediment material, includes sediment handling			2.67	6.00	0.00	0.00	8.67	
	180000	CY	480,600	1,080,000	0	0	1,560,600	8.6
L MIL 1 <02766 9030 > Return Flow Piping, 10" poly, install & remove			5.00	0.85	7.78	0.00	13.63	
	600.00	LF	3,000	509	4,668	0	8,177	13.6
TOTAL Dredging	180000	CY	483,600	1,080,509	4,668	0	1,568,777	8.7
06.03. 6. Closeout Dewatering Area								
L CIV 1 <02224 3810 > Excavating pavement and base material, bulk, mdm matl,			2.00	2.04	0.00	0.00	4.04	
	689.00	CY	1,378	1,405	0	0	2,783	4.0
L MIL 1 <02226 4100 > Fine grade area, 3 passes w/grader - grade 14 acres			25.14	12.24	0.00	0.00	37.38	
	676.00	CSY	16,994	8,276	0	0	25,270	37.3
B RSM 1 <02932 0010 > Seeding, athletic field mix, hydroseeding -14 acres area.			4.00	0.00	35.00	0.00	39.00	
	609.00	MSF	2,436	0	21,315	0	23,751	39.0
M MIL 1 <02241 0400 > provide and install 6" topsoil at dewatering area			1.95	0.98	30.00	0.00	32.93	
	259.00	CY	505	254	7,770	0	8,529	32.9
TOTAL Closeout Dewatering Area	14000	CY	21,313	9,935	29,085	0	60,333	4.3
06.03.07. Demobilization								
B HTW 1 <02083 2114 > Dredging, demobilization			640.00	400.00	200.00	0.00	1240.00	
	4.00	DAY	2,560	1,600	800	0	4,960	1240.0
TOTAL Demobilization			2,560	1,600	800	0	4,960	

6.43. Wildlife Facilities & Sanctuary	QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNI
TOTAL Wildlife Facilities & Sanctuary	1.00		608,370	1,154,519	112,683	0	1,875,571	187557
TOTAL Fish and Wildlife Facilities	1.00		608,370	1,154,519	112,683	0	1,875,571	187557
TOTAL Milford Pond Restoration Alt4	1.00	EA	608,370	1,154,519	112,683	0	1,875,571	187557

	QUANTY	UOM	CONTRACT	CONTINGN	ESCALATN	S&A	E&D	TOTAL COST	UNIT	NOTE
06 Fish and Wildlife Facilities										
06.03 Wildlife Facilities & Sanctuary										
06.03. 1 Engineering, Dam Inspection			9,249	2,312	0	752	246	12,559		
06.03. 2 Mobilization			20,964	5,241	0	1,703	558	28,466		
06.03. 3 Construct Dewatering Area	14000	SF	230,642	57,660	0	18,740	6,141	313,183	22.37	
06.03. 4 Weed Harvesting	20.00	ACR	53,541	13,385	0	4,350	1,426	72,702	3635.10	
06.03. 5 Dredging	180000	CY	2,042,295	510,574	0	165,936	54,376	2,773,181	15.41	
06.03. 6 Closeout Dewatering Area	14000	CY	78,544	19,636	0	6,382	2,091	106,653	7.62	
06.03.07 Demobilization			6,457	1,614	0	525	172	8,768		
TOTAL Wildlife Facilities & Sanctuary	1.00		2,441,692	610,423	0	198,387	65,010	3,315,512	3315512	
TOTAL Fish and Wildlife Facilities	1.00		2,441,692	610,423	0	198,387	65,010	3,315,512	3315512	
TOTAL Milford Pond Restoration Alt4	1.00	EA	2,441,692	610,423	0	198,387	65,010	3,315,512	3315512	

	QUANTY	UOM	DIRECT	FIELD OH	HOME OFC	PROFIT	BOND	TOTAL COST	UNI
06 Fish and Wildlife Facilities									
06.03 Wildlife Facilities & Sanctuary									
06.03. 1 Engineering, Dam Inspection			7,105	710	469	828	137	9,249	
06.03. 2 Mobilization			16,103	1,610	1,063	1,878	310	20,964	
06.03. 3 Construct Dewatering Area	14000	SF	177,166	17,717	11,693	20,658	3,408	230,642	16.4
06.03. 4 Weed Harvesting	20.00	ACR	41,127	4,113	2,714	4,795	791	53,541	2677.0
06.03. 5 Dredging	180000	CY	1,568,777	156,878	103,539	182,919	30,182	2,042,295	11.3
06.03. 6 Closeout Dewatering Area	14000	CY	60,333	6,033	3,982	7,035	1,161	78,544	5.6
06.03.07 Demobilization			4,960	496	327	578	95	6,457	
TOTAL Wildlife Facilities & Sanctuary	1.00		1,875,571	187,557	123,788	218,692	36,084	2,441,692	244169
TOTAL Fish and Wildlife Facilities	1.00		1,875,571	187,557	123,788	218,692	36,084	2,441,692	244169
TOTAL Milford Pond Restoration Alt4	1.00	EA	1,875,571	187,557	123,788	218,692	36,084	2,441,692	244169
Contingency								610,423	
SUBTOTAL								3,052,114	
								198,387	
SUBTOTAL								3,250,502	
								65,010	
TOTAL INCL OWNER COSTS								3,315,512	

APPENDIX E
REAL ESTATE REQUIREMENTS

US Army Corps of Engineers ®

REAL ESTATE PLAN
MILFORD POND AQUATIC ECOSYSTEM RESTORATION
MILFORD, MASSACHUSETTS

PREPARED FOR:
ENGINEERING AND PLANNING DIVISION
U. S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD, MA 01742-2751

PREPARED BY:
REAL ESTATE DIVISION
U. S. ARMY CORPS OF ENGINEERS, NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD, MA 01742-2751

DATE OF REPORT:
JANUARY 27, 2004

INTRODUCTION

This Real Estate Plan (REP) has been prepared to support a study conducted under Section 206 of the Water Resources Development Act of 1996 (as amended). Milford Pond is located less than one mile south of Interstate 95, near the center of the town of Milford, Massachusetts. The pond is approximately 120 acres and is formed by the impoundment of the Charles River with inflows from Huckleberry Brook, Louisa Lake, an intermittent stream, and 17 stormwater outfalls. The pond outlet flows over a small masonry dam and continues as the main channel of the Charles River through the Town of Milford to Boston Harbor. The overall watershed area is about 5,440 acres or 8.5 square miles and extends beyond the boundaries of Milford north and east to the adjoining communities of Hopkinton and Holliston, respectively. The northern portion of the watershed is comprised of residential development and open space, while the southern portion of the watershed is primarily urban with commercial and municipal uses.

Milford Pond was historically a cedar swamp located in the headwaters of the Charles River. Over time, this cedar swamp was converted into a pond through the cutting of the large cedar trees and the construction of an impoundment in the early 1900s. The present dam was constructed around 1938 and consists of an earthen embankment with a cast-in-place concrete primary spillway. It is approximately 200 feet long and reportedly is about 11 feet in height.

The study examined the economic and environmental benefits and costs of alternatives to restore and improve the aquatic habitat of Milford Pond. Five alternatives are being examined under the study: (1) Complete Dredge, (2) Partial Dredge of 45 Acres, (3) Partial Dredge of 21 Acres, (4) Dam Removal, and (5) Dam Removal with Partial Dredge of 45 Acres.

PURPOSE

Real estate plans are prepared in accordance U.S. Army Corps of Engineers regulations. The purpose of this real estate plan is to provide information for internal decision-making. It is anticipated that the information provided will provide a basis for the acquisition of real estate interests in support of alternatives for aquatic ecosystem restoration at the approximate location of Milford Pond.

DESCRIPTION OF LAND, EASEMENTS, AND RIGHTS (LER)

The LER necessary for the subject project include sites and associated access for five possible alternatives: (1) Complete Dredge, (2) Partial Dredge of 45 Acres, (3) Partial Dredge of 21 Acres (4) Dam Removal, and (5) Dam Removal with Partial Dredge of 45 Acres.

Complete Dredge: This alternative involves hydraulic dredging of the entire 120-acre pond basin. No fee acquisitions are required for the Complete Dredge alternative. Approximately 14 acres (609,840 SF) of temporary easement area for disposal of dredged material will be required for the Complete Dredge alternative. This area is situated entirely on land owned by the town of Milford. Approximately 51,660 SF of temporary easement area for staging of equipment will be required for the Complete Dredge alternative. Approximately 43,560 SF of this area is situated on land owned by the town of Milford, and about 8,100 SF of this area is situated on adjacent privately owned parcels. The estimated value of the temporary easements is $589,109.

Partial Dredge of 45 Acres: This alternative involves hydraulic dredging of a 45-acre section of Milford Pond extending from the dam northward past Clark Island. No fee acquisitions are required for the Partial Dredge of 45 Acres alternative. Approximately 14 acres (609,840 SF) of temporary easement area for disposal of dredged material will be required for the Partial Dredge of 45 Acres Alternative. This area is situated entirely on land owned by the town of Milford. Approximately 51,660 SF of temporary easement area will be required for staging of equipment for the Partial Dredge of 45 Acres alternative. Approximately 43,560 SF of this area is situated on land owned by the town of Milford, and about 8,100 SF of this area is situated on adjacent privately owned parcels. The estimated value of the temporary easements is $589,109.

Partial Dredge of 21 Acres: This alternative involves hydraulic dredging of a 21-acre section of Milford Pond extending from the dam northward past Clark Island. No fee acquisitions required for the Partial Dredge of 21 Acres alternative. Approximately 14 acres (609,840 SF) of temporary easement area for disposal of dredged material will be required for the Partial Dredge of 21 Acres alternative. This area is situated entirely on land owned by the town of Milford. Approximately 51,660 SF of temporary easement area for staging equipment will be required for the Partial Dredge of 21 Acres alternative. Approximately 43,560 SF of this area is situated on land owned by the town of Milford, and about 8,100 SF of this area is situated on adjacent privately owned parcels. The estimated value of the temporary easements is $589,109.

Dam Removal: This alternative involves removal of the dam. Approximately 10,000 SF of fee simple acquisition will be required for the Dam Removal alternative. This area is situated entirely on land owned by the town of Milford. Approximately 43,560 SF of temporary Easement area for staging of equipment will be required for the Dam Removal alternative. This area is situated entirely on land owned by the town of Milford. The estimated value of the fee acquisition is $10,000 and the estimated value of the temporary easements is $43,560.

Dam Removal With Partial Dredge of 45 Acres: This alternative involves removal of the dam and hydraulic dredging of a 45-acre section of Milford Pond extending from the dam northward past Clark Island. Approximately 10,000 SF will be required for the Dam Removal with Partial Dredge of 45 Acres alternative. This area is situated entirely on land owned by the town of Milford. Approximately 14 acres (609,840 SF) of permanent easement area will be required for disposal of dredged material for the Dam Removal with Partial Dredge of 45 Acres alternative. This area is situated entirely on land owned by the town of Milford. Approximately 95,220 SF of temporary easement area for staging equipment will be required the Dam Removal with Partial Dredge of 45 Acres alternative. Approximately 87,120 SF of this area is situated on land owned by the town of Milford, and about 8,100 SF of this area is situated on adjacent privately owned parcels. The estimated value of the fee acquisition is $10,000 and the estimated value of the temporary easements is $714,828.

Description of Standard Estates:

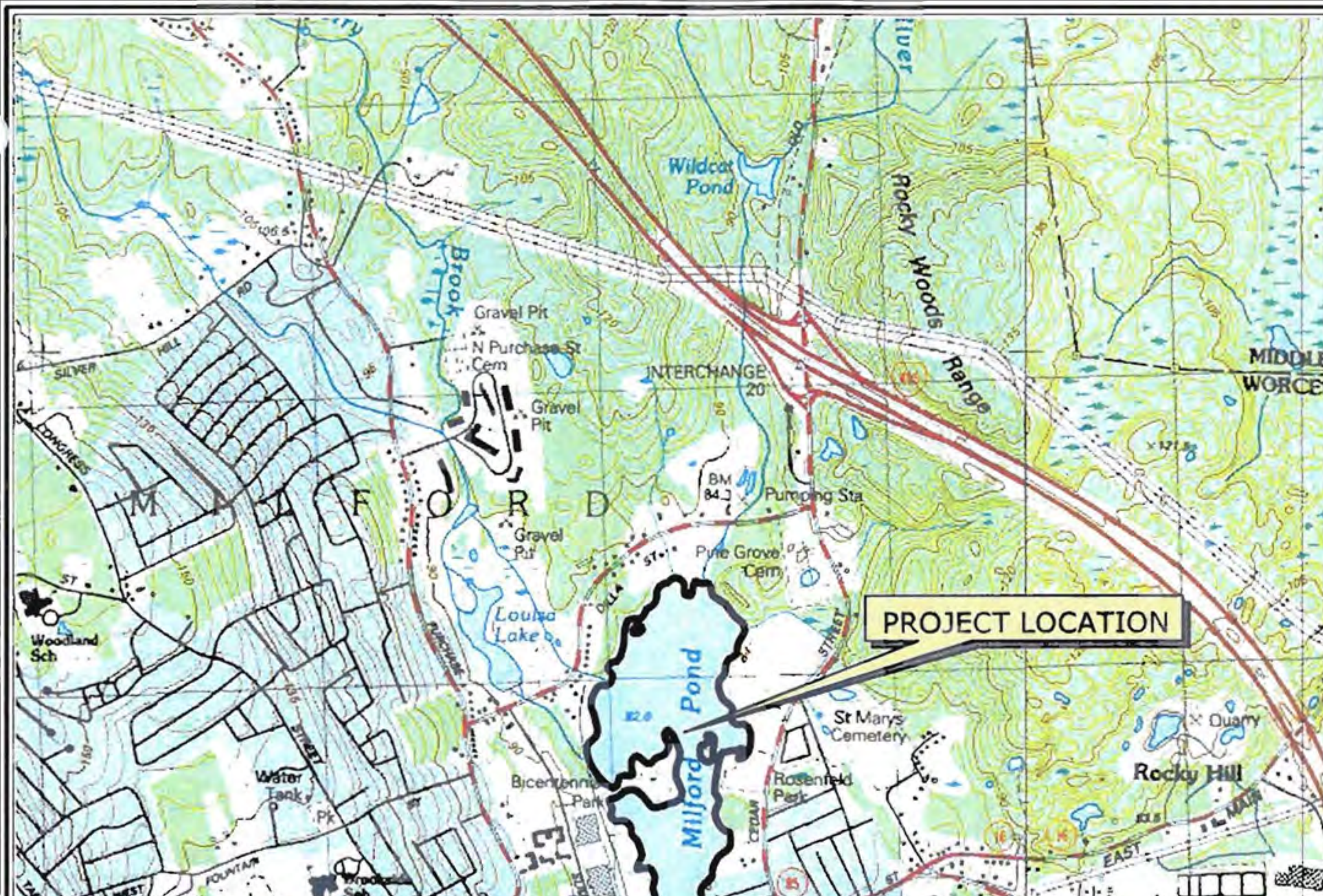
Standard Estate #1 will be utilized for the fee acquisition. Standard Estate No. 5 will be utilized for the Temporary Work Area Easement. The duration of the temporary easement is expected to be 2.5 years, the same time frame as the overall project. Winter shutdowns are anticipated.

NAVIGATION SERVITUDE: Navigation servitude does not apply.

EXISTING FEDERAL PROJECTS: There are no existing federal projects in the project area.

EXISTING FEDERAL OWNERSHIP: There are no Federally-owned lands in the project area.

REAL ESTATE MAPPING: The mapping showing the fee and easement areas will be finalized during the Plans & Spec phase.



MILFORD POND HABITAT RESTORATION PROJECT
MILFORD, MASSACHUSETTS

USGS TOPOGRAPHIC QUADRANGLE MAPS
MILFORD, 1982 &
HOLLISTON, 1987

BAYSTATE ENVIRONMENTAL CONSULTANTS, INC.
EAST LONGMEADOW, MASSACHUSETTS 01028

FIGURE 1-1: LOCUS MAP

POTENTIAL INDUCED FLOODING

There will be no flooding induced by the construction or the operation and maintenance of the Dam Removal or Dam Removal with Partial Dredge alternatives. While these two project alternatives involve the diversion of water, the process is carefully controlled by engineering design.

BASELINE COST ESTIMATE

Alternative 1 – Complete Dredge

Fee Acquisitions	0
Temporary Easements	589,109
Total Fee Acquisitions & Easements	$589,109
Add Contingency @ 25%	147,277
Total	$736,386
Relocation Assistance Costs	0
Total	$736,386

Alternative 2 – Partial Dredge of 45 Acres

Fee Acquisitions	0
Temporary Easements	589,109
Total Fee Acquisitions & Easements	$589,109
Add Contingency @ 25%	147,277
Total	$736,386
Relocation Assistance Costs	0
Total	$736,386

Alternative 3 – Partial Dredge of 21 Acres

Fee Acquisitions	0
Temporary Easements	589,109
Total Fee Acquisitions & Easements	$589,109
Add Contingency @ 25%	147,277
Total	$736,386
Relocation Assistance Costs	0
Total	$736,386

Alternative 4 – Dam Removal

Fee Acquisitions	$10,000
Temporary Easements	43,560
Total Fee Acquisitions & Easements	$53,560
Total Contingency @25%	13,390
Total	$66,950
Relocation Assistance Costs	0
Total	$66,950

Alternative 5 – Dam Removal with Partial Dredge of 45 Acres

Fee Acquisitions	$ 10,000
Temporary Easements	714,828
Total Fee Acquisitions & Easements	$724,828
Add Contingency @25%	181,207
Relocation Assistance Costs	0
Total	$906,035

RELOCATION ASSISTANCE BENEFITS

There are no relocation assistance benefits anticipated to be required in accordance with Public Law 91-646. There are no persons, farms, and businesses to e displaced under the Complete Dredge, Partial Dredge, Dam Removal, or Dam Removal with Partial Dredge alternatives.

TIMBER AND/OR MINERAL ACTIVITY

There is no known present or anticipated mineral or timber harvesting activity in the vicinity of the project.

NON-FEDERAL SPONSOR

The sponsor is the Town of Milford, Massachusetts, a non-federal sponsor. The Town of Milford, Massachusetts has sufficient legal and professional capability and experience to acquire the LER for the project. The Town of Milford, Massachusetts has both condemnation authority and "quick-take" capability.

