

**DRAFT – MASTER PLAN**

**UNION VILLAGE DAM  
THETFORD, VERMONT**

**November, 2003**



Prepared for:

US Army Corps of Engineers  
New England Division  
696 Virginia Road  
Concord, MA 01742-2751  
Contact: Richard Heidebrecht, P.E.  
Tel (978) 318 – 8513  
Fax (978) 318 - 8080

Prepared by:

Nobis Engineering, Inc.  
18 Chenell Drive  
Concord, NH 03301  
Contact: Judith E. Houston, P.E.  
Tel (603) 224 – 4182  
Fax (603) 224 – 2507

Nobis Project No. 72920

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**Thetford, Vermont**

**TABLE OF CONTENTS**

<b><u>DESCRIPTION</u></b>	<b><u>PAGE NO.</u></b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
1.1 Project Authorization and Purpose .....	1
1.2 Purpose and Scope of Master Plan .....	1
1.3 Planning Process .....	2
1.4 Reevaluation of the Master plan .....	3
1.5 Application of Federal Laws .....	3
1.6 USACE Guidance .....	6
1.7 Reference Documents.....	6
<b>2.0 PROJECT DESCRIPTION.....</b>	<b>8</b>
2.1 Location.....	8
2.2 Project Data.....	8
2.2.1 Reservoir Management .....	10
2.2.1.1 General .....	10
2.2.1.2 Operation and Maintenance .....	10
2.2.1.3 Flood Control.....	11
2.3 Real Estate and Land Use.....	13
2.4 Relationship of the Project to Other Projects and Programs..	13
2.4.1 Downstream Description.....	13
2.5 Significant Flood Control Storage .....	14
2.6 History .....	17
2.6.1 Prehistoric Period .....	17
2.6.2 Historic Period.....	17
2.7 Climate .....	17
2.7.1 General.....	17
2.7.2 Temperature .....	18
2.7.3 Precipitation.....	18
2.8 Topography .....	18
2.9 Project Access.....	19
2.9.1 Roadways.....	19
2.9.2 Parking .....	19
2.9.3 Trails.....	19

**DRAFT - MASTER PLAN**  
**Union Village Dam Flood Control Project**  
**Thetford, Vermont**

**TABLE OF CONTENTS**

<u>DESCRIPTION</u>	<u>PAGE NO</u>
<b>3.0 RESOURCE INVENTORIES AND ANALYSIS.....</b>	<b>20</b>
3.1 Introduction.....	20
3.2 Natural Resources.....	20
3.2.1 Geology.....	20
3.2.1.1 Bedrock Geology.....	20
3.2.1.2 Surficial Geology.....	20
3.2.1.3 Surficial Geologic Resources.....	21
3.2.2 Soils.....	21
3.2.2.1 Detailed Soil Descriptions.....	22
3.2.3 Surface Waters and Wetlands.....	24
3.2.4 Vegetative Cover.....	25
3.2.4.1 Forest Lands.....	25
3.2.4.2 Open Lands (Grass and Brushy Areas).....	27
3.2.4.3 Developed Areas.....	27
3.2.4.4 Exemplary Natural Communities.....	27
3.2.5 Wildlife.....	27
3.2.6 Fish.....	29
3.2.7 Rare, Threatened and Endangered Species.....	30
3.2.8 Water Quality.....	32
3.3 Cultural Resources.....	32
3.3.1 Prehistoric Resources.....	33
3.3.2 Historic Resources.....	33
3.4 Recreational Resources.....	34
3.4.1 Existing Facilities.....	34
3.4.1.1 General Description.....	34
3.4.1.2 Recreation Season and Hours of Operation...34	34
3.4.1.3 Group Use Permits.....	34
3.4.1.4 Public Access.....	35
3.4.1.5 Drinking Water and Sanitary Facilities.....	35
3.4.1.6 Picnic Facilities.....	35
3.4.1.7 Swimming.....	36

**DRAFT - MASTER PLAN**  
**Union Village Dam Flood Control Project**  
**Thetford, Vermont**

**TABLE OF CONTENTS**

<b>DESCRIPTION</b>	<b>PAGE NO</b>
3.4.1.8 Boating .....	36
3.4.1.9 Lawn Areas .....	36
3.4.1.10 Hunting, Trapping, and Fishing.....	36
3.4.1.11 Communications .....	36
3.4.1.12 First Aid.....	36
3.4.1.13 Park Information.....	37
3.5 Recreational Analysis .....	37
3.5.1 Existing Use.....	37
3.5.2 Natural and Scenic Qualities .....	37
3.5.3 Projected Use.....	38
3.5.4 Carrying Capacity.....	39
3.5.5 User Conflicts .....	39
<b>4.0 PUBLIC INVOLVEMENT AND COORDINATION .....</b>	<b>40</b>
<b>5.0 RESOURCE MANAGEMENT OBJECTIVES.....</b>	<b>42</b>
5.1 Natural Resources Objectives .....	42
5.2 Recreational Resources Objectives .....	42
5.3 Cultural Resources Objectives .....	43
<b>6.0 LAND ALLOCATION AND CLASSIFICATION.....</b>	<b>44</b>
6.1 Land Allocation .....	44
6.2 Land Classification .....	44
6.2.1 Project Operations .....	45
6.2.2 Recreation .....	45
6.2.3 Mitigation.....	46
6.2.4 Environmentally Sensitive Lands.....	46
6.2.5 Multiple Resource Management.....	47
6.2.6 Easement Lands.....	47
<b>7.0 RESOURCE DEVELOPMENT PLANS.....</b>	<b>48</b>
<b>8.0 CONCLUSIONS.....</b>	<b>49</b>
<b>9.0 RECOMMENDATIONS .....</b>	<b>50</b>

**DRAFT - MASTER PLAN  
Union Village Dam Flood Control Project  
Thetford, Vermont**

**TABLE OF CONTENTS**

<b>DESCRIPTION</b>	<b>PAGE NO</b>
--------------------	----------------

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**FIGURES:**

- Figure 1 – Locus Plan
- Figure 2 – Site Plan
- Figure 3 – Soil Classification Plan
- Figure 4 – Wetland Classification Plan
- Figure 5 – Forest Classification Plan
- Figure 6 – Market Area Plan
- Figure 7 – Land Classification Plan

**TABLES:**

Table 1 – Union Village Dam Pertinent Data .....	9
Table 2 – Reservoir Storage Area .....	10
Table 3 – Outflow Guidance .....	12
Table 4 - Significant Storages .....	15
Table 5 – Reservoir Area/Capacity .....	16
Table 6 – Dominant Soil Types Listed by Acreage.....	22
Table 7 – Palustrine Wetlands and Riverine System Acreages .....	25
Table 8 – Vegetative Cover Acreages .....	26
Table 9 – Visitation Data .....	37

**APPENDIX**

- A – Public Coordination Mailing List

## 1.0 INTRODUCTION

### 1.1 Project Authorization and Purpose

Union Village Dam was authorized by the Flood Control Act approved on June 22, 1936 (Public Law 738, 74<sup>th</sup> Congress), as amended by Public Laws III and 406, 75<sup>th</sup> Congress. This project is part of the Comprehensive Plan for Flood Control in the Connecticut River Valley approved by Congress in the Flood Control Act of June 28, 1938 (Public Law 761, 75<sup>th</sup> Congress), as modified by the Flood Control Act of August 18, 1941 (Public Law 228, 77<sup>th</sup> Congress)

Construction of Union Village Dam began in March 1947 and was completed in June 1950 at a cost of \$4,073,300. The project is one of numerous other projects in the Comprehensive Plan for flood damage reduction and other multiple purposes within the Connecticut River Basin. Union Village Dam provides flood damage reduction at downstream communities along the Connecticut River in Vermont, New Hampshire, Massachusetts and Connecticut. (Refer to attached *Figure 1 – Locus Plan.*)

In accordance with Federal Energy Regulatory Commission (FERC) recommendations in the 1940's, approximately 20 percent of the available flood control storage was provided for ultimate hydroelectric power use but was to be for flood control purposes until such time as power facilities were installed. There is no hydroelectric power installed at the project, nor is any planned for in the near future.

### 1.2 Purpose and Scope of the Master Plan

This Master Plan for the 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 for U.S. Army Corps of Engineers (USACE) water resources projects. These objectives and policies are outlined in the following USACE documents:

- 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;
- USACE Environmental Operating Principles and Implementation Guidance; 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 USACE administered land and water in accordance with ecosystem management principles to insure their continued availability; and
- 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 Union Village Dam's 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 suitability, 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 USACE recreation program;
- Provide outdoor recreation opportunities on USACE administered land and water on a sustained basis; and
- Optimize the use of leveraged resources to maintain and provide quality public experiences at USACE water resources projects.

### **1.3 Planning Process**

An interdisciplinary study team consisting of staff from the USACE, New England District (NAE, Engineering/Planning Division and Construction/Operations Division), and Nobis Engineering, Inc., of Concord, NH, working under contract to NAE, collected, reviewed and analyzed the information contained in this Master Plan. The team included personnel with expertise in the following disciplines:

- planning;
- civil/environmental engineering;
- environmental resources;
- archaeological and cultural resources;
- wetlands and forestry; and
- soils and geology.

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 objectives and goals to provide the best use of the federally owned land at Union Village Dam.

Public input was obtained through public workshops and meetings, and coordination with state, regional and local officials. Two public workshops were held in Thetford, Vermont, to present the study process, preliminary study results and receive input for 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). The OMP for Union Village Dam is currently being updated by the USACE. For consistency with the Master Plan, the OMP, dated 1996 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 USACE 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 USACE and any agency impounding, diverting, or controlling water, consult 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 USACE 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 USACE 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 USACE 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 USACE 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 USACE 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 that are, or may be eligible for listing on the National Register of Historic Places.

## 1.6 USACE Guidance

The Master Plan has been prepared in accordance with guidance contained in the following USACE 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 USACE Environmental Operating Principles and Implementation Guidance

## 1.7 Reference Documents

The following USACE and State of Vermont reports and documents were reviewed and evaluated as part of this master planning effort:

- Connecticut River Basin Ompompanoosuc River Watershed Drought Contingency Storage Plan, 1987.
- Connecticut River Flood Control Master Manual of Reservoir Regulation - Appendix A, Ompompanoosuc River Watershed, VT, revised 1993.
- Dam Break Flood Analysis, February 1984.
- Ecological Inventory of the USACE's Union Village Dam Project Area, 2000.
- Effects of Abandoned Elizabeth Copper Mine on Fisheries, January 1990.
- Environmental Compliance Assessment, April 1993.
- Flood Emergency Plan, Union Village Dam, East Thetford, VT, Orange County, Revised June 18, 2002.
- Historic Properties Management Plan – Final, September 2000.
- Project Plan for Recreation Resources Development, March 1980.
- Instream Flow Uses, Values & Policies in the Upper Connecticut River Watershed, April 1998.
- Operational Management Plan – Parts I through IV, 1996
- “Sand and Gravel Resources of Vermont”, Dudley, J. (Comp.), New England Governor’s Council, Inc., Boston MA, 1993.
- “Surficial Geologic Map of Vermont”, Doll, C.G. (Comp. & Ed.), Stewart, D.P., MacClintock, P., State of Vermont Geologic Survey, Department of Water Resources, 1970.

- VT Recreation Plan, Statewide Comprehensive Outdoor Recreation Plan (SCORP) by the VT Dept. of Forests, Parks and Recreation, January 2000.
- Water Quality Assessment, May 1999.
- Water Resource Development (NEDEP-360-1-37), November 1995.
- Wetland Community Description, Union Village Dam Flood Control Project, Draft 2002

## 2.0 PROJECT DESCRIPTION

### 2.1 Location

Union Village Dam is located in Thetford, Vermont, on the Ompompanoosuc River, four miles above its confluence with the Connecticut River. It is ¼ mile north of Union Village, and 11 miles north of White River Junction, Vermont. The project is the New England District's northernmost flood control reservoir, and consists of 991 acres of land owned in fee and four acres of flowage easement. The location of the project and its reservoir area are shown on attached *Figure 1 – Locus Map*.

### 2.2 Project Data

Union Village Dam is a rolled-earth fill embankment with rock slope protection. A concrete chute spillway, built in rock, is located on the west abutment of the dam. The outlet works consist of an approach channel, intake structure, discharge conduit and discharge channel. The concrete intake structure houses the gate equipment. Pertinent data for the dam is summarized in the following table, *Table 1 – Pertinent Data*:

<b>Union Village Dam Thetford, Vermont</b>		
<i>Table 1 – Pertinent Data</i>		
	<b>Data Description</b>	<b>Data</b>
<b>Location</b>		Ompompanoosuc River Thetford, Vermont
<b>Drainage Area</b>		126 square miles
<b>Dam Embankment Features</b>	Type Length Height Top Width Top Elevation (NGVD) Slope	Rolled earth & rockfill 1,100 feet 170 feet 30 feet 584 feet 1:2.5 to 1:3
<b>Spillway</b>	Type  Crest Length Crest Elevation (NGVD) Peak Inflow Maximum Discharge Capacity Maximum Surcharge	Chute spillway with uncontrolled ogee weir 388 feet 564.0 feet 87,500 cfs 84,900 cfs  15 feet (above crest = El 579)
<b>Intake Channel</b>	Length Width Invert Elevation (NGVD)	394 feet 23 feet 420 feet
<b>Outlet Works</b>	Type Diameter Length  Invert Elevation Gates	Circular conduit 13 feet 1,167 feet  420 feet (2) 7'-6" x 12'-0"
<b>Discharge Channel</b>	Length Width Capacity	640 feet 60 feet 2,300 cfs

cfs = cubic feet per second

NGVD = National Geodetic Vertical Datum of 1929

Union Village Dam is run-of-river except during non-winter months, when an approximate 50-acre impoundment with a depth of 20 feet is maintained to keep the floodgates from freezing. At spillway crest elevation, the flood storage area of the project totals 740 acres and extends three and one-half miles upstream of the dam. The capacity of this flood storage area is about 12.4 billion gallons of water which is equivalent to 5.65 inches of runoff from the upstream drainage area of 126 square miles. Additional data relative to the reservoir storage is summarized below in *Table 2 – Reservoir Storage Data*:

<b>Union Village Dam Thetford, Vermont</b>			
<i>Table 2 – Reservoir Storage Data</i>			
<b>Pool</b>	<b>Elevation (feet) (NVGD)</b>	<b>Area (acres)</b>	<b>Cumulative Capacity (acre-feet)</b>
<b>Invert</b>	419.0	N/A	N/A
<b>Winter</b>	440.0	50	400
<b>Flood Control (Spillway Crest)</b>	564.0	740	38,400

## 2.2.1 Reservoir Management

### 2.2.1.1 General:

Union Village Dam is operated and maintained by the New England Division of the USACE. Union Village Dam and North Hartland Lake in Hartland and Hartford, Vermont, are staffed by a project manager and three rangers, who perform operation and maintenance (O&M) and administrative duties. The resources are shared between these two projects. Additional rangers are hired during the summer months. In addition to their primary flood control duties, project staff are also responsible for implementation of this Master Plan through the OMP, recreation and natural resource management, visitor assistance and interpretive services.

### 2.2.1.2 Operation and Maintenance:

The overall operation and maintenance (O&M) of Union Village Dam is performed in accordance with the project’s OMP, dated 1996, and the O&M Manual dated 1976. Periodic duties including: maintenance, monitoring, inspection, testing, reporting and record keeping requirements are listed in detail in that O&M Manual. These duties provide for the O&M of the dam and appurtenant facilities, buildings, bridges, utilities, roads, electrical and mechanical equipment, and tools. (Motor vehicles are not maintained on the site by project staff.) Specific

implementation plans for related programs are contained in other sections of the OMP and include Safety, Security, Visitor Assistance and others.

In addition to inspections and reports required by the OMP and the O&M Manual, periodic inspections are performed by a team of specialists from the Engineering Directorate of the USACE New England District every five years. This constant and overlapping inspection of the dam and appurtenant structures insure that needed maintenance is identified and performed in a timely manner.

#### 2.2.1.3 Flood Control:

Regulation of Union Village Dam is performed as directed by the Reservoir Regulation Team (RRT) within the Reservoir Control Center (RCC), at the New England District Headquarters in Concord, Massachusetts. The RRT is responsible for regulation of flood control reservoirs within the comprehensive system. Contact is maintained between RRT and the project office at least once each week and more frequently during flood events. Periodic meetings with RRT are also scheduled throughout each year to discuss regulation and operations.

The discharge from Union Village Dam is recorded at the U.S. Geological Survey (USGS) gage located just downstream of the dam on the Ompompanoosuc River. This gage records pool stage, rainfall, air temperature and tailwater river stage. The tailwater stage is measured by use of a nitrogen gas pressure transducer and an electronic data collection platform. The gage is operated and maintained by the USGS under The Cooperative Stream Gaging Program making available a continuous record of releases from the project. The gage is equipped with both satellite and telephone telemetry. In addition to the gage on the Ompompanoosuc River, the USGS gages on the Connecticut River at West Lebanon and Wells River are also maintained by the USGS and monitored by the Reservoir Regulation Team.

Data collection platforms associated with the RRT's satellite data reporting network have been installed at other USGS gages along the Connecticut River. These stations report streamflow data directly to the RRT via NOAA's Geostationary Operational Environmental Satellite (GOES). The frequency with which data is transmitted is dependent on the severity of hydrologic conditions at the gage. Therefore, reports from the gages will vary from once every six to eight hours during normal conditions to every 30 to 60 minutes when river levels at the gage are rising rapidly or are at high stages.

During flood periods, the RRT coordinates operation of the 16 Connecticut River projects. Union Village Dam's operation is coordinated with the other reservoirs by the RRT to achieve the maximum reduction in flood stages and damages in the Connecticut River basin. Regulation is initiated by the RRT as a result of heavy rainfall or snowmelt within the basin, and also for specific river stations at key locations along the Ompompanoosuc and Connecticut Rivers.

