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Evaluation of Potential Wildlife Habitat in Created and Restored Freshwater Wetlands in Selected New England States

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EVALUATION OF POTENTIAL WILDLIFE HABITAT IN CREATED AND RESTORED FRESHWATER WETLANDS IN SELECTED NEW ENGLAND STATES

BY

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ABSTRACT

In the past, wetlands were considered to be a nuisance. They were thought of as sources of mosquitoes and places of disease. The environmental awakening of the late 1960's and early 1970's changed the negative view of wetlands and brought about a host of wetland protection laws, programs, and agencies directed toward wetland protection.

Today, many of the wetland protection legislations (e.g., Section 404 of the Clean Water Act, the Massachusetts Wetlands Protection Act, etc...), require a permit to alter a wetland. In efforts to stop any further net loss of wetlands, regulating agencies are allowing permit applicants to create or restore wetlands, as mitigation for wetland losses due to their projects, if there are no other practical alternatives.

These created and restored wetlands are the subject of this research project. The artificial wetlands are intended to compensate for wetland loss by replacing the natural wetlands. However, if the created and restored wetlands do not perform the same functions as the original wetland, then they are not sufficiently replacing the natural wetlands. If this is the case, then the wetland protection laws that allow this type of mitigation may not be fulfilling their purpose and natural wetlands may not be adequately protected.

This project will evaluate the potential wildlife habitat of created and restored wetland projects and compare it to that of natural, undisturbed wetlands to determine if artificial wetlands in New England are adequate replacements for natural wetlands.

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INTRODUCTION

Background

During the Ice Age, about twelve thousand years ago, the glaciers carved valleys, rivers, and lakes into the North American landscape. Shortly after, these waterbodies began to naturally evolve into the freshwater wetlands. (Mitchell, 1975). Through succession, all open bodies of water eventually become wetlands ". . . because all lakes and ponds are transitory, remaining open no longer than it takes geological and biological forces to transform them" (Mitchell, 1975: 1-2).

In the past, humans considered wetlands as a nuisance. They were thought of as places of disease, unpleasant odors, and as sources of mosquitoes and flies. "In 1868, the Massachusetts legislature passed an act providing for the "abatement of wet, rotten, or spongy land covered with stagnant water" (US EPA, February 1987: 3). Unfortunately, these efforts were successful. As a result of this negative perspective, much of the wetlands in the United States have been destroyed. Replacing them are agricultural lands and developments. Some are even used for receptacles of household and hazardous waste. (EPA, February 1988). It is reported that the United States has lost over fifty percent of its natural wetlands in the past 200 years, (Dahl, 1990).

Draining, filling and converting wetlands in the United States began shortly after the European settlers arrived. In the 1800's, the federal government portioned out nearly 65 million acres of wetlands to 15 states under the Land Swamp Acts. However, the most drastic conversion occurred in the 200 year span between the mid-1950's and mid-1970's. During this period, approximately 450,000 acres of wetlands were lost per year. Ninety percent of inland wetlands were lost to agriculture. (Baldwin, September 1987).

Within the past few decades, environmental awareness regarding wetlands has increased. This is evidenced by the many new laws, wetland protection mechanisms, and agencies that have surfaced whose objective is to preserve wetlands. With an increased understanding of the ecological processes of wetlands, attitudes have changed toward wetlands. Now efforts are to protect, not drain and fill wetlands. However, there is still great pressure from those wishing to convert the wet areas to developed or agricultural lands. In efforts to achieve no further net loss of wetlands, federal and state governments are requiring mitigation for their loss. As mitigation for wetlands being destroyed in these conversion efforts, there is a new idea that has sparked attention; wetland creation[1] and restoration[2] .

This study examines the quality of wetland creation and restoration projects in every New England state, except Vermont (no

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[1] Wetland creation, as used in this study, will denote an attempt, by humans, to make a wetland that simulates a natural wetland, in an area where a wetland has not previously existed.

[2] The term wetland restoration in this paper is used to denote the creation of a wetland in an area where a wetland previously existed.

site data could be obtained for this state). This study will examine the potential wildlife habitat of created/restored wetlands and compare it to that of natural wetlands in New England.

Statement/Significance of the Problem to be Addressed

Wetlands management and protection have recently become issues in the planning world. The creation and restoration of wetlands as compensation for altered or destroyed natural wetlands is a new issue that must be faced by all planners.

Attempting to create or restore a wetland may be difficult. One scientist states that there is not much scientific foundation supporting the fact that wetland replication[3] will replace lost wetland functions, (Larson, 1987). Thus, it is possible that replication of a natural wetland that was created through natural succession over many decades is impossible.

Of the many laws and statutes that attempt to protect wetlands, most require a permit for any party to 'alter' a wetland. If a permit is granted, depending on the size and permanence of the 'alteration,' the reviewing agencies usually require compensation for the altered or destroyed wetland. This compensation is usually in the form of cash, land donation, or increasingly more often, in the creation or restoration of another wetland. Thus, wetlands are created by humans to replace the natural wetlands destroyed by humans.

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[3] The term replication in this paper will be used to denote wetlands that are created or restored as mitigation for altering natural wetlands.

With the sprawl of our cities, prime land for development is becoming scarce. As the pressure for economic expansion increases, lands previously thought to be too difficult to develop due to natural features are now getting a second look. "As development moves into more marginal parcels of land, the presence of wetlands becomes more likely" (Smith, 1989). In increasing numbers, developers are applying for permits, attempting to overcome the obstacles presented by these natural features. This has resulted in an increase in the creation and restoration of wetlands around the country as mitigation for those destroyed by permitted activities. The quality of these created and restored wetlands is the topic of this research project.

Knowledge of issues concerning wetland mitigation are key issues to planners. Planners should be aware of the federal, state, and local laws that allow creation and restoration as compensation for altering wetlands. Awareness of this legislation and its impacts on the environment and future economic development within a community are critical to planners, especially when balancing long term goals for both urban development and environmental protection.

Chapter Two

WETLAND DEFINITION, TYPES AND VALUES

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Definition of a Wetland

Federal, state and local governments often have different definitions of wetlands, each using different criteria to delineate wetland/upland boundaries. Hence, for the purpose of this study, it will be essential to set a common definition of a wetland.

There is no one universally accepted definition for a wetland. The definitions vary from state to state and government agency to government agency. The U.S. Fish and Wildlife Service has their own definition, the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (COE) have another, many states have their own definitions, and the student biology books have yet another.

For example, Connecticut distinguishes freshwater wetlands by their soils and coastal wetlands by their vegetation. The freshwater definition reads: "Freshwater wetlands are areas such as banks, bogs, swamps, meadows and submerged land. Soil types designated as poorly drained, very poorly drained, alluvial and flood plain by the National Cooperative Soils Survey define inland (freshwater) wetlands for regulatory purposes" (US EPA, May 1981).

On the other hand, in Massachusetts, the wetland definition relies on the presence and duration of water, and the location in relation to inland water. It reads as follows:

> Freshwater Wetlands are defined as wet meadows, marshes, swamps, bogs; and areas where groundwater, flowing or standing surface water, or ice provides a significant part of the supporting substrate for a wetland plant community for at least five months of the year. Freshwater wetlands are also defined as emergent and submergent plant communities in inland waters and that portion of any bank which touches any inland waters (Mass. Gen. Laws Ch. 131, § 7, para. 7).

Federal agencies also have different definitions of wetlands. For example, for regulatory purposes, the EPA and the COE use a definition created in response to Section 404 of the Clean Water Act of 1977. This definition does not include lakes ponds and rivers as wetlands, and excludes similar areas that lack hydrophytic vegetation (Tiner, 1989). The definition reads as follows:

> Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas (EPA, 40 CFR 230.3 and CE, 33 CFR328.3).

On the other hand, the definition used by the U.S. Fish and Wildlife Service is a more scientific description. It is used more by federal agencies for technical classification (US EPA, February 1987). It reads as follows:

> Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this

> classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year (Cowardin, et al, 1979).

Different definitions of wetlands lead to different delineations of wetland/upland boundaries. Thus, it is important that the same definition that is recognized in the New Hampshire Method (the method used to evaluate wetlands in this study), is also the same that is recognized by this study. Both the State of New Hampshire and the New Hampshire Method recognize the EPA/COE definition. Thus, the same definition is chosen for this study.

Wetland Types

From ponds to bogs, there are many different types of wetlands. A few of these wetland types will be explained, focusing specifically on the three most common freshwater wetlands: marshes, swamps, and bogs.

Inland freshwater marshes are common in New England and usually have water depths from a few inches to three feet. These include marshes, river oxbows, wet meadows, and the borders of many lakes and ponds. The water sources for these types of wetlands are typically groundwater, springs, ponds and rivers, rainfall, and surface runoff (US EPA, February 1987).

Marshes usually begin as a shallow depression in a drainage system. Often they have a slow current flowing through them. They are characterized by vegetation with soft-stems, such as cattails

(*Typha latifolia*), grasses, sedges (*Dichromena colorata*), arrowheads (*Sagittatria latifolia*), and bullrushes (*Juncus effusus*). These plants can grow on moist soil, or partially submerged in water, or they may bind their roots together to form a floating colony (Howland, 1989: 20). "Bottom materials are a mix of organic/mineral silts and sediments. As the water level fluctuates and this organic base slowly reaches to and above the average water level, populations of shrubs and trees begin to establish themselves, and the transition from open marsh through shrub swamp to wooded swamp begins" (US EPA, May 1981).

Swamps are forested or shrub areas. The soil is very wet throughout most of the year. However, they may have no standing water at all at certain times during the year (US EPA, February 1987). These wetlands usually get their water from surface runoff or from the flooding of ponds or streams. Common trees found in swamps include: cedar (*Camaecyparis thyoides*), red maple (*Acer rubrum*), willows (*Salix*), alders(*Alnus*), dogwoods (*Cornus stolonifera*), blueberry (*Vaccinium corymbosum*), and buttonbush (*Cephalanthus occidentalis*).

Bogs are less common in New England, though they do exist here. The high acidity of their peat soils result in unique vegetation and wildlife that have adapted to the harsh conditions. Bogs usually form in depressions that are poorly drained. The spongy vegetative covering of sphagnum moss or sedge are characteristic of this wetland (US EPA, February 1987). Typical shrubs of the bog include: leatherleaf (*Chamaedaphne calyculata*), cranberry (*Vaccinium macrocarpon*), and bog laurel (*Kalmia angustifolia*).

Summary

The above types of wetlands only constitute a few of the many wetland types that can be found in the world. However, they are the types that were encountered in the field studies for this project. In this study the potential wildlife habitat of created and restored wetlands of one type will be compared to that of natural, undisturbed wetlands of a similar. This evaluation will indicate if created/restored wetlands are sufficient replacements for natural wetlands in New England. The study was only carried out in five of six New England states (Vermont was excluded because no site data could be located for the state).

Wetland Values

Wetlands of all types provide many unique benefits, or values, in their natural condition. The type of wetland and quality of the natural ecosystem can determine how many values are present. Thus, it is plausible that created wetlands will not provide the same beneficial values that natural wetlands provide because it is difficult, if not impossible, to recreate all the intricate pieces of a wetland ecosystem.

Different states and federal government agencies may recognize a different number of wetland values. However, for the most part they are similar. They can include:

Flood and Storm Protection

Wetlands are critical in protecting shorelines and downstream areas from flooding, waves, and storm flow. They tend to act like a tubs by storing floodwaters (Tiner, February 1988). Flood storage

occurs when peak flows of surface water or groundwater are slowed by a wetland basin (US EPA, February 1987). By slowing the velocity of the waters, the wetlands protect adjacent properties from flooding. After wetlands slow and store the water, they slowly release it downstream.

Fish and Wildlife Habitat

It is widely recognized that wetlands provide valuable wildlife habitat, (US EPA, February 1987). "Inland freshwater wetlands adjacent to rivers and lakes provide valuable nesting and brood habitat for wood ducks, hooded mergansers, and black ducks. These wetlands are also prime habitat for furbearers, such as beaver, muskrat, river otter, and mink. Eastern painted turtles, bog turtles, and snapping turtles are found in the region's freshwater wetlands, as are the American bittern, marsh wren, red-winged blackbird, swamp sparrow, and song sparrow" (U.S. Fish and Wildlife Service, 1989: 4-5).

Some animals, such as the wood duck (*Aix sponsa*) and muskrat (*Ondatra zibethicus*), are dependent on wetland ecosystems as their sole suitable habitat (Tiner, February 1988). However, to other animals, wetlands provide a portion of habitat necessary for their survival. For example, deer and moose may just use wetlands for the food and water.

Wetlands may also provide habitat to federally endangered, threatened or rare species. "More than one-third of the nation's threatened and endangered plant species and one-half of the animal species are wetland-dependent. Many Federally and State-listed

species are associated with the wetlands of the northeastern United States" (US Fish and Wildlife Service, 1989: 5).

Erosion Control

When wetlands are found between water and upland, they can protect the uplands from erosion. "Wetland vegetation can reduce shoreline erosion in several ways, including increasing durability of the sediment through binding with its roots; dampening waves through friction; and reducing the velocity of the current through friction" (Burke, et. al, 1988: 5). Thus, wetland vegetation helps protect not only uplands, but shorelines from erosion. In some states, wetland vegetation has been planted to control erosion (Burke, et. al., 1988: 5).

Water Quality Improvement

Since wetlands are usually located in between land and water, they also perform a very important task; the filtering of water. Water is filtered as it moves through the wetland, thus improving the quality of the water. Wetlands also increase water quality by removing and retaining nutrients, reducing sediments, and processing chemical and organic wastes. (Tiner, 1989: 55).

Wetland plants are important in most of the water purification process. For example, the wetland plants trap excess sediments and absorb overabundant nutrients such as nitrogen and phosphorus. Wetland plants have also been shown to remove waste products from water. "In fact, certain wetland plants are so efficient in this task that some artificial waste treatment systems are using these plants" (Burke, et. al, 1988: 7).

Natural Products

Wetlands can serve as vast resources for some natural products. The harvest of these natural resources has resulted in local economic prosperity. For example, timber, fish, wildlife, peat, animal furs, blueberries, cranberries, and wild rice are all found in wetlands. Wetland grasses are dried and used as food for livestock (Burke, et. al., 1988: 6). In addition, most of the nation's shellfish species are wetland dependent in some way. "For example, in the Southeast, 96 percent of the commercial catch and over 50 percent of the recreational harvest are fish and shellfish that depend on the estuary-coastal wetland system. Each year, the U.S. commercial fisheries harvest is valued at more than $10 billion." (US EPA, February 1988: 5).

Water Supply and Groundwater Recharge

Many wetlands are valuable for their groundwater discharge. On occasion, groundwater discharge may provide enough water for public use. In Massachusetts, at least 60 communities have public wells in or near wetlands. (Burke, et. al, 1988: 6).

Surface water recharge to groundwater from wetlands is not very common. However, when it does occur, it can be valuable to drinking water supplies, especially when a wetland is over an aquifer (US EPA, February 1987). Whether or not groundwater recharge occurs depends on a number of factors, including: wetland type, geographic location, season, soil type, water table location, and precipitation (Tiner, September 1989: 63).

Recreation and Aesthetics

Many recreational activities take place in wetlands. Opportunities exist for hiking, picnicking, boating, swimming, hunting, fishing, and ice skating. There are also ample opportunities to take advantage of the scenic beauty found in wetlands. Some may enjoy painting, photography, bird watching, and nature observation in wetlands (Burke, et. al., 1988: 7). Wetlands also provide an environment for the education of students and for scientific research.

Summary

The above listed values are only a few of the many known values of wetlands. However, this list has shown that marshes, swamps and other wetlands are assets to society in their natural state. They provide recreational opportunities, natural resources for human use, protect property from floods, and increase water quality (Tiner, September 1989: 64).

However, not all wetlands have every value listed above. It is often difficult to detect if some of the values are present in wetlands, or measure how well they function. Thus, for the purposes of this study, one wetland value was chosen to be measured. This value, wildlife habitat, was found to be the easiest to measure and was expected to be present in nearly all the New England wetlands studied.

Chapter Three

WETLAND PROTECTIVE LEGISLATION

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WETLAND PROTECTIVE LEGISLATION

As an offshoot of this study, the effectiveness of wetland protection legislations will be examined. If this study determines that the created/restored wetlands are not fulfilling the values of the natural wetlands, then it is possible that there may be a problem with the legislations that are supposed to be protecting wetlands. Thus, a brief look at the wetland protection mechanisms will be valuable here.

There is no one mechanism that is comprehensive enough to fully protect wetlands (US EPA, November 1988). "Because no omnibus wetlands protection law currently exists in the United States, wetlands are protected piecemeal through a variety of federal, state, and local policies, programs and regulations" (Pontius, 1990: 12). Since this is the case, it will be important to describe both the state and federal levels of protection below.

A variety of protection mechanisms exist, both for freshwater and coastal wetlands. However, since this study focuses only on freshwater wetlands, only those legislations affecting freshwater wetlands will be discussed.

Federal Protection Mechanisms

The National Environmental Policy Act of 1969

In December of 1969, the U.S. Congress passed the National Environmental Policy Act (NEPA). This act, created to reconcile conflicts between economic growth and environmental protection, was the beginning of "the environmental decade" (Salvesen, 1990). NEPA requires all federal agencies to be sensitive of the environment and consider the impacts on it when making major federal actions.

This act requires that an Environmental Impact Statement (EIS), be completed by all federal agencies when they are making major federal actions significantly affecting the quality of the human environment. The EIS includes an intense environmental analysis which studies the impact of the action, the adverse environmental effects that cannot be avoided, and any alternatives to the action (Salvesen, 1990).

An EIS is usually only required for significant projects. However, they may also be triggered by the value of the natural resource affected and the amount of controversy (Salvesen, 1990). Smaller projects with little adverse effects on the environment usually only require an Environmental Assessment (EA). An EA is a shorter, less-detailed version of an EIS.

Thus, in major projects that will affect natural resources, such as wetlands, NEPA requires that an EIS be completed. An EIS will assist in identifying the valuable resources that will be affected by the project. Federal, state, and local government can then focus on avoiding or mitigating the impacts on the environment. In doing so, NEPA helps to protect the entire environment, wetlands included.

Section 404, Clean Water Act

In 1972, the U.S. Congress amended the original Clean Water Act (originally called the Federal Water Pollution Control Act) to include Section 404. This section of the Act is now the strongest federal protection for wetlands (Smith, 1989). This act prohibits the discharge of dredged or fill materials into U.S. navigable waters. "Subsequent regulatory and legal actions extended the section 404 permit program authority beyond navigable waters to encompass "waters of the United States," which were defined as all surface waters and their tributaries" (Pontius, 1990: 14).

Both the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers jointly administer the program. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service advise and comment on the 404 process (Burke, et. al., 1988: 19).

According to Section 404, permits are necessary to alter or discharge material into wetlands. These permits may only be granted by the U.S. Army Corps of Engineers. The COE has the authority to determine if the permit should be issued based on compliance with the 404(b)(1) guidelines. These guidelines state that the applicant must show that the proposed action is the least environmentally damaging practicable alternative. However, the EPA has veto power over any decision made by the COE.

In 1977, Congress amended the Clean Water Act again and added some new sections. These involved: 1) the ability for the regulatory agencies to transfer authority to administer the program to individual states, 2) the provision for certain activities with minimal impact to be exempted from the program, and 3) the

creation of general permits for activities with minimal individual or cumulative impact on wetlands (Pontius, 1990).

The two administering agencies of Section 404 of the Clean Water Act, the EPA and the COE, require that the applicant must first try to avoid, then minimize the impacts on wetlands in their project. If wetlands will still be altered due to the project, the EPA and the COE require that the impacts on wetlands be mitigated. As compensation for the wetland loss, wetlands are either created, preserved[4] , enhanced[5] , or restored. The amount of compensation is equal or greater to the amount of wetland loss. In compensating for wetland loss in this way, it appears that there is no net loss of wetlands due to the project. However, if the created wetlands are not functioning as natural wetlands by performing functions that the destroyed wetlands performed, then they are not sufficient replacements for the natural wetlands and net loss is still occurring.

Rivers and Harbors Act of 1899

This regulatory program is also administered by the COE. Section 10 of this Act also requires a permit to dredge or place fill in the navigable waters of the United States. "Section 10 coverage extends only to traditionally navigable waters but is, in large measure, coextensive with Section 404 [of the Clean Water Act] coverage" (Salvesen, 1990: 9). Section 404 of the Clean Water Act is

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[4] Wetland preservation is usually accomplished by adding a covenant to the property deed where the wetland lies. The property owner gives up the opportunity to alter or convert the wetland in the future. This action ensures that the wetland will remain in its natural state indefinitely.

[5] Wetland enhancement, as used in this study, is increasing the quality of one or more values of a wetland, (e.g., wildlife habitat for wood ducks is increased by locating places for them to nest in wetlands).

much more encompassing than Section 10 of the Rivers and Harbors Act because it regulates all waters of the United States, including most wetlands, rather than just navigable waters.

Executive Orders

Order 11988 was released in 1977. This Order requires all federal agencies to avoid undertaking funding or permitting actions within the 100-year floodplain whenever possible (Salvesen, 1990). Order 11990, also released in 1977, requires all federal agencies to avoid undertaking any activities which may have an adverse impact on any wetlands (Salvesen, 1990).

National Flood Insurance Program

This program requires that communities control development within the 100-year floodplain. Communities are expected to restrict structures in the floodplain, especially those that will increase flooding downstream. This Program encourages communities to protect valuable environmental areas, including nontidal wetlands (Salvesen, 1990: 18).

Food Security Act of 1985

This Act creates a conservation reserve. Highly erodible lands that are taken out of crop production for ten to fifteen years are placed into this reserve. The Act also allows property easements to be taken from land owners who default on FmHA loans, if the property includes fish and wildlife habitat, floodplains, prime forestlands, erodible lands, or lands with high water quality. These easements are transferred to local governments or non-profit organizations for conservation purposes (Salvesen, 1990: 18).

Section 1221 of the Food Security Act of 1985

This section is known as the "swamp buster" provision of the Food Security Act. It uses economic sanctions to limit destructive actions that can impact wetlands. This section prohibits the payment of federal benefits to anyone who converts a former wetland to dry land for agricultural use, thus removing agricultural subsidies and loan guarantees when wetlands are converted (Salvesen, 1990).

Water Resources Development Act of 1986

This Act requires that compensation for wetland losses be completed at the same time as the construction of the project. It also authorizes the COE to assess corrective mitigation for past wetland losses, without permission from Congress, up to $30 million annually. If the action is not for the national benefit, then mitigation costs must be matched by 25 percent local or non-federal funds (Salvesen, 1990: 18).

Tax Reform Act of 1986

Under this act, landowners receive a strong incentive if they donate a conservation easement. This incentive is in the form of a tax benefit. "An easement for a wetland area would restrict the donor's rights in perpetuity to develop the wetland area" (Salvesen, 1990: 58). These gifts to the community are recorded on the deed as permanent covenants. These covenants can be very valuable in protecting wetlands.

The federal wetland protection mechanisms, as described above, overlap with state and local programs. Together, they help to preserve wetlands in the United States. Thus, state programs should also be examined.

State Protection Mechanisms

There are many different mechanisms which can protect wetlands on the state level. State programs in New England usually protect wetlands above and beyond the federal programs. Very few states other than those in New England have fresh water protection laws. New England is unique in this respect. "Unlike Section 404 of the federal Clean Water Act, which regulates both tidal and nontidal wetlands, state regulatory laws have tended to differentiate between tidal and nontidal wetlands, with the former receiving far greater protection" (Burke, et. al., 1988: 21).

However, it is not within the realm of this study, nor is it feasible to evaluate every state's wetland protection mechanisms. Thus, for the purposes of this project, only two of the five New England states that were encountered in this project will be discussed. They are Massachusetts and Rhode Island. In addition, since this study deals solely with freshwater wetlands, only the aspects of the laws that deal with freshwater wetlands will be described.

Massachusetts

Massachusetts was the first state to adopt a wetlands protection law. The Jones Act of 1963 was Massachusetts' first state wetland law, though it only regulated coastal wetlands. The Hatch Act followed in 1966, regulating the activities in inland wetlands. In 1972, the two acts were combined to create the Massachusetts Wetland Protection Act (Mass .Gen. Laws Ch. 131, Section 40). Salvesen (1990) states that this act is the strictest wetlands program in the nation.

The wetland regulations identify four inland and eleven coastal areas that are subject to protection. "The state's program is unusual in that it establishes general performance standards for different types of resource areas. The act presumes that wetlands prove at least one of the following seven values: protection of 1) groundwater, 2) water supplies, 3) fisheries, and 4) land containing shellfish; and protection from 5) storms, 6) floods, and 7) pollution--in that these values are in the public interest" (Salvesen, 1990: 64).

In Massachusetts, the legislation is unique in that it is administered at the local level by Conservation Commissions. If the community does not have a Conservation Commission, then the mayor will administer the program. If there is no one at the local level to administer the program, the the Massachusetts Department of Environmental Protection will administer it at the state level. Permits, issued by the local authorities, are required for any activity which will fill, dredge, remove or alter any bank, marsh, meadow, swamp, bog, creek, river, stream, pond, lake, or any area subject to flooding. Generally, these activities are regulated within 100 feet from any of the resources mentioned above.

Massachusetts usually receives approximately 6,000 permit applications each year. Very few are denied. In 1987, the state experienced a development boom. During this year, about 10,000 applications were received (Salvesen, 1990: 65). Mitigation typically required in Massachusetts is a 1:1 ratio.

Rhode Island

The legislation in Rhode Island regulates development in both coastal and freshwater wetlands. The legislation protecting the

freshwater wetlands is called "The Fresh Water Wetlands Act" (as amended in 1971 and 1979), and is found in the Rhode Island General Laws Sections 2-1-18 to 2-1-27. The freshwater program is administered at the state level by the Rhode Island Department of Environmental Management (DEM). Activities in wetlands such as filling, dumping, daming, diking, diverting water, dredging, draining, altering, or excavating a wetland require a permit from DEM. If there is no other practical alternative for the project and wetlands must be altered, DEM requires mitigation.

In the past, the protection of freshwater wetlands in Rhode Island included only those swamps greater than three acres, marshes greater than one acre, all bogs, ponds greater than half an acre, rivers, areas subject to storm flow, areas subject to flooding, and upland areas within fifty feet of a wetland edge. However, recently, an "other" category was included into the legislation, giving control of all the state's wetlands to DEM.

A summary of the two state wetlands programs mentioned above can be seen in the table below:

Table 1

SUMMARY OF TWO STATE WETLANDS PROGRAMS

State	Legislative Authority	Activities Regulated	Admin. Agency
Massachusetts	The Wetlands Protection Act (1972)	Removal, fill dredge, alter	Dept. of Environ. Protect.

Rhode Island	The Fresh Water Wetlands Act (amended 1971 &1979)	Fill, dump, dam dike, divert, dredge, drain, alter, excavate	Dept. of Environ. Mgmt.

Sources: Mass. Gen. Laws Ch. 131, Section 40 and
RI Gen. Laws, Sections 2-1-18 to 2-1-27

Summary

Thus, wetlands in the United States are protected by a variety of federal, state and local mechanisms. This study will determine if the creation and restoration of wetlands allowed by these laws (e.g., Section 404, Mass. Gen. Laws Ch. 131, Section 40 and RI Gen. Laws, Sections 2-1-18 to 2-1-27, etc...), are sufficient replacements for the natural wetlands. If they are not, then it will suggest that these wetland protection laws may not be comprehensive enough or do not meet their goals of preserving wetlands.