REGULATORY ANALYSIS

The project is located in an area of residential zoning. No enactment of zoning ordinances is proposed in lieu of, or to facilitate acquisition in connection with the project.

MILFORD POND ACQUATIC ECOSYSTEM RESTORATION
MILFORD, MASSACHUSETTS

REAL ESTATE ACQUISITION SCHEDULE

	Start	Finish
Survey & Legal Description	Nov 2004	Jan 2005
Appraisals	Feb 2005	May 2005
Negotiations	Jun 2005	Aug 2005
PCA Execution	Aug 2005	Aug 2005
Closings	Aug 2005	Sep 2005
File Condemnations	Oct 2005	Nov 2005
Possessions from Condemnations	Dec 2005	Jan 2006
LER Certification	Jan 2005	Jan 2006

FACILITY AND UTILITY RELOCATIONS

The Dam Removal and Dam Removal with Partial Dredge of 45 Acres alternatives do not involve facility and utility relocations. While there is little doubt that allowing the pond to drain could have a significant impact on the hydraulic properties beneath the Milford Pond (from which the Milford Water Company extracts drinking water), the impoundment is not considered to be a public utility. Also, there are no facility or utility relocations that must be performed in connection with either the Complete Dredge, Partial Dredge of 45 Acres, or Partial Dredge of 21 Acres alternatives.

CONTAMINANTS

There are no known contaminants associated with the project.

LANDOWNER CONSIDERATIONS

There is no known opposition to the project alternatives. Landowners in the subject Neighborhood generally support the project alternatives, due at least in part to the considerable dissemination of information through printed material and public meetings.

NON-FEDERAL SPONSOR

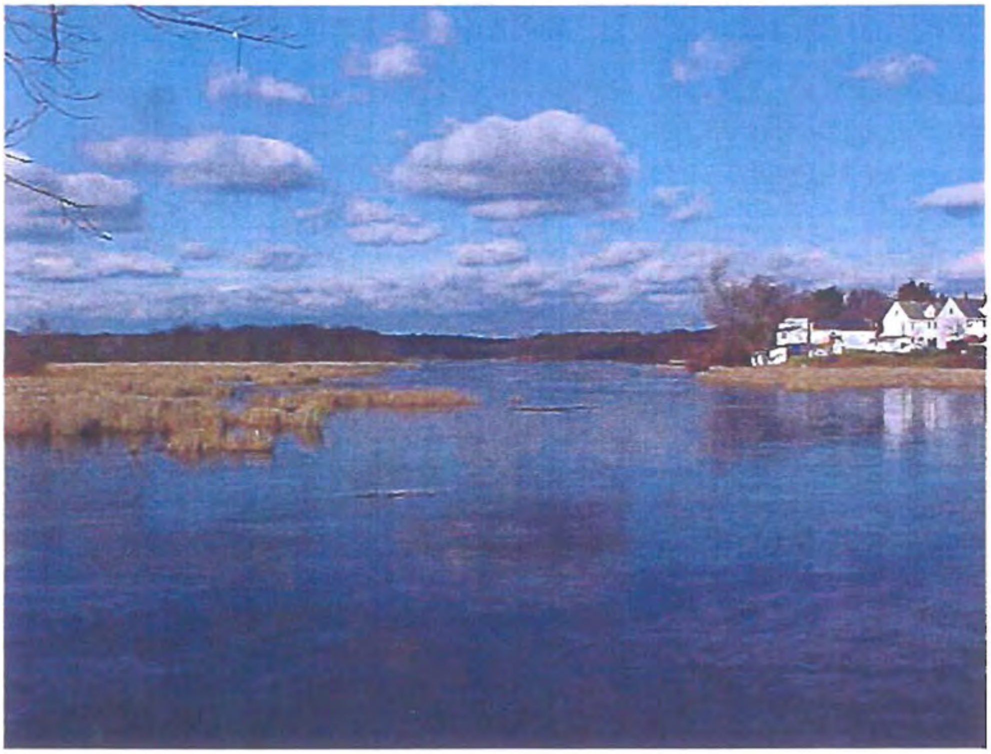
The Town of Milford, Massachusetts is the non-federal sponsor. The town was notified about the risks associated with acquiring land before the execution of the Project Cooperation Agreement (PCA). Portions of each project alternative lie within the boundaries of land owned by the Town of Milford.

OTHER REAL ESTATE ISSUES

There are two significant real estate issues relevant to planning, designing, or implementing the project. First, up to 270 lineal feet of piping will be required for the project. While portions of the piping will be installed utilizing existing rights-of-way, other areas encompassed by the project will require acquisition of easements along private property. I have based the acquisition cost for this element of the project on the assumption that there will be no severance damage due to the installation of this piping.

Second, the proposed location for staging and equipment is the parking area for a municipal recreation facility. Any acquisition of rights on this parcel is likely to have an effect on the ability of residents to use the facility. This real estate plan assumes the ability of the local sponsor to provide a substitute parking area during the construction period (estimated at between 2-3 years).

ADDENDA



Milford Pond Facing North (photo taken by G. Billings on December 4, 2003)

Milford Pond Facing South (photo taken by G. Billings on December 4, 2000

APPENDIX 12-E

ASSESSMENT OF NON-FEDERAL SPONSOR'S
REAL ESTATE ACQUISITION CAPABILITY

I. Legal Authority:

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes?
(yes/no)
b. Does the sponsor have the power of eminent domain for this project?
(yes/no)
c. Does the sponsor have "quick-take" authority for this project? (yes/no)
d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? (yes/no)
e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? (yes/no)

II. Human Resource Requirements:

a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P.L. 91-646, as amended? (yes/no)
b. If the answer to II.a. is "yes," has a reasonable plan been developed to provide such training? (yes/no)
c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project?
(yes/no)
d. Is the sponsor's projected in-house staffing level sufficient considering its other work load, if any, and the project schedule?
(yes/no)
e. Can the sponsor obtain contractor support, if required in a timely fashion? (yes/no)
f. Will the sponsor likely request USACE assistance in acquiring real estate? (yes/no) (If "yes," provide description)

III. Other Project Variables:

a. Will the sponsor's staff be located within reasonable proximity to the project site? (yes/no)
b. Has the sponsor approved the project/real estate schedule/milestones?
(yes/no)

IV. Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects?
(yes/no/not applicable) N A
b. With regard to this project, the sponsor is anticipated to be: highly capable/fully capable/moderately capable/marginally capable/insufficiently capable. (If sponsor is believed to be "insufficiently capable," provide explanation)

V. Coordination:

a. Has this assessment been coordinated with the sponsor? (yes/no)
b. Does the sponsor concur with this assessment? (yes/no) (If "no," provide explanation

Prepared by:

A. Mary Dunn, Staff Appraiser
[typed name]
[title]

Reviewed and approved by:

Joseph M. Redlinger
[typed name]
Chief, Real Estate Division

APPENDIX F
WATER QUALITY ANALYSES

Milford Pond Water Quality

Location	Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)
Mid Pond			
	Surface	7.0	20.0
	0.5	5.0	20.0
	1	4.0	20.0
	1.5	1.4	19.0
Lower Pond			
	Surface	3.1	19.5
	0.5	3	19.0
	1	2.1	19.0
Charles River inlet	Surface	7.8	21.0
Louisa Lake outlet	Surface	8.1	22.0

Note: Samples collected September 20, 2002

Location	Depth (m)	Dissolved Oxygen (mg/L)	Temperature (°C)
Mid Pond			
	Surface	8.2	11.1
	0.5	8.0	11.1
	1	7.9	11.1
Lower Pond			
	Surface	9.2	11.1
	1.2	7.9	10.9
Charles River inlet	Surface	7.6	11.0
Louisa Lake outlet	Surface	8.8	13.0
Dilla St.	Surface	9.7	13
Sumner St.	Surface	8.9	13

Note: Samples collected October 16, 2002

ALPHA ANALYTICAL LABORATORIES

Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220 www.alphalab.com

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

CERTIFICATE OF ANALYSIS

Client: Baystate Environmental Consultants

Address: 296 North Main Street

East Longmeadow, MA 01028

Attn: Mr. Tom Jenkins

Project Number: 98-0216-1

Site: MILFORD POND

Laboratory Job Number: L0209621

Invoice Number: 68912

Date Received: 20-SEP-02

Date Reported: 04-OCT-02

Delivery Method: Client

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
L0209621-01	SW-1A	MILFORD, MA
L0209621-02	SW-1B	MILFORD, MA
L0209621-03	SW-2A	MILFORD, MA
L0209621-04	SW-2B	MILFORD, MA
L0209621-05	SW-3	MILFORD, MA
L0209621-06	SW-4	MILFORD, MA

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized by: Scott McLean

Scott McLean - Technical Director
This document electronically signed

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L0209621-01
SW-1A
Sample Matrix: WATER
Condition of Sample: Satisfactory
Number & Type of Containers: 6-Plastic

Date Collected: 20-SEP-2002 11:00
Date Received : 20-SEP-2002
Date Reported : 04-OCT-2002
Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	10.	NTU	0.20	30 2130B		0920 18:30	WT
Alkalinity, Total	47.	mg CaCO3/L	2.0	30 2320B		0927 15:40	MA
Solids, Total Suspended	ND	mg/l	5.0	30 2540D		0926 21:20	DT
Nitrogen, Ammonia	0.767	mg/l	0.075	30 4500NH3-BH	0928 12:00	0929 10:45	-
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		0920 21:30	DD
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		0920 21:30	DD
Nitrogen, Total Kjeldahl	1.2	mg/l	0.15	30 4500N-C	0927 17:50	0929 11:51	ED
Phosphorus, Total	0.02	mg/l	0.01	30 4500P-E		0926 15:30	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		0920 22:00	DD
Chlorophyll A	13.0	mg/m3	2.00	30 10200H	0920 19:35	0923 14:40	DT
Total Metals				1 3015			
Iron, Total	2.4	mg/l	0.05	1 6010B	0923 13:00	0924 14:19	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L0209621-02
SW-1B
Sample Matrix: WATER
Condition of Sample: Satisfactory
Number & Type of Containers: 6-Plastic

Date Collected: 20-SEP-2002 11:00
Date Received : 20-SEP-2002
Date Reported : 04-OCT-2002
Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	15.	NTU	0.20	30 2130B		0920 18:30	WT
Alkalinity, Total	46.	mg CaCO3/L	2.0	30 2320B		0927 15:40	MA
Solids, Total Suspended	72.	mg/l	15.	30 2540D		0926 21:20	DT
Nitrogen, Ammonia	0.690	mg/l	0.075	30 4500NH3-BH	0928 12:00	0929 10:50	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		0920 21:31	DD
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		0920 21:31	DD
Nitrogen, Total Kjeldahl	3.7	mg/l	0.15	30 4500N-C	0927 17:50	0929 11:56	ED
Phosphorus, Total	0.29	mg/l	0.10	30 4500P-E		0926 15:30	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		0920 22:00	DD
Chlorophyll A	48.5	mg/m3	2.00	30 10200H	0920 19:35	0923 14:40	DT
Total Metals				1 3015			
Iron, Total	5.4	mg/l	0.05	1 6010B	0923 13:00	0924 14:26	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L0209621-03
SW-2A
Sample Matrix: WATER
Condition of Sample: Satisfactory
Number & Type of Containers: 6-Plastic

Date Collected: 20-SEP-2002 14:00
Date Received : 20-SEP-2002
Date Reported : 04-OCT-2002
Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	3.2	NTU	0.20	30 2130B		0920 18:30	WT
Alkalinity, Total	23.	mg $CaCO_3$/L	2.0	30 2320B		0927 15:40	MA
Solids, Total Suspended	ND	mg/l	10.	30 2540D		0926 21:20	DT
Nitrogen, Ammonia	0.171	mg/l	0.075	30 4500NH3-BH	0928 12:00	0929 10:47	[illegible]
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		0920 21:36	DD
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		0920 21:36	DD
Nitrogen, Total Kjeldahl	0.61	mg/l	0.15	30 4500N-C	0927 17:50	0929 11:55	ED
Phosphorus, Total	0.02	mg/l	0.01	30 4500P-E		0926 15:30	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		0920 22:00	DD
Chlorophyll A	21.0	mg/m3	2.00	30 10200H	0920 19:35	0923 14:40	DT
Total Metals				1 3015			
Iron, Total	1.9	mg/l	0.05	1 6010B	0923 13:00	0924 14:38	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L0209621-04
SW-2B
Sample Matrix: WATER
Condition of Sample: Satisfactory
Number & Type of Containers: 6-Plastic

Date Collected: 20-SEP-2002 14:00
Date Received : 20-SEP-2002
Date Reported : 04-OCT-2002
Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	9.8	NTU	0.20	30 2130B		0920 18:30	WT
Alkalinity, Total	20.	mg CaCO3/L	2.0	30 2320B		0927 15:40	MA
Solids, Total Suspended	230	mg/l	50.	30 2540D		0926 21:20	DT
Nitrogen, Ammonia	ND	mg/l	0.150	30 4500NH3-BH	0928 12:00	0929 10:54	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		0920 21:36	DD
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		0920 21:36	DD
Nitrogen, Total Kjeldahl	6.4	mg/l	0.15	30 4500N-C	0927 17:50	0929 11:56	ED
Phosphorus, Total	0.48	mg/l	0.10	30 4500P-E		0926 15:30	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		0920 22:00	DD
Chlorophyll A	95.8	mg/m3	2.00	30 10200H	0920 19:35	0923 14:40	DT
Total Metals				1 3015			
Iron, Total	9.0	mg/l	0.05	1 6010B	0923 13:00	0924 14:42	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L0209621-05
SW-3
Sample Matrix: WATER

Condition of Sample: Satisfactory

Number & Type of Containers: 6-Plastic

Date Collected: 20-SEP-2002 14:15
Date Received : 20-SEP-2002
Date Reported : 04-OCT-2002

Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	1.8	NTU	0.20	30 2130B		0920 18:30	WT
Alkalinity, Total	21.	mg CaCO3/L	2.0	30 2320B		0927 15:40	MA
Solids, Total Suspended	ND	mg/l	5.0	30 2540D		0926 21:20	DT
Nitrogen, Ammonia	20.1	mg/l	0.075	30 4500NH3-BH	0928 12:00	0929 10:46	[illegible]
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		0920 21:37	DD
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		0920 21:37	DD
Nitrogen, Total Kjeldahl	0.40	mg/l	0.15	30 4500N-C	0927 17:50	0929 11:52	ED
Phosphorus, Total	0.01	mg/l	0.01	30 4500P-E		0926 15:30	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		0920 22:00	DD
Chlorophyll A	11.8	mg/m3	2.00	30 10200H	0920 19:35	0923 14:40	DT
Total Metals				1 3015			
Iron, Total	0.63	mg/l	0.05	1 6010B	0923 13:00	0924 14:46	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA-086 NH:200395-B/C CT:PH-0574 ME:MA086 RI:65

Laboratory Sample Number: L0209621-06
SW-4
Sample Matrix: WATER

Condition of Sample: Satisfactory

Number & Type of Containers: 6-Plastic

Date Collected: 20-SEP-2002 14:30
Date Received : 20-SEP-2002
Date Reported : 04-OCT-2002

Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	4.5	NTU	0.20	30 2130B		0920 18:30	WT
Alkalinity, Total	28.	mg CaCO3/L	2.0	30 2320B		0927 15:40	MA
Solids, Total Suspended	9.8	mg/l	5.0	30 2540D		0926 21:20	DT
Nitrogen, Ammonia	0.096	mg/l	0.075	30 4500NH3-BH	0928 12:00	0929 10:48	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		0920 21:38	DD
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		0920 21:38	DD
Nitrogen, Total Kjeldahl	0.66	mg/l	0.15	30 4500N-C	0927 17:50	0929 11:54	ED
Phosphorus, Total	0.05	mg/l	0.01	30 4500P-E		0926 15:30	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		0920 22:00	DD
Chlorophyll A	47.3	mg/m3	2.00	30 10200H	0920 19:35	0923 14:40	DT
Total Metals				1 3015			
Iron, Total	1.9	mg/l	0.05	1 6010B	0923 13:00	0924 14:50	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH DUPLICATE ANALYSIS

Laboratory Job Number: L0209621

Parameter	Value 1	Value 2	RPD	Units
Turbidity for sample(s) 01-06 (L0209621-06, WG123130)				
Turbidity	4.5	4.7	4	NTU
Alkalinity, Total for sample(s) 01-06 (L0209621-03, WG123738)				
Alkalinity, Total	23.	22.	4	mg CaCO3/L
Solids, Total Suspended for sample(s) 01-06 (L0209621-02, WG123629)				
Solids, Total Suspended	72.	76.	5	mg/l
Nitrogen, Ammonia for sample(s) 01-06 (L0209721-05, WG123805)				
Nitrogen, Ammonia	20.7	21.2	2	mg/l
Nitrogen, Nitrite for sample(s) 01-06 (L0209621-06, WG123138)				
Nitrogen, Nitrite	ND	ND	NC	mg/l
Nitrogen, Nitrate for sample(s) 01-06 (L0209621-02, WG123137)				
Nitrogen, Nitrate	ND	ND	NC	mg/l
Nitrogen, Total Kjeldahl for sample(s) 01-06 (L0209621-05, WG123736)				
Nitrogen, Total Kjeldahl	0.40	0.38	5	mg/l
Phosphorus, Total for sample(s) 01-06 (L0209621-02, WG123607)				
Phosphorus, Total	0.29	0.29	0	mg/l
Phosphorus, Orthophosphate for sample(s) 01-06 (L0209621-01, WG123152)				
Phosphorus, Orthophosphate	ND	ND	NC	mg/l
Total Metals for sample(s) 01-06 (L0209621-02, WG123289)				
Iron, Total	5.4	5.3	2	mg/l