During flood periods, regulation occurs in three phases:

1. Appraisal of storm and river conditions during development of the flood leading to the initial regulation procedures;

2. Regulation of discharge from the reservoir while the Connecticut River flood flows crest and move downstream; and
3. Emptying the reservoir following the downstream recession of the flood.

Emergency operating procedures (EOP) are available in the event that the Project Manager is unable to communicate with the RRT by normal or emergency methods or in the event of extraordinary flood conditions.

Guidance for the control of flow from Union Village Dam is summarized in the following **Table 3 – Outflow Guidance**:

<b>Union Village Dam Thetford, Vermont</b>  <i>Table 3 – Outflow Guidance (Drainage Area = 126 sq.mi.)</i>							
		Maximum Outflow (cfs)	Minimum Outflow Aquatic Base Flow (ABF) (cfs)			Maximum change in Outflow (cfs/hr)	
			Oct. – March 130 cfs	April – May 500 cfs	June – Sept. 65 cfs	Increase	Decrease
<b>UNION VILLAGE DAM (DA = 126 sq. mi.)</b>	<i>Flood Control</i>	2,400	65 cfs			300 cfs/hr to 1,800 cfs then 100 cfs/hr	800 cfs/hr
	<i>Daily Operation</i>	NA	130 cfs or inflow whichever is less	500 cfs or inflow whichever is less	65 CFS or inflow whichever is less	130 cfs/hr above 500 cfs and 65 cfs/hr below 5000 cfs	
	<i>Maintenance</i>	NA					
<b>NOTES:</b>							
<ol style="list-style-type: none"> <li>1. When storing water to raise the pool to a target level, and inflow is less than the seasonal ABF, maintain outflow to greater than or equal to 70% of inflow, therefore, storing only 30% of inflow.</li> <li>2. Flood control operations are initiated due to a variety of circumstances. If, however, the pool level rises above 10 ft with a summer pool or 25 feet with a winter pool, operating procedures will follow the flood control outflow guidance parameters to whatever extent is necessary.</li> </ol>							

Existing flood control and flood storage information for Union Village Dam, are further described in *Section 2.5 – Significant Flood Control Storages*, of this Master Plan.

### **2.3 Real Estate and Land Use**

There are several easements and land use outgrants associated with the project lands. These frequently are amended or revised. For current real estate and land use outgrant information, contact the project manager.

### **2.4 Relationship of the Project to Other Projects and Programs**

Union Village Dam is one of 16 flood control dams in the comprehensive Connecticut River basin system. There are six other active flood control projects in the Upper Connecticut River Basin in Vermont and New Hampshire:

Ball Mountain Lake	Otter Brook Lake
Townshend Lake	Surry Mountain Lake
North Hartland Lake	North Springfield Lake

The Ompompanoosuc River originates above the Town of Vershire, in Vershire Heights, Vermont, and flows southeasterly for about six miles, then southerly for about 18 miles to its confluence with the Connecticut River near Pompanoosuc, Vermont. The main (East Branch) river channel lies on the easterly side of the watershed which is elongated in a north-south direction. The river has a fall of about 1,020 feet in the first six miles and 430 feet in the remaining 18 miles to the confluence. Major tributaries in the Ompompanoosuc River basin include the West Branch of the Ompompanoosuc River and Lake Fairlee Brook.

#### **2.4.1 Downstream Description**

The Ompompanoosuc River channel downstream of Union Village Dam to the Connecticut River, a distance of approximately three and one-half miles, flows through the small community of Union Village. The communities of Pompanoosuc, VT, Norwich, VT, Hanover, NH, Wilder, VT, West Lebanon, NH and White River Junction, VT are located on the Connecticut River below the Ompompanoosuc River confluence. The downstream area includes State Routes 10 and 132, U.S. Route 5, Interstates 91 and 89, two Boston & Maine Railroad lines and many local roads.

The Wilder Dam and Hydroelectric Project are located on the Connecticut River 11.2 miles downstream of Union Village Dam, eight miles downstream from the confluence with the Ompompanoosuc River.

## **2.5 Significant Flood Control Storages**

For Union Village Dam, “significant storage” is considered to be any event when more than 4% (pool stage of 45 feet) of the storage capacity is used. According to recorded data, the significant pool stage of 45 feet has been exceeded a total of 53 times since the dam was placed in operation in 1950.

Historic reservoir significant flood control storages, frequency distribution, and area/capacity information, are summarized in *Table 4 – Significant Storage* and *Table 5 – Reservoir Area/Capacity* as follows:

Union Village Dam Thetford, Vermont Table 4 – Significant Storages (1950 - 2002)					
Date	Pool Level (feet)	Storage			
		acre-feet	utilized inches	% Full	
1969 Apr	114	20080	3.0	53	
1984 Jun	104	15260	2.3	40	
1953 Mar	101	14260	2.1	38	
1987 Apr	98	12830	1.9	34	
1973 Jul	97	12440	1.8	33	
1976 Apr	89	9770	1.4	26	
1998 Apr	86	9100	1.4	24	
1979 Mar	84	8390	1.2	22	
1983 Dec	82	7730	1.2	20	
2001 Apr	82	8300	1.2	22	
1993 Apr	81	7490	1.1	20	
1960 Apr	77	6480	1.0	17	
1996 Jan	77	6340	0.9	17	
1981 Feb	77	6340	0.9	17	
2002 Apr	77	6500	1.0	17	
1952 Jun	74	5720	0.8	15	
1994 Apr	73	5530	0.8	15	
1977 Mar	72	5340	0.8	14	
1972 May	72	5340	0.8	14	
1964 Apr	69	4790	0.7	13	
1971 May	69	4770	0.7	13	
1951 Apr	67	4340	0.6	11	
1957 Dec	64	3910	0.6	10	
1955 Apr	64	3840	0.6	10	
1967 Apr	63	3750	0.6	10	
1984 Apr	63	3730	0.6	10	
1962 Apr	63	3700	0.6	10	
1959 Nov	62	3600	0.5	9	
1982 Apr	62	3570	0.5	9	
1990 Mar	61	3480	0.5	9	
1973 Dec	61	3480	0.5	9	
1992 Mar	61	3420	0.5	9	
2001 Dec	60	3300	0.5	9	
1986 Feb	59	3150	0.5	8	
1989 Apr	58	3040	0.4	8	
1958 Apr	57	2820	0.4	7	
1978 Jan	56	2780	0.4	7	
1980 Apr	56	2670	0.4	7	
1973 Mar	55	2670	0.4	7	
1954 Apr	56	2670	0.4	7	
1998 Jun	56	2740	0.4	7	
1955 Aug	55	2560	0.4	7	
1950 Apr	53	2390	0.4	6	
2000 Mar	53	2400	0.4	6	
1962 Apr	52	2240	0.3	6	
1996 Jul	51	2100	0.3	6	
1964 Mar	50	2030	0.3	5	
1972 Apr	50	1990	0.3	5	
1959 Oct	49	1940	0.3	5	
1996 May	49	1910	0.3	5	
1959 Apr	48	1890	0.3	5	
1976 Jan	47	1720	0.2	5	
1968 Mar	46	1690	0.2	5	

Spillway crest = 144 feet; Storage = 38,000 acre-feet

<b>Union Village Dam Thetford, Vermont</b>					
<i>Table 5 – Reservoir Area/Capacity (Drainage Area = 126 square miles)</i>					
Elevation (feet – NGVD)	Stage (feet)	Area (acres)	Capacity		Percent Full
			(acre-feet)	(inches)	
420	0	0	0	0.00	0.0
425	5	12	100	0.01	0.3
430	10	22	200	0.03	0.5
435	15	33	300	0.04	0.8
440	20	45	400	0.06	1.1
445	25	58	500	0.07	1.3
450	30	72	650	0.10	1.7
455	35	86	800	0.12	2
460	40	97	1200	0.18	3
465	45	115	1600	0.24	4
470	50	132	2100	0.31	6
475	55	148	2600	0.39	7
480	60	168	3300	0.49	9
485	65	188	4000	0.60	11
490	70	208	5000	0.74	13
495	75	232	6000	0.89	16
500	80	255	7250	1.08	19
505	85	280	8500	1.26	22
510	90	307	10000	1.49	26
515	95	338	11800	1.76	31
520	100	372	13700	2.04	36
525	105	406	15700	2.34	41
530	110	444	18000	2.68	47
535	115	483	20500	3.05	54
540	120	530	23000	3.42	61
545	125	575	26000	3.87	68
555	135	666	32300	4.81	85
560	140	707	35200	5.24	9.3
564	<b>144</b>	740	38000	5.65	100
<b>Spillway Crest = 144 Feet</b>					
565	145	748	38700	5.76	102
570	150	785	42500	6.32	119
575	155	823	46600	6.93	123
579	159	853	49640	7.39	131
580	160	860	50400	7.50	133
584	<b>164</b>	896	53920	8.02	142
<b>Top of Dam = 164 Feet</b>					

## **2.6 History**

### **2.6.1 Prehistoric Period**

Prehistoric settlement and land use patterns of the Thetford section of the Ompompanoosuc River drainage basin appear to be similar to those found throughout the Upper Connecticut River drainage basin which are characterized as limited use of upland areas and more intensive use of terraces above navigable streams and river mouths. Subsistence is biased towards hunting, fishing, and foraging. The typical village/settlement sites during this period in this region include residence at the lower reaches of all major rivers during summer period and a return to upland sites during other periods. This is the most common settlement pattern during the prehistoric period in Vermont. Upper sections of both the West Branch of the Ompompanoosuc and Ompompanoosuc River drainage basins may have been part of this settlement system during some time periods.

### **2.6.2 Historic Period**

Foreign inhabitants began populating the area in the late 1700's, with the majority working farms and cutting timber. By the early 1800's, shops and mills (saw, grist, and woolen) flourished and employed large numbers of local people.

During the mid-1800's, the Boston and Passumpsic Railroad became integral in the development of the mill industry. During this time, copper mining in the nearby towns of Fairlee and Strafford, employed many Thetford residents.

By 1880 many of the mills had ceased operations and primary means of employment were gained through rural farming. In 1935, there were still 208 farms in Thetford, and at least 83 percent of the land was cleared for crops or pasture. In the early twentieth century, summer camps for children and adults were established around Lake Fairlee and other lakes and ponds in the area. This marked the beginning of a seasonal recreational industry in Thetford. In the 1950s, the interstate system was being built in the United States and eventually Interstate 91 was constructed through the eastern part of Thetford. The highway made travel between communities easier, and the population of Thetford has increased dramatically in the last twenty-five years.

## **2.7 Climate**

### **2.7.1 General**

The Ompompanoosuc River watershed has a variable climate characterized by frequent but generally short periods of heavy precipitation in the summer and longer periods of less intense precipitation in the winter months. The river lies in the path of the “prevailing westerlies” and cyclonic storms that move across the country from the west or southwest. The area is also exposed to coastal storms, locally known as “northeasters” that travel up the Atlantic seaboard. In addition, tropical hurricanes constitute an infrequent but important potential for flood

producing precipitation, particularly from August through October. Thunderstorms may occur over the basin at any time of the year and may be of local origin or associated with a stationary front.

A climatological station is located in Chelsea, Vermont, about 16 miles northwest of Union Village Dam and about four miles outside of the Ompompanoosuc River watershed.

### 2.7.2 Temperature

Winters are moderately severe with sub-zero temperatures common; summers are mild with temperatures over 90°F infrequent. The average monthly temperatures of the Ompompanoosuc River vary widely throughout the year, from 16°F in January to about 67°F in July. Extremes in temperature range from a high of 100°F to a low of -40°F.

### 2.7.3 Precipitation

A precipitation weighing and recording gage is installed at the dam. Also located at the site is an automatic float-operated reservoir stage recorder which monitors the water level. A tile staff gage is located on the outside of the gate house; during periods of reservoir storage, the outside tile gage is compared with the tape readings and/or chart record to assure accuracy.

Measurements of snow depth and water equivalent in the Ompompanoosuc watershed are conducted from about January 15<sup>th</sup> to April 15<sup>th</sup> by personnel at Union Village Dam. These measurements enable the Reservoir Regulation Team to estimate runoff potential from snowmelt in the watershed.

The mean annual precipitation over the basin is about 35 inches, which is distributed rather uniformly throughout the year. Average monthly precipitation at Chelsea, ranges from a minimum of 2.37 inches in February to a maximum of 3.58 inches in July. Extremes in precipitation vary from a minimum recorded value of 0.13 inches in October to a maximum of 10.86 inches in November. The mean annual snowfall for 71 years of record at Chelsea, Vermont, is 87.7 inches with about 45 percent occurring in the months of January and February. Moderately high springtime discharges frequently occur as a result of melting snow, but runoff from this source alone has not caused a major flood during the period of record. However, serious flooding due to a combination of heavy rain and snowmelt is a yearly possibility.

The mean annual runoff from the drainage area above Union Village Dam represents about 55 percent of the mean annual precipitation. Approximately 60 percent of the runoff occurs in the months of March, April, and May. Usually, the maximum monthly runoff each year occurs during the snowmelt months of March and April.

## **2.8 Topography**

The Ompompanoosuc River watershed is located in east central Vermont, primarily in Orange County, with a small portion at the mouth of the river in Windsor County. The watershed pattern is dendritic, approximately 17 miles long and 12 miles wide, with a drainage area of 136 square miles. Only 10 square miles lie downstream from Union Village Dam.

The terrain of the watershed is steep and conducive to rapid runoff, sloping in a southeasterly direction. Elevations vary from over 2,300 feet NGVD in the northwestern headwaters to 385 feet NGVD at the river's mouth. The average watershed elevation is about 1,300 feet. The Y-shaped reservoir is confined in the narrow valleys of the West Branch of the Ompompanoosuc and Ompompanoosuc Rivers. Elevations in the vicinity of the project range from approximately 420 feet NGVD to more than 1,200 feet NGVD atop the Glebe, which flanks the Ompompanoosuc Valley northeast of the dam. (Refer to attached *Figure 1 – Locus Plan* and *Figure 2 – Site Plan*.)

## 2.9 Project Access

### 2.9.1 Roadways

Main access to the project area is provided via Interstate 91 and Vermont 132. Entrances to the reservoir area are located off Academy Road (the main entrance) in Union Village, off Route 113A in Thetford Center (“East Access Road”), and off Tucker Hill Road (“West Access Road”). There is less than one mile of bituminous asphalt roadway within the park. There are approximately three miles of gravel roadways that serve the recreation facilities. All roads within the park are gated (steel), and painted yellow. The entrance gates are painted brown with reflectorized tape on them. In addition, all roadways are heavily used during the winter months for cross-country skiing and for snowmobiling.

### 2.9.2 Parking

The “Entrance Picnic Area” has a paved parking area across from the restroom which holds approximately 20 vehicles. Each picnic area has a different parking capacity ranging from four to 10 vehicles. A 30-40 vehicle parking area is also located outside the gate near Thetford Center. There is also a parking area outside the main gate that holds approximately six vehicles.

Vehicle parking is not allowed on recreation area lawns.

### 2.9.3 Trails

There are two designated multiple use trails at Union Village Dam: the Union Village Forest Management Demonstration Trail and the Mystery Trail. The Forest Management Trail is a two loop system covering a total of 2.6 miles, while the Mystery Trail covers 0.75 miles. Both trails have self-guided brochures.

## 3.0 RESOURCE INVENTORIES

### 3.1 Introduction

The Union Village project area is a regionally important and valuable natural resource that provides for many popular recreational activities such as: hiking, hunting, fishing, swimming, picnicking, snowmobiling, cross country skiing, and snow shoeing. The project maintains a wide variety of habitats through wildlife and forestry management programs that are oriented toward conservation and passive recreation.

### 3.2 Natural Resources

#### 3.2.1 Geology

##### 3.2.1.1 Bedrock Geology:

East-central Vermont bedrock geology consists primarily of metamorphic rock ranging in age from Lower Devonian (395± million years before present) to Pre-Cambrian (greater than 590± million years before present). Based on the Geologic Map of Vermont bedrock in the vicinity of Union Village Dam and reservoir generally consists of:

- Middle Ordovician greenstone and green chloritic schist and chloritic and biotite gneiss of the Post Pond Volcanics of the Orfordville Formation.
- Lower Devonian gray slate and phyllite of the Meetinghouse Slate member of the Gile Mountain Formation.
- Lower Devonian gray quartzite-muscovite phyllite or schist of the Gile Mountain Formation.

Union Village Dam is located at or near the contact of the Middle Ordovician schist and the Lower Devonian slate. Structurally the dam and reservoir are located in the Brattleboro-Averill Syncline to the west of the Ammonoosuc Thrust fault.

##### 3.2.1.2 Surficial Geology:

Surficial geologic deposits in the vicinity of Union Village Dam and reservoir are primarily the result of deposition that occurred during the retreat of the Laurentide ice sheet 12,000± years before present and recent post-retreat deposition. Based on the Surficial Geologic map of Vermont the surficial deposits in the study area consist of:

- Glaciofluvial kame (ice contact) out wash gravel deposits.
- Glaciolacustrine littoral (beach) sands and lake bottom silts and clays.
- Glacial till (generally dense undifferentiated silt to gravel)
- Post glacial fluvial and recent alluvial sand and gravel.

### 3.2.1.3 Surficial Geologic Resources:

The surficial deposits described above constitute geologic resources in some areas. Based on the Sand and Gravel Resource Maps of Vermont the resources in the study area consist of:

- Sand Deposits – deposits of stratified and sorted fine to very coarse sand.
- Sand and Gravel Deposits – deposits of stratified and sorted boulder to pebble gravel and sand and gravel deposits of interbedded cobble to pebble gravel and medium to coarse sand.
- Land Use Exclusion Areas – areas where deposits are assumed to be unavailable due to development, critical habitat, or land use restrictions.

