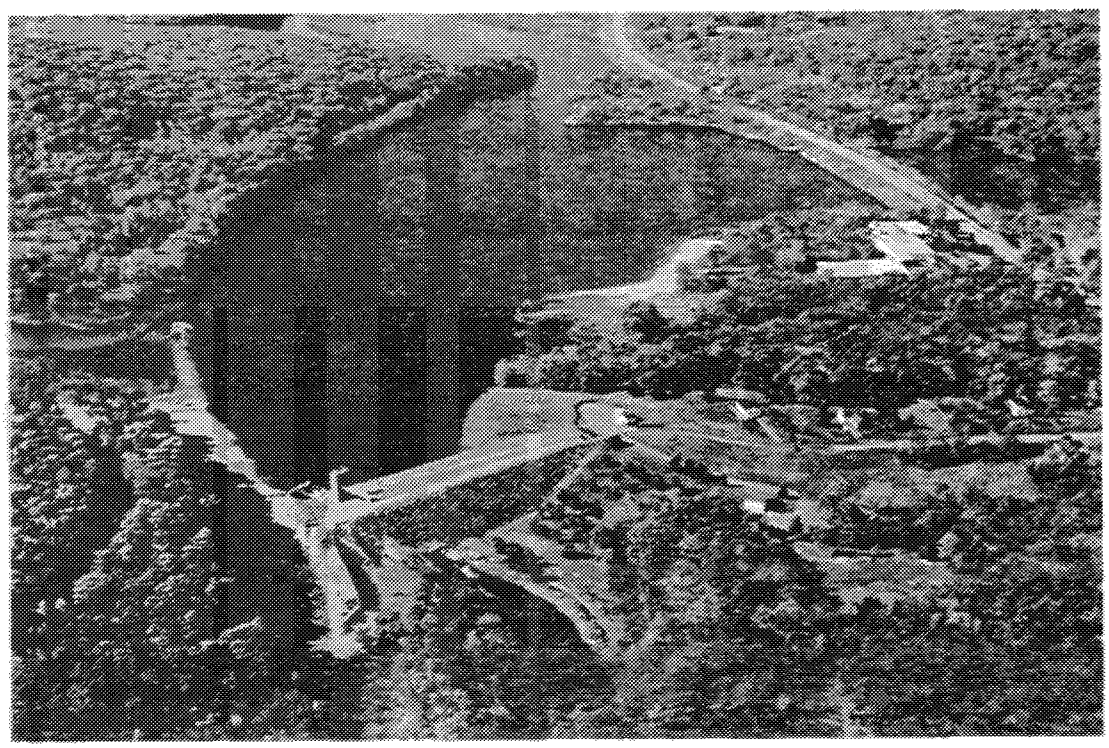
Master Plan

EAST BRIMFIELD LAKE
Brimfield, Holland and Sturbridge
Massachusetts



June 1998

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of Engineers
New England District

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13. ABSTRACT *(Maximum 200 words)*

The Master Plan covers approximately 2,070 acres of Federally owned land at East Brimfield Lake. The Master Plan prescribes an overall land and water management plan, resource objectives, and associated design and management concepts that will provide the best possible combination of responses to regional needs, resource capabilities, and expressed public interest and desires consistent with the project's authorized flood control purpose. The Master Plan covers all of the resources, including but not limited to, fish and wildlife, vegetation, cultural, aesthetic, interpretive, recreational, mineral, commercial, and outgranted lands, easements, and water. The planning process has identified opportunities for the improvement of existing recreational facilities, enhancement of boat ramps, vista improvement, and development of trails to allow limited access to areas containing exemplary natural communities. Other opportunities include extending existing trails to tie into community proposals such as the "Big X" in Sturbridge, and establishing other cross state bike and/or hiking trails. Several areas where local comminities could locate ball fields were also identified.

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26 June 1998
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MEMORANDUM FOR Commander

SUBJECT: Submittal of Master Plan - East Brimfield Lake, Brimfield, Holland, and Sturbridge, Massachusetts, dated June 1998

1. In accordance with ER 1130-2-550 (15 November 1996), district commanders are responsible for approving master plans, supplements, and updates.

2. The subject Master Plan is enclosed for your review and approval. The previous Master Plan for Reservoir Development, Design Memorandum No. 10, Supplement A, East Brimfield Reservoir, Quinebaug River, Massachusetts, dated February 1968 is rescinded.

3. The Master Plan prescribes an overall land and water management plan, resource objectives, and associated design and management concepts that will provide the best combination of responses to regional needs, resource capabilities, and expressed public interest and desires consistent with the authorized flood control function of the East Brimfield Lake project.

4. The plan has been prepared in cooperation with the Construction/Operations Division, which concurs with the Master Plan.

H. Farrell McMillan

Encl

H. FARRELL MCMILLAN, P.E.
Chief, Engineering/Planning Division

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CENAE-EE 1st End

DATE:

FOR Chief, Engineering/Planning Division

__X__ Approved

_____ Disapproved

Michael W. Pratt

MICHAEL W. PRATT
COL, EN
Commanding

MASTER PLAN

EAST BRIMFIELD LAKE

BRIMFIELD, HOLLAND AND STURBRIDGE, MASSACHUSETTS

JUNE 1998

EXECUTIVE SUMMARY

This Master Plan covers approximately 2070 acres of Federally owned land at East Brimfield Lake. It prescribes an overall land and water management plan, resource objectives, and associated design and management concepts which provide the best possible combination of responses to regional needs, resource capabilities and suitabilities, and expressed public interests and desires consistent with the project's authorized flood control purpose. The Master Plan covers all project resources, including but not limited to fish and wildlife, vegetation, cultural, aesthetic, interpretive, recreational, mineral, commercial, and outgranted lands, easements and water.

Inputs to the planning process were surveys and management plans for natural, wetland and cultural resources, and an analysis of recreational use, capacity and projected needs for project lands. Natural and man-made resources were located, identified, and analyzed, including wetlands, exemplary natural communities, and cultural resources that require specific management efforts for their protection. These were integrated into a series of project wide and compartmental objectives to protect and enhance project resources, and promote and develop, as appropriate, those resources for public use, education, and access.

Recreational opportunities were identified through an analysis of regional needs, and the public participation process. This planning process identified opportunities for the improvement of existing recreational facilities, enhancement of boat ramps, vista improvement, and development of trails to allow limited access to areas containing exemplary natural communities. Other opportunities include extending existing trails to tie into community proposals such as the "Big X" in Sturbridge, and establishing other cross state bike and/or hiking trails. Several areas where local communities could locate ball fields were also identified.

MASTER PLAN
EAST BRIMFIELD LAKE, MASSACHUSETTS

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1. INTRODUCTION

1.1 Project Authorization and Purpose

The East Brimfield Lake project was authorized in 1941 as an element of the flood protection plan for the Thames River Basin. The dam and reservoir are located in the towns of Brimfield, Holland and Sturbridge, Massachusetts. Specific authorization for the East Brimfield project is contained in the Flood Control Act of August 18, 1941 (Public Law 288, 77th Congress).

Authorization for development and use of the reservoir area for public recreation and other purposes is contained in Section 4 of the Flood Control Act of December 22, 1944 (Public Law 534, 78th Congress), as amended.

East Brimfield Lake was intended as a single purpose flood control project and is part of the Corps of Engineers comprehensive flood control plan for the Thames River Basin which includes a total of six flood control dams and reservoirs. Five of these flood control dams, including East Brimfield Lake, are located in the upper Quinebaug River Basin (see Figure 1). Operation of these projects by the New England District provides flood protection to downstream communities along both the Quinebaug and Thames Rivers. East Brimfield Lake reduces flood damages primarily in Sturbridge and Southbridge, Massachusetts, and coordinating its operation with other dams in the comprehensive system optimizes flood protection in the Basin. The project also provides natural resources management and recreational opportunities that are compatible with the project's primary purpose of flood control.

1.2 Purpose and Scope of the Master Plan

This master plan for management of natural resources and outdoor recreation has been prepared in accordance with the objectives and policies governing planning, development and management of these resources at Corps of Engineers water resources projects. These objectives and policies are outlined in ER 1130-2-540, "Environmental Stewardship Operation and Maintenance Policies"; ER 1130-2-550, "Recreation Operations and Maintenance Policies"; EP 1130-2-550, "Recreation Operations and Maintenance Guidance and Procedures"; ER 1165-2-400, "Recreational Planning, Development, and Management Policies"; and other related or referenced regulations and policies.

ER 1130-2-540 established the following program objectives for management of a project's natural resources.

- Manage natural resources on Corps of Engineers administered land and water in accordance with ecosystem management principles to insure their continued availability.

- Provide a safe and healthful environment for project visitors.

Utilizing this general guidance, ER 1130-2-550 and EP 1130-2-550 provide the specific policy for preparation of project master plans. Each master plan must cover all resources, including, but not limited to fish and wildlife, vegetation, cultural, aesthetic, interpretive, recreational, mineral, commercial and outgranted lands, easements, and water. Based on EP 1130-2-550, the primary goals of the East Brimfield Lake Master Plan are to prepare a concept document that prescribes an overall land and water management plan, and establishes resource objectives, and associated design and management concepts, which:

- Provide the best combination of responses to regional needs, resource capabilities and suitabilities, and expressed public desires consistent with authorized project purposes;

- Contribute towards providing a high degree of recreational diversity within the region;

- Emphasize the particular qualities, characteristics and potentials of the project;

- Exhibit consistency and compatibility with national objectives and other state and regional goals and programs.

ER 1130-2-550 further defines these goals as they relate to recreation management and established the following program objectives:

- Provide a quality outdoor recreation experience which includes an accessible, safe and healthful environment for a diverse population,

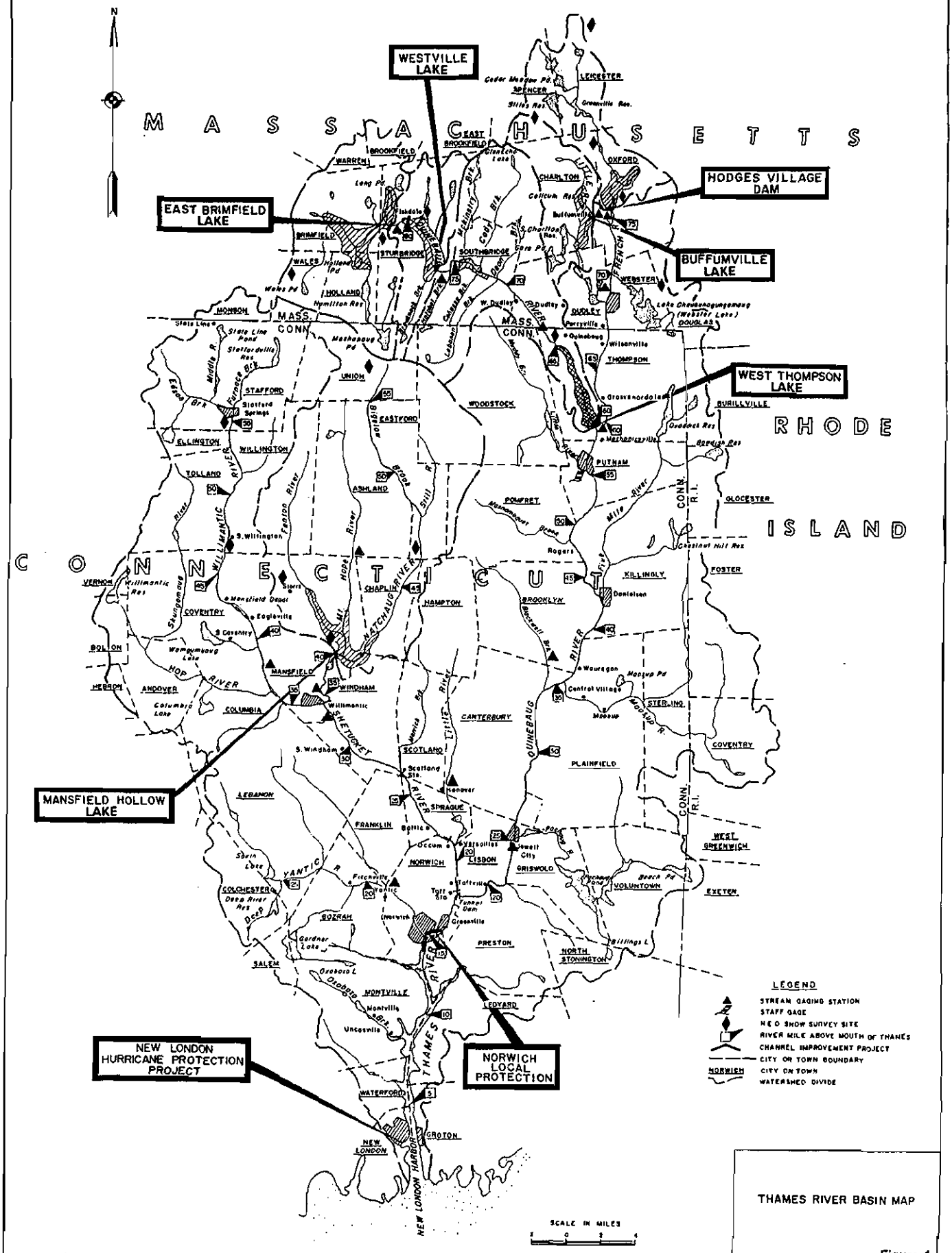
- Increase the level of self sufficiency for the Corps recreation program,

- Provide outdoor recreation opportunities on Corps of Engineers administered land and water on a sustained basis, and

- Optimize the use of leveraged resources to maintain and provide quality public experiences at Corps water resources projects.

1.3 Planning Process

An interdisciplinary study team consisting of staff from the Corps of Engineers, New England District (Engineering/Planning Division and Construction/Operations Division) developed the majority of information contained in the master plan. The team included personnel with expertise in the following disciplines:



THAMES RIVER BASIN MAP

Figure 1

- Planning and engineering
- Environmental resources
- Landscape architecture
- Archaeological and cultural resources
- Forestry

Major inputs to the planning process included natural, cultural, and recreational resource inventories and analysis, projections of future needs, and public desires for use of project lands. This information was integrated into project-wide, and compartmental objectives and goals to provide the best use of the 2,070 acres of Federally owned land at East Brimfield Lake.

Public input was obtained through public notices, coordination with state, regional and local officials, a public meeting held in Brimfield, Massachusetts to present preliminary study results and receive input, and public review of the draft Master Plan.

The Master Plan is a policy document that serves as an overall management guide for the project while specific management actions are included in the Operational Management Plan (OMP). For consistency with the Master Plan, the existing OMP, dated 1994, will be revised to describe, in detail, how the objectives and concepts of the Master Plan will be achieved.

1.4 Reevaluation of the Master Plan

The Master Plan is a flexible planning document that will be periodically reevaluated to be kept current. It will be reviewed on a periodic basis, and will be revised as required. The District Engineer will approve supplements and revisions to the Master Plan.

1.5 Application of Federal Laws

The following laws and regulations provide for the development and management of Federal projects:

1. **Historic Sites, Buildings and Antiquities Act of 1935** (16 U.S.C. 461-467). Known as the Historic Sites Act, this Act declared it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provides for designation, acquisition, administration and protection of such sites. (Additionally, National Historic Landmarks are designated under authority of this Act.)

2. Public Law 78-534 (**The Flood Control Act of 1944**), as amended by the Flood Control Acts of 1946, 1954, 1960 and 1962, authorizes the Corps of Engineers to construct, operate and maintain public park and recreation facilities at water resource development projects, and to permit local interests to construct, operate and maintain such facilities.

3. Public Law 85-624 (**The Fish and Wildlife Coordination Act**) requires that the Corps of Engineers and any agency impounding, diverting, or controlling water, consult with the United States Department of the Interior, Fish and Wildlife Service. The Department of the Interior would evaluate proposed water resources development measures, and determine potential impacts to wildlife resources and measures needed to prevent such impacts.

4. **Reservoir Salvage Act of 1960** (16 U.S.C. 469-469c). This Act is also known as the Archaeological and Historic Data Preservation Act, Archaeological and Historic Preservation Act, "Moss-Bennett Act", and the Archaeological Recovery Act. When enacted in 1960, this law simply authorized the Secretary of the Interior to conduct salvage archaeology in advance of dam and reservoir construction by the Corps of Engineers and other agencies. In 1974, it was amended comprehensively to authorize salvage in connection with all kinds of Federal, Federally assisted, and Federally licensed projects. As amended, it also directs Federal agencies to cooperate with the Department of the Interior in conducting salvage, or to fund such work themselves, and to report to Interior on archaeological programs and any disturbance of archaeological sites.

5. Public Law 86-717 (**Forest Cover Act**, 6 September 1960) provides a statutory mandate for multiple use forest management, or other vegetative cover management, on project lands and waters.

6. Public Law 89-72 (**The Federal Water Project Recreation Act of 1965**), accompanied by House Committee Report No. 254, requires that the Corps of Engineers and other Federal agencies give full consideration to fish and wildlife enhancement. It also provides for non-Federal participation in land acquisition, and in the development and management of recreational facilities and fish and wildlife resources.

7. Public Law 89-665 (**The National Historic Preservation Act of 1966**), as amended in 1992, directs the Corps of Engineers and other Federal agencies to provide leadership in preserving, restoring and maintaining the historic and cultural environment of the Nation.

8. Public Law 91-190 (**The National Environmental Policy Act of 1969**), directs the Corps of Engineers and other Federal agencies to prepare environmental

impact statements or assessments that describe the environmental effects of proposed projects and measures necessary to minimize any adverse effects.

9. Public Law 91-604 (**The Clean Air Act, as amended**), specifies that any Federal activity, which may result in discharge of air pollutants, comply with Federal, state, interstate, and local requirements concerning control and abatement of air pollution.

10. Public Law 03-205 (**The Endangered Species Act of 1973, as amended**), requires Federal agencies to utilize their authorities to carry out programs for conservation of endangered and threatened species protected by the Act.

11. Executive Order 11988 (**Floodplain Management**, 24 May 1977) requires that the Corps of Engineers and other Federal agencies prevent avoidable adverse or incompatible developments in floodplains by assessing proposed actions, considering alternative approaches when adverse effects would result, and formulating designs and project modifications to minimize impacts.

12. Executive Order 11990 (**Protection of Wetlands**, 24 May 1977) requires that all Federal agencies take action to minimize destruction, loss or degradation of wetlands. It stipulates that Federal agencies must avoid providing assistance for new construction located in wetlands unless no practicable alternatives exist, and the proposed action includes measures to minimize harm to wetlands.

13. Public Law 95-217 (**Clean Water Act of 1977, as amended**). Section 404 imposes requirements with respect to dredge and fill activities in waterways of the United States, including wetlands. Any fill activities in wetlands must comply with Section 404(b)(1), Guidelines for the Specification of Disposal Sites for Dredge or Fill Material. These guidelines allow fill activities for only the least environmentally damaging practicable alternative.

14. Public Law 95-341 (**American Indian Religious Freedom Act of 1978-AIRFA**). This act formalizes a policy whereby Federal agencies will preserve the inherent right of American Indians to express and exercise their traditional religion. These rights include access to sites (which may be on Federal lands), use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. The Act requires agencies to consult with Native American groups, but agencies need not accede to Native American requests.

15. Public Law 96-95 (**Archaeological Resources Protection Act of 1979 - ARPA**). This statute provides protection for archaeological resources by requiring any interested parties to apply for a permit from the controlling Federal agency to excavate, or remove any archaeological resource located on public or Indian

lands. The Act also provides for civil and criminal penalties for individuals disturbing or looting sites (including military personnel that allow such actions).

16. Public Law 101-601 (**Native American Graves Protection and Repatriation Act of 1990 - NAGPRA**). This act requires agencies to inventory and repatriate certain Native American cultural items recovered from Federal property to associated Native American groups. These items include human remains, associated funerary objects, sacred objects, and objects of cultural patrimony. The Act describes in detail the items included in these classifications and the procedure for repatriation. The Act also provides for the inadvertent discovery of Native remains and objects. If discovery is related to an activity on Federal land such as construction, logging, agriculture, or other, such activity must cease until proper notification is conducted.

17. **National Register of Historic Places, Nominations by States and Federal Agencies (36 CFR 60)**. These regulations govern the process whereby State and Federal agencies nominate specific resources under their control to the National Register of Historic Places. This is the country's basic inventory of historic resources and it is maintained by the Secretary of the Interior. This inventory includes buildings, structures, objects, sites, districts, and archaeological resources that may be significant at the national, state or local level.

18. **Advisory Council on Historic Preservation, Protection of Historic Properties (36 CFR 800)**. These are the implementing regulations which govern the Section 106 review process established by the National Historic Preservation Act of 1966, as amended for Federal agencies. These regulations implement procedures for assessing the effects of Federally approved, assisted, or funded undertakings on properties which are, or may be eligible for listing on the National Register of Historic Places.

1.6 Corps of Engineers Guidance

The Master Plan has been prepared in accordance with guidance contained in the following Corps regulations, pamphlets, and manual:

ER 1130-2-500	Project Operations, Partners and Support, Work Management Policies
ER 1130-2-540	Environmental Stewardship, Operations and Maintenance Policies
ER 1130-2-550	Recreation, Operations and Maintenance Policies

ER 1165-2-400	Recreation Planning, Development and Management Policies
EP 1130-2-500	Project Operations, Partners and Support, Work Management Guidance and Procedures
EP 1130-2-540	Environmental Stewardship, Operations and Maintenance Guidance and Procedures
EP 1130-2-550	Recreation, Operations and Maintenance Guidance and Procedures
EM 1110-1-400	Recreation Planning and Design Criteria

1.7 Prior Pertinent Reports

The following design memoranda, prepared by the New England Division, Corps of Engineers, provided basic data concerning the project.

Memorandum No.	Title	Date
1	Hydrology	May 1956
2	Hydraulic Design	July 1956
3	Geology and Soils	June 1956
4	General	July 1956
5	Embankment Design	June 1956
6	Structures	July 1956
7	Real Estate Requirements	October 1956
8	Relocations	September 1956
9	Concrete Materials	September 1957
10	Master Plan for Reservoir Development	December 1961

Other New England Division reports that were reviewed and evaluated as part of this recreational master planning effort include the following:

1. "Design Memorandum No. 10, Supplement A, Master Plan for Reservoir Development, Thames River Flood Control, East Brimfield Reservoir, Quinebaug River, Massachusetts", dated February 1968.

2. "Operation and Maintenance Manual, East Brimfield Lake, Sturbridge, Massachusetts", dated June 1972.

3. "Environmental Assessment of the Operation and Maintenance of East Brimfield Lake", dated October 1973.

4. "Master Water Control Manual, Thames River Basin", dated July 1980

5. "Forest Management Plan, Master Plan Appendix B, and Fish and Wildlife Management Plan, Master Plan Appendix D, East Brimfield Lake", dated March 1982.

6. "East Brimfield Lake Water Quality Evaluation", dated January 1983.

7. "East Brimfield Lake Water Quality Evaluation Update", dated September 1984.

8. "Drought Contingency Plan, East Brimfield Lake, Sturbridge, Massachusetts", dated November 1983, and updated in September 1993.

9. "Operational Management Plan, East Brimfield Lake", dated July 1994.

In addition, the following reports provided information on recreation, archaeological, and natural resources in the project area.

- The 1988-92 Massachusetts Statewide Comprehensive Outdoor Recreation Plan, "For Our Common Good", prepared by the Massachusetts Department of Environmental Management.

- "Archaeological Reconnaissance Survey of The East Brimfield Dam and Reservoir in Brimfield, Holland and Sturbridge, Massachusetts", prepared by The Public Archaeology Laboratory, Inc., Providence, Rhode Island, under contract to the New England Division, Corps of Engineers, 1988.

- "Rare or Protected Species and Exemplary Natural Communities Survey, 1996, East Brimfield Lake Property", prepared by the Massachusetts Natural Heritage and Endangered Species Program, under contract to the New England District , Corps of Engineers

2. PROJECT DESCRIPTION

2.1 Location

The East Brimfield Lake project is located along the upper reaches of the Quinebaug River in south central Massachusetts. The Quinebaug River, which originates at Hamilton Reservoir, has a drainage area of about 744 square miles. From its origin, the river flows in a general southerly direction to its confluence with the Shetucket River about three miles north of Norwich, Connecticut. East Brimfield Dam is located on the Quinebaug River about one mile west of the village of Fiskdale in the town of Sturbridge, Worcester County, Massachusetts. Portions of the reservoir, or flood impoundment area, are located within the communities of Brimfield, Holland and Sturbridge. The location of the project and its reservoir area are shown on Plate 1.

Land use adjacent to the project area is primarily residential with some light industry. A small area used for agriculture is located adjacent to the project area. Commercial and industrial development can be found east of the project in Sturbridge along Route 20, which includes the Sturbridge Village tourist attraction.

2.2 Project Data

East Brimfield Dam is a rolled earth fill and rock embankment with an overall length of 520 feet. The dam has a top elevation of 672.2 feet National Geodetic Vertical Datum (NGVD) and a maximum height of 55 feet. An emergency chute type spillway with a low overflow weir is located at the right abutment of the dam. The spillway has a crest elevation of 653 feet NGVD and a length of 75 feet. The outlet works at the dam consist of a 10'-6" horseshoe-shaped conduit about 210 feet long and control tower located near the right abutment of the dam. Two 6'-3" by 11'-0" electrically operated sluice gates, with invert elevations at 619 feet NGVD, control flow through this conduit. The discharge capacity of the outlet works at spillway crest elevation is 3,300 cubic feet per second (cfs). A permanent weir, with a crest elevation of 632 feet NGVD, is located upstream from the intake to the outlet works. Two 24-inch gates at this structure can be used to make necessary releases from the permanent pool. Daily project operations are conducted from a project office, maintenance garage and other facilities located near the dam.

At spillway crest elevation, the East Brimfield Reservoir has a total storage capacity of 32,220 acre-feet. The majority of this capacity, 29,900 acre-feet, is allocated to flood control operations. This is equivalent to 8.3 inches of runoff from the contributing drainage area of 67.5 square miles. At spillway crest elevation, the reservoir would have a water surface area of 2,270 acres and extend upstream about 5.5 miles. A permanent pool with a surface area of 360 acres and a surface elevation of 632 feet NGVD is maintained at the project. The project was completed in 1960 at a total cost of about $7,020,000. Through May 1, 1998, the facility has prevented approximately $45,000,000 in flood damages. Additional pertinent data concerning the project is contained in Table 1.

Table 1

Pertinent Data
East Brimfield Lake

Location: Quinebaug River; Brimfield, Holland and Sturbridge, Massachusetts

Drainage Area: 67.5 Square Miles

Storage Uses: Flood Control, Recreation, Industrial Water Supply

Reservoir Storage:

Pool	Elevation (NGVD)	Area (acres)	Cumulative Capacity (acre-feet)
Invert	619.0	---	---
Permanent	628.0	260	1,130
Conservation	632.0	360	2,320
Flood Control (Spillway Crest)	653.0	2,270	32,220

Dam:

Type:	Rolled earth with rock slope protection
Maximum Height(ft):	55
Length(ft):	520
Top Elevation(NGVD):	672.2

Spillway:

Location:	Right (south) abutment of dam
Type:	Concrete chute, ogee crest
Crest Length(ft):	75
Crest Elevation(NGVD):	653.0
Maximum Discharge Capacity(cfs):	15,520

Outlet:

Type:	Horseshoe conduit
Size:	10'-6" diameter
Length(ft):	210
Gates:	(2) service 6'-3" wide by 11'-0" high slide, (2) weir 24" by 24"
Discharge at Spillway Crest(cfs):	3,300
Stilling Basin:	None (outlet channel training dike)

TABLE 1 (continued)

Pertinent Data
East Brimfield Lake

Land Acquisition:	
Fee (acres):	2,070
Easement (acres):	646
Cost of Construction:	
Federal:	
construction:	$1,337,043
real estate acquisition:	$5,720,000
Non-Federal:	0
TOTAL:	$7,057,043

Reservoir Management: Reservoir management has proceeded in accordance with the basic project document; Design Memorandum Number 10, Supplement A, Master Plan for Reservoir Development, dated February 1968. The overall project is maintained by the New England Division, Corps of Engineers. Streeter State Beach and Lake Siog Park (Holland Pond Recreation Area) are operated and maintained by the Commonwealth of Massachusetts and the Town of Holland respectively under lease agreements.

The East Brimfield project is staffed by a Project Manager and two Rangers who perform continual operation and maintenance, and administration of leases at East Brimfield Lake, Westville Lake, and Conant Brook Dam. An additional Ranger is usually hired for three months during the summer. In addition to their primary flood control duties, project staff are also responsible for implementation of the Master Plan through the Operational Management Plan, visitor assistance, interpretive services, recreation, and natural resource management.

2.3 Real Estate and Land Use

All lands at East Brimfield Lake were acquired for flood control operations at the project. This included areas for permanent structures, construction, borrow, highway relocation and the reservoir. At the present time about 2,070 acres are owned in fee and permanent flowage easements are maintained over an additional 646 acres. Since these lands were purchased for flood control and their primary purpose continues to be for flood control, all lands at the project are allocated to the operations category.

There are several outgrants for recreational use of the project lands. These include: A 5-year lease (expires July 1998) to the town of Holland for 52 acres at Holland Pond (Lake Siog) which they operate as a public park; a 5-year lease (renewed in April 1996) to the Commonwealth of Massachusetts, Department of Environmental Management, for 4.5 acres at the Streeter State Beach Recreational Area; a 5-year lease (renewed in May 1997) to the Springfield Boys Club for 42 acres for outdoor sports activities near Mill Brook; and a 5-year lease (initiated in September 1997) to the Springfield Girls Club for 3 acres at Holland Pond that is used for recreational activities. Other outgrants total about 11.57 acres, and are primarily for roadway rights-of-way. There are no agricultural or grazing outgrants at the project.

The majority of long-term outgrants are easements for roadways within the reservoir area. These roadway easements have been issued to the Commonwealth of Massachusetts, Worcester County, and the towns of Brimfield, Holland and Sturbridge, and total about 11.57 acres. The majority of short-term (5-year) outgrants concern use of project lands for recreational purposes. General information concerning recreational leases is shown in the following list:

Lessee	Purpose(Use)	Acreage
Commonwealth of Massachusetts	Streeter State Park	4.5 acres
Town of Holland	Lake Siog Park	52 acres
Springfield Boys Club	Outdoor Sports Activities	42 acres
Springfield Girls Club	Outdoor Sports Activities	3 acres
Outdoor Recreation, Inc.	Quinebaug Cove Campsite	1200 sq. ft.

2.4 Relationship of the Project to Other Projects and Programs

As stated in Section I, the project's primary purpose is to provide flood protection to the downstream communities of Sturbridge and Southbridge, and, in conjunction with the other five flood control impoundments in the Thames River Basin, to reduce flood flows in communities farther downstream. During flood periods, the Reservoir Control Center (RCC) at New England District headquarters in Concord, Massachusetts coordinates operation of these six projects. Due to their close proximity, East Brimfield Lake and Westville Lake are operated in tandem during most flood events. Their operation is coordinated with the other

the Thames River basin. Regulation is initiated as a result of heavy rainfall over the Quinebaug River watershed, and also for specific river stages at key locations along the Quinebaug River. Reservoir regulation is normally conducted in three phases: phase I involves the initial appraisal of storm and river conditions that leads to regulation of flows; phase II concerns regulation during the event as floodflows crest and move downstream; and phase III includes emptying of the reservoir following recession of the flood.

Personnel at East Brimfield Lake are also responsible for operation and maintenance activities at Conant Brook Dam. Although Conant Brook Dam is self-regulating during flood events, resources for daily management of the project must be shared with East Brimfield Lake.

As discussed in the previous section, there are several leases for use of reservoir property. Water-based recreational needs are provided by the Commonwealth of Massachusetts, Department of Environmental Management at Streeter State Park, and by the Town of Holland at Lake Siog Park. Agreements with the Springfield Girl Club, Springfield Boys Club and the Quinebaug Cove Campground also provide recreational use of project lands.

A portion of the permanent pool at East Brimfield Lake can also be used by the American Optical Company in Southbridge, Massachusetts. Under a contract between this Company and the U.S. Government, approximately 1,140 acre-feet of storage in the conservation pool, between stages 9 and 13 feet, are available for use by the Company for regulating the flow for industrial water supply. The permanent pool elevation at the project is 632.0 feet N.G.V.D., which is at a stage of 13 feet. Low flow releases from the project will only be made at the request of American Optical Company and are subject to the following conditions:

- Water for this purpose will be released only during the period 30 June through 31 December.

- Reservoir levels shall not be drawn below stage 12 (631 feet N.G.V.D.) before 1 August, below stage 11 (630 feet N.G.V.D.) before Labor Day or below stage 9 (628 feet N.V.G.D.) after Labor Day.

- Reservoir level shall not be lowered more than six inches in any one week.

- No regulation will be permitted which, in the opinion of the Government, infringes on downstream water rights or might contribute to downstream flooding.

- Variation in the regulation procedures will be permitted only as approved by the Government.

2.5 Significant Flood Control Storages

The normal permanent pool stage at East Brimfield Lake is 13 feet (632 feet N.G.V.D.). This pool stage is maintained throughout the year under normal conditions. A pool stage of 16.5 feet (3.5 feet above the normal permanent pool level) represents the start of significant storage. Flood waters stored at this level utilize approximately 6 percent of the 30,000 acre-feet of total flood control storage available at spillway crest elevation 653.0 feet N.V.G.D. (stage of 34 feet). Since being placed in operation in 1960, the pool stage has exceeded 16.5 feet on 33 occasions, with the ten highest recorded pool levels as follows:

Date	Pool Stage (feet)	Percent of Storage Utilized
June 1984	26.1	47
April 1987	26.0	47
June 1982	24.2	37
March 1968	23.8	35
April 1993	23.4	33
April 1983	22.7	30
January 1979	22.4	29
April 1996	22.0	26
January 1996	21.7	25
March 1979	20.7	21

The remaining 23 significant storage events used from 6 to 20 percent of available flood storage, and resulted in pool stages that ranged from 16.5 to 20.5 feet.

2.6 History

2.6.1 Prehistoric Period

Prehistoric settlement and land use patterns of the East Brimfield section of the upper Quinebaug River drainage appeared to be similar to those found in the nearby Quaboag drainage. Upper sections of both drainages may have been parts of the same settlement system during some time periods. The first regular use of site locations (riverine floodplain or pond) that later became established base camps probably began in the Middle Archaic period after about 7,500 years ago by ancestors of the historic Nipmuck tribe. The upper Quaboag River appears to have been more intensively occupied during the Late Archaic or Terminal Archaic/Early Woodland periods (4,000-2,500 years ago) in riverine/pond and upland settings. Archaeological resources range from large base camps to small scale camps and workshops. Holland Pond is the site of a large multicomponent Archaic and Woodland period base camp expected to have a maximum density of at least several thousand square meters and contain relatively dense deposits of cultural material.