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

aboratory Job Number: L0209621

Parameter	% Recovery
Turbidity LCS for sample(s) 01-06 (WG123130)	
Turbidity	98
Alkalinity, Total LCS for sample(s) 01-06 (WG123738)	
Alkalinity, Total	106
Nitrogen, Ammonia LCS for sample(s) 01-06 (WG123805)	
Nitrogen, Ammonia	100
Nitrogen, Nitrite LCS for sample(s) 01-06 (WG123138)	
Nitrogen, Nitrite	100
Nitrogen, Nitrate LCS for sample(s) 01-06 (WG123137)	
Nitrogen, Nitrate	96
Nitrogen, Total Kjeldahl LCS for sample(s) 01-06 (WG123736)	
Nitrogen, Total Kjeldahl	100
Phosphorus, Total LCS for sample(s) 01-06 (WG123607)	
Phosphorus, Total	100
Phosphorus, Orthophosphate LCS for sample(s) 01-06 (WG123152)	
hosphorus, Orthophosphate	99
Total Metals LCS for sample(s) 01-06 (WG123289)	
Iron, Total	100
Alkalinity, Total SPIKE for sample(s) 01-06 (L0209621-05, WG123738)	
Alkalinity, Total	108
Nitrogen, Ammonia SPIKE for sample(s) 01-06 (L0209721-04, WG123805)	
Nitrogen, Ammonia	105
Nitrogen, Nitrite SPIKE for sample(s) 01-06 (L0209621-05, WG123138)	
Nitrogen, Nitrite	100
Nitrogen, Nitrate SPIKE for sample(s) 01-06 (L0209621-01, WG123137)	
Nitrogen, Nitrate	98
Nitrogen, Total Kjeldahl SPIKE for sample(s) 01-06 (L0209721-02, WG123736)	
Nitrogen, Total Kjeldahl	99
Phosphorus, Total SPIKE for sample(s) 01-06 (L0209738-05, WG123607)	
Phosphorus, Total	100
Phosphorus, Orthophosphate SPIKE for sample(s) 01-06 (L0209621-06, WG123152)	
Phosphorus, Orthophosphate	100

Laboratory Job Number: L0209621

Continued

Parameter	% Recovery
Total Metals SPIKE for sample(s) 01-06 (L0209621-01, WG123289)	
Iron, Total	100

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

aboratory Job Number: L0209621

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-06							
Alkalinity, Total	ND	mg CaCO3/L	2.0	30 2320B		0927 15:40	MA
Blank Analysis for sample(s) 01-06							
Solids, Total Suspended	ND	mg/l	5.0	30 2540D		0926 21:20	DT
Blank Analysis for sample(s) 01-06							
Nitrogen, Ammonia	ND	mg/l	0.075	30 4500NH3-BH	0928 12:00	0929 10:34	ED
Blank Analysis for sample(s) 01-06							
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		0920 21:41	DD
Blank Analysis for sample(s) 01-06							
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		0920 21:33	DD
Blank Analysis for sample(s) 01-06							
Nitrogen, Total Kjeldahl	ND	mg/l	0.05	30 4500N-C	0927 17:50	0929 11:38	ED
Blank Analysis for sample(s) 01-06							
Phosphorus, Total	ND	mg/l	0.01	30 4500P-E		0926 15:30	NL
Blank Analysis for sample(s) 01-06							
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		0920 22:00	DD
Blank Analysis for sample(s) 01-06							
Chlorophyll A	ND	mg/m3	2.00	30 10200H	0920 19:35	0923 14:40	DT
Blank Analysis for sample(s) 01-06							
Total Metals				1 3015			
Iron, Total	ND	mg/l	0.05	1 6010B	0923 13:00	0924 13:59	RW

REFERENCES

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Update III, 1997.

30. Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

GLOSSARY OF TERMS AND SYMBOLS

REF Reference number in which test method may be found.
METHOD Method number by which analysis was performed.
ID Initials of the analyst.

Please note that all solid samples are reported on dry weight basis unless noted otherwise.

LIMITATION OF LIABILITIES

Alpha Analytical, Inc. performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical, Inc., shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical, Inc. be held liable for any incidental consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical, Inc.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding times and splitting of samples in the field.

attachment 1

Quality Control Acceptance Criteria

Volatile Organics by Method 8260B

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
1,2-Dichloroethane-d_4	75%	125%	75%	125%		
4-Bromofluorobenzene	75%	125%	75%	125%		
Toluene-d_8	75%	125%	75%	125%		
Dibromofluoromethane	75%	125%	75%	125%		
matrix spike / matrix spike duplicate (MS/MSD) & lab control sample (LCS)	percent recovery AQ Limits		Soil Limits		duplicate and/or MSD AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
1,1-Dichloroethene	61%	145%	59%	172%	all target compounds	
Trichloroethene	71%	120%	62%	137%	20%	30%
Chlorobenzene	75%	130%	60%	133%		
Benzene	76%	127%	66%	142%		
Toluene	76%	125%	59%	139%		

Volatile Organics by Method 8021B

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
4-Bromochlorobenzene	70%	110%	70%	120%		
4-Bromofluorobenzene	70%	110%	70%	120%		
matrix spike / matrix spike duplicate (MS/MSD) & lab control sample (LCS)	percent recovery AQ Limits		Soil Limits		duplicate and/or MSD AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
1,1-Dichloroethene	70%	130%	70%	130%	all target compounds	
Trichloroethene	70%	130%	70%	130%	20%	30%
Chlorobenzene	70%	130%	70%	130%		
Benzene	70%	130%	70%	130%		
Toluene	70%	130%	70%	130%		
Ethylbenzene	70%	130%	70%	130%		

Semi-Volatile Organics by Method 8270C (includes PAHs)

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
Nitrobenzene-d_5	23%	120%	23%	120%		
Phenol-d_6	10%	120%	10%	120%		
2-Fluorophenol	21%	120%	25%	120%		
2-Fluorobiphenyl	43%	120%	30%	120%		
p-Terphenyl-d_{14}	33%	120%	18%	120%		
2,4,6-Tribromophenol	10%	120%	19%	120%		
matrix spike / matrix spike duplicate (MS/MSD) & lab control sample (LCS)	percent recovery AQ Limits		Soil Limits		duplicate and/or MSD AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
1,2,4-Trichlorobenzene	39%	98%	38%	107%	all target compounds	
Acenaphthene	46%	118%	31%	137%	40%	50%
2,4-Dinitrotoluene	24%	96%	28%	89%		
Pyrene	26%	127%	35%	142%		
N-Nitroso-di-n-propylamine	41%	116%	41%	126%		
1,4-Dichlorobenzene	36%	97%	28%	104%		
Pentachlorophenol	9%	103%	17%	109%		
Phenol	12%	110%	26%	90%		
2-Chlorophenol	27%	123%	25%	102%		
4-Chloro-3-methylphenol	23%	97%	26%	103%		
4-Nitrophenol	10%	80%	11%	114%		

attachment 1

Quality Control Acceptance Criteria

PCB/Pesticides by Method 8082/8081

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
2,4,5,6-Tetrachloro-m-xylene	30%	150%	30%	150%		
Decachlorobiphenyl	30%	150%	30%	150%		
matrix spike / matrix spike duplicate	percent recovery				duplicate and/or MSD	
(MS/MSD) & lab control sample (LCS)	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
Lindane	56%	123%	46%	127%	all target compounds	
Heptachlor	40%	131%	35%	130%	30%	50%
Aldrin	40%	120%	34%	132%		
Dieldrin	52%	126%	31%	134%		
Endrin	56%	121%	42%	139%		
4,4'-DDT	38%	127%	23%	134%		
Aroclor 1242/1016	40%	140%	40%	140%		
Aroclor 1260	40%	140%	40%	140%		

Volatile Petroleum Hydrocarbons (VPH) by MA DEP 98-1

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
2,5-Dibromotoluene	70%	130%	70%	130%		
	percent recovery				duplicate	
laboratory control sample (LCS)	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
all compounds	70%	130%	70%	130%	50%	50%

Extractable Petroleum Hydrocarbons (EPH) by MA DEP 98-1

surrogate spike % recovery	AQ Limits		Soil Limits			
	LCL	UCL	LCL	UCL		
Chloro-octadecane	40%	140%	40%	140%		
ortho-Terphenyl	40%	140%	40%	140%		
2-Fluorobiphenyl (fractionation)	40%	140%	40%	140%		
2-Bromonaphthalene (fractionation)	40%	140%	40%	140%		
	percent recovery				duplicate	
laboratory control sample (LCS)	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
all compounds	40%	140%	40%	140%	50%	50%

TPH (GC-FID) by Method 8100M

					duplicate	
surrogate spike % recovery	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
ortho-Terphenyl	40%	140%	40%	140%	40%	40%

TPH by Method 418.1

matrix spike (MS)	percent recovery				duplicate	
& laboratory control sample (LCS)	AQ Limits		Soil Limits		AQ Limits	Soil Limits
	LCL	UCL	LCL	UCL	RPD	RPD
TPH	60%	140%	60%	140%	40%	40%

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 9/20

ALPHA Job #: L0 9621

ALPHA

Eight Walkup Drive Westborough, MA 01581
TEL: 508-898-9220 FAX: 508-898-9193

Client Information

Client:	Baystate Environmental Consultants
Address:	296 N. Main St
	E. Longmeadow MA 01028
Phone:	413-525-3822
Fax:	413-525-8348
Email:	tjenkins@b-e-c.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name:	MILFORD POND
Project Location:	MILFORD, MA
Project #:	98-0216-1
Project Manager:	TOM JENKINS
ALPHA Quote #:	?

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due: 9/27 10/4 Time:

Report Information - Data Deliverables

☐ FAX MCP S1 GW1
☒ ADEx
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
☐ EMAIL (standard pdf report)
☐ Additional Deliverables:
Report to: (if different than Project Manager)

Billing Information

☒ Same as Client Info PO #:

ACOE (Army Corps of Engineers)

Regulatory Requirements/Report Limits

State /Fed	Program	Criteria

Other Project Specific Requirements/Comments:

ANALYSIS: Total Fe; TSS; NO3 NO2 Alk-T Turb; Chlorophyll A; OPhos; NH3, TKN, TPhos

SAMPLE HANDLING
Filtration
☐ Done
☐ Not needed
☒ Lab to do if needed
Preservation
☐ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Total Fe	TSS	NO3 NO2 Alk-T Turb	Chlorophyll A	OPhos	NH3, TKN, TPhos	Sample Specific Comments	TOTAL # BOTTLES
9621.1	SW-1A	9/20/02	11:00	SW/L	JRM	↓	↓	↓	↓	↓	↓		
2	SW-1B	9/20/02	11:00	SW/L	JRM								
3	SW-2A	9/20/02	2:00	SW/L	JRM								
4	SW-2B	9/20/02	2:00	SW/L	JRM								
5	SW-3	9/20/02	4:15	SW/L	JRM								
6	SW-4	9/20/02	4:30	SW/L	JRM	↓	↓	↓	↓	↓	↓		
Container Type						P	P	P	P	P	P		
Preservative						C	A	A	A	A	D		

Shaded Gray Areas For Lab Use Only

Relinquished By:	Date/Time	Received By:	Date/Time
Jennifer R Mackey	9/20/02 5:37	[signature]	9/20 17:4?

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.

Form No: 02-02 STD

ALPHA ANALYTICAL LABORATORIES

Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220 www.alphalab.com

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

CERTIFICATE OF ANALYSIS

Client: Baystate Environmental Consultants **Laboratory Job Number:** L0210625

Address: 296 North Main Street
East Longmeadow, MA 01028 **Date Received:** 17-OCT-2002

Attn: Mr. Tom Jenkins **Date Reported:** 01-NOV-2002

Project Number: 98-0216-1 **Delivery Method:** Alpha

Site: MILFORD POND

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
L0210625-01	MP1	MILFORD, MA
L0210625-02	MP2	MILFORD, MA
L0210625-03	MP3	MILFORD, MA
L0210625-04	MP4	MILFORD, MA
L0210625-05	MP5	MILFORD, MA
L0210625-06	MP6	MILFORD, MA
L0210625-07	MP7	MILFORD, MA
L0210625-08	MP8	MILFORD, MA
L0210625-09	MP9	MILFORD, MA

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized by: James R. Roth

James R. Roth, PhD - Technical Director
This document electronically signed

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0210625-01
MP1
Sample Matrix: WATER
Condition of Sample: Satisfactory
Number & Type of Containers: 6-Plastic

Date Collected: 16-OCT-2002 11:00
Date Received : 17-OCT-2002
Date Reported : 01-NOV-2002
Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	9.0	NTU	0.20	30 2130B		1017 19:37	WT
Alkalinity, Total	43.	mg CaCO3/L	2.0	30 2320B		1026 12:50	MA
Solids, Total Suspended	ND	mg/l	5.0	30 2540D		1022 16:15	DT
Nitrogen, Ammonia	0.822	mg/l	0.075	30 4500NH3-BH	1026 10:30	1028 12:38	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		1017 23:12	DD
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		1017 23:12	DD
Nitrogen, Total Kjeldahl	1.2	mg/l	0.15	30 4500N-C	1028 16:00	1029 15:51	
Phosphorus, Total	0.01	mg/l	0.01	30 4500P-E		1023 13:00	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		1017 21:25	AT
Chlorophyll A	ND	mg/m3	2.00	30 10200H	1018 00:05	1018 10:00	DT
Total Metals				1 3015			
Iron, Total	2.0	mg/l	0.05	1 6010B	1018 10:10	1021 19:42	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0210625-02
MP2
Sample Matrix: WATER

Condition of Sample: Satisfactory

Number & Type of Containers: 6-Plastic

Date Collected: 16-OCT-2002 13:00
Date Received : 17-OCT-2002
Date Reported : 01-NOV-2002

Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Turbidity	7.0	NTU	0.20	30	2130B		1017 19:37	WT
Alkalinity, Total	36.	mg CaCO3/L	2.0	30	2320B		1026 12:50	MA
Solids, Total Suspended	ND	mg/l	10.	30	2540D		1022 16:15	DT
Nitrogen, Ammonia	0.551	mg/l	0.075	30	4500NH3-BH	1026 10:30	1028 12:39	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30	4500NO3-F		1017 23:16	DD
Nitrogen, Nitrate	ND	mg/l	0.10	30	4500NO3-F		1017 23:16	DD
Nitrogen, Total Kjeldahl	0.92	mg/l	0.15	30	4500N-C	1018 19:30	1022 12:37	ED
Phosphorus, Total	0.01	mg/l	0.01	30	4500P-E		1023 13:00	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30	4500P-E		1017 21:25	AT
Chlorophyll A	ND	mg/m3	2.00	30	10200H	1018 00:05	1018 10:00	DT
Total Metals				1	3015			
Iron, Total	1.6	mg/l	0.05	1	6010B	1018 10:10	1021 19:46	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0210625-03
MP3
Sample Matrix: WATER

Condition of Sample: Satisfactory

Number & Type of Containers: 6-Plastic

Date Collected: 16-OCT-2002 11:30
Date Received : 17-OCT-2002
Date Reported : 01-NOV-2002

Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	5.3	NTU	0.20	30 2130B		1017 19:37	WT
Alkalinity, Total	34.	mg CaCO3/L	2.0	30 2320B		1026 12:50	MA
Solids, Total Suspended	ND	mg/l	5.0	30 2540D		1022 16:15	DT
Nitrogen, Ammonia	0.534	mg/l	0.075	30 4500NH3-BH	1025 10:30	1028 12:40	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		1017 23:17	DD
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		1017 23:17	DD
Nitrogen, Total Kjeldahl	0.92	mg/l	0.15	30 4500N-C	1028 16:00	1029 15:52	[illegible]
Phosphorus, Total	0.01	mg/l	0.01	30 4500P-E		1023 13:00	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		1017 21:25	AT
Chlorophyll A	ND	mg/m3	2.00	30 10200H	1018 00:05	1018 10:00	DT
Total Metals				1 3015			
Iron, Total	1.5	mg/l	0.05	1 6010B	1018 10:10	1021 19:50	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0210625-04
MP4
Sample Matrix: WATER
Condition of Sample: Satisfactory
Number & Type of Containers: 6-Plastic

Date Collected: 16-OCT-2002 08:45
Date Received : 17-OCT-2002
Date Reported : 01-NOV-2002
Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	3.5	NTU	0.20	30 2130B		1017 19:37	WT
Alkalinity, Total	28.	mg CaCO3/L	2.0	30 2320B		1026 12:50	MA
Solids, Total Suspended	ND	mg/l	5.0	30 2540D		1022 16:15	DT
Nitrogen, Ammonia	0.145	mg/l	0.075	30 4500NH3-BH	1026 10:30	1028 12:41	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		1017 23:18	DD
Nitrogen, Nitrate	0.16	mg/l	0.10	30 4500NO3-F		1017 23:16	DD
Nitrogen, Total Kjeldahl	0.30	mg/l	0.15	30 4500N-C	1018 19:30	1022 12:52	ED
Phosphorus, Total	0.02	mg/l	0.01	30 4500P-E		1023 13:00	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		1017 21:25	AT
Chlorophyll A	ND	mg/m3	2.00	30 10200H	1018 00:05	1018 10:00	DT
Total Metals				1 3015			
Iron, Total	0.97	mg/l	0.05	1 6010B	1018 10:10	1021 19:53	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0210625-05
MP5
Sample Matrix: WATER
Condition of Sample: Satisfactory
Number & Type of Containers: 6-Plastic

Date Collected: 16-OCT-2002 09:20
Date Received : 17-OCT-2002
Date Reported : 01-NOV-2002
Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	1.2	NTU	0.20	30 2130B		1017 19:37	WT
Alkalinity, Total	43.	mg CaCO3/L	2.0	30 2320B		1026 12:50	MA
Solids, Total Suspended	37.	mg/l	5.0	30 2540D		1022 16:15	DT
Nitrogen, Ammonia	ND	mg/l	0.075	30 4500NH3-BH	1026 10:30	1028 12:42	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		1017 23:18	DD
Nitrogen, Nitrate	2.4	mg/l	0.10	30 4500NO3-F		1017 23:18	DD
Nitrogen, Total Kjeldahl	0.36	mg/l	0.15	30 4500N-C	1028 15:00	1029 15:53	
Phosphorus, Total	0.03	mg/l	0.01	30 4500P-E		1023 13:00	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		1017 21:25	AT
Chlorophyll A	ND	mg/m3	2.00	30 10200H	1018 00:05	1018 10:00	DT
Total Metals				1 3015			
Iron, Total	0.38	mg/l	0.05	1 6010B	1018 10:10	1021 19:57	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0210625-06
MP6
Sample Matrix: WATER