### 3.2.2 Soils

Soil mapping information for the project is summarized in *Table 6 – Dominant Soil Types Listed by Acreage* and depicted on attached *Figure 3 – Soil Classification Plan*:

**Union Village Dam  
Thetford, Vermont**

*Table 6 – Dominant Soil Types Listed by Acreage*

Map Symbol	Soil Type	Total Acreage
Ag-	Agawam fine sandy loam	144
Me-	Merrimac fine sandy loam	121
Hd-	Hartland silty loam	104
MI	Made Land	77
Tr-	Tunbridge – Woodstock very rocky fine sandy loam	74
Wo-	Winooski very fine sandy loam.	62
Ha-	Hadley very fine sandy loam	60
Be-	Belgrade silty loam	56
Le-	Limerick fine sandy loam	46
Tw-	Tunbridge – Woodstock- complex, 25 to 50% slopes	43
Wn-	Windsor loamy fine sand	37
Cs-	Colrain very stony loam	27
Bv-	Buckland very stony loam	24
Nn-	Ninigret fine sandy loam	19
Sa-	Saco mucky silty loam	6
Wa-	Walpole fine sandy loam	3
Bp-	Borohemists, Poned	3
Co-	Colrain stony fine sandy loam	2
BW-	Buckland	1

### 3.2.2.1 Detailed Soils Descriptions:

Detailed soils descriptions for the dominant soil types were obtained from the USDA Natural Resources Conservation Service (NRCS) office in White River Junction, Vermont. The following soil descriptions are excerpted from the Soil Survey of Orange County, Vermont, published by the USDA Soil Conservation Service:

#### Ag-Agawam fine sandy loam:

This series consists of deep, well drained, level to steep soils on stream terraces. These soils formed in stratified outwash derived mainly from schist, granite, gneiss, and phyllite. The surface layer is very dark grayish brown fine sandy loam 9 inches thick. The subsoil is between the depths of nine and 34 inches; the upper part is dark yellowish brown and olive brown fine sandy loam, and the lower part is light olive brown loamy fine sand. The underlying material is between depths of 34 and 60 inches and is light olive. Agawam soils have moderated available water capacity, permeability is moderately rapid and the shrink-swell potential is low. Where this soil has no cover, it is subject to soil blowing. *The hazard of water erosion is severe.*

Me- Merrimac fine sandy loam:

The Merrimac series consists of level to steep, deep, somewhat excessively drained soils on terraces. These soils formed in stratified outwash sand and gravel. These soils formed in stratified outwash derived from granite, schist, quartzite, gneiss, and phyllite. The surface layer is very dark grayish brown fine sandy loam six inches thick. The upper 10 inches of the subsoil is brown to dark brown grading to yellowish brown fine sandy loam, and the lower seven inches is brown sandy loam. The underlying material to a depth of 60 inches is olive gray gravelly sand. Merrimac soils have low available water capacity. Natural fertility is low. Permeability is rapid. When farmed, these soils are used mainly for hay, pasture, or corn for silage. Many gravel pits are in areas of these soils. Steep areas are in forests or are idle. *The hazard of water erosion is severe when the soil is cultivated.* Soil blowing is a hazard where there is no plant cover.

HdD—Hartland silty loam:

The Hartland series consists of level to steep, deep, well drained soils on dissected stream terraces. They formed in glaciolacustrine silt and very fine sandy loam. The surface layer is dark grayish brown silt loam six inches thick. The silt loam subsoil is 13 inches thick. The upper part is olive brown, and the lower part is light olive brown. The underlying material between depths of 19 and 60 inches varies of dark grayish brown and olive silt and of light olive brown, yellowish brown, and olive very fine sandy loam.

Hartland soils have a high available water capacity. Natural fertility is high. Permeability is moderately slow. Management practices are needed to prevent excessive soil loss. Runoff is rapid. *The hazard of water erosion is severe when the soil is cultivated.* Gullies develop readily where water flows through drainageways that have no plant cover.

Ml – Made Land:

Typically depressional areas of poorly or very poorly drained soils which have been disturbed, altered, or manipulated to such an extent that the surface and subsoil have been obliterated or buried to a depth of at least 30 cm. The fill may consist of either soil or non-soil material. Most areas have been graded and are 0.25 to five acres in size. Please note: this designation was used to describe the dam.

Tr – Tunbridge – Woodstock-Rock outcrop complex:

The Tunbridge series consists of gently sloping to steep, moderately deep, stony to very stony, well-drained soils on the sides and tops of hills and ridges where the topography is bedrock controlled. These soils formed in glacial till derived mainly from siliceous limestone and schistose rocks. They are mapped only in complexes with the Woodstock soils.

The surface layer is very dark grayish brown fine sandy loam seven inches thick. The sub soil is fine sandy loam 22 inches thick; it is dark brown in the upper part and very dark grayish brown in the lower part. Mica schist bedrock is at a depth of 29 inches. Sound woodland management that includes control of erosion on logging roads is needed. Runoff is medium to rapid. *The hazard of water erosion is moderate to severe where the soils have no plant cover.*

Wo—Winooski very fine sandy loam:

The Winooski series consists of level, deep, moderately well drained soils on flood plains of major streams and their tributaries. These soils formed in very fine sandy loam and silt loam alluvium. The surface layer is very dark grayish brown very fine sandy loam eight inches thick. The underlying material between the depths of eight and 17 inches is about equal parts of very

dark grayish brown and olive very fine sandy loam. Between 17 and 60 inches it is dominantly very dark grayish brown very fine sandy loam that has distinct dark yellowish brown mottles.

Winooski soils have high available water capacity. Natural fertility is high. Permeability is moderate Wetness and the hazard of flooding limits this soil for most non-farm uses. Runoff is slow. *The hazard of water erosion is slight.*

Ha-Hadley very fine sandy loam:

The Hadley series consist of deep, well-drained level soils on the flood plains of the major streams and their tributaries. These soils formed in very fine sandy loam and silt loam alluvium. The surface layer is very dark grayish brown very fine sandy loam 11 inches thick. The next 17 inches is dark grayish brown very fine sandy loam. Below a depth of 28 inches is olive very fine sandy loam that has very dark grayish brown bands one to 12 inch thick.

This soil is in areas that are parallel to the nearby stream. In a few areas considerable debris is deposited by floodwater. Flooding limits the use of this soil for most non-farm uses. Runoff is slow. *The hazard of water erosion is slight.* Streambank erosion is concern along some streams.

3.2.3 Surface Waters and Wetlands

Union Village Dam flood control project is a dry bed reservoir that maintains a pool only during the winter months to prevent the freezing of the control gates. The winter pool is 50 acres at elevation 440 feet NGVD, with a water depth of approximately 20 feet and a volume of about 400 acre-feet.

The Ompompanoosuc River watershed is located in east central Vermont, primarily in Orange County, with a small portion at the mouth of the river in Windsor County. The watershed pattern is dendritic, approximately 17 miles long and 12 miles wide, with a drainage area of 136 square miles. Only 10 square miles lie downstream from Union Village Dam.

The river habitat is comprised of the Ompompanoosuc and West Branch of the Ompompanoosuc Rivers. Within project bounds, a few permanent brooks and many intermittent ones contribute to the system.

Wetlands on the project were classified in accordance with the Cowardin et. al. classification system, as follows:

- Palustrine - all non-tidal wetlands dominated by trees, shrubs, and persistent emergent herbaceous plants.
- Riverine - generally all wetlands and deepwater habitats contained within a channel.

Wetland mapping and land habitat classification information for the project is shown on attached **Figure 4 – Wetland Classification Plan.**

The palustrine wetlands and riverine system acreages are summarized in **Table 7 – Palustrine Wetlands and Riverine System Acreages** below:

<b>Union Village Dam Thetford, Vermont</b>		
<i>Table 7 – Palustrine Wetlands and Riverine System Acreages</i>		
<b>Wetland Classification</b>	<b>Description</b>	<b>Acres</b>
	<b>Palustrine System:</b>	
POW	Open Water	0.4
PAB	Aquatic Bed	6.1
PEM1	Emergent vegetation, persistent	18.2
PEM1/PSS1	Emergent vegetation persistent, with a shrub/scrub broad-leaved deciduous component	1.0
PSS1/PEM1	Scrub/shrub broad-leaved deciduous, with an emergent, persistent component	5.1
PSS1	Shrub/scrub broad-leaved deciduous	24.6
PSS1/PFO1	Shrub/scrub broad-leaved deciduous with a forested broad-leaved deciduous component	12.4
PFO1	Forested broad-leaved deciduous	1.7
	<b>Riverine System:</b>	
ROW	Open water contained within a channel	53.6
	<b>Total =</b>	<b>123.1</b>

### 3.2.4 Vegetative Cover

#### 3.2.4.1 Forest Lands:

The forested lands at Union Village Dam are primarily noncommercial due to the generally poor quality of the timber, steep terrain, and small stand size. Most forest stands are located in areas that were too steep to farm, were between fields, or were too boggy for cultivation. Consequently, these areas remained in forest cover.

The forest stands perform a valuable function by protecting the lands surrounding the river from erosion, by providing recreational opportunities, and habitat diversity.

The forested lands are considered second growth and consist of northern hardwoods, mixed hardwoods-softwoods or softwood. The principal cover types include white pine (*Pinus strobus*), hemlock (*Tsuga canadensis*), white pine-hemlock, and sugar maple (*Acer saccharum*)-beech (*Fagus grandifolia*)-yellow birch (*Betula alleghaniensis*).

Approximately 330 of the 991 acres are open fields and pasture; the remainder is mixed hardwood and softwood stands. The total acreages of the forest cover types for the project area are shown below, in *Table 8 – Vegetative Cover Acreages*, and are depicted on the attached *Figure 5 – Forest Classification Plan*.

<b>Union Village Dam Thetford, Vermont</b>	
<i>Table 8 – Vegetative Cover Acreages</i>	
<b>Forest Cover Type</b>	<b>Total Acres</b>
White Pine	381.3
Open to Brushy Fields	226
Mixed Hardwoods	102.4
Eastern Hemlock	65.7
Red Maple	10.4
Red Pine	25.4

The cover type of greatest frequency at Union Village Dam is white pine. Pure stands are rare; the remaining areas are made up of white pine and associated species, including: yellow birch, sugar maple, northern red oak (*Quercus rubra*), American basswood (*Tilia americana*), white ash (*Fraxinus americana*), black cherry (*Prunus serotina*), beech and hemlock (*Tsuga Canadensis*).

The second most common forest type is typical northern hardwoods -- beech, sugar maple, and yellow birch. Associated species include paper birch (*Betula papyrifera*), black cherry, and white pine. It is anticipated that, over time, this cover type will transition away from a dominance of beech, due to the infestation of beech bark disease.

The third most common type found is hemlock. This type is found on hills or ridges away from areas prone to flooding. Associated species are similar to the white pine type.

The goal of the USACE forest management program at Union Village Dam is to actively manage the forest resource for the enhancement of wildlife habitat to benefit selected indigenous wildlife species while providing some wood products for sale.

#### 3.2.4.2 Open Lands (Grass and Brushy Areas):

Open or brushy areas were not inventoried as forest lands but were included on the cover type map because they represent the second largest category of ground cover. These areas generally consist of small intolerant hardwoods like quaking aspen (*Populus tremuloides*), bigtooth aspen (*Populus grandidentata*), and shrubs such as speckled alder (*Alnus rugosa*), blackberry and spirea in association. These areas typically comprise ecotones between areas of open field and forested land, swamps, areas of poor soil types, or flood plain areas.

Open lands found at the project are associated primarily with project administration areas, former agricultural fields, areas cleared of trees during the project's construction, and areas kept open through flooding and damage from ice.

The areas around the administration facilities are maintained as lawns except for small sections of pavement. The greatest amount of open land is located in the reservoir proper. Open herbaceous areas are kept open through an agricultural lease; sale of standing hay; mowing by project, volunteer, or contract labor; and through the use of prescribed fire. Areas inaccessible to equipment are slowly becoming reforested.

#### 3.2.4.3 Developed Areas:

At Union Village Dam there is: an office area; one developed recreation area and three picnic sites; a swimming area; several parking areas; a restroom building and portable toilets; a picnic shelter; and a number of multiple use trails. The approximate locations of the existing developed areas are depicted on attached **Figure 2 – Site Plan**.

#### 3.2.4.4 Exemplary Natural Communities:

Exemplary natural communities are identified by the Vermont Nongame and Natural Heritage Program and the US Fish and Wildlife Service. Per correspondence with this agency, no natural communities of statewide significance have been identified at the project.

### 3.2.5 Wildlife

Wildlife species that can be found in the project area include muskrat, fisher, raccoon, beaver, mink, red fox, whitetail deer, various species of rabbit, and wild turkey. A variety of avian species including wood duck, green-winged teal, common snipe, Canada geese, American woodcock, and various songbirds and raptors can be found within the project boundaries. A wide variety of amphibians and reptiles are also found including various salamander, frog, toad, snake, and turtle species. The following are some of the wildlife species that have been observed at Union Village Dam:

- eastern chipmunk (*Tamias striatus*);
- eastern gray squirrel (*Sciurus carolinensis*);

- New England cottontail (*Sylvilagus transitionalis*);
- red fox (*Vulpes fulva*);
- red squirrel (*Tamiasciurus hudsonicus*);
- ruffed grouse (*Bonasa umbellus*);
- snowshoe hare (*Lepus americanus*);
- tree swallow (*Iridoprocne bicolor*);
- whitetail deer (*Odocoileus virginianus*);
- wild turkey (*Meleagris gallopavo*);
- woodcock (*Philohela minor*);
- muskrat (*Ondatra zibethica*);
- beaver (*Castor canadensis*);
- mink (*Mustela vison*);
- otter (*Lutra canadensis*);
- black-capped chickadee (*Parus atricapillus*);
- eastern bluebird (*Sialia sialis*);
- wood duck (*Aix sponsa*);
- green heron (*Butorides v. virescens*);
- killdeer (*Charadrius v. vociferous*);
- kestrel (*Falco sparverius*);
- green-winged teal (*Anas carolinensis*);
- spotted sandpiper (*Agelaius phoeniceus*);
- eastern belted kingfisher (*Megaceryle a. alcyon*);
- American bittern (*Botaurus lentiginosus*);
- hooded merganser (*Lophodytes cucullatus*);
- common merganser (*Mergus merganser*);
- red-shouldered hawk (*Buteo lineatus*);
- common snipe (*Gallinago gallinago*);
- American woodcock (*Scolopax minor*);
- barred owl (*Strix varia*);
- whip-poor-will (*Caprimulgus vociferous*);
- belted kingfisher (*Ceryle alcyon*);
- yellow-bellied sapsucker (*Sphyrapicus varius*);
- pileated woodpecker (*Dryocopus pileatus*);
- willow flycatchers (*Empidonax traillii*);
- great-crested flycatcher (*Myiarchus crinitus*);
- brown thrasher (*Toxostoma rufum*);
- gray catbird (*Dumetella carolinensis*);
- American pipit (*Anthus rubescens*);
- Nashville warbler (*Vermivora ruficapilla*);
- northern parula (*Parula Americana*);
- black-throated green warbler (*Dendroica virens*);
- bay-breasted warbler (*Dendroica castanea*);
- swamp sparrow (*Melospiza Georgiana*); and
- white-throated sparrow (*Zonotrichia albicollis*).

Muskrat, fisher, raccoon, beaver, mink, and red fox are all targeted species for trapping at Union Village Dam. Hunting is primarily focused upon whitetail deer, with some hunting for ruffed grouse and woodcock, also.

Primary terrestrial wildlife requirements are food, water, and shelter in adequate quantity and quality. Many species also need escape cover to elude predators. Several species have rather specific habitat requirements for breeding and propagation. Some examples are drumming sites for ruffed grouse, suitable den trees for raccoons or pileated woodpeckers, and flood-proof and relatively predator-proof nesting sites for waterfowl.

The majority of the wildlife habitat management practices at Union Village Dam 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, seedling, saplings, brush, and mature forest provides for distribution of cover types to meet wildlife needs.

There is a need for open grassland in the New England area as many potential open space zones are being lost to woody growth. Open fields in primary successional stages are maintained to provide a diversity of habitats for wildlife and overall ecological quality. Existing open areas are maintained through mowing and burning. Open areas are important as early plant successional areas and to maintain a variety of interspersed wildlife habitats. Travel corridors for wildlife are also provided through hedgerow maintenance using native plant species that also provide food and cover.

### 3.2.6 Fish

Union Village Dam contains limited aquatic habitats, including shallow ponds, wetlands (including vernal pool habitat), Avery Brook, the Ompompanoosuc River, and the West Branch of the Ompompanoosuc River.

Water level fluctuations occur at the project site in conjunction with flood control operations to regulate downstream flows. These fluctuations can be both beneficial and detrimental to fish species with the extent of the damage depending on many factors. These factors include: the time of year, the amount of fluctuation, and the direction of fluctuation (a raising or a lowering of the pool level).

Copperas Brook flows into the West Branch of the Ompompanoosuc River upstream of the project area. This brook flows through a large copper tailing area (associated with the former Elizabeth Copper Mine) that contributes several heavy metals, silt and water that has a measured pH as low as 2.0. This and other sources of silt and contaminants render the West Branch of the Ompompanoosuc River a very poor fishery.

The fish species found in the project area include mostly cold-water species. Species include:

- brown bullhead (*Ictalurus nebulosus*);
- yellow perch (*Perca flavescens*);
- white sucker (*Catostomus commersoni*);
- spottail shiner (*Notropis hudsonius*);

- blacknose dace (*Rhinichthys atratulus*);
- common shiner (*Notropis cornutus*);
- longnose dace (*Rhinichthys cataractae*);
- creek chub (*Semotilus atromaculatus*);
- rainbow trout (*Salmo gairdneri*);
- brook trout (*Salvelinus fontinalis*); and
- brown trout (*Salmo trutta*).

Stocking practices are currently in place for trout species including brown, brook, and rainbow trout. The Vermont Department of Fish and Wildlife currently manages portions of the Ompompanoosuc River within the project bounds under a put-and-take program. In 1990, a program involving the stocking of Atlantic salmon was initiated. Natural reproduction of salmonid species appears to be somewhat problematic.