2.6.2 Historic Period

The town of Brimfield, Massachusetts was settled in the early eighteenth century. Small businesses, home industries, and limited industrialization supplemented a primarily agrarian economy. The town's population peaked in 1820 then declined until 1980 when it began to increase gradually. Brimfield remained an agriculturally based economy throughout the industrial period, due primarily to the lack of adequate water power sites. Today, Brimfield is a residential community with tourism as one of the largest industries due to its world famous flea market.

The town of Holland was settled during the mid-eighteenth century. Crop production and cattle and sheep grazing occurred in the river bottomlands and adjacent hills. Industrial development was minor because of the lack of suitable water power sites. The population peaked in the early nineteenth century then declined until 1940 when it began to increase. It remains primarily a residential community today. The shores of Holland Pond and Lost Lake were developed with summer cottages and year round residences. These were all either removed prior to or demolished after Government acquisition.

Sturbridge was the site of European activity as early as the mid-seventeenth century with the excavations at John Winthrop's Tantiusques leadmine. Permanent settlement, focussing on agriculture including dairying, sheep raising, and orcharding began in the eighteenth century. Three sites in Sturbridge experienced large scale water powered industrial development. Otherwise the town remained predominately agricultural throughout most of its history with diverse small scale mill industries. Today the town is predominately residential with tourism a major industry due to Old Sturbridge Village, a re-created nineteenth century village museum.

2.7 Climate

The Thames River Basin, which includes the Quinebaug River sub-basin, has a variable climate characterized by frequent but short periods of heavy precipitation. The basin lies in the path of the "prevailing westerlies" and cyclonic disturbances that cross the country from west to east or southwest to northeast. These types of storms occur at fairly regular intervals. The area also experiences two types of coastal storms; tropical hurricanes and non-tropical storms. Hurricanes normally occur in August and September and can cause significant damage and flooding. Non-tropical coastal storms develop along the east coast usually in the fall through spring months, and may contain large amounts of precipitation. Thunderstorms also occur during the summer months, and are normally of short but intense duration.

The average annual precipitation over the Thames River Basin is about 44 inches, and in the vicinity of East Brimfield Lake and upland areas, about 48 inches. This precipitation is distributed fairly uniformly throughout the year. Annual snowfall in the basin varies from

about 30 inches in the southern portion to more than 50 inches at the higher elevations in Massachusetts.

The mean annual temperature of the basin is about 48 degrees F., varying from 50 degrees F. near the coast to 46 degrees F. in the northern areas. Average monthly temperatures range from highs of 68-72 degrees F. in July and August to 25-30 degrees F. in January and February. Occasional extremes in temperature range from the upper 90's to lows of minus ten or lower. Freezing temperatures may be expected from the latter part of October until late in April.

2.8 Topography

The East Brimfield project is located in the northward continuation of the eastern upland area of Connecticut. The topography in the project area is hilly, but relief is moderate, being about 300 feet. Small lakes or ponds and poorly drained marshy areas are common in the valley. The hills and valleys are oriented northeastward, and are more or less parallel to the strike of the underlying bedrock formations and the direction of ice movement during continental glaciation.

The Quinebaug River valley is a partly filled pre-glacial valley. At the dam site, the valley is a narrow gap or notch situated between a bedrock hill on the right and a glacial till hill on the left. The valley widens upstream of the damsite and is between 1,000 and 2,000 feet wide in many areas.

2.9 Project Access

Access to East Brimfield Dam and overlook, the administrative area, Streeter State Beach, and other facilities is provided by State Route 20 which cuts through the reservoir area in an east-west direction. As shown on Plate 2, this roadway is easily reached from Interstate 90 (MassPike) or Interstate 86. Numerous paved town roads adjacent to the project, and several dirt roads within the reservoir area provide access to other project areas.

3. RESOURCE INVENTORIES AND ANALYSIS

3.1 Introduction

The environmental resources of the East Brimfield Lake project provide important and valuable natural resource and recreational opportunities. The project maintains a wide variety of fish and wildlife resources, and provides popular recreational facilities for the surrounding areas. Fish and wildlife management and forestry management programs are carried out on project lands. Recreational activities include swimming, picnicking, boating, hunting, fishing and hiking.

The project area consists of a total of 2716 acres, of which 2070 are owned in fee, and 646 acres are in flowage easement. All lands at the project are under the jurisdiction of the Corps of Engineers. Of the 2070 acres, 57 percent (1189 acres) are forested (482 acres of which are forested wetlands), 35 percent (734 acres) are non-forested wetlands (for a total of 1216 acres of wetlands), and 1 percent (28 acres) is open area. The remainder of the project area consists of developed areas that are outgranted primarily for recreational use, and roadway rights-of-way.

3.2 Natural Resources

3.2.1 Geology and Soils

The project area, which is situated in both Hampden and Worcester Counties, was subject to glaciation during the Ice Age or Pleistocene Epoch beginning about one million years ago. Glaciation rounded and smoothed the bedrock, hills and ridges of the area, and covered them with a thin layer of till. The principle evidence of the Late Wisconsin glacial period is stratified and unstratified drift. Within the reservoir area, bedrock is composed of metamorphic rocks that range in age from pre-Cambrian to Pennsylvanian. They include gneiss, schist, quartzite and phyllite. All have been folded, and the trend of the folds is in a north-south to a northeast-southwest direction.

Detailed soils data for the project area was obtained from two U.S.D.A. soil surveys: "Soil Survey of Hampden and Hampshire Counties, Massachusetts, Eastern Part, 1989", prepared by the Soil Conservation Service, and an "Interim Soil Survey Report, Worcester County, Southern Part", prepared by the Worcester County Conservation Districts in cooperation with the Soil Conservation Service. Information contained in these reports has been consolidated onto one project map which is included in Appendix E as Figure E-1. Table E-I in Appendix E provides a key for the soil types shown on this map. A review of this data determined that soil types in the reservoir area are quite varied. Low areas along the Quinebaug River and its tributaries consist primarily of Freetown muck with areas of Swansea muck, Deerfield loamy fine sand, and Walpole fine sandy loam. Soils in sloping areas include Hinckley and Windsor loamy sands, Merrimac sandy loam, and Paxton and Sudbury fine sandy loams. There are also several areas of Brookfield and Brimfield soils with rock

outcrops on hills and ridges within the project area. Data concerning the suitability of soils at the project for recreational development and roadways is shown on Table E-2 in Appendix E.

3.2.2 Surface Waters and Wetlands

Water resources at the project include Holland Pond, the Quinebaug River between Holland Pond, the permanent pool, which includes Long Pond, Lost Lake, Green Pond, Pork Barrel Pond, and Mill Brook (See Plate 3). Lost Lake is classified as a "Great Pond" by the Commonwealth of Massachusetts. It was not acquired by the government, and is owned by the state. The Quinebaug River originates at Hamilton Reservoir to the west of the project, and is approximately two miles long between Hamilton Reservoir and Holland Pond (Lake Siog). From Holland Pond (Lake Siog), the river flows in a general northeasterly direction and discharges to the west end of the permanent pool at East Brimfield Road. Mill Brook originates north of the project and flows south approximately 3 miles to its confluence with the Quinebaug River within the reservoir area. Long Pond originates from the north of the project and primarily consists of discharges from Ayer Brook and Big Alum Lake. Long Pond is part of the permanent pool and it joins the rest of the permanent pool at Route 20. The water levels of the permanent pool (including Long Pond) are maintained at elevation 632 N.G.V.D. which has resulted in a natural shoreline environment with relatively little evidence of pool fluctuation. This stable shoreline provides good habitat for vegetation, and fish and wildlife. A detailed description of the limnological characteristics of the water resources of the project can be found in "General Limnological Survey of the East Brimfield Project/Lake" by Peter J. Trinchero, New England Division, Corps of Engineers, dated 1981.

Many wetland areas are located within the East Brimfield project area. Approximately 1,216 acres of wetlands are found throughout the project and comprise 58 percent of the land area. The wetlands in the East Brimfield project area provide important functions and values. The wetlands provide flood storage capabilities, as well as filtering of any pollutants with improvement of water quality conditions. They provide recharge areas for any groundwater supplies. Wetland areas directly associated with the river can provide important nursery areas for fish. They provide important habitat for birds, reptiles, amphibians, and many species of mammals. Recreational opportunities are provided through passive activities such as bird watching, canoeing, and overall aesthetic enjoyment of these areas.

Wetlands were classified in 1997 under a modification of the Cowardin et. al. classification system[1], as follows:

- Palustrine - all non-tidal wetlands dominated by trees, shrubs, and persistent emergent herbaceous plants

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Cowardin, L., Carter, V. and E. LaRoe, "Classification of the Wetlands and Deepwater Habitats of the United States", Fish and Wildlife Service, U.S. Dept. of Interior, FWS/OBS-79/31, Dec, 1979

- Lacustrine - generally areas of open water greater than 20 acres or more than 6.6 feet in depth

- Riverine - generally all wetlands and deepwater habitats contained within a channel

The palustrine wetland acreages determined from this examination are:

Open water, less than 20 acres	0.1 acres
Aquatic bed vegetation, rooted vascular	34.0 acres
Aquatic bed, floating vascular	0.8 acres
Emergent vegetation, persistent	176.3 acres
Emergent vegetation, nonpersistent	2.5 acres
Moss wetland	1.4 acres
Shrub/scrub broad-leaved deciduous	137.1 acres
Forested broad-leaved deciduous	425.0 acres
Forested needle-leaved deciduous	4.3 acres
Forested needle-leaved evergreen	52.4 acres
Total	833.9 acres

Lacustrine system habitat totals 357 acres, which are located within the permanent pool, Long Pond, and Holland Pond. The narrow, shallow areas of the Quinebaug River were classified as riverine, and encompass 25.5 acres. Figures B-1 to B-5 in Appendix B show the delineation and classification of wetland areas.

Since East Brimfield Lake is a large project with irregular boundaries and extensive wetlands, the results of the 1997 study were presented by project compartment (see Plate 3). The following is a brief description of various wetland areas within the project:

- The Quinebaug River above Holland Pond is a riverine, lower perennial stream, which is well channelized. The slope of the river flattens near the inflow to Holland Pond and flows through palustrine forested and palustrine scrub/shrub wetlands.

- Emergent vegetation in Holland Pond consists of pickerel weed, arrowhead, willow, rush and sedges. Submergent vegetation consists of water milfoil and coontail.

- The section of the Quinebaug River from Holland Pond to the conservation pool is a slow moving stream passing through emergent, scrub/shrub and forested wetland.

- Mill Brook, which flows into the Quinebaug River from the northwest, is primarily palustrine forested wetland.

• Inflow to Long Pond is from Ayer Brook and Big Alum Pond which have contributed silt and organic matter. There is substantial emergent and submergent vegetation in the pond.

• The conservation pool also contains substantial submergent vegetation, with large areas of Eurasian water-milfoil (*Myriophyllum spicatum*), a nuisance aquatic species.

The large amount of aquatic vegetation that is present in the permanent pool is choking portions of the pond. The primary species impacting the area is Eurasian water-milfoil, although coontail (*Ceratophyllum*) and spatterdock (*Nuphar variegatum*) have also been identified. The shallow (4 feet or less) and warmwater characteristics of the pool provide ideal conditions for proliferation of these aquatic weeds. Swimming, canoeing, boating and fishing have been adversely affected by the presence of this vegetation.

Typical methods for control or removal of nuisance aquatic vegetation include mechanical harvesting, chemical treatment, and biological control. The method chosen depends on the extent of the problem, type of vegetation present, limnological characteristics of the waterbody, and available funding. Mechanical harvesting could be very costly, and a "one time" harvesting may not eradicate the weeds. Chemical treatment may have to be done over several seasons to be effective, and biological control must be geared toward specific species.

3.2.3 Vegetative Cover

3.2.3.1 Forest lands

East Brimfield is located in the southeastern portion of the northern forest region. Approximately 57 percent, or 1,189 acres of the 2,070 acres owned in fee are forested. Typical forest species found in the project area include aspen (*Populus tremuloides*), grey birch (*Betula populifolia*), white pine (*Pinus strobus*), hemlock (*Tsuga canadensis*), black ash (*Fraxinus nigra*), red maple (*Acer rubrum*), and northern red oak (*Quercus rubra*). Alder, black willow, flowering dogwood, viburnum and other species make up the understory and brushy cover in the flat bottom lands.

East Brimfield is located in the southeastern part of the Northern Forest Region just above the Central Forest Region. Approximately 57% or 1189 acres of the 2070 acres owned in fee are forested. The forest cover is in the 40 - 60 year age class and most stands are even aged. The crown closure averages 100% in pole and sawlog size stands. Due to the large amount of competing undesirable growing stock and cull trees, acceptable growing stock is low to moderate. During the 1960's, artificial reforestation was conducted, primarily with conifers, to help natural regeneration in the borrow area east of the project office and dam (OMP, 1994). A discussion of forest species associated with wetland habitats is included in the "Surface Waters and Wetlands" section. Figures B-1 through B-5 in Appendix B show the wetland areas (1,216 acres) for the project.

The 1994 Corps of Engineers forest inventory of the East Brimfield Lake project divided the project area into the seven compartments (see Plate 3) that were also used for the current wetland surveys. These compartments and their acreages are shown in the following tabulation:

1.	Conservation Pool	294 acres
2.	Long Pond	302 acres
3.	Holland Pond	199 acres
4.	Lost Lake	362 acres
5.	Five Bridge Road	377 acres
6.	Morse Road	266 acres
7.	Mill Brook	271 acres

The inventory determined the acreage of the various forest types within a compartment, size, average dbh (diameter, basal height), stocking rating, basal area, and age class. The acreages of the forest cover types by compartment are shown in the following tabulation. Compartment maps showing these forest cover types are also include in Appendix D as Figures D-1 to D-7.

FOREST COVER TYPES BY COMPARTMENT

Conservation Pool (294 acres)

White pine/oak	16 acres
Grey birch/red maple	12 acres
Poplar	15 acres
Mixed oak	26 acres

Long Pond Compartment (302 acres)

White pine/oak	69 acres
White pine/hemlock	12 acres
White pine	14 acres

Holland Pond Compartment (199 acres)

White pine	43 acres
Red maple	17 acres
White pine/hardwood	33 acres

Lost Lake Compartment (362 acres)

Poplar	11 acres
White pine/oak	33 acres
White pine/hardwood	45 acres

Five Bridge Road Compartment (377 acres)

Poplar	25 acres
Mixed Oak	18 acres
White Pine/hemlock	82 acres
White Pine/hardwood	78 acres

Morse Road Compartment (266 acres)

White pine/hemlock	49 acres
White pine/oak	12 acres
White pine	40 acres

Mill Brook Compartment (271 acres)

White pine/hemlock	64 acres
White pine/oak	61 acres
White pine	45 acres

The total acreages of the forest cover types for the project area are shown below. As can be seen from the table, white pine/hemlock, white pine/oak, white pine/hardwood, and white pine are the dominant forest cover types at East Brimfield Lake.

FOREST COVER TYPES - PROJECT AREA

White pine/hemlock	207 acres
White pine/oak	191 acres
White pine/hardwood	156 acres
White pine	142 acres
Poplar	51 acres
Mixed oak	44 acres
Red maple	17 acres
Grey birch/red maple	12 acres

The overall quality of the forestry growing stock is fair to medium (CE, 1994). Timber stand improvement practices (weeding, thinning and pruning) should be carried out to improve the overall quality of forest stands. Harvesting practices will improve the health of the forest, while also benefiting wildlife, improving aesthetics for passive recreational users of the area, and improve the quality of the forest products for commercial uses. The forest management program should also include practices for wildlife habitat improvement, including limiting fragmentation of the forest. The forest should be managed for a variety of age classes of trees to insure continuous supplies of food and shelter for wildlife.

The majority of the forest contains early successional species, and is generally 40-60 years in age. Over time, the white pine, popular, and red maple will be naturally replaced by later successional species. The biodiversity and aesthetic values of the older portions of the forest should be considered in future forest management activities.

3.2.3.2 Open Lands (Grass and Old Fields)

Open areas make up approximately 28 acres or 1 percent of the project area. These areas are mowed at various intervals (weekly, monthly or semi-annually) during the year. All of the abandoned fields are gradually reverting to forest. Open grass areas provide a much needed diversity of habitat for wildlife both on the project and the region. Old fields should be maintained in early successional growth through the mowing program, or through new agricultural leases which would also provide open areas. Openings for edge species should occur near existing disturbances, and not disrupt larger tracts of forest.

The Massachusetts Division of Fish and Wildlife has developed a mission statement that discusses the needs for early successional vegetation while not fragmenting older forest. Upland wildlife management program goals, and other recommendations for managing open lands are discussed in a letter from the Massachusetts Division of Fish and Wildlife, dated October 30, 1997 (see Appendix A, Pertinent Correspondence).

3.2.3.3 Developed Areas

Developed areas at East Brimfield include those areas associated with flood control structures, recreational facilities and administration areas. The major structural components were described in Section 2, Project Description. The developed recreational facilities include comfort stations, picnic tables, shelters, and boat ramps at the various day use areas in the project area. A more detailed description of the recreational facilities is included in this section under Recreational Resources. The administration facilities, located adjacent to the dam, consist of three small buildings, a project office, utility building, storage building, and a small parking lot.

3.2.3.4 Exemplary Natural Communities

The 1996 Massachusetts Natural Heritage and Endangered Species Program (NHESP) survey noted several areas of local importance and uniqueness. These include a hemlock ravine, hemlock forest, an acidic peatland, a *Calamagrostis canadensis* (blue-joint) marsh and associated red maple swamps, and beaver meadows. The NHESP considered the extensive wetland mosaic which covers the majority of the surveyed area to be unique. The NHESP also noted that the areas surveyed are free from invasive species such as purple loosestrife, buckthorn, and honeysuckle which make the area a significant natural resource. A brief description of these areas is provided below.

Hemlock ravine and forest. The ravine is located in the center of an upland area south of Route 20, north of Five Bridge Road in the center of the project. A 100-foot high, 500-foot long, east facing cliff includes a 25-50 foot granite face with a talus slope below. The NHESP noted that the vegetative community located here is unique to the area. Beech, yellow birch and red oak are found along the slope, and the surrounding area is an extensive hemlock forest. This is one of the few large hemlock communities in the area and the only one located on East Brimfield Lake property.

Wetland areas and beaver meadows. A wetland area north of the Massachusetts Turnpike contains a mosaic of several wetland types, with a large diversity of species resulting from recent beaver activity. Species include patches of willow, alder, and arrowhead interspersed with a diversity of forbs and graminoids. The area opens into an extensive *Calamagrostis canadensis* (blue-joint) and *Carex stricta* (tussock sedge) marsh.

Acidic peatland ("floating bog"). An acidic peatland ("floating bog") is located on the east side of East Brimfield Road. This peatland is a good example of a small, mineral enriched peatland, and consists of a quaking mat of spagnum with denser low hummock areas supporting red maple, white pine and gray birch (sapling size), with spiraea, goldenrod, and wool grass. Other species include arrowhead, sundew, water lily. and pond weeds. Blueberries and cranberries are also found.

A deep water marsh with large stands of cattails interspersed by open water can be found south of Holland Pond (Lake Siog), including the presence of an old beaver dam in this area, as well as at the outlet of the pond.

The Quinebaug River from Holland Pond to the lower reservoir contains a mosaic of various wetland types: mixed shrub swamps, red maple, floating aquatics such as pickerel-weed, water smartweeds, white water-lilies, and yellow pond lilies. Mats of Eurasian water-milfoil (*Myriophyllum spicatum*) and bladderwort are also common. The widest area, after Mill Brook merges with the river, is dominated by *Calamagrostis* (blue-joint), with a large stand of cattails and a large area of *Phragmites australis* (reedgrass). The ponds in the project area have limited diversity, containing areas of red maples, shrub thickets, and floating aquatics.

Analysis of these resources indicate that the following areas of exemplary natural communities should be preserved and protected:

- Hemlock ravine and forest north of Five Bridge Road.
- Unique wetland/upland area north of the Massachusetts Turnpike.
- Acidic peatland ("floating bog") on the east side of East Brimfield Road.
- Deep water marsh and cattail stands on the south side of Holland Pond (Lake Siog).

3.2.4 Wildlife

Wildlife species that can be found in the project area include muskrats, minks, otters, beaver, woodchucks, red foxes, coyote, raccoons, squirrels, chipmunks, rabbits and whitetail deer. A variety of songbirds, black ducks, wood ducks, Canada geese, mergansers, teal, mallards, ruffed grouse, woodcock and wild turkey also occur in the project area. A wide variety of amphibians and reptiles are also found, including various salamanders, frogs, toads, turtles and snakes. Tables C-1 through C-3 in Appendix C list wildlife species which are likely to occur in the project area.

The Massachusetts Division of Fisheries and Wildlife, Connecticut Valley Wildlife District Office, stocks pheasants within the reservoir area off of Five-Mile Bridge and Morse Roads. Approximately 20 - 24 pheasants are released four times during the hunting season from the middle of October through the end of November.

The majority of the wildlife habitat improvement practices at the East Brimfield project area are carried out under the forest management program. The forest is managed to insure food and shelter for wildlife by improving the amount, quality and distribution of food

and cover. Management of a combination of open areas, seedlings, saplings, brush and mature forest provides for distribution of cover types to meet wildlife needs.

Open fields in primary succession stage provide a diversity of habitats for wildlife, as well as contributing to the project's aesthetics and overall environmental quality. There is a need for open grassland in the New England area as many potential open space zones are being lost to woody growth. Existing open areas can be maintained through mowing, and also can be acquired through new agricultural leases. Agricultural areas are important for setting back plant succession and maintaining a variety of interspersed wildlife habitats. Any abandoned fields can be opened through mechanical brush removal and controlled burning. Travel lanes for wildlife can be provided through hedgerows of native plant species which also intersperse cover and food plots. A small percentage of crops is required to remain for the benefit of wildlife. Any fields formerly cleared for agriculture can be used for the cultivation of hay and other crops. There are currently no agricultural leases at the East Brimfield project. Edge habitat needs of some species are also met by the naturally occurring openings along streams, rivers, wetlands, and roadways.

3.2.5 Fish

East Brimfield supports a variety of aquatic habitats, including deep and shallow ponds, wetlands, and the Quinebaug River.

The ponds at the East Brimfield project and the deeper areas of the Quinebaug River support typical warm water fish species. Fish species found in the Quinebaug River include: longnose dace (*Rhinichthys cataractae*), brown bullhead (*Ictalurus nebulosus)*, largemouth bass (*Micropterus salmoides)*, redbreast sunfish (*Lepomis aureitus)*, golden shiner (*Notemigonus crysoleucas)*, Johnny darter (*Etheostoma nigrum)*, and bluegill (*Lepomis macrochirus)* (OMP, 1994). The area also supports a population of crayfish (*Oronectes)*.

The warmwater fish species known to occur in Holland Pond include: bluegill (*Lepomis macrochirus*), white perch (*Morone americanus*), pumpkinseed (*Lepomis gibbosus*), chain pickerel (*Esox niger*), largemouth bass (*Micropterous salmoides*), yellow perch (*Perca flavescens*), yellow bullhead (*Icktalurus natalis*), golden shiner (*Notemigonus crysoleucas*), bridle shiner (*Notropis bifrenatus*), spot-tailed shiner (*Notropis hudsonius*), alewife (*Alsoa pseudohargenus*), red breast sunfish (*Lepomis auritus*), northern pike (*Esox lucius*), brown bullhead (*Ictalurus nebulosa*), white sucker (*Catastomus commersoni*), black crappie (*Pomoxis nigromaculatus*), and creek chubsucker (*Erimyzon oblongus*) (OMP, 1994).

The shallower, faster flowing areas of the Quinebaug River are periodically stocked with trout and northern pike by the Massachusetts Division of Fish and Wildlife, and receive heavy fishing pressure. Also, several bass tournaments are held each year at the project.

Water level fluctuations periodically occur due to reservoir regulations for flood control purposes. However, these fluctuations are usually short-term, and do not pose

significant disruption to aquatic life. Fluctuations can control macrophyte populations. Flooding during the spring spawning season could leave eggs exposed or left in too shallow water once drawdown occurs. Water level fluctuations can also effect freshwater mussels if the water level is too low or flows are very silt laden. Current management practices have kept the mussel species present in the river.

The Massachusetts Division of Fisheries and Wildlife have informally managed the fishery resources at East Brimfield since 1988 (OMP, 1994). Water quality conditions are suitable for the propagation of the fishery. The put and take stocking of trout by the state will continue as the primary means of fishery management. Excessive growth of the aquatic weed, Eurasian water milfoil (*Myriophyllum spicatum*), is a problem in the reservoir, impacting productivity of the fishery resource and recreation activities. Management techniques should be implemented to control the growth of the milfoil through chemical, biological or mechanical methods.

3.2.6 Rare, Threatened and Endangered Species

The Massachusetts Natural Heritage and Endangered Species Program (NHESP) inventoried the East Brimfield property in 1996 for moths, butterflies, dragonflies, freshwater mussels, reptiles, amphibians, birds, vascular plants and exemplary plant communities. No state or federally listed species of moths, butterflies, amphibians, birds, or plants were found at the property during the surveys. However, relatively large populations of two species of freshwater mussels, several individuals of two species of turtles, and a species of water shrew that are listed as rare in Massachusetts were found. These species are ranked by the state as species of Special Concern (SC). These species are:

Triangle Floater	*Alasmidonta undulata*
Sqawfoot	*Strophitus undulatus*
Spotted Turtle	*Clemmys guttata*
Wood Turtle	*Clemmys insulpta*
Water Shrew	*Sorex palustris*

The wood turtle population appears to be a large, core population, likely an important source of turtles throughout the wetlands surrounding the project. The NHESP also noted the presence of the secretive shorebird, the Sora (*Poizzana carolina)* as a species of particular interest (it is not listed as rare, however).

3.2.7 Water Quality

The Quinebaug River and its tributaries are classified Class B by the Commonwealth of Massachusetts. Class B waters are described as: "designated as a habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. Where designated they shall be suitable as a source of public water supply with appropriate treatment. They shall be suitable for irrigation and other agricultural uses and for compatible

industrial cooling and process uses. These waters shall have consistently good aesthetic value."

The Corps of Engineers last assessed the water quality of East Brimfield Lake in 1988. (Draft EA, 1997). The data collected at that time showed that the water quality of the reservoir to be of good quality, generally meeting the standards of the Class B classification. The primary water quality concerns resulting from the 1988 testing were low pH and high phosphorus levels. Dissolved oxygen levels were above 5.0 mg/l. The 1988 testing did not include profiles of dissolved oxygen and temperature through the water column at Holland Pond, East Brimfield Reservoir, or Long Pond. Maintenance of a relatively stable permanent pool has minimized shoreline erosion, thereby contributing to overall good water quality conditions.

3.3 Archaeological Resources

An archaeological reconnaissance survey of the East Brimfield Lake project area was completed in July 1988 by the Public Archaeology Laboratory, Inc. of Pawtucket, Rhode Island under contract to the Corps of Engineers, New England Division. Goals of this survey were to stratify the project area into zones of archaeological sensitivity (high, moderate, and low) and prepare recommendations for a cultural resources management plan for the East Brimfield Lake project in compliance with relevant Federal legislation including the National Historic Preservation Act of 1966, as amended. The following information is based upon the "Archaeological Reconnaissance Survey of the East Brimfield Dam and Reservoir in Brimfield, Holland, and Sturbridge, Massachusetts".

During the field testing and survey portions of the study, a total of 11 prehistoric and 33 historic period cultural resources were identified. Many of these sites were deemed potentially significant and further recommendations for avoidance or additional study were described. In addition, many of the stratified zones of high or medium archaeological sensitivity would require further investigation. Recommendations for all known and potential historic and archaeological resources were offered and are summarized below. Please note that archaeological site locations are confidential information that is exempt from the Freedom of Information Act requirements, and cannot be divulged to the general public.

3.3.1 Prehistoric Resources

As indicated above, a total of eleven (11) prehistoric archaeological sites were identified during the Reconnaissance survey. Five sites were identified during the walkover inspection portion of the survey in areas of previous disturbance including machine stripping or grading of soil, wave action or erosion along Holland and Long Ponds, and construction of an unpaved access road. Integrity of these remains is, however, generally good.

Limited subsurface testing in areas of high and moderate archaeological sensitivity as defined by background research and a predictive model yielded four previously unidentified prehistoric sites and verification of one previously reported site. One additional previously recorded site is also located within the project area, although its extent is unknown.

At the time of the 1988 survey, no prehistoric sites appeared to be threatened by maintaining a permanent pool. One shoreline site appears to be unaffected by erosion, while four other sites could be threatened by inundation during a seasonal flood or periods of high water.

One site identified during the survey has been subjected to some surface erosion and protective measures should be taken to minimize further erosion, possibly through the use of some type of ground cover (wood chips or bark mulch, for example).

All identified sites should be monitored for possible impacts and excavation in these areas should be kept to an absolute minimum to decrease the possibility of damages to documented and undocumented sites. Undeveloped portions of both Lake Siog Park and adjacent to Lost Lake have the potential to contain unknown archaeological resources.

Although the Streeter State Beach recreation area does not contain any recorded archaeological resources, it does have moderate archaeological sensitivity. Future development in this area, as well as in areas at Lake Siog Park and Lost Lake, should be preceded by an intensive archaeological survey.

Most identified prehistoric sites and areas of high and moderate archaeological sensitivity are located in areas that are used primarily for passive recreational pursuits such as fishing, hunting, hiking, and birdwatching. These activities are not considered serious threats to archaeological resources. Use of off-road vehicles should continue to be discouraged to prevent impacts to both identified and potential sites. Sites which are listed on the National Register of Historic Places should be protected. Further studies at an intensive level would be required in order to determine the National Register eligibility of the sites identified during the reconnaissance.

3.3.2 Historic Resources

During the reconnaissance survey, a total of thirty-three (33) historic period sites were identified. All functional types were represented including village, domestic, agrarian, industrial, transportation and others. Of the total, 17 were situated in Brimfield, 11 in Holland, and 5 in Sturbridge including 9 industrial, 9 domestic, 9 transportation, 3 agrarian, 3 others (dam sites), and 1 village site (East Brimfield Village). These sites were located based on historic map research as part of the background research, from additional information, or during the field reconnaissance investigations.

One historic site, the A. Lumbard Saw Mill, has been damaged as a result of erosion. Some evidence of damage from high water levels has been noted. The other mills, dams, and bridges at East Brimfield Lake could also be subject to similar erosion damage.

3.4 Recreation Resources

East Brimfield Lake provides numerous opportunities for recreational pursuits. The project contains two major developed recreation areas: Lake Siog Park (formerly the Holland Pond Recreation Area) that is now managed by the town of Holland; and Streeter State Beach, managed by the Commonwealth of Massachusetts, Department of Environmental Management. Areas maintained by the Corps of Engineers around the conservation pool include the East Brimfield Lake and Long Pond Boat Launch Areas, the Champeau Road Fishing Area, and the Administration Area Overlook Parking Area. The Corps also maintains a natural boat launch area, a vista parking area and a canoe launching area on Holland Pond (Lake Siog), and a Group Use Area on the edge of Lost Lake in Brimfield. The reservoir area is also open to the public for hiking, cross-country skiing, horseback riding, hunting, fishing, and snowmobiling. These recreational areas and other recreational opportunities are described by compartment in the following paragraphs. Major recreational areas are shown on Plates 4 and 5.

3.4.1 Conservation Pool Compartment

3.4.1.1 Streeter State Beach

This 4.5 acre day-use park is operated by the Commonwealth of Massachusetts, Department of Environmental Management. Swimming and picnicking are the primary activities at this site. The area is staffed only during the recreation season which extends from May to September. The Corps of Engineers developed this area as part of the public use development plan in 1965, and a water-borne comfort station with flush toilets was constructed by the Corps in 1970.

The area contains the following major facilities:

A 100 foot wide by 400 foot long bathing beach, with buoyed swimming area, is the primary attraction in the park.

A paved parking area with 80 parking spaces (non-delineated) and two spaces designated for persons with disabilities. During high use periods, overflow parking has been provided along the access road which is part of the former Streeter Road.

A 950 foot long , 4 foot wide paved walkway that meanders through the picnic area providing barrier free access for persons with disabilities.

A water-borne comfort station that is accessible to persons with disabilities. The facility has electricity, and contains five toilets and two sinks on the women's side, and three toilets, two urinals and two lavatories on the men's side. An on-site septic system is used to treat wastewater.

One drinking fountain that is accessible to persons with disabilities is provided near the beach. Drinking water is furnished by the Sturbridge Water Department.

Picnic facilities include 21 barbecue grills, 60 wooden picnic tables, and 2 picnic table/barbecue grill sites that are accessible to persons with disabilities.

One dumpster is provided in lieu of trash barrels. Trash bags are provided to the public at the time of entry by park staff.

3.4.1.2 Administration Area Overlook Parking Area

A 400 foot long paved entrance road provides access to the dam and administrative office. A 5,000 square foot parking area at the end of this road contains space for about 10 cars (not delineated). Since the parking area is at approximately the same elevation as the top of the dam, excellent views of the dam and conservation pool are available from this overlook. The parking lot also provides access to a 3/4 mile nature trail that has been established east of the dam, and a lawn area for blanket picnics. A utility building at the parking lot contains restrooms and a telephone, but the building is normally locked and the facilities are available only upon request. The project's administrative office is located in the former dam operator's quarters. This former residence is located on the right side of the entrance road upon entering government property.

3.4.1.3 East Brimfield Lake Boat Launch Area and Vista

This boat launch area is one of two Corps maintained boat launch areas that serve the conservation pool. The East Brimfield Lake Boat Launch Area, located south of Route 20, is used mostly by those wishing to boat and fish in the southern portion of the conservation pool.

The boat launch area is accessed through property owned by the Commonwealth of Massachusetts. The access road is part of the former Route 20 which was relocated when the dam was constructed. The area consists of two launching lanes, each 12 feet wide and 80 feet long to the water's edge, and a paved parking lot for 14 cars and 15 cars with trailers. Access to this area from Route 20 is difficult for cars with trailers, and the steepness and length of the boat ramps minimize their use.

A bulletin board with brochure box is located adjacent to the ramps, and a contractor furnished portable toilet is placed at the site from May through October each year. One trash

barrel is placed at the site during the boating season which extends from April to November. No other services or facilities are provided at the site.

A scenic vista near the entrance to the boat launch area provides a view of the permanent pool and dam. Parking for 8 cars is available near the site. Views from this site have been impacted by tree growth, and the area is currently used primarily by fishermen that fish from the shoreline.

3.4.2 Long Pond Compartment

3.4.2.1 Long Pond Boat Launch Area

This boat launch area is located on the north side of Route 20, and is used to access the northern or Long Pond portion of the conservation pool. A 35 foot wide by 70 foot long concrete box culvert under Route 20 connects the two portions of the conservation pool. At the normal pool elevation of 632 feet N.G.V.D., there is 8 feet of clearance through the culvert. The boat launch area is located on land owned by the United States. Its access road is a portion of old Route 20. One launching lane, 20 feet wide and about 25 feet long to the waters edge, and parking for 23 cars with trailers are available. Similar to the East Brimfield Lake Boat Launch Area, this site is also provided with a bulletin board, a portable toilet and a trash barrel.