Chapter Four

RESEARCH HYPOTHESIS

Chapter Four

RESEARCH HYPOTHESIS

Since wetlands are ecosystems that are created through natural succession over many years, it is unlikely that humans can replicate a wetland exactly. The issue of whether human-made wetland replicas are sufficient replacements for natural wetlands provides the foundation for the hypothesis of this research project. The purpose of this research project is to evaluate the hypothesis; wetlands created or restored by humans cannot be satisfactory replacements for natural wetlands.

To test this hypothesis, it was necessary to examine the quality of wetland creations and restorations and to compare natural wetlands to human-made wetlands. This study evaluated the potential wildlife habitat value of created/restored wetlands and compared it to that of similar type (e.g., forested, scrub-shrub, etc...), natural, undisturbed wetlands in five of the six New England states. This comparison is described further in Chapter Five, Methods of Analysis.

Other studies that conducted tests similar to the one in this study have determined that wetland creation is not successful and that created wetlands are not sufficient replacements for natural wetlands. Some of this literature is discussed below.

Is Wetland Creation Successful?

Gwin and Kentula (1990) completed a report similar to this one for the US EPA that evaluated compliance of created wetlands in Oregon. This study compared ten created wetlands to the permits that were issued for them. The report found that cumulatively, the differences between what was described in the permits and what was actually built totaled a loss of 3.5 acres, or 29% of total wetland area that was specified to be created in the ten permits (Gwin and Kentula, 1990). "Losses of area occurred due to the differences between the permit conditions and the construction plans, often found in the same file. When the area of the wetland as-built was determined, it was often less than the area indicated in the construction drawings. Cumulatively, both discrepancies amounted to a loss of 29% of the wetland area that was to be created" (Gwin and Kentula, 1990: 23).

In an inter-agency memo at the US EPA - Region 1, it was stated that the rate of success of a wetland depends on the type of wetland that is being created (Shields, 1985). However, Krohe (1989) states that "we know very little about restoring wetlands, even though there is a lot of wetlands restoration going on" (Krohe, 1989: 4). Krohe goes on to explain that the Massachusetts policy guidelines on wetlands clearly state that no engineering solutions exist that can replicate a freshwater wetland. This is because creating habitats with such eccentric water regimes is tricky: if the hydrology is not right, then a wetland can not exist (Krohe, 1989). Even "...the Fish and Wildlife Service calls wetlands creation an experimental technology and insists that substituting artificial

wetlands cannot justify [the] development of their counterparts" (Krohe, 1989: 7).

At the 1987 National Wetlands Policy Forum, it was explained that roughly half the restoration and creation projects created up until 1987 had failed in some respect. "The 1986 National Wetlands Symposium had heard much the same news; as a Massachusetts official told the symposium, many replicated wetlands were in fact only stormwater storage areas with a few wetland plants added" (Krohe, 1989: 7).

An article in The Boston Globe reported similar findings. A researcher reported of the wetland creations he had examined, "Most of them certainly didn't look good...They did not look like a natural system...You have a lot of mudholes in the name of replication ...For all the other functions of wetlands [other than waterfowl habitat], it's a crap shoot, just because you have cattails doesn't mean that you have a functioning site...[replication] is an art rather than a science" (Dumanoski, 1989: 25).

An authority on wetlands, Jon Kusler, also reports on the success of creation in a paper called "Wetland Restoration/Creation: A Science Perspective." Kusler explains that certain values of wetlands can be recreated with reasonable certainty, for example floodwater detention. However, he states that the scientific base is not complete enough to support assertions that the other values of natural wetlands can be created in artificial wetlands. In addition, Kusler believes that "based upon the limited studies of both intentional and unintentional restoration and creation projects to date, there is scientific consensus that no wetland can be duplicated

or replicated exactly. Natural systems are far too complex for that. Most naturally occurring wetlands represent thousands of years of geologic and hydrologic processes..." (Kusler, 1987: 3).

A report done for the EPA by Reimold and Cobler (1986) shows similar results. In this study, 94 wetland replacement sites were evaluated on the basis of vegetative cover and wetlands size. Of that 94, 36 percent were unsuccessful while seven percent were marginal. Ten percent of the mitigation projects had not even been built, or had been destroyed by fill material (Reimold and Cobler, 1986). This study also discovered that "In some cases where unsuccessful projects were granted a COC [Certificate of Compliance], Conservation Commissions appeared satisfied by the fact that applicants had made a "good faith effort" to comply with...regulations" (Reimold and Cobler, 1986: 13).

Another concurrent view is described in the New York Times. In this article, it is reported that "More often than not, according to proliferating studies made by and for Federal and state governments ...efforts [at wetland restoration] are ending in failure. The failures not only threaten to undermine a highly advertised Federal and state goal of no further net loss of wetlands, they also jeopardize the hard-won credibility of wetlands restoration itself" (Stevens, 1991: pp C1).

Another wetlands expert focuses on how wetland mitigation should be evaluated in the future. "Larson (a wetland expert at the University of Massachusetts), states that "The test of whether replacement wetlands are a valid resource management practice is no longer a test of whether human-made wetlands will grow aquatic

plants, attract ducks, or have the initial appearance of a natural wetland. The question to be answered is whether or not the artificial wetland will have a suite of ecological functions similar to those of the natural wetland it replaces"" (Kriz, 1988: 5).

Summary

In conclusion, many studies have examined the success of wetland creations and restorations. Most have determined that they are not successful. This indicates that low quality, human-made wetlands are not replacing the values of natural wetlands. This study examines a similar issue, the potential wildlife habitat of created and restored wetlands as compared to natural, undisturbed wetlands in New England.

Chapter Five

METHODS OF ANALYSIS

Chapter Five

METHODS OF ANALYSIS

Many methods to evaluate wetlands were considered for use in this project. One method was found to be particularly applicable. This method, Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire, was written by Ammann et. al. (1991). He modeled the method after a similar method that he created for the state of Connecticut called the "Method for the Evaluation of Inland Wetlands in Connecticut" (1986). According to a Wetlands Protection Specialist at the U.S. Environmental Protection Agency (EPA), the EPA and the U.S. Army Corps of Engineers are attempting to create a similar method, using the Connecticut and New Hampshire methods as models (Bennett, personal communication: 7/17/91).

The New Hampshire Method analyzes wetlands by their values. The Method is divided into fourteen sections, one for each of the values that the state of New Hampshire recognizes. Each section begins with a short introduction on the importance of that particular value. This is followed by a list of questions that should be answered in the field. These questions examine the different factors that contribute to the value. The answers to the questions are filled in on the data sheets, also provided in the section. Each possible answer to the questions has a number assigned to it. A few minor calculations at the end of the data collection yields a numerical value for each

wetland. These numerical values can be used to compare one wetland to another.

The New Hampshire Method was chosen primarily for use in this project because it was designed for government officials, planners, and others who are familiar with wetlands, but who are not necessarily wetland experts. It was designed to assess local wetlands to determine which are the most valuable. In addition to being recommended to me by staff of the US EPA, it was also chosen for its simplicity.

If all of the worksheets in the manual are completed, the most valuable wetlands can be determined by the highest values. Thus, this method can be used to determine the "best" wetlands so they can be targeted for protection. However, in this study, the purpose is to compare created and restored wetlands to natural wetlands through one specific value that could be easily measured; potential wildlife habitat. If it is determined that the human-made wetlands do not replace the wildlife value adequately, then it is highly possible that they do not replace other values adequately either.

Wetland Comparison

There are many ways that wetlands can be evaluated and compared. The federal government recognizes twelve values, and individual states may recognize many different values. Eight of those values have been listed above in Chapter Two. For the purposes of this project, it will not be feasible to measure every single value for every wetland sampled. Therefore, one value will be compared among all the wetlands: potential wildlife habitat.

Through the evaluation of wildlife habitat of selected wetlands in New England, each created/restored wetland was compared to its natural counterpart. Specifically, wildlife habitat value was chosen for its ease of measurement. Since this researcher does not have formal training in wetland evaluation, the measurement of wildlife habitat appeared to be the most feasible.

To evaluate wildlife habitat, the habitat evaluation and ecological integrity sections of the Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire were followed. The data sheets were completed and relatively simple math calculations produced values which were used to compare the wetlands.

The values provided a basis to compare the wetlands to each other and ultimately to evaluate the hypothesis; wetlands created or restored by humans cannot be satisfactory replacements for natural wetlands. If this project determines the hypothesis is true, it may indicate that the wetlands in New England are adequately protected.

Procedure of Analysis

The first step of the study was to choose the ten created/restored sites in New England. These were chosen from the file drawers of the EPA - Region 1. Wetlands were chosen in five of the six New England states. Site specific information could not be located on any sites in Vermont. As much site specific information as possible was gathered from the files. The permits that were available can be found in Appendix B. Only human-made wetlands from two to five years old were chosen.

The control sites were chosen next. These sites were the same type and of similar size as the artificial wetlands. The control sites were chosen within two miles of the created/restored wetland (with two exceptions). The ten chosen created/restored sites are listed in the table below:

Table 2

CREATED/RESTORED SITES

Name	Location	Age	Created/ Restored
1. Portsmouth High School	Portsmouth, NH	2	Created
2. Bradgate Associates	Nashua, NH	4	Created
3. Rockingham Mall	Salem, NH	2	Created
4. Woonsocket Ind. Highway	Lincoln, RI	3	Created
5. Nemon	Saco, ME	3	Restored
6. Signal Resource Recov.	Millbury, MA	5	Created
7. Cheshire WWTP	Cheshire, CT	4	Created
8. Robertson/Tomasso Park	Plainville, CT	3	Created
9. CT Route 7	Norwalk, CT	3	Created
10. Southbury Travel Center	Southbury, CT	3	Restored

Information on soils and water quality were then gathered as required in the habitat evaluation section of the New Hampshire Method. The U.S.G.S. Topographical Maps and the corresponding National Wetlands Inventory maps were obtained for each site.

Field visits took place next. The wetlands were located from the maps and from information in their files. At the field visits, wildlife and plants were identified using field guides. Photographs were taken and pertinent data noted. The potential wildlife habitat

and ecological integrity[6] were then measured by recording the information requested on the data sheets from the New Hampshire Method.

The data sheets for both the wildlife habitat value and ecological integrity value were completed because both values are closely related to each other. In addition, the wildlife habitat data sheets required information called for in the ecological integrity section. The completed data sheets for each site can be found in Appendix A.

After all the primary data was collected, a value was calculated from the data sheets for each wetland. This value represents the wetland's potential wildlife habitat. The objective was then to evaluate the hypothesis.

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[6] The term ecological integrity, as used in this study, means the overall health and function of the wetland ecosystem. All the functions that a wetland performs contribute to the ecological integrity of the wetland (Ammann, 1986).

Chapter Six

SPECIFICATION OF DATA

Chapter Six

SPECIFICATION OF DATA

NEW HAMPSHIRE SITES

Portsmouth High School

Created Wetland

Purpose

This site was created as mitigation for isolated wetlands destroyed for an athletic field expansion at Portsmouth High School, in the City of Portsmouth, New Hampshire (Map 1). The City of Portsmouth applied for a permit to fill 4.7 acres of wetlands for the athletic field project. I decided to focus on the largest of the artificial wetlands, the one southwest of the baseball field. This created wetland consisted of one acre of shallow marsh/wet meadow. It was created as compensation for a similar wetland that was destroyed (see site Maps 2 and 3).

Description

Construction of the created wetland began in July of 1989. Therefore, the wetland was approximately two growing seasons old at the time of the site visit on August 10, 1991. The site had re-vegetated well (see photos, page 44). According to a wetland regulatory specialist at the US COE, this wet meadow/shallow marsh wetland drains into an unnamed tributary of Sagamore Creek (Herke, personal communication: 7/92). There was a moderate interspersion

of the two wetland classes visible. Marsh and emergent vegetation were apparent, as can be seen in the photos.

There were visible plantings on the earth berm located adjacent to the ball field. Being in such close proximity to a school, it was evident that the wetland had been used as an educational site because the periphery was trodden. Less than twenty-five percent of the soils on the site were hydric, according to the US Soil Conservation Service's (US SCS) Soil Survey for this county (see Map 4). The zoning of the site was found to be residential, with one house to a 1/2 acre. I estimated five buildings to be within 500 feet of the wetland edge. No wildlife was observed using the site.

Portsmouth High School - Control Site

Natural Wetland

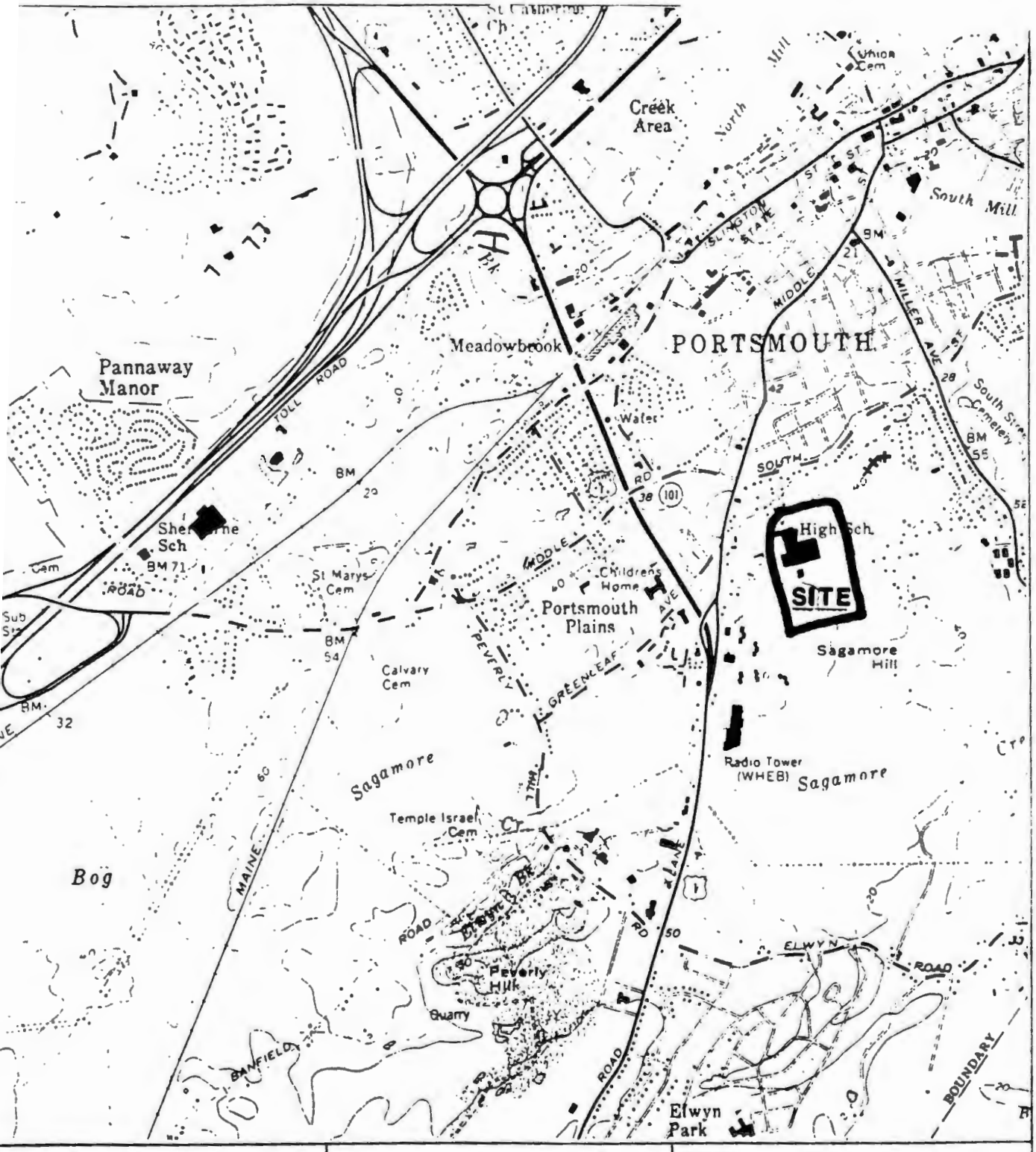
Description

This wetland site is slightly over 3/4 of a mile away from the High School and is located just southwest of the intersection of Peverly Hill Road and Middle Road (Map 5). This site was chosen because it is described as a palustrine emergent wetland, like the created wetland described above. However, after visiting the site, it was apparent that some the site had succeeded to include some scrub shrub (see photos, page 48). It is slightly larger in size than the artificial wetland (1.25 acres), because none could be found exactly the same size within one mile of the High School.

More than fifty percent of the soils on the site are hydric, according to the US SCS's soil survey (Map 4). The zoning of the site is single family residential, with one house to 20,000 square feet, or

1/2 acre zoning. No mowing, draining, filling, or any other type of disturbance could be detected. There seemed to be little or no human influence on the site. The site was, however, located adjacent to a fairly busy local roadway, thus causing a slight disturbance to wildlife in the nearby upland. There was free vegetated access for wildlife along the well vegetated corridor straight to Sagamore Creek.

Map 1
Portsmouth High School
Site Location Map



PURPOSE: ATHLETIC FIELD EXPANSION
DATUM: MEAN SEA LEVEL (USGS)

LOCATION PLAN

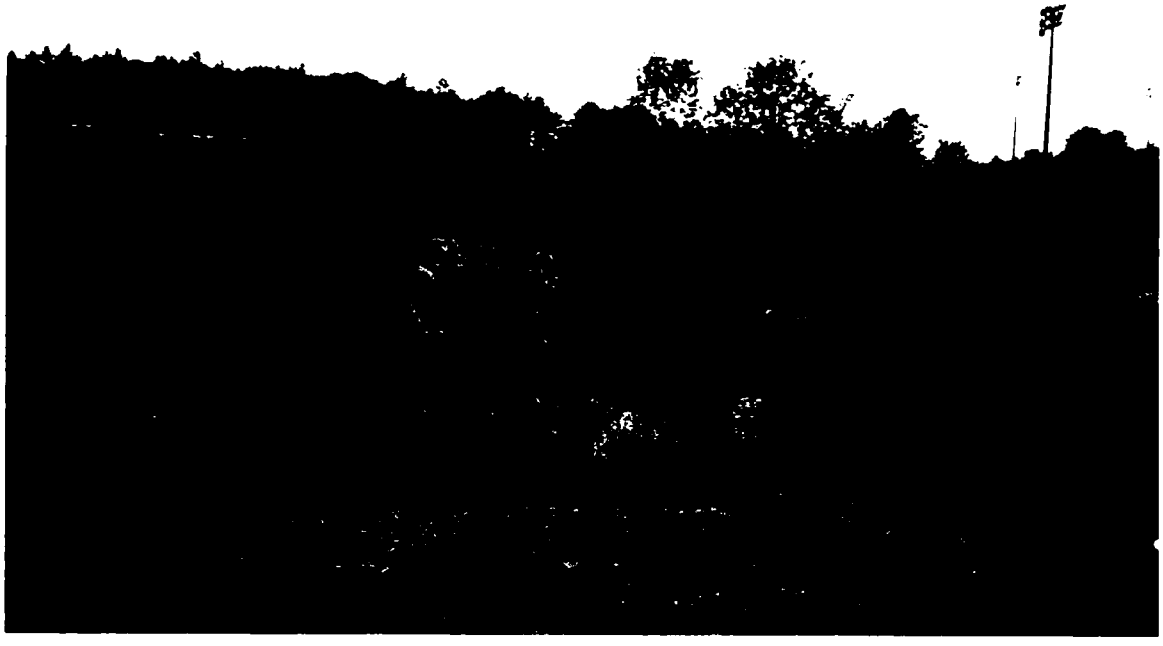
SCALE: 1" = 2,000'

PROPOSED: FILL IN ISOLATED WETLANDS
AT: PORTSMOUTH HIGH SCHOOL
COUNTY OF: ROCKINGHAM
APPLICATION BY:
CITY OF PORTSMOUTH

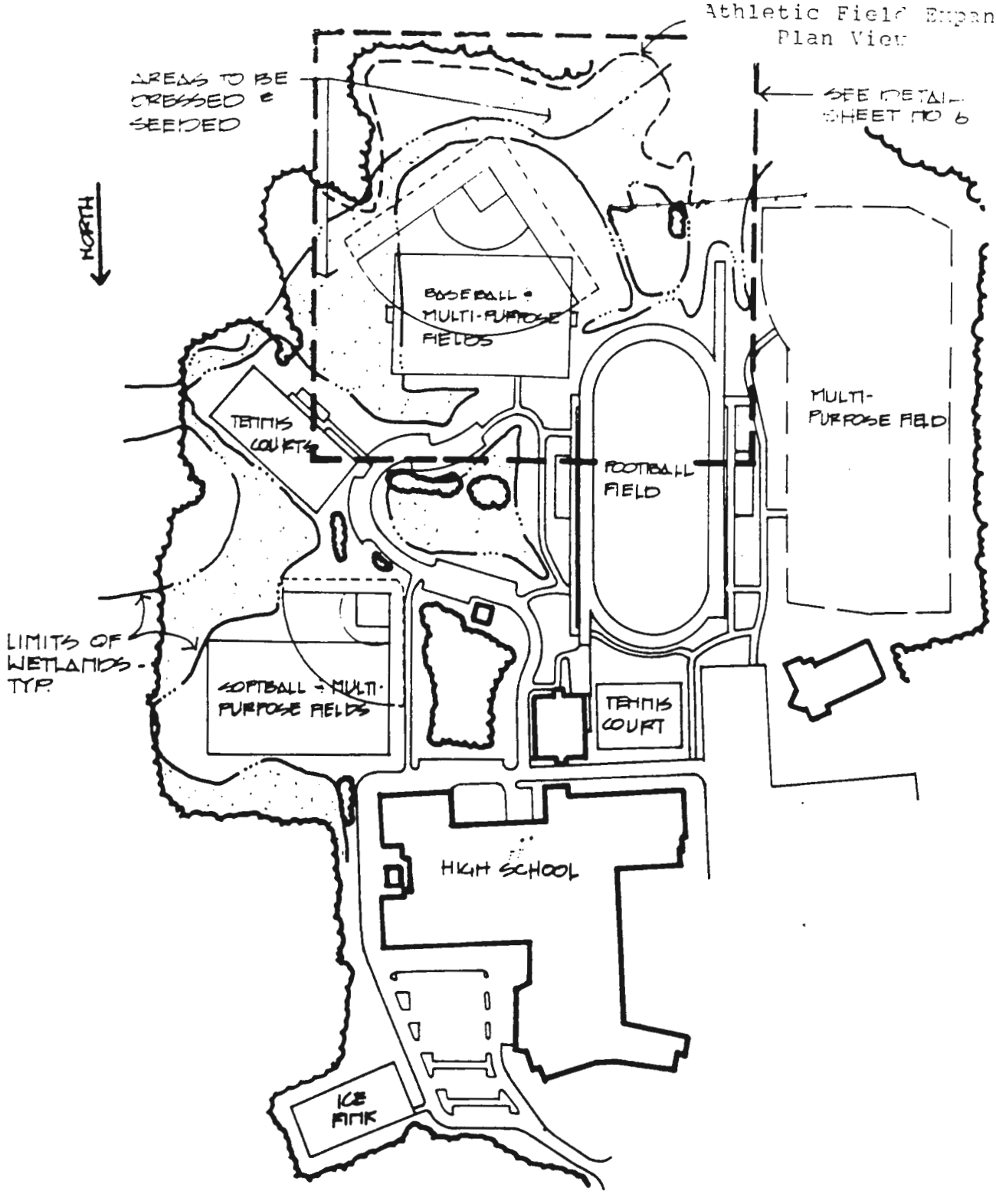
SHEET 1 OF 8 DATE: 6/29/89

PORTSMOUTH HIGH SCHOOL

Created Site



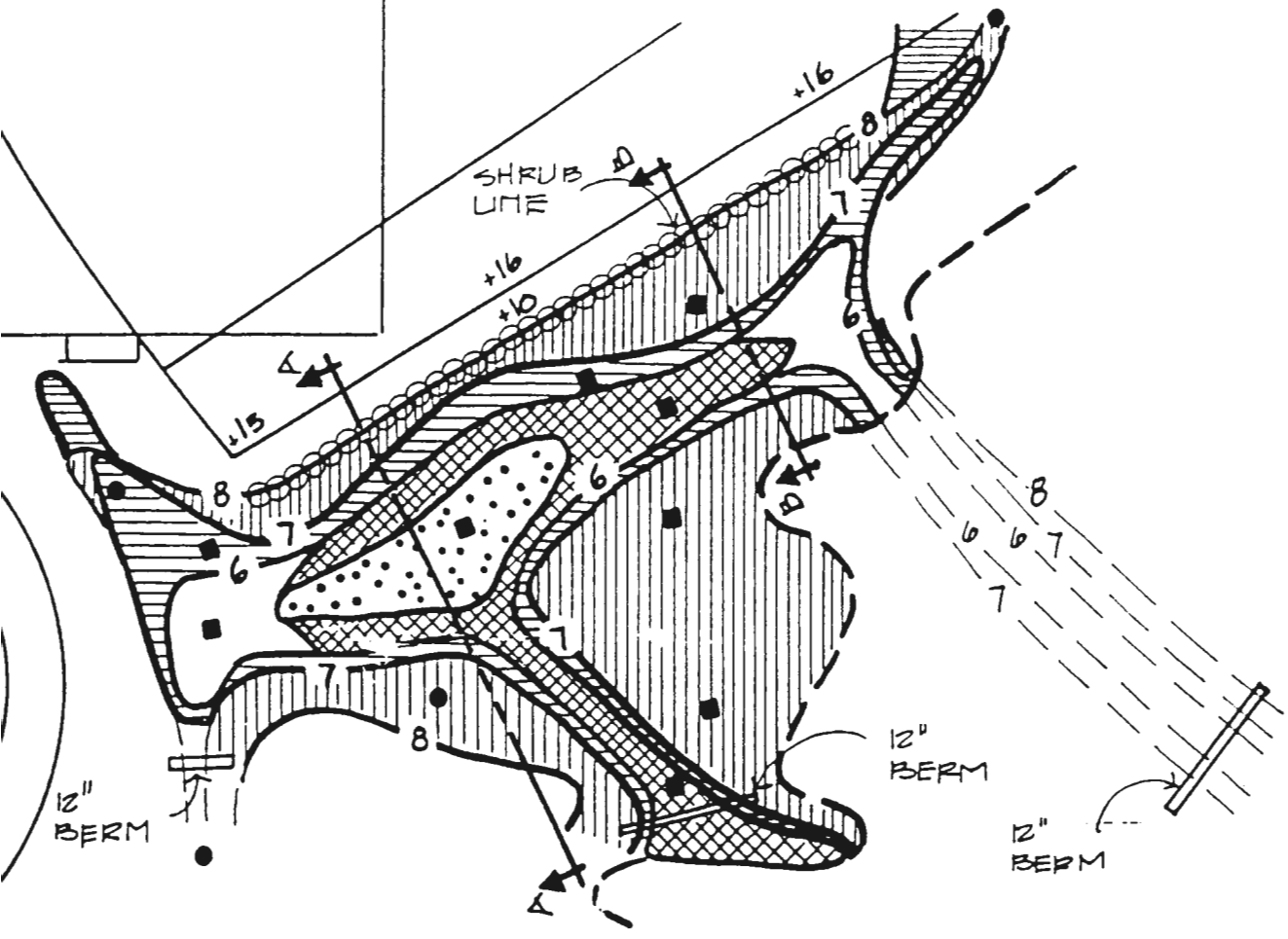
Map 2
Portsmouth High School
Athletic Field Expansion
Plan View



PURPOSE: ATHLETIC FIELD EXPANSION
AT: PORTSMOUTH HIGH SCHOOL
APPLICANT: CITY OF PORTSMOUTH, NEW HAMPSHIRE

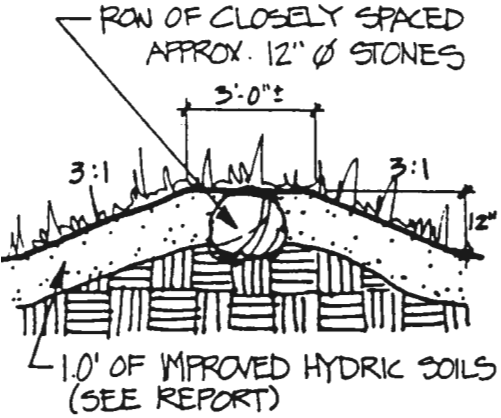
OVERALL PLAN VIEW

SCALE: NOT TO SCALE
DATE: 6/29/89
SHEET 5 OF 8



LEGEND

- CATTAIL
- DUCK POTATO
- CUT GRASS/ SWEET FLAG
- BULRUSH
- PLANT PLOT MONITORING STATION
- WATER QUALITY SAMPLING PTS.