### 3.2.7 Rare, Threatened and Endangered Species

The Vermont Nongame and Natural Heritage Program and the US Fish and Wildlife Service was contacted for updated official state and federal data for listings of rare, threatened and endangered species found at the project site. The following species of plants are listed for Union Village Dam:

<u>Common Name</u>	<u>Scientific Name</u>	<u>Federal Status</u>	<u>State Rank</u>	<u>Global Rank</u>	<u>Comments</u>
large marsh-bedstraw	Galium obtusum	None	S1	G5	Last seen 1999
marsh mermaid-weed	Proserpinaca palustris	None	S1	G5	Last seen 1999

Union Village Dam personnel have also found the following species of rare and uncommon native birds at the site, as listed October 2000 on the Union Village Dam website:

<u>Common Name</u>	<u>Scientific Name</u>	<u>Federal Status</u>	<u>State Status</u>	<u>State Rank</u>	<u>Global Rank</u>
pieb-billed grebe	Podilymbus podiceps		SC	S2B,S3N	G5
American bittern	Botaurus lentiginosus			S3B,S3N	G4
great blue heron	Ardea herodias			S2,S3B,S5N	G5
green-winged teal	Anas crecca			S2B,S5N	G5
turkey vulture	Cathartes aura			S3B,S4N	G5
osprey	Pandion haliaetus		E	S2B,S4N	G5
bald eagle	Haliaeetus leucocephalus	LE	E	SHB,S2N	G4
northern harrier	Circus cyaneus		SC	S2B,S3,S4N	G5
merlin	Falco columbarius			S1B,SZN	G5
common nighthawk	Chordeiles minor		SC	S2,S3B,SZN	G5
whip-poor-will	Caprimulgus vociferus		SC	S2B,SZN	G5
carolina wren	Thryothorus ludovicianus			S1,S2B,S2N	G5
Tennessee warbler	Vermivora peregrina			S2,S3B,SZN	G5
pine warbler	Dendroica pinus			S3B,SZN	G5
prairie warbler	Dendroica discolor			S3B,SZN	G5
palm warbler	Dendroica palmarum			S1B,SZN	G5
bay-breasted warbler	Dendroica castanea			S1B,SZN	G5

**KEY:**

- E: Endangered: in immediate danger of becoming extirpated in the state*
- SC: Special Concern: rare; status should be watched*
- LE: Listed endangered*
- S1: Very rare, generally 1 to 5 occurrences believed to be extant and/or some factor(s) making it especially vulnerable to extirpation from the state*
- S2: Rare, generally 6 to 20 occurrences believed to be extant and/or some factor(s) making it vulnerable to extirpation in the state*
- S3: Uncommon, believed to be more than 20 occurrences and/or there is some threat to it in the state*
- S4: Apparently secure in state, often with more than 100 occurrences*
- S5: Demonstrably secure in state*
- SZ: Not of practical conservation concern because there are no definable occurrences*
- B: Breeding status e.g. S1B is a very rare breeder*
- N: Nonbreeding status e.g. S1N is a very rare nonbreeder; and SZN is a migrant that occurs in an irregular, transitory, and/or dispersed manner*
- G4: Apparently secure globally, though perhaps locally rare*
- G5: Demonstrably secure globally*

Union Village Dam is also included in the Silvio O. Conte National Wildlife Refuge.

### 3.2.8 Water Quality

Any discussion of water quality at Union Village Dam begins with an examination of the upstream abandoned copper mines: the Elizabeth Mine on the West Branch and the Ely Mine on the East Branch of the Ompomanoosuc River.

The Elizabeth Mine was active until the 1950's, involved both open pit and shaft mining, and left over 40 acres of tailing piles. Acid mine drainage originates in an air vent to the now-flooded mining tunnel, and from runoff from the tailing piles. This runoff enters the West Branch of the Ompomanoosuc River about two miles upstream from Union Village Dam's project boundaries, adding acidity and heavy metals, especially iron, to the river. Under normal conditions, the watershed's limestone soils add enough buffering capacity that the pH remains high and metals precipitate out before the river reaches the USACE project boundary. During storms, large amounts of material can be washed from the tailings pile into the river. Some of this material settles out in the flood control impoundment behind Union Village Dam, but most of the material is washed through the project. During these events, suspended solids levels in the river increase greatly, with possible decreases in pH and increases in dissolved heavy metals levels.

The Ely Mine is more than five miles upstream from Union Village Dam, and was a smaller operation than the Elizabeth Mine. The Ely Mine closed in the 1800's. It does not have extensive tailings areas and has much less effect on the East (Main) Branch than the Elizabeth Mine has on the West.

Between storms, overall water quality in both branches of the river within the Union Village project area is good in that it generally meets State standards and is suitable for intended recreational uses. Dissolved oxygen (D.O.) levels are usually high and the natural buffering capacity of the watershed's limestone soils keeps the pH in the alkaline range. Data collected between 1981 and 1997 showed the DO was rarely below 6.0 and never below 5.5 mg/l, pH almost always between 7.0 and 8.5, and turbidity usually less than 5 NTU's. Analyses in 1995 showed low levels of metals, and nitrogen and phosphorus. The waters are free of floating oils and pollutants that form objectionable deposits or nuisances.

Since August 1996 elevated bacteria levels in the East (Main) Branch have been a chronic problem. Initial investigations showed that dairy cows with direct access to streams were causing this contamination. When the owner fenced off the streams, conditions improved for a while. However, high levels of *Escherichia coli*. bacteria still often closed the beach in July and August. This high bacteria count has not consistently occurred only after storms. Extensive sampling by USACE and the local health department has not been able to find the source, however, it is suspected to be an intermittently failing septic system. Until the source is found and corrected, additional sampling of the East (Main) Branch and its tributaries will continue.

## **3.3 Cultural Resources**

An archaeological reconnaissance survey of Union Village Dam was completed in 1986 by the Department of Archeology, University of Vermont under contract to Sanford Ecological Services, Inc. and the USACE New England Division. The purpose of the reconnaissance level

survey was to provide information on the archaeological sensitivity of Union Village Dam and review the possible effects of current project operations on cultural resources.

The project area was stratified into zones of expected archaeological sensitivity. Limited subsurface testing was completed on fee-owned lands to field check the predictive model for prehistoric and historic resources. Historic cultural resources were identified from documentary sources, subsurface testing, and walkover inspections.

The archaeological reconnaissance survey identified several zones of high and moderate prehistoric archaeological sensitivity within Union Village Dam. No specific prehistoric sites were identified and 40 archaeological-historic sites were identified with 25 of those sites requiring further investigation. Note that archaeological site locations are confidential information that are exempt from the Freedom of Information Act requirements and cannot be divulged to the general public.

### 3.3.1 Prehistoric Resources

Thomas and Bourassa did not identify any specific sites of prehistoric significance. However, they do note that it is very likely that the Ompompanoosuc River watershed was actively exploited as a hunting/fishing/trapping territory during the Late Woodland period (950 to 450 B.P.)

Certain sections of Union Village Dam have physical attributes that appear very similar to the locations of previously recorded prehistoric sites in the interior uplands of Vermont. Limited subsurface testing (eight test pits, soil core tube sampling, and eight - three meter long backhoe trenches), performed in areas of high and moderate prehistoric sensitivity failed to identify any prehistoric sites. The lack of prehistoric resources encountered within the project area may be explained by the limited testing completed during the reconnaissance investigation of Union Village Dam. Also, the post-construction deposition of flood sediments up to 1.5 meters thick in the southern portion of the project area may explain the lack of prehistoric sites. However, the testing served to refine the initial sensitivity assessment of the project area and it is estimated that 250 acres of fee-owned land possess moderate to high prehistoric archaeological sensitivity. The results of the reconnaissance survey suggest that additional, more intensive archaeological surveys of these sensitive areas could identify prehistoric sites.

### 3.3.2 Historic Resources

A site that is determined to be of historic significance is one that meets eligibility requirements for nomination to the Historic National Register (NR). Twenty-five of the 40 identified historical sites at Union Village Dam require further archaeological investigations to assess their potential NR eligibility. These sites represent a variety of site types including domestic, agrarian, and industrial sites. Four additional (bridge abutments) sites should be measured and photographed. Ten archaeological sites have been destroyed and no further investigations are recommended.

Recommendations were made in the 1986 report for each of the 40 archaeological sites based on the limited data available from the reconnaissance survey. Since no assessment can yet be made as to the significance of the 25 known archaeological sites on fee-owned land at Union Village

Dam that require additional evaluation, they must be treated as though they are eligible for the NR until further archaeological investigations are completed.

### 3.4 Recreational Resources

Union Village Dam provides numerous opportunities for recreational pursuits. The project contains a number of developed recreation areas as well as undeveloped passive recreational resources. These resources are managed as specified in the OMP.

#### 3.4.1 Existing Facilities

##### 3.4.1.1 General Description:

The project is located in the town of Thetford, Vermont. At Union Village Dam there is one developed recreation area that consists of: a covered picnic shelter, restroom facilities, grills, picnic tables, two horseshoe pits, a volleyball net, and a swing set and slide. The other picnic areas have grills, picnic tables, and portable toilets. The picnic area at Sandy Beach has a small beach area for swimming. Union Village Dam also has a number of trail systems suitable for hiking, snowmobiling, and cross-country skiing. The approximate locations of the existing recreational facilities are depicted on the attached *Figure 2 – Site Plan*.

##### 3.4.1.2 Recreation Season and Hours of Operation:

The park and all its facilities are open during the hours of 8:00 a.m. to 8:00 p.m. from the third Saturday in May to the first Sunday after Labor Day in September. The park is also open to pedestrians, hunters, skiers, etc. during the rest of the year. However, restrooms are closed during those off-season dates.

##### 3.4.1.3 Group Use Permits:

There is no formal set-aside group area at Union Village Dam. However, several spots on the project have been used by public service organizations such as scouts, 4-H clubs, and military units. The use of these areas is governed on a case-by-case basis by issuance of a Special Use Permit from the Operations Manager. A picnic shelter may be reserved for a nominal fee by calling the project office at either Union Village or North Hartland.

#### 3.4.1.4 Public Access:

As referenced in **Section 2.9 – Public Access**, entrances to the reservoir area are located off of Academy Road (the main entrance) in Union Village, off of Route 113A in Thetford Center, and off of Tucker Hill Road near the junction of Route 132. All roads within the park are gated. Parking at the Entrance Picnic Area consists of a paved area across from the restrooms that holds 20 vehicles, and each picnic area has a parking area with capacities ranging from four to 10 vehicles. A 30-40 vehicle parking area is also located near the Sandy Beach, outside the gate near Thetford Center. There is also a parking area outside the main gate that holds approximately 6 vehicles. No parking is allowed on the recreation area lawns.

#### 3.4.1.5 Drinking Water And Sanitary Facilities:

There are no public drinking water fountains available at Union Village Dam.

The Entrance Picnic Area has restroom facilities. Faucets are located inside the restroom facilities and one is located on the back of the building. The restrooms include the following facilities: one sink, urinal and toilet for men; and one sink and two toilets for women.

The remaining picnic areas have temporary/portable toilet facilities.

#### 3.4.1.6 Picnic Facilities:

There are five separate picnic areas located within the park. Union Village Dam no longer provides trash containers at the picnic areas, and now operates as a “carry-in/carry-out” park. The five picnic areas contain the following facilities:

1. Entrance Picnic Area (or “Main” Area), includes:
  - 20 picnic tables
  - seven grills
  - one large shelter grill
  - one picnic shelter
  - two horse shoe pits
  - one volleyball net
  - swing set and slide
  - restroom(s)
2. First Picnic Area, includes:
  - two picnic tables
  - two grills
  - portable toilet(s)
3. Second Picnic Area, includes:
  - four picnic tables
  - three grills
  - portable toilet(s)

4. Third Picnic Area (Mystery Trail), includes:
  - two picnic tables
  - one grill
  - portable toilet(s)
  
5. Fourth Picnic Area (Sandy Beach), includes:
  - four picnic tables
  - two grills
  - sand beach
  - portable toilet(s)

#### 3.4.1.7 Swimming:

An 80-foot long sand beach swimming area is located at the fourth picnic area (“Sandy Beach”). In addition, there is an old mill plunge pool that is quite popular for swimming. It is located between the second and third picnic areas along the East Access Road.

#### 3.4.1.8 Boating:

As there is no summer conservation pool, only an occasional canoe is seen in the river. Many obstacles make even canoeing and kayaking difficult. All persons using a flotation device (boat, raft, etc.) must comply with applicable US Coast Guard and Corps of Engineers' regulations.

#### 3.4.1.9 Lawn Areas:

There are approximately four acres of regularly mowed and maintained lawn areas that are available for blanket picnicking, sunbathing, games, passive recreation, and special events.

#### 3.4.1.10 Hunting, Trapping, and Fishing:

Hunting, trapping, and fishing are permitted in accordance with applicable Federal, State, and Local laws except in areas designated by the Division Engineer. Trappers must also have a permit issued free by the USACE. Currently, no game stocking program is in effect at the project. The river offers a coldwater fishery and is stocked in the spring by the Vermont Department of Fish and Wildlife, as described in *Section 3.2.6 – Fish*.

#### 3.4.1.11 Communications:

A public pay telephone is attached to the outside of the office building approximately one-eighth of a mile from the entrance. Refer to *Figure 2 – Site Plan* for the location of the office building.

#### 3.4.1.12 First Aid:

Emergency first aid is available from uniformed park personnel.

3.4.1.13 Park Information

Park rules, interpretive schedules, and other park information are posted at the beach area, the office and at the Entrance Picnic Area. A brochure box with Corps Lakeside Recreation brochures, Title 36 CFR, pamphlets, and interpretive program schedules are also maintained in the main recreation area. Park personnel are available to assist visitors. There is also a bulletin board at Sandy Beach, and a small brochure box on the ranger station.

**3.5.1 Recreational Analysis**

3.5.1 Existing Use:

Historically, the visiting public has regularly used the recreation facilities at Union Village Dam. There were more people using the park in the 1980’s than have in recent years. Visitation has been fairly steady throughout the past nine years with a slight drop-off in FY2000 and FY2001. The number of visitor hours recorded are significantly influenced by beach visitation, when the beach is open, visitor hours increase and when the beach is closed, visitor hours drop off dramatically. **Table 9 – Visitation Data** summarizes recreational attendance in visitor hours at Union Village Dam from 1992 to 2002.

Union Village Dam Thetford, Vermont											
<i>Table 9 – Visitation Data*</i>											
Fiscal Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Visitor Hours	23843	16410	51059	96603	78143	55011	50006	40322	35542	37754	79398

\* Source: U.S. Army Corps, N.E. District, VERS Report. All visitation data is based on traffic counters located at various locations around the facility.

As shown above, use of Union Village Dam’s facilities has been fairly consistent since 1994, with a peak in FY1995. The majority of usage involves swimming, sunbathing, picnicking, hunting and fishing, sightseeing, snowmobiling, cross-country skiing, hiking, and nature walking. Due to the type of facilities available at the project, it is common for the recreation areas to experience a high level of usage during weekends when the weather is hot and sunny, and use of the beach area is not restricted due to high water contamination levels.

3.5.2 Natural and Scenic Qualities:

Visitors are attracted to the area by the diversity of geologic and natural features that were formed in this area. The terrain in the watershed is steep and conducive to rapid runoff in a southeasterly direction. Elevations vary from over 2,300 feet NGVD in the northwestern

headwaters to 385 feet NGVD at the river's mouth with an average watershed elevation of about 1,300 feet. The Y-shaped reservoir is confined in the narrow valleys of the West Branch of the Ompompanoosuc and Ompompanoosuc Rivers. Elevations in the vicinity of the project range from about 420 feet NGVD to more than 1,200 feet NGVD atop The Glebe, which flanks the Ompompanoosuc valley northeast of the dam.

The area is typical of much of the upland New England physiographic province inasmuch as it displays the character of an ancient plateau dissected by narrow V-shaped valleys. Crystalline igneous and metamorphic rocks underlie remnants of the plateau (at an average elevation of 1,500 feet NGVD) and the valleys are lined with sands and gravels of glacial and more recent fluvial origin. Exploitation of some minerals, principally copper, has occurred in the past and, most recently, during and after World War II at scattered localities in the general region, but the deposits are now considered submarginal at best.

The major association of white pine, hemlock, sugar maple, beech, and yellow birch characterizes the forest vegetation of the Ompompanoosuc watershed. Other species found in the reservoir area are white birch, flowering dogwood, red and silver maple, red oak and numerous other hardwoods and shrubs interspersed among the more predominant species. Portions of the limited flood plain area between the dam and the Connecticut River are either used for pasture and hayfields or are wooded.

There are several small rocky swimming holes along the banks of both the East and West Branches of the Ompompanoosuc River. These swimming holes, some of which have small waterfalls that provide a scenic backdrop, are used primarily by local residents. The USACE maintains a sandy beach area upstream of Union Village Dam on the East (Main) Branch of the river, less than a mile from Thetford Center.

### 3.5.3 Projected Use:

The demand for recreation at Union Village Dam is expected to continue to increase in the coming years. This assumption is based on existing and past use of the facility as well as recreational needs projected by the Vermont Statewide Comprehensive Outdoor Recreation Plan (SCORP), dated January 2000. The demand for public outdoor recreation preferences in Vermont is demonstrated by the following SCORP findings:

- The numbers of participants will continue to increase for almost all of recreational activities. The family travel and recreation market will continue to increase. (Land Conservation Plan's Recreation Work Group's *White Paper*)
- Nationally, activities expected to have the greatest growth rates through 2040 are downhill and cross-country skiing, day hiking, pool swimming, backpacking, visiting pre-historic sites, and running/jogging. (Northern Forest Lands Council)
- Hunting, fishing, boating, trapping, hiking, canoeing, and active winter recreation travel will continue to have their niches in the travel market. (Northern Forest Lands Council)
- New emerging "consumer" trends include the desire for convenience over complexity. Requests from potential park visitors indicate changing demands...to a more active, more

interesting, and more comfortable experience. Requested increases include cabins to rent, what to do in a park and surrounding area, and hookups for recreational vehicles. (Land Conservation Plan's Recreation Work Group's *White Paper*) (Parks Long Range Plan)

- Recreationists and travelers will seek more "back-to-nature" and personally enriching experiences. (Land Conservation Plan's Recreation Work Group's *White Paper*)

The potential market areas for facilities at Union Village Dam were also assessed to determine the population base that is currently served, and that will be served in the future. The primary market area for this project was assumed to be the area within a 20-mile radius of the facility. This area is shown on attached **Figure 6 – Market Area Plan**. The secondary market area can be considered to be a region that encompasses New England and the immediately surrounding states.