The access road and parking area at the Long Pond Boat Launch Area are plowed in the winter by Corps personnel for ice fishermen.

3.4.2.2 Champeaux Road Fishing Area

This fishing area is located adjacent to Champeaux Road on a peninsula at the northern end of the Long Pond. Champeaux Road is situated about two miles north of the dam off Route 148. The area consists of a 75 foot long gravel entrance road and a gravel parking area with space for approximately 15 cars. Two barrier free fishing platforms, constructed in 1996, can accommodate up to five wheelchairs at a time. Other amenities at the site include a fully accessible portable toilet (contractor furnished), a bulletin board with brochure box, a rough lawn area, and a trash barrel. The access road and parking area are plowed in the winter to provide access for ice fishermen.

3.4.3 Holland Pond (Lake Siog) Compartment

Holland Pond (Lake Siog) is a 65-acre natural water body located within the reservoir area approximately 4.5 road miles from the dam. The northern shoreline along Pond Bridge Road is easily accessible to shore fishermen, and is extensively used.

Corps maintained areas on the lake include: a Vista Parking Area on Pond Bridge Road; a gravel boat ramp/parking area at the northeastern end of the lake; and a Canoe

Launch/Parking area adjacent to the Pond Bridge Road bridge. In addition, a major recreational facility in this area is Lake Siog Park, which is currently leased to the Town of Holland.

3.4.3.1 Lake Siog Park

Formerly known as the Holland Pond Recreation Area, this area is now under lease to the Town of Holland. The facilities in the park were constructed by the Corps of Engineers and were managed by the Commonwealth of Massachusetts for over 25 years. The area was returned to the Corps of Engineers in 1991 due to State fiscal difficulties. In August of 1993, a five-year lease was issued to the Town for 52 acres in this area. The Town manages the recreation facility as a day use area.

The area contains the following Corps constructed facilities:

- A 1200 foot long entrance road (the former Pond Road)
- About 2100 feet of gravel service roads.
- A 120 car (non-delineated) paved parking lot constructed in 1962.
- Two water-born comfort stations that are not handicapped accessible. The station at the west end of the park, constructed in 1962, contains six toilets and three lavatories on the women's side, and four urinals, three toilets and three lavatories on the men's side. The comfort station at the east end of the park was constructed in 1970, contains five toilets and two lavatories on the women's side, and two urinals, three toilets and two lavatories on the men's side. Each comfort station has an on-site septic system to treat wastewater.
- A water supply well installed in 1962, provides all of the park's water needs. The pump chamber is situated alongside the comfort station at the west end of the park.
- Two drinking fountains are situated in the park.
- A change house, with five stalls on each side, was constructed in 1962.
- A 65 foot wide by 380 foot long bathing beach with buoyed swimming area.

Other facilities include a beach sand volley ball court, a group camp fire area, 17 concrete grills, 14 metal grills and 16 picnic tables. A 2300 foot long hiking trail has been blazed and painted on the east side of the area. A rented dumpster and four trash barrels are used to collect refuse.

The Tennessee Gas Pipeline Company's right-of-way for two underground natural gas pipelines crosses the park entrance road about 200 feet south of the parking lot. When the

company installed the second pipeline in 1986, the area west of the entrance road was cleared and graded to a condition suitable for a play field, and the area east of the entrance road was graded to allow dry weather vehicular access to some fields that existed east of a culverted stream crossing.

3.4.3.2 Vista and Boat Launch Area

The vista area consists of a 25 foot deep by 70 foot wide gravel parking lot with space for seven cars. It existed at the time of acquisition by the United States. A trash barrel is placed at the site from April to November. No other facilities or services are available at the area.

The Holland Pond (Lake Siog) natural boat ramp also existed when the reservoir area was acquired. A 15 foot wide by 50 foot long trap rock - surfaced launching lane is provided. The low gradient of the ramp allows for the launching of boats under 16 feet long only. Parking of cars and cars with trailers is haphazard as no designated parking area has been delineated. An area of old, deteriorated paved roadway is used for parking. A bulletin board with brochure box and trash barrel are the only services or facilities provided at this area.

3.4.3.3 Canoe Launch Area, Quinebaug River Trail

The Canoe Launch/Parking Area is 80 by 100 feet and is gravel. A short, narrow path leads to the Quinebaug River's edge. The parking area existed at the time of acquisition by the United States. Approximately 16 car spaces are available and are not delineated by pavement markings. No handicap spaces have been signed or delineated. An interpretive map of the trail and a brochure box for canoe trail brochures is located near the parking area. A trash barrel is placed here from April to November. No other facilities or services are provided at this location.

The six mile river trail starts at the north end of Holland Pond, adjacent to the Pond Bridge Road Bridge. It follows the course of the river north, enters the East Brimfield Lake Conservation Pool, and ends at the East Brimfield Lake Boat Launch Area. This river trail was designated a "Watchable Wildlife Trail" in 1996. Four designated viewing areas are situated along this river trail. The canoe trail and viewing areas are occasionally patrolled by Corps personnel.

3.4.4 Lost Lake Compartment

Lost Lake is a 15-acre natural water body located less than 1/2 mile northeast of Holland Pond. The lake, which is classified as a "Great Pond", is owned by the Commonwealth of Massachusetts, although the United States owns the entire shoreline.

3.4.4.1 Lost Lake Group Use Area

This area was developed by the Corps of Engineers in 1973 and was operated by the Commonwealth of Massachusetts under a long term lease until 1991. It is currently maintained by the Corps, and only used for group outings and camping. The shoreline in the vicinity of the group use area is available to shore fishermen.

Developed facilities at the Lost Lake Group Use Area are a 1450 foot long paved entrance road and parking for 26 cars in two parking areas. Parking spaces are not delineated. A five car, paved parking area is also located on the former East Brimfield Holland Road about 400 feet south of the end of LaFlamme Road. This parking was developed to provide for those desiring to fish or canoe on Lost Lake. It was constructed under the same contract as the initial development. A well-used trail leads from the parking lot to the lake. Two test wells were drilled in an attempt to develop a suitable water supply, but the water did not meet drinking water standards and the wells were abandoned. Additional development that was to have been carried out by the Commonwealth of Massachusetts was canceled and no attempts were made to promote the area for group use. No other facilities or services are provided.

3.4.5 Five Bridge Road Compartment

No developed recreational areas are situated in this compartment. However, the Quinebaug River canoe trail runs along the southern boundary of this compartment. This compartment is used for passive recreational pursuits such as hunting, fishing, hiking, and wildlife observation. The hemlock ravine and forest situated north of Five Bridge Road is a significant recreation asset.

3.4.6 Morse Road Compartment

Although the Quinebaug River canoe trail follows a portion of this compartment's eastern boundary, this compartment does not contain any developed recreational areas. Passive recreation use of this compartment is common. Primary uses include hunting, fishing, and hiking.

3.4.7 Mill Brook Compartment

There are no developed recreational areas in this compartment that are open to the general public. A portion of this compartment (42 acres) is leased by the Springfield Boys Club for outdoor sports activities. Passive recreational uses such as hunting and fishing are common..

In addition to the above developed facilities, there are many opportunities for fishing and hunting at the East Brimfield Lake project. A large portion of the shoreline is regularly used by fishermen, and hunting for small game is common in the fall months. A popular winter activity is ice fishing.

3.4.8 Recreational Analysis

3.4.8.1 Existing Use

Historically, recreation facilities at East Brimfield Lake have been heavily used by the visiting public. The following tabulation summarizes recreational attendance in visitor hours at all East Brimfield Lake recreational areas from 1993 to 1997.

HISTORIC RECREATIONAL USE AT EAST BRIMFIELD LAKE

Year	Attendance (visitor hours)
1993	178,900
1994	284,900
1995	310,500
1996	279,300
1997	316,000

As shown above, use of East Brimfield Lake facilities has been fairly consistent since 1994, with somewhat lower visitation in 1993. The majority of usage involves swimming, picnicking, fishing, boating, sightseeing, hiking and nature-walking. Due to the type of facilities available at the project, it is common for the recreation areas to reach capacity during weekends when the weather is hot.

3.4.8.2 Natural and Scenic Qualities

The East Brimfield project is situated in a relatively hilly portion of the Thames River Basin headwaters. The reservoir area is quite diverse; with the western portion containing large wetland areas and several large ponds, while the eastern portion consists largely of open water and surrounding hilly areas. These large wetland and open water areas, along with the adjacent upland areas, provide conditions suitable for diverse vegetation cover, and support a large variety of fish and wildlife species.

The project provides numerous opportunities for excellent scenic views. The overlook area at the dam and a vista along Route 20 provide views of both project features and the permanent pool , and a vista at Holland Pond provides views of the pond and adjacent areas. Scenic views are also provided at most developed recreation areas and at other sites throughout the project area.

The combination of topographic relief, open water areas, ease of access, and diversity of vegetation and wildlife provide a varied landscape and an aesthetically pleasing experience for visitors. The continuation of management practices that provide for the greatest diversity of indigenous plant and wildlife species, within a multiple use framework, will contribute to

maintaining the natural and scenic qualities of this project. Other management practices to be continued are the maintenance of viewing areas, and protection of visually and environmentally sensitive areas.

3.4.8.3 Projected Use

The demand for recreation at East Brimfield Lake is expected to continue at a high level. This is based on existing and past use of the facility, and the needs identified in the Massachusetts Statewide Comprehensive Outdoor Recreation Plan (SCORP). For purposes of recreational planning, the State is divided into seven regions. East Brimfield Lake is located on the border between the Connecticut Valley region and the Central Massachusetts region. The Massachusetts SCORP concluded that the primary recreational needs of both of these regions were water based. This includes boating, fishing and swimming. Since these activities are East Brimfield Lake's primary recreational pursuits, it is concluded that this resource will continue to be in high demand. The SCORP also recommended the development and expansion of trail corridors in Central Massachusetts region to support hiking and cross-country skiing, and the protection of conservation, cultural and scenic areas in the Connecticut Valley region.

The potential market areas for facilities at East Brimfield Lake were also assessed to determine the population base that is currently served, and will be served in the future. The primary market area for the dam and reservoir was assumed to be the area within a 20 mile radius of the facilities. For Streeter State Beach and Lake Siog Park, the primary market area was an area within a 10 mile radius. These market areas are shown on Plate 6. These market areas are consistent with the SCORP which indicated that visits for fishing, swimming, hiking and picnicking can be expected from areas within a 15 to 30 minute commute (10 - 20 miles). The following tabulation shows the population that was served in 1995 and that which is projected to be served in the years 2000 and 2010.

POPULATION BASE

	Population Base		
Facility	1995	2000	2010
Dam/Reservoir	408,237	426,182	465,391
Streeter State Beach	52,448	55,336	61,091
Lake Siog Park	52,448	55,336	61,091

Another factor affecting recreational use at East Brimfield Lake is customer satisfaction. Staffed facilities at the project are scenic and well maintained, and park personnel are both visible and available to help and/or advise visitors. Demand for quality facilities that are well maintained and staffed will always be high.

3.4.8.4 Carrying Capacity

The carrying capacity of Streeter State Beach is constrained primarily by parking limitations. At an average of 4.3 people per car and 80 spaces, 344 people can visit the site at any given time. Since other amenities at the site can support many more people, from 360 at picnic tables alone to nearly 800 on the beach, additional parking is required, particularly during peak use periods. The addition of at least 40, and as many as 80 parking spaces would improve the recreational effectiveness of this facility.

Recreation facilities at Lake Siog park are fairly closely matched. There is parking for over 500 people (120 spaces) and the beach can support about 600. An apparent deficiency seems to be in the number of picnic tables, but with the other activities available at this site, this doesn't appear to be a serious detriment..

The carrying capacity of the conservation pool for boating was computed based on a total of 276 acres available for boating. Based on past usage, it was assumed that 2/3 of the boating is for general fishing and 1/3 is general boating. The boating area carrying capacity was then calculated by multiplying the percentage use times the number of pool acres, and dividing this number by the area required for each type of boating.

- 67 percent (fishing) x 276 acres = 182 acres / 4 acres/boat = 45 boats
- 33 percent (general boating) x 276 acres = 94 acres / 10 acres per boat = 9 boats
- The total carrying capacity of the pool at one time is 54 boats.

Considering that the existing boat launch areas have capacity for 38 cars with trailers and 14 cars, the capacity of the boat launch areas appear well matched to the capacity of the conservation pool. However, improvement of both boat launch areas is required to maximize the use of these facilities. The Long Pond Boat Launch Area receives the most use because the boat ramp is the easiest to use, but the ramp is deteriorating and the parking lot should be reconfigured for maximum use. Use of the East Brimfield Lake Boat Launch Area by inexperienced boaters with trailers is minimized by access difficulties, and the steepness and length of the boat ramps. In its present condition, it is better suited to car top boats only.

Based on the above analyses, there aren't any serious carrying capacity deficiencies at major recreation facilities. However, since future use of these and other facilities is expected to remain high, continued maintenance and improvement of these and other areas should be practiced to ensure high quality recreation experiences.

4. PUBLIC INVOLVEMENT AND COORDINATION

Coordination with elected officials, other agencies , and the public was conducted as part of the planning process. This insured that the Master Plan provided the best response to local and regional needs, project resource capabilities and suitabilities, and expressed public desires. Public coordination was initiated with the issuance of a Public Notice on June 5, 1996, and a News Release on June 7, 1996. These documents announced the initiation of the study, solicited input, and resulted in several letters from interested agencies and individuals concerning the study (see Appendix A).

Several workshop meetings were held with State and Local officials during the study. These include the following:

- A meeting and site inspection of boat launching facilities with the Massachusetts Department of Fisheries, Wildlife and Environmental Law Enforcement, Public Access Board, on July 9, 1997.

- A meeting with Massachusetts Department of Environmental Management and Town of Holland on July 9, 1997.

- A meeting with the Town of Sturbridge on July 11, 1997.

In addition to the above workshop meetings, a formal public meeting was held at the Brimfield Town Hall during the evening of July 21, 1997. Concerned interests were well represented at this meeting. Officials from all affected communities (Brimfield, Holland and Sturbridge) were present, as were representatives from the Commonwealth of Massachusetts and Quinebaug Rivers Association.

The above meetings resulted in the following public comments and desires:

1. Recommend connection of the Corps nature trail at the dam to the Lions Club Trail, and extension of this trail to Streeter State Beach.

2. Support development of local and cross state hiking and biking trails on Corps property. This would support Sturbridge's "Big X" trail proposal and other regional initiatives. As trail systems expand, Corps land could provide the vital link between existing Massachusetts and Connecticut state parks and forests.

3. Desire allocation of appropriate reservoir lands for future development of ball fields. Specific areas discussed include the area behind Howletts Lumber in Holland, and a level area along Old Brimfield Road south of Lost Lake.

4. Support improvement of boat launch facilities, particularly at the Long Pond launching area. Recommended improvements include better access from Route 20, parking lot reconfiguration, and boat ramp repair or modification.

5. Support development of interpretive trails to allow limited access to exemplary natural communities, particularly the hemlock ravine and forest.

6. Brimfield desires to expand facilities at Lake Siog Park by adding a picnic shelter and a ball field.

7. Support development of interpretive pamphlets and displays concerning the natural and historic features of the project in conjunction with local town boards and commissions.

8. Encourage continued vegetative and other management activities to enhance fish and wildlife resources. Practice successional control to retain open grassland habitat.

9. Support expanding the parking area at Streeter State Beach, and recommend the addition of a picnic shelter and comfort station improvements.

10. Desire that the project area remain in a natural state with continued access for hunting and fishing.

5. RESOURCE MANAGEMENT OBJECTIVES

5.1 General

The purpose of this section is to establish resource objectives for the East Brimfield Lake project. Resource objectives are developed to guide future design, development and management of the resource base, natural and man-made, to obtain the greatest possible benefit through meeting the needs of the public and protecting and enhancing environmental quality and ensuring sustained use.

These objectives are consistent with authorized project purposes, applicable Federal laws and directives, regional needs, resource capabilities and expressed public desires.

The overall mission is to provide high quality and responsive management of East Brimfield Lake's natural and man-made resources, while maintaining efficient and effective flood control operations to fulfill the project's authorized flood control purpose.

5.2 Project Wide Objectives

5.2.1 Natural Resources

1. Manage project lands to improve vegetation health and vigor for sustained yield of timber, increased or sustained wildlife carrying capacity, and recreation use through maintenance of a diversity of age groups and species, succession control, and timber harvesting.

2. Preserve and enhance the natural and beneficial values of wetlands, flood plains and aquifers. Control infestation of non-native aquatic plant species where practical and feasible.

3. Protect and conserve species that are State listed as rare and of "Special Concern" and have been identified at East Brimfield Lake. These species include two freshwater mussels (the "triangle floater" and "squawfoot"), two turtles (the "spotted turtle" and "wood turtle"), and the water shrew. Recommendations for management of these species were developed as part of the Massachusetts NHESP survey of rare or protected species. These management recommendations are included as Appendix F.

4. Preserve and protect identified exemplary communities including the hemlock ravine and forest, the various unique wetland mosaic areas, and the acidic peatland ("floating bog").

5. Implement erosion control measures as necessary to protect water quality and other project resources.

6. Manage fisheries for sustained population, health and growth, in concert with the Commonwealth's stocking efforts, and other management activities.

5.2.2 Cultural Resources

1. Utilize the East Brimfield Lake Archaeological Reconnaissance Survey report to guide the preservation and protection of cultural resources identified on project lands.

2. Future development in zones of high or moderate archaeological sensitivity will be preceded by intensive surveys to identify archaeological resources. The Cultural Resources Checklist in Section L, Cultural Resources, of the Operational Management Plan lists activities that require review by the New England District staff archaeologist.

5.2.3 Recreational Resources

1. Improve existing recreation areas to ensure high quality recreation experiences, barrier free access, public health and safety.

2. Identify and evaluate the development of potential recreation sites to afford the public a diversity of recreational opportunities and/or enhance public use of project lands.

3. Provide recreation activities for both consumptive (hunting and fishing) and non-consumptive (bird watching and photography) use of fish and wildlife. Continue current trout, northern pike and pheasant stocking programs.

4. Identify and develop trails through project lands to meet regional and local needs for formally designated recreational trails, and provide the public with opportunities to view unique natural areas.

5. Maintain a visitor assistance program including interpretation to enhance the public's understanding and appreciation of the role of the Corps of Engineers in development and administration of East Brimfield Lake.

5.3 Specific Objectives for Project Compartments (Management Units)

5.3.1 Conservation Pool Compartment

1. Manage and maintain existing flood control facilities at the administration area to ensure safe and efficient operation of the project while permitting public use at controlled access points.

2. Maintain the existing pool and support facilities for fishing, swimming, and recreational boating.

3. Improve the boat launch area and vista to increase the effectiveness and efficiency of these facilities.

4. Connect the existing nature trail at the administration area to the Lions Club Trail and extend this trail spur to Streeter State Beach.

5. Maintain the existing high quality bathing beach, picnic, and support facilities at Streeter State Beach through the lease agreement with the Commonwealth of Massachusetts. Support improvements to include 40-80 additional parking spaces, a picnic shelter, and comfort station improvements.

6. Maintain the shoreline in a natural condition free from future development or clearing to ensure natural shoreline vistas, fish and wildlife protection, and water quality.

7. Open corridors in the densest stands of Eurasian water-milfoil to increase fish productivity. Support Eurasian water-milfoil control efforts which are compatible with other management and recreational activities.

5.3.2 Long Pond Compartment

1. Maintain the existing pool and support facilities for fishing and recreational boating.

2. Improve the Long Pond Boat Launch Area by continuing to coordinate with the Massachusetts Public Access Board. Facilities needing improvement include the parking area, both configuration and access, and the boat ramp.

3. Preserve and protect the unique wetland/upland area north of the Massachusetts Turnpike that is currently influenced by beaver activities.

5.3.3 Holland Pond (Lake Siog) Compartment

1. Maintain existing high quality bathing beach, picnic, and support facilities at Lake Siog Park through the lease agreement with the Town of Holland. Support improvements being considered by the Town to include a picnic shelter and ball field.

2. Maintain existing Corps facilities and natural setting at Holland Pond (Lake Siog) with no further development.

3. Protect prehistoric site 5-1 with ground cover to prevent further erosion.

4. Protect and preserve the deep water marsh and cattail stands on the south side of Holland Pond (Lake Siog).

5. Develop the grassland area behind Howletts Lumber for use as ball fields by the Town of Holland.

6. Improve the unnamed brook between Lake Siog Park and the Springfield Girls Club for native trout through stream bank stabilization, and increasing the pool to riffle ratio.

5.3.4 Lost Lake Compartment

1. Maintain existing Corps facilities and natural setting at Lost Lake Group Use Area with no further development.

2. Monitor prehistoric sites 4-2 and 4-3 for possible impacts. Any excavation in this area should be discouraged.

3. Develop the area along Old Brimfield Road south of Lost Lake for use as ball fields by local communities.

4. Conduct sampling for fish species, age and growth in Pork Barrel Pond to develop fisheries management recommendations.

5. Protect the acidic peatland ("floating bog") located on the east side of East Brimfield Road.

5.3.5 Five Bridge Road Compartment

1. Protect and preserve the hemlock ravine and forest north of Five Bridge Road. Provide limited public access to this unique area.

2. Manage the area to improve the health and vigor of vegetation to increase the value of such areas for wildlife, passive recreation, scenic value, timber harvesting and wildfire prevention.

5.3.6 Morse Road and Mill Brook Compartments

1. Manage these areas to improve the health and vigor of vegetation to increase the value of such areas for wildlife, passive recreation, scenic value, timber harvesting and wildfire prevention.

2. Control the expansion and/or infestation of invasive, non-native aquatic plant species, particularly in the Mill Brook compartment, where practical and feasible.

6. LAND CLASSIFICATION

6.1 Land Allocation

As stated in Section 2, the entire East Brimfield Lake project area was initially acquired for flood control purposes. Consequently, all project lands are allocated to the Operations category.

6.2 Land Classification

In accordance with U.S. Army Corps of Engineers regulation, ER 1130-2-550, and pamphlet, EP 1130-2-550, these allocated project lands are further classified to provide for development and resource management consistent with authorized project purposes, and the provisions of the National Environmental Policy Act (NEPA) and other Federal laws. Land classification categories are described below:

- Project Operations - This classification includes land required for flood control structures, administration and maintenance facilities, and operation of the project.

- Recreation - Land developed for intensive recreational activities by the visiting public.

- Mitigation - This includes land acquired or designated specifically for mitigation. No areas at East Brimfield Lake are classified in this category.

- Environmental Sensitive Areas - Areas where scientific, ecological, cultural or aesthetic features have been identified.

- Multiple Resource Management - Lands managed for one or more of, but not limited to, the following activities:

a. Recreation - Low Density. Activities such as hiking, primitive camping, wildlife observation, hunting or similar low density recreational pursuits.

b. Wildlife Management General. Fish and wildlife management activities.

c. Vegetative Management. Management activities for the protection and development of forest and vegetative cover.

d. Inactive and/or Future Recreational Areas. Recreation areas planned for the future or temporarily closed.

• Easement Lands - All lands for which the Corps holds an easement interest but not fee title.

The following paragraphs describe the classification of land by compartment at East Brimfield Lake. Previous sections concerning East Brimfield Lake's purpose, available natural and recreation resources, and development constraints and opportunities, provided the basis for this land classification.

6.2.1 Conservation Pool Compartment

There are three classification categories within this compartment. Approximately 60 acres have been classified as project operations. This area includes the dam and appurtenant structures, including log boom, and administration and maintenance areas required for project operation. Two areas; Streeter State Beach (4.5 acres), and the East Brimfield Lake Boat Launch Area (about 5 acres), have been classified as recreation. The remaining acreage, approximately 224.5 acres, was classified for multiple resource management. Based on existing and potential uses of this area, the area will be managed primarily for low density recreation. Plate 7 shows the classification of land in this compartment.

6.2.2 Long Pond Compartment

This 302 acre area has been classified as 75 acres environmentally sensitive, 5 acres recreation, and 225 acres multiple resource management. As shown on Plate 8, the area classified as environmentally sensitive is north of the Massachusetts Turnpike. Since the area is somewhat isolated, it has been impacted by beaver activities which have created a mosaic of several wetland types with a large diversity of species. This unique area could be used for limited access hiking, hunting and fishing, and wildlife viewing and photography. The 5 acres classified as recreation include the Champeau Road Fishing Area, and the Long Pond Boat Launch Area. As the remaining areas are used for fishing, boating and hunting, the area's primary use will be low density recreation.

6.2.3 Holland Pond (Lake Siog) Compartment

As shown on Plate 9, a sizable portion of this compartment is classified for recreation. About 52 acres are leased to the town of Holland as Lake Siog Park, and an additional 3 acres are leased to the Springfield Girls Club. About 4 acres of deep marsh and cattail stands have been set aside as environmentally sensitive. This 4 acre area would provide opportunities for bird watching and photography. Canoeing and fishing would also be allowed at or adjacent to the area. The remaining 140 acres is classified as multiple resource management. This area is also used for numerous low density recreational pursuits such as fishing, boating and viewing the scenery from the shoreline.

6.2.4 Lost Lake Compartment

This compartment, which contains 362 acres, has two classification categories (see Plate 10). Approximately 4 acres of acidic peatland ("floating bog") situated east of East Brimfield Road have been classified as environmentally sensitive. This area should be protected from disturbance and nutrient enrichment. The remaining 358 acres were classified as multiple resource management, and are currently used for fishing, hunting, hiking, and primitive group use camping. Continued low density recreational activities are anticipated in this area.

6.2.5 Five Bridge Road Compartment

This compartment is relatively large at about 377 acres. Approximately 16 acres, which encompass the hemlock ravine and forest, have been classified as environmentally sensitive. This area, which is near the center of the compartment, is shown on Plate 11. This area could be used for limited access hiking, hunting, wildlife viewing, and photography. The remaining 361 acres have been classified for multiple resource management. Primary uses in this area will be low density recreation (canoeing) along the river, and vegetative and wildlife management.

6.2.6 Morse Road Compartment

As shown on Plate 12, all 266 acres of this compartment were classified as multiple resource management. The Quinebaug River, which forms the eastern boundary of this compartment, is part of the Quinebaug River Trail and will be used for low density recreation. Remaining areas will be managed to enhance vegetative and wildlife resources.

6.2.7 Mill Brook Compartment

All 271 acres of this compartment (see Plate 13) has been classified as multiple resource management. This includes about 42 acres of land that is leased to the Springfield Boys Club for passive recreation. Existing and contemplated uses in the remaining 229 acres of this compartment include passive recreation, and vegetative management to increase the value of the area for wildlife and improve aesthetics.

7. RESOURCE DEVELOPMENT PLANS

East Brimfield Lake should continue to be used primarily for day use recreation. The only exception to this would be the group use area adjacent to Lost Lake where group camping is allowed. In addition, since the majority of visitors come from within 20 miles of the recreation sites, the needs of the people within this area should continue to guide recreation development at the project. Operation and maintenance of the damsite and other flood control improvements, and management of the majority of the reservoir area will continue to be the responsibility of the Corps of Engineers. Operation and maintenance of Streeter State Park, Lake Siog Park, and other leased recreation facilities will be allocated based on future lease agreements. The following paragraphs describe improvements to meet the short and long term recreational and other needs at East Brimfield Lake.

- Improve the Streeter State Beach recreation area by adding between 40 and 80 parking spaces, a picnic shelter, and improving the comfort station (see Plate 7).

- Connect the Corps nature trail east of the dam to the Lion's Club trail, and extend this trail from the Administrative Area Overlook area to Streeter State Beach.

- Modify the East Brimfield Lake Boat Launch area to improve safety. Redesignate the area for car top boats only.

- Improve the vista and parking area, east of the East Brimfield Lake Boat Launch Area (see Plate 7). This would improve the view of the dam and conservation pool, allow additional fishing access to the area, and overflow parking for the boat launch area.

- Improve access to the Long Pond Boat Launch Area by reconfiguring the parking lot and Route 20 access, and extending the boat ramp (see Plate 8).

- Improve Lake Siog Park by adding a picnic shelter and ball field (see Plate 9).

- Develop the area behind Howletts Lumber for use as ball fields (see Plate 9).

- Develop the area along Old Brimfield Road south of Lost Lake for use as ball fields (see Plate 10).

- Protect and preserve the hemlock ravine and forest north of Five Bridge Road. Designate an interpretive trail through the area to allow limited public access (see Plate 11).

Recreation improvements and fish and wildlife enhancement activities will need to be accomplished by sharing costs with public or private agencies or groups. New recreation development is possible if developed and maintained by other public or private agencies. Improvements or development will require specific proposals for Corps review and approval.

8. CONCLUSIONS

This master plan provides guidance for future development at East Brimfield Lake. The natural and man-made resources at the project will continue to be managed by the New England District to provide the best combination of responses to regional and ecosystem needs, project resource capabilities and suitabilities, and public desires consistent with the project's authorized flood control purpose.

Natural and man-made resources have been identified and analyzed. This included wetlands, exemplary natural communities and cultural resources which require specific management efforts for their protection. Recreational opportunities were identified through an analysis of regional needs and expressed public desires.

Through land use classification, the master plan has designated areas for project operations, recreation, environmental protection, and multiple resource management. About 60 acres in the vicinity of the dam will continue to be reserved for project operations. Streeter State Beach (4.5 acres), Lake Siog Park (52 acres), and the Springfield Girls Club parcel (3 acres) have been classified as intensive recreation. Existing leases for these recreation areas, as well as for other outgranted parcels, are expected to be renewed. About 10 acres of land in the vicinity of the Corps' boat ramps and Champeaux Road fishing area have also been classified as intensive recreation. Due to the presence of exemplary natural communities, four separate areas, totalling about 95 acres, have been classified as environmentally sensitive.

The master plan has identified opportunities for the improvement of existing recreation facilities, enhancement of boat ramps, vista improvement, and establishment of interpretive trails in areas containing exemplary natural communities. Other opportunities include establishing trails to tie into community proposals such as the "Big X" in Sturbridge or other cross state bike or hiking trails. Several areas where the towns of Brimfield or Holland could locate sports fields were also identified.

All specific proposals for recreational or other development at the project must comply with this master plan, the Thames River Basin flood control requirements, and the National Environmental Policy Act and other Federal requirements.

9. RECOMMENDATIONS

It is recommended that the East Brimfield Lake Master Plan be approved as a guide to the orderly use and development of natural and man-made resources at the East Brimfield Lake flood control project. Approval of this master plan would rescind Design Memorandum No. 10, Supplement A, Master Plan for Reservoir Development, dated February 1968.