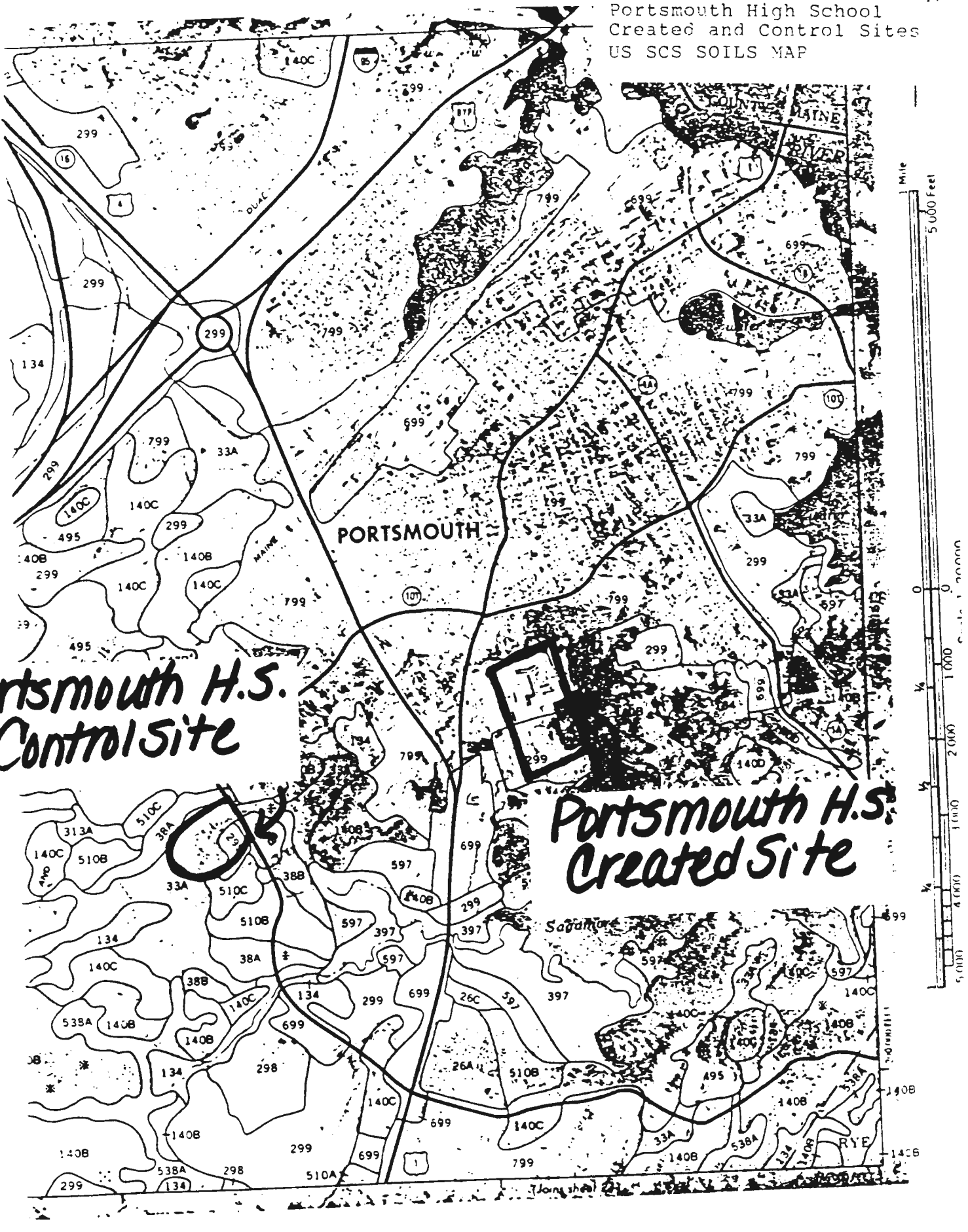
BERM SECTION

PURPOSE: ATHLETIC FIELD EXPANSION
PROJECT: PORTSMOUTH HIGH SCHOOL
APPLICANT: CITY OF PORTSMOUTH, NEW HAMPSHIRE

MITIGATION AREA PLANTING

SCALE: 1" = 80'
DATE: 6/29/89
SHEET 7 OF 8

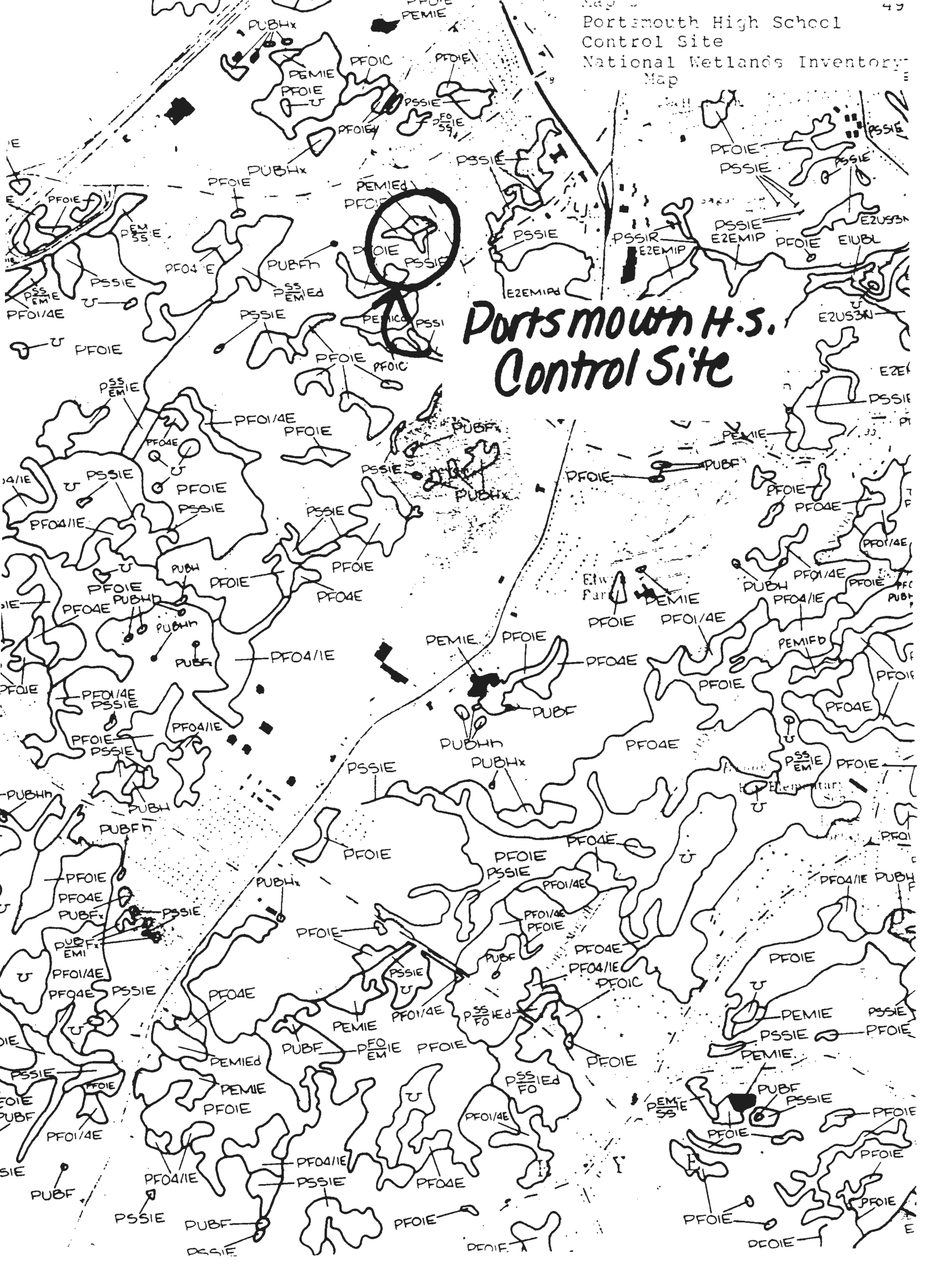
Map 4
Portsmouth High School
Created and Control Sites
US SCS SOILS MAP



PORTSMOUTH HIGH SCHOOL
Control Site

Map 5

Portsmouth High School Control Site National Wetlands Inventory Map



Bradgate Associates

Created Wetland

Purpose

Bradgate Associates Inc., developers, applied for a permit to fill 1 1/2 acres of wetlands to create a residential condominium complex called Meadowview Estates in Nashua, New Hampshire. The applicant later revised its plan to fill just less than one acre of wetland. Since the project involved the filling of less than an acre of wetland, the COE were granted a Nationwide Permit in April of 1986. Since the creation was permitted in 1986, it is estimated that the wetland was 4 growing seasons old at the time of the site visit on August 10, 1991. The creation was to include a .7 acre detention pond and surrounding wetlands, totalling approximately an acre of artificial wetlands.

Meadowview is located off Middle Dunstable Road in Nashua, New Hampshire (Map 6). The condominiums are attached units. The buildings are relatively close to each other, and appear to be in a "cluster" type of arrangement. The site work involved clearing the entire site, dredging and filling a 1 1/2 acre emergent wetland to create a detention pond and some upland for building foundations and parking lots (Map 8).

Description

The site visit showed the created area to be a relatively small pond in a large ditch (see site photos, page 53). The pond was smaller than .7 acres and most of the surrounding wetland area was being mowed. A small amount of emergent vegetation was seen around the periphery of the pond.

There were about ten condominium buildings within 500 feet of the isolated wetland. The wetland was surrounded on all sides by either roads or parking lots. Thus, the site was not accessible to wildlife, other than those animals that could fly in.

It would seem that the residents of Meadow View used the wetland area for recreation because trash was seen in the ditch. The soils of the area were mostly hydric, according to the US SCS soil survey (Map 7).

Bradgate Associates - Control Site

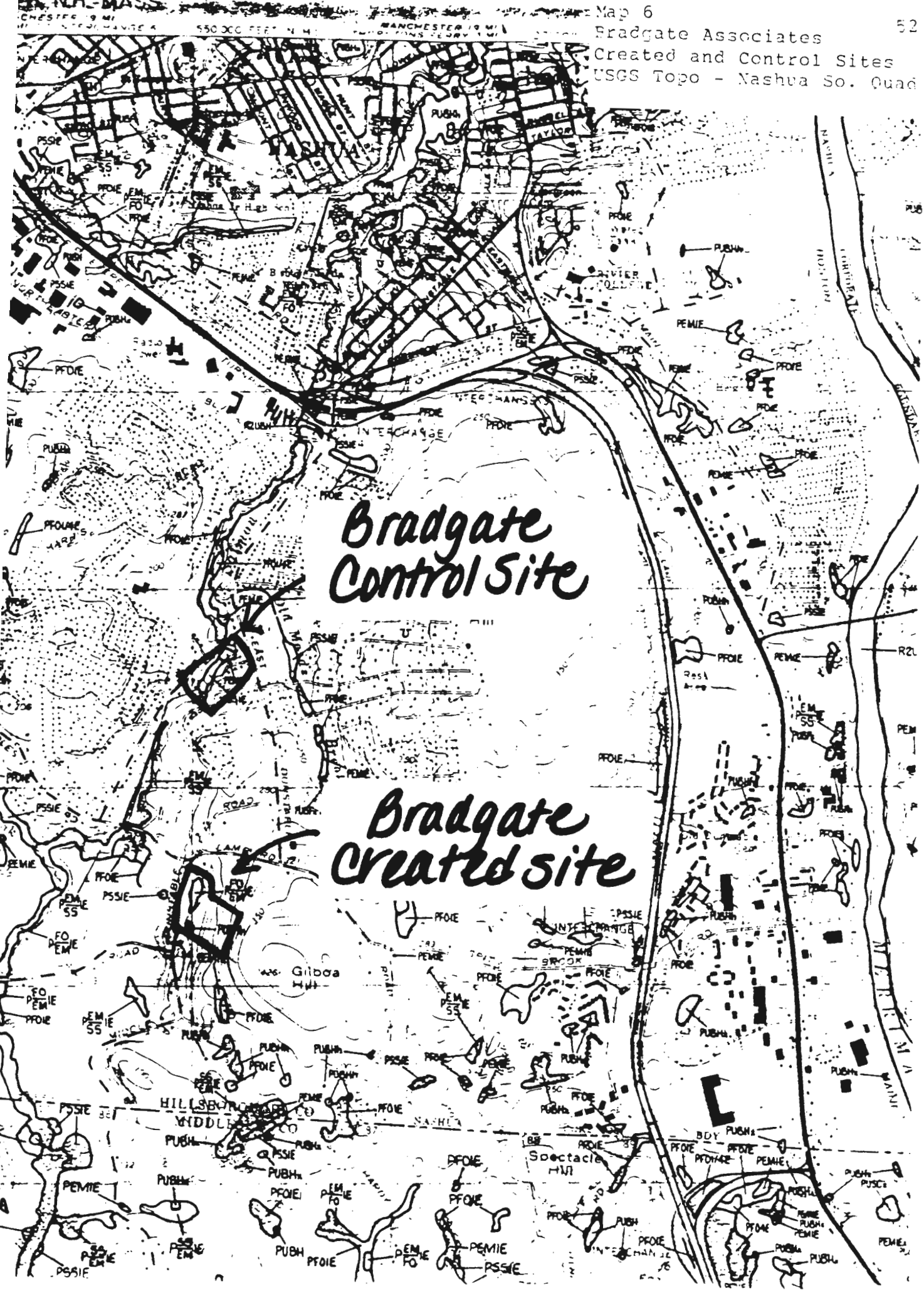
Natural Wetland

Description

This site was visited on August 31, 1991. It is located just over a half mile north of the artificial site, along Salmon Brook (Map 6). Hydric soils were under most of the site, as was determined by the US SCS soil survey for Hillsborough County (Map 7). The wetland was an emergent type, similar to the created site at Meadowview Estates. However, there was a small amount of shrub vegetation (see photos, page 56). The zoning was quoted as R-18, meaning one single family residence on a minimum lot size of 18,000 square feet. There were about six houses within 500 feet of the wetland.

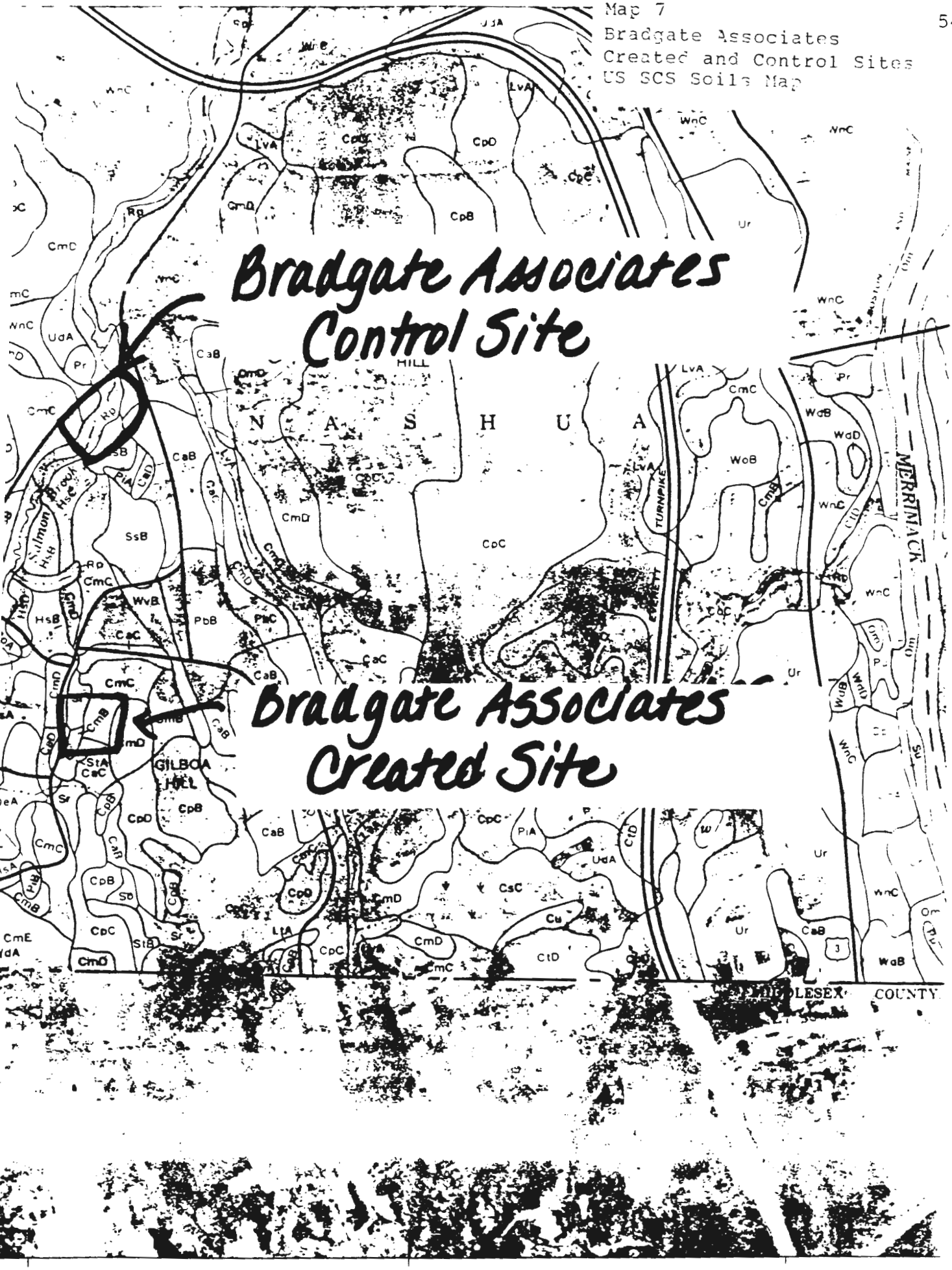
A bridge crossed over the River, just adjacent to the wetland. Little human activity could be determined in the wetland itself. Wildlife could access the wetland from the well vegetated stream corridor.

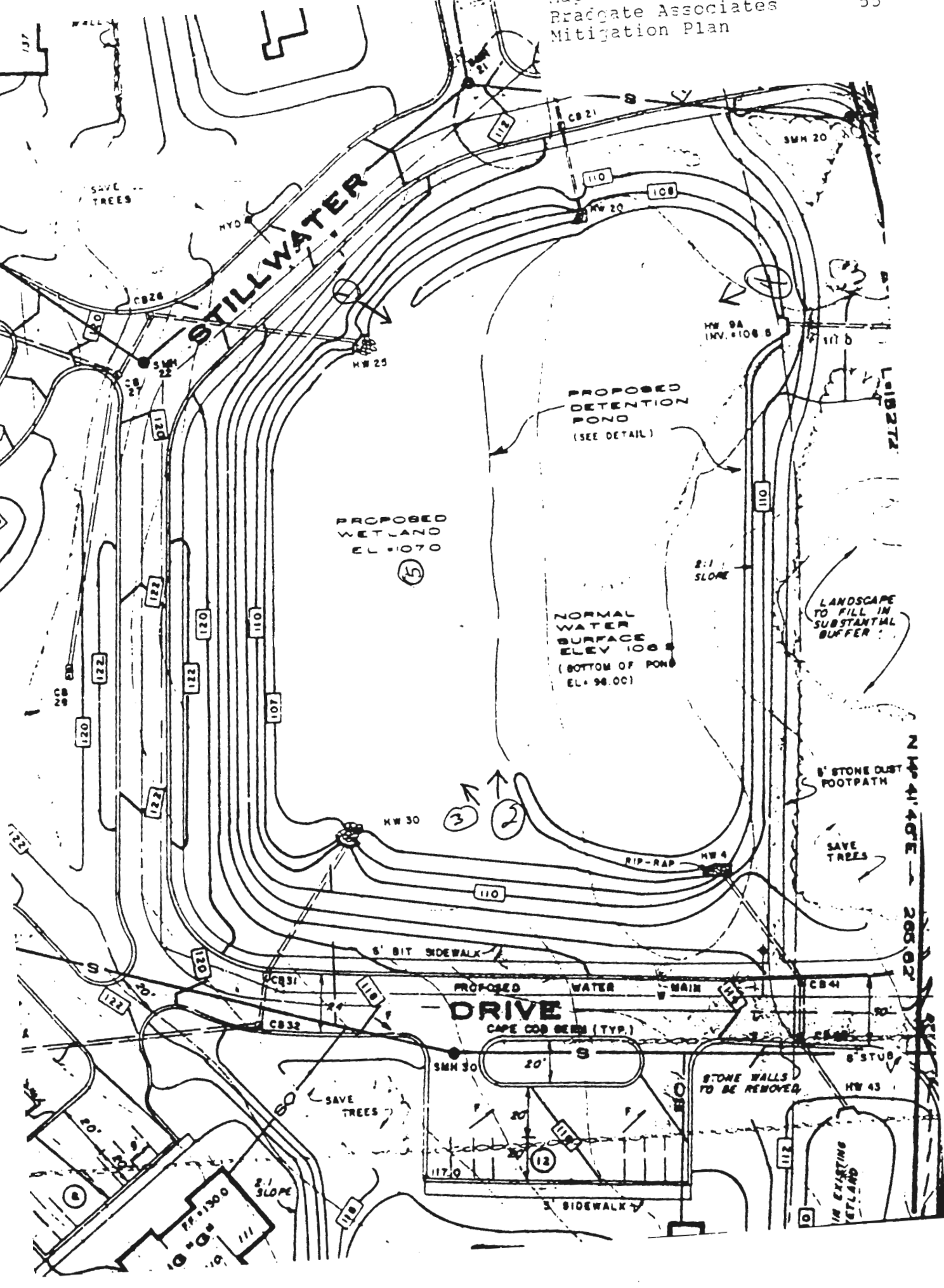
Map 6
Bradgate Associates
Created and Control Sites
USGS Topo - Nashua So. Quad



BRADGATE ASSOCIATES
Created Site

Map 7
Bradgate Associates
Created and Control Sites
US SCS Soils Map




STILLWATER
DRIVE
PROPOSED DETENTION POND (SEE DETAIL)
PROPOSED WETLAND EL. ±107.0
NORMAL WATER SURFACE ELEV 106.5 (BOTTOM OF POND EL. 98.00)
2:1 SLOPE
LANDSCAPE TO FILL IN SUBSTANTIAL BUFFER
8' STONE DUST FOOTPATH
SAVE TREES
5' BIT SIDEWALK
PROPOSED WATER MAIN
CAPE COD BERM (TYP.)
STONE WALLS TO BE REMOVED
8" STUB
5' SIDEWALK
RIP-RAP
HW 30
HW 4
HW 43
HW 25
HW 20
HW 9A INV. ±106.5
SMH 20
SMH 30
CB 21
CB 26
CB 27
CB 28
CB 31
CB 32
CB 41
HYD
S 24° 41' 40" E — 288.02'
L=182.72'

BRADGATE ASSOCIATES
Control Site

Rockingham Mall

Created Wetland

Purpose

The 4.5 acres of artificial wetlands on this site were created as mitigation for two wetlands that were filled to create the "Mall at Rockingham Park" and surrounding parking areas. The developers stated that the wetlands to be destroyed had low functional values because they had already been altered. They were granted a Nationwide Permit #26 to fill 5 acres of wetlands. The wetlands were not only proposed as mitigation for those destroyed, but also for stormwater management.

Description

The mall was visited on August 31, 1991. At this time, the mall had just recently opened for business. The mall is located just west of Rockingham Park, a racetrack, in Salem, New Hampshire (see Map 9). The wetlands were created in three sites, totalling 4.5 acres, according to one of the members of the consulting firm that worked on the project, (Wood, personal communication: 8/28/91). I chose to focus on the two smaller of the three wetland sites. Together, the two sites totalled about one acre of artificial wetlands. They are located at the southeastern and southwestern corners of the property. The planting plans for these two wetlands can be seen on Maps 11a and 11b.

These wetlands were just under two growing seasons old at the time of my visit. They are considered a mixture of both emergent and scrub shrub vegetation (see photos, page 61). About 25 to 50 percent of the soil under the site is considered hydric, as discovered

in the US SCS soil survey (Map 10). The zoning for the site is commercial/industrial, according to the planning department in Salem.

Seven buildings were counted within 500 feet of just one of the wetlands. Both wetlands were entirely fenced in. They appear to be small, deep, human-made ditches with wetland vegetation on the bottom. Thus, both sites were inaccessible to wildlife, except those that are able to fly. There was high activity in the upland surrounding both wetlands with the mall, its parking lots and ring road, as well as residences.