#### 3.5.4 Carrying Capacity:

The carrying capacity of Union Village Dam is constrained primarily by: the number of parking areas; the types of recreational activities; and the number and size of developed recreational facilities available at the present time.

Considering that the projected future demand for this type of recreational facility is expected to increase in the coming years (SCORP 2000), it is important that along with the continued maintenance and improvement of existing facilities, the addition and expansion of some recreational uses be considered for future action.

#### 3.5.5 User Conflicts:

The project area provides a variety of active and passive recreational opportunities throughout the year. These activities include: hiking, snowmobiling, cross-country skiing, sightseeing, fishing, hunting, trapping, swimming, sunbathing, ball playing, picnicking and enjoying the great outdoors.

Currently there are no significant use conflicts have been observed between pedestrians, vehicles and recreational users of Union Village Dam facility.

#### 4.0 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 and a News Release by Colonel Thomas L. Koning, Corps of Engineers, District Engineer, on November 1, 2002. These documents announced the initiation of the study and solicited input. A complete mailing list of those that received the Public Notice is included in *Appendix A – Public Coordination Mailing List*.

Two Public Workshop Meetings were held with the public, and State and Local officials during the initial phase of the Master Planning process. The first was held on November 12, 2002 and the second on December 10, 2002. Both meetings were held at the Thetford Academy library, Academy Road, Thetford, Vermont. The attendance lists for these meetings are included in *Appendix A*. These meetings resulted in the following public general comments that are/will be addressed in the Union Village Dam OMP:

1. Request to maintain and improve bird watching habitat and x-country skiing uses of the project.
2. Concern about “undesirable” recreational activities, such as ATV riding throughout the project, and four-wheeled truck use off of designated roadways, especially during hunting season.
3. Request that the USACE identify the need for additional studies/remedies for the recurrent bacterial problem in the river which requires the frequent closing of the beach at the project.
4. Concern with “invasive” vegetation and how they will be identified, controlled and managed.
5. Individuals have apparently been mowing/maintaining portions of USACE property, without authorization. [These individuals must coordinate with USACE, to assure compliance with the USACE management plans for that particular area.]
6. Request to determine if area downstream of Tucker Hill Road covered bridge – pile of old glass, bottles, cans, etc., is some sort of archeological site. If it is on USACE property, would like it cleaned up.
7. Request that the USACE develop a “work group” of Town/public/USACE personnel to obtain public input on various activities at the project.
8. Request to clear the old “circuit loop trail” that connects the west-east side, over the dam.
9. Identify the need for mixed stands of forest/vegetation types.

10. Request to add another trail that is NOT for snowmobile use, or request snowmobile groups to keep an ungroomed small portion of trails for non-vehicular use.
11. Request for stationary sign with simple map be placed at each trailhead.

Comment was also made that there is currently very good communication between the USACE and the local power company, PG&E, regarding coordination of water release from UVD with the Conn. River.

A request was also made to determine if the concrete berm across the river (CRREL ice jamming study) can be removed. Union Village Dam personnel will check with CRREL regarding this issue.

## **5.0 RESOURCE MANAGEMENT OBJECTIVES**

The following natural, recreation and cultural resource management objectives were prepared from information provide by the USACE New England District and through public meetings held within the Town of Thetford, Vermont. Resource objectives have been developed to guide future design, development and management of the resource base, natural and manmade, to obtain the greatest possible benefit through meeting the needs of the public and protecting and enhancing environmental quality.

### **5.1 Natural Resources Objectives**

The following are a series of natural resources goals and objectives that have been developed through public meetings and needs identified by the USACE as steward of the property:

1. Provide for the management of all natural resources associated with the project with input from the local community, to include the protection and preservation of rare, threatened and endangered species, the harvesting of forest resources, the protection of water quality, and the implementation of programs to manage invasive, non-native species.
2. Enhance and protect fish and wildlife habitat for native indigenous species through the use of various woodland, wetland, and open land management programs.
3. Monitor wildlife species and their habitat within the project limits.
4. Promote and evaluate public use of the natural resources of the project to include hunting, trapping, fishing, viewing, and snowmobiling. Support the state fish stocking program and efforts to establish a warmwater fishery.
5. Protect and conserve wetlands and rare plant and animal habitats, such as vernal pools, from detrimental activities.

### **5.2 Recreational Resources Objectives**

The following are a series of recreational resources goals and objectives that have been developed through public meetings and needs identified by the USACE as steward of the property:

1. Provide for the continued maintenance and growth of recreational opportunities (programs, etc.) with input from the local community.
2. Maintain and improve the Interpretive Services and Outreach Program to enhance the public's understanding and appreciation of the role of the USACE in the administration and management of Union Village Dam.
3. Provide for the continuance of activities associated with fish and wildlife resources.
4. Maintain existing trails on project lands.

5. Identify, develop, and promote trails on project lands in accordance with natural resources objectives.

### **5.3 Cultural Resources Objectives**

The following are a series of cultural resources goals and objectives that have been developed through public meetings and needs identified by the USACE as steward of the property:

1. Protect known and documented prehistoric and historic archaeological sites. Measures may include, but not be limited to:
  - a. Avoid known sites, if possible. If resources cannot be avoided, every effort should be made to minimize these impacts. If impacts to significant resources are unavoidable, then further archaeological investigations may be required prior to implementation. In all cases, development activities should be reviewed by a USACE staff archaeologist and may require coordination with the Vermont State Historic Presentation Officer (VT SHPO).
  - b. Monitor the project area for evidence of unauthorized excavation or collection of cultural resources and damage to sites. Known sites should be maintained and preserved as important project resources.
2. Consult with the USACE archaeologist prior to any development or disturbance on USACE property.
3. Support interpretative programs for historic and cultural resources, where appropriate and in accordance with federal laws and directives.

## **6.0 LAND ALLOCATION AND CLASSIFICATION**

### **6.1 Land Allocation**

All project lands will be allocated in accordance with the authorized purposes for which they were acquired. Project land will be allocated into one of the following categories:

- (1) Project Operations – Lands acquired in accordance with the authorized documents for operation of the project, i.e., flood control, hydropower, navigation, water supply, etc.
- (2) Recreation – Separable lands acquired in accordance with the authorized documents for public recreation.
- (3) Fish and Wildlife - Separable lands acquired in accordance with the authorized documents for fish and wildlife management.
- (4) Mitigation - Lands acquired or designated in accordance with the authorized documents to offset losses associated with development of the project.

All project lands at Union Village Dam were acquired for flood control purposes; therefore, all project lands are allocated to the Project Operations category.

### **6.2 Land Classification**

In accordance with the USACE regulation, ER 1130-2-550 and pamphlet EP 1130-2-550, the allocated project lands will be 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. The classification process refines the land allocations to fully utilize project lands and must consider public desires, legislative authority, regional and project specific resource requirements and suitability.

Land classification categories are described below.

- (1) Project Operations – The project operations classification category includes land required for the flood control structure, operations center, office, maintenance facilities and other areas used solely for project operations.
- (2) Recreation – Land developed for intensive recreational activities by the visiting public, including developed recreation areas and areas for concession, resort, and quasi-public development.
- (3) Mitigation – This category only includes land acquired or designated specifically for mitigation.
- (4) Environmentally Sensitive Areas – Areas where scientific, ecological, cultural or aesthetic features have been identified. Although these areas are usually found within one of the other classification categories, they must be considered by management to

ensure the sensitive areas are not adversely impacted. Limited or restricted use by the public should be considered for managing the land in this classification. In addition, no agricultural or grazing uses are permitted in environmentally sensitive lands.

- (5) Multiple Resource Management – Land managed for one or more of, but not limited to the following activities, to the extent that they are compatible with the primary land allocation(s).
  - 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.
- (6) Easement Lands - All lands for which the USACE holds an easement interest but not fee title.

The following information will describe the classification of land within the bounds of Union Village Dam. Previous sections concerning the project area including purpose, natural and recreational resources and development constraints and opportunities provided the basis for attached **Figure 7 – Land Classification Plan**.

#### 6.2.1 Project Operations

The USACE operates and maintains Union Village Dam to ensure the protection of life and property downstream of the dam structure. Union Village Dam is run-of-river except during non-winter months, when an approximate 50-acre impoundment with a depth of 20 feet is maintained to keep the floodgates from freezing. At spillway crest elevation, the flood storage area of the project totals 740 acres and extends three and one-half miles upstream of the dam. The facilities that are maintained by the USACE park rangers at Union Village Dam include the spillway, intake and outlet tunnel, operations office, dike, debris field, access roads, and surrounding area.

#### 6.2.2 Recreation

Intensive recreation areas in Union Village include:

- the entrances to the reservoir area located off of Academy Road (the main entrance) in Union Village, off Route 113A in Thetford Center, and off of Tucker Hill Road near the junction of Route 132;
- the less than one mile of bituminous asphalt roadway within the park and approximately three miles of gravel roadways that serve the recreational facilities;
- parking at various locations;
- sanitary facilities; and

- picnic facilities.

The approximate locations of these facilities are identified on **Figure 7**.

### 6.2.3 Mitigation

No land areas at Union Village Dam are classified in this category.

### 6.2.4 Environmentally Sensitive Lands

Several locations within the project site constitute areas of scientific, ecological, cultural, or aesthetic value. The oak-pine forest and rich northern hardwood forest are examples of locally significant natural communities due to their vegetative composition and age structure. The emergent riparian marsh and floodplain meadow terraces are especially valuable as exemplary wildlife habitats. Other areas within the project classified as providing scientific or ecological value are shown on **Figure 7**. Areas of particular aesthetic value at the site include the timbered ridge upslope of the Ompompanoosuc River.

The following descriptions are provided for each of the environmentally sensitive areas, as excerpted from the 2000 “*Ecological Inventory of the USACE’s Union Village Dam Project Area*”, and are shown on **Figure 7**:

- Sites B and C: Beaver Pond Wetland and Old Oxbow Wetland:  
LOCATION: Along the Ompompanoosuc River, south of the covered bridge and at north end of property along the Ompompanoosuc River.  
SOURCE OF INFORMATION: 1999 Field visit, (Michael Lew-Smith)  
UTM LOCATION: Beaver Pond Wetland (Site B): 720910E 4855464N Oxbow Wetland (Site C): 721151E 4857652N  
SIGNIFICANCE: Two populations of mermaid weed (*Proserpinaca palustris*) grow in these wetlands. It is a state ranked rare (S1) species. (Global rank G5).
- (Site D): Sand Bluff:  
LOCATION: On top of the sand bluff located just east of the West Branch south of Tucker Hill Road  
SOURCE OF INFORMATION: 1999 Field visit, (Michael Lew-Smith)  
UTM LOCATION: 719608E 4855094N  
SIGNIFICANCE: A population of leathery grape fern (*Botrichium multifidum*). It is a state ranked uncommon (S3) species. (Global rank G5).
- Site F: Beaver Pond Wetland Complex:  
LOCATION: Along the Ompompanoosuc River, south of the covered bridge  
SOURCE OF INFORMATION: 1999 Field visit, (Michael Lew-Smith)  
OWNERSHIP: US Army Corps of Engineers  
SIGNIFICANCE: Locally Significant - This site contains large examples of many wetland plant communities which contain relatively high species diversity and species assemblages that are not found elsewhere on the property.

- Sites H: Various (see below):  
LOCATION: 1) East of Dam, 2) West of Beaver Pond, 3) South of Beaver Pond on west side of Ompompanoosuc.  
SOURCE OF INFORMATION: 1999 Field visit, (Michael Lew-Smith)  
SIGNIFICANCE: Three Locally Significant Hemlock Forests

Those areas identified as having cultural resource value include the prehistoric and historic sites documented within Union Village Dam. However, the exact location of these cultural resources is not shown on *Figure 7* as a protective measure.

#### 6.2.5 Multiple Resource Management

A significant portion of Union Village Dam can be characterized as multiple resource management areas. These resources include surface waters (Ompompanoosuc River), wetlands, forested areas, fields and low-density recreational areas. A general description is as follows:

- (a) Recreation – Low-Density – Lands allocated for low-density recreation activities at Union Village Dam include areas suitable for swimming, fishing, canoeing, hunting, trapping, hiking, snowshoeing and snowmobiling.
- (b) Wildlife Management General – The areas surrounding the Ompompanoosuc River, forested area and open fields provide excellent habitat environments for a variety of wildlife. These areas are subject to protection under state and federal environmental laws. Lands managed for the enhancement of resident and migratory wildlife species are designated for wildlife management. These lands may also be used for low-density recreation activities as long as they do not interfere with wildlife management.
- (c) Vegetation Management – Project lands currently utilized for vegetation management.
- (d) Inactive and/or Future Recreation Areas - No land areas at Union Village Dam are classified in this category.

#### 6.2.6 Easement Lands

Union Village Dam has four acres classified in this category. The approximate boundaries of these easement lands are identified on *Figure 7*.

## **7.0 RESOURCE DEVELOPMENT PLANS**

The USACE New England District has identified the following list of action items for improving operations and recreation at the project:

1. Develop and implement outflow guidance in accordance with the Adaptive Management Plan.
2. Identify the need for additional studies/remedies for the recurrent bacterial problem in the river which requires the frequent closing of the beach at the project.
3. Maintain cooperative effort with various users of the project.

## **8.0 CONCLUSIONS**

This Master Plan provides guidance for future development at Union Village Dam. The natural and man-made resources at the project will continue to be managed to provide the best combination of responses to regional and ecosystem needs, project resources and capabilities.

The natural and man-made resources within Union Village Dam have been identified and analyzed. The project's natural resources include wetlands, exemplary natural communities and cultural resources (which require specific management efforts for their protection); and the man-made resources include project operation areas, both intensive and low-density recreational facilities, as well as areas of wildlife and vegetation management. Additional recreational opportunities were identified through an analysis of regional needs and public comments.

Through land use classification, the Master Plan has designated areas for project operations, recreation, environmentally sensitive lands and multiple resource management. The areas in the vicinity of the dam and office facilities will continue to be used for project operations. The Union Village Dam recreation area has been classified as intensive recreation. The remaining areas have been classified as multiple resource management areas.

Through an analysis of regional needs and the public participation process, the Master Plan identified a continuing need to provide recreational opportunities at Union Village Dam. This planning process also identified a need to develop and implement an Adaptive Management Plan for outflow guidance, the need for additional studies/remedies for the recurring bacterial problem in the river which causes frequent closing of the beach at the project, and the need to maintain cooperative efforts with various user groups at the project.

All specific proposals for recreational development or natural resources management at the project must comply with this Master Plan, the Connecticut River Basin flood control requirements, and the National Environmental Policy Act and federal requirements. Implementation of recommended resource management plans must be performed in accordance with appropriate USACE procedures, e.g. as may be indicated in the Operational Management Plan.

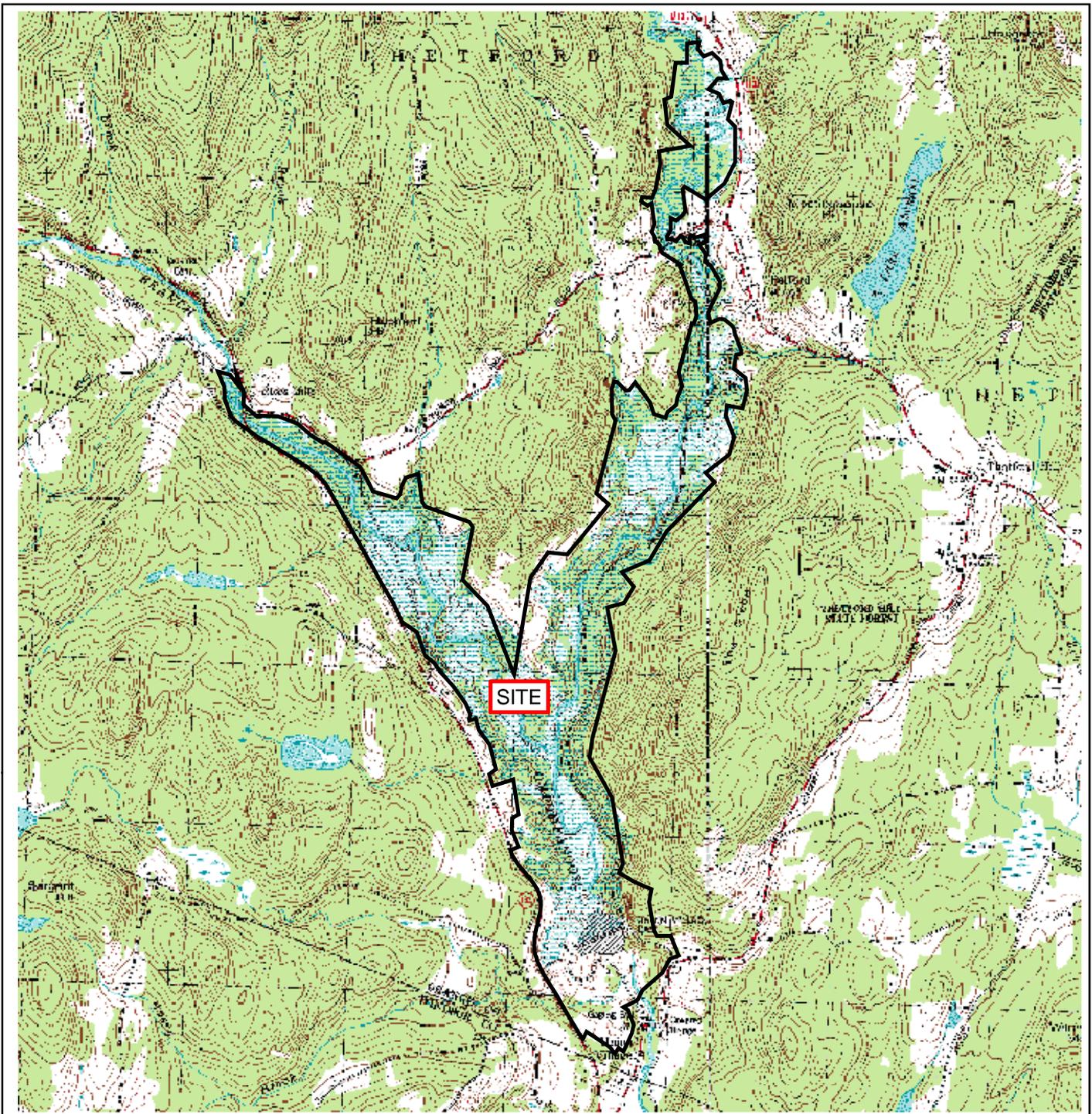
## **9.0 RECOMMENDATIONS**

It is recommended that the Union Village Dam Master Plan be approved as a guide to the Union Village Dam Flood Control Project. Approval of this plan would rescind Design Memorandum, Project Plan for Recreation Resources Development, dated 1980.