Condition of Sample: Satisfactory

Number & Type of Containers: 6-Plastic

Date Collected: 16-OCT-2002 10:00
Date Received : 17-OCT-2002
Date Reported : 01-NOV-2002

Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Turbidity	6.4	NTU	0.20	30	2130B		1017 19:37	WT
Alkalinity, Total	19.	mg CaCO3/L	2.0	30	2320B		1026 12:50	MA
Solids, Total Suspended	9.9	mg/l	5.0	30	2540D		1022 16:15	DT
Nitrogen, Ammonia	0.242	mg/l	0.075	30	4500NH3-BH	1026 10:30	1028 12:43	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30	4500NO3-F		1017 23:19	DD
Nitrogen, Nitrate	1.6	mg/l	0.10	30	4500NO3-F		1017 23:19	DD
.trogen, Total Kjeldahl	0.50	mg/l	0.15	30	4500N-C	1028 16:00	1029 15:54	ED
Phosphorus, Total	0.05	mg/l	0.01	30	4500P-E		1023 13:00	NL
Phosphorus, Orthophosphate	0.01	mg/l	0.01	30	4500P-E		1017 21:25	AT
Chlorophyll A	ND	mg/m3	2.00	30	10200H	1018 00:05	1018 10:00	DT
Total Metals				1	3015			
Iron, Total	0.14	mg/l	0.05	1	6010B	1018 10:10	1021 20:01	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0210625-07
MP7
Sample Matrix: WATER

Condition of Sample: Satisfactory

Number & Type of Containers: 6-Plastic

Date Collected: 16-OCT-2002 09:45
Date Received : 17-OCT-2002
Date Reported : 01-NOV-2002

Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	1.7	NTU	0.20	30 2130B		1017 19:37	WT
Alkalinity, Total	17.	mg CaCO3/L	2.0	30 2320B		1026 12:50	MA
Solids, Total Suspended	ND	mg/l	5.0	30 2540D		1022 16:15	DT
Nitrogen, Ammonia	0.111	mg/l	0.075	30 4500NH3-BH	1026 10:30	1028 12:43	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		1017 23:20	DD
Nitrogen, Nitrate	0.12	mg/l	0.10	30 4500NO3-F		1017 23:59	DD
Nitrogen, Total Kjeldahl	0.34	mg/l	0.15	30 4500N-C	1028 16:00	1029 16:09	
Phosphorus, Total	0.01	mg/l	0.01	30 4500P-E		1023 13:00	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		1017 21:25	AT
Chlorophyll A	ND	mg/m3	2.00	30 10200H	1018 00:05	1018 10:00	DT
Total Metals				1 3015			
Iron, Total	0.35	mg/l	0.05	1 6010B	1018 10:10	1021 20:18	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0210625-08
MP8
Sample Matrix: WATER

Condition of Sample: Satisfactory

Number & Type of Containers: 6-Plastic

Date Collected: 16-OCT-2002 15:00
Date Received : 17-OCT-2002
Date Reported : 01-NOV-2002

Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	1.2	NTU	0.20	30 2130B		1017 19:37	WT
Alkalinity, Total	16.	mg CaCO3/L	2.0	30 2320B		1026 12:50	MA
Solids, Total Suspended	ND	mg/l	5.0	30 2540D		1022 16:15	DT
Nitrogen, Ammonia	ND	mg/l	0.075	30 4500NH3-BH	1026 10:30	1028 12:47	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		1017 23:20	DD
Nitrogen, Nitrate	0.10	mg/l	0.10	30 4500NO3-F		1017 23:20	DD
itrogen, Total Kjeldahl	0.32	mg/l	0.15	30 4500N-C	1028 16:00	1029 16:10	ED
Phosphorus, Total	0.01	mg/l	0.01	30 4500P-E		1023 13:00	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		1017 21:25	AT
Chlorophyll A	ND	mg/m3	2.00	30 10200H	1018 00:05	1018 10:00	DT
Total Metals				1 3015			
Iron, Total	0.49	mg/l	0.05	1 6010B	1018 10:10	1021 20:22	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:200301-A CT:PH-0574 ME:MA086 RI:65 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0210625-09
MP9
Sample Matrix: WATER
Condition of Sample: Satisfactory
Number & Type of Containers: 6-Plastic

Date Collected: 16-OCT-2002 15:00
Date Received : 17-OCT-2002
Date Reported : 01-NOV-2002
Field Prep: None

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Turbidity	14.	NTU	0.20	30 2130B		1017 19:37	WT
Alkalinity, Total	16.	mg CaCO3/L	2.0	30 2320B		1026 12:50	MA
Solids, Total Suspended	62.	mg/l	10.	30 2540D		1022 16:15	DT
Nitrogen, Ammonia	ND	mg/l	0.075	30 4500NH3-BH	1026 10:30	1028 12:48	ED
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		1017 23:21	DD
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		1017 23:21	DD
Nitrogen, Total Kjeldahl	1.6	mg/l	0.15	30 4500N-C	1028 16:00	1029 16:11	
Phosphorus, Total	0.12	mg/l	0.01	30 4500P-E		1023 13:00	NL
Phosphorus, Orthophosphate	ND	mg/l	0.01	30 4500P-E		1017 21:25	AT
Chlorophyll A	ND	mg/m3	2.00	30 10200H	1018 00:05	1018 10:00	DT
Total Metals				1 3015			
Iron, Total	2.4	mg/l	0.05	1 6010B	1018 10:10	1021 20:26	RW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH DUPLICATE ANALYSIS

Laboratory Job Number: L0210625

Parameter	Value 1	Value 2	Units	RPD	RPD Limits
Turbidity for sample(s) 01-09 (L0210625-09, WG125340)					
Turbidity	14.	14.	NTU	0	
Alkalinity, Total for sample(s) 01-09 (L0210608-05, WG126176)					
Alkalinity, Total	8.6	8.5	mg CaCO3/L	1	
Solids, Total Suspended for sample(s) 01-09 (L0210625-09, WG125694)					
Solids, Total Suspended	62.	66.	mg/l	6	
Nitrogen, Ammonia for sample(s) 01-09 (L0210674-01, WG126173)					
Nitrogen, Ammonia	ND	ND	mg/l	NC	
Nitrogen, Nitrite for sample(s) 01-09 (L0210625-09, WG125336)					
Nitrogen, Nitrite	ND	ND	mg/l	NC	
Nitrogen, Nitrate for sample(s) 01-09 (L0210608-01, WG125327)					
Nitrogen, Nitrate	0.30	0.29	mg/l	3	
Nitrogen, Total Kjeldahl for sample(s) 02,04 (L0210625-02, WG125497)					
Nitrogen, Total Kjeldahl	0.92	0.85	mg/l	8	
Nitrogen, Total Kjeldahl for sample(s) 01,03,05-09 (L0210625-06, WG126259)					
Nitrogen, Total Kjeldahl	0.50	0.48	mg/l	4	
Phosphorus, Total for sample(s) 01-09 (L0210606-02, WG125857)					
Phosphorus, Total	0.34	0.35	mg/l	3	
Phosphorus, Orthophosphate for sample(s) 01-09 (L0210625-06, WG125360)					
Phosphorus, Orthophosphate	0.01	0.01	mg/l	6	
Total Metals for sample(s) 01-09 (L0210540-11, WG125554)					
Iron, Total	0.84	0.84	mg/l	0	20

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0210625

Parameter	% Recovery	QC Criteria
Turbidity LCS for sample(s) 01-09 (WG125340)		
Turbidity	99	
Alkalinity, Total LCS for sample(s) 01-09 (WG126176)		
Alkalinity, Total	100	
Nitrogen, Ammonia LCS for sample(s) 01-09 (WG126173)		
Nitrogen, Ammonia	97	
Nitrogen, Nitrite LCS for sample(s) 01-09 (WG125336)		
Nitrogen, Nitrite	100	
Nitrogen, Nitrate LCS for sample(s) 01-09 (WG125327)		
Nitrogen, Nitrate	96	
Nitrogen, Total Kjeldahl LCS for sample(s) 02,04 (WG125497)		
Nitrogen, Total Kjeldahl	95	
Nitrogen, Total Kjeldahl LCS for sample(s) 01,03,05-09 (WG126259)		
Nitrogen, Total Kjeldahl	98	
Phosphorus, Total LCS for sample(s) 01-09 (WG125857)		
Phosphorus, Total	99	
Phosphorus, Orthophosphate LCS for sample(s) 01-09 (WG125360)		
Phosphorus, Orthophosphate	103	
Total Metals LCS for sample(s) 01-09 (WG125554)		
Iron, Total	100	75-125
Alkalinity, Total SPIKE for sample(s) 01-09 (L0210820-06, WG126176)		
Alkalinity, Total	90	
Nitrogen, Ammonia SPIKE for sample(s) 01-09 (L0210674-02, WG126173)		
Nitrogen, Ammonia	97	
Nitrogen, Nitrite SPIKE for sample(s) 01-09 (L0210625-08, WG125336)		
Nitrogen, Nitrite	103	
Nitrogen, Nitrate SPIKE for sample(s) 01-09 (L0210625-01, WG125327)		
Nitrogen, Nitrate	98	
Nitrogen, Total Kjeldahl SPIKE for sample(s) 02,04 (L0210625-04, WG125497)		
Nitrogen, Total Kjeldahl	94	
Nitrogen, Total Kjeldahl SPIKE for sample(s) 01,03,05-09 (L0210625-01, WG126259)		
Nitrogen, Total Kjeldahl	98	

Laboratory Job Number: L0210625

Continued

Parameter	% Recovery	QC Criteria
Phosphorus, Total SPIKE for sample(s) 01-09 (L0210606-01, WG125857)		
Phosphorus, Total	102	
Phosphorus, Orthophosphate SPIKE for sample(s) 01-09 (L0210625-05, WG125360)		
Phosphorus, Orthophosphate	101	
Total Metals SPIKE for sample(s) 01-09 (L0210540-11, WG125554)		
Iron, Total	106	75-125

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0210625

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-09 (WG125340-2)							
Turbidity	ND	NTU	0.20	30 2130B		1017 19:37	WT
Blank Analysis for sample(s) 01-09 (WG126176-1)							
Alkalinity, Total	ND	mg CaCO3/L	2.0	30 2320B		1026 12:50	MA
Blank Analysis for sample(s) 01-09 (WG125694-1)							
Solids, Total Suspended	ND	mg/l	5.0	30 2540D		1022 16:15	DT
Blank Analysis for sample(s) 01-09 (WG126173-1)							
Nitrogen, Ammonia	ND	mg/l	0.075	30 4500NH3-BH	1025 10:30	1028 12:32	ED
Blank Analysis for sample(s) 01-09 (WG125336-2)							
Nitrogen, Nitrite	ND	mg/l	0.10	30 4500NO3-F		1017 23:31	DD
Blank Analysis for sample(s) 01-09 (WG125327-2)							
Nitrogen, Nitrate	ND	mg/l	0.10	30 4500NO3-F		1017 23:13	
Blank Analysis for sample(s) 02,04 (WG125497-1)							
Nitrogen, Total Kjeldahl	ND	mg/l	0.05	30 4500N-C	1018 19:30	1022 12:14	ED
Blank Analysis for sample(s) 01,03,05-09 (WG126259-1)							
Nitrogen, Total Kjeldahl	ND	mg/l	0.05	30 4500N-C	1028 16:00	1029 15:47	ED
Blank Analysis for sample(s) 01-09 (WG125857-1)							
Phosphorus, Total	ND	mg/l	0.01	30 4500P-E		1023 13:00	NL
Blank Analysis for sample(s) 01-09 (WG125360-1)							
Phosphorus, Orthophosphate	ND	mg/l	0.005	30 4500P-E		1017 21:25	AT
Blank Analysis for sample(s) 01-09 (WG125362-1)							
Chlorophyll A	ND	mg/m3	2.00	30 10200H	1018 00:05	1018 10:00	DT

ALPHA ANALYTICAL LABORATORIES
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0210625

Continued

PARAMETER	RESULT	UNITS	RDL	REF METHOD	DATE PREP	DATE ANAL	ID
Blank Analysis for sample(s) 01-09 (WG125554-3)							
Total Metals				1 3015			
Iron, Total	ND	mg/l	0.05	1 6010B	1018 10:10	1021 10:32	RW

REFERENCES

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Update III, 1997.

30. Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

GLOSSARY OF TERMS AND SYMBOLS

REF Reference number in which test method may be found.
METHOD Method number by which analysis was performed.
ID Initials of the analyst.

Please note that all solid samples are reported on dry weight basis unless noted otherwise.

LIMITATION OF LIABILITIES

Alpha Analytical, Inc. performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical, Inc., shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical, Inc. be held liable for any incidental consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical, Inc.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding times and splitting of samples in the field.

CHAIN OF CUSTODY

PAGE 1 OF ___

Date Rec'd in Lab: 10/17

ALPHA Job #: L0625

ALPHA
Eight Walkup Drive Westborough, MA 01581
TEL: 508-898-9220 FAX: 508-898-9193

Client Information

Client: Baystate Environmental Consultants

Address: 296 North Main St, East Longmeadow MA 01028

Phone: 413-525-3822

Fax: 413-525-8348

Email: tjenkins@b-e-c.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Milford Pond

Project Location: Milford, MA

Project #: 98-0216-1

Project Manager: Tom Jenkins

ALPHA Quote #: 2002312

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due: 10/31 Time:

Report Information - Data Deliverables

☒ FAX

☒ ADEx . XLS format

Criteria Checker:

(Default based on Regulatory Criteria Indicated)

Other Formats:

☐ EMAIL (standard pdf report)

☐ Additional Deliverables:

Report to: (if different than Project Manager)

Billing Information

☐ Same as Client info PO #:

Army Corps of Engineers.

Regulatory Requirements/Report Limits

State /Fed	Program	Criteria

Other Project Specific Requirements/Comments:

SAMPLE HANDLING

Filtration
☐ Done
☐ Not needed
☒ Lab to do if needed

Preservation
☒ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Total Fe	TSS	NO3/NO2/Alk-T/Turb	Chlorophyll A	OPhos	NH3/TKN/TPhos	Sample Specific Comments	TOTAL # BOTTLES
L0625-1	MP1	10/16/02	11:00	SW/L	RTF/ERG	X	X	X	X	X	X		6
2	MP2	↓	13:00	↓	↓	↓	↓	↓	↓	↓	↓		6
3	MP3	↓	~~11~~ 30	↓	↓	↓	↓	↓	↓	↓	↓		6
4	MP4	↓	8:45	↓	↓	↓	↓	↓	↓	↓	↓		6
5	MP5	↓	9:20	↓	↓	↓	↓	↓	↓	↓	↓		6
6	MP6	↓	10:00	↓	↓	↓	↓	↓	↓	↓	↓		6
7	~~MP6~~ MP7	↓	9:45	↓	↓	↓	↓	↓	↓	↓	↓		6
8	MP8	↓	15:00	↓	↓	↓	↓	↓	↓	↓	↓		6
9	MP9	↓	15:00	↓	↓	↓	↓	↓	↓	↓	↓		6

Shaded Gray Areas For Lab Use Only

	Total Fe	TSS	NO3/NO2/Alk-T/Turb	Chlorophyll A	OPhos	NH3/TKN/TPhos
Container Type	P	P	P	P	P	P
Preservative	C	A	A	A	A	D

Relinquished By:	Date/Time	Received By:	Date/Time
Paul Mulak		L Edmonds	10/17/02 1250
L Edmonds		[signature]	10/17 1801

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.

Form No: 02-02 STD

APPENDIX G
FISH SPECIES

Milford Pond Fisheries Data
Milford Massachusetts

Date	Location	Species	TL (cm)	WT(G)	WT(OZ)	K	Row #
9/17/2002	2	BB	30.2	392.5		1.43	23
9/17/2002	4	BC	5.5	2		1.20	42
9/17/2002	1	BG	2.7	0.3		1.52	17
9/17/2002	1	BG	3.1	0.4		1.34	16
9/17/2002	4	BG	3.1	2.4		8.06	46
9/17/2002	5	BG	3.2	0.6		1.83	57
9/17/2002	4	BG	3.5	0.5		1.17	39
9/17/2002	5	BG	3.5	0.6		1.40	59
9/17/2002	1	BG	3.7	0.6		1.18	14
9/17/2002	5	BG	3.8	1.1		2.00	56
9/17/2002	1	BG	3.9	0.7		1.18	13
9/17/2002	5	BG	4	0.9		1.41	58
9/17/2002	4	BG	4.2	0.8		1.08	45
9/17/2002	4	BG	4.4	1.2		1.41	44
9/17/2002	1	BG	4.5	1.3		1.43	12
9/17/2002	1	BG	4.5	1.5		1.65	10
9/17/2002	1	BG	4.8	0.7		0.63	15
9/17/2002	2	BG	4.8	1.6		1.45	26
9/17/2002	1	BG	18.3	146		2.38	5
9/17/2002	1	BG	20	174		2.18	4
9/17/2002	3	BG	20.5	189		2.19	32
9/17/2002	3	BG	20.9	204		2.23	34
9/17/2002	1	BG	21.2	211.8		2.22	3
9/17/2002	3	BG	24.5	294		2.00	33
9/17/2002	5	CP	11	6		0.45	51
9/17/2002	4	CP	11.9	7.2		0.43	38
9/17/2002	3	CP	12.7	10.5		0.51	31
9/17/2002	4	CP	14.6	17		0.55	37
9/17/2002	1	CP	23.7	75.2		0.56	1
9/17/2002	2	CP	27.3	104		0.51	24
9/17/2002	3	CP	30	134		0.50	30
9/17/2002	5	CP	30.3	150		0.54	49
9/17/2002	1	CP	30.8	168.2		0.58	2
9/17/2002	5	CP	33.9	227		0.58	50
9/17/2002	2	CP	46.7	538.631	19	0.53	20
9/17/2002	4	GS	6.8	1.9		0.60	43
9/17/2002	5	GS	7.8	1.5		0.32	52
9/17/2002	6	GS	12.6	16.2		0.81	63
9/17/2002	5	GS	12.7	17.5		0.85	54
9/17/2002	6	GS	13	17.7		0.81	61
9/17/2002	5	GS	13.5	21.3		0.87	55
9/17/2002	5	GS	14.1	24.5		0.87	53
9/17/2002	6	GS	14.7	29.3		0.92	62
9/17/2002	6	GS	15.5	35		0.94	64