Rockingham Mall - Control Site

Natural Wetland

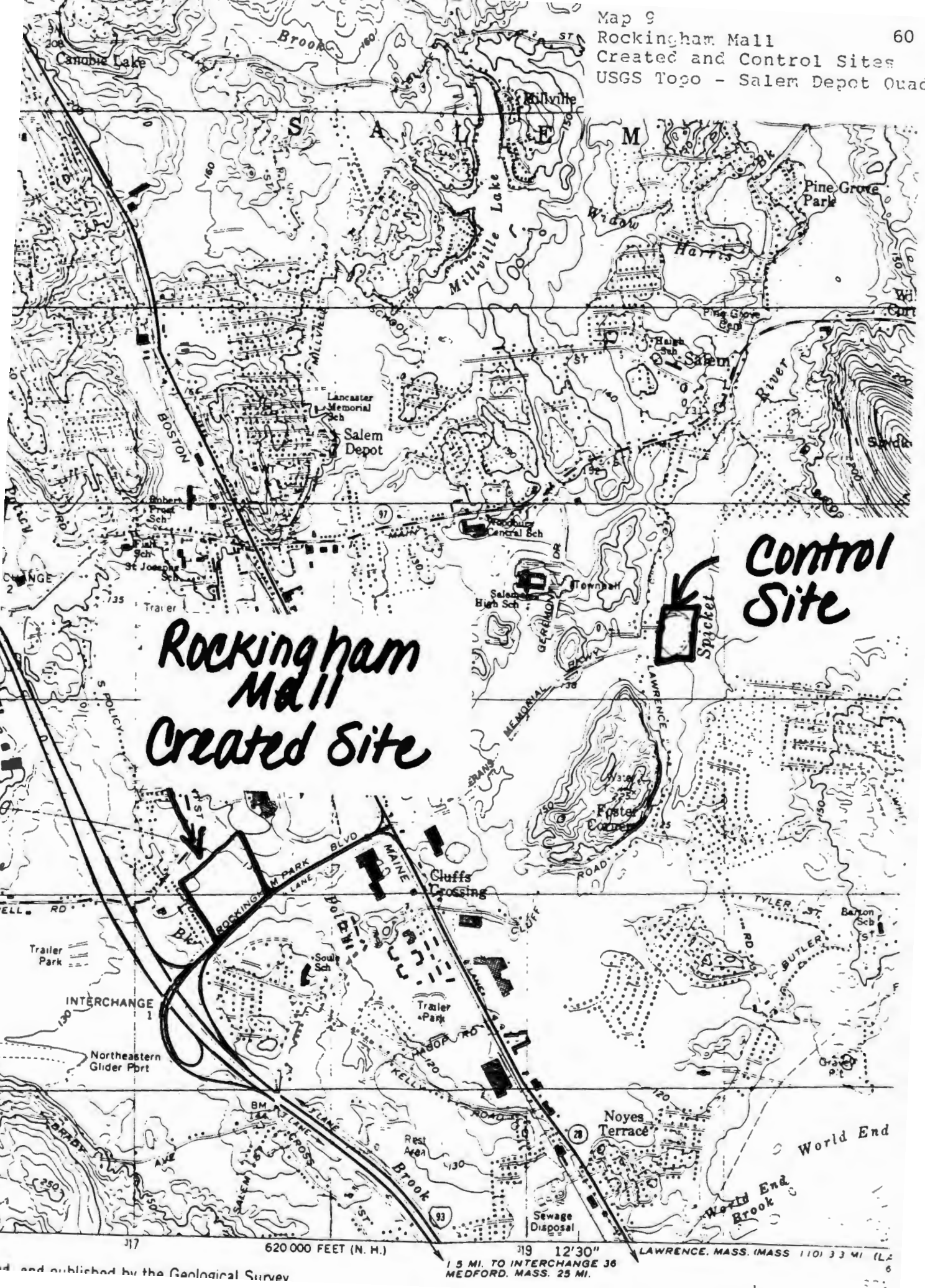
Description

The natural site was also located in Salem, less than two miles away, at the end of Veterans Memorial Parkway, adjacent to the Spicket River (see Map 9). This site was visited on August 31, 1991. The wetland was of the same types as the created wetland: emergent and scrub-shrub (Map 12). More than 50 percent of the soils were defined as hydric, according to the US SCS soil survey (Map 10). The zoning was quoted to be rural residential in this area. There were only two houses counted within 500 feet of this wetland.

Over 50 percent of this wetland was bordered by a woodland or natural buffer (see photos, page 66). There was ample access from the wetland to the vegetated stream corridor of the Spicket River, just adjacent to the wetland. Thus, the site was highly accessible to wildlife. No human activity could be detected within

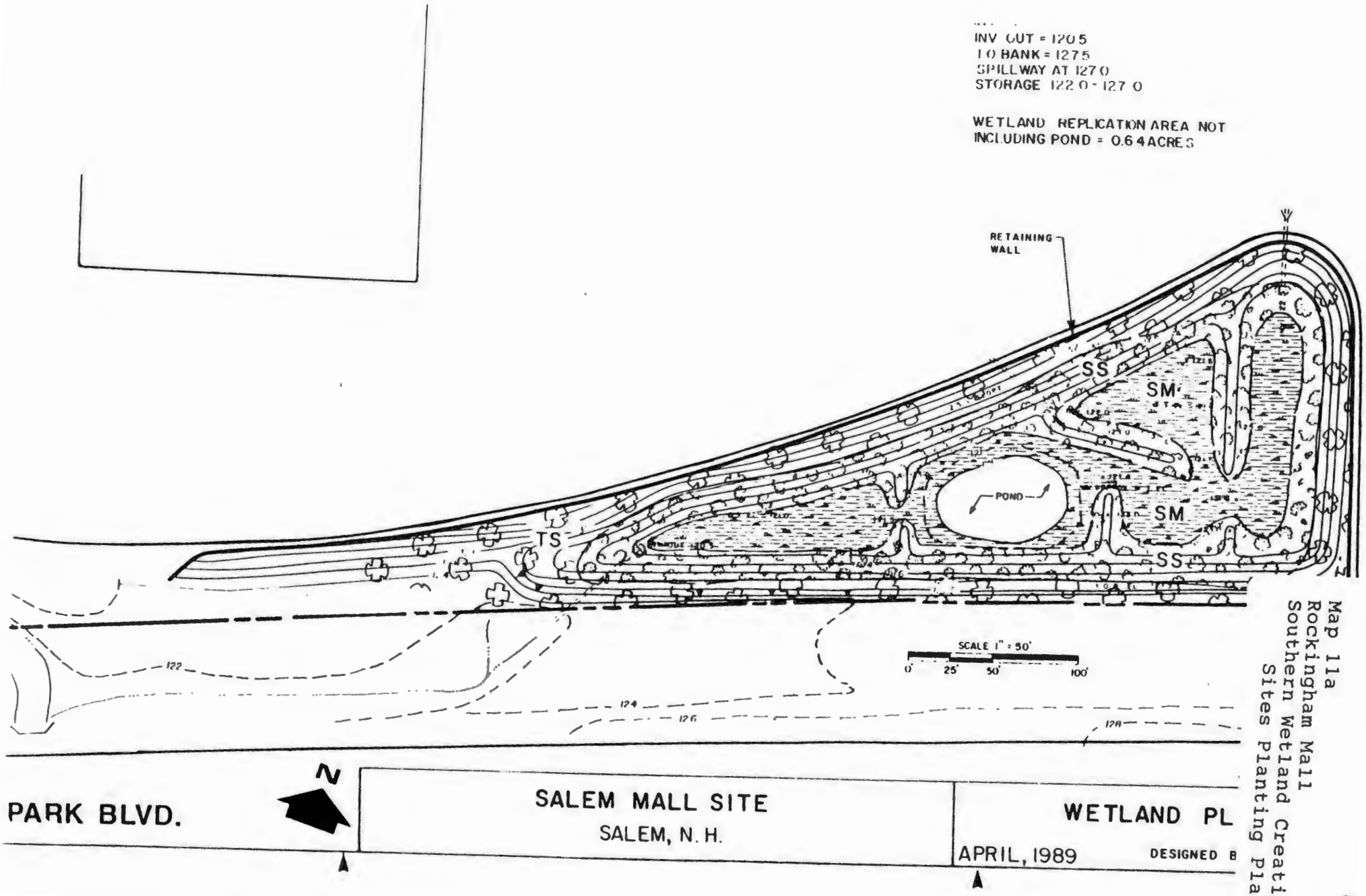
the wetland, and there was very little activity in the nearby upland as well. The wetland was located at the end of a dead end street. The street was only sparsely populated with homes.

Map 9
Rockingham Mall
Created and Control Sites
USGS Topo - Salem Depot Quad



ROCKINGHAM MALL
Created Site

Map 10
Rockingham Mall
Created and Control Sites
US SCS Soils Map

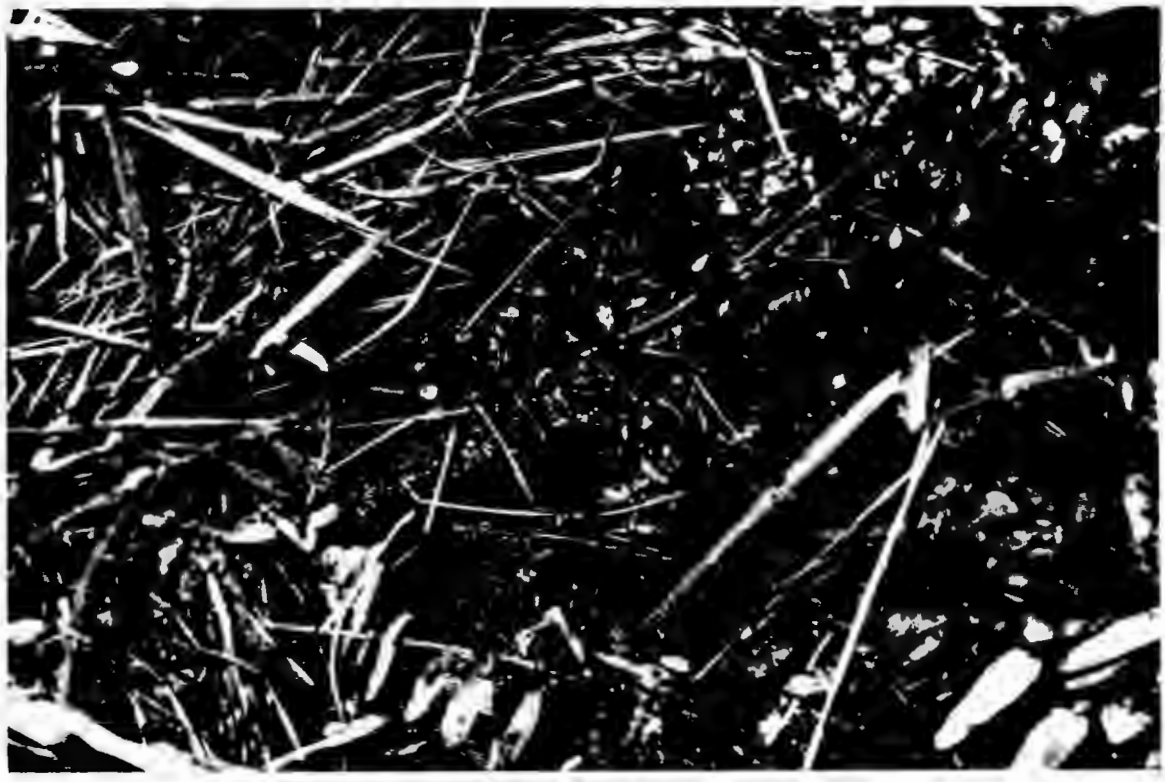


Map 11a
Rockingham Mall
Southern Wetland Creation
Sites Planting Plan

Map 11
Rockingham Mall
Southern Wetlands Creation
Sites Planting Plan

Map 12
Rockingham Mall
Control Site
National Wetlands Invent. v
Map

ROCKINGHAM MALL
Control Site



RHODE ISLAND SITE

Woonsocket Industrial Highway (Route 99)

Created Wetland

Purpose

In early 1987, construction of this highway began. Created wetlands were planned along with the construction to serve as mitigation for 6.7 acres of natural wetlands that were filled for the roadway. Approximately 6.7 acres of wetlands were created. Additional mitigation was in the form of wetlands enhancement and preservation.

The Rhode Island Department of Transportation (RI DOT), acquisitioned an eleven acre parcel which supports a 5.8 acre wetland. RI DOT will preserve this parcel. In addition, .1 acres of wetlands will be enhanced as partial mitigation for temporary fill in wetlands during construction of the Blackstone River Bridge. The existing wetland supports a dense stand of phragmites. Following the construction of the bridge and the removal of temporary fill, approximately .1 acres of wetlands will be excavated below existing grade to to promote the establishment of more valuable wetland plant species. Thus, mitigation for this project will include 6.7 acres of created wetlands, 5.8 acres of preserved wetlands, and .1 acres of enhanced wetlands.

Description

The wetland areas were completed in 1988, and thus were about three growing seasons old when I visited them on August 24, 1991. The roadway runs approximately north to south from Route 122 to Route 146 in Lincoln, Rhode Island. The roadway and created site can be seen on Maps 13 and 14.

There were several artificial wetland sites; however, I chose to concentrate on "Site E," a 3.5 acre emergent/scrub shrub wetland, located just southwest of the intersection of the new Route 99 and Sayles Hill Road. This wetland is adjacent to the 5.8 acre wetland preservation area mentioned above (Map 15). The wetland was converted from an upland meadow and forested area to a mix of open water, emergent wetland, and shrub wetland (see photos, page 71).

From 25 to 50 percent of the wetland was listed as having hydric soils, as determined from the US SCS soil survey (Map 14). The zoning of the area, according to the Cumberland Planning Department is RA40. This zone allows one single family residence per acre. The wetland is associated with Crook Fall Brook. The Brook has a water quality of 'B' according to a water quality specialist at the US EPA - Region 1, (Hall, personal communication: 5/5/92).

One building was noted within 500 feet of the wetland edge. Since the wetland was surrounded by wooded/vegetated areas and adjacent to other contiguous wetlands, the site is easily accessible to wildlife. During my site visit, I could hear shots being fired in the adjacent wetland, indicating some people used the area for hunting recreation.

Woonsocket Industrial Highway (Route 99) - Control Site

Natural Site

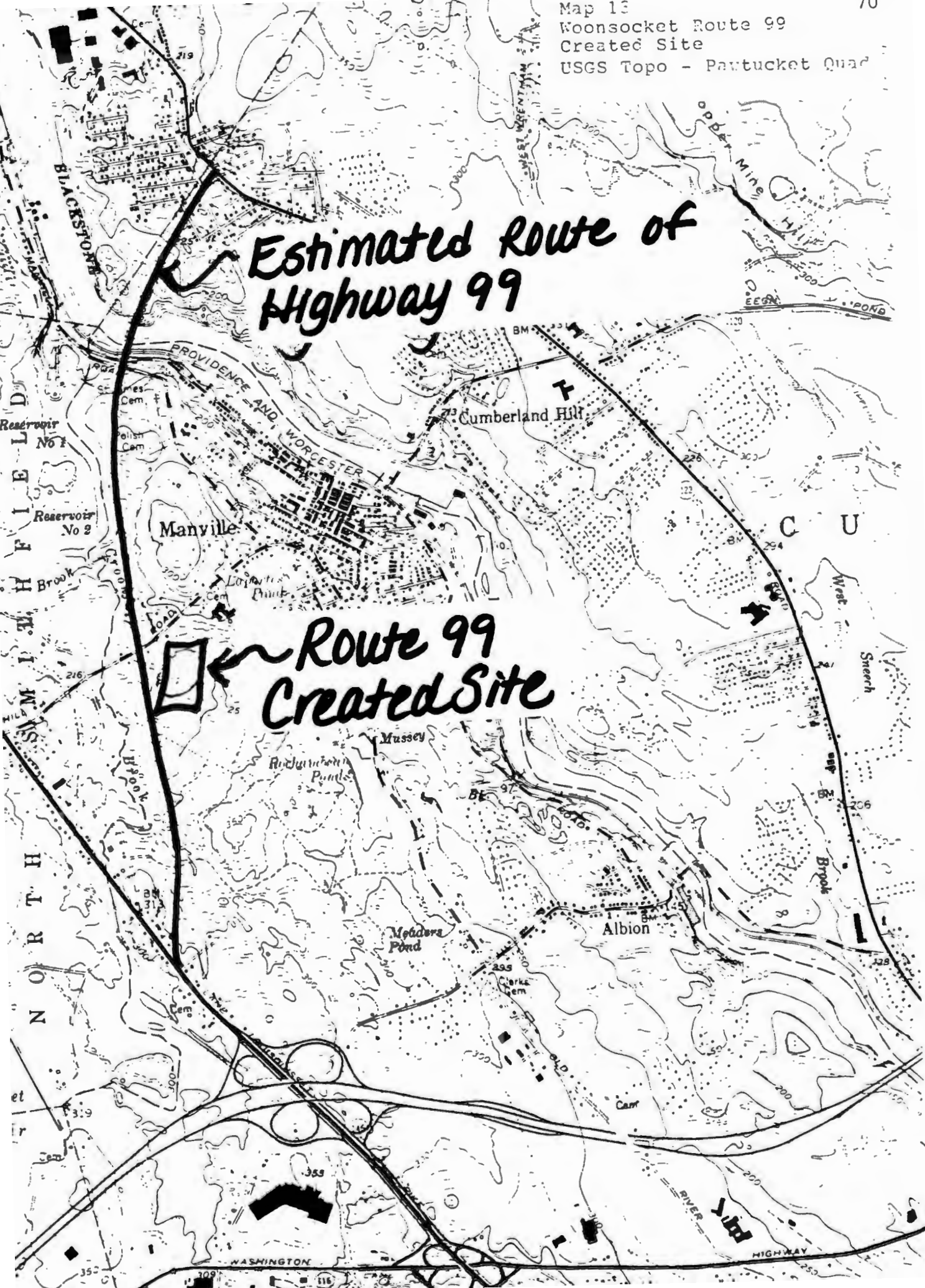
Description

The natural wetland, visited on August 24, 1991, is located in the Town of Cumberland, Rhode Island (Map 16). This site is about three miles away from the created site. This site was one of the few exceptions to the two mile limit. No other similar sites could be located within two miles of the artificial wetland.

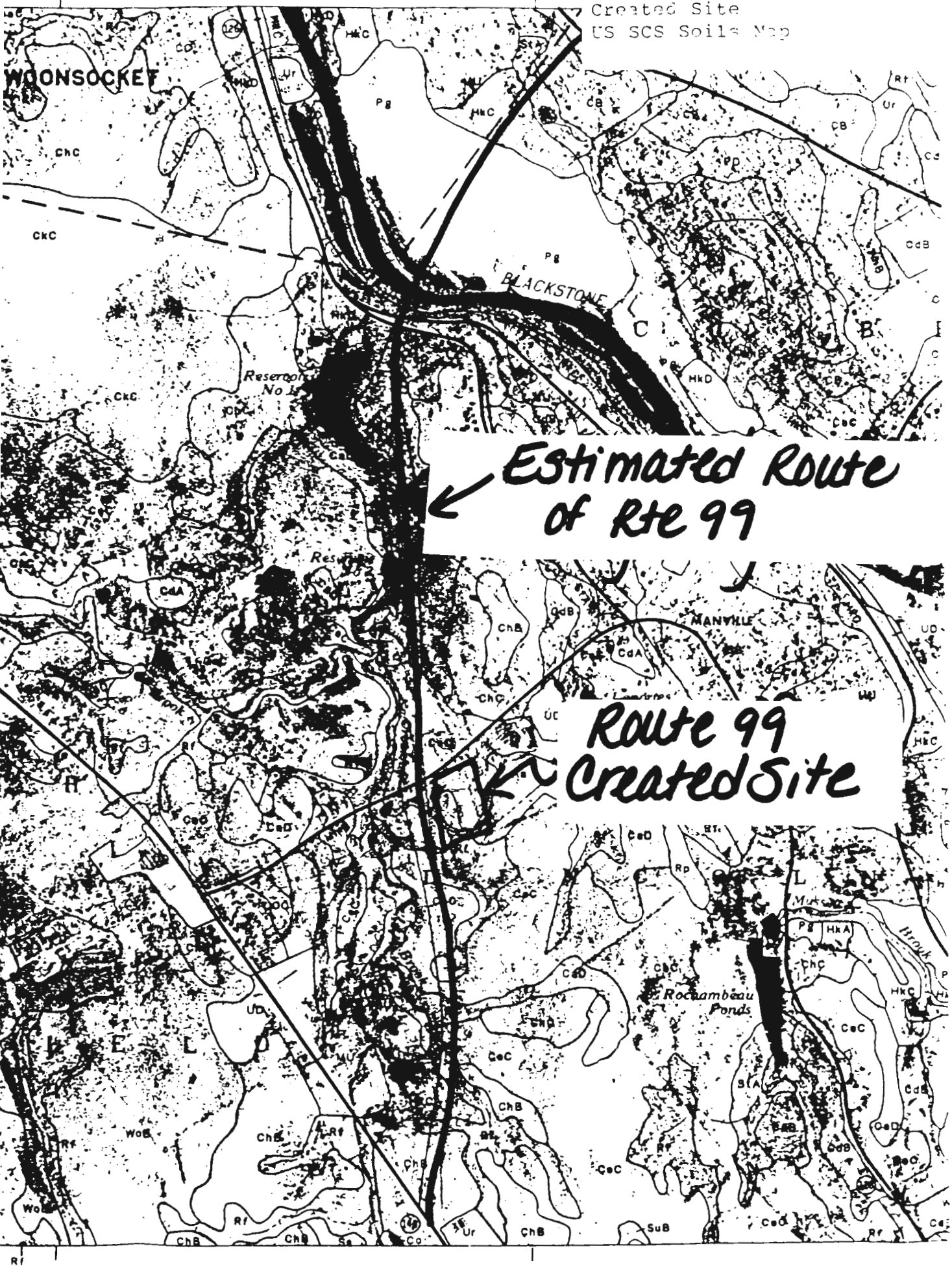
The site is estimated to have over 50 percent hydric soils, as determined thorough the US SCS soil survey (see Map 17). Since the zoning of the site could not be obtained (the only incidence of this in this study), the current land use was used, as allowed in the New Hampshire Method. The current land use was determined to be rural residential. There were about six houses within 500 feet of the wetland.

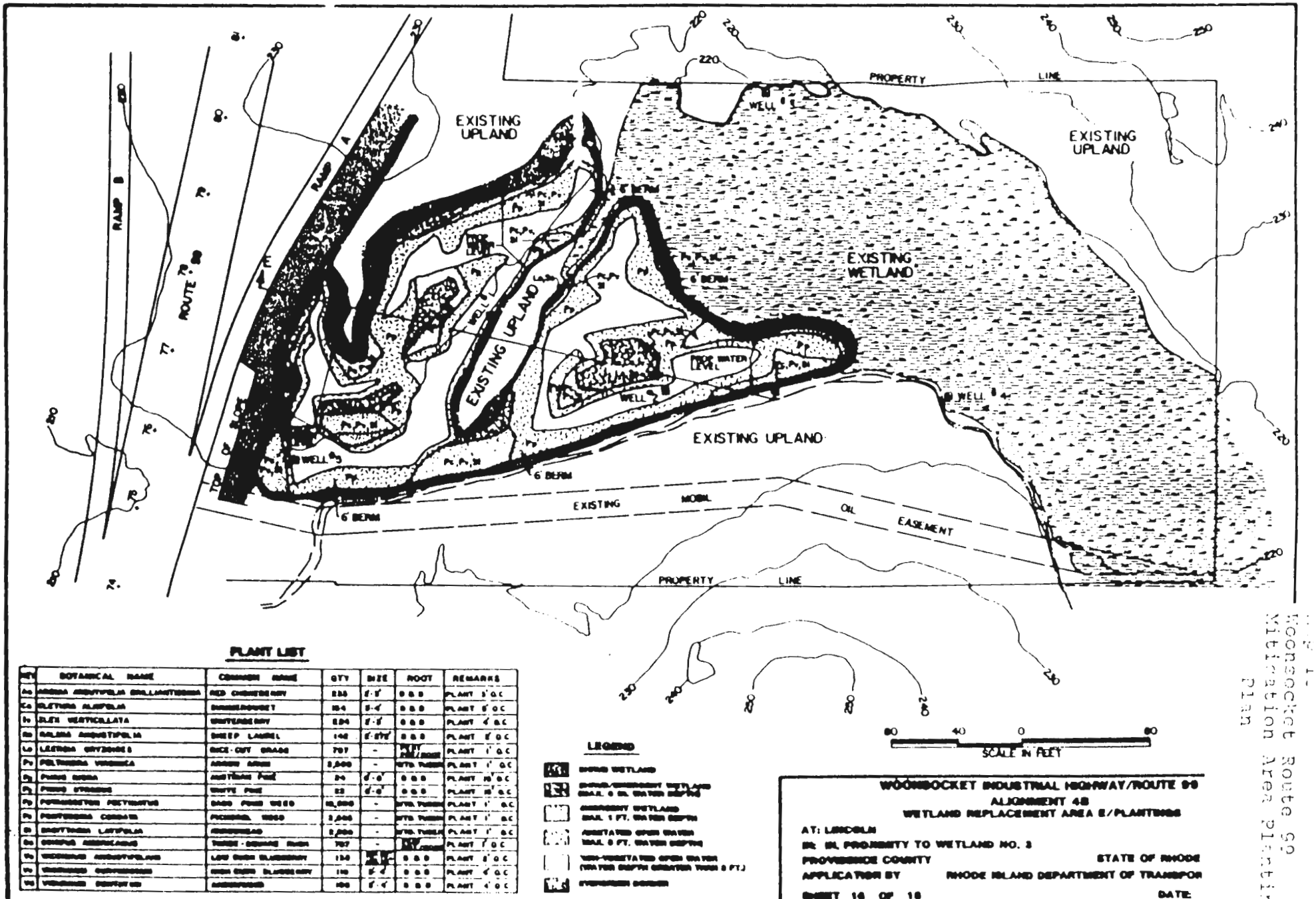
The wetland was located in a valley, surrounding a pond, (see photos, page 75). There was no evidence of human activity in the wetland, or even in the nearby upland. The wetland was surrounded by hills, forests, and fields, providing sufficient access to the wetland for wildlife.

Map 13
Woonsocket Route 99
Created Site
USGS Topo - Pawtucket Quad



WOONSOCKET INDUSTRIAL HIGHWAY (Route 99)
Created Site "E"


WOONSOCKET
BLACKSTONE
MANVILLE
Reservoir No 1
Rocambeau Ponds
Estimated Route of Rte 99
Route 99 Created Site



PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY	SIZE	ROOT	REMARKS
Aa	ARONIA ARBUTIFOLIA BRILLIANTISSIMA	RED CHOKEBERRY	235	2'-3'	B & B	PLANT 3' O.C.
Ca	CLETHRA ALNIFOLIA	SWEETBUSHSET	304	2'-4'	B & B	PLANT 5' O.C.
Ii	ILEX VERTICILLATA	WINTERBERRY	234	2'-3'	B & B	PLANT 4' O.C.
Kl	KALMIA ANGUSTIFOLIA	SHEEP LAUREL	140	2'-3½'	B & B	PLANT 5' O.C.
Lg	LEERSIA ORYZOIDES	RICE-CUT GRASS	707	-	[illegible]	PLANT 1' O.C.
Pv	PELTANDRA VIRGINICA	ARROW ARUM	2,500	-	[illegible]	PLANT 1' O.C.
Pr	PINUS RIGIDA	PITCH PINE	24	4'-6'	B & B	PLANT 10' O.C.
Ps	PINUS STROBUS	WHITE PINE	23	4'-6'	B & B	PLANT 10' O.C.
Pa	POTAMOGETON PECTINATUS	SAGO PONDWEED	10,000	-	[illegible]	PLANT 1' O.C.
Pc	POTAMOGETON CORIACEUS	PICKEREL WEED	2,000	-	[illegible]	PLANT 1' O.C.
Sl	SAGITTARIA LATIFOLIA	ARROWHEAD	2,000	-	[illegible]	PLANT 1' O.C.
Sa	SPARGANIUM AMERICANUM	BURR-REED/BUR REED	707	-	[illegible]	PLANT 1' O.C.
Va	VACCINIUM ANGUSTIFOLIUM	LOW BUSH BLUEBERRY	150	2'-3'	B & B	PLANT 5' O.C.
Vc	VACCINIUM CORYMBOSUM	HIGH BUSH BLUEBERRY	110	2'-4'	B & B	PLANT 4' O.C.
Vn	VACCINIUM NIGRUM	HUCKLEBERRY	100	2'-4'	B & B	PLANT 4' O.C.