CORPS OF ENGINEERS U. S. ARMY

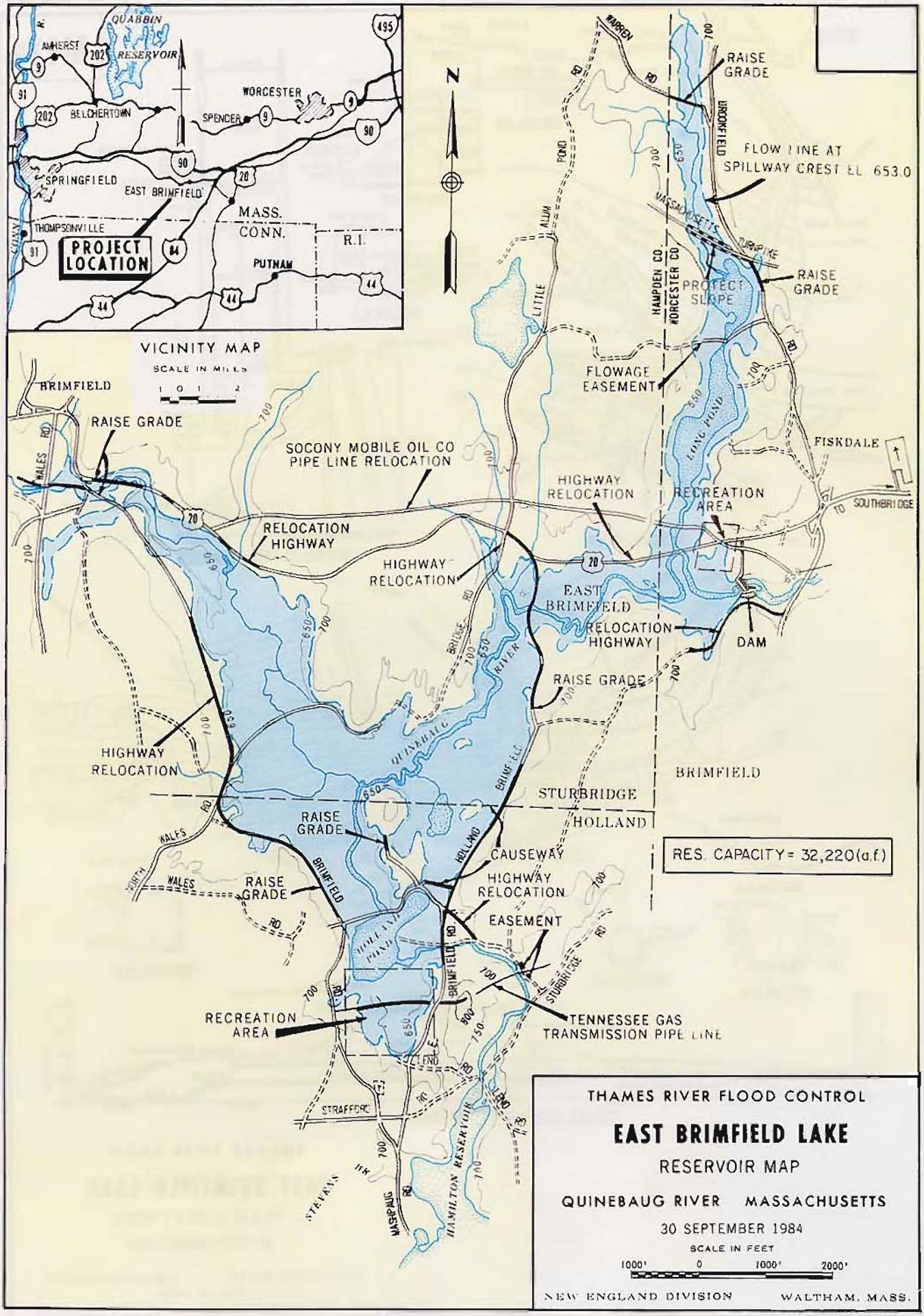
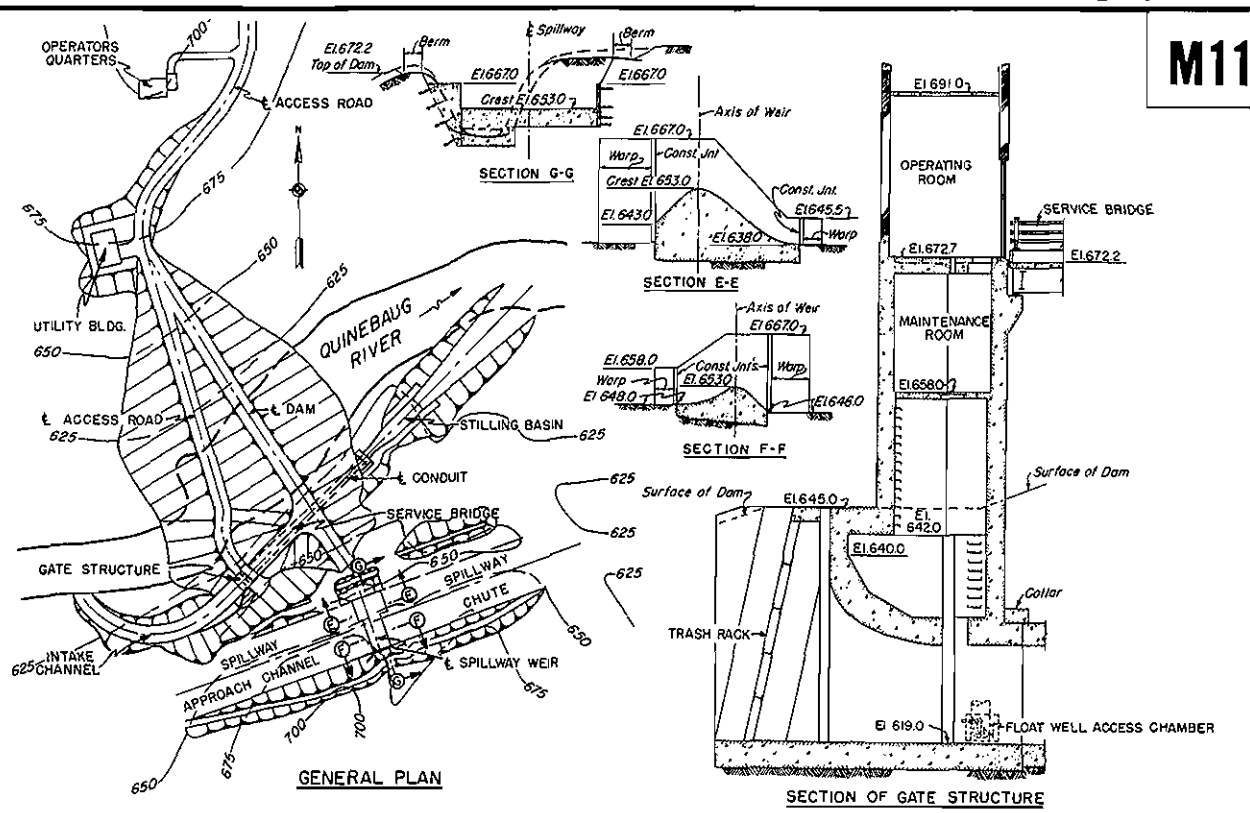
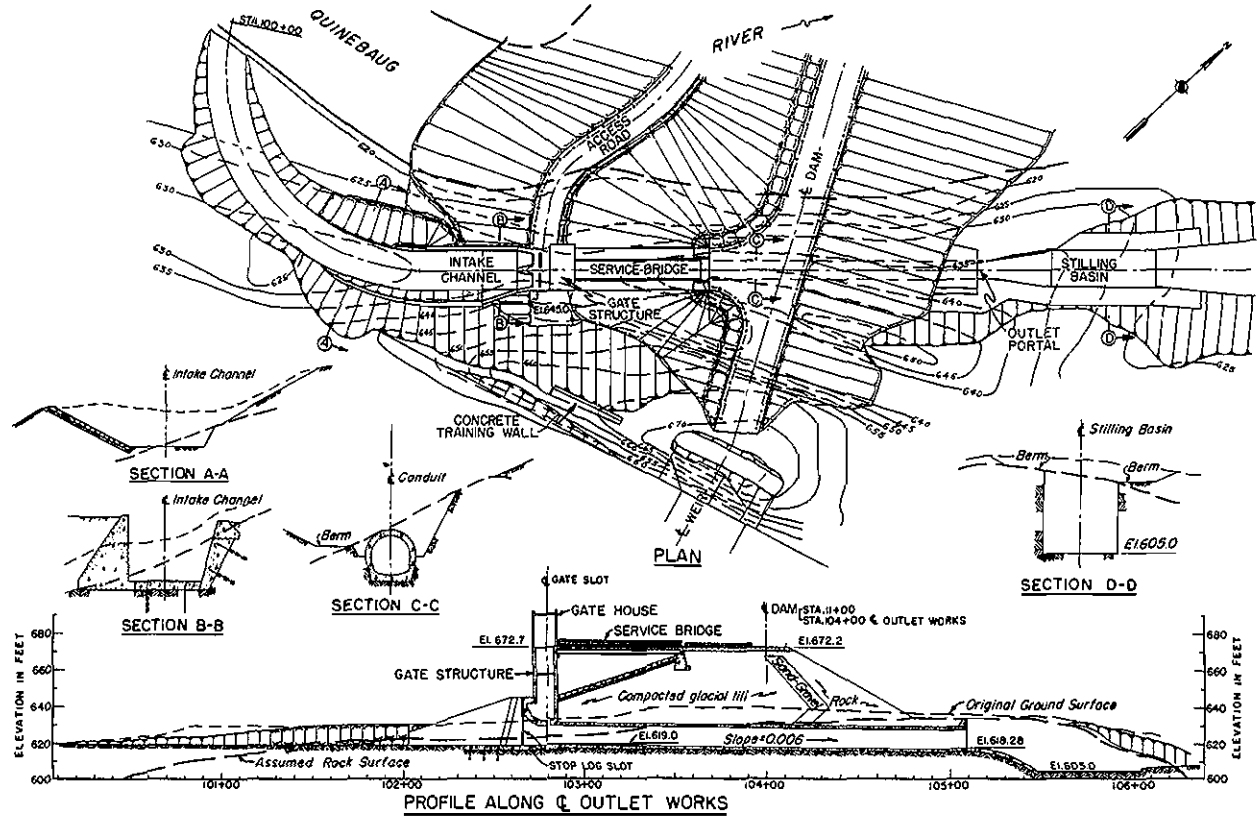


PLATE 1

M11a





THAMES RIVER BASIN

EAST BRIMFIELD LAKE

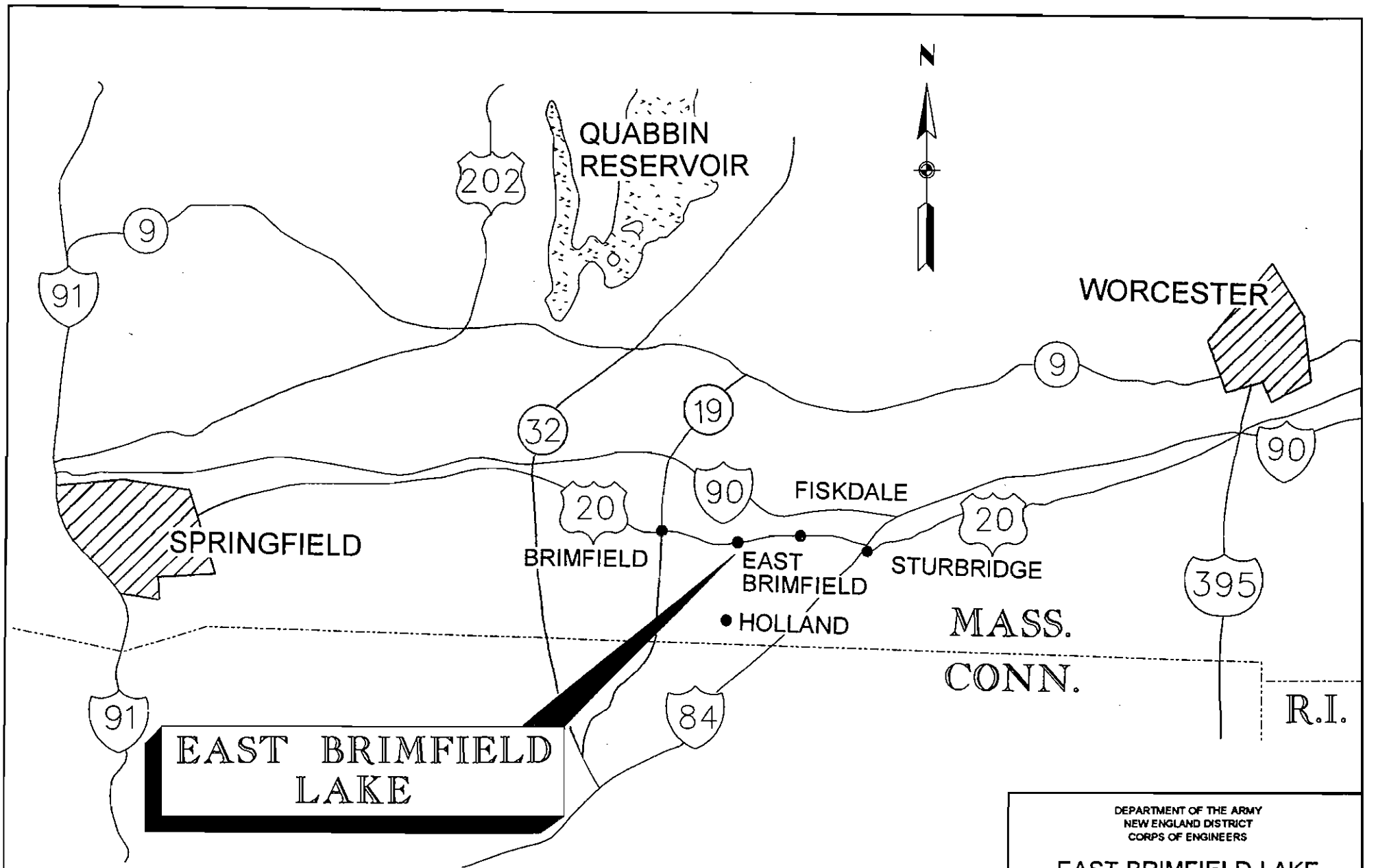
PLAN & SECTIONS

30 SEPTEMBER 1976

QUINEBAUG RIVER MASSACHUSETTS

NOT TO SCALE

NEW ENGLAND DIVISION WALTHAM, MASS.



DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS

EAST BRIMFIELD LAKE
MASTER PLAN

Vicinity Map
(not to scale)

PLATE 2

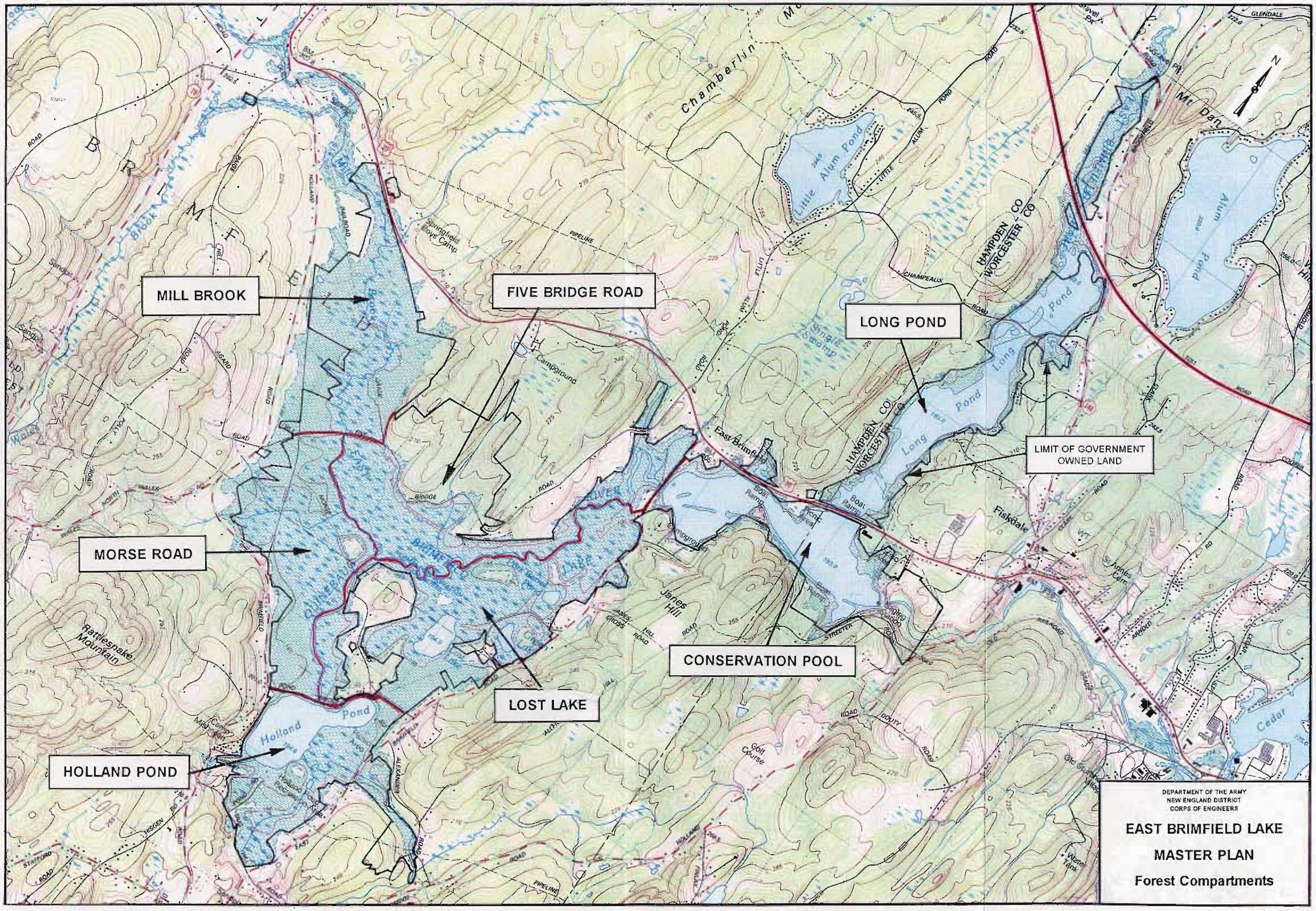

MILL BROOK
FIVE BRIDGE ROAD
LONG POND
LIMIT OF GOVERNMENT OWNED LAND
MORSE ROAD
CONSERVATION POOL
LOST LAKE
HOLLAND POND
DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
EAST BRIMFIELD LAKE
MASTER PLAN
Forest Compartments

PLATE 3

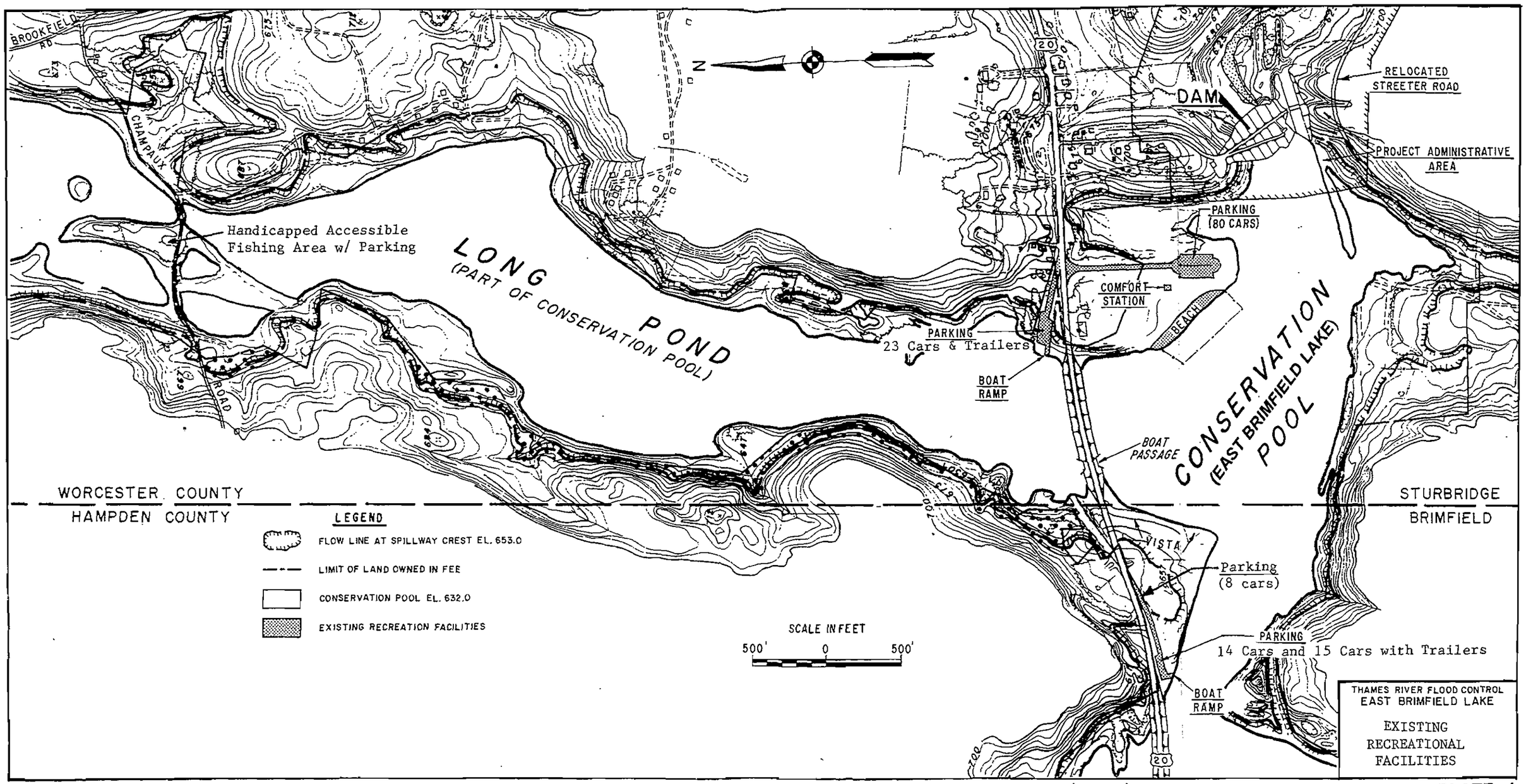

BROOKFIELD RD
CHAMPAUX
ROAD
N
DAM
RELOCATED STREETER ROAD
PROJECT ADMINISTRATIVE AREA
PARKING (80 CARS)
COMFORT STATION
BEACH
Handicapped Accessible Fishing Area w/ Parking
LONG POND
(PART OF CONSERVATION POOL)
PARKING
23 Cars & Trailers
BOAT RAMP
BOAT PASSAGE
CONSERVATION POOL
(EAST BRIMFIELD LAKE)
WORCESTER COUNTY
HAMPDEN COUNTY
STURBRIDGE
BRIMFIELD
VISTA
Parking
(8 cars)
PARKING
14 Cars and 15 Cars with Trailers
BOAT RAMP
LEGEND
FLOW LINE AT SPILLWAY CREST EL. 653.0
LIMIT OF LAND OWNED IN FEE
CONSERVATION POOL EL. 632.0
EXISTING RECREATION FACILITIES
SCALE IN FEET
500' 0 500'
THAMES RIVER FLOOD CONTROL
EAST BRIMFIELD LAKE
EXISTING RECREATIONAL FACILITIES

PLATE 4

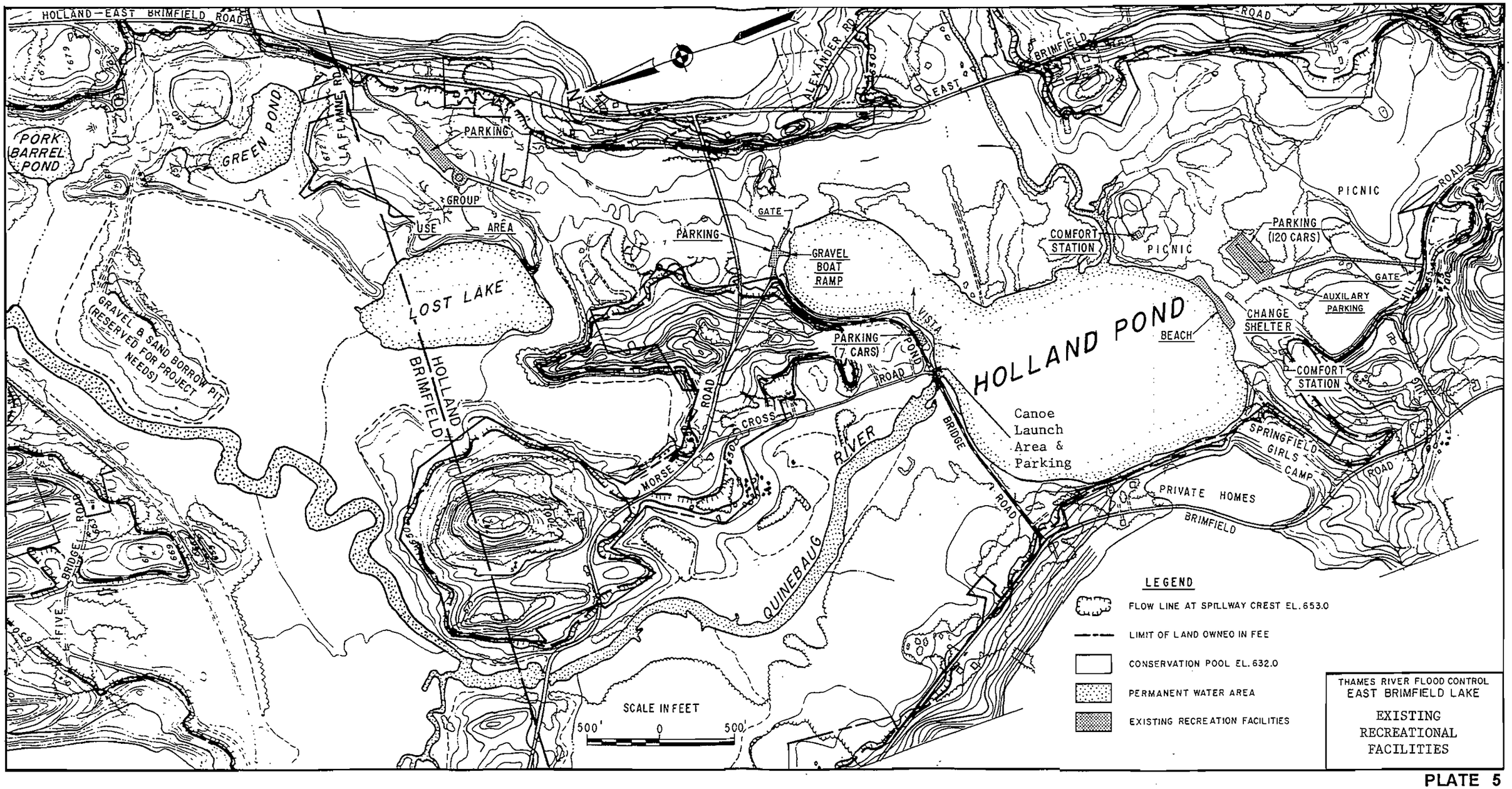
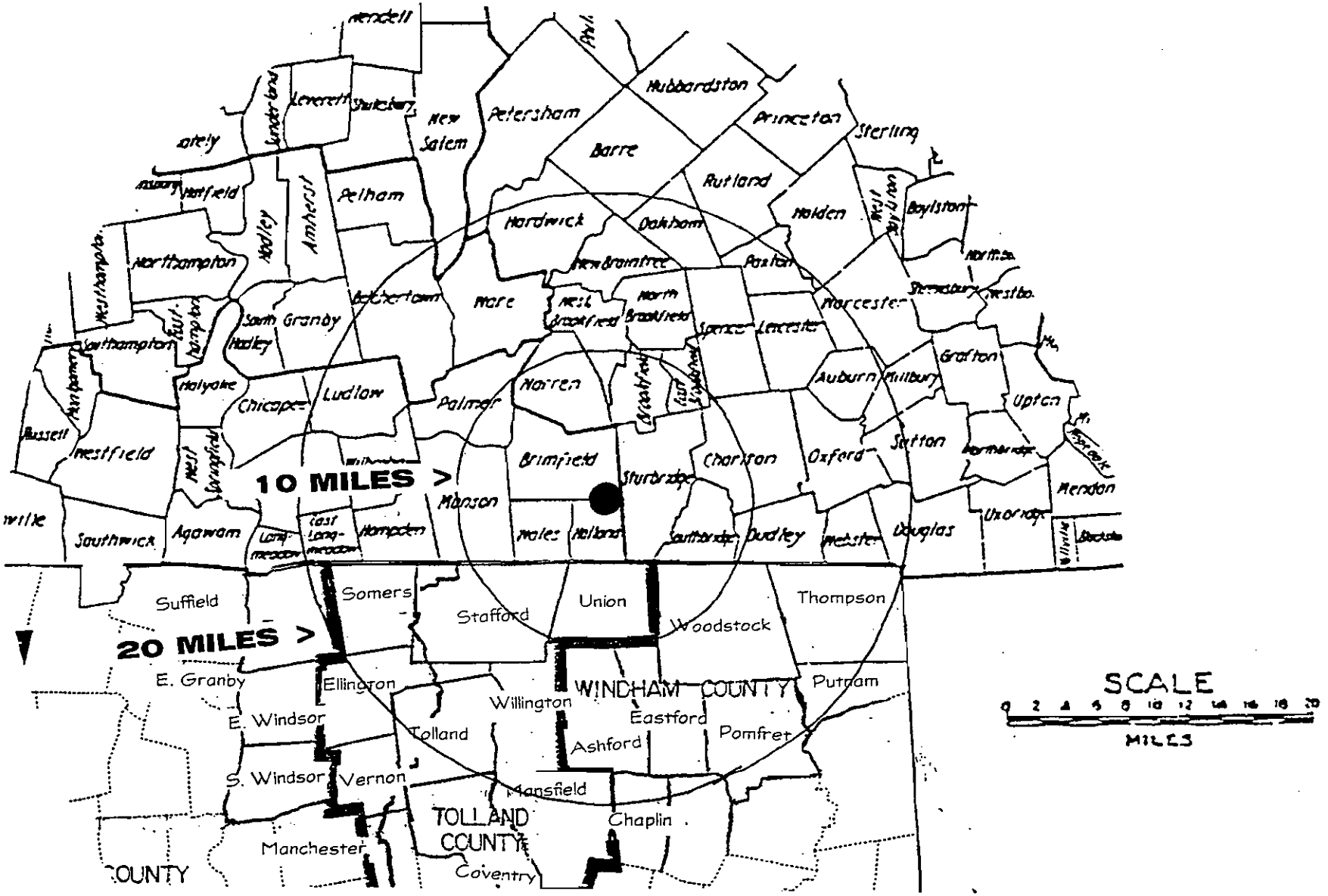
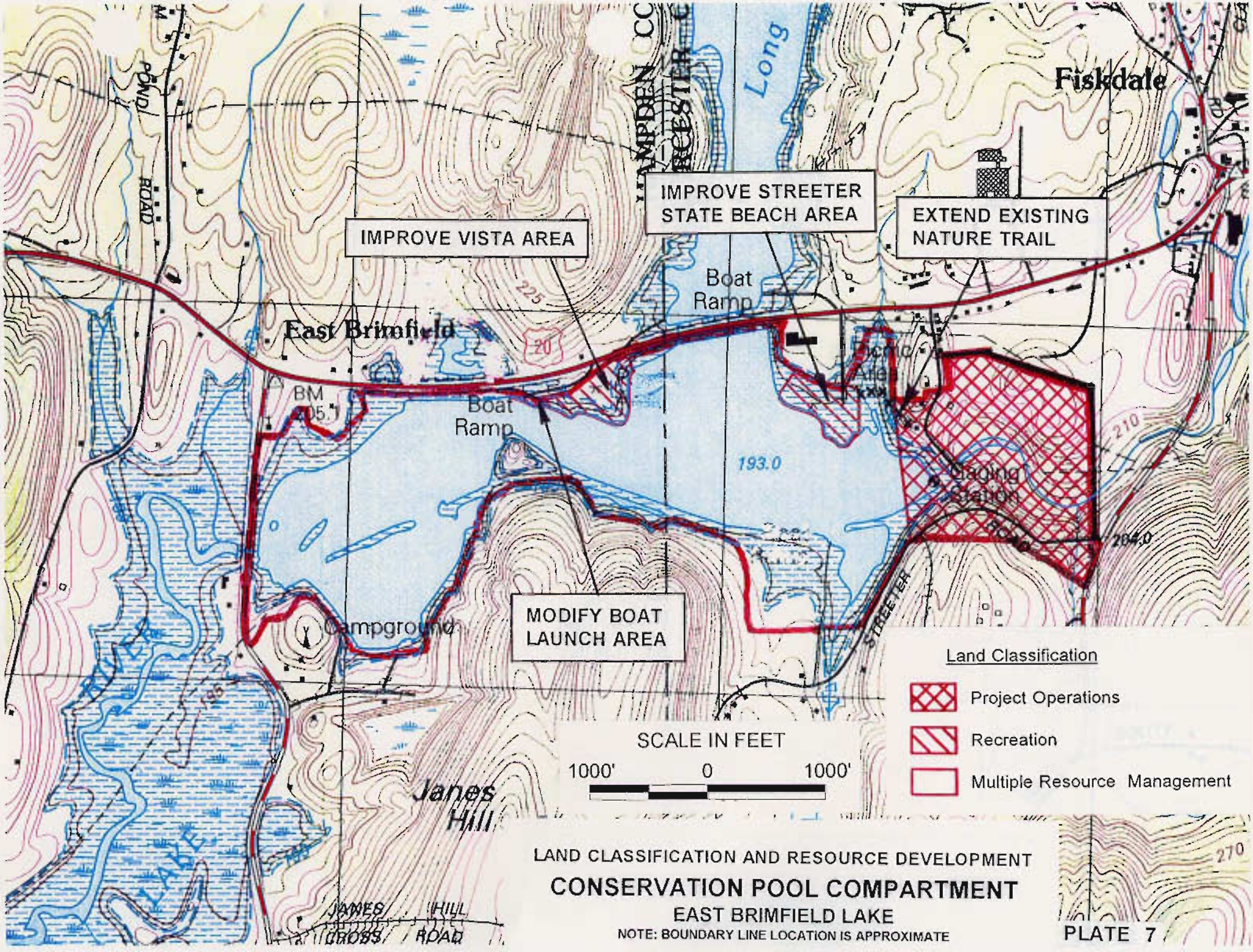

HOLLAND-EAST BRIMFIELD ROAD
PORK BARREL POND
GREEN POND
LA FLAMME RD.
PARKING
GROUP USE AREA
LOST LAKE
GRAVEL & SAND BORROW PIT (RESERVED FOR PROJECT NEEDS)
HOLLAND BRIMFIELD
BRIDGE ROAD
FIVE
ALEXANDER RD.
EAST BRIMFIELD ROAD
GATE
PARKING
GRAVEL BOAT RAMP
MORSE ROAD
CROSS ROAD
QUINEBAUG RIVER
VISTA POND ROAD
PARKING (7 CARS)
HOLLAND POND
Canoe Launch Area & Parking
BRIDGE ROAD
COMFORT STATION
PICNIC
PARKING (120 CARS)
GATE
AUXILARY PARKING
CHANGE SHELTER
BEACH
COMFORT STATION
HILL ROAD
SPRINGFIELD GIRLS CAMP ROAD
PRIVATE HOMES
BRIMFIELD
SCALE IN FEET
500' 0 500'
LEGEND
FLOW LINE AT SPILLWAY CREST EL. 653.0
LIMIT OF LAND OWNED IN FEE
CONSERVATION POOL EL. 632.0
PERMANENT WATER AREA
EXISTING RECREATION FACILITIES
THAMES RIVER FLOOD CONTROL
EAST BRIMFIELD LAKE
EXISTING RECREATIONAL FACILITIES

PLATE 5



EAST BRIMFIELD LAKE
MARKET AREA

PLATE 6



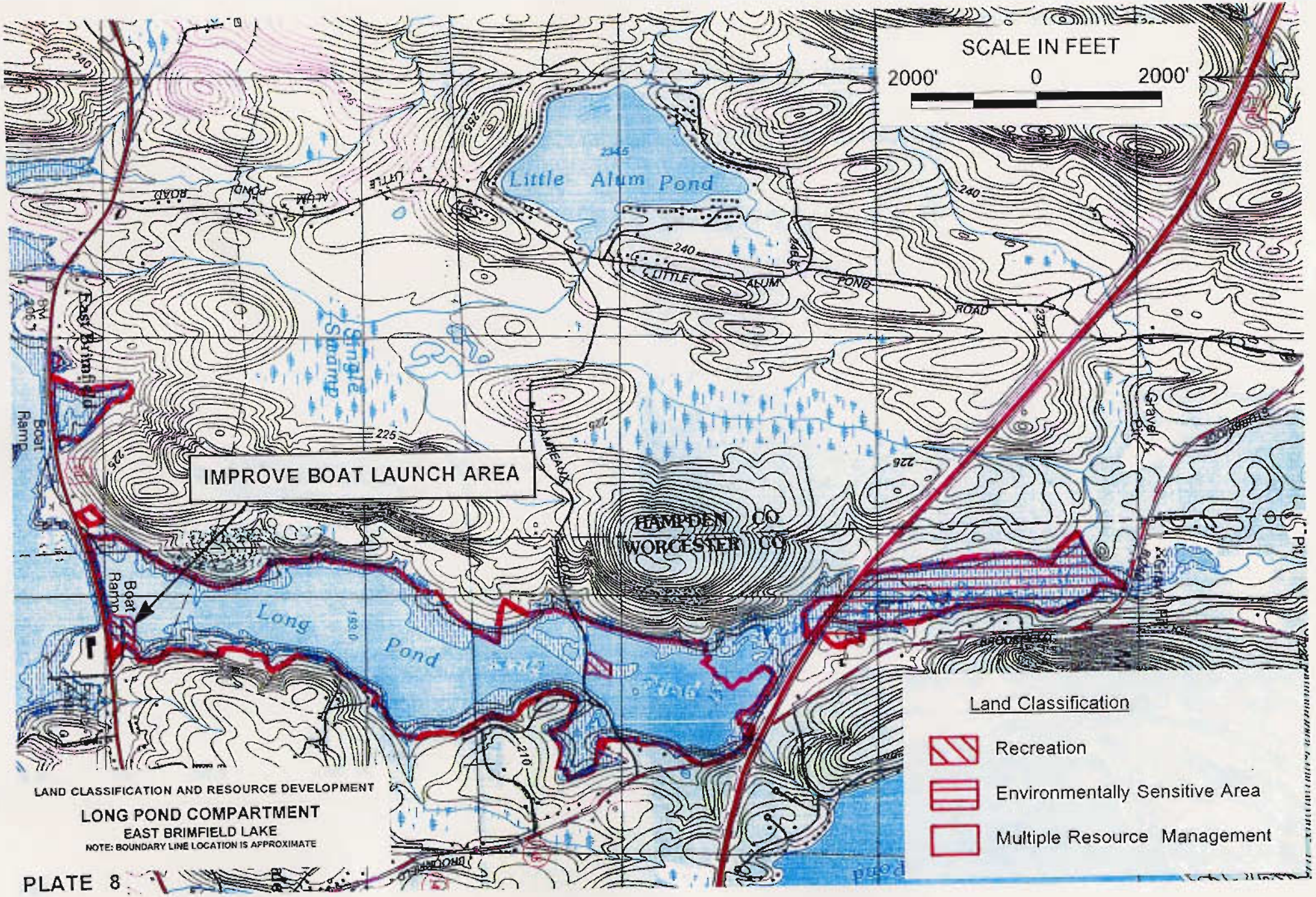
LAND CLASSIFICATION AND RESOURCE DEVELOPMENT