9/17/2002	1	LMB	6.6	4.2		1.46		7
9/17/2002	4	LMB	6.8	4.3		1.37		41
9/17/2002	4	LMB	7.1	5.1		1.42		40
9/17/2002	1	LMB	7.2	4		1.07		8
9/17/2002	2	LMB	7.5	5.5		1.30		25
9/17/2002	2	LMB	38.1	907.168	32	1.64		22
9/17/2002	2	LMB	39.6	878.819	31	1.42		21
9/17/2002	3	PS	4.6	1.1		1.13		35
9/17/2002	1	PS	4.9	1.4		1.19		11
9/17/2002	1	PS	5.5	1.9		1.14		9
9/17/2002	1	PS	10.5	22.2		1.92		6
9/17/2002	3	YP	26.5	227		1.22		28
9/17/2002	3	YP	26.9	231		1.19		29

Fish Code	Common Name	Sciname
A	Alewife	*Alosa pseudoharangus*
AE	American eel	*Anguilla rostrata*
AS	Atlantic salmon	*Salmo salar*
B	Bluegill	*Lepomis macrochirus*
BB	Brown bullhead	*Ameiurus nebulosus*
BBH	Blueback herring	*Alosa aestivalis*
BC	Black crappie	*Pomoxis nigromaculatus*
BF	Bowfin	*Amia calva*
BL	American Brook Lamprey	*Lampetra appendix*
BM	Bridle shiner	*Notropis bifrenatus*
BND	Blacknosed dace	*Rhinichthys atratulus*
BNM	Bluntnose Minnow	*Pimephales notatus*
BS	Banded sunfish	*Enneacanthus obesus*
BT	Brown trout	*Salmo trutta*
BXP	Hybrid Bluegill/Pumpkinseed	*Lepomis macrochirus X Lepomis gibbosus*
C	Common carp	*Cyprinus carpio*
CC	Channel catfish	*Ictalurus punctatus*
CCS	Creek chubsucker	*Erimyzon oblongus*
CLM	Cutlips Minnow	*Exoglossum maxillingua*
CM	Central Mudminnow	*Umbra limi*
CP	Chain pickerel	*Esox niger*
CRC	Creek chub	*Semotilus atromaculatus*
CS	Common shiner	*Notropis cornutus*
EBT	Brook trout	*Salvelinus fontinalis*
EBTXBT	Hybrid Brook Trout X Brown Trout	
EM	Eastern Mosquitofish	*Gabusia affinis holbrooki*
F	Fallfish	*Semotilus corporalis*
FSS	Fourspine stickleback	
G	Goldfish	*Carassius auratus*
GS	Golden shiner	*Notemigonus crysoleucas*
GSF	Green sunfish	*Lepomis cyanellus*
K	Banded killifish	*Fundulus diaphanus*
LC	Lake chub	*Couesius plumbeus*
LLS	Landlocked salmon	*Salmo salar*
LMB	Largemouth bass	*Micropterus salmoides*
LND	Longnose dace	*Rhinicthys cataractae*
LNS	Longnose Sucker	*Catostomus catostomus*
LT	Lake trout	*Salvelinus namaycush*
M	Mummichog	*Fundulus heteroclitus*
MM	Margined Madtom	*Noturus insignis*
NP	Northern pike	*Esox lucius*
P	Pumpkinseed	*Lepomis gibbosus*
RB	Rock bass	*Ambloplites rupestris*
RBS	Redbreast sunfish	*Lepomis auritus*
RP	Redfin pickerel	*Esox americanus americanus*
RPXCP	Hybrid Redfin/Chain Pickerel	*Esox americanus americanus X Esox niger*
RS	Rainbow smelt	*Osmerus mordax*
RT	Rainbow trout	*Oncorhynchus mykiss*
S	American shad	*Alosa sapidissima*
SB	Striped bass	*Morone saxatilis*
SC	Slimy sculpin	*Cottus cognatus*
SD	Swamp Darter	*Etheostoma fusiforme*
SL	Sea Lamprey	*Petromyzon marinus*
SMB	Smallmouth bass	*Micropterus dolomieu*
SS	Spottail shiner	*Notropis hudsonius*
TD	Tesselated darter	*Etheostoma olmstedi*
TM	tiger muskellunge	*Esox lucius X Esox masquinongy*
TMT	Tadpole Madtom	*Noturus gyrinus*
TSS	three-spined stickle	*Gasterosteus aculeatus*
TT	Tiger Trout	*Salvelinus fontinalis X Salmo trutta*
W	Walleye	*Stizostedion vitreum*
WC	White catfish	*Ameiurus catus*
WP	White perch	*Morone americana*
WR	White crappie	*Pomoxis annularis*
WS	White sucker	*Catostomus commersoni*
YB	Yellow bullhead	*Ameiurus natalis*
YP	Yellow perch	*Perca flavescens*

APPENDIX H
RARE SPECIES

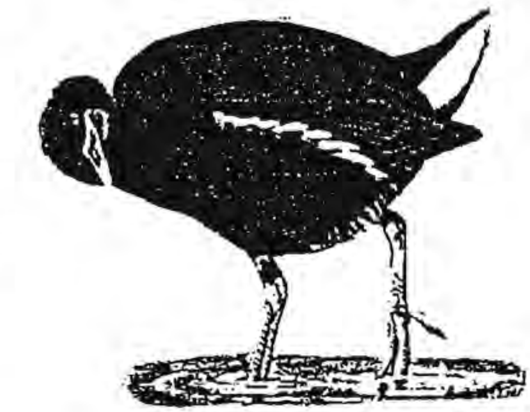
Massachusetts Natural Heritage Program

Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508)792-7270, ext. 200

MASSACHUSETTS RARE AND ENDANGERED WILDLIFE

COMMON MOORHEN

(Gallinula chloropus)



Forbush, E.H. Birds of Massachusetts. Commonwealth of Massachusetts, 1929.

DESCRIPTION

The Common Moorhen is a duck-like swimming bird about 13" (32cm) long. Its body is slate-grey with a prominent red bill with a yellow tip and a red frontal shield. Its tail cocks up and is white beneath. The voice of the Common Moorhen is a series of clucks or a squawking scream similar to that of the American Coot (Fulica americana). Nestlings are black and downy with the red bill with yellow tip, but lack the frontal shield.

SIMILAR SPECIES IN MASSACHUSETTS

The American Coot is about the same size and is slate-grey, but it has a conspicuous white bill unlike the red bill of the Common Moorhen. Also, the American Coot is often found in open water, while the Common Moorhen keeps to dense vegetation. Rails (Rallus spp.) may be found in the same marsh habitat, but they generally have a brown body and a long bill. They are even more secretive than the Common Moorhen and are very rarely flushed out of dense vegetation.

LIFE HISTORY IN MASSACHUSETTS

The Common Moorhen inhabits large freshwater marshes and ponds with cattails (Typha spp.) and other emergent vegetation. It generally keeps to the cover of dense vegetation and feeds by wading or diving at the edges of open water. Its food is

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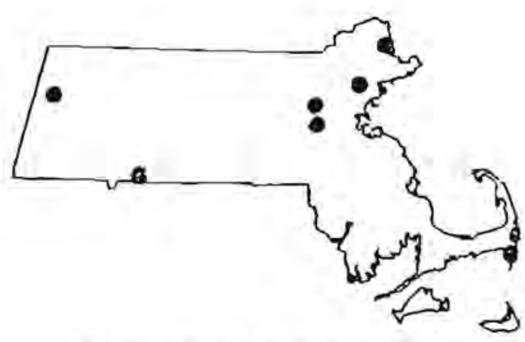
Range of Gallinula chloropus

breeding range
winter range



● Verified since 1978
○ Reported prior to 1978

Breeding Distribution in Massachusetts by Town

mostly made up of grass and sedge seeds and insects.

The Common Moorhen arrives in Massachusetts from the south during late April or May, and returns to its southern wintering range in October. Nesting begins throughout May into early June. It builds its nest of dead marsh plants to form a bulky platform that is usually at the shore edge or floating in dense vegetation.

The female lays 5-12 eggs that are buff or greyish to cinnamon-brown and have reddish-brown or greyish spots. Incubation is carried out by either parent and last for about 21 days. The male cares for the first-hatched chicks while the female incubates the remaining eggs. Young leave the nest very soon after hatching, can feed independently in 3 weeks, and can fly in 6-7 weeks, though they remain with the parents for some time thereafter.

RANGE

The Common Moorhen breeds from Maine to Minnesota, south to Florida and eastern Texas. It also breeds in the west from southern Oregon to Mexico. Its wintering range is from eastern South Carolina through Florida and along the Gulf coast.

POPULATION STATUS IN MASSACHUSETTS

The Common Moorhen is a species of Special Concern in Massachusetts. Only 8 currently verified sites (since 1978) have been identified in Massachusetts, and 1 additional historical site is recorded. Current breeding population in Massachusetts is estimated at between 11 and 20 pairs.

Since 1985, the hunting season on the Common Moorhen has been closed. Historically, hunting pressure on Common Moorhen has been light in Massachusetts and is unlikely to have affected its population status. The loss of significant amounts of shallow freshwater marsh habitat through drainage and development may be responsible for the decline in population of the Common Moorhen in Massachusetts.

Massachusetts Natural Heritage Program

Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508)792-7270, ext. 200

MASSACHUSETTS RARE AND ENDANGERED WILDLIFE

LEAST BITTERN (*Ixobrychus exilis*)

DESCRIPTION
The Least Bittern is 11-14" long with a wingspan of 16-18", making it the smallest member of the Heron Family. It has a black and green head and back with buff and chestnut wing patches, distinguishing it from the larger, dark-winged green heron. The Least Bittern has a slightly crested head and a yellow bill. It also has a rare dark phase which is a rich chestnut color. It is a weak flier and usually walks or climbs through wetland vegetation.

Golden Field Guide Series

RANGE
Southern Canada and northern United States to southern Texas and the West Indies. Winters from the Gulf Coast south.

STATE OCCURRENCES
Suspected breeding at less than 20 wetland sites scattered throughout Massachusetts.

HABITAT
Freshwater marshes where cattails and reeds predominate.

POPULATION STATUS
Considered rare and vulnerable in Massachusetts; believed declining throughout its range.

LIMITING FACTORS
Primary cause of rarity is the destruction of wetland habitat.

Breeding Range

Winter Range

• Verified since 1978

Breeding Distribution in Massachusetts by Town

Natural Heritage &
Endangered Species
Program

Natural Heritage & Endangered Species
Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508)792-7270, ext. 200

MASSACHUSETTS RARE AND ENDANGERED WILDLIFE

Pied-billed Grebe
(Podilymbus podiceps)

Charles Joslin, from DeGraaf, R. and Rudis, D. New England Wildlife, 1983

DESCRIPTION: Pied-billed Grebes are stocky waterbirds, 30 to 38 cm (12 to 15 in.) in length, with short legs far back on the body, short wings, a short tail, flat lobes on the toes, and a stout, thick, chicken- like bill. The plumage of the Pied-billed Grebe changes with the seasons. During the summer, the bird is uniformly brown with a dusky underside, a fluffy white posterior, and a large black patch on the throat; its bill is bluish-white, encircled near the middle by a black band. During the winter, the throat loses its black patch, and the bill becomes yellowish, with no black band. The young are liberally banded with black and white stripes, with a smattering of reddish-brown spots. The call of the Pied-billed Grebe is only given during the breeding season, and resembles a series of "*cow cow cow* " sounds. They are poor fliers and must run across the water for several yards before becoming airborne; the head is held low during flight.

SIMILAR SPECIES: Pied-billed Grebes can be distinguished from all other grebes by the lack of white wing patches in flight, the chicken-like bill, and, in summer, the black band around the bill.

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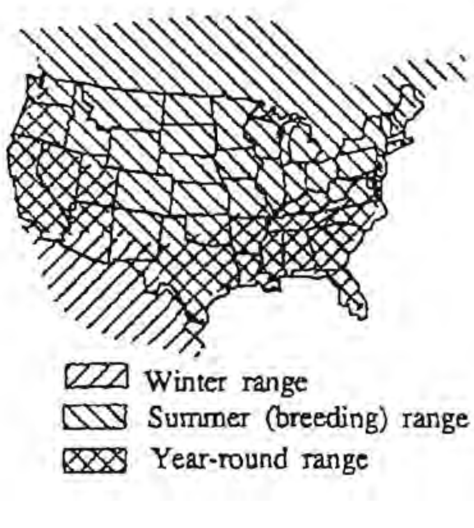

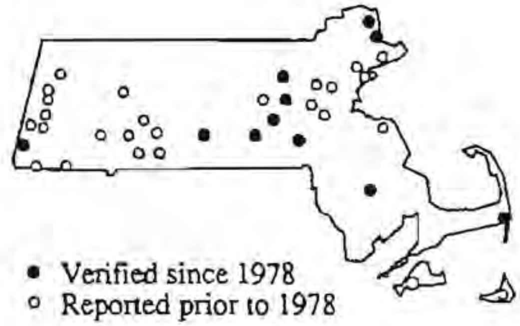

Massachusetts Distribution by Town

1990

HABITAT IN MASSACHUSETTS: Pied-billed Grebes prefer to nest in marshes, lakes, large ponds, and other wetlands which have an abundant supply of cattails, reeds, and other vegetation which can provide cover and nesting materials. They spend the winter in open lakes and rivers, estuaries, and tidal creeks, usually to the south of Massachusetts.

RANGE: The Pied-billed Grebe is the most widespread species of grebe in North America. Pied-billed Grebes can be found from southern Canada southward through the U.S., Central America, and South America to Argentina. The northern populations (including those in Massachusetts) migrate in autumn to the northern limit of unfrozen fresh water south to Panama. Some of the birds may be found in saltwater marshes if there is no unfrozen fresh water available.

BEHAVIOR/LIFE HISTORY: Pied-billed Grebes arrive in Massachusetts in late March and begin courtship displays, which consist of diving and chasing, bill touching, circling, and calling; this may continue until June, but nesting is usually initiated in late April. The nest is constructed over a period of 3 to 7 days by both the male and female out of decayed reeds, sedges, grasses, and other vegetation. It is normally located in thick vegetation near to or surrounded by open water, which allows the birds to travel to and from the nest underwater and undetected. The territory of the breeding pair usually comprises the area within 46 meters (150 ft.) of the nest; the pair's home range is about twice this area. Grebes are very shy during the breeding and nesting periods. When alarmed or disturbed, they sink slowly beneath the water and surface again a considerable distance away, often in an area of dense vegetation.

Egg-laying occurs from late April to June; 2 to 10 whitish-blue eggs are laid over a period of several days. The eggs are covered with debris whenever both parents leave the nest, so the egg color gradually changes to a dirty brown. Both parents (but usually the female) incubate the eggs for 23 to 24 days. The chicks are precocial and can swim and dive only hours after emerging from their shells, but they tire quickly. They often climb onto their parents' backs regardless of whether they are in the water or on the nest. The chicks follow their parents everywhere, constantly begging for food. They grow rapidly and are capable of flight in less than a month.

Pied-billed Grebes eat a variety of foods, including aquatic vegetation, seeds, frogs, tadpoles, fish, aquatic insects, and especially crayfish. Pied-billed Grebes begin to migrate south from Massachusetts in September (sometimes late August), and most of them are gone by the end of December. Considerable numbers of Pied-billed Grebes from farther north can sometimes be seen in Massachusetts as they migrate south. Pied-billed Grebes are infrequently found in Massachusetts in mid-winter.

POPULATION STATUS: The Pied-billed Grebe is classified as a Threatened Species in Massachusetts due to the limited amount of suitable wetland habitats and the small population size of the birds. Nesting occurs erratically at some of the known breeding sites: a pair may breed at a suitable location one year and then never return again. Despite the small amount of available habitat, many of these areas are left vacant by the Pied-billed Grebes.

Massachusetts Natural Heritage Program

Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508)792-7270, ext. 200

MASSACHUSETTS RARE AND ENDANGERED WILDLIFE

KING RAIL
(Rallus elegans)

Bureau of Sport Fish and Wildlife, US Department of the Interior. Natural History of the King Rail. North American Fauna, No. 67, 1969.

DESCRIPTION

The King Rail, largest of the New England rails (15-19"/38-48 cm long), is a plump, chicken-sized marshbird. The long, slender bill curves downward and varies from orange-red to dark brown. Sexes look alike; males are usually slightly larger than females. Upper parts are rich olive-brown, distinctly streaked with brownish-black or olive-gray. Wings are brown. Over each eye a brownish-white or brownish-orange line turns to brownish-gray behind the eye. Sides of the head are dusky, bluish-ash, while the upper throat is whitish. The entire chest and sides of the neck are a deep reddish-brown. Most conspicuous of all markings is the bold white barring on the dark brown flanks and wing linings, which fades to whitish under the tail. Legs and feet vary from light reddish-brown to grayish-maroon. Wingspread is 21 to 25"/52 to 62 cm. Chicks are glossy greenish-black and downy; feet and legs are brownish-gray.

SIMILAR SPECIES

King and Clapper Rails, often found together in salt and brackish marshes, are similar in plumage and habits, and have been known to hybridize where their ranges overlap. Some ornithologists disagree as to whether they are different species or merely races of the same species. The Clapper is smaller, grayer and has paler flank barring. Virginia Rails are much smaller than Kings and have gray, instead of brown, cheeks.

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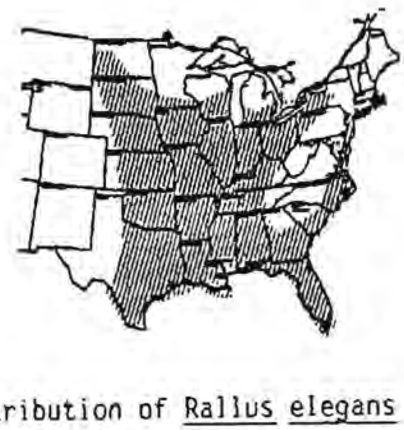
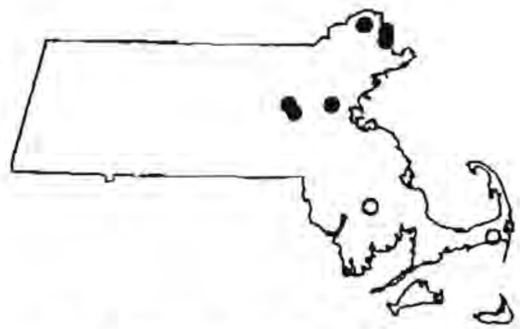


Distribution of Rallus elegans



Breeding Distribution in Massachusetts by Town

HABITAT IN MASSACHUSETTS
King Rails inhabit large freshwater and brackish marshes dominated by cattails and other emergent vegetation. Members of this species are more inclined than other rails to wander onto adjacent fields.