LEGEND

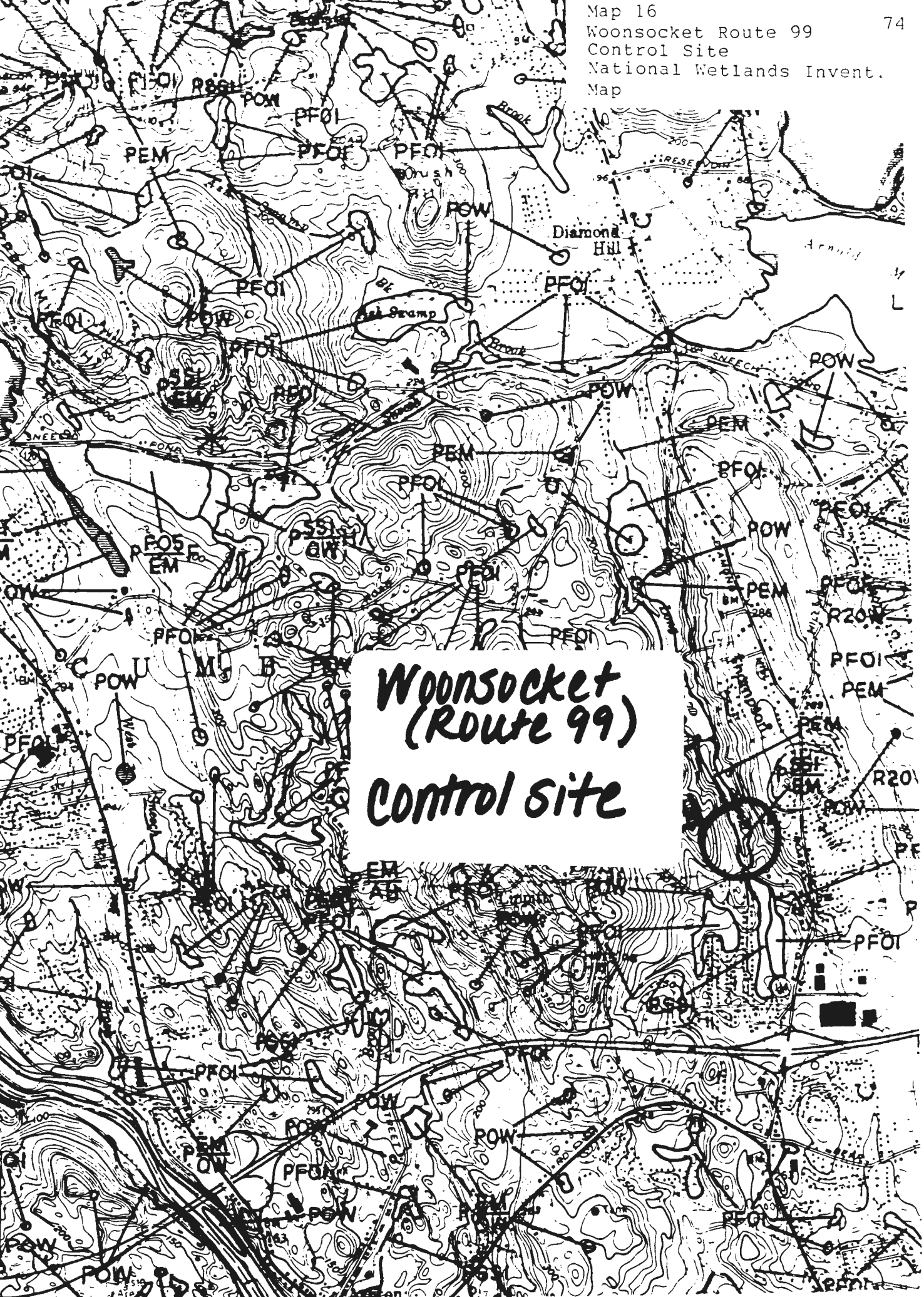
- EMERGENT WETLAND
- EMERGENT/SHRUB WETLAND (SHALLOW TO DEEP WATER DEPTH)
- SHRUB WETLAND (SHALLOW WATER DEPTH)
- VEGETATED OPEN WATER (SHALLOW WATER DEPTH)
- NON-VEGETATED OPEN WATER (WATER DEPTH GREATER THAN 6 FT.)
- EVERGREEN SHRUB

WOONSOCKET INDUSTRIAL HIGHWAY/ROUTE 99
ALIGNMENT 4B
WETLAND REPLACEMENT AREA B/PLANTINGS

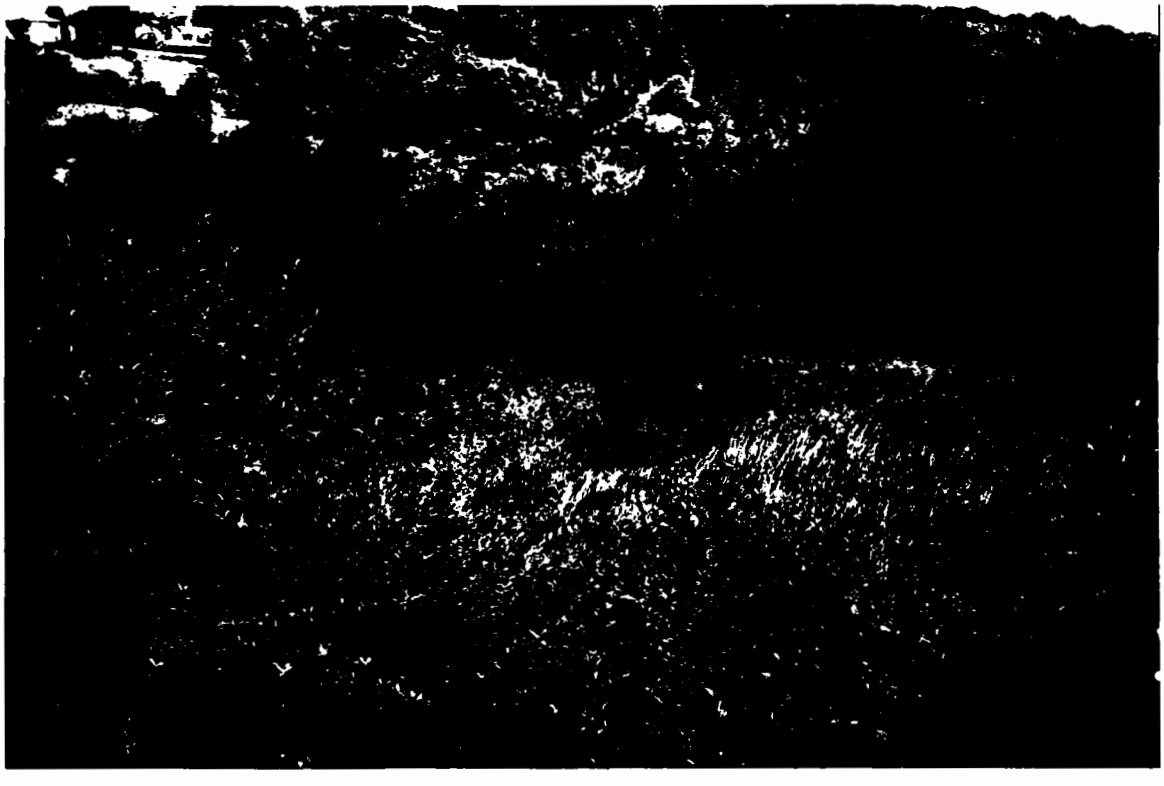
AT: LINCOLN
IN: IN PROXIMITY TO WETLAND NO. 3
PROVIDENCE COUNTY — STATE OF RHODE
APPLICATION BY — RHODE ISLAND DEPARTMENT OF TRANSPOR
SHEET 16 OF 18 — DATE:

Woonsocket Route 99
Mitigation Area Planting
Plan

Map 16
Woonsocket Route 99
Control Site
National Wetlands Invent.
Map



WOONSOCKET INDUSTRIAL HIGHWAY (Route 99)
Control Site



Woonsocket Route 99
Control Site
US SCS Soils Map

MAINE SITE

Nemon

Restored Site

Purpose

An illegal filling of a wetland in Saco, Maine, was reported to the US EPA - Region 1, on June 1, 1987 (Map 18). This fill was in violation of Section 404 of the Clean Water Act of 1977. In addition to a fine, the violator was required to restore the wetland to its natural state. The violation occurred in two sites totalling 1.5 acres. I chose to focus on the .5 acre scrub shrub/emergent restoration on the property between Oakland and Hubbard Streets (see Map 19).

Description

The restoration was completed in 1989, and thus was three growing seasons old during my August 31, 1991 visit. The site appeared to simply be an open field with some wetland vegetation in it though parts of the wetland were wet (see photos, page 81). The site appeared to be an isolated wetland, not connected to any other water ways. Over 50 percent of the soils on the site were hydric, according to the US SCS soil survey (see Map 20). The zoning of the area was R1A, according to the local zoning office. This means that one residence is allowed on a minimum lot size of one acre. There were five houses counted within 500 feet of the wetland edges.

There was some trash and a small amount of trodden vegetation in the wetland, providing evidence of some human activity within the wetland. The activity in the upland was moderate

as well, with the wetland being surrounded on two sides with roads, and nearby residences. A small woodland was adjacent to the site, about 50 feet deep, however, there were houses on the opposite side of the woods. Thus, the only way wildlife could access the site would be by crossing a road or going through someone's yard.

Nemon - Control Site

Natural Site

Description

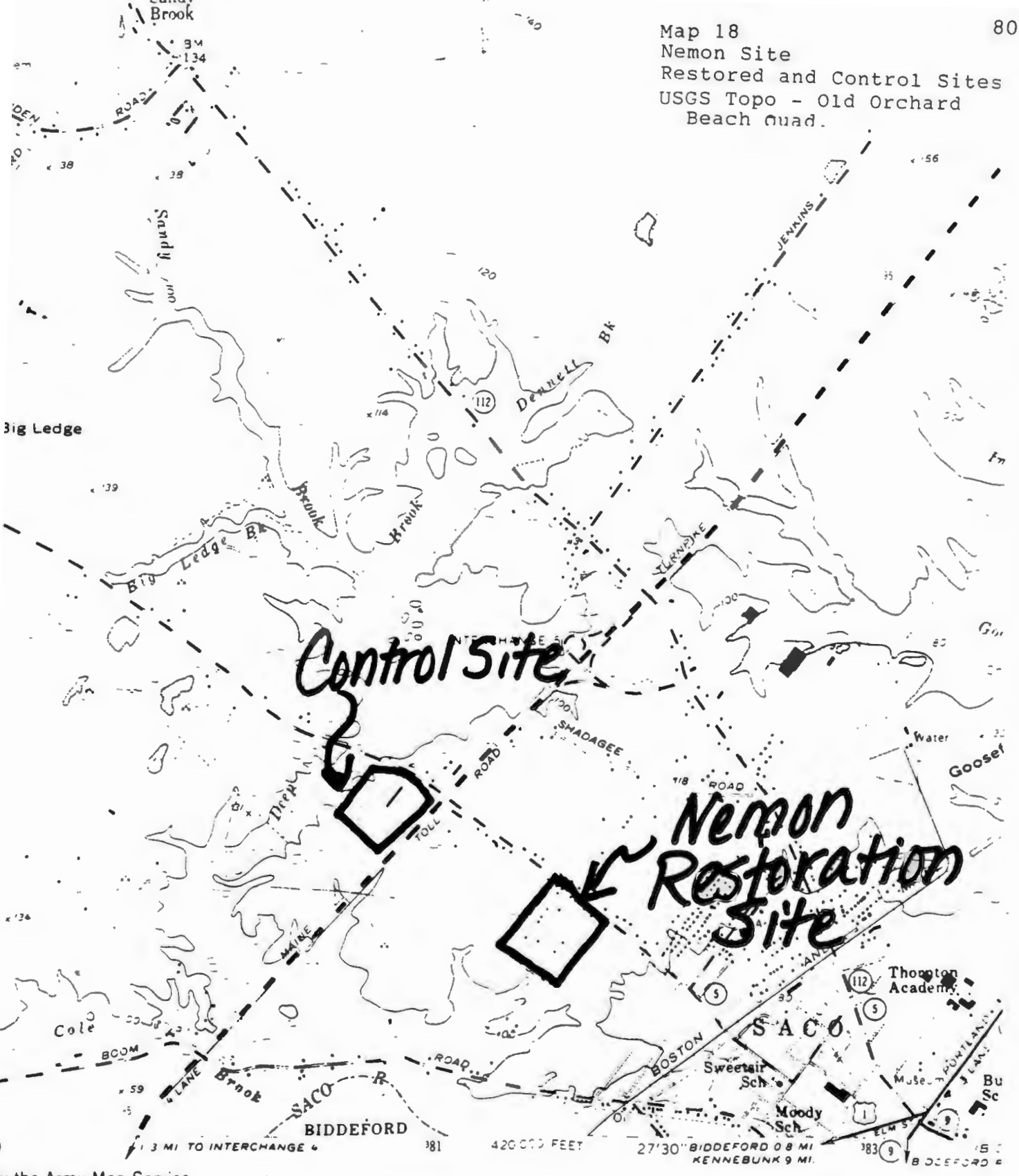
The natural site, visited on August 31, 1991, was located less than a half mile away from the Nemon site. The site is located west of the intersection of Route 112 and the Maine Toll Road, Route 95 (see Map 20).

Since no mixed emergent/scrub shrub wetlands could be located within two miles of the restored site, two separate natural sites were chosen; one emergent and one scrub shrub, almost adjacent to each other. The total combined area of the wetlands was .75 acres. The wetlands can be identified in the National Wetlands Inventory Map; Map number 21.

The zoning of this area is listed as commercial/industrial at the town level. These wetlands are associated with nearby Deep Brook. Only one house was counted within 500 feet of the edges of both wetlands. One side of both wetlands is bordered by a vegetative buffer that leads to the Brook (see photographs, page 84). This will provide wildlife access to the site. However, the opposite side of the wetlands has the major highway, Route 95. The emergent wetland site is actually adjacent to the highway. Thus, even though there is

no evidence of human activity within the wetlands, there is ample disturbance in the adjacent upland.

Map 18
Nemon Site
Restored and Control Sites
USGS Topo - Old Orchard Beach Quad.

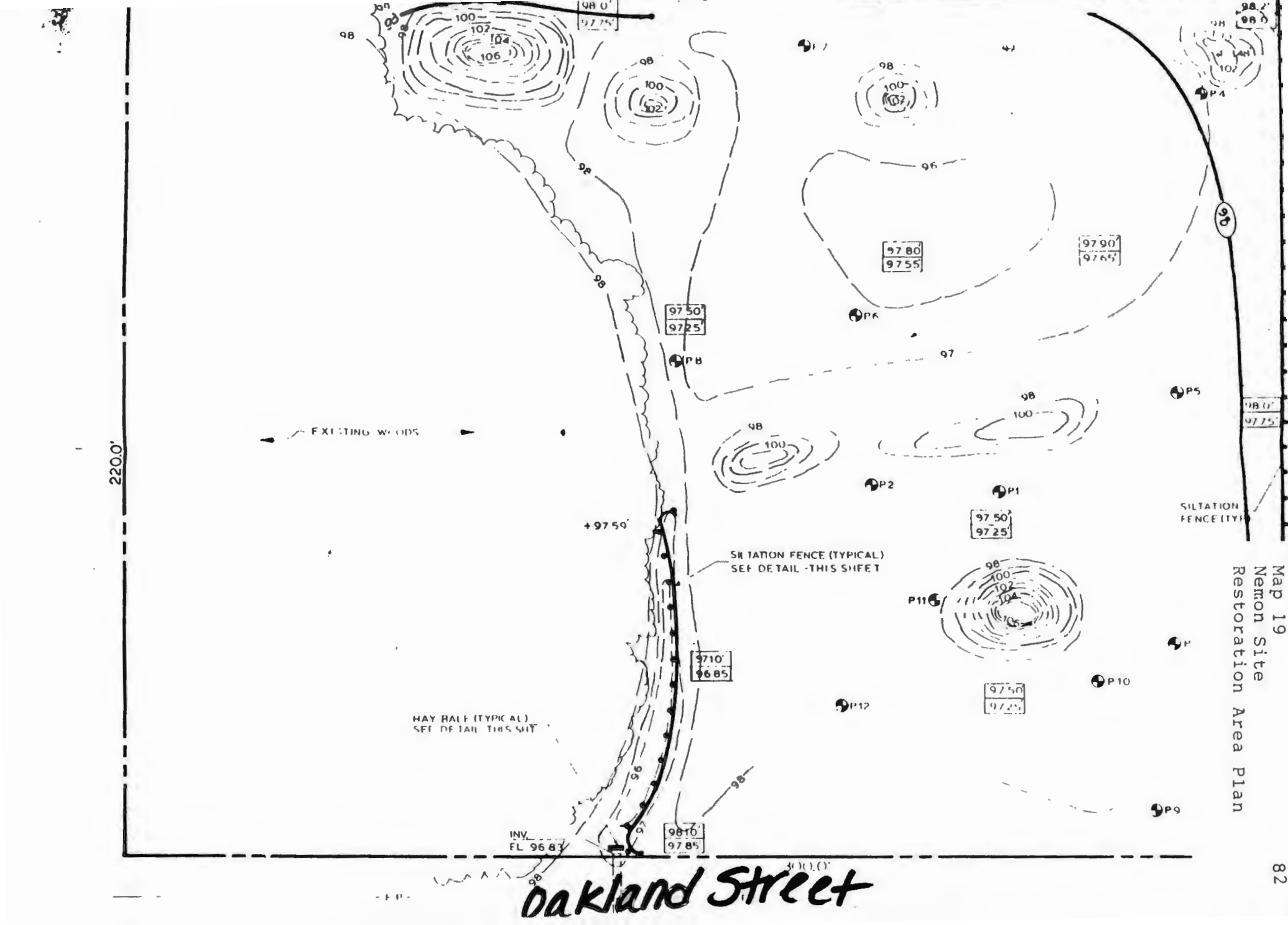


y the Army Map Service
d published by the Geological Survey
USGS and USC&GS
d drainage in part compiled from aerial photographs
3. Topography by planetable surveys 1944
ised by the Geological Survey 1956
y compiled from USC&GS chart 231 (1954)
rojection. 1927 North American datum
t grid based on Maine coordinate system,
r Universal Transverse Mercator grid ticks,
own in blue

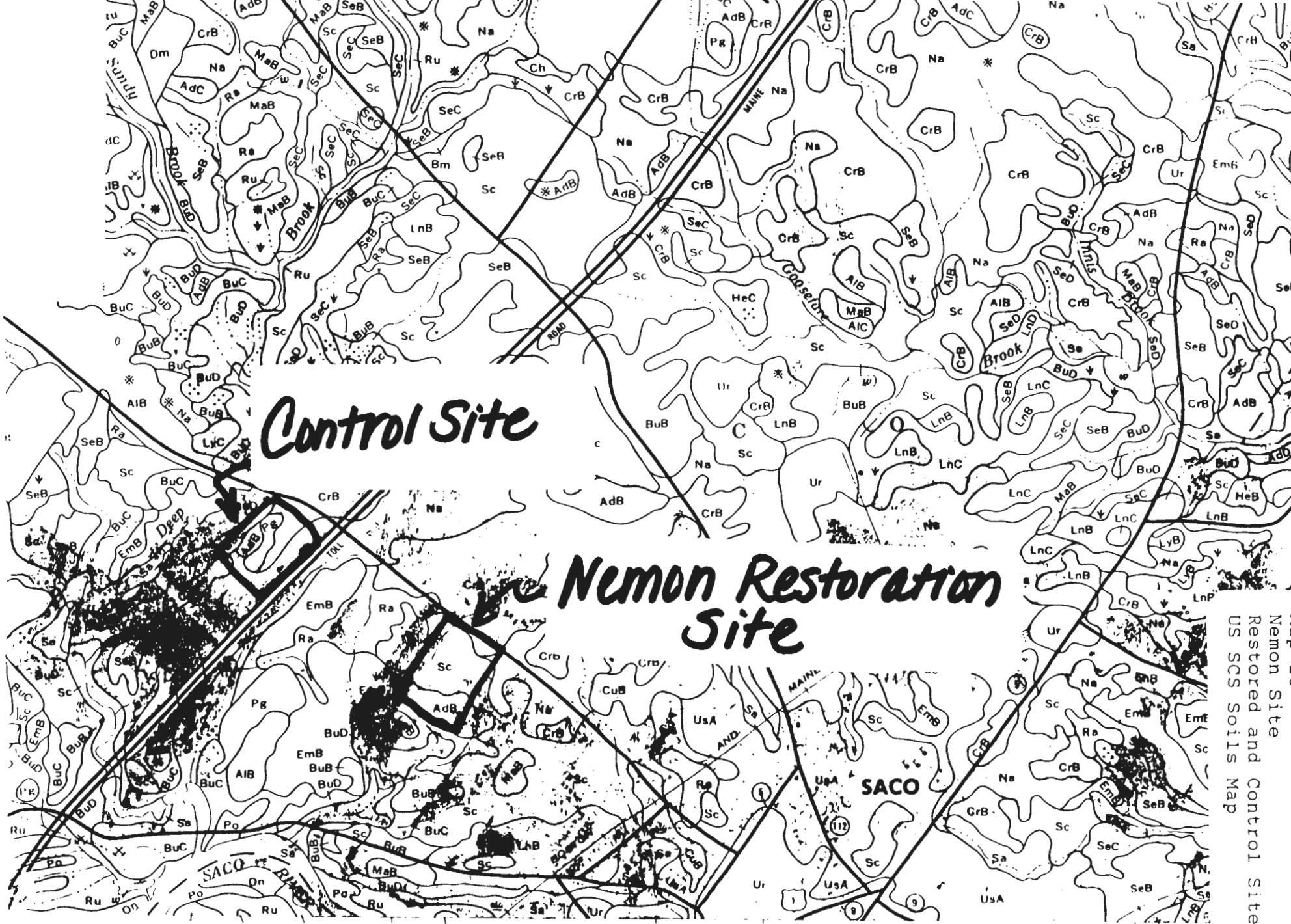
1000 0

DEPTH CURVES AND
SHORELINE

NEMON SITE
Restored Site

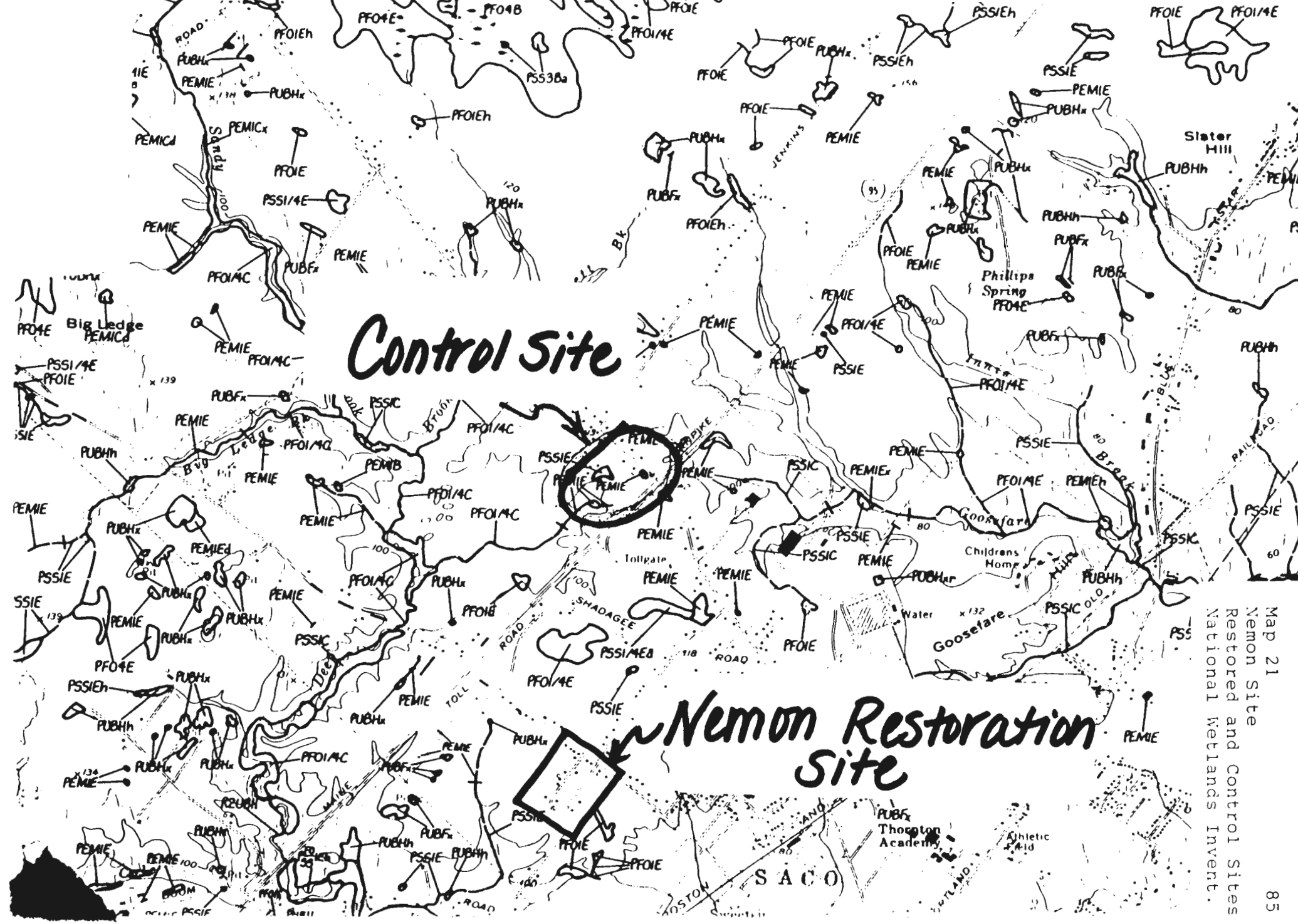


Map 19
Nemon Site
Restoration Area Plan



Map 20
Nemon Site
Restored and Control Sites
US SCS Soils Map

NEMON SITE
Control Site



Map 21
Nemon Site
Restored and Control Sites
National Wetlands Invent.

MASSACHUSETTS SITE

Signal Resco/Resource Recovery Facility

Created Site

Purpose

The construction of the Central Massachusetts Resource Recovery Facility, a trash to energy conversion plant, resulted in the disturbance of about a half acre of three separate wetland sites. One replacement wetland area will compensate for the three small disturbed wetlands. The replacement wetland is a .5 acre scrub shrub/emergent artificial wetland. The central and southern sections of the created wetland were converted from uplands. The northern section is a former wetland.