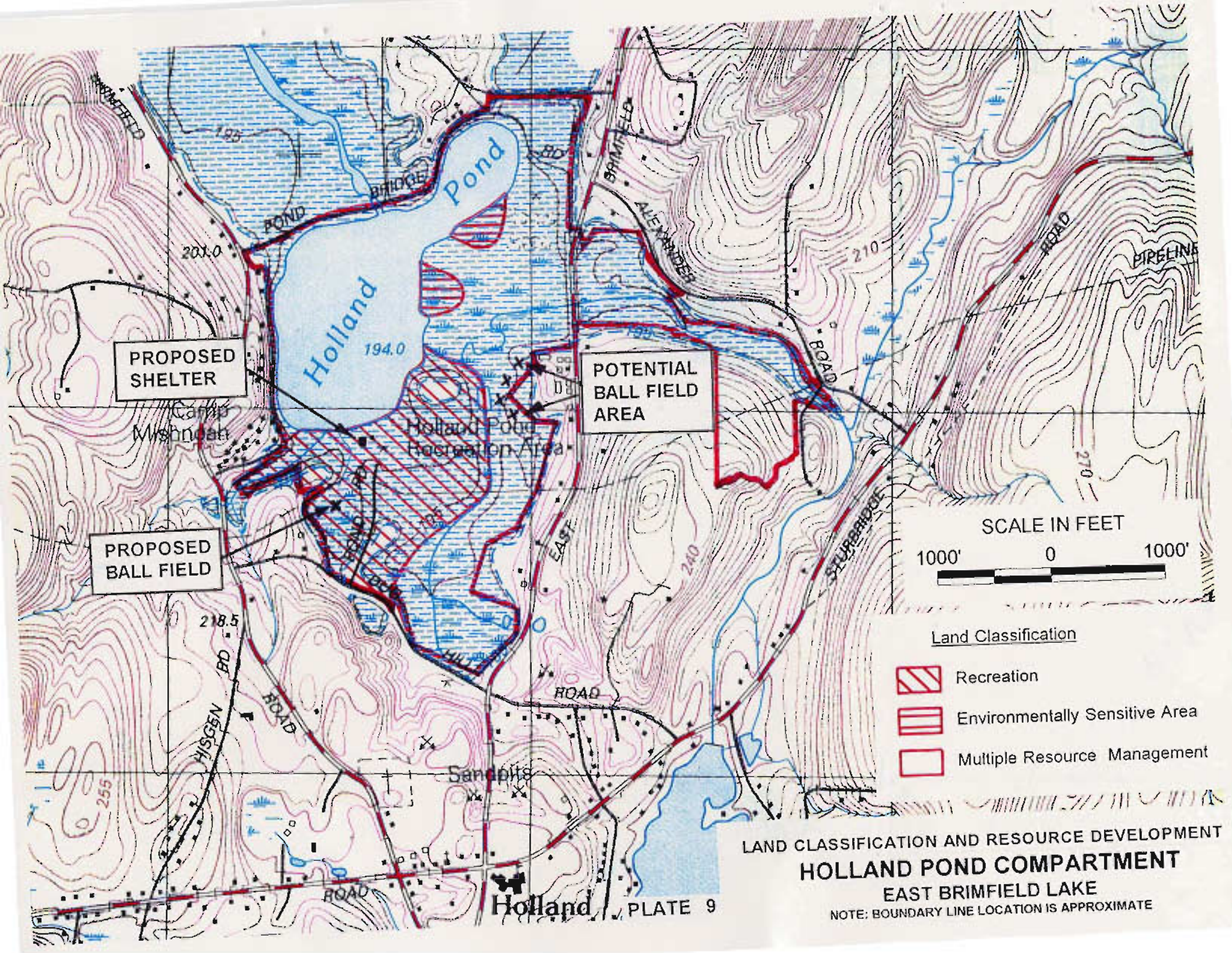
CONSERVATION POOL COMPARTMENT

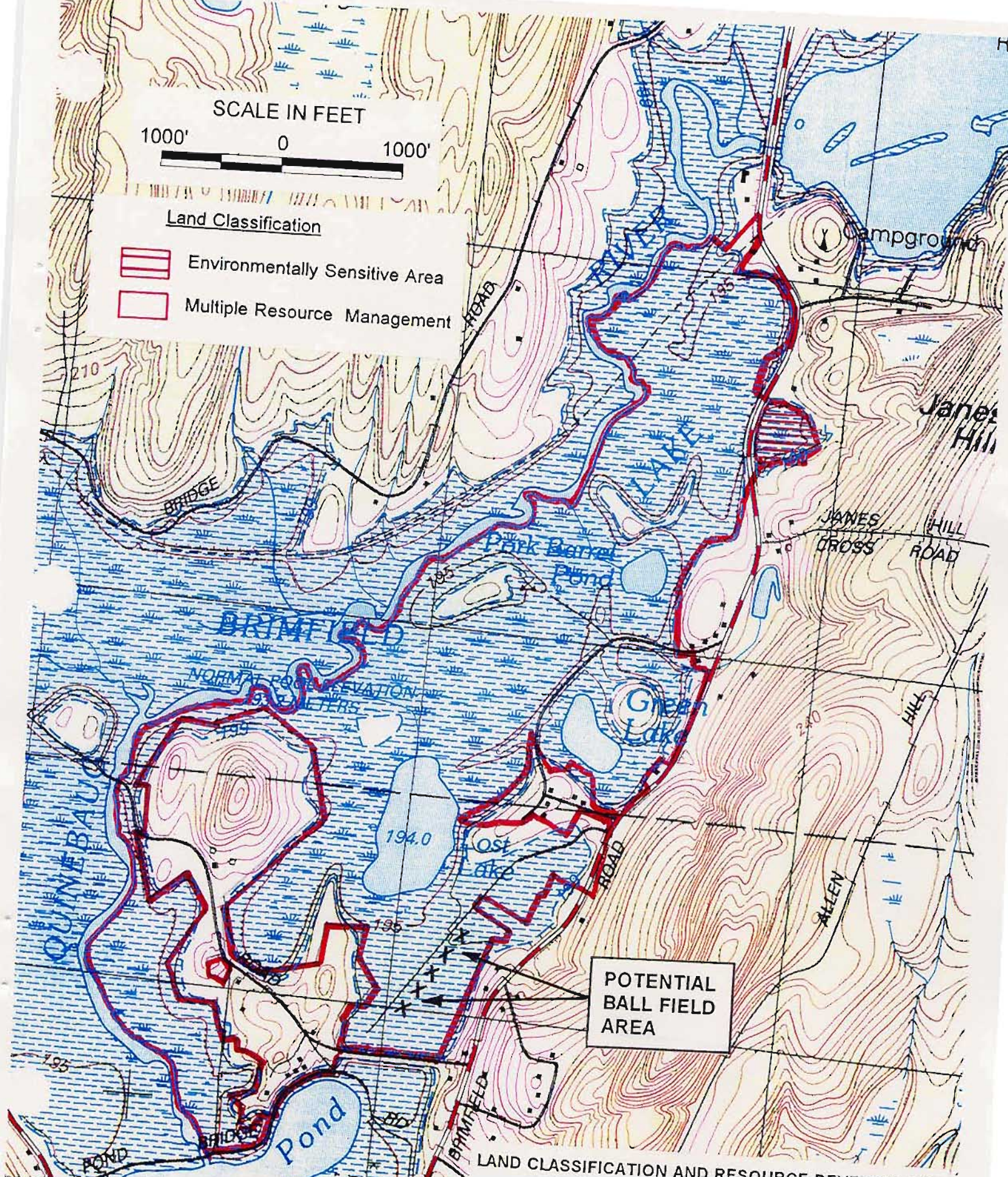
EAST BRIMFIELD LAKE

NOTE: BOUNDARY LINE LOCATION IS APPROXIMATE

PLATE 7


SCALE IN FEET
2000' 0 2000'
Little Alum Pond
LITTLE ALUM POND ROAD
IMPROVE BOAT LAUNCH AREA
HAMPDEN CO.
WORCESTER CO.
Long Pond
East Brimfield
Boat Ramp
Boat Ramp
Gravel Pit
Land Classification
Recreation
Environmentally Sensitive Area
Multiple Resource Management
LAND CLASSIFICATION AND RESOURCE DEVELOPMENT
LONG POND COMPARTMENT
EAST BRIMFIELD LAKE
NOTE: BOUNDARY LINE LOCATION IS APPROXIMATE
PLATE 8


PROPOSED SHELTER
POTENTIAL BALL FIELD AREA
PROPOSED BALL FIELD
Holland Pond
Camp Wyonegonic
Holland Pond Recreation Area
Sandpits
Holland
SCALE IN FEET
1000' 0 1000'
Land Classification
Recreation
Environmentally Sensitive Area
Multiple Resource Management
LAND CLASSIFICATION AND RESOURCE DEVELOPMENT
HOLLAND POND COMPARTMENT
EAST BRIMFIELD LAKE
NOTE: BOUNDARY LINE LOCATION IS APPROXIMATE
PLATE 9



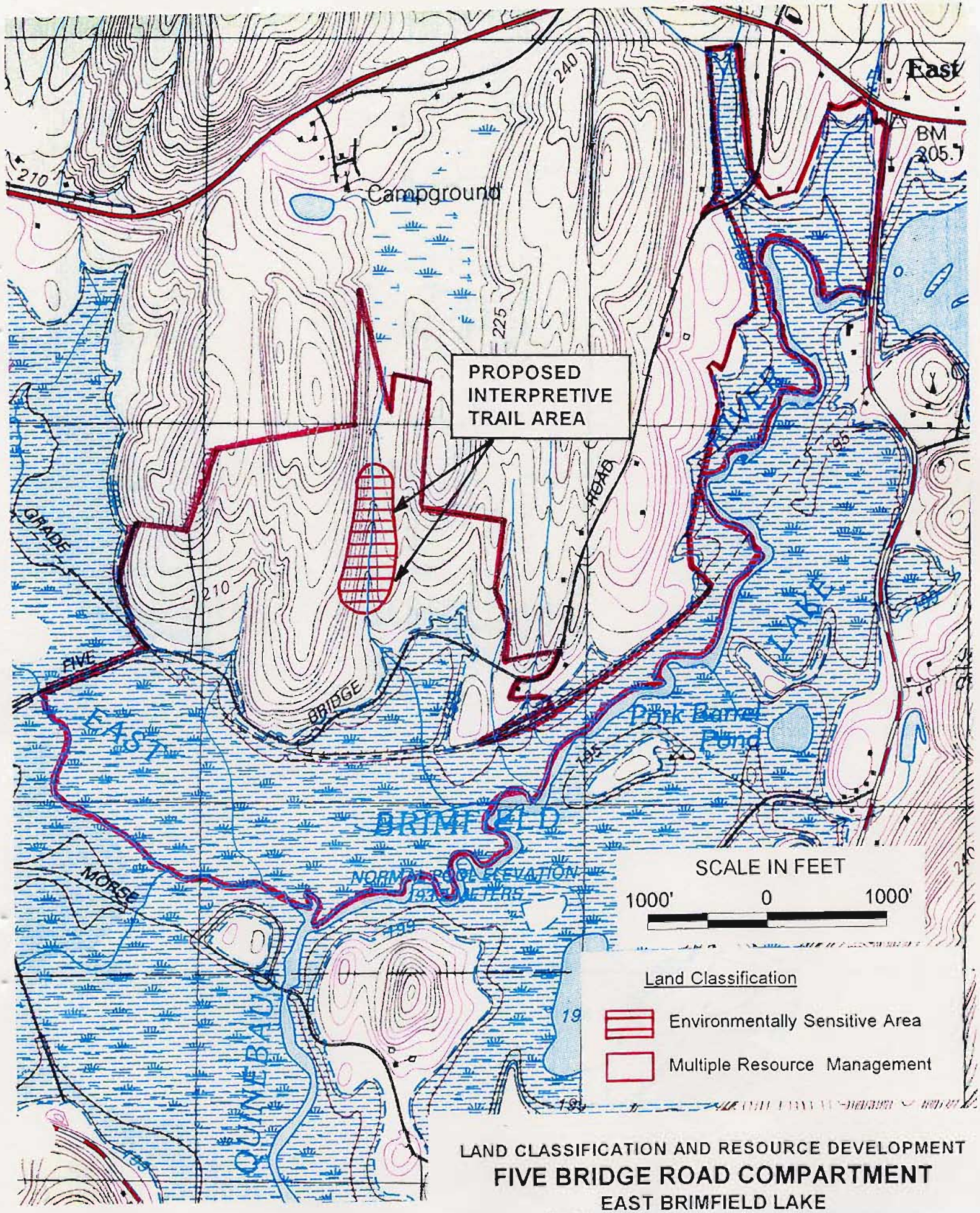
LAND CLASSIFICATION AND RESOURCE DEVELOPMENT

LOST LAKE COMPARTMENT

EAST BRIMFIELD LAKE

NOTE: BOUNDARY LINE LOCATION IS APPROXIMATE

PLATE 10



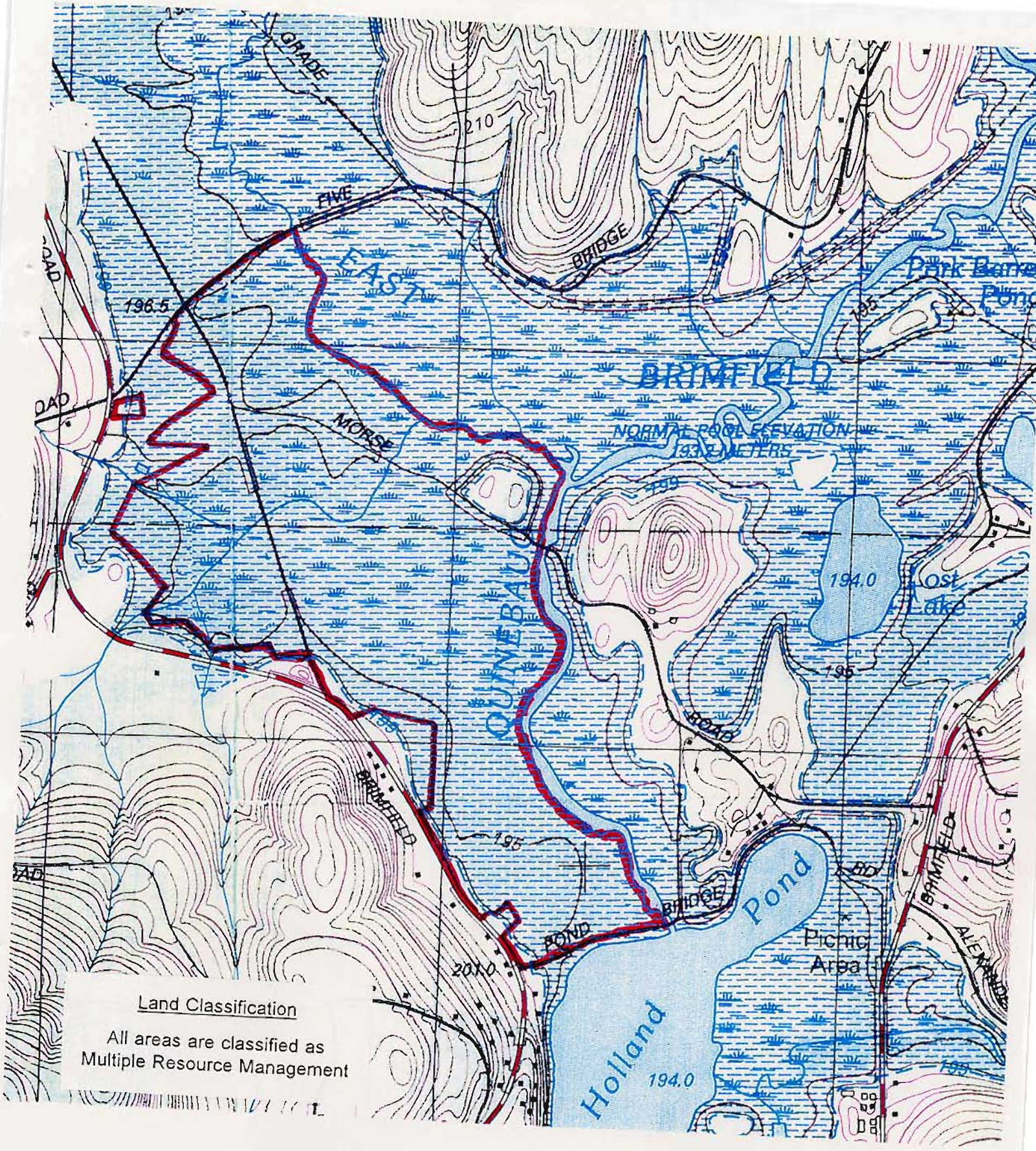
LAND CLASSIFICATION AND RESOURCE DEVELOPMENT

FIVE BRIDGE ROAD COMPARTMENT

EAST BRIMFIELD LAKE

NOTE: BOUNDARY LINE LOCATION IS APPROXIMATE

PLATE 11



SCALE IN FEET

1000' 0 1000'

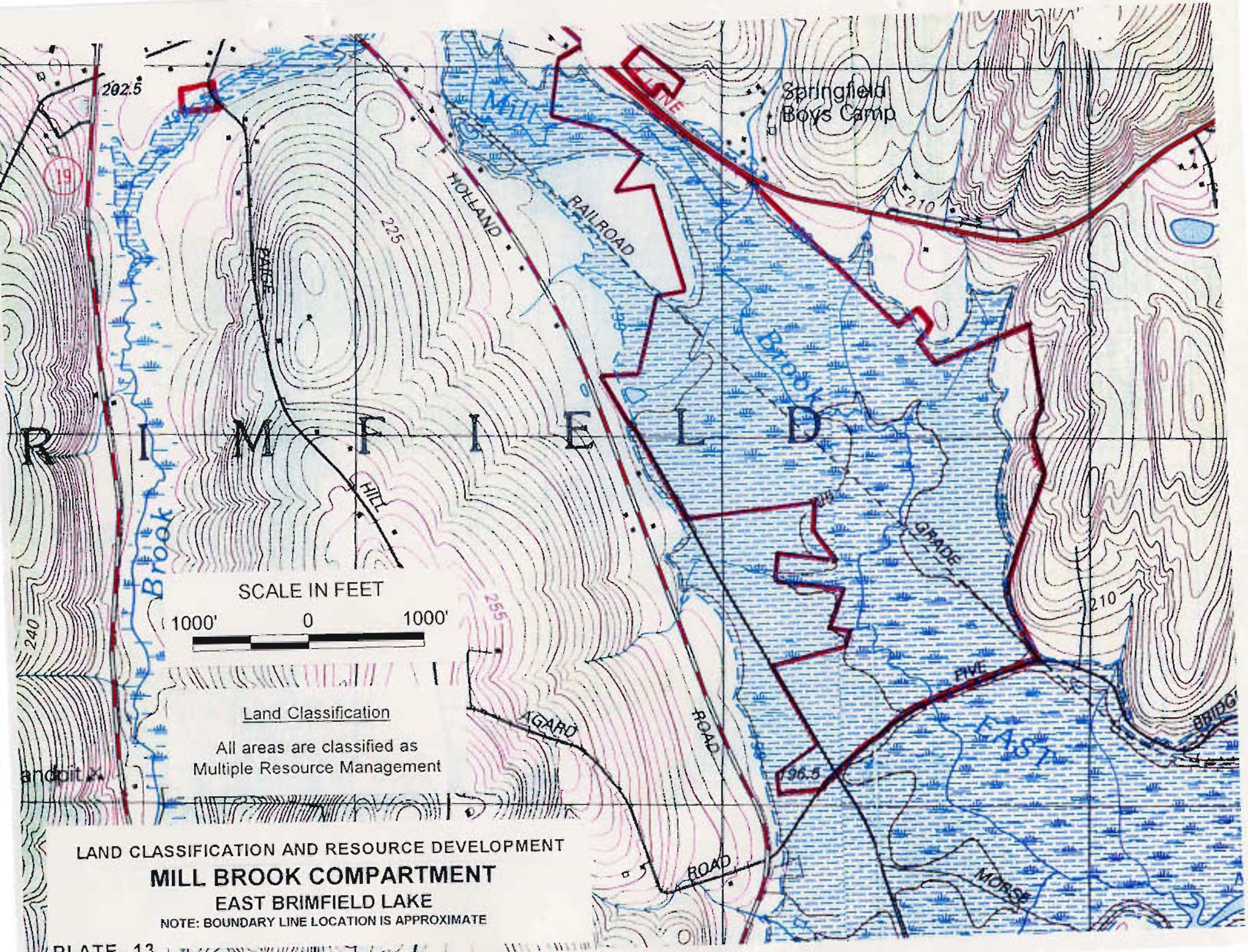
LAND CLASSIFICATION AND RESOURCE DEVELOPMENT

MORSE ROAD COMPARTMENT

EAST BRIMFIELD LAKE

NOTE: BOUNDARY LINE LOCATION IS APPROXIMATE

PLATE 12



LAND CLASSIFICATION AND RESOURCE DEVELOPMENT

MILL BROOK COMPARTMENT

EAST BRIMFIELD LAKE

NOTE: BOUNDARY LINE LOCATION IS APPROXIMATE

PLATE 13

Appendix A

Pertinent Correspondence

January 22, 1998

Engineering/Planning Division
Planning Branch

Mr. John A. Desmond
Basin Chief West
Massachusetts Department of
Environmental Protection
627 Main Street
Worcester, Massachusetts 01608

Dear Mr. Desmond:

Your letter of October 30, 1997, that was addressed to Lieutenant Colonel Michael W. Pratt, and faxed to Mr. Richard Heidebrecht of my staff, has been referred to me for response. It was our understanding that this version of the letter, which provides your review comments on the draft East Brimfield Lake Master Plan, was going to be revised. To date, this office has not received either an original or a revised comment letter from your office. However, since we feel that it is important to address your comments, we have prepared a response based on the letter we received by fax.

Your letter expressed the following concerns relative to the operation of the Army Corps of Engineers East Brimfield Lake flood control project. The letter suggested that as part of our update of the project's Master Plan, consideration be given to developing a minimum flow release for fish protection, and providing flow augmentation for industrial uses. It also suggested that the potential negative environmental impacts of such augmentation be considered as part of the study. These concerns were also discussed at a meeting that was held at your Worcester office on October 23, 1997. Mr. Robert Hanacek, the Basin Manager for projects within the Thames River Basin, attended this meeting. His staff is responsible for daily operation and maintenance of East Brimfield Lake.

Although the recommended studies are worthwhile efforts, they are beyond the scope of the Master Plan. The primary goals of the Master Plan are to prescribe an overall land and water resource plan, and to establish resource objectives and associated design and management concepts. The Master Plan deals in concepts, not in details of design or administration.

The detailed flow augmentation studies that you suggest would be conducted under a separate feasibility study. The following paragraph describes a program that could be used to pursue such studies.

A common program used by the Commonwealth for studies of this type is the Corps Planning Assistance to States (PAS) program. This program was established in the Water Resources Development Act of 1974 to enable states, and communities within the states, to use Corps expertise in planning for the water and related land resources of drainage areas within state boundaries. Investigations conducted under this program require 50 percent cost sharing by the project sponsor. Because of the limited funds available and the numerous requests for assistance, we have asked the Massachusetts Water Resources Commission to review and prioritize requests for assistance under this program. Any requests should be forwarded to Mr. Michael Gildesgame of the Massachusetts Department of Environmental Management to establish a priority. He can be reached at (617) 727-8900, extension 585.

Please review this program and inform my office if you feel that further study is warranted. At that time, funding requirements could be addressed.

I hope this information sufficiently addresses your concerns. This office looks forward to working with you on matters that concern the Quinebaug River Basin. If you have any questions or require any additional information, please do not hesitate to contact me at (781) 647-8500. Specific questions concerning the Master Plan can be addressed to Mr. Richard Heidebrecht of my staff at (781) 647-8513 or to Mr. Robert Hanacek at (508) 987-0108.

Sincerely,

Richard D. Reardon, P.E.
Chief, Engineering/Planning Division

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATERSHED MANAGEMENT

ARGEO PAUL CELLUCCI
Governor

TRUDY COXE
Secretary

DAVID B. STRUHS
Commissioner

TELECOPIER TRANSMITTAL SHEET -- PLEASE DELIVER AT ONCE!!

DATE: _____

FAX #: _____

PLEASE DELIVER THE FOLLOWING PAGE(S) TO:

NAME: Richard Heidebrecht

LOCATION: _____

FROM: John Desmond

TOTAL NUMBER OF PAGES BEING TRANSMITTED: 3 (INCLUDING THIS COVER SHEET)

ADDITIONAL INFORMATION:

Hard copy to Follow

PLEASE PHONE THE DEP, OWM SECTION IF YOU DO NOT RECEIVE THE CORRECT NUMBER OF PAGES (508) 792-7470.

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CENTRAL REGIONAL OFFICE

ARGEO PAUL CELLUCCI
Governor

TRUDY COXE
Secretary

DAVID B. STRUHS
Commissioner

October 30, 1997

Lt. Col. Michael W. Pratt
District Engineer
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149

Dear Lieutenant Colonel Pratt:

The Massachusetts Department of Environmental Protection (DEP) reviewed the Draft Master Plan dated September, 1997 for the East Brimfield Lake, and have the following concerns relative to the operation of the East Brimfield Dam which were not addressed in the Draft Master Plan.

1. In order to protect certain fish species from excessive habitat destruction during critical life stages a minimum flow release must be maintained in the river. The Department expects that a determination of the exact rate of flow will come from some type of habit analysis and an examination of available options.

2. Flow augmentation for certain industrial uses should be considered.

3. The potential negative impacts on wetland habitats upstream of the dam from flow augmentation should be considered.

Inasmuch as the operation of this dam will have an effect on each of the items listed above, all of which are of interest to DEP, I am requesting that DEP be given the opportunity of interacting with the Army Corps of Engineers in developing its Master Plan for dam operations in the Quinebaug River.

The Commonwealth of Massachusetts environmental agencies have recently reorganized to better coordinate addressing the wide variety of needs in each watershed. The Massachusetts Department of Environmental Protection (DEP) has developed Basin Teams which interact with other EOEA agencies on a regular basis, I am the current Quinebaug Basin Chief for DEP, and as such, will serve as contact to the Army Corps of Engineers on this matter.

Please contact me at (508) 792-7650, extension 3710, so that I may assist you in addressing the above mentioned issues.

Very truly yours,

John A. Desmond
Basin West Chief
Bureau of Resource Protection

cc:
DEP - DWS - Boston - ATTN: David Terry, Director
DEP - BRP - CERO - ATTN: Paul Hogan
DEP - DWM - CERO - ATTN: Kathleen Keohane
DEP - DWM - ATTN: Glen Haas
DEP - DWM - CERO - ATTN: G. Szal
DEP - DWM - CERO - D. Dunn
DEP - WPC - CERO - ATTN: W. Hack
DEP - WSC - CERO - ATTN: Lynne Welsh
EOEA - MEPA - ATTN: Douglas Vigneau

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

October 30, 1997

U.S. Army Corps of Engineers
New England District
ATTN. Mr. Richard Heidebrecht (Planning Branch)
424 Trapelo Road
Waltham, MA 92254-9149

Dear Mr. Heidebrecht:

Thank you for the opportunity to comment on the draft Master Plan for East Brimfield Lake. The synopsis in the Plan of the interim results of the rare species and exemplary plant community inventory contracted to this office was very well done, and the protections recommended for the main areas identified in the interim report are impressive. Below I have updates on occurrences of rare species and another, small, plant community from the recently submitted pre-final report, and some comments on other aspects of natural resource management in the Plan. The comments are in the order of the Master Plan.

On page 20, and scattered throughout other places in the Plan, there are references to control of the *Myriophyllum* that is dense in areas of the river and lakes of the project. Nowhere is the exact species given, and that is critical knowledge for managing the problem. Although we strongly recommend control of non-native and invasive species, we are also concerned about the approaches to that control. It is important to understand the reasons for any excessive growth: attempting to control invasive species without identifying and dealing with the factors that permit the growth can involve a great deal of non-productive effort. If extra nutrients are entering the system, some sort of excessive growth will likely continue or require constant management for many years. If harvesting is undertaken, many non-target species will be affected, and the process will have to be continued unless the causes are treated. If biological control agents are to be used, they must have been carefully chosen for species specific effects: and unless the causes of the original growth were addressed as well, some other species may well fill in. We recommend control of the patches of Purple Loosestrife (*Lythrum salicaria*) and Reedgrass (*Phragmites australis*) that occur in the wetlands, but they too will recur if the sources of the problem are not dealt with.

p. 20, Forest Lands. The initial part of this section would be more useful if integrated with the information on p. 22, with references to the relative abundances of the forest types. I found that because the cover-types are given in the order of the SAF number, there is an implication of importance that does not exist. That is, Red Pine cover type is actually not important in the total, but it is listed first. Because Red Pine is not native to southern Massachusetts, and plantations

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

have much less biodiversity than do naturally regenerating forests, it seems unfortunate to appear to highlight it. It would also be useful for planning purposes to include the implications of the young age of the forest: not only is the forest generally 40-60 years, but much of it is early successional species. These forests will change, white pine, poplar (aspen), and red maple are being naturally replaced by later successional hard woods. The Corps recent forest inventory is important for biodiversity planning as well as the timber management. Those sections of forest that are older are worth noting and maintaining for biodiversity and aesthetics. Where any forest is being timbered, issues of fragmentation and wildlife management need to be included in the activities, such as are implicit in the multiple use philosophy discussed. A particular planning issue arises from the likely infestation of the hemlocks by the woolly adelgid, an aggressive insect that is killing hemlock forests in Connecticut and is present in Massachusetts. This non-native species is impractical to control in forest situations. Contingency plans for managing the very nice hemlock forest need to be made. If there is no perceived fire or other hazard, the area might be left to natural succession.

p. 22, Open Lands (also p. 24). The acreage of undeveloped open lands is very small, but the plan includes the intention to open new areas. The biodiversity initiative of the Massachusetts Division of Fisheries & Wildlife, and the department we are part of, has developed a mission statement that addresses the needs for early successional vegetation while not fragmenting older forest. The BioDiversity Initiative's Upland Wildlife Management Program Goals are:

1. Identify appropriate sites for management of declining upland habitats (especially early-successional, post-agricultural herb/shrub plant communities), while maintaining extensive, unfragmented forestlands. Appropriate sites include former agricultural fields adjacent to existing fields or other open-land habitats at or near the periphery of extensive forestlands.
2. Implement strategies and techniques to manage and restore declining upland habitats to ensure they continue to support native biota.

We are suggesting looking at the landscape context of habitat management, and adjusting the management of a property to include consideration of habitats available on surrounding properties, and putting openings near existing openings. The mowing schedule of the open spaces at East Brimfield are given as variable: managing properties always requires flexibility and such schedules are difficult to maintain. We recommend reducing the monthly mowings to less often, and not mowing any except the weekly areas, in the spring until after July 15, to allow ground nesting birds to raise their young. The differences in aesthetics of grasslands mowed monthly or yearly are much less than the differences between weekly and monthly mowing. Annual mowing allows native wildflowers to develop to the flowering stage and maintain populations. Regularly mowed (weekly or monthly) areas become extremely simplified ecosystems. A few species of birds do use such depauperate habitats for feeding, but such habitats also occur plentifully in modern suburbia and don't need to be maintained for the wildlife diversity values on public lands. Most places have some sort of wildlife value, but it is minimal in regularly mowed grasslands.

p. 23 has a nice synopsis of the results given in the interim report we submitted on rare species and exemplary communities. The following additional information is from the pre-final report. There is a very good example of an acidic peatland, called a "floating bog" in several of the subcontractors reports. Located on the east side of the Brimfield Road in the Lost Lake Forestry Compartment, this is a significant occurrence of an uncommon type of natural community, and should be noted as such in the master plan. It is a sensitive community, and a designation as an Environmentally Sensitive Area would

increase its protection for the long term. Current project staff called it to our attention and are quite aware of its significance.

In the main, large wetland (Mill Brook, Five Bridges, Morse Road, and Holland Pond compartments), there are vernal pools with "obligate species", animals that require vernal pools for at least some of their life activities, usually reproduction. On the East Brimfield Lake Property, none of these species are state listed as rare, but they are indicators of the importance of these parts of the hydrologic system. In addition, we have records of two vernal pools south of Holland Pond that have been "certified," which means that by state law, any alteration to them requires that a Notice of Intent be filed with the Holland Conservation Commission. The vernal pools identified during our inventory were deemed to be certifiable, but have not been submitted for certification. From an ecological point of view, they should remain unaltered.

p. 24. While the concern about open fields has been addressed above, it is worth reiterating that habitat needs of some of the early successional and edge species can be met within the larger landscape, which may not be able to supply unfragmented forest. Edge habitat also naturally occurs along the streams, rivers, wetlands, and roads of the property. The master plan makes a good point about the hedge rows of native plants being good corridors.

p. 25. Water level fluctuations effect fresh water mussels if the flow becomes too low. Two state listed mussel species were identified on the property, a very good population of one has several subpopulations. More common mussel species also occur. Mussels need to be covered with water, and are threatened if the level is too low or too silt laden. Current practices have kept the species present on the site.

p. 26. An additional state-listed species was reported in the pre-final report of the rare species inventory: a water shrew (*Sorex palustris*) was found in the Northern Wetland along Ayer Brook, north of the Massachusetts Turnpike. This area has already been identified in the Master Plan as environmentally significant. The phrase "small mammals" should be removed from the sentence that lists the groups without rare species identified during the survey. Somewhere in the paragraph it would be appropriate to note that the wood turtle population appears to be a large, core population, likely an important source of turtles throughout the wetlands of the region around the ACOE property.

p. 35. We appreciate the sensitivity throughout the Master Plan shown by the use of the phrase "indigenous plant and wildlife," here used in paragraph 4. It supports our concern for maintaining habitats for appropriate native biological diversity.

Resource Management Objectives. p. 40. #3. Add Water shrew, although it is covered by the general phrasing. #4, the "floating bog", acidic peatland should be included in the exemplary communities, although again it is covered by the general phrasing. #4 also might include the protection of general wildlife values, since these habitats keep the typical and common from becoming rare. Somewhere, perhaps in #2, the control of non-natives before they become a problem ought to be listed as a priority. Also in #2, I read this as protecting the beaver activities, as stated on page 45, but it is perhaps ambiguous on p. 40. The beaver activities create much of the habitat mosaic that makes the wetlands extra valuable.