**DRAFT - MASTER PLAN**

**FIGURES**

**Union Village Dam  
Thetford, VT**



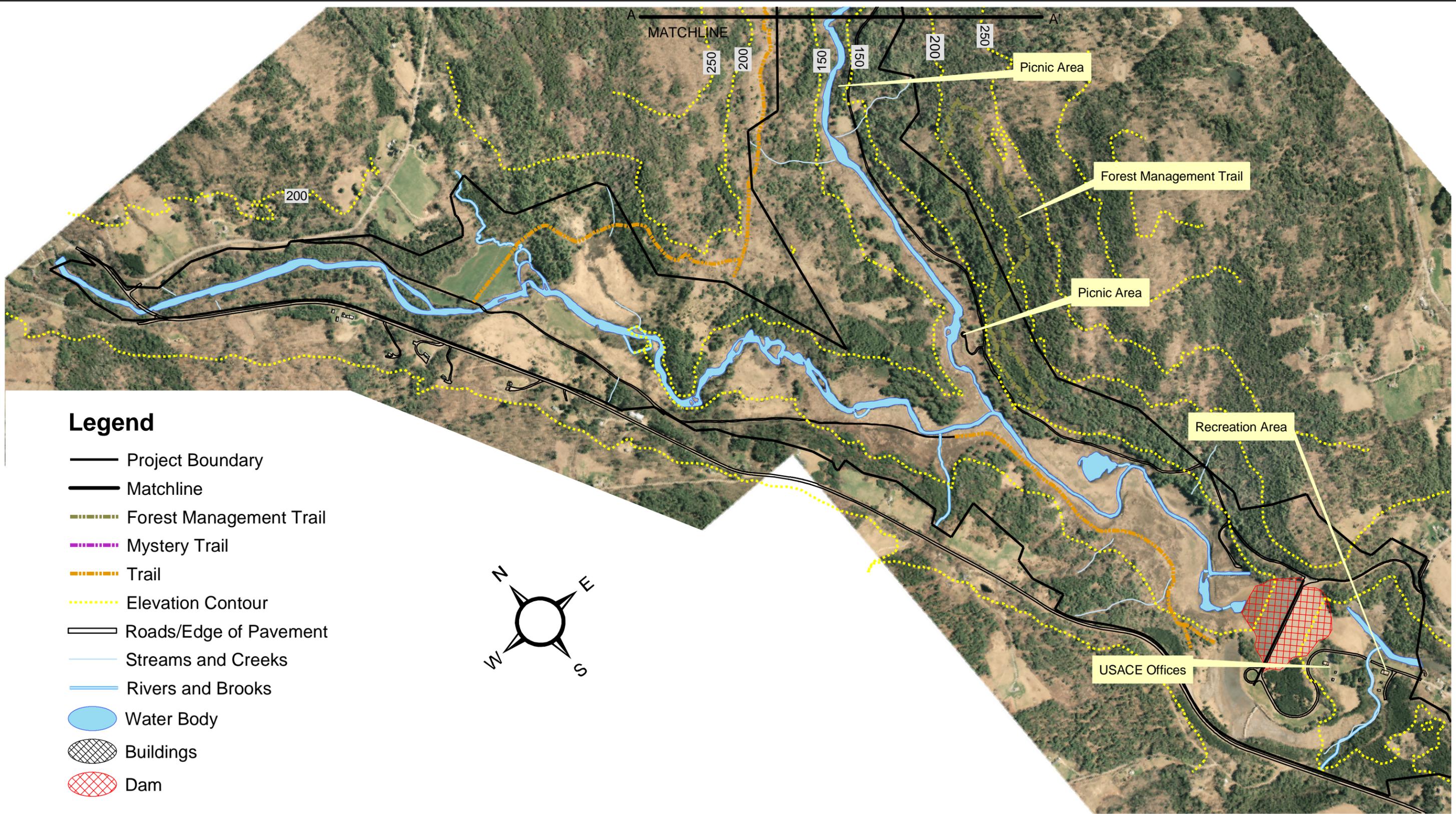
USGS TOPOGRAPHIC MAP  
 SOUTH STRAFFORD, VERMONT, 1983  
 LYME, VERMONT, 1983

APPROXIMATE SCALE  
 1 inch equals 3,000 feet



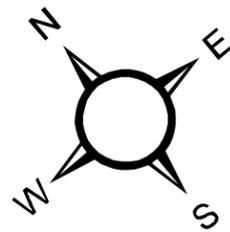
**DRAFT FIGURE 1**  
 LOCUS PLAN  
 UNION VILLAGE DAM  
 U.S. ARMY CORPS OF ENGINEERS  
 NEW ENGLAND DISTRICT  
 THETFORD, VERMONT

SEPTEMBER 2003



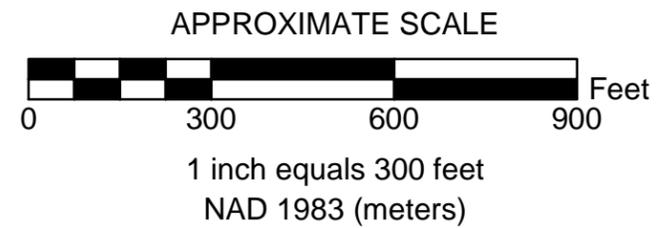
**Legend**

- Project Boundary
- Matchline
- Forest Management Trail
- Mystery Trail
- Trail
- Elevation Contour
- Roads/Edge of Pavement
- Streams and Creeks
- Rivers and Brooks
- Water Body
- Buildings
- Dam



**NOTES:**

1. Data displayed on this figure was obtained from the United States Army Corp of Engineers, New England District.
2. Data displayed is for illustrative purposes only.

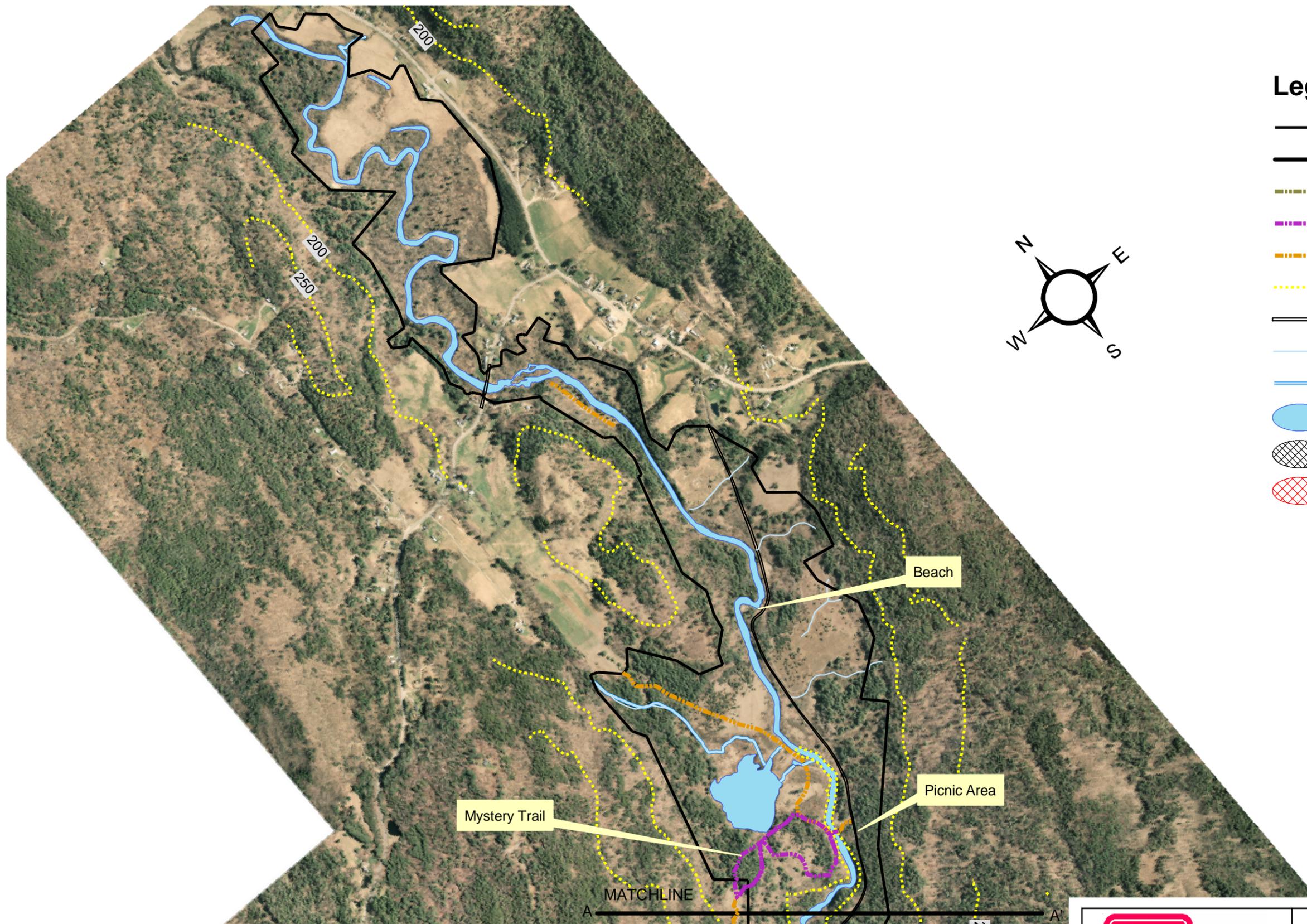


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New England District

DRAFT FIGURE 2 PAGE 1 OF 2

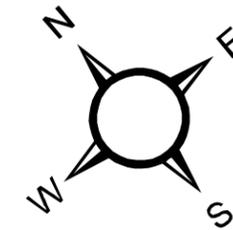
SITE PLAN  
UNION VILLAGE DAM  
U.S. ARMY CORPS OF ENGINEERS,  
NEW ENGLAND DISTRICT  
THETFORD, VERMONT

NOVMEBER 2003



### Legend

- Project Boundary
- Matchline
- Forest Management Trail
- Mystery Trail
- Trail
- ... Elevation Contour
- Roads/Edge of Pavement
- Streams and Creeks
- Rivers and Brooks
- Water Body
- ▨ Buildings
- ▨ Dam



Beach

Picnic Area

Mystery Trail

MATCHLINE  
A ————— A'

#### NOTES:

1. Data displayed on this figure was obtained from the United States Army Corp of Engineers, New England District.
2. Data displayed is for illustrative purposes only.

#### APPROXIMATE SCALE



1 inch equals 300.622 feet  
NAD 1983 (meters)



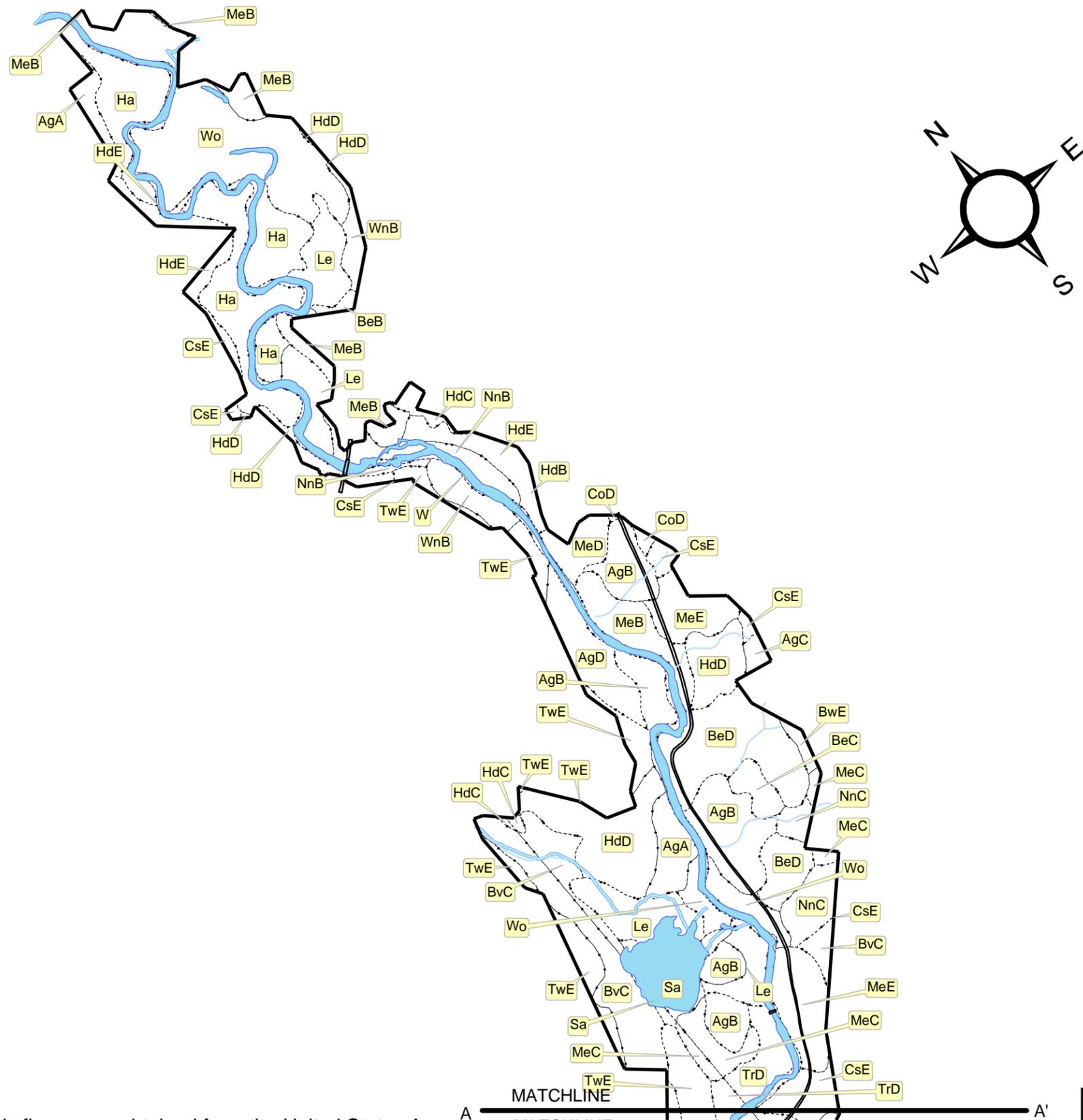
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New England District