Description

The site is located on the border between the Town of Millbury and the City of Worcester, Massachusetts. It can be found next to Dorothy Pond, between Route 20 and the Massachusetts Turnpike (Route 90) on Map 22. The wetland is located in both communities, however, the majority of the wetland is located in Millbury, as can be seen in Map 25. The permit to alter the wetlands from the US COE was granted in 1985, thus the wetland was between five or six growing seasons old at the time of my site visit on September 28, 1991.

The compensatory wetland is long and narrow and is directly adjacent to the west side of the access road to the Recovery Facility (Map 24). Directly to the east and adjacent to the created wetland is an existing forested wetland (see photos, page 90). From 25 to 50 percent of the soils are hydric according to the latest mapping of the

soils (Map 23). Since the majority of the wetland lies in Millbury, the zoning was obtained from that town. The site is in an I2 zone, or industrial zone, as reported by the Millbury Planning Department. Five industrial buildings were counted within 500 feet of the wetland edge.

The artificial wetland is associated with Broad Meadow Brook and other contiguous wetlands. About half of the wetland is bordered by a vegetative buffer of another wetland (on the eastern side of the wetland) which leads directly to the vegetative corridor of Broad meadow Brook. Thus, the site can be accessed by wildlife. There was no mowing of the wetland vegetation noticed, however, some purple loosestrife has worked its way into the created site.

There is no evidence of human activity within the wetland, however, there is significant disturbance in the nearby upland. Route 20, the nearby local highway, is a heavily traveled road. The adjacent access road is well traveled by trucks hauling trash to the Recovery Facility to be incinerated. The huge Recovery Facility with its large smoke stack is also less than 500 feet away.

Signal Resco/Resource Recovery Facility - Control Site

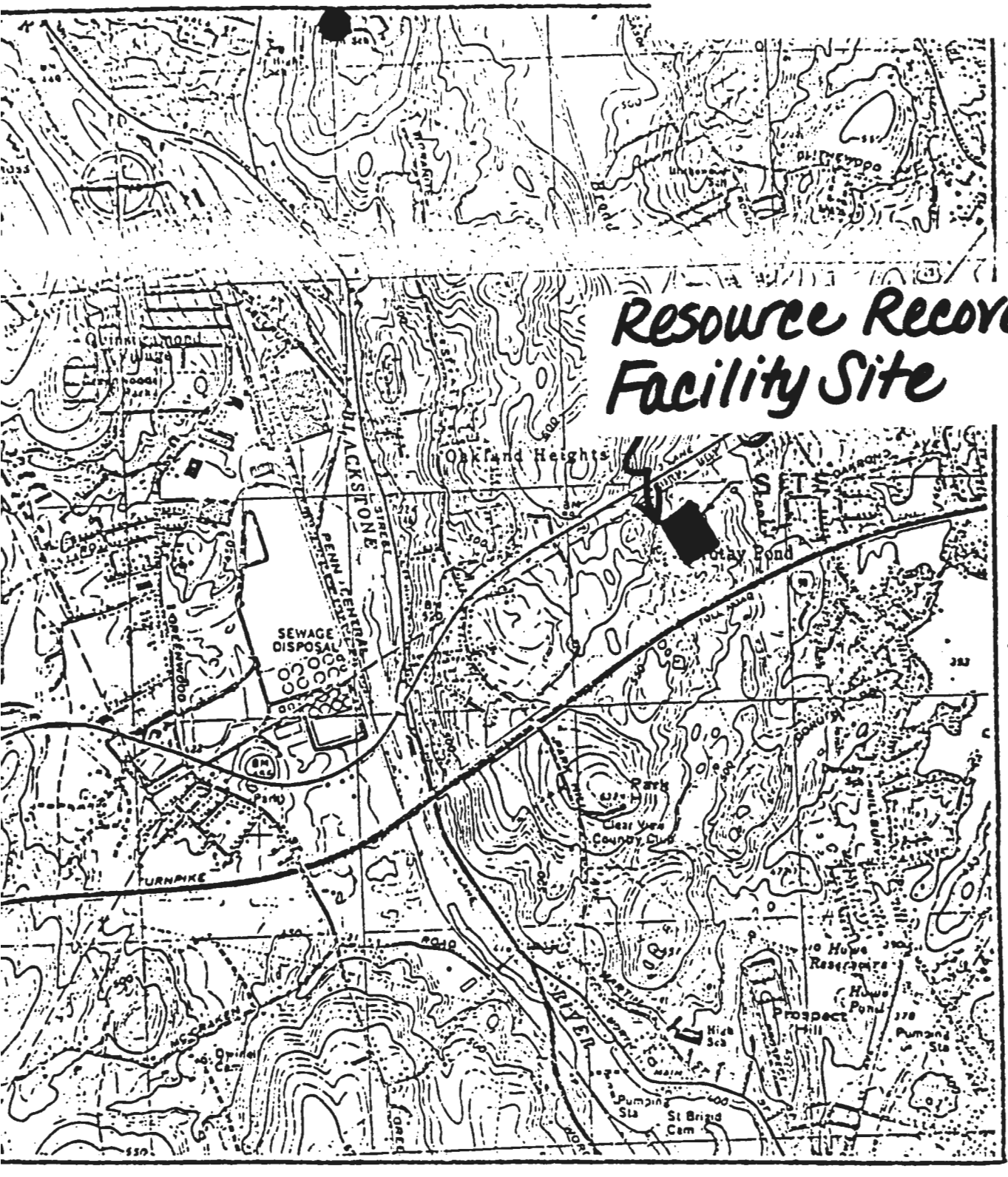
Natural Site

Description

The natural emergent/scrub shrub site was also located in Millbury, next to Shiner Hole Pond (see Map 26). The wetland is associated with an unnamed tributary of Ramshorn Brook. It is of similar types as the created wetland: scrub-shrub/emergent (see Map 26). This one acre site was visited on September 28, 1991. It is

located in the middle of a large wooded, natural area, (see photos, page 95). It can be seen that the area is used for recreation because of the many well trodden trails throughout the woods. In the wetland itself, there was no evidence of human activity and a lot of deer sign was noted. Because of the ample wooded area and nearby contiguous wetlands and pond, wildlife have sufficient access to the wetland.

The area is zoned as Suburban Residential, though there were no buildings in the area. The area was quite secluded and thus there was no evidence of mowing, draining, or any type of disturbance to the wetland. There were also no roads close-by.



SCALE: 1" = 2083'

SOURCE: TOPOGRAPHY TAKEN FROM 1973 WORCESTER SOUTH, MASS. U.S.G.S. QUADRANGLE SERIES V814

MAP LOCATION

FIGURE 1

SITE LOCATION MAP

MILLBURY RESOURCE RECOVERY FACILITY

SIGNAL/RESCO RESOURCE RECOVERY PLANT
Created Site

Map 23
Signal Resource Recovery
Created Site
US SCS Soils Map

FIGURE 1

WETLANDS MITIGATION

MILLBURY RESOURCE RECOVERY FACILITY

Map 24
Signal Resource Recovery
Wetlands Mitigation Plan

Map 25
Signal Resource Recovery
Proposed Compensatory
Wetland

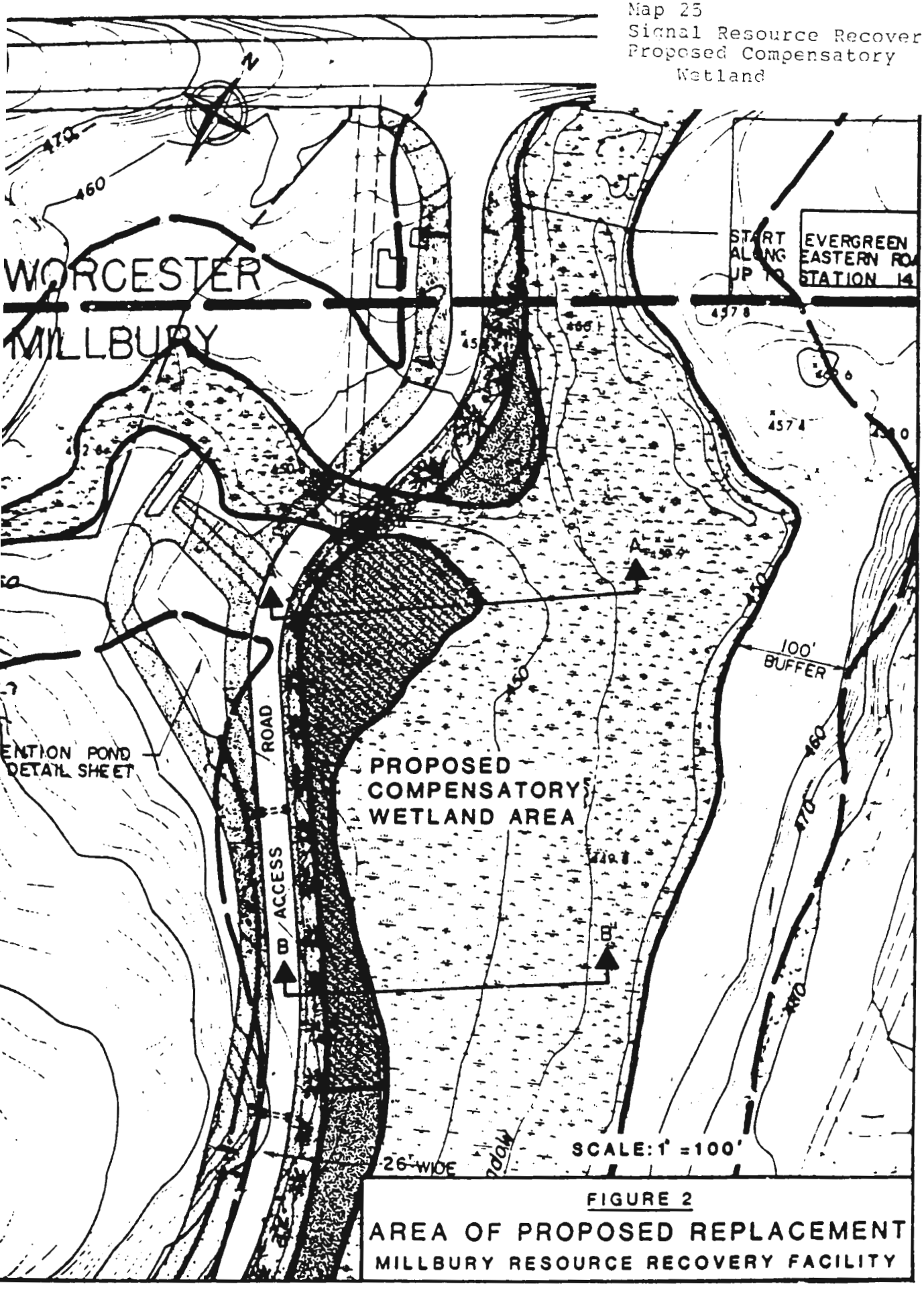
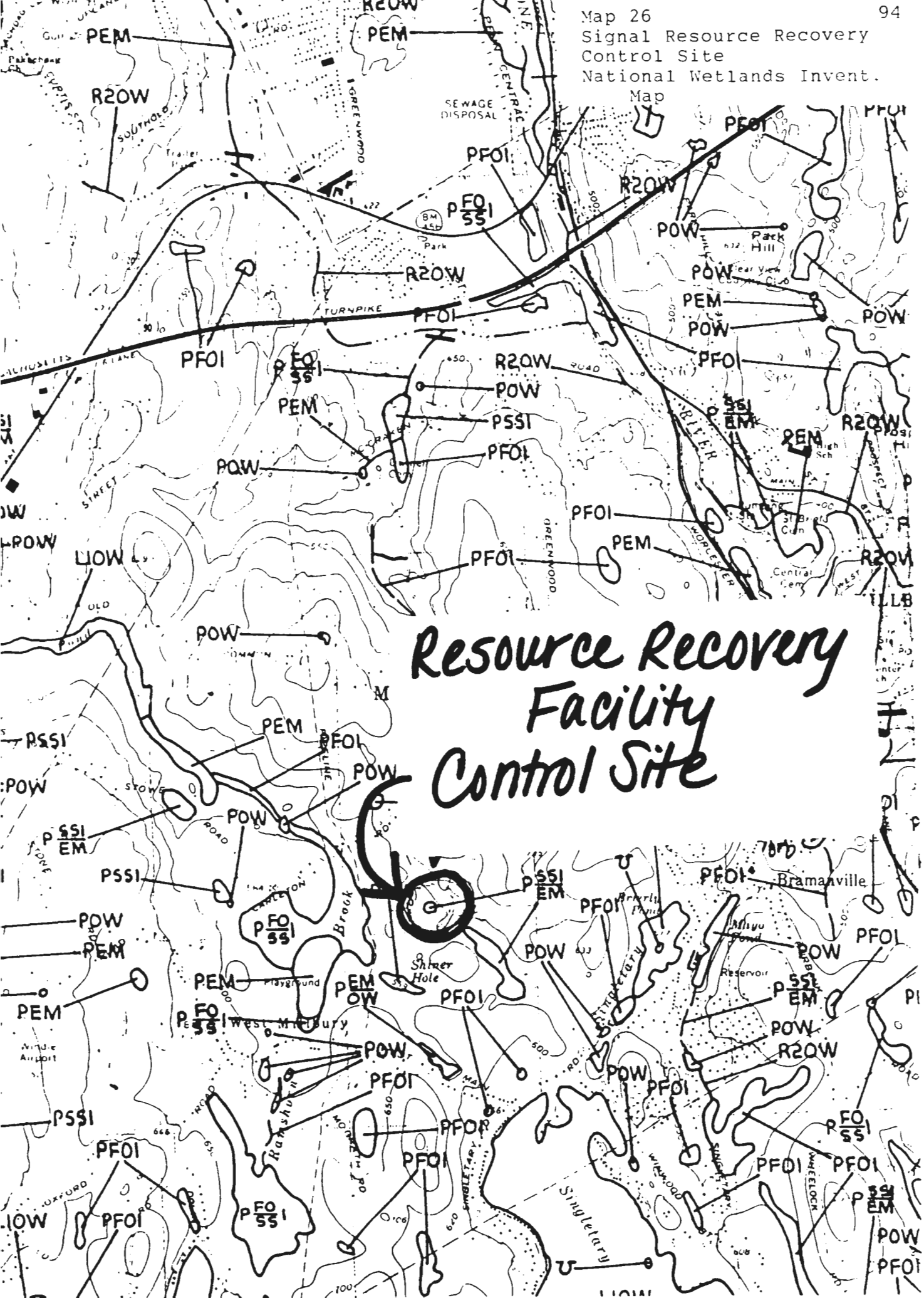


FIGURE 2

AREA OF PROPOSED REPLACEMENT
MILLBURY RESOURCE RECOVERY FACILITY

Map 26
Signal Resource Recovery
Control Site
National Wetlands Invent.
Map



SIGNAL/RESCO RESOURCE RECOVERY PLANT
Control Site

CONNECTICUT SITES

Cheshire Waste Water Treatment Plant

Created Site

Purpose

This wetland was created to offset the wetlands lost to create a dike at the Cheshire Sewage Treatment Plant. Approximately .65 acres of "buttonbush" shrub wetland was filled during the dike construction. In addition, six large bottom land trees were cut down. The creation will be a total of 1.42 acres, including .85 acres of like wetland and .57 acres of side slopes. The created wetland will connect with the existing buttonbush wetland. The wetland will be approximately 650 feet long, narrow at the junction with the existing wetland and widening to 150 feet as it reaches the upland soils (see Map 30).

Description

This .85 acre shrub wetland was visited on August 17, 1991. The US COE permit was granted in 1986, making the wetland four growing seasons old during the summer of my visit. It is located just off Cheshire Street in Cheshire, Connecticut (Map 27). None of the soils under this creation are hydric, according to the US SCS soil survey (Map 28). According to the local zoning department, the site is zoned R40, or one-acre residential.

The wetland is associated with the Quinnipiac River, listed as having a "B" water quality (Hall, personal communication: 5/5/92). There were three buildings within 500 feet of the wetland edge. All three were a part of the Waste Water Treatment Plant. This can be seen on Map 29.

There was no evidence of human activity within the wetland (see photos, page 100). However, in the upland, near the dike and towards the wetland, the area was being mowed. There were also deep tire tracks at the base of the dike. The nearby athletic fields and the Waste Water Plant are buffered from the wetland by a wooded area and the dike, respectively.

The wetland is adjacent to an existing wetland and the vegetative corridor of the Quinnipiac River, creating ample access to the site for wildlife.

Cheshire Waste Water Treatment Plant - Control Site

Natural Site

Description

Since no accessible similar natural site could be found within two miles of the created site, one had to be chosen from outside the two mile limit. The scrub shrub site that was chosen from the National Wetlands Inventory map falls slightly over 2.5 miles away from the artificial wetland, just off Reservoir Road in Cheshire, Connecticut (see Map 31). The site is located behind a small multi-family residential apartment building. The wetland appears to be a field with very little wetland vegetation (see photos, page 105).

The one acre wetland was visited on September 20, 1991. The zoning for the area is reported to be R-80, or two acre residential zoning. Six buildings were noted, all residences, within 500 feet of the wetland edge. There was some trash observed at the wetland site indicated that there is some human activity within the wetland.

There is a moderate level of activity in the upland as well, from the apartment building and its parking lot.

The wetland appears to be isolated, not associated with any other water bodies. About 50 percent of the site is bordered by a wooded land. Thus, wildlife may access this site.

Map 27
Cheshire WWTP
Created Site
USGS Topo - Meriden Quad.

edited, and published by the Geological Survey
cooperation with Connecticut Highway Department
SGS, NOS/NOAA, and Connecticut Geodetic Survey
by planetable surveys 1943–1944. Revised from
graphs taken 1966 Field checked 1967

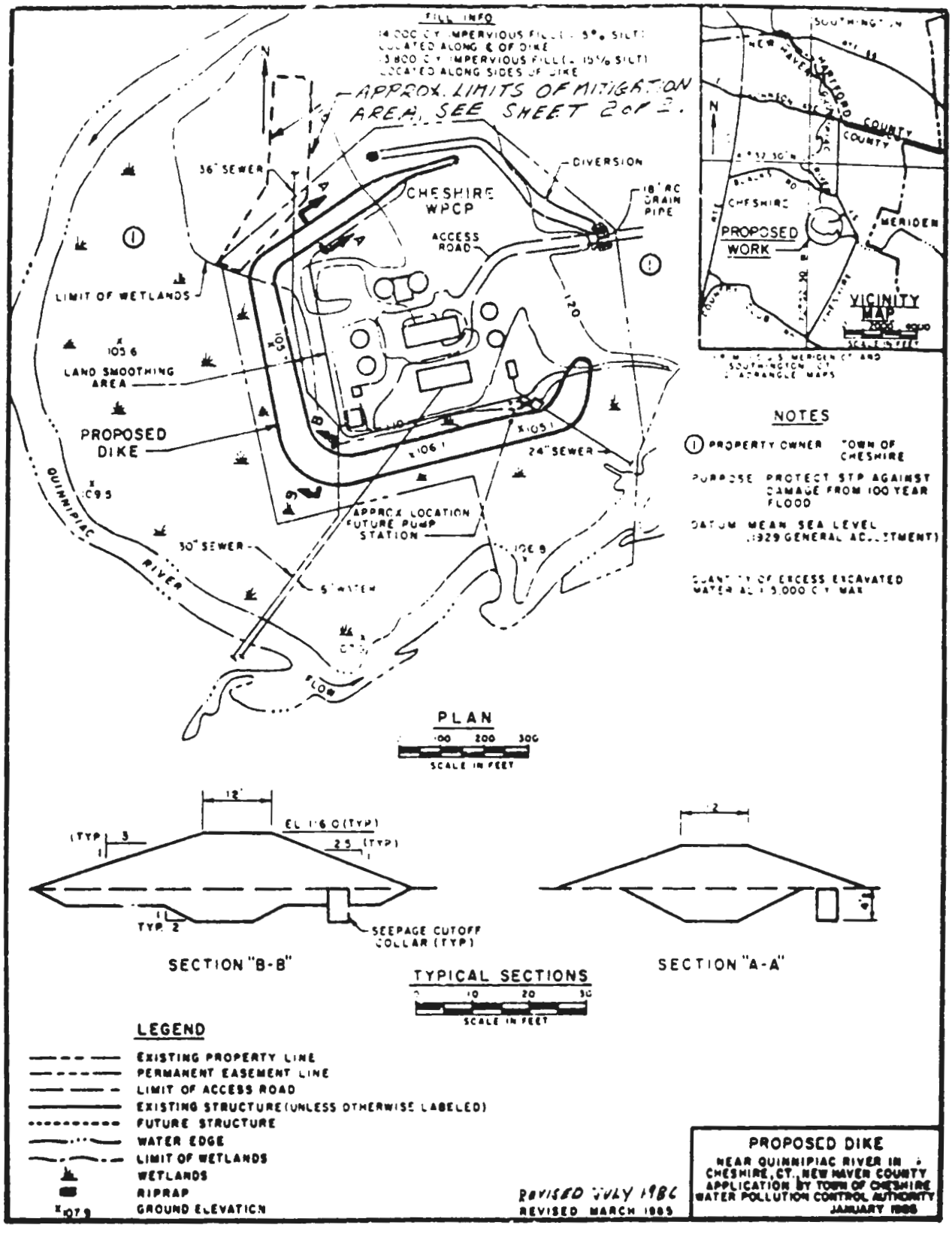
MN GN

1000

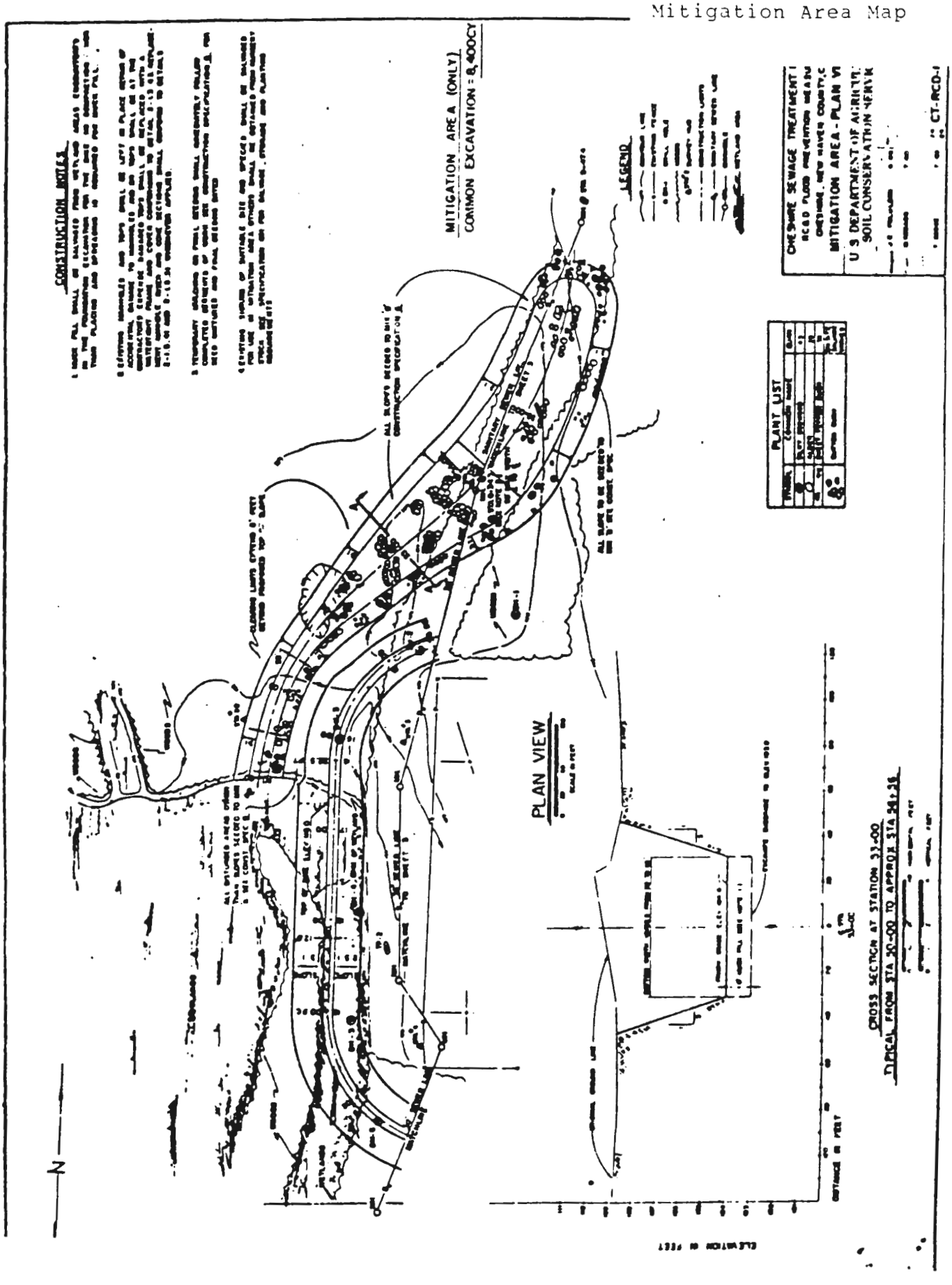
14°
249 MILS
1:27'

CHESHIRE WASTE WATER TREATMENT PLANT
Created Site

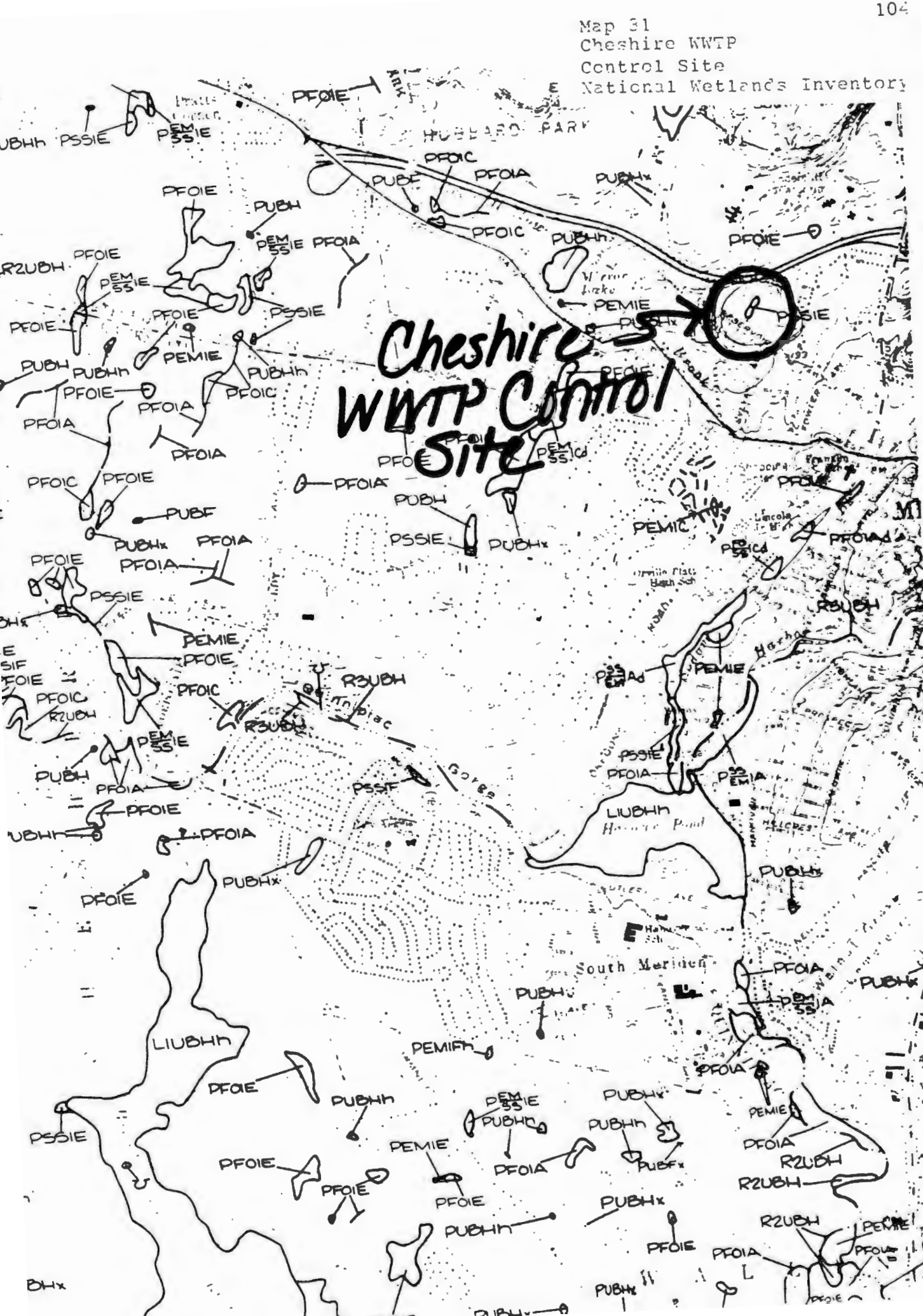
Map 28
Cheshire WWTP
Created Site
US SCS Soils Map