Throughout this section the phrase" increase value for wildlife" is regularly used. This is a moderately ambiguous phrase given the variety of wildlife species. Species of wildlife that need

unfragmented forest and occur in the larger parcels don't need openings. Openings for edge species should occur near existing disturbances, and not disrupt larger tracts of forest.

p. 43. Lost Lake. Add protecting the "floating bog" acidic peatland as a priority.

Five Bridge Rd compartment. Add as a priority limiting fragmentation of the forest currently used by neo-tropical migrant species of song birds that need a closed forest. Keep the hiking trails narrow to avoid introducing edge effects and edge species many of which prey on song birds. Logging carefully to avoid creating openings in the surrounding forests to maintain a buffer around the core would also help.

Morse Rd and Mill Brook. We suggest adding control of non-native species, particularly in the Mill Brook Compartment, before the invasive species become too widespread. Protection of the vernal pools throughout these sections should be a priority.

Land Classification. p. 45. The Long Pond discussion is exactly what is needed.

Holland Pond has certified vernal pools in the areas designated recreation, but no development is planned where they are..

p. 46. Lost Lake has the environmentally sensitive acidic peatland. It is in good shape now, and will continue to be so without nutrient enrichment or greater fluctuation of water levels.

Five Bridge Rd. Contains vernal pools and sedge fen area at the base of the hemlock ravine, which are sensitive to siltation and enrichment, but with that in mind, the multiple use category should be appropriate. A buffer should be established around the environmentally sensitive area.

Morse Rd and Mill Brook also have the vernal pools, wood turtle habitat, and mussels. General use is appropriate, with regard for the sensitivity to alteration.

Resource Development Plans p. 47. The trail around the ravine will need to be carefully placed to control erosion in the steep areas, and it should be narrow enough to not become a corridor for predators of nesting birds. Impact of ball fields extends beyond their construction. All potential ball fields should be put in with caution because the stream near by has freshwater mussels and is near wood turtle habitat. The mussels need clear water, and even temporary siltation from construction would cause problems. Ball fields require regular fertilizer which would need to be applied carefully not to affect the surrounding areas. Disposal of clippings needs to be outside of the wetlands areas. Associated parking areas would need to be carefully situated to avoid runoff and dust into the wetlands. The towns that want to establish ball fields will need to have ongoing sensitivity to the environmental issues of the ball fields. On Plate 9, the potential ball fields in the northern part of the area appear to be within Estimated Habitat of Rare Wetlands Wildlife, which requires that for any construction project a Notice of Intent must be filed with the town Conservation Commission and this office.

I hope these rather detailed comments are useful. The Master Plan has included great sensitivity to maintaining and protecting the rare and uncommon species and natural communities of the East Brimfield Lake property. These suggestions are based on the detailed information of the site that we were able to gain through the Corps' efforts.

Sincerely yours,

Pat Swain

Patricia Swain, PhD
Plant Community Ecologist

WESTBROOK FARM
176 WARREN ROAD • BRIMFIELD, MA 01010 • 413/245-3293

15 October 1997

Richard Heidebrecht
U.S. Army Corps of Engineers
New England District
424 Trapelo Road
Waltham, MA 02254-9149

Dear Mr. Heidebrecht;

I wish to submit the following comments on the East Brimfield Lake Draft Master Plan with particular attention to land use and cultural resources.

The scope and quality of the natural and cultural resources at the Lake are of regional importance to Massachusetts. It is located in a section of the state where growth pressure has remained modest, but which is poised to receive considerable new residential development. The communities which host the Lake lack resources to directly preserve open space of this size and importance, but state action aimed at establishing a greenway here is becoming more focused. This suggests that the Lake Master Plan should include goals of coordination with 1. local communities for their flood control and recreation needs, and 2. with state agencies for open space and environmental values. I support forest resource management and BMP agricultural uses.

The cultural resource sections of the Draft Plan include very brief descriptions of these resources. I would like to suggest that a fuller action plan be prepared with the help of the towns, to identify and interpret these resources. There are at least three major themes which help explain the historic importance of the Lake lands: 1.Native American occupation at Janes Hill, 2.water power sites for small mills and the factory village at East Brimfield, and 3.transportation routes of the Grand Trunk rail and the inter-urban trolley. Very little, if any, information is available to residents and visitors on these topics. Coordination by the Corps could draw together local groups to prepare and help implement a program of markers, trails etc.

Thank you for soliciting comments from residents and for the continued presence of this resource.

Sincerely,

Marcia D. Starkey

Marcia D. Starkey

Heidebrecht/eml/78513

September 30, 1997

Engineering/Planning Division
Planning Branch

1-

Dear 2-:

The purpose of this letter is to forward a copy of the draft East Brimfield Lake Master Plan for your review and comment. The report evaluated the natural and developed resources of the project, assessed regional needs and expressed public desires, and developed an overall land and water management plan for the project.

Public needs and desires were initially addressed with issuance of a Public Notice and News Release in June 1996. These documents announced the initiation of the study and invited elected officials, regional and local agencies, and concerned individuals to provide input to the study. Several workshop meetings were held in the study area with State and local officials. A formal public meeting was also held at the Brimfield Town Hall during the evening of July 21, 1997.

All comments should arrive at the following address no later than October 30, 1997, to ensure consideration for inclusion in the final report.

U.S. Army Corps of Engineers
New England District
ATTN: Mr. Richard Heidebrecht (Planning Branch)
424 Trapelo Road
Waltham, Massachusetts 02254-9149

Copies of this letter and the draft Master Plan will be hand-carried to libraries in the towns of Brimfield, Holland, and Sturbridge for posting. If you have any questions or require additional information, please contact Mr. Richard Heidebrecht at (617) 647-8513.

Sincerely,

Richard D. Reardon, P.E.
Chief, Engineering/Planning Division

Enclosure

3~

SAME LETTER TO:

Mr. Wayne F. McCallum, Director
Division of Fisheries and Wildlife
Leverett Saltonstall Building
100 Cambridge Street
Boston, Massachusetts 02202

Mr. Ralph Taylor, District Supervisor
Connecticut Valley Wildlife District
East Street
Belchertown, Massachusetts 01107

Mr. Chris Thurlow, District Supervisor
Division of Fish and Wildlife
221 Temple Street
West Boylston, Massachusetts 01583

Mr. Lee McLaughlin
Division of Fish and Wildlife
221 Temple Street
West Boylston, Massachusetts 01583

Mr. John Sheppard
Public Access Board
Department of Fisheries, Wildlife and
Environmental Law Enforcement
100 Nashua Street
Boston, Massachusetts 02114

Mr. Peter Webber, Commissioner
Department of Environmental Management
100 Cambridge Street
Boston, Massachusetts 02202

Mr. Howard Fife
MA Department of Environmental Management
Wells State Park
P.O. Box 602
Sturbridge, Massachusetts 01566

Mr. James Foley, Chairman
Board of Selectmen
Town of Holland
RR #2, Box 170
Holland, Massachusetts 01521
cf: Conservation Commission
Economic Development Committee
Parks and Recreation Committee

Mr. Martin J. Kelly, Chairman
Board of Selectmen
Town of Brimfield
Brimfield, Massachusetts 01010
cf: Conservation Commission
Parks and Recreation Committee

Mr. Paul Allen, Chairman
Parks and Recreation Committee
12 Tower Hill Road
Brimfield, MA 01010

Mr. John Keizer
Brimfield Conservation Commission
285 Little Alum Road
Brimfield, MA 01010

Mr. Henry Pelletier
Brimfield Conservation Commission
22 Brookfield Road
Brimfield, MA 01010

Mr. Charles Blanchard, Chairman
Board of Selectmen
Sturbridge Town Hall
308 Main Street
Sturbridge, Massachusetts 01566
cf: Mr. James Malloy, Town Administrator
Conservation Commission
Parks and Recreation Commission

Mr. Daniel Szumilas
Sturbridge Conservation Commission
127 Gifford Road
Sturbridge, MA 01566

Ms. Patricia Swain, PhD
Plant Community Ecologist
Natural Heritage and Endangered Species Program
Route 135
Westborough, Massachusetts 01581

Mr. Roger Hunt
Quinebaug Rivers Association, Inc.
20 Kenilworth Road
Worsester, MA 01602

Ms. Marcia Starkey
71 Warren Road
Brimfield, MA 01010

Mr. Doug Dickinson
P.O. Box 609
12 Sizer Drive
Wales, MA 01081

Ms. Kay Konove
81 Five Bridge Road
Brimfield, MA 01010

Ms. Julie C. Prior
Brimfield State Forest Advisory Committee
6 Cedar Swamp Road
Monson, MA 01057

Mr. John A. Desmond
Basin Chief West
Bureau of Resource Protection
Central Region Office DEP
627 Main Street
Worcester, MA 01608

Mr. Gerald Szal, Aquatic Ecologist
MA Division of Waterahed Management
627 Main Street, 2nd Floor
Worcester, MA 01608

July 16, 1997

Dear Mr. Heidebrecht;

We recently were informed of a public hearing to be held on July 21, regarding plans for the East Brimfield Lake project. We will , unfortunately, be away at summer camp that week, and cannot make this meeting. We would, however, like to offer our suggestions. Our Boy Scout troop (# 163, Sturbridge) has camped at lost lake for several years. We understand this area is "officially" closed, but the project manager, Mr. Tryba, allows us and other scout troops to use the area.

We want to express our interest in seeing this area "officially" opened for use by youth groups for camping. We understand that this is why it was originally built. As this general area continues to develop with houses, we are loosing good sites for camping. We would hope plans could be developed for adding a drinking water source, some type of shelter, and a camp fire ring.

Our troop has helped clean up this area, and we would be available to volunteer to help improving lost lake.

Sincerely,

Paul VanCamp

Mr Paul VanCamp
Committee Chairman,
Boy Scout Troop 163

July 8, 1997

Engineering/Planning Division
Planning Branch

1~

Dear 2~:

The New England District of the U.S. Army Corps of Engineers is updating the existing Master Plan at its East Brimfield Lake flood control project in south central Massachusetts. The East Brimfield Lake impoundment area occupies portions of the towns of Brimfield, Holland, and Sturbridge. The purpose of the study is to assess the natural and developed resources of the project, determine regional needs and public desires, and develop an overall land and water management plan for the project. The study is scheduled for completion in the fall of 1997.

You are invited to participate in the following public meeting. Preliminary results of the study will be presented, and the public will be invited to provide their input to the Master Plan.

East Brimfield Lake Master Plan Meeting
July 21, 1997 at 7:00 p.m.
Brimfield Town Hall
Main Street
Brimfield, Massachusetts 01010

If you have any questions or require additional information, please contact the Study Manager, Mr. Richard Heidebrecht, at (617) 647-8513.

Sincerely,

Richard D. Reardon, P.E.
Chief, Engineering/Planning Division

3~

SAME LETTER TO:

Mr. Wayne F. McCallum, Director
Division of Fisheries and Wildlife
Leverett Saltonstall Building
100 Cambridge Street
Boston, Massachusetts 02202

Mr. Ralph Taylor, District Supervisor
Connecticut Valley Wildlife District
East Street
Belchertown, Massachusetts 01107

Mr. Chris Turlow, District supervisor
Central Wildlife District
221 Temple Street
West Boylston, Massachusetts 01583

Mr. John Sheppard
Public Access Board
Department of Fisheries, Wildlife and
Environmental Law Enforcement
100 Nashua Street
Boston, Massachusetts 02114

Mr. Peter Webber, Commissioner
Department of Environmental Management
100 Cambridge Street
Boston, Massachusetts 02202

Mr. Howard Fife
MA Department of Environmental Management
Wells State Park
P.O. Box 602
Sturbridge, Massachusetts 01566

Mr. James Foley, Chairman
Board of Selectmen
Town of Holland
RR #2, Box 170
Holland, Massachusetts 01521
cf: Conservation Commission
Economic Development Committee
Parks and Recreation Committee

Mr. Martin J. Kelly, Chairman
Board of Selectmen
Town of Brimfield
Brimfield, Massachusetts 01010
cf: Conservation Commission
Parks and Recreation Committee

Mr. Charles Blanchard, Chairman
Board of Selectmen
Sturbridge Town Hall
308 Main Street
Sturbridge, Massachusetts 01566
cf: Mr. James Malloy, Town Administrator
Conservation Commission
Parks and Recreation Commission

Ms. Patricia Swain, PhD
Plant Community Ecologist
Natural Heritage and Endangered Species Program
Route 135
Westborough, Massachusetts 01581

Commonwealth of Massachusetts
Department of Fisheries, Wildlife & Environmental Law Enforcement

Public Access Board

1440 Soldiers Field Road • Brighton, Massachusetts 02135
(617) 727-1843 • FAX (617) 727-7214

John P. Sheppard, *Director*

April 7, 1997

Col. Michael S. Meuleners
U. S. Army Corp of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02254-9149

Dear Col. Meuleners:

This agency, the Mass. Public Access Board (P.A.B.), is the engineering and technical agency within the Department of Fisheries, Wildlife, and Environmental Law Enforcement (D.F.W.E.L.E.). As such, we were up until recently involved in the management of the boat ramp on East Brimfield Reservoir when said ramp was under the management of the Massachusetts Department of Environmental Management, Division of Forests and Parks as part of a now expired agreement with the Corps of Engineers.

As this site is of considerable interest to the D.F.W.E.L.E. because of its obvious access to a significant cold and warm-water fishery we are interested in exploring the possibility of a Memorandum of Understanding (MOU) whereby we may assist the Corps in both the area of improved design (function) and repairs at this facility and other fishing related facilities on East Brimfield Reservoir.

If there is interest on the part of the Corps to pursue this matter further, please contact my office and possibly we can arrange some informal talks to develop a framework for the MOU.

Please call if you have any questions or if I can be of assistance in any other way.

Sincerely,

John P. Sheppard
Director

JPS/vas

cc: Bob Hanacek/Basin Mgr./Corps. of Engineers

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

July 16, 1996

New England Division
Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149

Attn: Richard Heidebrecht,
Planning Directorate
Formulation Division

Dear Mr. Heidebrecht:

Director Wayne F. MacCallum of the Massachusetts Division of Fisheries & Wildlife (DFW) has asked me to respond to Joseph Ignazio's request of June 12, 1996, for input into the master plan for the East Brimfield Lake project.

As you know, the ACOE-NED has contracted with DFW's Natural Heritage & Endangered Species Program to conduct an inventory for rare species and uncommon or exemplary plant communities in the East Brimfield project area in 1996. Mr. Mike Penko of the ACOE-NED office has been our contact on this project. So far, several state listed species of turtle have been identified on the property. The inventory is continuing throughout the summer. We will be providing management suggestions for all rare species and exemplary or uncommon plant communities identified on the project. The habitat of the turtles which are identified as rare wetlands wildlife, is protected under state law. The ACOE will be receiving an interim report September 15, with a draft final report due on December 15, 1996. The habitat maps will be included in the final report. We hope that our suggestions for managing the populations of rare species will be incorporated into the site master plan.

Any questions regarding this inventory should be addressed to me at the address below. My phone is (508) 792-7270, ext.160.

Sincerely yours,

Patricia Swain

Patricia Swain, PhD
Plant Community Ecologist

cc. Mike Penko, ACOE
Wayne MacCallum, DFW,
Patricia Huckery, Wetlands Environmental Reviewer, DFW

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

Economic Development Board
Town Hall, Holland, MA 01521-9712
413-245-7108

July 8, 1996

Mr. Richard Heidebrecht
U.S. Army Corps of Engineers
Formulation Division
424 Trapelo Road
Waltham, MA 02254-9149

Dear Mr. Heidebrecht:

I am writing to provide input, as the news release refers to it, concerning the Army Corps' plan to update the East Brimfield flood control project. The Economic Development Board of the Town of Holland is looking to develop the natural resources of our area for ourselves as well as for tourists as a means to increase our tax base.

This letter is about the seven mile flat water river canoe trail which you mention is designated as a National Watchable Wildlife Trail. No one can watch wildlife on this trail because one is too preoccupied trying to navigate the canoe through the intense buildup of weeds on the trail. It is basically unusable during the summer months. I have been in contact with the Army Corps numerous times concerning this. I was told that not only is the Corps refusing to help us cut the weeds back (too expensive) but that they are going to continue to divert much of the water for the use of the American Optical Company in Southbridge.

If you are revamping your plans for this flood control area, the Economic Development Board and local canoe enthusiasts would be quite pleased if you would consider the condition of the canoe trail as you do this.

Thank you.

Sincerely,

Debbie Benveniste

Debbie Benveniste, Clerk
Economic Development Board

COMMONWEALTH OF MASSACHUSETTS

DIVISION OF FISHERIES & WILDLIFE

Chris Thurlow, Manager

June 26, 1996

Mr. Richard Heidebrecht
Formulation Division
U S Army Corp. Of Engineers
424 Trapelo Rd.
Waltham MA 02254-9149

Dear Richard:

I am writing in regard to the Public Notice of 6/15 regarding East Brimfield Lake. Please contact me if you need input regarding any fishery concerns that arise during your master plan study.

Sincerely,

Lee McLaughlin,
Central District Aquatic Biologist
508-835-3607

Central Wildlife District
Temple Street, West Boylston, Massachusetts 01583
508-835-3607 Voice 508-792-7420 Fax
An Agency of the Department of Fisheries, Wildlife & Environmental Law Enforcement

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

June 12, 1996

Planning Directorate
Formulation Division

Honorable Robert D. Wetmore
Massachusetts Senate
State House, Room 409
Boston, MA 02133

Dear Senator Wetmore:

This is to inform you that the New England Division of the U.S. Army Corps of Engineers has initiated a master planning study at its East Brimfield Lake project in south central Massachusetts. The East Brimfield Dam is located on the Quinebaug River in Sturbridge, and the flood impoundment area occupies portions of Brimfield, Holland, and Sturbridge. The purpose of the study is to develop an overall management plan for the project based on an evaluation of natural and manmade resources, regional needs, and public desires. The study is scheduled for completion in April 1997.

Copies of the Public Notice and News Release are enclosed for your information. They have been forwarded to the Federal Congressional delegation and the news media.

At this time we are requesting any comments or other input that you may have concerning existing conditions, present or future programs, or other information that may assist us in developing a management plan for the project.

If you have any questions concerning the investigation, please do not hesitate to contact Mr. Richard Heidebrecht, the Study Manager, at (617) 647-8513.

Sincerely,

Joseph L. Ignazio
Director of Planning

Enclosures

Same letter sent to:

Honorable Robert D. Wetmore
Massachusetts Senate
State House, Room 409
Boston, MA 02133

Honorable David Peters
Massachusetts House of
Representatives
State House, Room 443
Boston, MA 02133

Honorable Patrick Landers
Massachusetts House of
Representatives
State House, Room 134
Boston, MA 02133

Mr. Wayne F. McCallum, Director
Division of Fisheries and Wildlife
Leverett Saltonstall Building
100 Cambridge Street
Boston, MA 02202

Mr. Ralph Taylor, District Supervisor
Connecticut Valley Wildlife District
East Street
Belchertown, MA 01107

Mr. Chris Turlow, District supervisor
Central Wildlife District
221 Temple Street
West Boylston, MA 01583

Mr. John Sheppard
Public Access Board
Department of Fisheries, Wildlife and
Environmental Law Enforcement
100 Nashua Street
Boston, MA 02114

Nr. Peter Webber, Commissioner
MA Department of Environmental Management
100 Cambridge Street
Boston, MA 02202

MA Department of Environmental Management
Division of Forests and Parks
P.O. Box 484
Amherst, MA 01004

Mr. Howard Fife
MA Department of Environmental Management
Wells State Park
P.O. Box 602
Sturbridge, MA 01566

Board of Selectmen
Town Hall
Holland Center
Holland, MA 01521
cf: Conservation Commission
Economic Development Committee
Parks and Recreation Committee

Board of Selectmen
Town Hall
Brimfield, MA 01010
cf: Conservation Commission
Parks and Recreation Committee

Board of Selectmen
Town Hall
Main Street
Sturbridge, MA 01566
cf: Conservation Commission
Parks and Recreation Commission

Board of Selectmen
Town Hall
Hollow Road
Wales, MA 01081

June 5, 1996

Planning Directorate
Formulation Division

Honorable Edward M. Kennedy
United States Senate
Washington, DC 20510-2101

Dear Senator Kennedy:

I am writing to inform you that the New England Division of the U.S. Army Corps of Engineers has initiated a study to update the existing Master Plan at its East Brimfield Lake project in south central Massachusetts. The East Brimfield Dam is located on the Quinebaug River in Sturbridge, and the flood impoundment area occupies portions of Brimfield, Holland, and Sturbridge. The purpose of the study is to develop an overall management plan for the project based on an updated evaluation of natural and manmade resources, regional needs, and public desires. The study is scheduled for completion in April 1997.

Copies of the Public Notice and News Release are enclosed for your information. They will be forwarded to concerned governmental and other interests, and the media to solicit information and/or comments concerning the study.

If you have any questions concerning the investigation, please do not hesitate to contact me at (617) 647-8220. Mr. Richard Heidebrecht is the Study Manager. He can be reached at (617) 647-8513.

Sincerely,

Earle C. Richardson
Colonel, Corps of Engineers
Division Engineer

Enclosures

SAME Letter
Sent to:

United States Senate

Honorable Edward M. Kennedy
United States Senate
Washington, DC 20510-2101

Honorable Edward M. Kennedy
United States Senator
2400 JFK Federal Building
Boston, MA 02203

Honorable John F. Kerry
United States Senate
Washington, DC 20510-2102

Honorable John F. Kerry
United States Senator
One Bowdoin Square
Tenth Floor
Boston, MA 02114

MA Congressman
1st District
Honorable John W. Olver
House of Representatives
Washington, DC 20515-2101

Honorable John W. Olver
Representative in Congress
187 High Street
Holyoke, MA 01040

2nd District
Honorable Richard E. Neal
House of Representatives
Washington, DC 20515-2102

Honorable Richard E. Neal
Representative in Congress
1550 Federal Building
Springfield, MA 01103

3rd District
Honorable Peter I. Blute
House of Representatives
Washington, DC 20515-2103

Honorable Peter I. Blute
Representative in Congress
1079 Mechanics Tower
Worcester, MA 01608

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

June 5, 1996

PUBLIC NOTICE

INITIATION OF A MASTER PLANNING STUDY
EAST BRIMFIELD LAKE
MASSACHUSETTS

The U.S. Army Corps of Engineers, New England Division, has initiated a study to update the existing Master Plan at its East Brimfield Lake flood control project. The East Brimfield Lake project is located on the Quinebaug River in south central Massachusetts. As shown on the attached map, the dam and reservoir area are located in the communities of Brimfield, Holland, and Sturbridge.

The purpose of the study is to assess the natural and manmade resources of the project, determine regional needs and public desires, and develop an overall land and water management plan for the project.

At this time we are requesting input from public officials, concerned citizens, and others that may be able to provide information or assistance in updating the master plan. If you are able to provide this type of assistance, please contact the Study Manager, Richard Heidebrecht, at (617) 647-8513, or at the following address:

U.S. Army Corps of Engineers
Formulation Division
ATTN: Richard Heidebrecht
424 Trapelo Road
Waltham, MA 02254-9149

Earle C. Richardson
Colonel, Corps of Engineers
Division Engineer

News Release

US Army Corps of Engineers
New England Division

Release No. 96-135
For Release: Upon Receipt

Contact: Sue Douglas
Phone: 617-647-8264

424 Trapelo Road, Waltham, MA 02254-9149

June 7, 1996

East Brimfield Lake Master Plan Update

WALTHAM, Mass. -- The management plan for 2,070 acres of land and water surface area at the East Brimfield flood control project in south-central Massachusetts is being updated by the U.S. Army Corps of Engineers. To assist in developing an updated master plan, the Corps' New England Division is requesting input from public officials, concerned citizens, and others who may be able to provide information or assistance.

Along the shore of the permanent pool, which covers 360 surface acres, is Streeter Point Beach which is managed by the Massachusetts Department of Environmental Management. In addition to the sandy beach area, the site features a picnic area which includes 40 picnic tables, 10 fireplaces, a grassy area, drinking water, parking and sanitary facilities.

The project lands also encompass Holland Pond, a 65-acre natural lake about seven miles upstream of the dam, and 15-acre Lost Lake, about one mile north of Holland Pond. The Town of Holland operates a beach and picnic area on Holland Pond.

Two boat ramps at East Brimfield Lake and one at Holland Pond provide access for canoeing, sailing and water skiing. The facility also provides a seven-mile flat water river canoe trail which is designated as a National Watchable Wildlife Trail.

East Brimfield offers excellent opportunities for fishing, including such species as native bass, pickerel, perch, northern pike and horned pout as a result of a state stocking program. Hunters will find state-stocked small pheasant and native rabbit, squirrel, and deer.

The 520-foot long, 55-foot high East Brimfield Dam on the Quinebaug River and its associated reservoir are situated in the communities of Brimfield, Holland and Sturbridge. Completed at a cost of $7 million in 1960, the dam can impound a 2,270-acre reservoir capable of storing 9.7 billion gallons of water. To date, the facility has prevented damages of $38.9 million.

Anyone wishing to provide input may do so by contacting Richard Heidebrecht at the New England Division, U.S. Army Corps of Engineers, 424 Trapelo Road, Waltham, MA 02254-9149, telephone 617-647-8513.

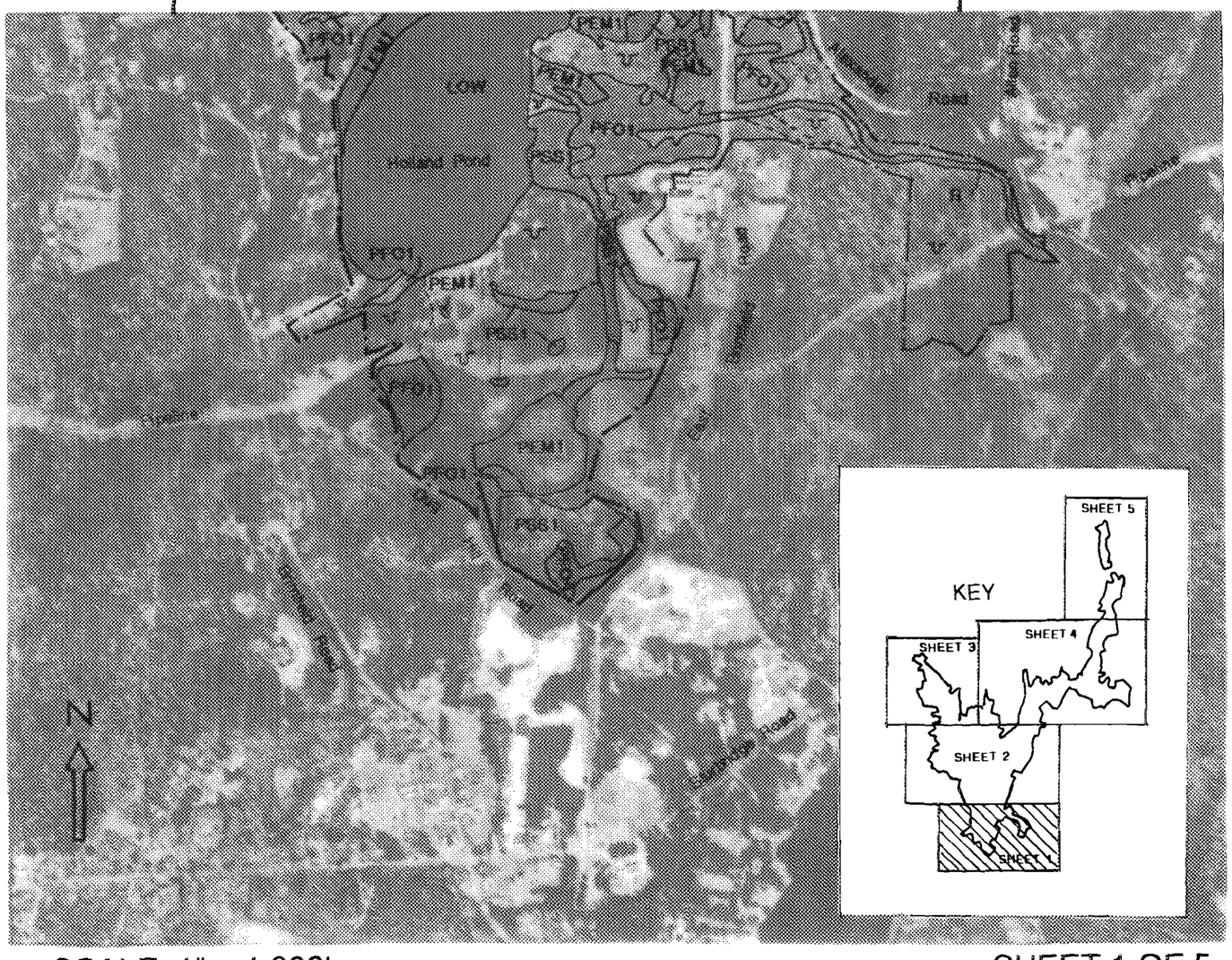
-30-

Public Notice Attached

Appendix B

Wetland Maps

MATCHES SHEET 2



SCALE: 1" = 1,000'

SHEET 1 OF 5

LEGEND

LACUSTRINE

LOW	Open Water, More Than 20 Acres (252.8 Acres)
LAB1	Aquatic Bed Vegetation, Rooted Vascular (66.7 Acres)
LAB2	Aquatic Bed Vegetation, Floating Vascular (21.0 Acres)
LEM1	Emergent Vegetation, Persistent (9.5 Acres)
LEM2	Emergent Vegetation, Nonpersistent (12.1 Acres)

PALUSTRINE SYSTEM

POW	Open Water, Less Than 20 Acres (5.8 Acres)
PAB1	Aquatic Bed Vegetation, Rooted Vascular (23.6 Acres)
PAB2	Aquatic Bed Vegetation, Floating Vascular (0.8 Acres)
PEM1	Emergent Vegetation, Persistent (137.7 Acres)
PEM2	Emergent Vegetation, Nonpersistent (1.5 Acres)
PM	Moss Wetland (2.5 Acres)
PSS1	Shrub/Scrub Broad-Leaved Deciduous (126.1 Acres)
PSS3	Shrub/Scrub Broad-Leaved Evergreen (2.3 Acres)
PFO1	Forested Broad-Leaved Deciduous (430.3 Acres)
PFO4	Forested Needle-Leaved Evergreen (52.4 Acres)

RIVERINE SYSTEM

R	Open Water Contained Within a Channel (4.4 Acres)
RAB1	Aquatic Bed Vegetation, Rooted Vascular (21.1 Acres)
REM1	Emergent Vegetation, Persistent (38.5 Acres)
	Intermittent Stream

MODIFIERS

^	Semi-Permanently Flooded
+	Seasonally Flooded
b	Historical/Recent Beaver Activity
VP?	Possible Vernal Pool

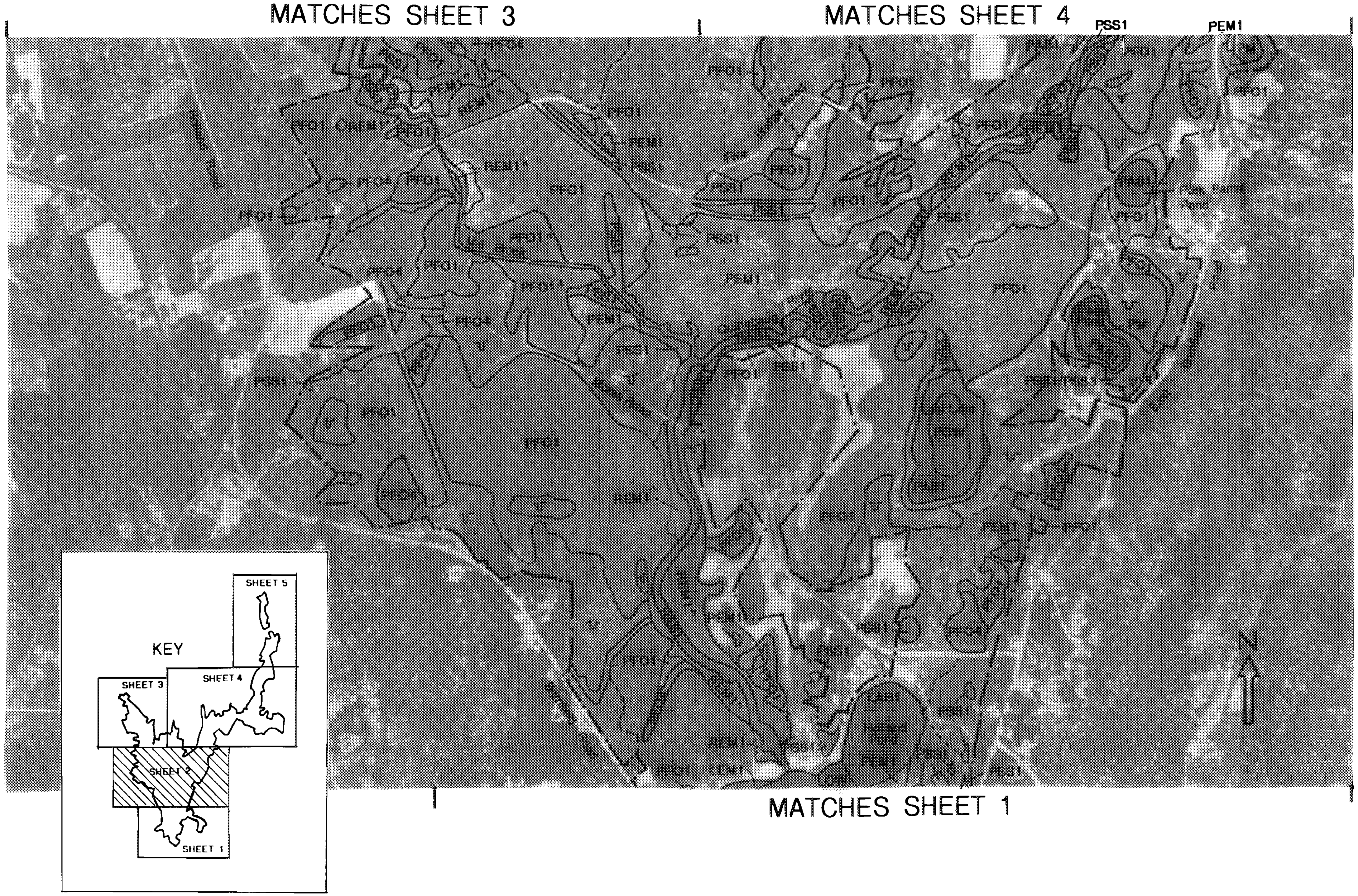
NON-WETLAND

∪	Upland
—·—	Project Boundary

WETLAND MAP
Thames River Basin
EAST BRIMFIELD LAKE

ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
WALTHAM, MASSACHUSETTS

Figure B-1



SCALE: 1" = 1,000'