BEHAVIOR
These secretive marshbirds often remain hidden among the dense vegetation. When flushed they fly weakly for only short distances. Males defend small strips of freshwater marshland as breeding territories.

FEEDING HABITS
In Massachusetts King Rails typically forage in shallow water, 2 to 3" deep, in areas concealed by vegetation. The preferred diet of both adults and young includes insects, slugs, tadpoles, small frogs, crayfish, grains, and seeds from aquatic plants. Most food items are ingested whole, but larger crustaceans are often dismembered before eating.

MIGRATION
As nocturnal migrants, King Rails probably arrive at nesting areas in local marshes in late April and early May, and remain until late August or early September. King Rails return to the same section of the same marsh for several consecutive years to breed; but they never return to the same nest.

BREEDING BEHAVIOR
King Rails probably nest in Massachusetts in June, on or close to the ground, weaving the nest of sedges and grasses in cattails or other dense vegetation, in the shallow part of the marsh. Occasionally, the nest (8"/20cm. in diameter) is placed on a clump of grass or on a sedge tussock about 18"/45 cm. above the water. Males appear to choose nest sites and actively participate in nest building. Usually, in the north, one clutch is laid yearly of 10-12 buffy or creamy-white, and slightly glossy, ovate-shaped eggs, speckled with reddish-brown and lilac. Incubation lasts from 21 to 23 days. Precocial young are fed the first day by parents, able to eat from the ground by the second day, and can walk one hour after hatching. Young follow their mother from the nest and remain with adults for more than a month. They remain flightless for about 9 weeks.

RANGE
The King Rail is scattered throughout the eastern half of North America, excluding mountainous areas. In general, it breeds very locally where appropriate habitat exists from Massachusetts, west to southern Ontario, southern Michigan, central Minnesota and eastern Nebraska, south along the Atlantic coast to Florida and southwest through the Great Plains, to Texas, and west along the Gulf states. The species winters or is a year round resident mainly in the southern part of the breeding range and along coastal areas. King Rails winter in salt marshes located anywhere within their range.

POPULATION STATUS
Confirmed or suspected breeding in Massachusetts has occurred at only a few widely scattered localities. King Rails are listed as "threatened" in Massachusetts; there have only been four reported sites since 1978. Since Massachusetts lies at the northern periphery of the range, King Rails, have always been rare and apparently local breeding birds in the state. Although raccoons prey upon eggs in nests, loss of wetland nesting and feeding habitat is undoubtedly the major factor threatening the King Rail in Massachusetts.

APPENDIX I
MILFORD POND STORMWATER MANAGEMENT AND MAINTENANCE ACTIVITIES

Milford Pond Storm Water Management And Maintenance Activities

1 Introduction

The value of the aquatic habitat of Milford Pond has been diminished by a loss of water depth within the pond due to sediment infilling and organic accumulation; and excessive aquatic and emergent macrophyte growth within the remaining open water. The Town of Milford is proposing to restore the aquatic habitat within a portion of Milford Pond by hydraulically dredging accumulated sediment and organic deposits from the pond bottom. Excavation of the nutrient-rich soft organic sediments (muck) that have accumulated over recent years would increase pond depth and allow for a substantial decrease in aquatic plant density and percent cover that severely impacts the warm-water fishery of the pond.

The accumulation of sediment in Milford Pond is evidence of the ability of the waterbody to trap input particulate matter. The majority of particulate matter entering Milford Pond is of a size that would have a settling rate of more than an order of magnitude greater than the current Milford Pond overflow rate (total inflow/pond area). This suggests that Milford Pond is an efficient trap for particulates. Significant pollutant loadings enter Milford Pond via storm water runoff, which drains from the surrounding 5,440±-acre watershed. Storm flows induce scour, erosion, and the suspension of particles, creating turbid sediment-laden runoff. Suspended solids contribute to water quality and aquatic habitat degradation, since many other pollutant constituents including heavy metals, bacteria, and organic chemicals sorb to sediment particles. Other pollutants in storm water include nutrients, salt, and pesticides.

In order to extend the life of the benefits realized by dredging Milford Pond, a program for storm water management and pond maintenance is necessary. Successful storm water management is achieved by the implementation of Best Management Practices (BMPs), which may reduce or prevent pollutants in untreated storm water runoff from entering the receiving water body. BMPs may be applied within the watershed and/or within the pond itself. Examples of in-pond management include:

- Forebay construction, or "sacrificial ponds";
- Wetland delta areas;
- Inlet/outlet modifications;
- Dredging;
- First flush diversion/interception; and
- Nutrient inactivation.

Positive changes in water quality can be realized by storm water management within the watershed by addressing either point sources or non-point sources of pollutants. Examples include:

- ξ Sedimentation chambers/spill controls;
- ξ Stream bank protection;
- ξ Alternate land treatments;
- ξ Groundwater conveyance;
- ξ Public education; and
- ξ End of pipe BMPs.

Implementation of storm water BMPs is intended to reduce the inputs of total nitrogen, phosphorus and TSS, thereby reducing the mass of material that is available for accumulation in Milford Pond. The reduction of sediment and nutrient loadings to Milford Pond will result in maintenance of the restored pond depth and lowered nutrient levels. This will lessen, but not eliminate, the potential for regrowth of aquatic vegetation. It can be expected that additional occasional management efforts for aquatic macrophytes may be necessary.

2 Storm Water Management Program

There are seventeen (17) drainage outfalls discharging to Milford Pond, none of which are believed to discharge any illicit sewage flows (The Bioengineering Group, Inc., 1997). Each of these drains plus others in the Huckleberry Brook area were investigated by BEC in the Spring of 2000 to assess their physical suitability for the retrofitting of BMPs for sediment removal. Characteristics of the storm drain outfalls are presented in Table J.1 and identified in Figure J.1.

Selection of individual BMPs is very site and situation-specific. Not all of the sites were judged suitable for BMP installation. Major considerations in the review process were overall contributing drainage area and potential for significant pollutant loading. Of the twenty-one outfalls assessed, ten appeared suitable and appropriate for BMP installation. Hydrodynamic particle separators will be incorporated into drainage systems 1, 2, 8, 9, 15, 17, and 18, and systems 3, 12, and 14 will be retrofitted with open sedimentation basins.

The selected storm water drainage systems are estimated to contribute approximately 19%, 18%, and 13% of the total annual loads of TSS, TKN, and TP, respectively. Based on literature values it is assumed that the hydrodynamic devices and sedimentation basins will achieve 70% TSS removal, and 40% removal of both TKN and TP. The BMPs are expected to yield an estimated reduction of 13%, 7%, and 5% of the total TSS, TKN, and TP annual loads.

Table I.1 Characteristics of Milford Pond Storm Water Outfalls

Storm Water Discharge Site #	Outfall Location	Size	Material*	Drainage Area
1	Dilla St. Bridge, NE	12"	CI	Medium
2	Dilla St. Bridge, SE	18"	RCP	Medium
3	South of Dilla St.	24"	RCP	Large
3A	Dilla St. - 300' w of pump sta.	10"	RCP	Medium
4	Near Pine Grove Cemetery	24"	CMP	Medium
5	Cedar St., near pole #44	12"	RCP	Small
6	Cedar St. at landfill	24"	RCP	Medium
7	Cedar St. at landfill	15"	RCP	Small
8	Cedar St. near Ravenna St.	12"	RCP	Medium
9	Meade Street	12"	RCP	Medium
10	Meade St., club parking lot	10"	??	Small
11	Sumner St., behind Benj. Moore	12"	CMP	Small
11A	Sumner St., behind Benj. Moore	15"	CMP	Small
11B	Sumner St., behind Benj. Moore	8"	PVC	Small
12	Sumner St., behind Benj. Moore	48"	RCP	Large
13	Sumner St.	10"	DI	Small
14	Sumner St., near Votoloto Field	15"	CMP	Small
15	Votoloto Field	12"	RCP	Small
16	Town Pool area	12"	RCP	Small
17	Sumner & Dilla into Huckleberry Brook	36"	CMP	Medium
18	Dilla St. into Huckleberry Brook	12"	RCP	Small

*CI = cast iron; CMP = corrugated metal pipe; DI = ductile iron; PVC = poly vinyl chloride; RCP = reinforced concrete pipe

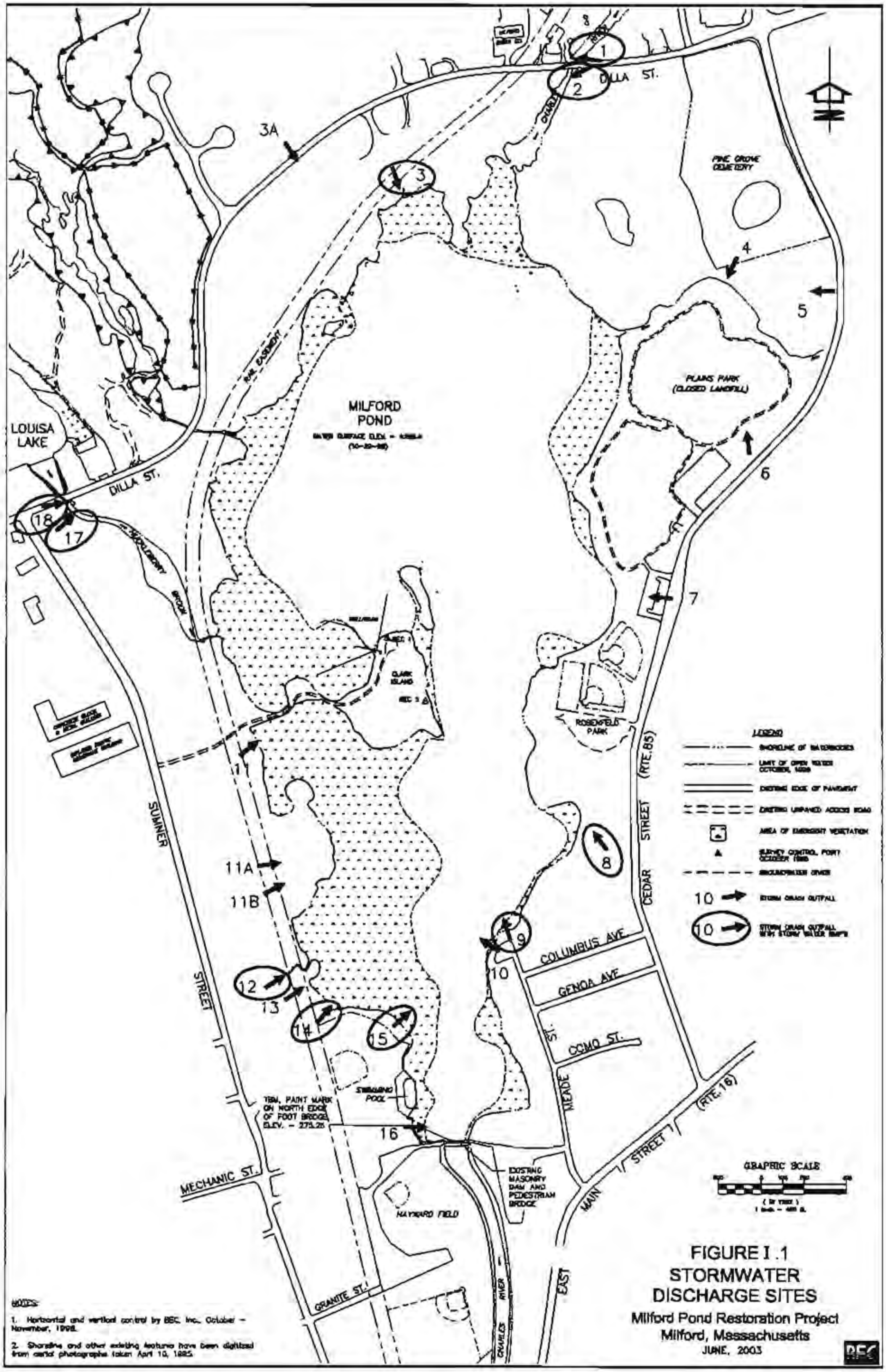


FIGURE I .1
STORMWATER DISCHARGE SITES
Milford Pond Restoration Project
Milford, Massachusetts
JUNE, 2003

NOTES:
1. Horizontal and vertical control by BEC, Inc., October – November, 1998.
2. Shoreline and other existing features have been digitized from aerial photographs taken April 10, 1985.

The implementation of storm water Best Management Practices (BMPs) is an important component of the Milford Pond Restoration Project. Experience has shown that end-of-pipe BMPs can be most effective at making lasting improvements in water quality. A program of end-of-pipe BMPs applied at Milford Pond is a realistic goal for instituting effective and lasting storm water management to alleviate water quality concerns both in the pond and for downstream resources.

3 References

The Bioengineering Group, Inc. 1997. "Charles River Storm Drain Outfall Dry-Weather Monitoring Final Report." Board of Selectmen Town of Milford.

APPENDIX J
SEDIMENT CHEMISTRY ANALYSES

Milford Pond
Sediment Analysis
Table 5 - TCLP Volatile Organics.
(All Measurements are in ug/kg (ppb))

		SS-1	SS-2	SS-3	SS-4	310CMR40 Mass. Contingency Plan	
TCLP Volatile Organics – TCLP Extraction						S-1	S-2
	Chloroform (ug/L)	ND	ND	ND	ND	100	10,000
	Carbon Tetrachloride (ug/L)	ND	ND	ND	ND	1,000	4,000
	Tetrachloroethene (ug/L)	ND	ND	ND	ND	—	—
	Chlorobenzene (ug/L)	ND	ND	ND	ND	8,000	40,000
	1,2-Dichloroethane (ug/L)	ND	ND	ND	ND	50	200
	Benzene (ug/L)	ND	ND	ND	ND	10,000	60,000
	Vinyl Chloride (ug/L)	ND	ND	ND	ND	300	400
	1,1-Dichloroethene (ug/L)	ND	ND	ND	ND	100	100
	Trichloroethene (ug/L)	ND	ND	ND	ND	400	20,000
	1,4-Dichlorobenzene (ug/L)	ND	ND	ND	ND	2,000	60,000
	2-Butanone	ND	ND	ND	ND	300	40,000

Milford Pond

Sediment Analysis

Table 6 - Volatile Organics – 8260 Scan.

(All Measurements are in ug/kg (ppb))

	COE-1	COE-2	COE-3	COE-4	COE-5	COE-6	COE-7	COE-8	COE-9	COE-10	COE-11	COE-12	COE-13	COE-14	COE-15
Volatile Organics – 8260 Scan															
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichlorpropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Milford Pond
Sediment Analysis
Table 3 - Metals.

Parameter	Sample Date: January 11, 2001				Sample Date: May 30, 2002															310CMR40 Mass. Contingency Plan		MADEP Background Soil Concentrations[1]
	SS-1	SS-2	SS-3	SS-4	COE-1	COE-2	COE-3	COE-4	COE-5	COE-6	COE-7	COE-8	COE-9	COE-10	COE-11	COE-12	COE-13	COE-14	COE-15	S-1	S-2	
Total Metals (mg/kg)																						
Arsenic, Total	2.58	1.15	5.79	5.4	3.6	3.0	3.9	1.4	1.4	1.2	1.6	3.6	0.92	2.6	0.98	2.0	1.9	1.1	1.3	30	30	17
Barium, Total					84	84	68	57	69	49	48	44	27	40	45	86	82	55	63	1,000	2,500	45
Cadmium, Total	0.91	0.36	1.2	4.7	1.5	0.79	ND	0.27	0.13	0.15	ND	0.35	0.24	0.15	0.12	0.38	0.26	0.13	0.13	30	80	2
Calcium, Total	13,000	6,100	7,300	6,700																—	—	—
Chromium, Total	4.33	3.09	8.4	8.1	4.1	2.7	1.8	2.0	2.1	2.0	1.8	4.8	5.6	5.2	1.3	3.4	1.8	1.7	2.5	1,000	2,500	29
Copper, Total	12	6.1	14	23																—	—	38
Lead, Total	31	24	38	91	52	27	1.2	6.5	3.5	14	4.8	1.7	15	4.5	5.4	23	11	6.4	5.9	300	600	99
Magnesium, Total	1,200	640	1,100	880																—	—	4,900
Mercury, Total	ND	ND	ND	0.4	0.110	0.074	0.029	0.042	0.041	0.034	0.034	0.053	0.038	0.02	0.032	0.085	0.050	0.044	0.049	20	60	0.3
Nickel, Total	5.07	2.58	8	12																300	700	17
Potassium, Total	ND	ND	ND	ND																—	—	—
Selenium, Total					ND	ND	ND	ND	ND	ND	ND	ND	1.2	ND	ND	ND	ND	ND	ND	400	2,500	0.5
Silver, Total					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100	200	0.6
Zinc, Total	77	44	100	260																2,500	2,500	116
TCLP Metals (mg/L) -- TCLP Extraction																						
Arsenic, TCLP	ND	ND	ND	ND																		
Cadmium, TCLP	ND	ND	ND	ND																		
Chromium, TCLP	ND	ND	ND	ND																		
Copper, TCLP	ND	ND	ND	ND																AS LISTED ABOVE		
Lead, TCLP	ND	ND	ND	ND																		
Mercury, TCLP	ND	ND	ND	ND																		
Nickel, TCLP	ND	ND	ND	ND																		
Zinc, TCLP	ND	ND	ND	ND																		

* Blank shaded cells indicate parameter was not measured for this sample date. Shaded cells with values indicate exceedence of MA DEP Background Levels for soils for the parameter
ND= Not detected - indicates the constituent was not present in quantities above the Method Detection Limit (MDL)
[1] Source: Massachusetts DEP. 1995. Guidance for Disposal Site Risk Characterization. Interim Final Policy WSC/ORS-95-141.