FILL INFO
APPROX. LIMITS OF MITIGATION AREA, SEE SHEET 2 OF 2.
CHESHIRE WPCP
ACCESS ROAD
DIVERSION
36" SEWER
18" RC DRAIN PIPE
LIMIT OF WETLANDS
LAND SMOOTHING AREA
PROPOSED DIKE
24" SEWER
30" SEWER
APPROX LOCATION FUTURE PUMP STATION
QUINNIPIAC RIVER
FLOW
PROPOSED WORK
VICINITY MAP
MERIDEN
SOUTHINGTON
NOTES
PROPERTY OWNER TOWN OF CHESHIRE
PURPOSE PROTECT STP AGAINST DAMAGE FROM 100 YEAR FLOOD
DATUM MEAN SEA LEVEL (1929 GENERAL ADJUSTMENT)
PLAN
SCALE IN FEET
EL 116.0 (TYP)
SEEPAGE CUTOFF COLLAR (TYP)
SECTION "B-B"
SECTION "A-A"
TYPICAL SECTIONS
LEGEND
EXISTING PROPERTY LINE
PERMANENT EASEMENT LINE
LIMIT OF ACCESS ROAD
EXISTING STRUCTURE (UNLESS OTHERWISE LABELED)
FUTURE STRUCTURE
WATER EDGE
LIMIT OF WETLANDS
WETLANDS
RIPRAP
GROUND ELEVATION
REVISED JULY 1986
REVISED MARCH 1985
PROPOSED DIKE
NEAR QUINNIPIAC RIVER IN CHESHIRE, CT, NEW HAVEN COUNTY
APPLICATION BY TOWN OF CHESHIRE
WATER POLLUTION CONTROL AUTHORITY
JANUARY 1985

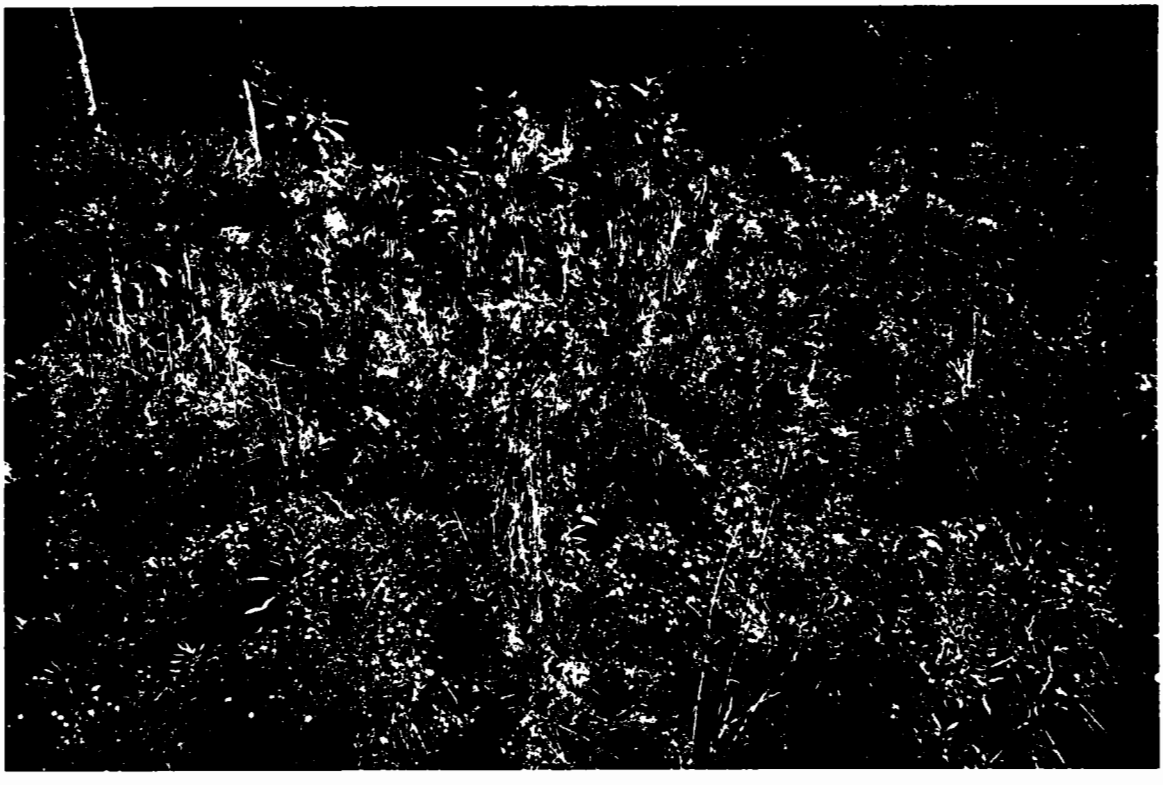
Map 30
Cheshire WWTP
Mitigation Area Map



Map 31
Cheshire WWTP
Control Site
National Wetlands Inventory



CHESHIRE WASTE WATER TREATMENT PLANT
Control Site



Robertson Airport/Tomasso Nature Park

Created Wetland

Purpose

The created wetland is to provide mitigation for 3.6 acres of emergent/scrub shrub wetlands (with open water areas) filled for a southerly runway expansion at the Robertson Airport. The runway expansion, filled areas, and mitigation areas can be seen on Map 34. The wetland filled was part of Shade Swamp, a large riverine wetland system, which lies adjacent to the Pequabuck River. Shade Swamp covers about 1000 acres in both the towns of Farmington and Plainville, Connecticut. The filled site was a part of the southern section of the Swamp.

As mitigation for the filled wetlands, a 3.8 acre wetland was created. The artificial wetland was similar to the destroyed wetland: an emergent/scrub shrub wetland with areas of open water (see Map 35). The wetland was also hydrologically connected to Shade Swamp. The area was conserved by the town by turning it into a park. The name of the park is Tomasso Nature Park. The area that the created wetland lies on was once part of the Plainville land fill. The site is located adjacent to the present landfill site (Map 34). The area of the artificial wetland is almost immediately adjacent to the west of the existing wetland.

Description

This wetland was completed in 1988, making it three growing seasons old. The project site is just east of Johnson Avenue, at the Robertson Airport, in Plainville, Connecticut (see Map 32). Hydric soils cover almost the entire site according to the US SCS soil survey

(Map 33). The zoning of the area, according to the planning office in town, is restricted industrial. There were fourteen homes counted within 500 feet of the wetland, although they were located outside the of the fenced in wetland.

As described above, the wetland is bordered by a large, contiguous wetland called Shade Swamp and the associated Pequabuck River. The wetland area is set up as a nature park (see photos, page 110), with educational signs, walkways, bridges, and benches. There appeared to be little human activity in the wetland. However, it may be difficult to find evidence of human activities since there are walkways. No trash was seen. There were no visitors on the day of my site visit, a beautiful, sunny, summer day.

There was activity in the nearby upland, with the airport, residences, the landfill and the salvage yard. Planes lift off adjacent to the wetland and often fly overhead. Wildlife do have access to the site through Shade Swamp and along the Pequabuck River corridor.

Robertson Airport/Tomasso Nature Park - Control Site

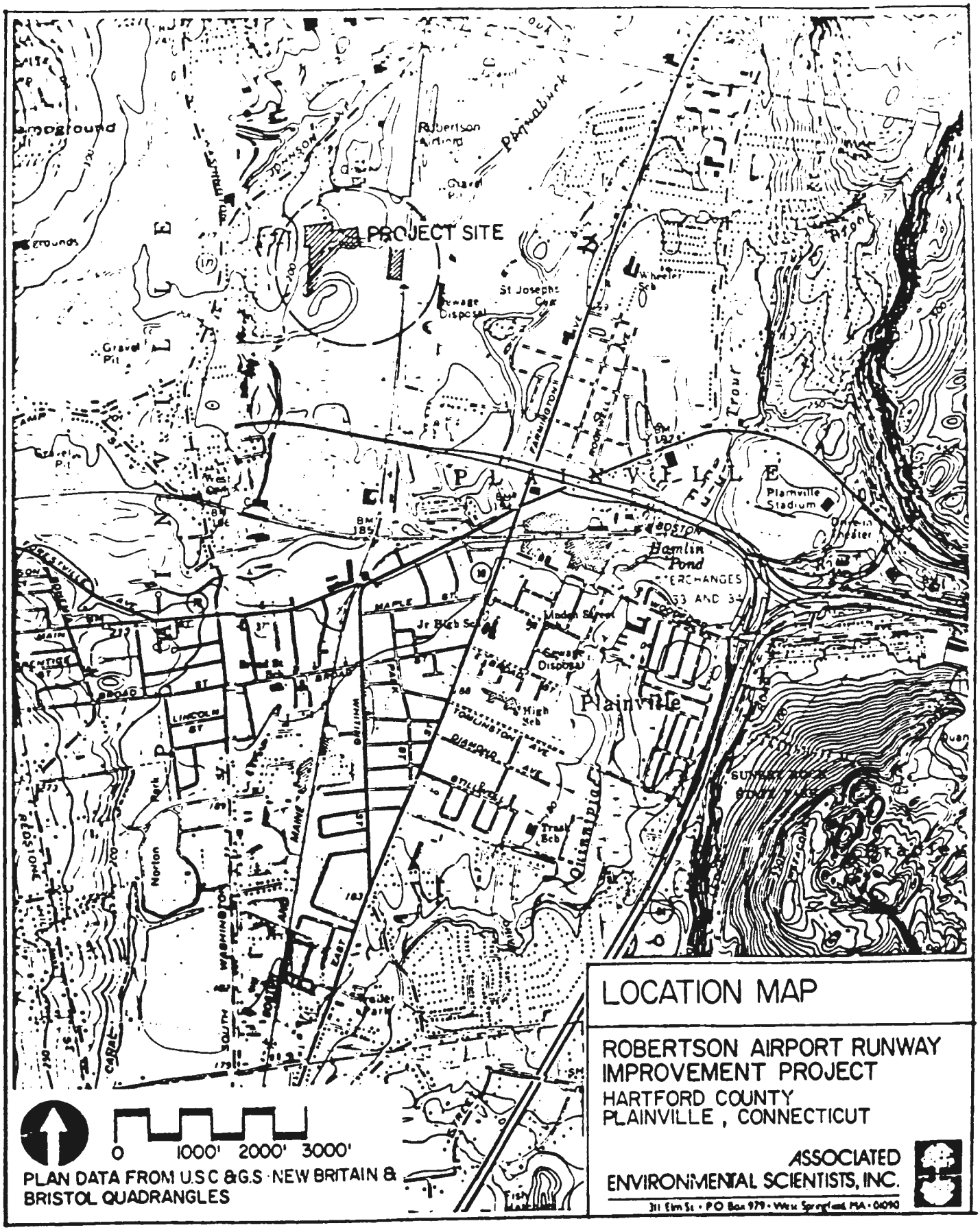
Natural Wetland

Description

This wetland was less than one mile away from the Nature Park, off Farmington Avenue, in Plainville, Connecticut (Map 36). The site visit was conducted on September 20, 1992. This wetland is a 4.5 acre scrub shrub/emergent wetland (see NWI Map, #37). According to the local planning/zoning department, the area is 1/2 floodplain and 1/2 restricted industrial. However, the land use of the area is rural residential. When zoning is different from the

current land use, the New Hampshire Method allows researchers to choose current land use rather than the local zoning classification. Four homes were counted within 500 feet of the wetland edge.

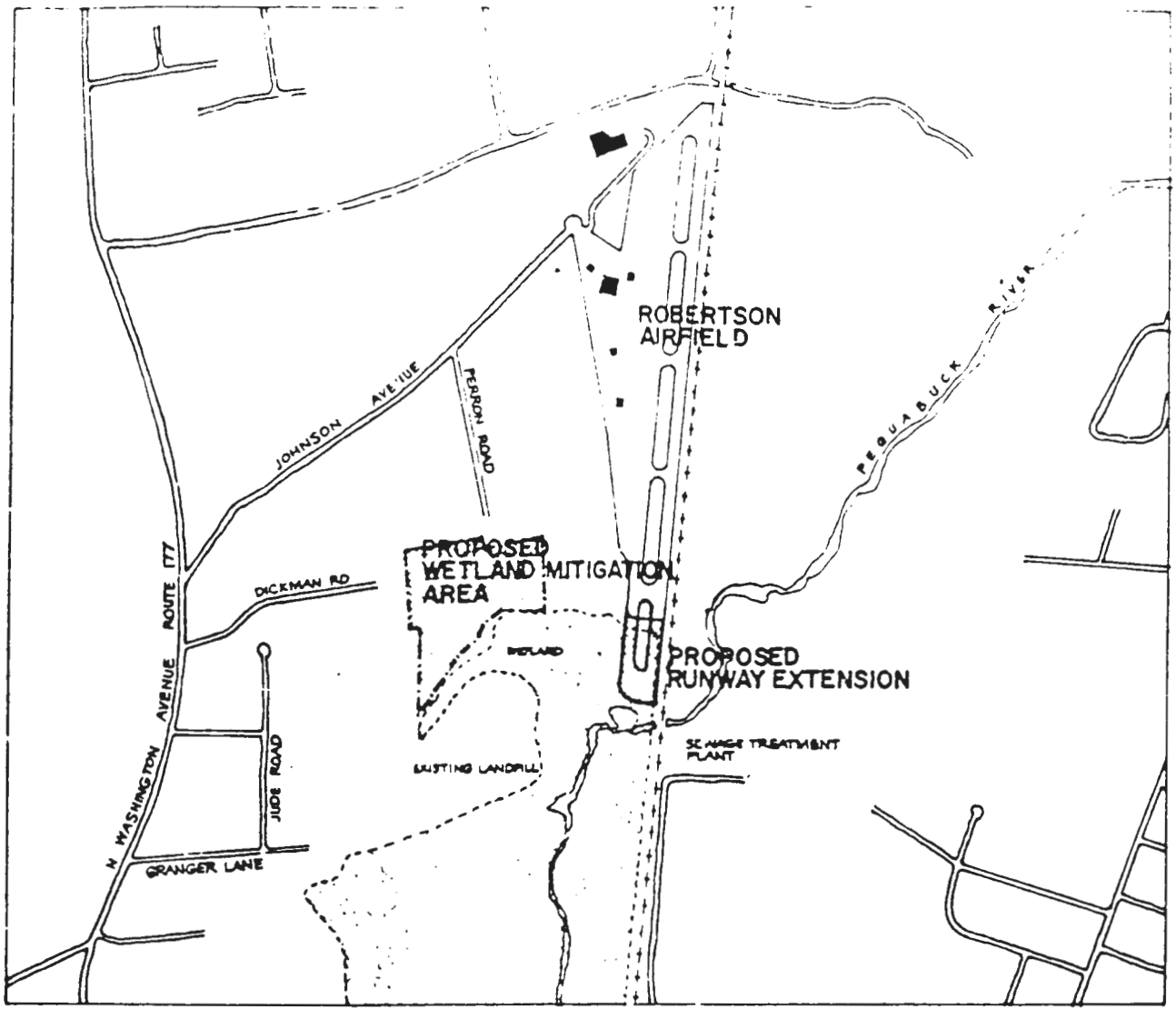
The wetland is associated with the Pequabuck River, as is the created site. The water quality classification of this river is "B," according to an EPA specialist (Hall, personal communication: 5/5/92). There could be no human activity detected within the thick brush of the wetland. The wetland is divided by a local road. The photographs on page 115 show the wetlands on either side of the road. Wildlife may access the site along the stream corridor or through the other contiguous wetlands.


PROJECT SITE
Robertson Airport
Plainville
Plainville Stadium
Hamlin Pond
INTERCHANGES 33 AND 34
Sewage Disposal
Grave Pit
Gravel Pit
St Joseph Cem
Jr High Sch
Middle School
Trout Brook
Norton
LOCATION MAP
ROBERTSON AIRPORT RUNWAY IMPROVEMENT PROJECT
HARTFORD COUNTY
PLAINVILLE, CONNECTICUT
0 1000' 2000' 3000'
PLAN DATA FROM U.S.C.&G.S. NEW BRITAIN & BRISTOL QUADRANGLES
ASSOCIATED ENVIRONMENTAL SCIENTISTS, INC.
311 Elm St. · P.O. Box 979 · West Springfield, MA 01090

ROBERTSON AIRPORT/TOMASSO NATURE PARK
Created Site

Map 33
Robertson/Tomasso
Created Site
US SCS Soils Map

Map 34
Robertson/Tomasso
Area Context Map



AREA CONTEXT

ROBERTSON AIRPORT RUNWAY IMPROVEMENT PROJECT

HARTFORD COUNTY
PLAINVILLE, CONNECTICUT

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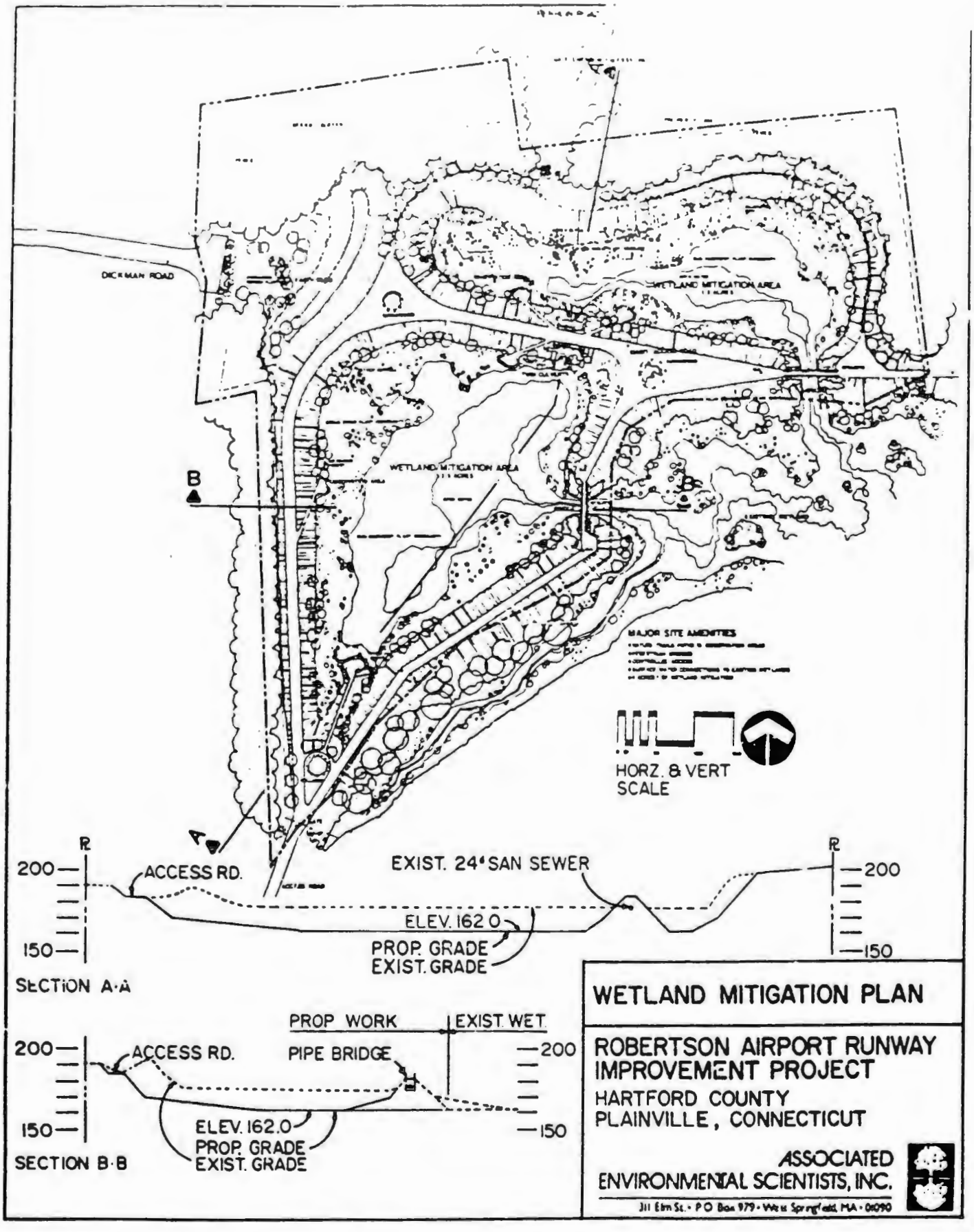

WETLAND MITIGATION PLAN

ROBERTSON AIRPORT RUNWAY IMPROVEMENT PROJECT

HARTFORD COUNTY
PLAINVILLE, CONNECTICUT

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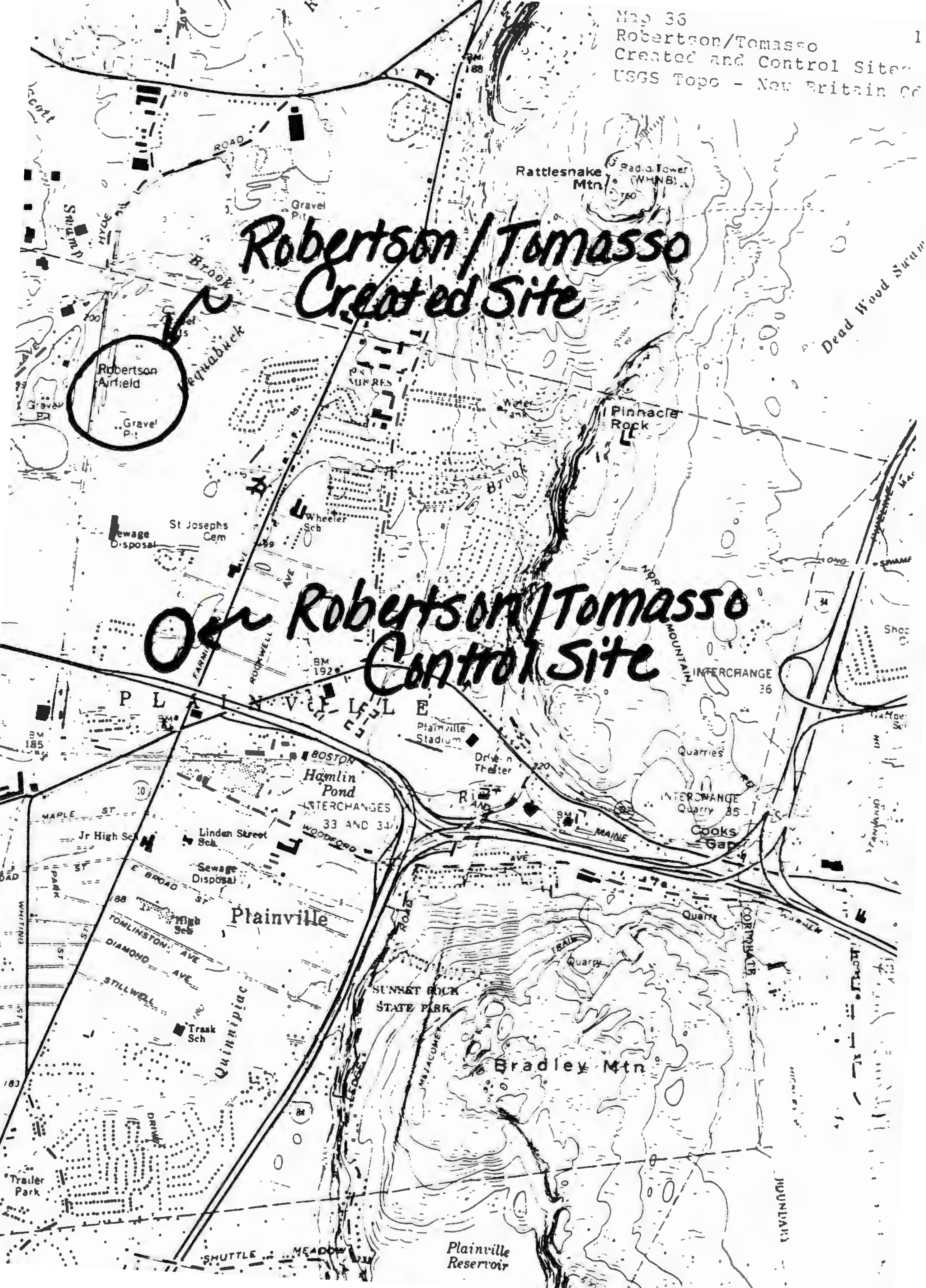
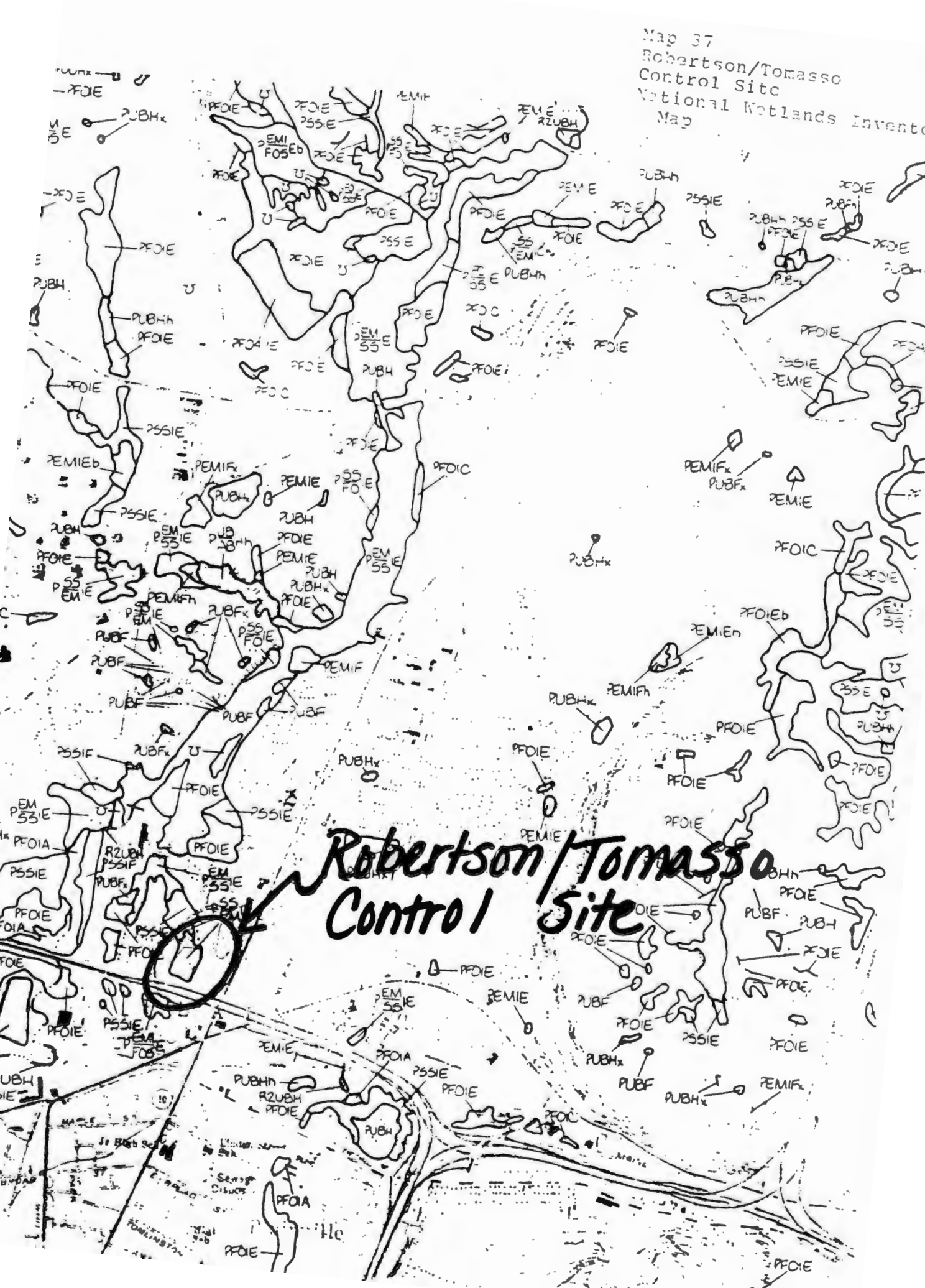
Map 36
Robertson/Tomasso
Created and Control Sites
USGS Topo - New Britain Qd



ROBERTSON AIRPORT/TOMASSO NATURE PARK
Control Site

Map 37
Robertson/Tomasso
Control Site
National Wetlands Invento
Map



Connecticut Route 7

Created Wetland

Purpose

In extending the Route 7 expressway from Route 15 to Grist Mill Road in the City of Norwalk, Connecticut, fill was placed in several wetland sites. About 7.8 acres of existing wetlands were excavated or filled for this project. As compensation for the altered wetlands, 8.1 acres of wetlands were created. Created types included marsh, scrub/shrub and wet meadow habitat. The wetlands will be created in ten separate areas. As recommended to me by a wetland specialist at the US COE, I focused on site #7, at the Nusco Towers (Map 40).