SHEET 2 OF 5

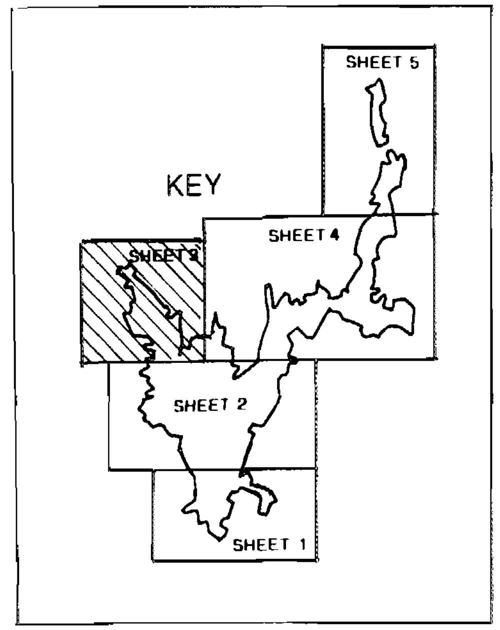
WETLAND MAP
Thames River Basin
EAST BRIMFIELD LAKE

ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
WALTHAM, MASSACHUSETTS

Figure B-2

MATCHES SHEET 4

MATCHES SHEET 2



SCALE: 1"=1,000'

WETLAND MAP
Thames River Basin
EAST BRIMFIELD LAKE

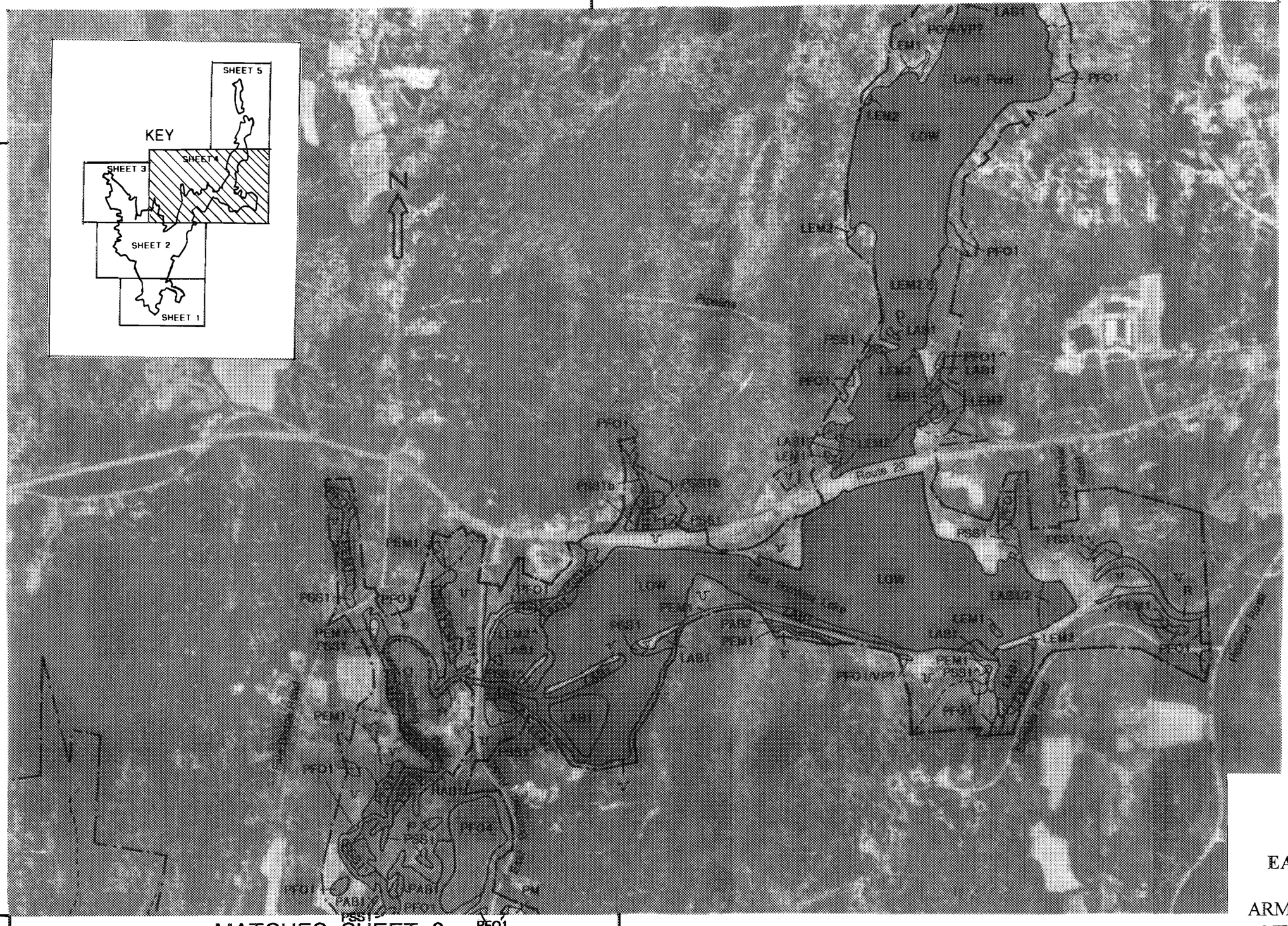
ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
WALTHAM, MASSACHUSETTS

Figure B-3

SHEET 3 OF 5

MATCHES SHEET 5

MATCHES SHEET 3



MATCHES SHEET 2

MATCHES SHEET 4

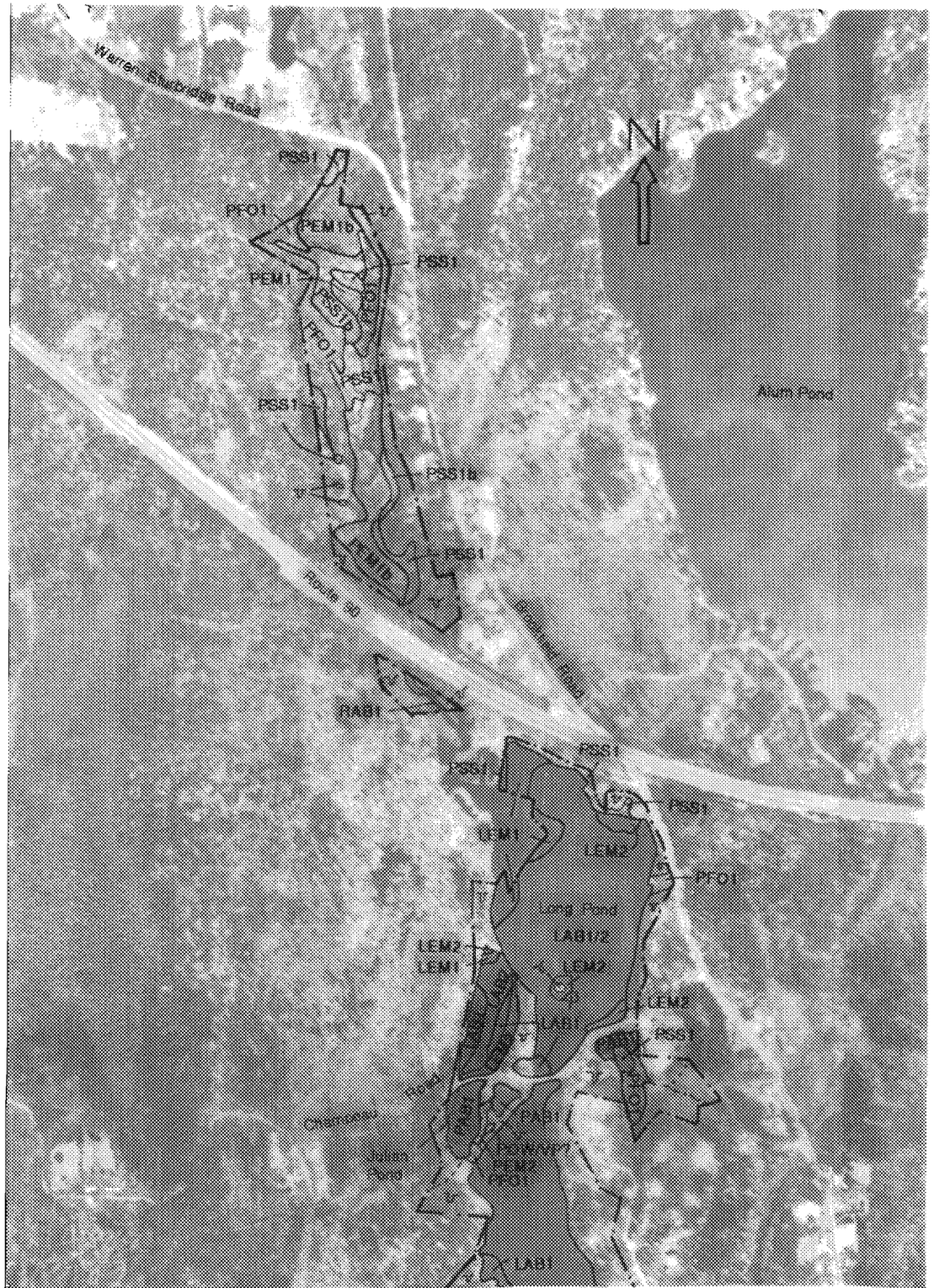
SCALE: 1" = 1,000'

WETLAND MAP
Thames River Basin
EAST BRIMFIELD LAKE

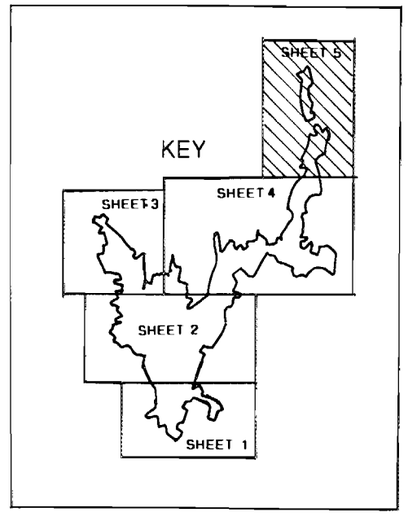
ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
WALTHAM, MASSACHUSETTS

SHEET 4 OF 5

Figure B-4



MATCHES SHEET 4



SCALE: 1" = 1,000'

WETLAND MAP
Thames River Basin
EAST BRIMFIELD LAKE

ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
WALTHAM, MASSACHUSETTS

Figure B-5

Appendix C

Wildlife Resources

TABLE C-1: COMMON BIRDS LIKELY TO OCCUR AT THE EAST BRIMFIELD PROJECT AREA

Common Name	Scientific Name	Season**
Green-backed Heron	Butorides striatus	B
Great Blue Heron	Ardea herodias	P
American Bittern	Botaurus leutiginosus	B
Mallard Duck	Anas platyrhynchos	P
American Black Duck	Anas rubripes	P
Wood Duck	Aix sponsa	B
Pied-billed Grebe	Podilymbus podiceps	B
Virginia Rail	Rallus limicola	B
Sora Rail	Porzana carolina	B
King Rail	Rallus elegans	B
Killdeer	Charadrius vociferus	B
American Woodcock	Scolopax minor	B
Spotted Sandpiper	Actitis macularia	B
Broad-winged Hawk	Buteo platypterus	B
Red-tailed Hawk	Buteo jamaicensis	P
Cooper's Hawk	Accipiter cooperii	P
Sharp-shinned Hawk	Accipiter striatus	P
Northern Goshawk	Accipiter gentilis	P
Red-shouldered Hawk	Buteo lineatus	B
Rough-legged Hawk	Buteo lagopus	W
American Kestrel	Falco sparverius	P
Great-horned Owl	Bubo virginianus	P
Wild Turkey	Meleagris gallopavo	P
Ruffed Grouse	Bonasa umbellus	P
Ring-necked Pheasant	Phasianus colchicus	P
Ruby-throated Hummingbird	Archilochus colubris	B
Belted Kingfisher	Ceryle alcyon	B
Northern Flicker	Colaptes auratus	B
Downy Woodpecker	Picoides pubescens	P
Hairy Woodpecker	Picoides villosus	P
Pileated Woodpecker	Dryocopus pileatus	P
Red-headed Woodpecker	Melanerpes erythrocephalus	B
Red-bellied Woodpecker	Melanerpes carolinus	B
Eastern Kingbird	Tyrannus tyrannus	B
Eastern Phoebe	Sayornis phoebe	B
Great Crested Flycatcher	Myiarchus crinitus	B
Least Flycatcher	Empidonax minimus	B
Alder Flycatcher	Empidonax alnorum	B
Willow Flycatcher	Empidonax traillii	B
Horned Lark	Eremophilia alpestris	P
Purple Martin	Progne subis	B
Cliff Swallow*	Hirundo purrhonota	B
Barn Swallow	Hirando rustica	B
Tree Swallow	Tachycineta bicolor	B
Northern Rough-winged Swallow	Stelgidopteryx serripennis	B
Bank Swallow	Riparia riparia	B
Blue Jay	Cyanocitta cristata	P
American Crow	Corvus brachyrhynchos	P
Black-capped Chickadee	Parus atricapillus	P
Red-breasted Nuthatch	Sitta canadensis	P
White-breasted Nuthatch*	Sitta carolinensis	P
Tufted Titmouse*	Parus bicolor	P
House Wren	Troglodytes aedon	B
Marsh Wren	Cistothorus palustris	B
Sedge Wren	Cistothorus platensis	B

TABLE C-1 (con't)

Golden-crowned Kinglet	Regulus satrapa	W
Grey Catbird	Dumetella carolinensis	B
American Robin	Turdus migratorius	P
Eastern Bluebird	Sialis sialis	P
Northern Mockingbird	Mimus polyglottus	P
Hermit Thrush	Catharus guttatus	B
Wood Thrush	Hylocichla mustelina	B
Veery	Catharus fuscescens	B
European Starling	Sturnus volgaris	P
Red-eyed Vireo	Vireo olivaceus	B
Black-throated Blue Warbler	Dendroica caerulescens	B
Black-throated Green Warbler	Dendroica virens	B
Chestnut-sided Warbler	Dendroica pensylvanica	B
Nashville Warbler	Vermivora ruficapilla	B
Yellow Warbler	Dendroica petechia	B
Golden-winged Warbler	Vermivora chrysoptera	B
Yellow-rumped Warbler	Dendroica coronata	W
Pine Warbler	endroica pinus	B
Prairie Warbler	Dendroica discolor	B
Black-and-White Warbler	Mniotilta varia	B
Canada Warbler	Wilsonia canadensis	B
Blue-winged Warbler	Vermivora pinus	B
Worm-eating Warbler	Helmitheros vermivorus	B
Ovenbird	Seiurus aurocapillus	B
Common Yellowthroat	Geothlypis trichas	B
American Redstart	Setophaga ruticilla	B
Scarlet Tanager	Piranga olivacea	B
Indigo Bunting	Passerina cyanea	B
Northern Cardinal	Cardinalis cardinalis	P
Eastern Meadowlark	Sturnella magna	P
Red-winged Blackbird	Agelaius phoeniceus	B
Common Grackle	Quiscalus quiscula	P
Brown-headed Cowbird	Molothrus ater	P
Northern (Baltimore) Oriole	Icterus galbula	B
Orchard Oriole	Icterus spurius	B
Rose-breasted Grosbeak	Pheucticus ludovicianus	B
Purple Finch	Carpodacus purpureus	P
House Finch	Carpodacus mexicanus	P
Evening Grosbeak	Coccothraustes vespertinus	W
Pine Grosbeak	Pinicola enucleator	W
American Goldfinch	Carduelis tristis	P
Rufous-sided Towhee	Pipilo erythrophthalmus	B
American Tree Sparrow	Spizella arborea	W
Chipping Sparrow	Spizella passerina	B
Field Sparrow	Spizella pusilla	P
House Sparrow	Passer domesticus	P
Song Sparrow	Melospiza melodia	P
Swamp Sparrow	Melospiza georgiana	P
White-throated Sparrow	Zonotrichia albicollis	W
Vesper Sparrow	Pooecetes gramineus	B
Savannah Sparrow	Passerculus sandwichensis	B
Grasshopper Sparrow	Ammodramus savannarum	B
Henslow's Sparrow	Ammodramus henslowii	B
Dark-eyed Junco	Junco hyemalis	P
Mourning Dove	Zenaida macroura	P
Rock Dove	Columba livia	P
Common Loon	Gavia immer	B
Least Bittern	Ixobrychus exilis	B
Black-crowned Night-Heron	Nycticorax nycticorax	B
Northern Harrier	Circus cyaneus	B

TABLE C-1 (con't)

Northern Bobwhite	Colinus virginianus	P
Herring Gull	Larus argentatus	B
Black-billed Cuckoo	Coccyzus erythropthalmus	B
Yellow-billed Cuckoo	Coccyzus americanus	B
Common Barn-Owl	Tyto alba	B
Eastern Screech-Owl	Otus asio	P
Barred Owl	Strix varia	P
Long-eared Owl	Asio otus	P
Short-eared Owl	Asio flammeus	W
Northern Saw-whet Owl	Aegolius acadicus	P
Common Nighthawk	Chordeiles minor	B
Whip-poor-will	Caprimulgus vociferus	B
Chimney Swift	Chaetura pelagica	B
Eastern Wood-Pewee	Contopus virenus	B
Brown Creeper	Certhia americana	P
Blue-gray Gnatcatcher	Polioptila caerulea	B
Brown Thrasher	Toxostoma rufum	B
Cedar Waxwing	Bombycilla cedrorum	P
Northern Shrike	Lanius excubitor	W
Solitary Vireo	Vireo solitarius	B
Yellow-throated Vireo	Vireo flavifrons	B
Warbling Vireo	Vireo gilvus	B
Northern Waterthrush	Seiurus noveboracensis	B
Louisiana Waterthrush	Seiurus motacilla	B
Lapland Longspur	Calcarius lapponicus	W
Snow Bunting	Plectrophenax nivalis	W
Bobolink	Dolichonyx oryzivorus	B
Common Redpoll	Carduelis flammea	W
Hoary Redpoll	Carduelis hornemanni	W
Canada Goose	Branta canadensis	P
Blue-winged Teal	Anas discors	B
Common Goldeneye	Bucephala clangula	W
Common Merganser	Mergus merganser	W
Turkey Vulture	Cathartes aura	B
Bald Eagle	Haliaeetus leucocephalus	W
Yellow-breasted Chat	Icteria virens	B

LEGEND:
B - Breeding
P - Permanent
W - Winter

TABLE C-2: MAMMALS WHOSE KNOWN RANGE INCLUDES THE EAST BRIMFIELD PROJECT AREA

Common Name	Scientific Name	Status
Insectivora		
Masked Shrew	Sorex cinereus	C/U
Water Shrew	Sorex palustris	U
N. Short-tailed Shrew	Blarina brevicauda	C
Smoky Shrew	Sorex fumeus	LC/U
Hairy-tailed Mole	Parascalops breweri	LC
Star-nosed Mole	Condylura cristata	C/U
Eastern Mole	Scalopus aquaticus	LC,N
Chiroptera		
Red Bat	Lasiurus borealis	U/R
Hoary Bat	Lasiurus cinereus	R
Keen's Myotis	Myotis keenii	C/U
Little Brown Myotis	Myotis lucifugus	C
Silver-haired Bat	Lasionycteris noctivagans	U/R
Eastern Pipistrelle	Pipistrellus subflavus	U/R
Big Brown Bat	Eptesicus fuscus	C
Marsupialia		
Virginia Opossum	Didelphis virginians	C/U
Lagomorpha		
Snowshoe Hare	Lepus americanus	C
Eastern Cottontail	Sylvilagus floridanus	A
N.E. Cottontail	Sylvilagus transitionalis	U/R
Rodentia		
Beaver	Castor canadensis	C
Eastern Chipmunk	Tamias striatus	C
White-footed Mouse	Peromyscus leucopus	C
S. Bog Lemming	Synaptomys cooperi	U
House Mouse	Mus musculus	A
Meadow Jumping Mouse	Zapus hudsonius	LC
Woodland Jumping Mouse	Napaeozapus insignis	LC
Muskrat	Ondatra zibethica	C/U
Norway Rat	Rattus norvegicus	C
Gray Squirrel	Sciurus carolinensis	C/A
Red Squirrel	Tamiasciurus hudsonicus	C/U
N. Flying Squirrel	Glaucomys sabrinus	C/U
S. Flying Squirrel	Glaucomys volans	C/U
S. Red-backed Vole	Clethrionomys gapperi	C
Meadow Vole	Microtus pennsylvanicus	A
Woodland Vole	Microtus pinetorum	C/U
Woodchuck	Marmota monax	C
Carnivora		
Long-tailed Weasel	Mustela frenata	C/U
Ermine	Mustela erminea	C/U
Fisher	Martes pennanti	C/U,S
Mink	Mustela vision	C/U
River Otter	Lotra canadensis	U
Striped Skunk	Mephitis mephitis	C

TABLE C-2 (con't)

Coyote	Canis latrans	U/C
Red Fox	Vulpes vulpes	C/U
Gray Fox	Urocyon cinereoargenteus	C/U
Racoon	Procyon lotor	C
Bobcat	Felis rufus	C/U
Artiodactyla		
White-tailed Deer	Odocoileus virginianus	C

Notes: List Based on DeGraaf and Rudis (1986).

Legend:

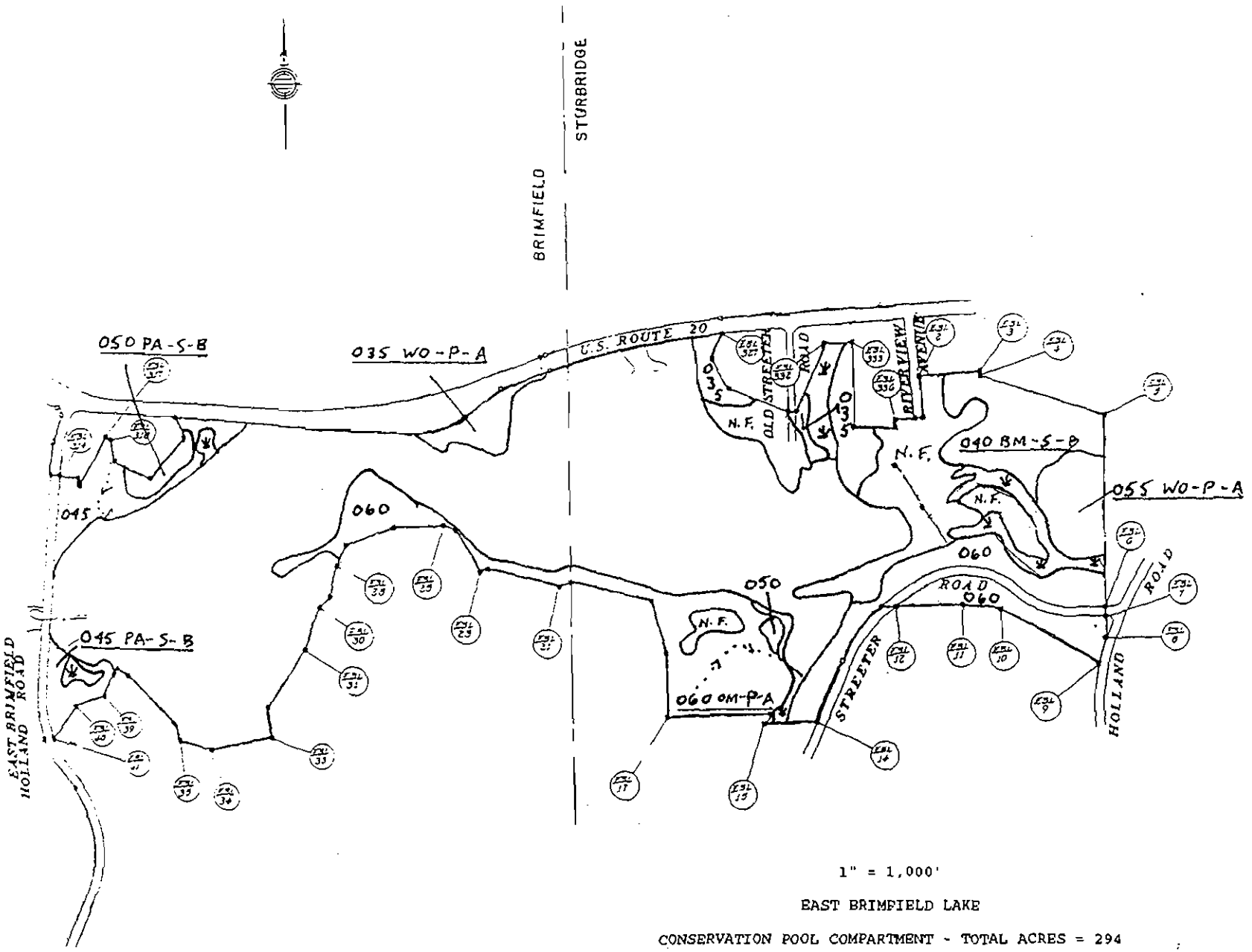
A	- abundant
C	- common
U	- uncommon
D	- declining
R	- rare
T	- threatened
LA	- locally abundant
LC	- locally common
N	- species at northern edge of range
S	- species at southern edge of range

TABLE C-3: AMPHIBIANS AND REPTILES WHOSE KNOWN RANGE INCLUDES THE EAST BRIMFIELD PROJECT AREA

Common Name	Scientific Name	Status
Salamanders and Newts		
Blue-spotted Salamander	Ambystoma laterale	T
Jefferson Salamander	Ambystoma jeffersonianum	LC/R
Marbled Salamander	Ambystoma opacum	U
Spotted Salamander	Ambystoma maculatum	C
Red-spotted Newt	Notophthalmus v.viridescens	C
N. Dusky Salamander	Desmognathus f.fuscus	C/A
Redback Salamander	Plethodon cinereus	A
Four-toed Salamander	Hemidactylium scutatum	U/R
N. Spring Salamander	Gyrinophilur piporphyriticus	U/R
N. Two-lined Salamander	Eurycea bibislineata	C/A
Frogs and Toads		
Eastern Spadefoot	Scaphiopus h. holbrookii	R
Eastern American Toad	Bufo a. americanus	C
Fowler's Toad	Bufo woodhousii fowler	U/LA
Gray Treefrog	Hyla versicolor	C
Northern Spring Peeper	Hyla c. crucifer	C/A
Bullfrog	Rana cates beiano	C
Green Frog	Rana clamitans melanota	C
Northern Leopard Frog	Rana pipiens	LC
Pickerel Frog	Rana palustris	LC
Wood Frog	Rana sylvatica	C
Turtles		
Common Snapping Turtle	Chelydra s. serpentina	C
Stinkpot	Sternotherus odoratus	C
Wood Turtle	Clemmys insculpta	C/D
Spotted Turtle	Clemmys guttata	U/R
Eastern Box Turtle	Terrapene c. carolina	LC
Eastern Painted Turtle	Chrysemys p. picta	C/A
Blandings Turtle	Emydoidea blandingii	S/LA
Snakes		
Northern Brown Snake	Storeria d. dekayi	C
Northern Water Snake	Nerodia s. sipedon	C
Northern Redbelly Snake	Storeria o. occipitomaculata	LA
Eastern Garter Snake	Thamnophis s. sirtalis	A
Eastern Ribbon Snake	Thamnophis s. sauritus	C
Northern Ringneck Snake	Diadophis punctatus edwards	C
Northern Black Racer	Coluber c. constrictor	LA
E. Smooth Green Snake	Opheodrys v. vernalis	C
Eastern Milk Snake	Lampropeltis t. triangulum	C
Timber Rattlesnake	Crotalus horridus	U/R
Eastern Hognose Snake	Heterodon platyrhinos	LC
Northern Copperhead	Agkistrodon contortrix mokeson	U/R

Appendix D

Forest Cover Maps



1" = 1,000'

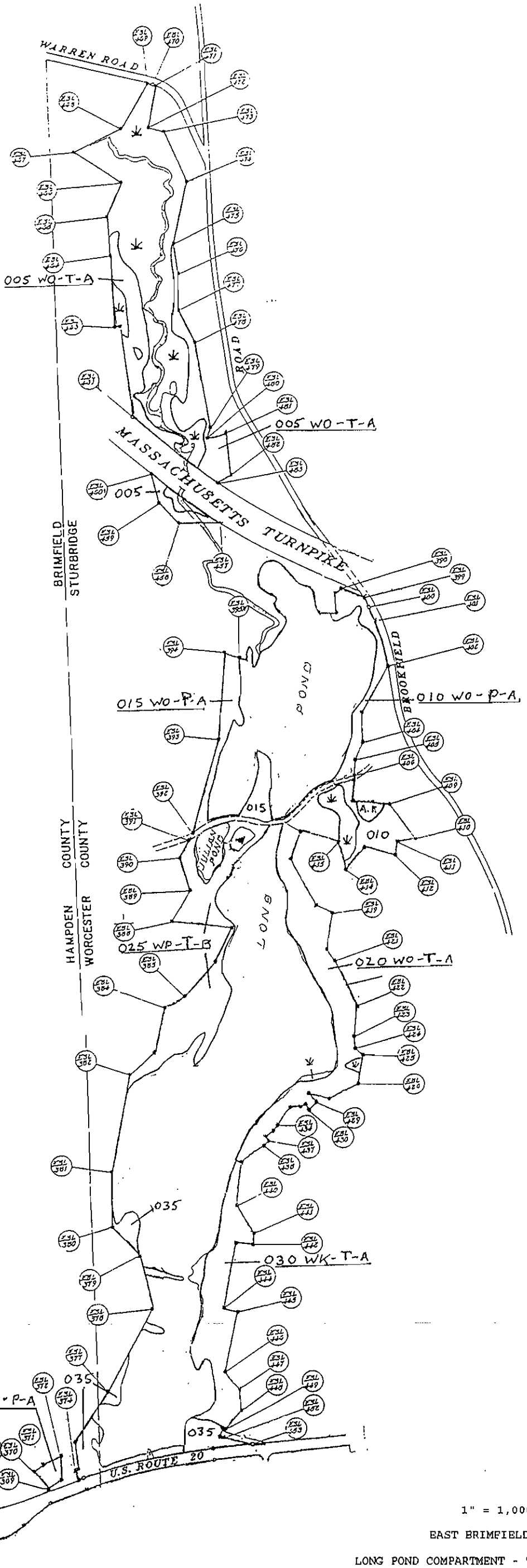
EAST BRIMFIELD LAKE

CONSERVATION POOL COMPARTMENT - TOTAL ACRES = 294

Stand	Forest Type	Acres	Size	Ave. DBH	Stocking	Basal Area	Site Index	Age Class
CP035	White Pine - Oak	10	Pole	12.8	A	153	55	40 - 50
CP040	Grey Birch - Red Maple	12	Sapling	N/M*	B	N/M	N/M	N/M
CP045	Poplar	12	Sapling	N/M	B	N/M	N/M	N/M
CP050	Poplar	3	Sapling	3.7	B	81	75	30 - 40
CP055	White Pine - Oak	6	Pole	12.3	A	185	55	70 - 80
CP060	Mixed Oak	26	Pole	8.8	A	113	44	70 - 80

* N/M = Not Measured

Figure D-1



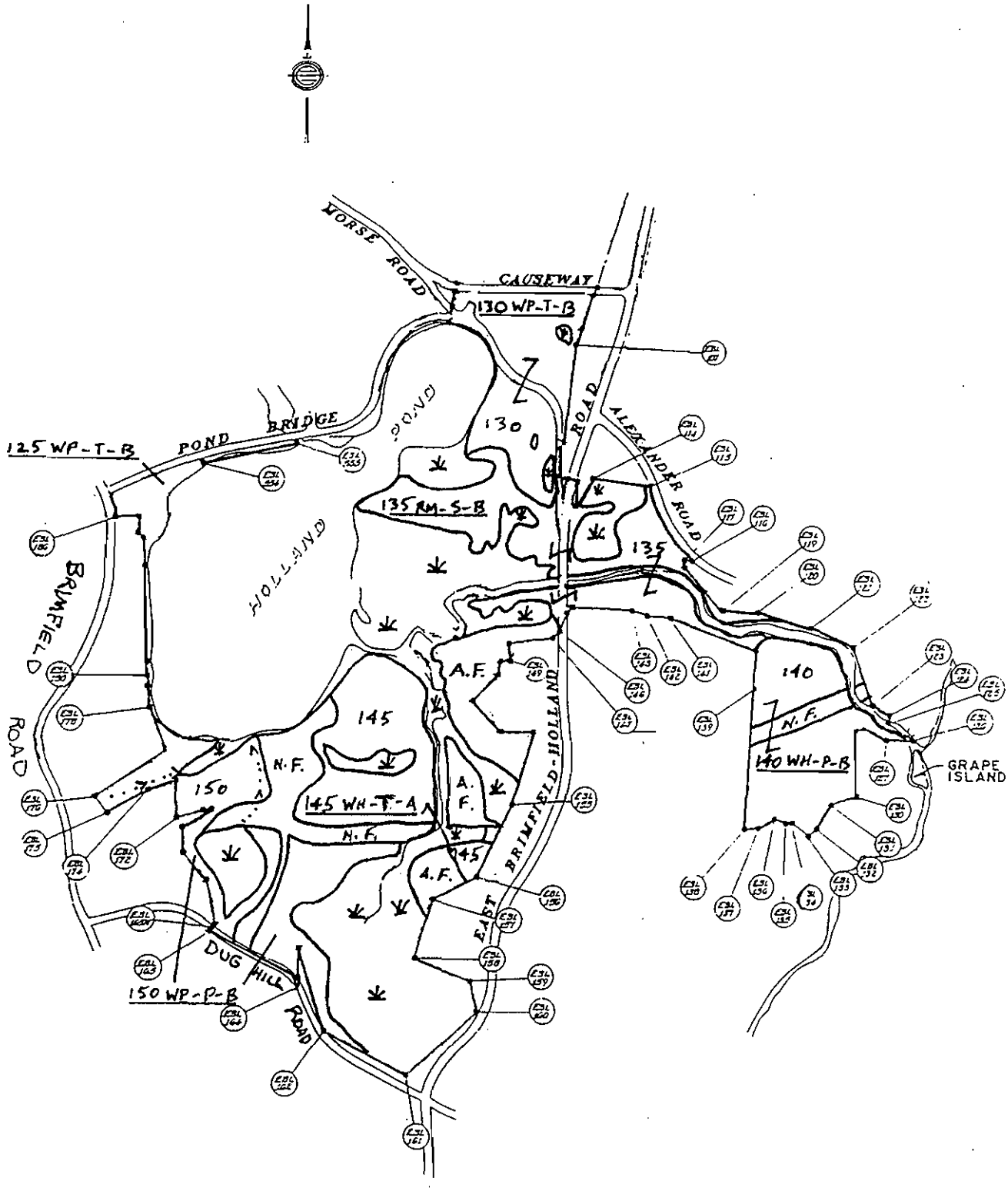
1" = 1,000'