DRAFT FIGURE 2 PAGE 2 OF 2

SITE PLAN  
UNION VILLAGE DAM  
U.S. ARMY CORPS OF ENGINEERS,  
NEW ENGLAND DISTRICT  
THETFORD, VERMONT

NOVEMBER 2003

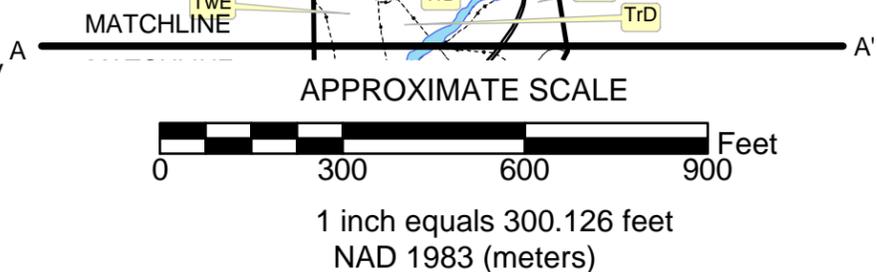




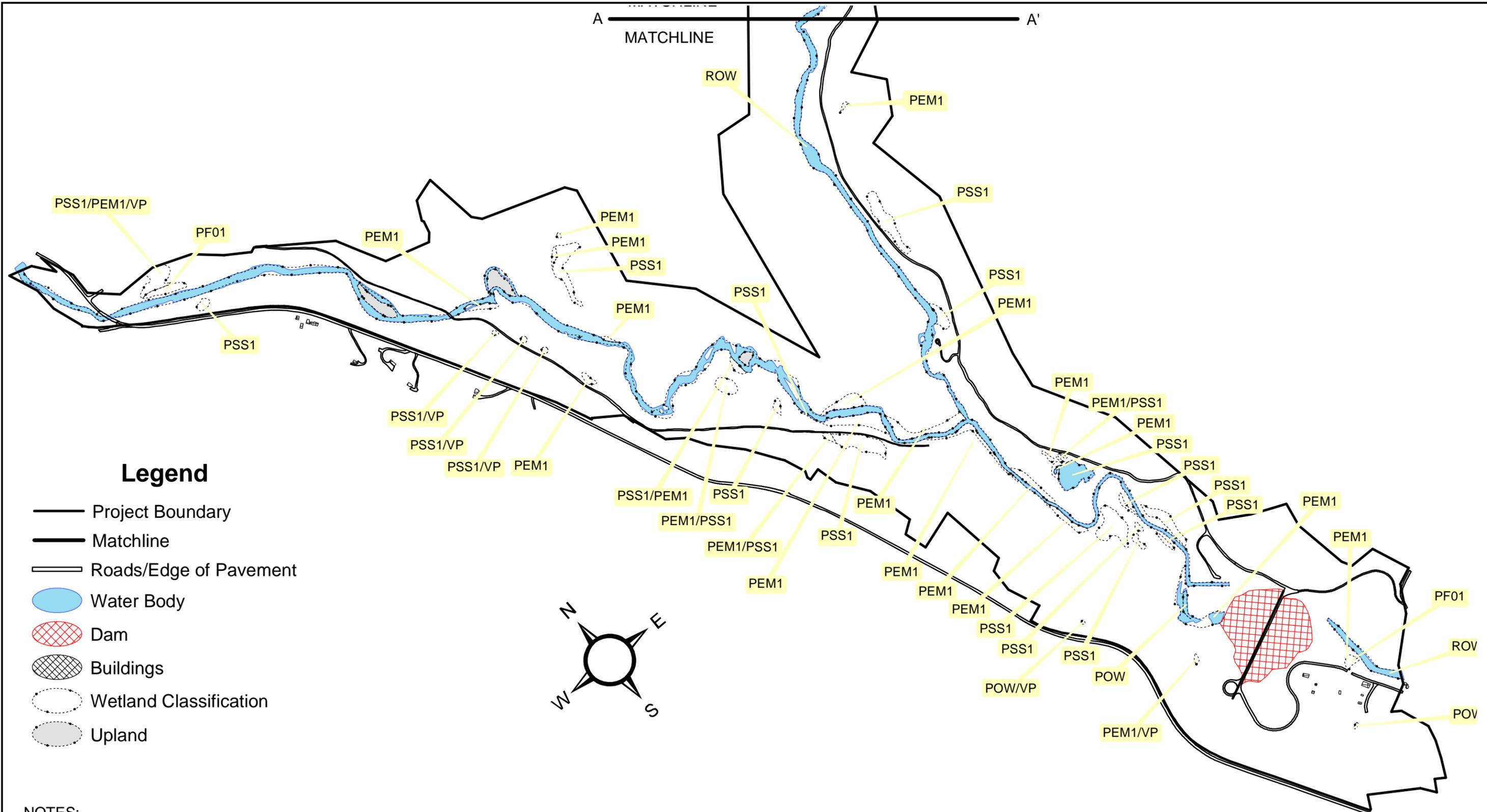
- ### Legend
- Project Boundary
  - Matchline
  - Streams and Creeks
  - River and Brook
  - ▨ Buildings
  - ▭ Roads/Edge of Pavement
  - ▨ Dam
  - Water Body
  - Soil Classification

**NOTES:**

1. Data displayed on this figure was obtained from the United States Army Corp of Engineers, New England District.
2. Refer to Table XX for soil classification descriptions.
3. Data displayed is for illustrative purposes only.

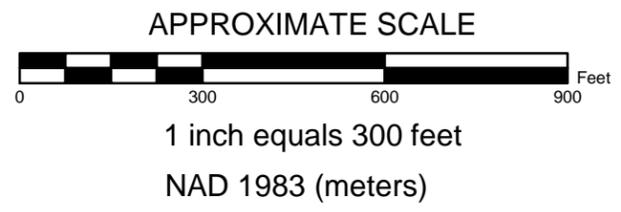
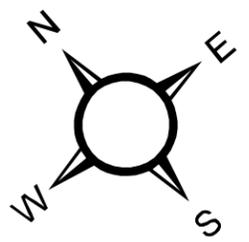


DRAFT FIGURE 3 PAGE 2 OF 2  
SOIL CLASSIFICATION PLAN  
UNION VILLAGE DAM  
U.S. ARMY CORPS OF ENGINEERS,  
NEW ENGLAND DISTRICT  
THETFORD, VERMONT  
NOVEMBER 2003



**Legend**

- Project Boundary
- Matchline
- Roads/Edge of Pavement
- Water Body
- Dam
- Buildings
- Wetland Classification
- Upland

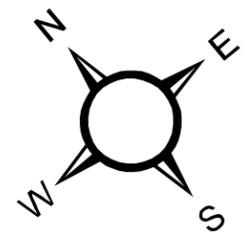


**NOTES:**

1. Data displayed on this figure were obtained from the United States Army Corp of Engineers, New England District.
2. Refer to Table XX for wetland classification descriptions.
3. Data displayed is for illustrative purposes only.

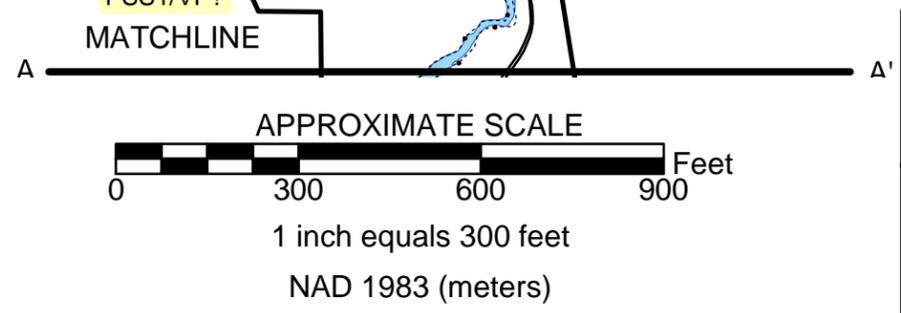


DRAFT FIGURE 4 PAGE 1 OF 2  
 WETLAND CLASSIFICATION PLAN  
 UNION VILLAGE DAM  
 U.S. ARMY CORPS OF ENGINEERS  
 NEW ENGLAND DISTRICT  
 THETFORD, VERMONT  
 NOVEMBER 2003



- Legend**
- Project Boundary
  - Matchline
  - Roads/Edge of Pavement
  - Water Body
  - ▨ Dam
  - ▩ Buildings
  - Wetland Classification
  - Upland

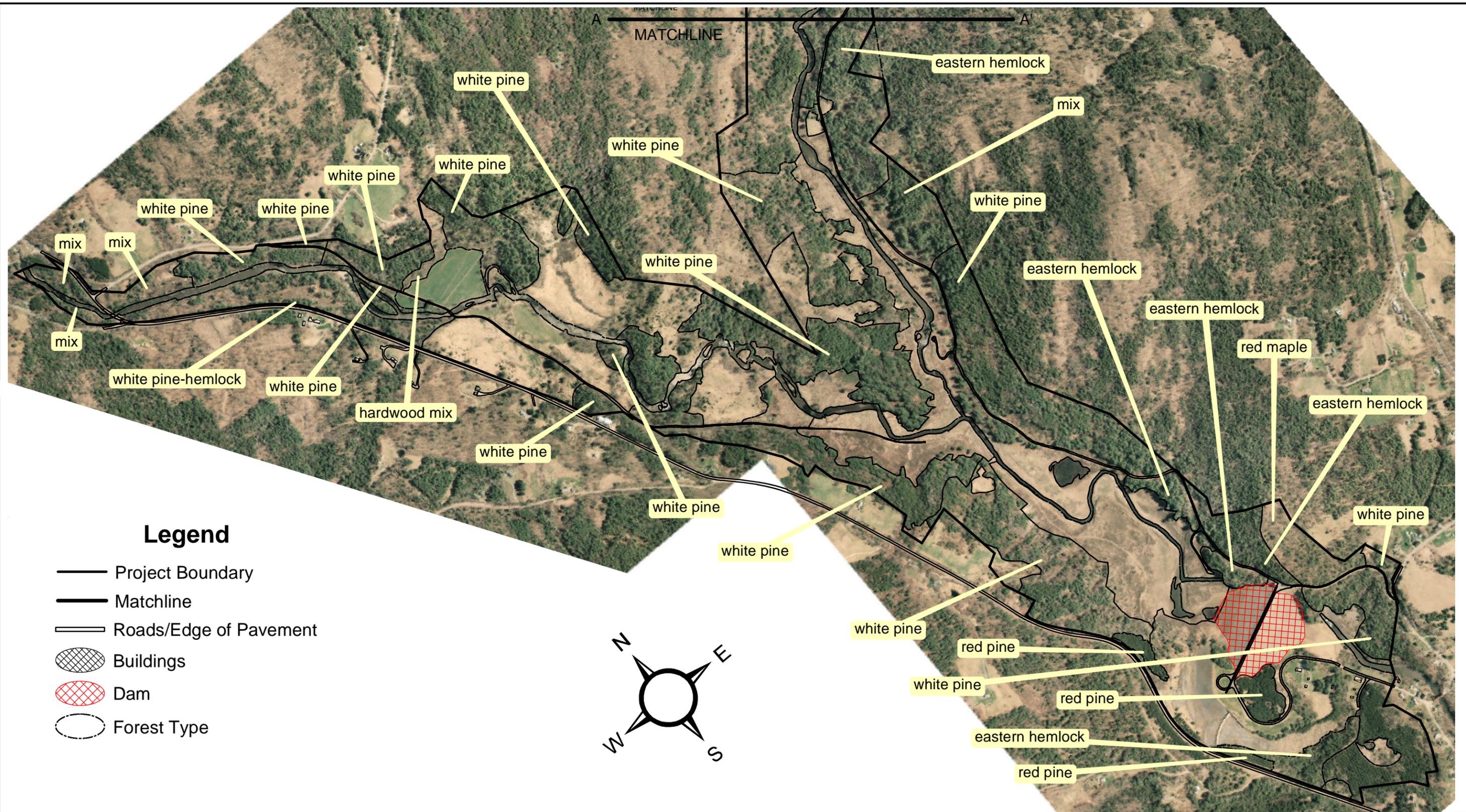
- NOTES:
1. Data displayed on this figure were obtained from the United States Army Corps of Engineers, New England District.
  2. Refer to Table XX for wetland classification descriptions.
  3. Data displayed is for illustrative purposes only.



DRAFT FIGURE 4 PAGE 2 OF 2

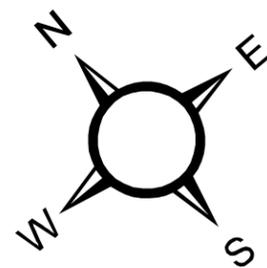
WETLAND CLASSIFICATION PLAN  
 UNION VILLAGE DAM  
 U.S. ARMY CORPS OF ENGINEERS  
 NEW ENGLAND DISTRICT  
 THETFORD, VERMONT

NOVEMBER 2003



### Legend

- Project Boundary
- Matchline
- Roads/Edge of Pavement
- ▨ Buildings
- ▨ Dam
- Forest Type



#### APPROXIMATE SCALE



1 inch equals 300 feet  
NAD 1983 (meters)



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New England District

DRAFT FIGURE 5 PAGE 1 OF 2

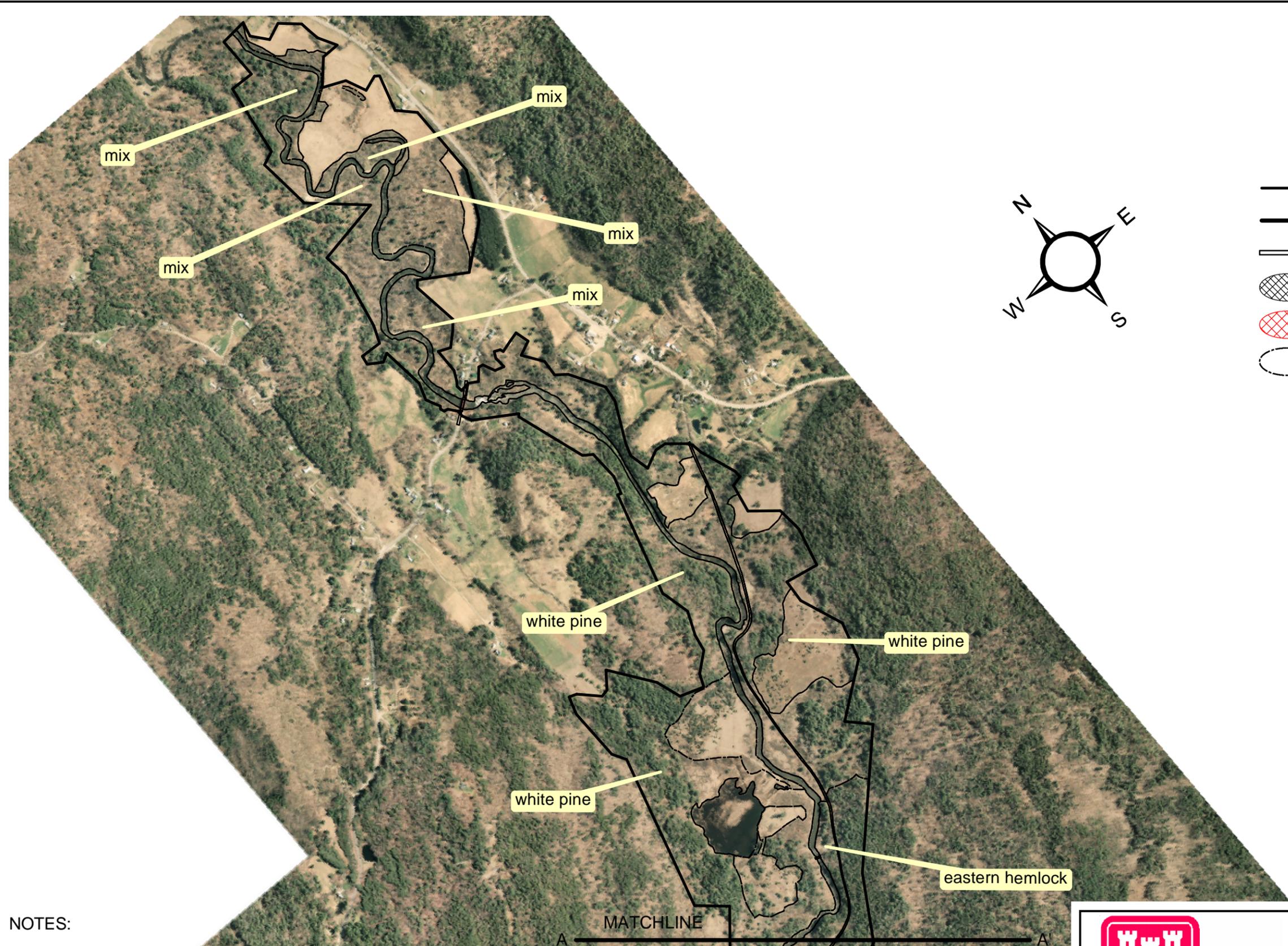
FOREST CLASSIFICATION PLAN  
UNION VILLAGE DAM  
U.S. ARMY CORPS OF ENGINEERS,  
NEW ENGLAND DISTRICT  
THETFORD, VERMONT

NOVEMBER 2003

1. Data displayed on this figure was obtained from the United States Army Corps of Engineers, New England District.

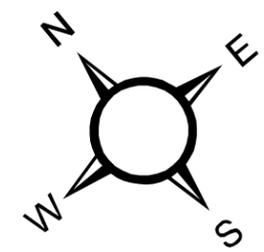
2. Refer to Site Plan for additional notes and legend.

3. Features not labeled are considered open to brushy areas.

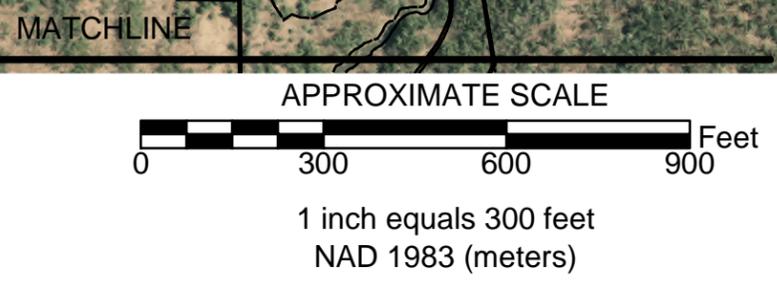


**Legend**

- Project Boundary
- Matchline
- ▬ Roads/Edge of Pavement
- ▨ Buildings
- ▨ Dam
- Forest Type



- NOTES:
1. Data displayed on this figure was obtained from the United States Army Corps of Engineers, New England District.
  2. Refer to Site Plan for additional notes and legend.
  3. Features not labeled are considered open to brushy areas.