TCLP was required for both sample sets. For the second sampling event (May 2002) TCLP was only required when the concentration of metals or organic compounds were equal to or greater than the theoretical concentration at which TCLP criteria may be exceeded (as follows)
If:
As>100 mg/kg
Ba> 2000mg/kg
Cd> 20 mg/kg
Cr> 100 mg/kg
Pb> 100 mg/kg
Hg> 4 mg/kg
Se> 20 mg/kg
Ag> 100 mg/kg

Milford Pond
Sediment Analysis
Table 2 - Polynuclear Aromatic Hydrocarbons (PAHs).
(All Measurements are in ug/kg (ppb))

	Sample Date: January 11, 1999				Sample Date: May 29-30, 2002															310CMR40 Mass. Contingency Plan	
	SS-1	SS-2	SS-3	SS-4	COE-1	COE-2	COE-3	COE-4	COE-5	COE-6	COE-7	COE-8	COE-9	COE-10	COE-11	COE-12	COE-13	COE-14	COE-15	S-1	S-2
PAH by GC/MS SIM 8270M																					
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20,000	20,000
2-Chloronaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Fluoranthene	ND	ND	ND	ND	630	280	ND	ND	ND	ND	ND	ND	130	ND	ND	110	170	ND	ND	1,000,000	2,000,000
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	4,000
Benzo (a) anthracene	ND	ND	ND	ND	230	82	ND	ND	ND	ND	ND	ND	46	ND	ND	ND	ND	ND	ND	700	1,000
Benzo (a)pyrene	ND	ND	ND	1700	89	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	700	700
Benzo (b) fluoranthene	ND	ND	ND	1400	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	700	1,000
Benzo (k) fluoranthene	ND	ND	ND	1500	230	ND	ND	ND	ND	ND	ND	ND	46	ND	ND	ND	ND	ND	ND	7,000	10,000
Chrysene	ND	ND	ND	ND	380	150	ND	ND	ND	ND	ND	ND	64	ND	ND	ND	77	ND	ND	7,000	10,000
Acenaphthylene	ND	ND	ND	ND	110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100,000	100,000
Anthracene	ND	ND	ND	ND	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,000,000	2,500,000
Benzo (ghi) perylene	ND	ND	ND	ND	270	ND	ND	ND	ND	ND	ND	ND	74	ND	ND	ND	ND	ND	ND	1,000,000	2,500,000
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	400,000	400,000
Phenanthrene	ND	ND	ND	ND	430	200	ND	ND	ND	ND	ND	ND	52	ND	ND	ND	68	ND	ND	700,000	700,000
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	700	700
Indeno (1,2,3-cd) Pyrene	ND	ND	ND	ND	210	ND	ND	ND	ND	ND	ND	ND	56	ND	ND	ND	ND	ND	ND	700	1,000
Pyrene	ND	ND	ND	ND	690	280	ND	ND	ND	ND	ND	ND	120	ND	ND	97	150	ND	ND	700,000	1,000,000
1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,000	4,000
Perylene	7200	3400	3800	3200	630	1000	1700	520	630	300	310	2000	130	ND	670	650	2200	450	900	—	—
Biphenyl	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,000	1,000
2,6-dimethylnaphthalene	ND	ND	ND	ND																—	—
1-Methylphenanthrene	ND	ND	ND	ND																—	—
Benzo (e) Pyrene					210	83	ND	ND	ND	ND	ND	ND	40	ND	ND	ND	ND	ND	ND	—	—
Total PAHs	7200	3400	3800	7800	4359	2075	1700	520	630	300	310	2000	758	ND	670	857	2665	450	900		

* Blank shaded cells indicate parameter was not measured for this sample date. Shaded cells with values indicate exceedence of MCP S-1 for GW-1 for soils for the parameter.
ND= Not detected - indicates the constituent was not present in quantities above the Method Detection Limit (MDL)

Milford Pond
Sediment Analysis
Table 1 - General Chemical and Physical Characteristics.

	Sample Date: January 11, 1999				Sample Date: May 30, 2002														
	SS-1	SS-2	SS-3	SS-4	COE-1	COE-2	COE-3	COE-4	COE-5	COE-6	COE-7	COE-8	COE-9	COE-10	COE-11	COE-12	COE-13	COE-14	COE-15
Solids, Total (%)	8.3	8.6	8.6	10	11	8.8	8.6	9.8	9.9	9.7	10	12	29	24	11	9.6	10	9.4	10
Solids, Total Volatile (%)	80	76	58	58	64	80	80	64	67	56	76	60	12	23	58	55	75	52	55
pH (SU)	6.3	5.9	5.9	6.7															
Buffer pH (SU)	5.89	5.94	6.23	5.93															
Exchangeable Acidity (meq/100g)	47	55	39	48															
Nitrogen, Ammonia (mg/kg)	290	180	190	330															
Nitrogen, Nitrite (mg/kg)	ND	ND	ND	ND															
Nitrogen, Nitrate (mg/kg)	ND	ND	ND	ND															
Nitrogen, Total Kjeldahl (mg/kg)	21000	16000	11000	14000															
Phosphorus, Total (mg/kg)	380	170	370	590															
Hydrocarbons, Total (IR) (mg/kg)	ND	ND	ND	ND															
Moisture (%)	92	91	91	90															
Total Organic Carbon (%)					15.5	19.6	17.1	15.4	17.0	14.6	17.5	27.5	6.45	8.42	18.0	23.9	30.8	22.2	26.3
Particle Size (% passing) – By Sieve																			
Sieve, 1 inch (%)	100	100	100	100															
Sieve, #4 (%)	93.8	86	82	95.2	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Sieve, #10 (%)	89	83	78	91	100	100	98.6	100	100	100	100	100	99.8	99.3	100	99.9	99.0	100	100
Sieve, #20 (%)	81	71	70	83															
Sieve, #40 (%)	74	66	62	79	94.4	100	97.5	98.9	99.8	99.7	99.8	92.8	54	91.6	100	99.6	98.4	99.9	99.9
Sieve, #60 (%)	71	62	58	76															
Sieve, #140 (%)	63	57	50	66															
Sieve, #200 (%)	60	56	48	63	79	97.0	93.3	91.0	96.2	94.9	98.7	61	18	47	84	79	76	98.9	98.5
Particle Size –By Hydrometer																			
Sand+ (>53um) (%)	59	62	48	40	38	30	30	19	15	23	29	45	81	54	30	38	28	21	19
Coarse Silt (20-53um) (%)	21	18	25	33	8.3	19	14	9.9	16	4.1	15	17	6.7	30	21	8.7	14	3.1	11
Medium Silt (5-20um) (%)	15	15	23	23	22	21	22	40	30	24	28	19	5.7	12	20	31	29	37	25
Fine Silt (2-5um) (%)	4.8	4.4	4.3	4	21	25	18	24	28	34	24	9.8	3.8	2.1	18	13	13	31	32
Clay (<2um) (%)	ND	ND	ND	ND	10	4.6	16	7.1	11	15	3.9	8.6	2.3	2.2	10	9.0	16	7.2	12
Organic Matter, Total (%)	6.7	6.5	5	5.8															

*Blank shaded cells indicate parameter was not measured for this sample date.

ND= Not detected - indicates the constituent was not present in quantities above the Method Detection Limit (MDL)

Milford Pond
Sediment Analysis
Table 4 - Polychlorinated Biphenyls (PCBs) / Pesticides.
(All measurements are in ug/kg (ppb))

	Sample Date: January 11, 1999				Sample Dates: May 29-30, 2002															310CMR40 Mass Contingency Plan	
	SS-1	SS-2	SS-3	SS-4	COE-1	COE-2	COE-3	COE-4	COE-5	COE-6	COE-7	COE-8	COE-9	COE-10	COE-11	COE-12	COE-13	COE-14	COE-15	S-1	S-2
PCB/Pesticides																					
Delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Lindane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100	200
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	30	40
Heptachlor epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	60	90
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	600	600
Endrin aldehyde	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Endrin ketone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	30	40
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2000*	2000*
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2000*	3000*
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2000*	2000*
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20,000*	20,000*
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Endosulfan sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Methoxychlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100,000	300,000
Toxaphene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,000	2,000
cis-Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
trans-Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Aroclor 1221	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Aroclor 1232	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Aroclor 1242/1016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Aroclor 1248	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Aroclor 1254	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—
Aroclor 1260	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	—	—

Milford Pond
Sediment Analysis
Table 6 - Volatile Organics -- 8260 Scan.
(All Measurements are in ug/kg (ppb))

	COE-1	COE-2	COE-3	COE-4	COE-5	COE-6	COE-7	COE-8	COE-9	COE-10	COE-11	COE-12	COE-13	COE-14	COE-15
Volatile Organics -- 8260 Scan															
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichlorpropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tertiary butyl ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p/m-Xylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobutane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iodomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl acetate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl methacrylate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrolein	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrylonitrile	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrahydrofuran	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	640	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,4-Dichloro-2-butene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

*sample dates: May 29-30, 2002
ND= Not detected - indicates the constituent was not present in quantities above the Method Detection Limit (MDL)

Milford Pond

Sediment Analysis

Table 7 - Extractable Petroleum Hydrocarbons
(All values in mg/kg)

Sample ID	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics
310CMR40 MCP S1/GW1	1000	2500	200
COE-1	38.5	120	153
COE-2	ND	165	282
COE-3	ND	110	281
COE-4	ND	97	169
COE-5	ND	97	142
COE-6	ND	64	73.6
COE-7	ND	83	160
COE-8	ND	80	147
COE-9	ND	13	24.7
COE-10	ND	34	29.4
COE-11	ND	70	203
COE-12	ND	142	134
COE-13	ND	99	142
COE-14	ND	72	81.7
COE-15	ND	101	91.2

*Shaded cells indicate exceedence of the MCP Method 1 S-1 Standard for the parameter.

APPENDIX K
MILFORD POND HYDROGEOLOGIC EVALUATION
June 25, 2002

Introduction

Milford Pond, in Milford, Massachusetts, is situated within the state-designated Zone II drinking water withdrawal area of the Clark Island Well Field, owned and operated by the Milford Water Company. The U.S. Army Corp of Engineers plans to dredge the pond to restore the channel, thereby increasing the ability to navigate watercraft through this surface water. Marin Environmental has been retained by Baystate Environmental Consultants under contract to the U.S. Army Corp of Engineers (USACOE) to evaluate the hydrogeological conditions beneath Milford Pond and determine what effect, if any, the dredging of the channel within Milford Pond will have upon the Clark Island Well Field. The well field is located west of the area of proposed dredging.

This study summarizes and evaluates the vibracore borings performed by TG&B for Baystate Environmental, Inc. including a review and evaluation of previous information provided for this study.

Based upon this information, we have provided a professional opinion as to the impact of dredging upon the Clark Island Well Field, specifically, the ability of the peat and/or clay/silt layers to protect the public supply wells from dredging impacts, and related other local activities, such as the landfill.

Previous Investigations

The previous investigations provide a variety of hydrogeological interpretations of the Milford Pond area.

In 1976, the Milford Water Company retained Dr. John F. Kick to perform a seismic investigation to determine the depth to bedrock in the area surrounding Milford Pond[i]. In the vicinity of Dilla Street, the depth to bedrock ranged from 5 to 45 feet below surface and was highly irregular. The bedrock was described as Amphibolite.

In 1984, the Milford Board of Health retained IEP, Inc. to perform a hydrogeologic assessment of the Milford Landfill[ii], which abuts the pond. IEP concluded that the peat underlying the landfill acts as an impermeable barrier and prevents landfill leachate from contaminating the groundwater aquifer. They also stated that the vertical hydraulic conductivity of the peat is low, thus preventing downward migration of contaminants, yet the horizontal hydraulic conductivity of the peat is relatively high, allowing for lateral groundwater migration. IEP's data from wells installed in the landfill indicated that "the confining nature of the peat has not created a situation where artesian conditions exist." The report indicated that the cone of depression generated by the Clark Island Well Field extended approximately 850 feet.

In 1987, the Milford Water Company again retained Dr. John F. Kick to perform a gravity survey to evaluate the depth to bedrock[iii]. The results of the gravity survey indicated that Clark Island is composed of glacial till with a bedrock high beneath the island. The east to west cross-sections show that the sand and gravel aquifer lies on top of the slopes of the till hill that composes Clark Island. Muck is found to overlie the sand and gravel. Based upon this information there appears to be a groundwater divide separating the well field area from the area to be dredged.

Also in 1987, the Milford Water Company retained Ground Water Associates to perform a hydrogeologic study[iv]. This study describes the results of Dr. Kick's gravity survey. The study states that: "The groundwater flow in the vicinity of Cedar Swamp Pond (now Milford Pond) generally follows the regional trend, although pumpage from the well field and the presence of impermeable bedrock boundaries alter flow." This report also states that the low permeability zone in the vicinity of the island restricts the expansion of the drawdown cone of the Clark Island well field to the east.

In 1991, the Milford Water Company retained Whitman & Howard of Wellesley, Massachusetts, to provide Zone II delineations for the Godfrey Brook, Clark Island and Dilla Street well fields[v]. The report described the Clark Island Well Field as being screened in a shallow sand and gravel deposit generally at depths less than 35 feet. The system has the capability of yielding approximately one million gallons per day. The description of the aquifer is composed of glacial sands and gravels less than 40 feet thick restricted to narrow bands adjacent to the Charles River and its tributaries. This report relies on Kick's data and describes the aquifer in the vicinity of the Clark Island Well Field as a sand and gravel unit averaging 25 feet thick. It describes a semi-confining layer of peat and fine sand, silt and clay overlying the aquifer. This report describes a north-south trending till ridge partially separating the sand and gravel aquifer near Clark Island into western and eastern units and then both units north and possibly south of the till ridge.

In 1991, the Town of Milford retained Weston & Sampson to perform a study of the Milford Landfill[vi]. This report describes a 22-acre landfill, which operated for 50 years, prior to which it was used to burn refuse. Surficial drainage from the landfill drains to Milford Pond to the south and west. The stratigraphy of the landfill indicates a shallow sand and fill deposit overlying 15 to 30 feet of semi-permeable peat and clay. The underlying sand and gravel deposits "represent the permeable water-bearing aquifer formation for the Clark's Island Well Field."

In 1994, the town of Milford again retained Weston & Sampson to perform a Comprehensive Site Assessment[vii] on the Milford landfill.

Vibracore Investigation

During the period of May 29th through 31st, 2002, TG&B drillers under the supervision of Baystate Environmental, Inc. and Marin Environmental, Inc. drilled a series of 15 shallow (8 to 10 feet deep) and two deep (27.5 to 30 feet deep) vibracore borings on a boat mounted drilling rig within Milford Pond. Continuous soil samples were collected from each boring and geologic logs were prepared. The following section is a brief description of the materials encountered during the drilling program.

Geological Conditions

The stratigraphy of the sediments underlying Milford Pond consists of organic and inorganic sediments as shown in Figure 1, the north-south geologic cross-section. Based upon the vibracore boring program, the water column on Milford Pond is 2 to 5.5 feet in depth. The location of each of the vibracore borings and the cross-section line can be found in Figure 2.

The bottom of the pond has a saturated layer of dark brown peat described as fine silty organics with some small wood/leaf debris with a trace of fine sand. This layer varies from zero to four feet in thickness.

Underlying the dark brown peat is a thick layer of saturated, red-brown peat described as coarse organics with large woody stems and leaf debris. A tree stump was found within this layer. This layer was found in each boring and ranged in thickness from one to eight feet.

Below the red-brown peat was a discontinuous layer of saturated brown-yellow peat described as soft degraded organic peat with some plasticity. This layer ranged from zero to five feet in thickness.

In the southern part of the pond, contiguous to the brown-yellow peat was a five-foot layer of saturated gray medium to fine sand grading into gray-light brown coarse sand/fine gravel.

In the central portion of the pond due east of Clark Island, a sand and gravel deposit was found to extend up to twenty feet in thickness. This saturated deposit grades from a brown coarse sand to a brown very fine sand to a brown coarse sand and gravel. This deposit appears to be the aquifer for the Clark Island Well Field.

In the northern part of the pond, the coarse sand and gravel seems to grade into a saturated brown to yellow very fine organic silt deposit approximately twenty feet thick This material is of lower permeability and is not part of the aquifer.

Discussion

A conceptual hydrogeologic model of the Milford Pond/Charles River area can be developed based upon the data reviewed during this investigation. During the last Pleistocene glaciation, the bedrock in the Milford Pond area was scoured in a generally north to south orientation. This scouring was parallel to the general structural trend of the area. A bedrock knob remained in the area of Clark Island and a basal till was deposited upon it. This created a north-south trending ridge, which would result in a groundwater divide. As the glacier receded from the area, outwash sand and gravel deposits were laid down within what was to become Milford Pond. It is likely that a higher energy condition existed in the central and southern part of the pond area at this time, which resulted in the deposition of coarser sediment. In the northern part of the pond, finer sediments such as a yellow to brown organic silt were deposited which would be more indicative of a lower energy condition.

After the melting of the Pleistocene glacier, a pond and river valley remained. The low energy of the pond resulted in deposition of finer grained sediment and organics, which includes the organic silt, brown-yellow, red-brown and dark brown peat.

It appears that all sediments collected during the vibracore investigation are saturated with water. None of the sediments observed during this investigation appeared to be impermeable or capable of creating an artesian/perched groundwater condition. It appears that there is hydraulic communication between Milford Pond and the aquifer supplying the Clark Island Well Field.

In recent years, the Clark Island Well Field was installed on the western side of the groundwater divide. Groundwater from these wells will tend to flow to the pumping wells preferentially from the north and south, with a lesser flow component from the east.

Review of previous studies indicates that the proposed area to be dredged in Milford Pond lies to the east of the groundwater divide. The pond is to be dredged to a maximum depth of 12 feet below the pond bottom. The proposed dredging would only penetrate the peat, exposing the sand and gravel aquifer to the pond water in two locations, at the very southern area of the pond, in the vicinity of vibracore boring COE-1, and in the central area of the pond, due east of Clark Island near COE-9.