EAST BRIMFIELD LAKE

LONG POND COMPARTMENT - TOTAL ACRES = 302

Stand	Forest Type	Acres	Size	Ave. DBH	Stocking	Basal Area	Site Index	Age Class
LP005	White Pine - Oak	16	Timber	14.0	A	195	53	70 - 80
LP010	White Pine - Oak	10	Pole	9.9	A	145	57	60 - 70
LP015	White Pine - Oak	7	Pole	9.1	A	123	54	50 - 60
LP020	White Pine - Oak	17	Timber	14.9	A	178	59	70 - 80
LP025	White Pine	14	Timber	18.0	B	175	62	70 - 80
LP030	White Pine - Hemlock	12	Timber	14.9	A	183	61	55 - 75
LP035	White Pine - Oak	19	Pole	12.8	A	153	55	40 - 50

Figure D-2



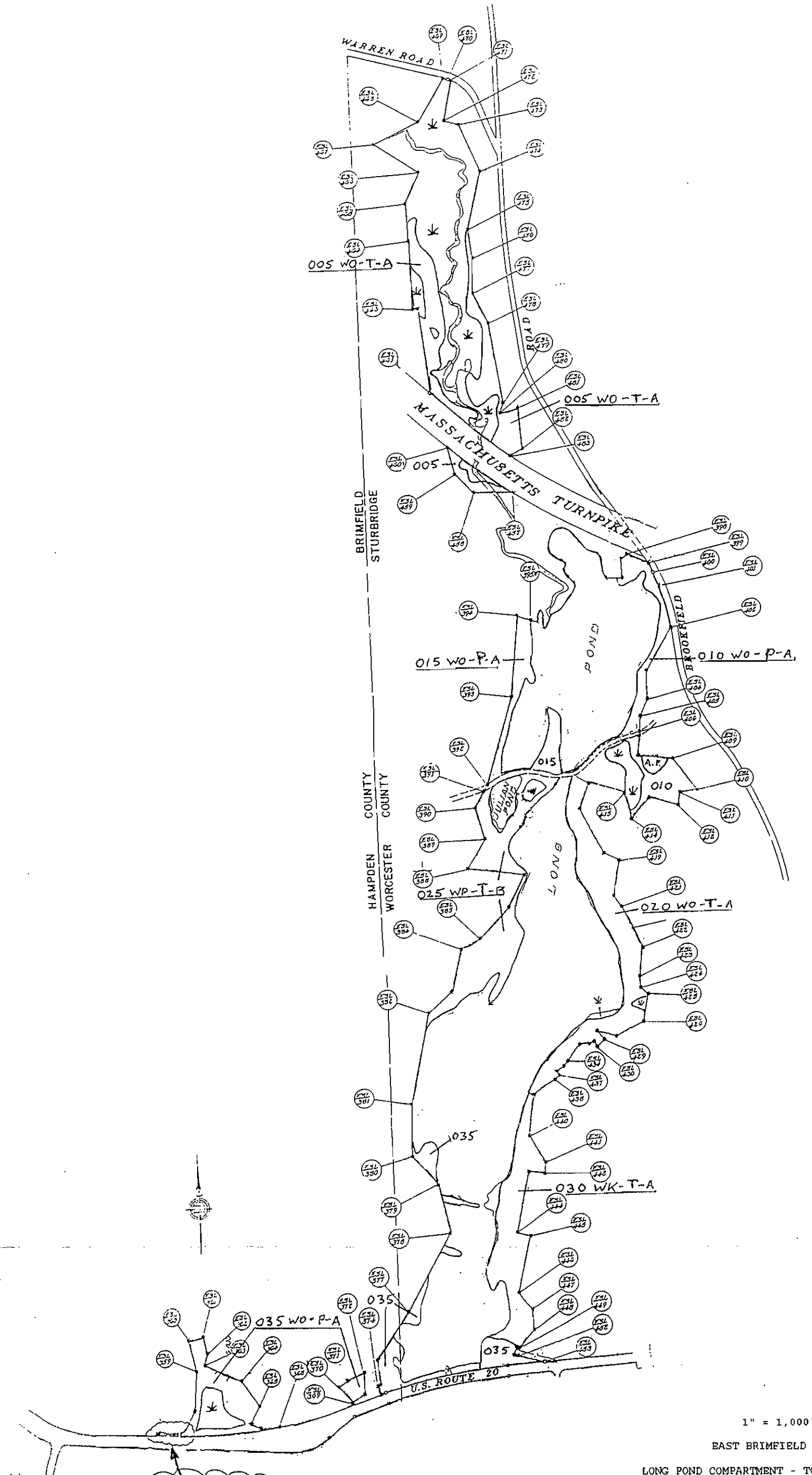
1" = 1,000'

EAST BRIMFIELD LAKE

HOLLAND POND COMPARTMENT - TOTAL ACRES = 199

Stand	Forest Type	Acres	Size	Ave. DBH	Stocking	Basal Area	Site Index	Age Class
HP125	White Pine	3	Timber	16.2	B	152	64	60 - 70
HP130	White Pine	18	Timber	16.1	B	143	57	50 - 60
HP135	Red Maple	17	Sapling	8.7	B	93	51	40 - 50
HP140	White Pine - Hardwoods	17	Pole	12.6	B	129	60	50 - 60
HP145	White Pine - Hardwoods	16	Timber	15.3	A	125	57	60 - 70
HP150	White Pine	22	Pole	17.4	B	180	56	70 - 80

Figure D-3



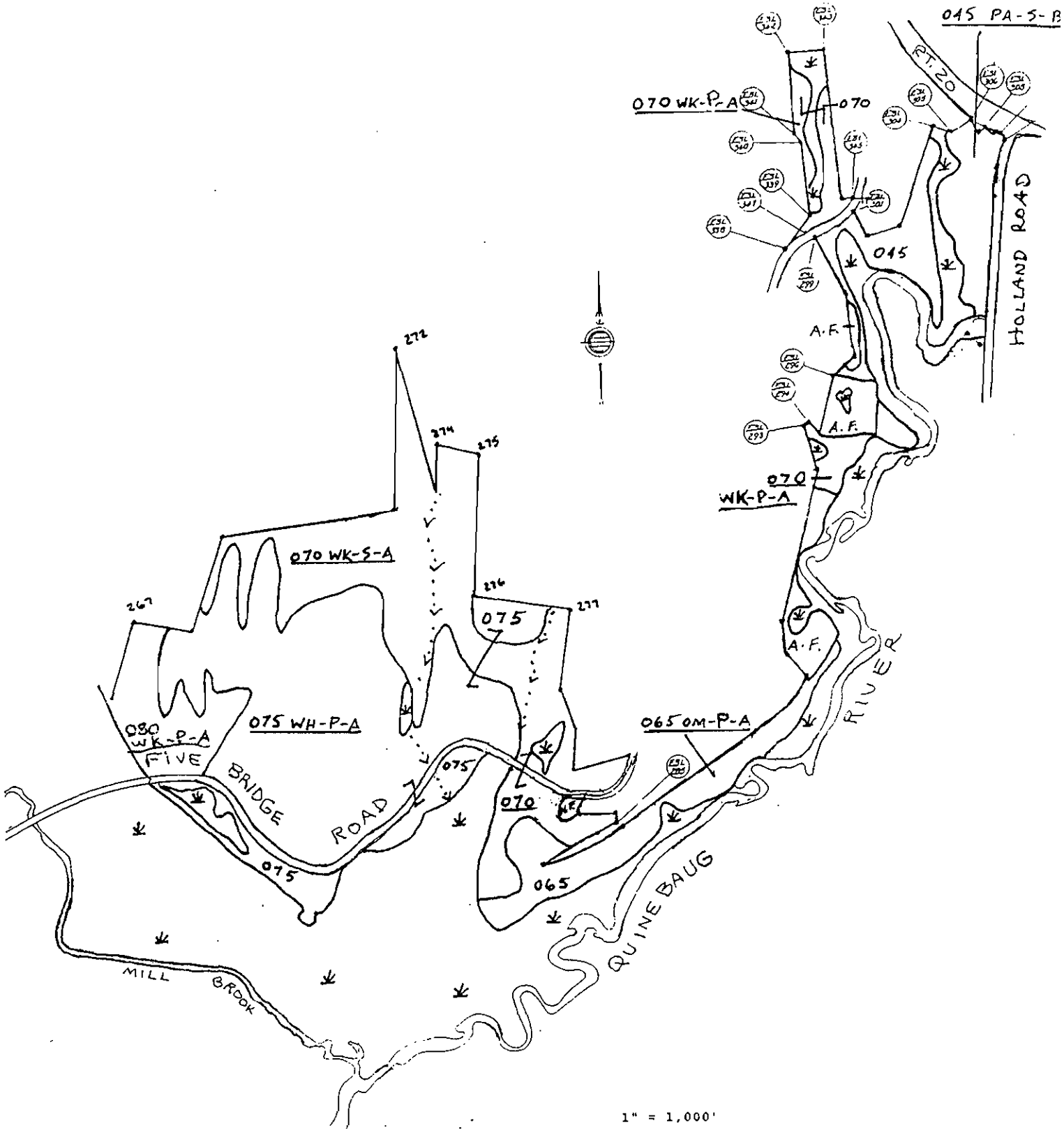
1" = 1,000'

EAST BRIMFIELD LAKE

LONG POND COMPARTMENT - TOTAL ACRES = 302

Stand	Forest Type	Acres	Size	Ave. DBH	Stocking	Basal Area	Site Index	Age Class
LP005	White Pine - Oak	16	Timber	14.0	A	195	53	70 - 80
LP010	White Pine - Oak	10	Pole	9.9	A	145	57	60 - 70
LP015	White Pine - Oak	7	Pole	9.1	A	123	54	50 - 60
LP020	White Pine - Oak	17	Timber	14.9	A	178	59	70 - 80
LP025	White Pine	14	Timber	18.0	B	175	62	70 - 80
LP030	White Pine - Hemlock	12	Timber	14.9	A	183	61	55 - 75
LP035	White Pine - Oak	19	Pole	12.8	A	153	55	40 - 50

Figure D-2



1" = 1,000'

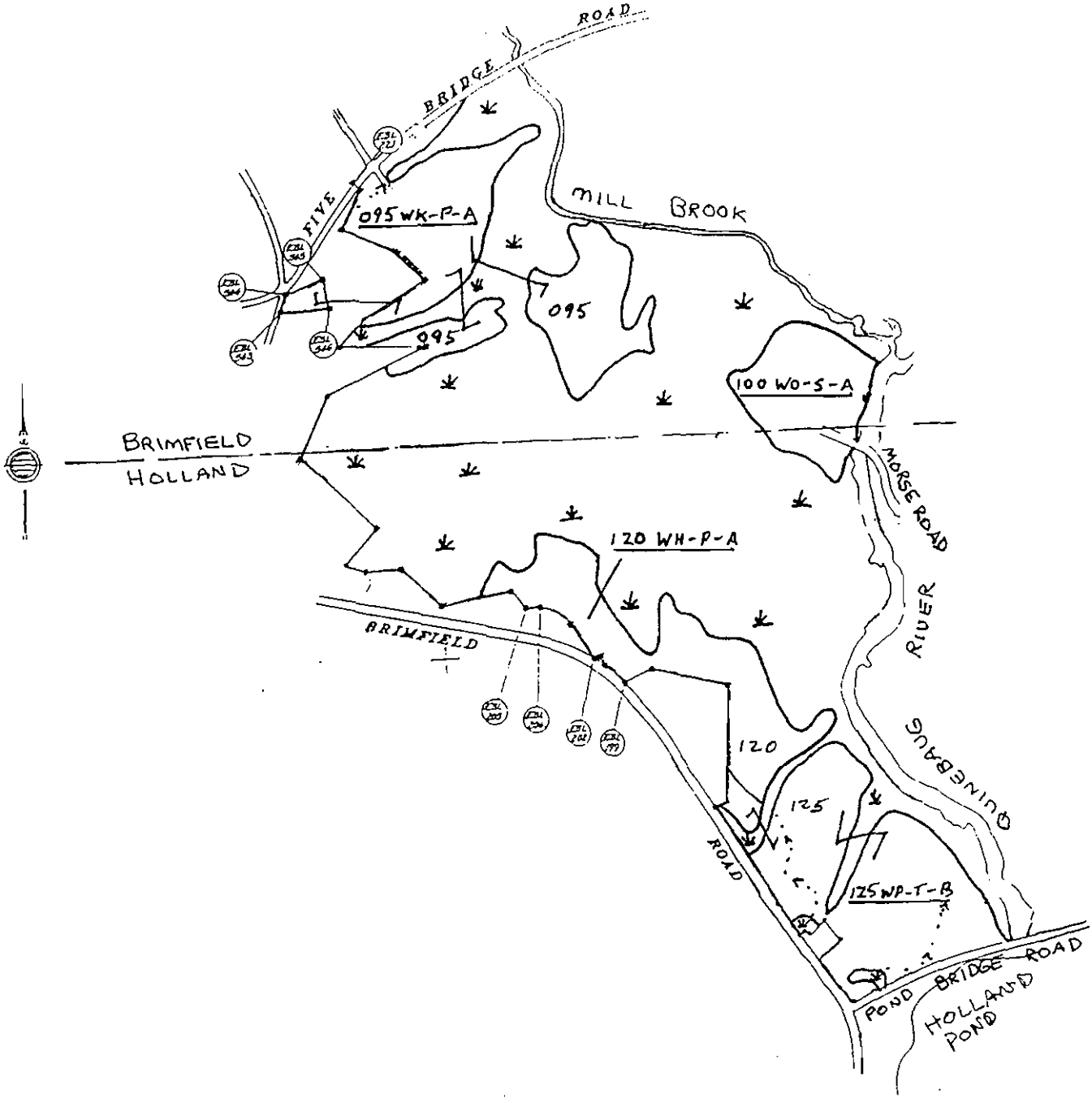
EAST BRIMFIELD LAKE

FIVE BRIDGE ROAD COMPARTMENT - TOTAL ACRES = 377

Stand	Forest Type	Acres	Size	Ave. DBH	Stocking	Basal Area	Site Index	Age Class
FB045	Poplar	25	Sapling	N/M*	B	N/M	N/M	N/M
FB065	Mixed Oak	18	Pole	11.3	A	128	61	40 - 50
FB070	White Pine - Hemlock	70	Pole	12.3	A	153	50	70 - 80
FB075	White Pine - Hardwoods	78	Pole	11.3	A	134	55	60 - 70
FB080	White Pine - Hemlock	12	Pole	10.9	A	172	47	80 - 90

* N/M = Not Measured

Figure D-5



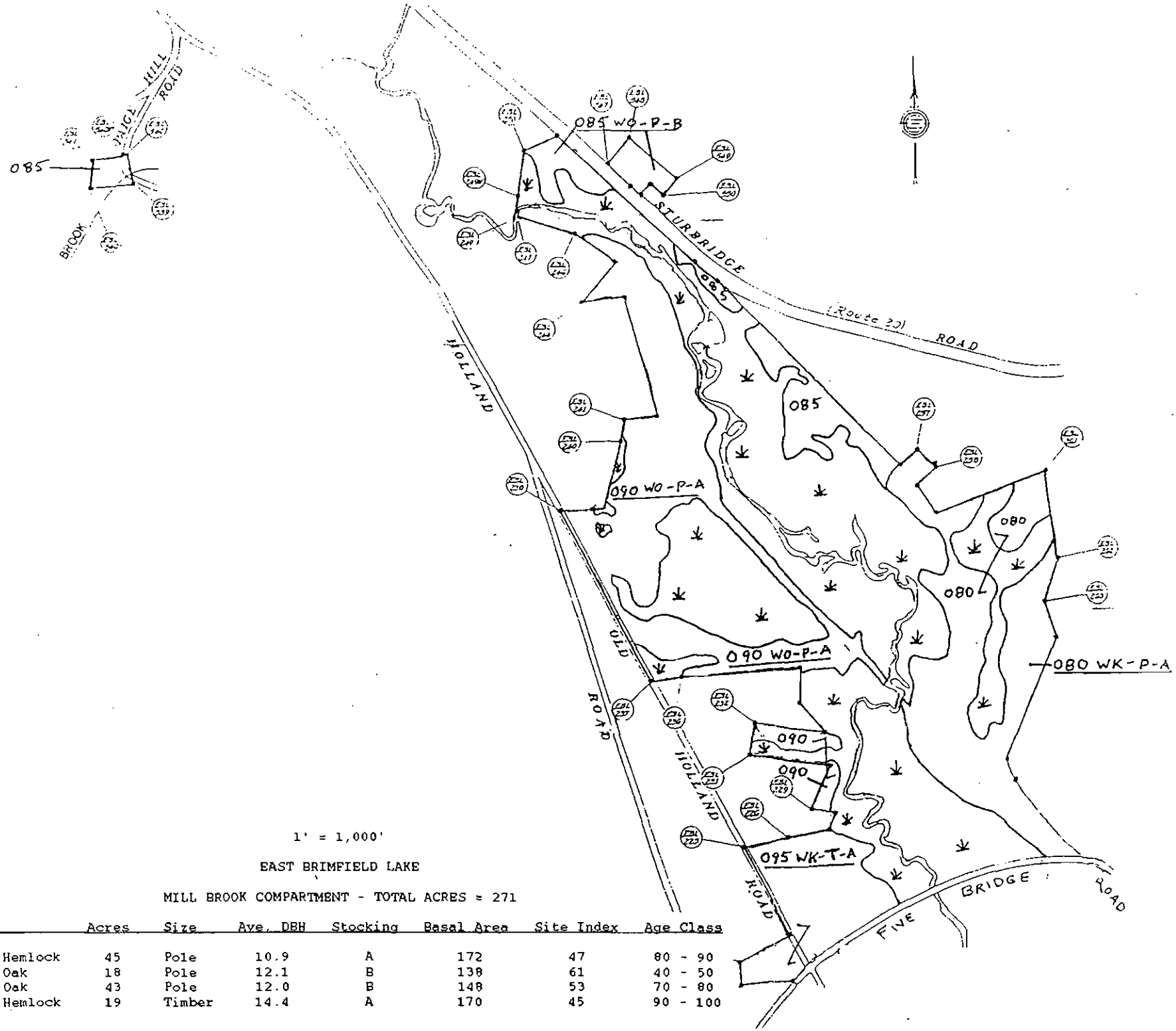
1' = 1,000'

EAST BRIMFIELD LAKE

MORSE ROAD COMPARTMENT - TOTAL ACRES = 266

Stand	Forest Type	Acres	Size	Ave. DBH	Stocking	Basal Area	Site Index	Age Class
MR095	White Pine - Hemlock	27	Timber	14.4	A	158	45	90 - 100
MR100	White Pine - Oak	12	Timber	16.3	A	160	60	80 - 90
MR120	White Pine - Hemlock	22	Pole	11.0	A	168	53	50 - 60
MR125	White Pine	40	Timber	16.1	B	167	64	60 - 70

Figure D-6



1' = 1,000'

EAST BRIMFIELD LAKE

MILL BROOK COMPARTMENT - TOTAL ACRES = 271

Stand	Forest Type	Acres	Size	Ave. DBH	Stocking	Basal Area	Site Index	Age Class
MB080	White Pine - Hemlock	45	Pole	10.9	A	172	47	80 - 90
MB085	White Pine - Oak	18	Pole	12.1	B	138	61	40 - 50
MB090	White Pine - Oak	43	Pole	12.0	B	148	53	70 - 80
MB095	White Pine - Hemlock	19	Timber	14.4	A	170	45	90 - 100

Figure D-7

Appendix E

Soil Map and Soil Suitability Information

Table E-1

Soil Types at East Brimfield Lake

Map Symbol	Soil Name and Description
BrC	Brookfield-Brimfield-Rock outcrop complex, strongly sloping
BrE	Brookfield-Brimfield-Rock outcrop complex, steep
CcC	Canton fine sandy loam, 8-15 percent slopes, extremely stony
CmB	Charlton fine sandy loam, 3-8 percent slopes, very stony
CnC	Charlton fine sandy loam, 8-15 percent slopes, very stony
De	Deerfield loamy fine sand
Fm	Freetown muck
HgB	Hinckley loamy sand, 3-8 percent slopes
HgC	Hinckley loamy sand, 8-15 percent slopes
HgE	Hinckley loamy sand, 25-35 percent slopes
MeA	Merrimac sandy loam, 0-3 percent slopes
MeB	Merrimac sandy loam, 3-8 percent slopes
MeC	Merrimac sandy loam, 8-15 percent slopes
PaB	Paxton fine sandy loam, 3-8 percent slopes
PaC	Paxton fine sandy loam, 8-15 percent slopes
PbC	Paxton fine sandy loam, 8-15 percent slopes, very stony
PcB	Paxton fine sandy loam, 3-8 percent slopes, extremely stony
PcC	Paxton fine sandy loam, 8-15 percent slopes, extremely stony
PcD	Paxton fine sandy loam, 15-25 percent slopes, extremely stony
PeE	Paxton and Montauk fine sandy loams, steep, extremely stony
Pg	Pits, gravel
ReA	Ridgebury fine sandy loam, 0-3 percent slopes, extremely stony
ReB	Ridgebury fine sandy loam, 3-8 percent slopes, extremely stony
ShB	Scituate fine sandy loam, 3-8 percent slopes, very stony
SuA	Sudbury fine sandy loam, 0-3 percent slopes
Sw	Swansea muck
Ud	Udorthents, smoothed (areas formed by filling or excavation)
Wa	Walpole fine sandy loam
WnB	Windsor loamy sand, 3-8 percent slopes
WnC	Windsor loamy sand, 8-15 percent slopes
WnD	Windsor loamy sand, 15-25 percent slopes
WtB	Woodbridge fine sandy loam, 3-8 percent slopes, extremely stony

Table E-2

Soil Suitability at East Brimfield Lake

Map Symbol	Picnic Areas	Paths and Trails	Playgrounds	Camp Areas	Local Roads
BrC	Severe: large stones depth to rock	Slight	Severe: large stones, slope, depth to rock	Severe: large stones, depth to rock	Moderate - Severe slope, frost action, depth to rock
BrE	Severe: slope, large stones, depth to rock	Moderate: slope	Severe: large stones, slope, depth to rock	Severe: slope, large stones, depth to rock	Severe: slope, depth to rock
CcC	Severe: large stones	Slight	Severe: slope large stones	Severe: large stones	Moderate: slope
CnC	Severe: large stones	Slight	Severe: large stones, slope	Severe: large stones	Moderate: slope
De	Moderate: wetness	Slight	Moderate: wetness	Moderate: wetness	Moderate: frost action, wetness
Fm	Severe: wetness, excess humus	Severe: wetness, excess humus	Severe: wetness, excess humus	Severe: wetness, excess humus	Severe: wetness, low strength, frost action
HgB	Slight	Moderate: too sandy	Moderate: slope, small stones	Slight	Slight

Table E-2 (con't)

Soil Suitability at East Brimfield Lake

Map Symbol	Picnic Areas	Paths and Trails	Playgrounds	Camp Areas	Local Roads
HgC	Moderate: slope	Moderate: too sandy	Severe: slope	Moderate: slope	Moderate: slope
HgE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
MeA	Slight	Slight	Moderate: small stones	Slight	Slight
MeB	Slight	Slight	Moderate: slope, small stones	Slight	Slight
MeC	Moderate: slope	Slight	Severe: slope	Moderate: slope	Moderate: slope
PaB	Moderate: percs slowly	Slight	Moderate: slope, small stones, percs slowly	Moderate: percs slowly	Moderate: wetness, frost action
PaC	Moderate: slope, percs slowly	Slight	Severe: slope	Moderate: slope, percs slowly	Moderate: wetness, slope, frost action
PbC	Moderate: slope, large stones	Slight	Severe: large stones, slope	Moderate: slope, large stones	Moderate: wetness, slope, frost action

Table E-2 (con't)

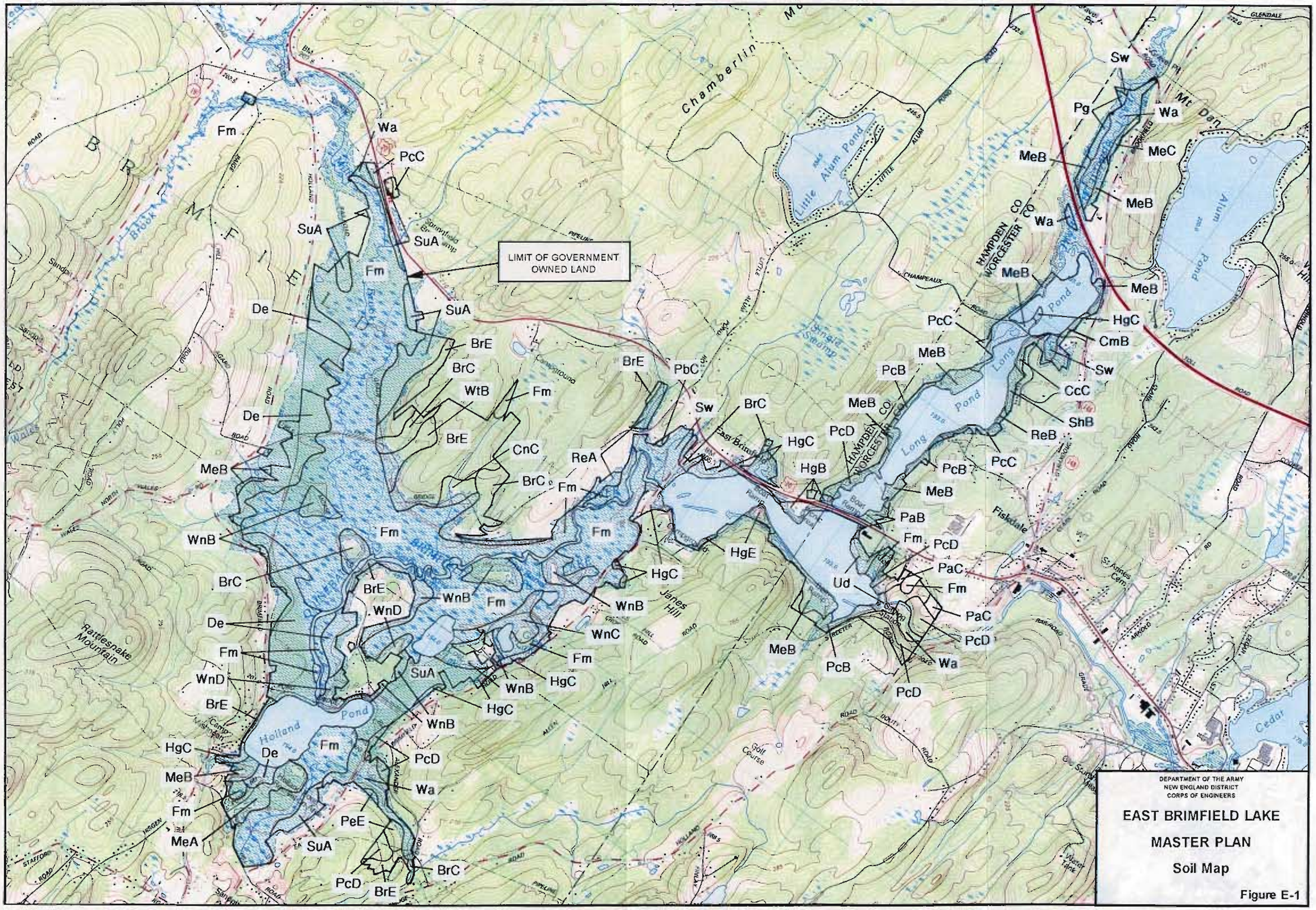
Soil Suitability at East Brimfield Lake

Map Symbol	Picnic Areas	Paths and Trails	Playgrounds	Camp Areas	Local Roads
PcB	Severe: large stones	Slight	Severe: large stones,	Severe: large stones	Moderate: wetness, frost action
PcC	Severe: large stones	Slight	Severe: large stones, slope	Severe: large stones	Moderate: wetness, slope, frost action
PcD	Severe: slope, large stones	Moderate: slope	Severe: large stones, slope	Severe: slope, large stones	Severe: slope
PeE	Severe: slope, large stones	Moderate: slope	Severe: large stones, slope	Severe: slope, large stones	Severe: slope
ReA	Severe: large stones, wetness, percs slowly	Severe: wetness	Severe: wetness, large stones, small stones	Severe: large stones, wetness, percs slowly	Severe: wetness, frost action
ReB	Severe: large stones, wetness, percs slowly	Severe: wetness	Severe: wetness, large stones, small stones	Severe: large stones, wetness, percs slowly	Severe: wetness, frost action
ShB	Moderate: large stones, wetness	Moderate: wetness	Severe: large stones, small stones	Moderate: large stones, small stones	Moderate: wetness, frost action

Table E-2 (con't)

Soil Suitability at East Brimfield Lake

Map Symbol	Picnic Areas	Paths and Trails	Playgrounds	Camp Areas	Local Roads
SuA	Moderate: wetness	Slight	Moderate: wetness, small stones	Moderate: wetness	Moderate: wetness, frost action
Sw	Severe: wetness, excess humus	Severe: wetness, excess humus	Severe: wetness, excess humus	Severe: wetness, excess humus	Severe: wetness, low strength, frost action
Wa	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness, frost action
WnB	Moderate: too sandy	Moderate: too sandy	Moderate: slope, too sandy	Moderate: too sandy	slight
WnC	Moderate: slope, too sandy	Moderate: too sandy	Moderate: slope	Moderate: slope, too sandy	Moderate: slope
WnD	Severe: slope	Moderate: too sandy, slope	Severe: slope	Severe: slope	Severe: slope
WtB	Severe: large stones	Moderate: wetness	Severe: large stones	Severe: large stones	Severe: frost action


LIMIT OF GOVERNMENT OWNED LAND
Fm
Wa
PcC
SuA
De
BrE
BrC
WtB
MeB
CnC
ReA
WnB
WnD
WnC
HgC
HgB
HgE
PbC
Sw
PcB
PcD
CcC
CmB
ShB
ReB
PaB
PaC
Ud
Pg
MeC
HgC
PeE
MeA
Brimfield
Holland Pond
Little Alum Pond
Alum Pond
Long Pond
Chamberlin
Mt Dan
James Hill
Rattlesnake Mountain
Fiskdale
Cedar
Golf Course
DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT
CORPS OF ENGINEERS
EAST BRIMFIELD LAKE
MASTER PLAN
Soil Map
Figure E-1

Appendix F

Management Recommendations for Rare or Protected Species, and Exemplary Natural Communities

Management Recommendations

Most of the natural communities at East Brimfield can be best managed by leaving them alone. The rare species are doing well under the current water regime. The flooding probably to reduces the overall diversity of amphibians and reptiles, but may maintain the habitat needs (mixture of open water and shrubby and emergent vegetation) of the state-listed turtles. The vernal pools along the periphery are important for a variety of amphibian and invertebrate species. They should be recognized as important habitats, and not filled or altered. The Massachusetts Forestry Best Management Practices Manual recommends that logging near vernal pools leave a filter strip around the pool, no equipment operate in the pool, and slash be kept out of them (but naturally falling branches be left for use by the species of the pools).

Spotted turtles and Wood turtles are reported from the East Brimfield Lake property and surrounding areas. The number of records, including road kills reported from the area, and abundance of wetlands in the area suggests good core populations throughout the region's wetlands. The protection of the wetlands and adjoining uplands on the ACOE property may become more and more critical to maintaining the populations of these turtles as human use of the region increases. Wood turtles overwinter in the bottoms and banks of slow moving streams, and use sandy banks for nesting. They spend their summers in meadows and upland forests. Spotted Turtles also hibernate, but in the wetlands where they stay in the summer except to nest. Because turtles hibernate in the winter, the winter flood control activities seem to have little impact on them. The most susceptible stage of their lives is probably the eggs in holes in sand or gravel, which can be flooded out by summer flood control activities. Spotted turtles use wetlands and moister forests for most of their activities. Both species nest in sandy openings and need the habitat mosaic that is provided on the property and its vicinity. Maintaining the currently forested areas will continue to provide habitat for these species. If any forests near known habitat are to be logged, the best times would be winter, when the turtles are hibernating. The herpetological contractors were concerned that the turtles are collectable, and suggested that more public education about the rarity of the turtles would be appropriate. Leaving a buffer zone near streams during logging activities helps maintain the water quality in the streams and maintains some habitat for all reptiles and amphibians.

Because of being part of relatively large forest area and protected from development, and being unusual communities, we strongly recommend that the core of the hemlock ravine and talus slopes be maintained as they are. If management activities such as logging are needed in the surrounding hemlock woods, they should leave a buffer around the ravine, and not make any large openings. The core area should be designated as being an area of special significance, and afforded any long term protections that the Corps can give.

The northern wetland will maintain itself and the rare species there, if the hydrology is not altered and no enrichment occurs - no road run off or leachate. It provides good habitat to the rare species that occur there now.

Maintaining the water quality in the river and maintaining the variety of riverine habitats will protect the freshwater mussels. Sedimentation and lack of flow are the main threats to them, once water quality is established. The fish that they depend on for one life phase, and for dispersal, are themselves dependent on the water quality and flow.

The main management needed to protect the main wetland is to control the not yet abundant aggressive invasive species. Giant Reed Grass occurs downstream of the confluence of the Mill Brook and Quinebaug, and there is Purple Loosestrife and Giant Reed Grass in the South Beaver Pond. Either of these could easily be dispersed throughout the system during a flood stage. Control of these species before they are a major problem is possible, and should be undertaken before the habitat deteriorates. Control of these species would enhance the wetlands for the water birds, as well as other species of the wetlands.

Direct application of herbicides is often the only way to successfully eliminate invasive species, even when cutting is followed by mowing. Carefully used, herbicides should have no adverse effects on other species. Any application of herbicides on public land needs to be undertaken by a certified pesticide applicator. Control of invasives at the times of small populations can avoid future major problems. The presence of invasive plants in a community detracts from the community's rank and such plants are likely to be displacing native species and changing the habitat for remaining species. Removing non-native species can be very labor intensive, and may only work if the original reason for their presence has been dealt with: that is, if, for example, altering wetlands so that mud surfaces are exposed allows a non-native plant such as Purple Loosestrife a foothold into an area, removing the Purple Loosestrife without dealing with the alteration may not allow native plants to become established.

Managing for the animals (including all state listed species) includes not broadcast spraying pesticides in the vicinity of good habitat. Native moth species are very susceptible to most Gypsy moth treatments. Broadcast spraying of insecticides has also reduced food resources for insect-eating species such as many of the birds.

Conclusions: The Hemlock Ravine should be identified and protected as an exemplary community. The Northern Wetland and the Mill Brook/Quinebaug Wetland support rare species, and should continue to do so. The Acidic Peatland (Floating Bog) is also a good example of an uncommon community, and should be protected from disturbance and nutrient enrichment. Maintaining water quality in the Quinebaug River should help maintain the mussel species present. Siltation of the mussel populations should be avoided. Exotic species should be controlled before they spread further and lead to deterioration of the habitat.