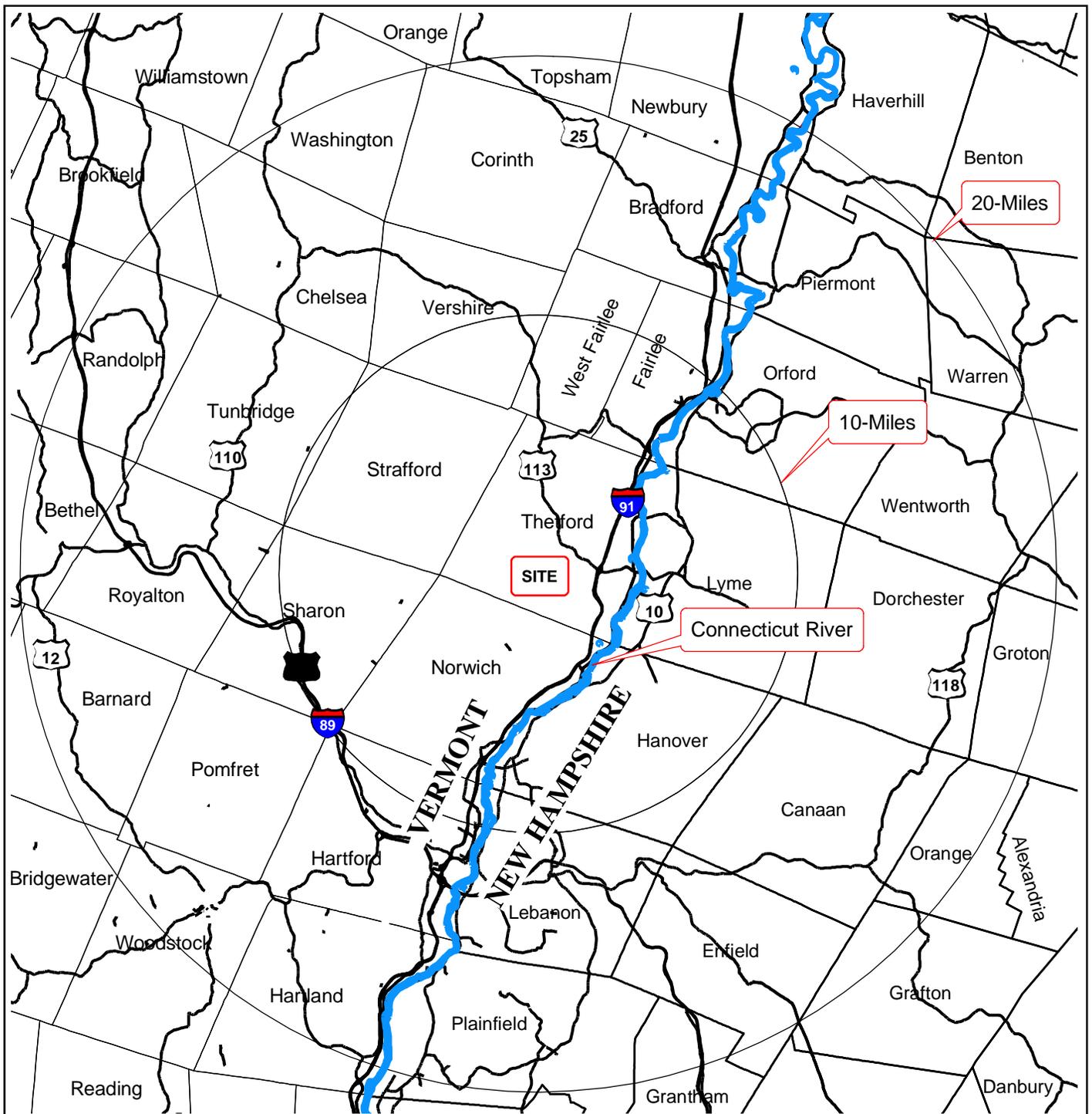


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New England District

DRAFT FIGURE 5 PAGE 2 OF 2

FOREST CLASSIFICATION PLAN  
UNION VILLAGE DAM  
U.S. ARMY CORPS OF ENGINEERS,  
NEW ENGLAND DISTRICT  
THETFORD, VERMONT

NOVEMBER 2003



NOTES:

1. State and town boundaries and transportation data was obtained from the Vermont GIS project and from the Complex Systems Research Center, Institute for the Study of Earth, Oceans, and Space, University of New Hampshire.



APPROXIMATE SCALE  
1 inch equals 30,000 feet

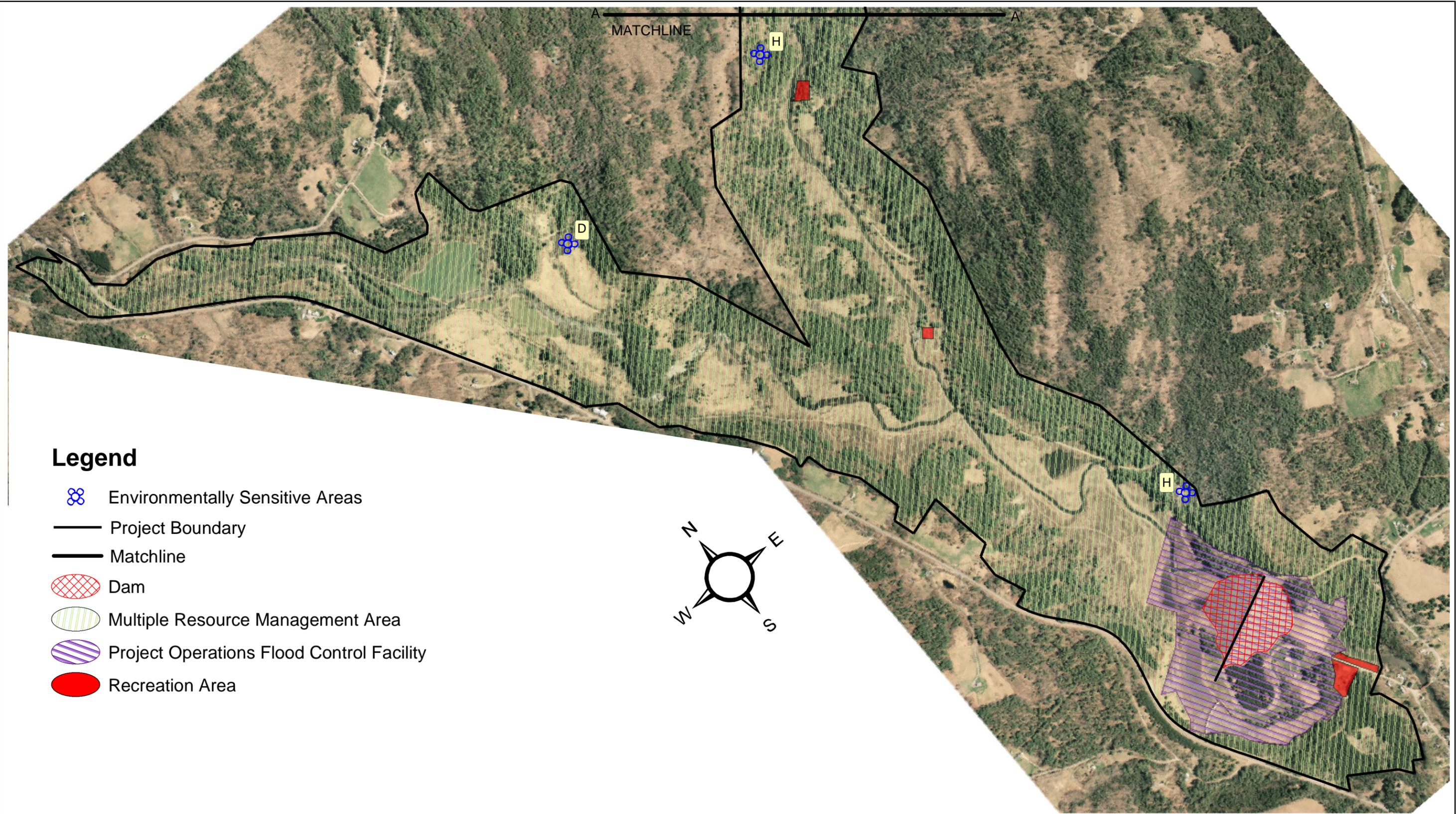


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New England District



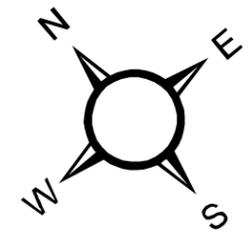
**DRAFT FIGURE 6**  
MARKET AREA PLAN  
UNION VILLAGE DAM  
U.S. ARMY CORPS OF ENGINEERS  
NEW ENGLAND DISTRICT  
THETFORD, VERMONT

NOVEMBER 2003



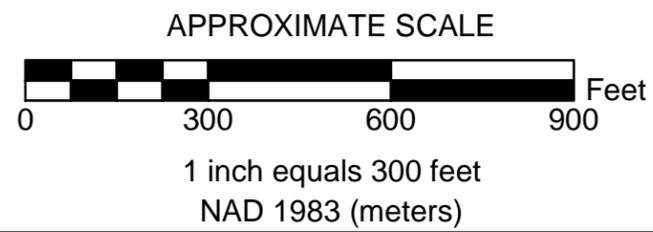
**Legend**

-  Environmentally Sensitive Areas
-  Project Boundary
-  Matchline
-  Dam
-  Multiple Resource Management Area
-  Project Operations Flood Control Facility
-  Recreation Area

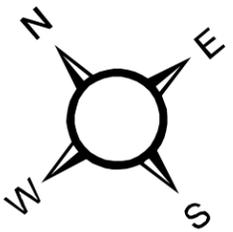
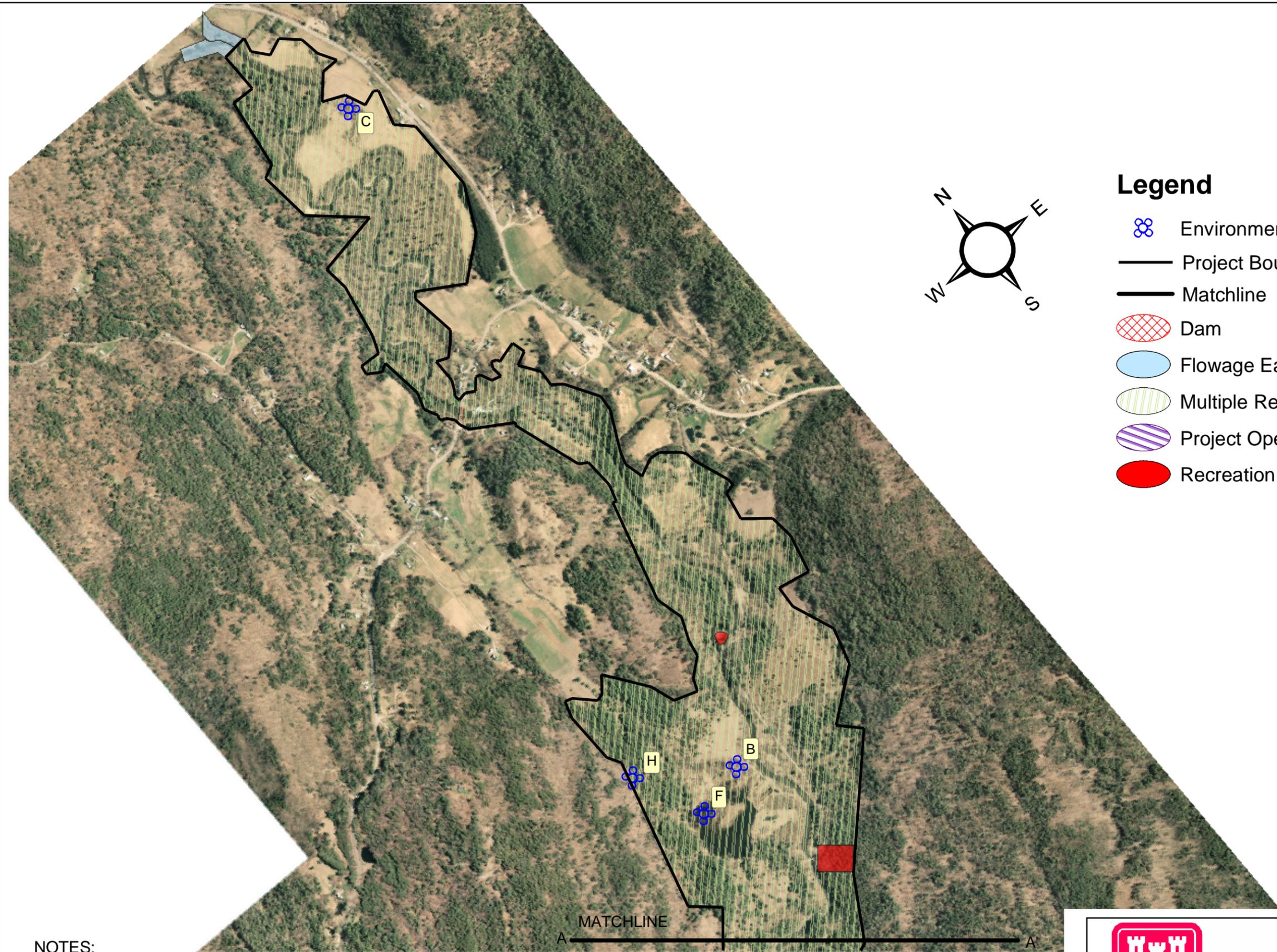


**NOTES:**

1. Data displayed on this figure was obtained from the United States Army Corp of Engineers, New England District.
2. Data displayed is for illustrative purposes only.



DRAFT FIGURE 7 PAGE 1 OF 2  
 LAND CLASSIFICATION PLAN  
 UNION VILLAGE DAM  
 U.S. ARMY CORPS OF ENGINEERS,  
 NEW ENGLAND DISTRICT  
 THETFORD, VERMONT  
 NOVEMBER 2003



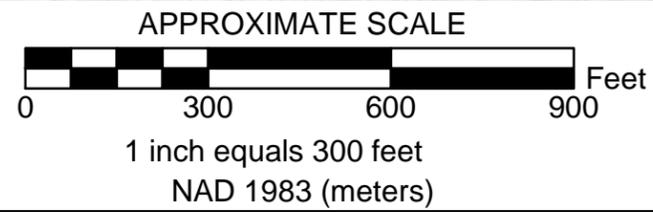
**Legend**

-  Environmentally Sensitive Area
-  Project Boundary
-  Matchline
-  Dam
-  Flowage Easement
-  Multiple Resource Management Area
-  Project Operations Flood Control Facility
-  Recreation Area

**NOTES:**

1. Data displayed on this figure was obtained from the United States Army Corp of Engineers, New England District.
2. Data displayed is for illustrative purposes only.

MATCHLINE  
A ————— A'



DRAFT FIGURE 7 PAGE 2 OF 2

LAND CLASSIFICATION PLAN  
UNION VILLAGE DAM  
U.S. ARMY CORPS OF ENGINEERS,  
NEW ENGLAND DISTRICT  
THETFORD, VERMONT

NOVEMBER 2003

**DRAFT - MASTER PLAN**

**APPENDIX A  
PUBLIC COORDINATION MAILING LIST**

**Union Village Dam  
Thetford, VT**

**DRAFT - MASTER PLAN**

**APPENDIX A  
PUBLIC COORDINATION MAILING LIST**

**Union Village Dam  
Thetford, VT**

Honorable William Corrow Vermont Senate State House 115 State Street Drawer 33 Montpelier, VT 05633	Honorable James Masland Vermont House of Representatives 714 Pero Hill Rd Thetford Center, VT 05075	Mr. Rich Kim Fisheries Biologist Fish and Wildlife Laboratory Department of Fish & Wildlife Vermont Agency of Natural Resources Roxbury, VT 05669	Mr. William Moulton District Forest Manager Department of Forests, Parks and Recreation Vermont Agency of Natural Resources 324 North Main Street Barre, VT 05641
Honorable William Corrow Vermont Senate 361 Chelsea Road Williamstown, VT 05679	Mr. Conrad Motyka, Commissioner Department of Forests, Parks and Recreation Vermont Agency of Natural Resources 103 South Main Street Waterbury, VT 05671-0605	Mr. John Austin District Wildlife Biologist Department of Fish & Wildlife Vermont Agency of Natural Resources 324 North Main Street Barre, VT 05641	Ms. Diana Frederick State Lands Forester Department of Forests, Parks and Recreation Vermont Agency of Natural Resources 324 North Main Street Barre, VT 05641
Mr. Evan Eastman Game Warden Vermont Agency of Natural Resources P.O. Box 58 Fairlee, VT 05045	William Throne Zoning Administrator Town of Thetford P.O. Box 126 Thetford Center, VT 05075	Mr. Jeff Cueto Water Quality Division Vermont Department of Environmental Conservation Building 10 North 103 South Main Street	Mr. Brian Keefe Natural Resources Coordinator United States Senator James Jeffords 2 South Main Street Rutland, Vermont 05701

**DRAFT - MASTER PLAN**

**APPENDIX A  
PUBLIC COORDINATION MAILING LIST**

**Union Village Dam  
Thetford, VT**

		Waterbury, Vermont 05671	
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**DRAFT - MASTER PLAN**

**APPENDIX A  
PUBLIC COORDINATION MAILING LIST**

**Union Village Dam  
Thetford, VT**

Mr. George Lowe Director of Emergency Management Department of Public Safety Emergency Management Division 103 South Main Street Waterbury, VT 05671	Ms. Sharon Francis Executive Director Connecticut River Joint Commissions Post Office Box 1182 Charlestown, NH 03603	Mr. Mike Bartlett U.S. Fish and Wildlife Service New England Field Office 70 Commercial Street, Suite 300 Concord, New Hampshire 03301-5087	Mr. Dean Corren Natural Resources Coordinator US Representative Bernard Sanders 1 Church Street Burlington, Vermont 05401- 4451
Roberta Howard Thetford Town Clerk P.O. Box 126 Thetford Center, VT 05075	Mr. Dan Maxon Water Quality Division Vermont Department of Environmental Conservation Building 10 North 103 South Main Street Waterbury, Vermont 05671	Mr. Brian T. Fitzgerald Vermont Agency of Natural Resources 103 South Moan Street, 10 North Waterbury, Vermont 05671- 0408	Honorable James Douglas Governor of the State of Vermont State Capitol Montpelier, Vermont 05602
Mark McMahon Selectboard Chair Town of Thetford P.O. Box 126 Thetford Center, VT 05075	Daniel Koloski White River Conservation District 617 Comstock Rd. Suite 1 Berlin, VT 05602	Mr. Robert G. Paquin Legislative Assistant United States Senator Patrick Leahy Box 933 Federal Building	Ms. Giovanna Peebles, State Archaeologist Vermont Division for Historic Preservation National Life Building, Drawer

**DRAFT - MASTER PLAN**

**APPENDIX A  
PUBLIC COORDINATION MAILING LIST**

**Union Village Dam  
Thetford, VT**

		Montpelier, Vermont 05601	20 Montpelier, VT 05620-0501
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**DRAFT - MASTER PLAN**

**APPENDIX A  
PUBLIC COORDINATION MAILING LIST**

**Union Village Dam  
Thetford, VT**

Mr. Bill Shepard 2360 Academy Road Thetford Center, Vermont 05075			
Mr. Pete Richardson P.O. Box 1005 Norwich, Vermont 05055			
Mr. Jonathan Hancock Hinman Box 1053 Dartmouth College Hanover, New Hampshire 03755			