Any groundwater from the exposed southern area would have to flow approximately 2000 feet to impact the Clark Island wells. Groundwater from the exposed central area would likely have to flow over 500 feet to the north or south, several hundred feet west and then another 500 feet south or north to impact the Clark Island wells.

Conclusions

Based upon the results of the May 2002 vibracore drilling program, and review of the referenced documents, the following is concluded:

1. There is hydraulic communication between surface water, peat and sand and gravel aquifer.

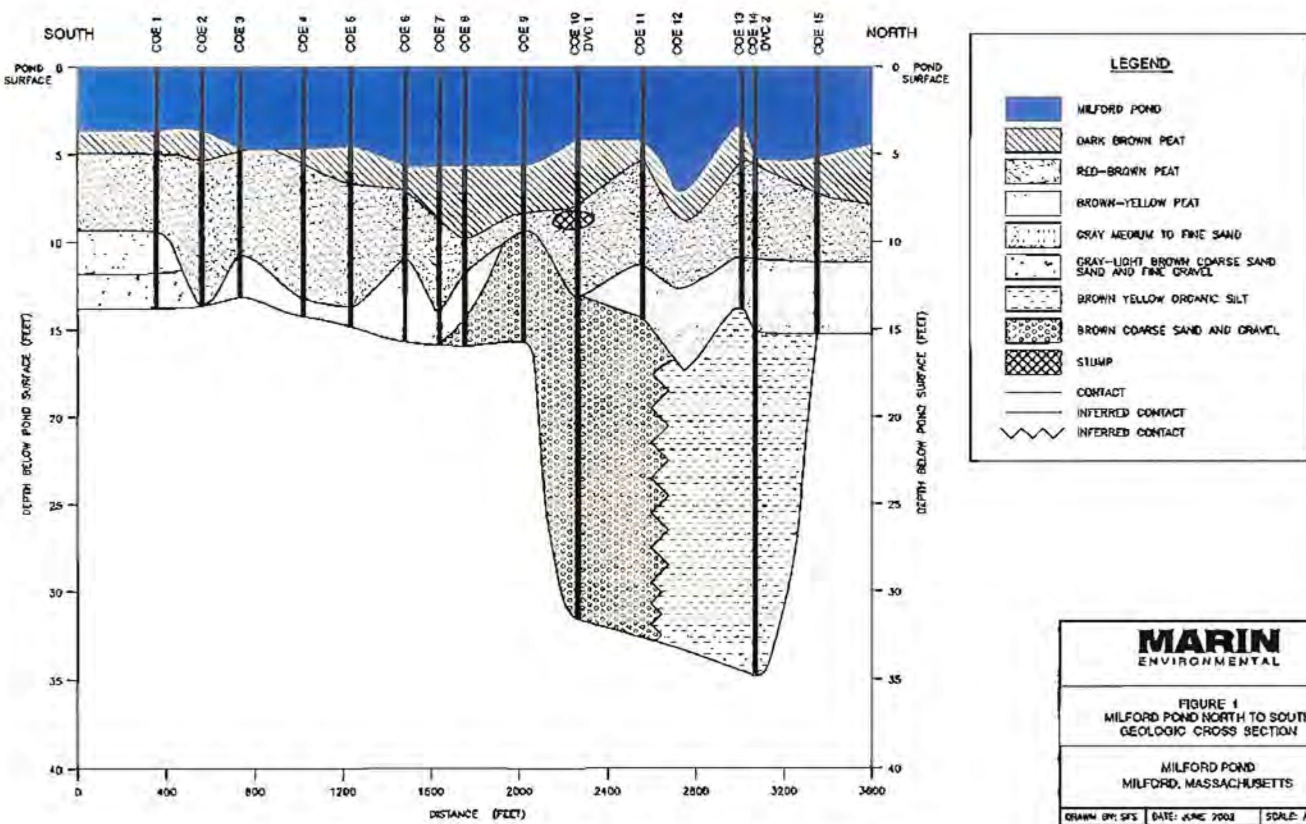
2. The proposed area to be dredged lies to the east of the groundwater divide.

3. Pond water that could come into direct contact with any part of the sand and gravel aquifer that could be directly exposed to the pond during dredging would need to flow a minimum of 1000 feet before impacting the Clark Island wells.

4. There does not seem to be a significant increase in risk of contamination to the Clark Island Well Field from dredging in Milford Pond, east of the groundwater divide.

References

[i] "Seismic Investigation, Milford, Massachusetts, 1976, by Dr. John F. Kick, Dunstable, MA
[ii] "Milford Landfill Hydrogeological Assessment", October 1984, by IEP, Inc., Northborough, MA
[iii] "Gravity Survey for Depth to Bedrock, Cedar Swamp Pond, Milford, Massachusetts, 1987, by Dr. John F. Kick, Dunstable, MA
[iv] "Preliminary Hydrogeologic Report on the Clark's Island Well Field, Milford, Massachusetts, April 1987 by Ground Water Associates of Arlington, Massachusetts
[v] "Zone II Delineations for the Godfrey Brook, Clark Island, and Dilla Street Well Fields, Milford, Massachusetts, February 1991, by Whitman & Howard, Inc., Wellesley, MA
[vi] "Phase 1 Landfill Study for the Town of Milford, Massachusetts, April 1991 by Weston & Sampson Engineers, Inc., Peabody MA
[vii] "Report on Comprehensive Site Assessment for the town of Milford, Massachusetts", July 1994, Weston & Sampson Engineers, Inc.



MARIN ENVIRONMENTAL

FIGURE 1
MILFORD POND NORTH TO SOUTH
GEOLOGIC CROSS SECTION

MILFORD POND
MILFORD, MASSACHUSETTS

DRAWN BY: SFS | DATE: JUNE 2002 | SCALE: As shown
APPROVED BY: MP | FILE No.: MA820008

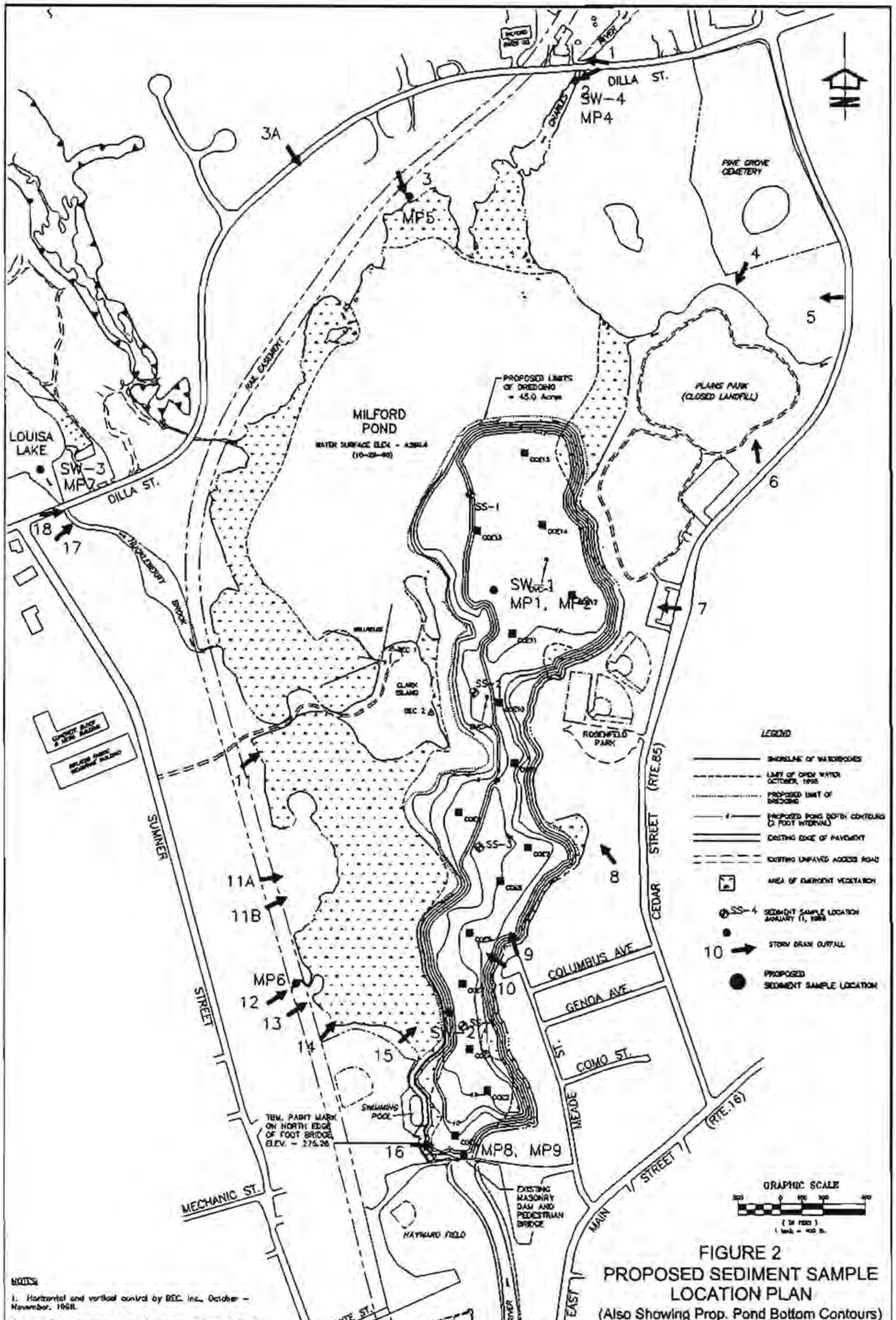
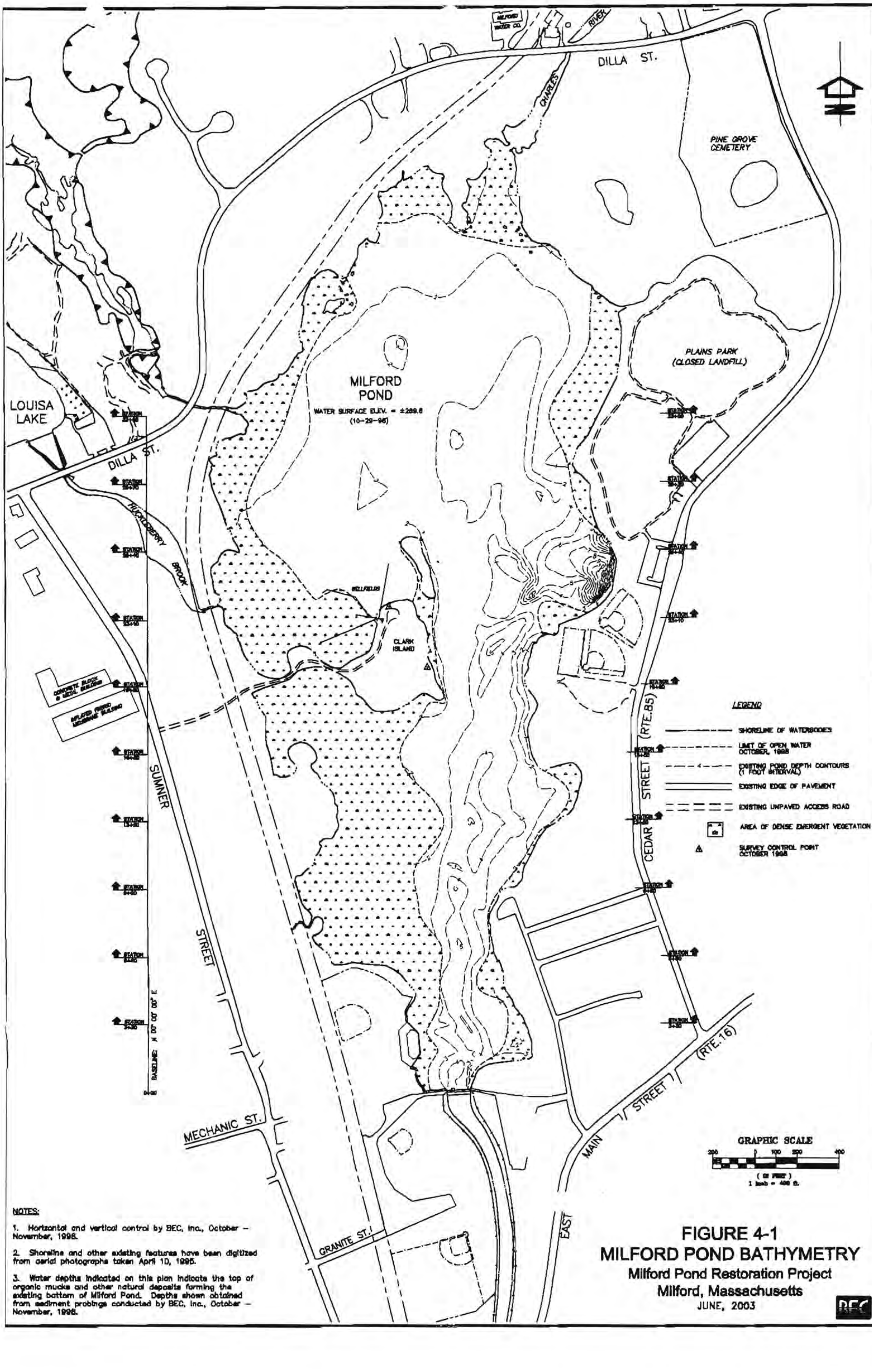


FIGURE 2
PROPOSED SEDIMENT SAMPLE LOCATION PLAN
(Also Showing Prop. Pond Bottom Contours)
Milford Pond Restoration Project
Milford, Massachusetts
4/02

APPENDIX L
ENLARGED FIGURES

Figure 2-1 Vegetation Map
Figure 4-1 Milford Pond Bathymetry



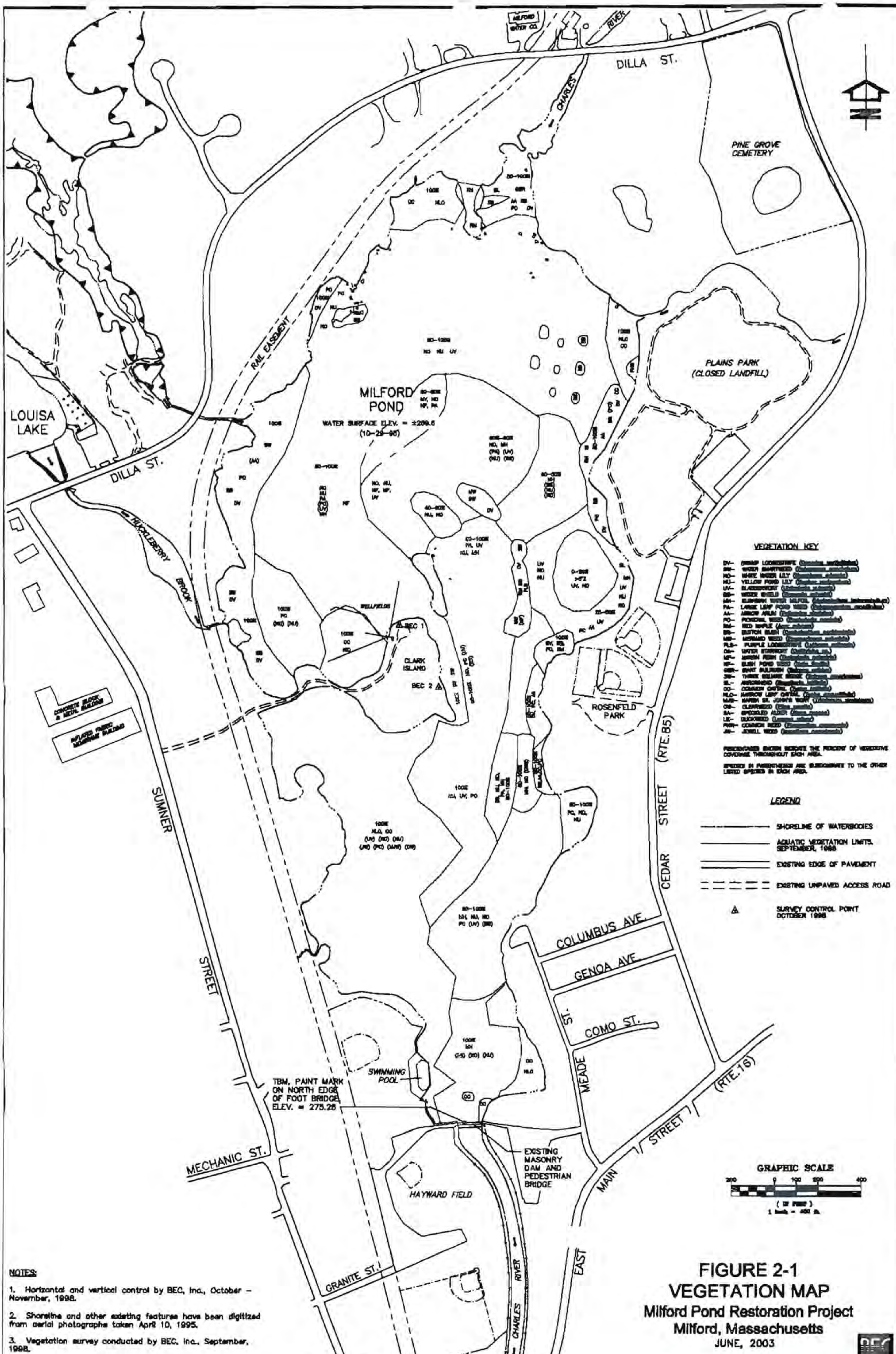
NOTES:

1. Horizontal and vertical control by BEC, Inc., October – November, 1998.

2. Shoreline and other existing features have been digitized from aerial photographs taken April 10, 1995.

3. Water depths indicated on this plan indicate the top of organic mucks and other natural deposits forming the existing bottom of Milford Pond. Depths shown obtained from sediment probings conducted by BEC, Inc., October – November, 1998.

FIGURE 4-1
MILFORD POND BATHYMETRY
Milford Pond Restoration Project
Milford, Massachusetts
JUNE, 2003



NOTES:

1. Horizontal and vertical control by BEC, Inc., October – November, 1998.
2. Shoreline and other existing features have been digitized from aerial photographs taken April 10, 1995.
3. Vegetation survey conducted by BEC, Inc., September, 1998.

FIGURE 2-1
VEGETATION MAP
Milford Pond Restoration Project
Milford, Massachusetts
JUNE, 2003