Description

This site is located on Indian Hill, just west of the existing Route 7 and north of the Merritt Parkway (see Map 38). This emergent/scrub shrub, 3.1 acre creation is broken into two sections, or basins (see Map 41). I visited the site on August 17, 1991, three growing seasons after it was completed.

Site # 7 is located along the NUSCO power lines, between Louden Street and Seir Hill Road. To create this wetland, the cliffs were blasted away around the power lines to a low elevation. By attempting to avoid the power lines, the state divided the created wetland in half. This unusual wetland is surrounded by high, vertical cliffs and is adjacent to the new Route 7 (not yet completed at the time of my site visit). This is clearly depicted in the photographs on page 121.

Less than 25 percent of the soils at this site are hydric, as determined by the US SCS soil survey (Map 39). The zoning of the area is R40, or one-acre residential. The isolated wetland is connected via a culvert under the highway to the pond and existing wetland on the other side of the highway. Other than these culverts, there is no wildlife access to this site. The steep cliffs and highway surround the wetland.

Ten buildings were noted within 500 feet of the wetland edge. The buildings were multi-family apartment buildings, beyond the fence on the opposite side of the road. There was no evidence of human activity within the wetland. There was little activity in the upland on the weekend day that I conducted my site visit. However, as soon as the highway is completed, the activity in the upland will dramatically increase.

Connecticut Route 7 - Control Site

Natural Wetland

Description

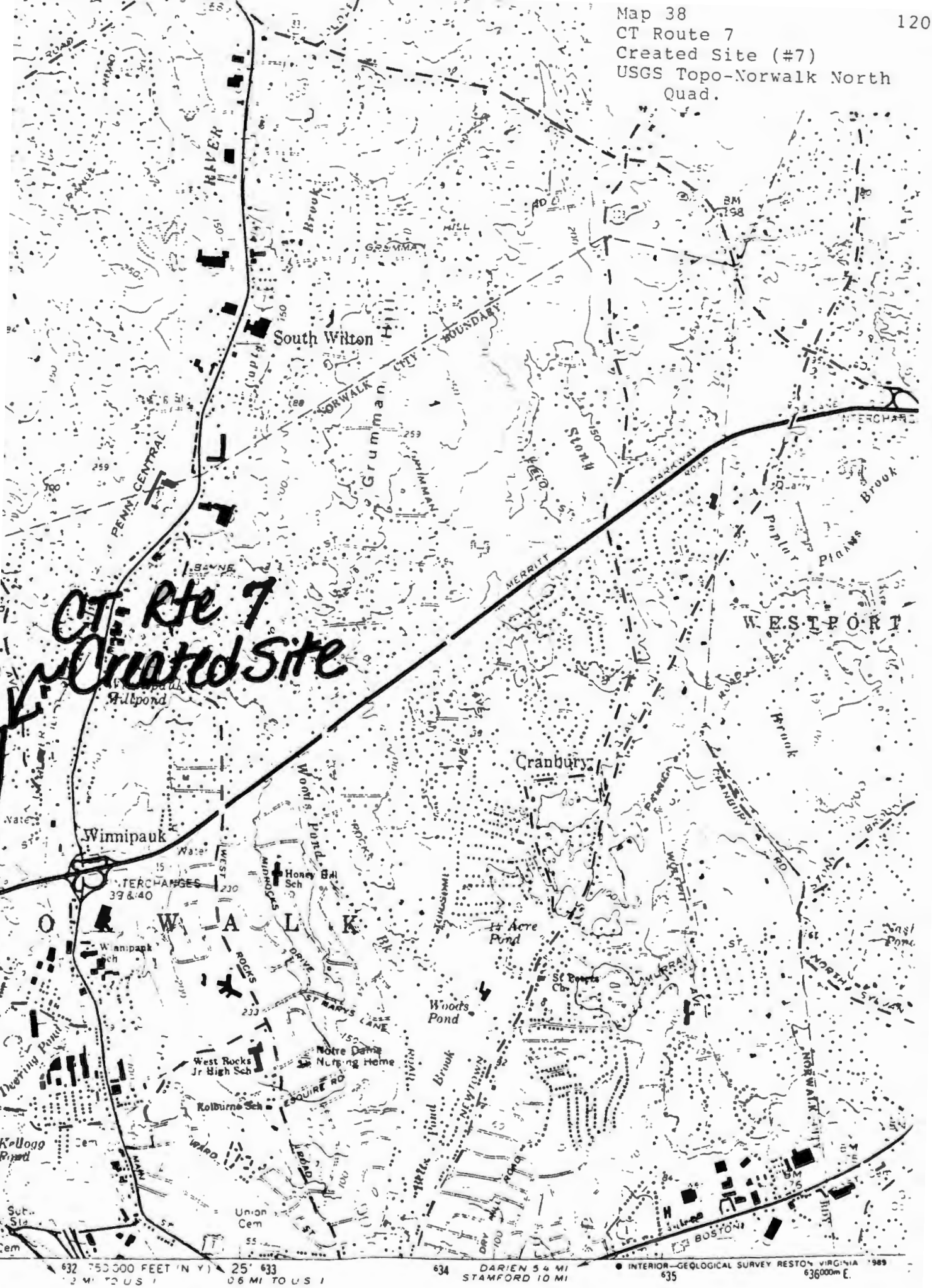
This wetland is only slightly over two miles away from created site. The site visit to this wetland took place on September 30, 1991. The 3 acre emergent/scrub shrub wetland is north of Gruman Hill Road, on Copts Brook (Map 42). Over 50 percent of the soils here are hydric, according to the US SCS soil survey (see Map 43). The zoning is R40, rural residential. There were five houses located within 500 feet of the wetland edge.

The level of human activity in the wetland was low. There was no evidence of fill, although there may have been a small amount

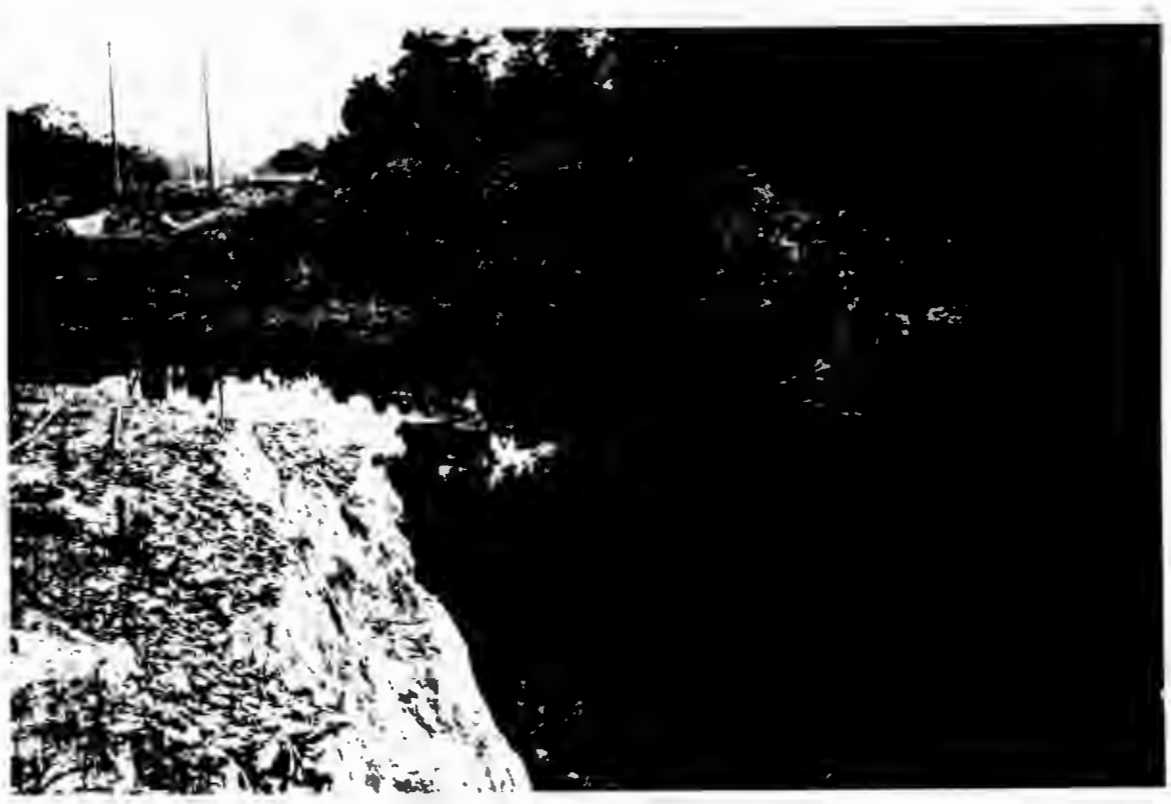
around the power lines that go through the site. One local road crosses the wetland. The road and surrounding residences only amounts to slight activity in the upland surrounding the natural wetland.

Wildlife have access to this site along the stream corridor. However, it would be difficult for them to access the area because of the dense phragmites that have taken over the site (see photos on page 126).

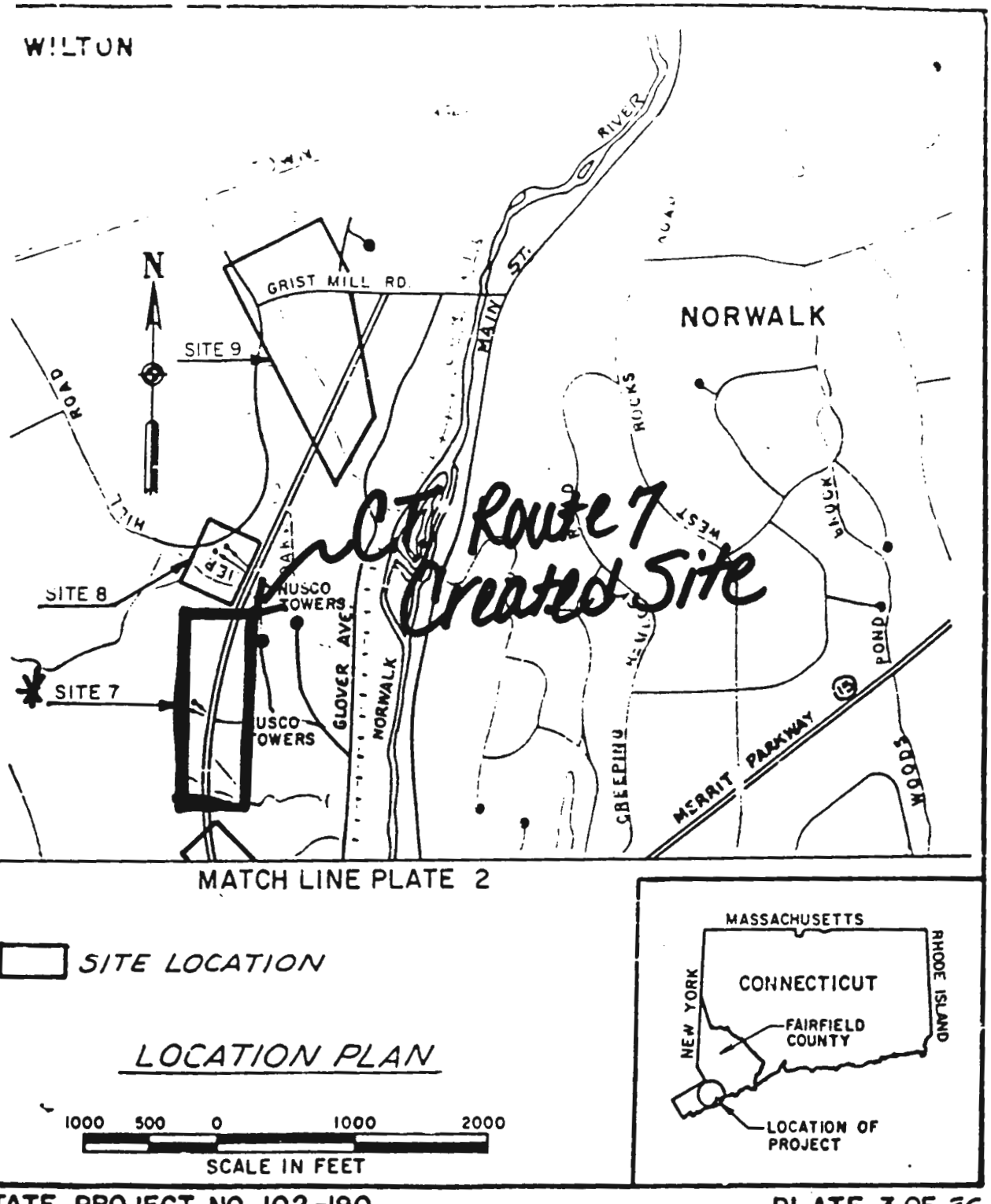
Map 38
CT Route 7
Created Site (#7)
USGS Topo-Norwalk North Quad.



CONNECTICUT ROUTE 7
Created Site #7



Map 29
CT Route 7
Created Site
US SCS Soils Map



TATE PROJECT NO. 102-190
ELOCATION OF U.S. ROUTE 7
ORWALK
LAND—WETLAND

PLATE 3 OF 26
DATE: NOV., 1986

Map 41
CT Route 7
Created Site #7
Mitigation Planting Plan

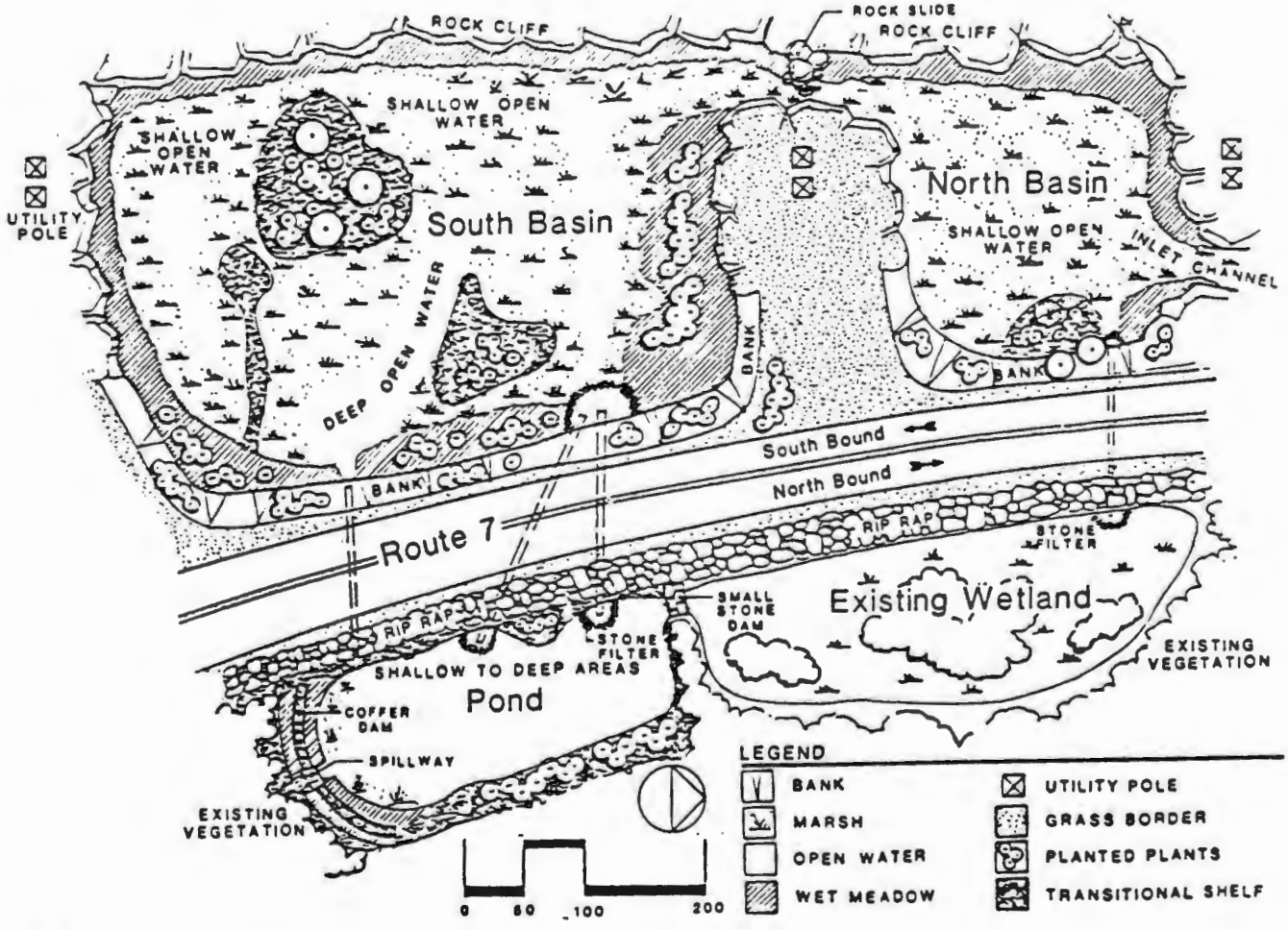
CREATED WETLAND - PLANT SPECIES PRESENT

MARSH AREA		
Water Plantain	Soft Rush	Arrowhead
Broad-leaved Cattail*	Pickerelweed (P)	Water Lily

BANK AREA		
Rugosa Rose (P)	Serviceberry (P)	Highbush Blueberry (P)
Winterberry (P)	Honeysuckle (P)	Smartweed*
White Pine (P)	Boneset	Silver Maple (P)
Showy Tick-Trefoil	Red Maple (P)	Tickseed Sunflowers
Crab Apple (P)	Clethra (P)	Siberia Dogwood (P)
Red Cedar (P)		

WET MEADOW AREA		
Barnyard Grass	Foxtail	Beggars Tick
Blue Curls	Spike Rush	Narrow-leaf Willow Herb
Beak Rush	Soft Rush	Boneset
Bugleweed	Smartweed	Rice Cutgrass
Blue Vervain		

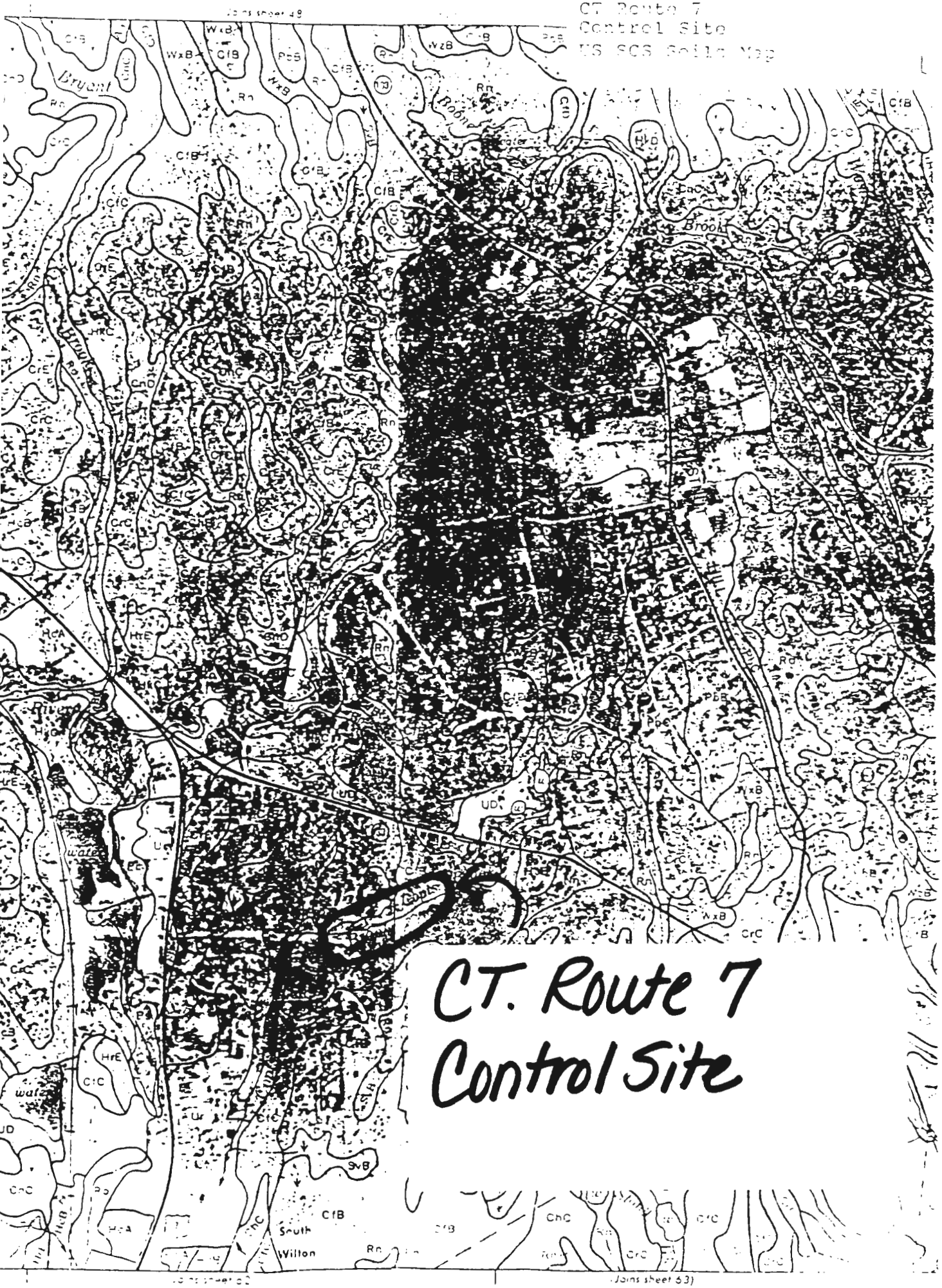
Notes: (P) - Planted, * - Dominant



Wetland Creation Site #7 - Site Plan

Map 42
CT Route 7
Control Site
National Wetlands Inventory

CONNECTICUT ROUTE 7
Control Site



CT. Route 7
Control Site

Southbury Travel Center

Restored Site

Purpose

Professional Properties Associates applied for a permit to place fill in approximately 1.9 acres of wetlands in conjunction with the development of "Phase 2" of a travel center, called Southbury Travel Center. The Travel Center is located just of exit 14 of Interstate 84, at the southwest corner of CT Route 172 and Main Street South, in Southbury Connecticut (see Map 44). Later, the approximate fill area in wetlands was reduced to 1.1 acres. The filled wetland was a disturbed wet meadow with some wetland shrubs occurring. As partial mitigation for the 1.1 acres of fill, an adjacent .65 acre wetland restoration was completed.

The wetland to be restored was an adjacent formerly filled wetland. The restoration was similar to the filled wetland, with scrub shrub, marsh, and pond habitat types (Map 45). The restored wetland was designed to perform three functions; wildlife habitat, water quality renovation, and sediment control during construction.

Description

This site was visited on August 17, 1991, approximately three growing seasons after the wetland restoration was completed. According to the US SCS soil survey for the county, over 50 percent of the soils at the site were hydric (see Map 46). The local zoning office reported the zoning of the site to be B2E, a business zone. There were nine buildings counted within 500 feet of the wetland edge.

The site consisted of an open water pond with marsh and scrub shrub vegetation. The restored site can be seen in the photographs on page 132. The restored wetland site is surrounded by roads and the Travel Center on all sides, creating a significant disturbance in the adjacent upland. Within the wetland, there was evidence of disturbance, with an old silt fence still in tact as well as rusted cables and barrels at a corner of the site. The wetland is surrounded by a high hill, called Ichabod Hill, on one side. Interstate 84 travels up this hill on one side of the wetland. It appears that runoff from the roads and hills will end up in the low-lying restored wetland.

Mowing of the adjacent upland is evident on the edges of the wetland. Phragmites have taken over much of the existing southwestern wetland. Farming is taking place across the street though there is no evidence of draining for agricultural or any other purpose. There is no corridor for wildlife to gain access to the site. The site is surrounded by roads, though they are not immediately adjacent to the wetland itself.

Southbury Travel Center - Control Site

Control Site

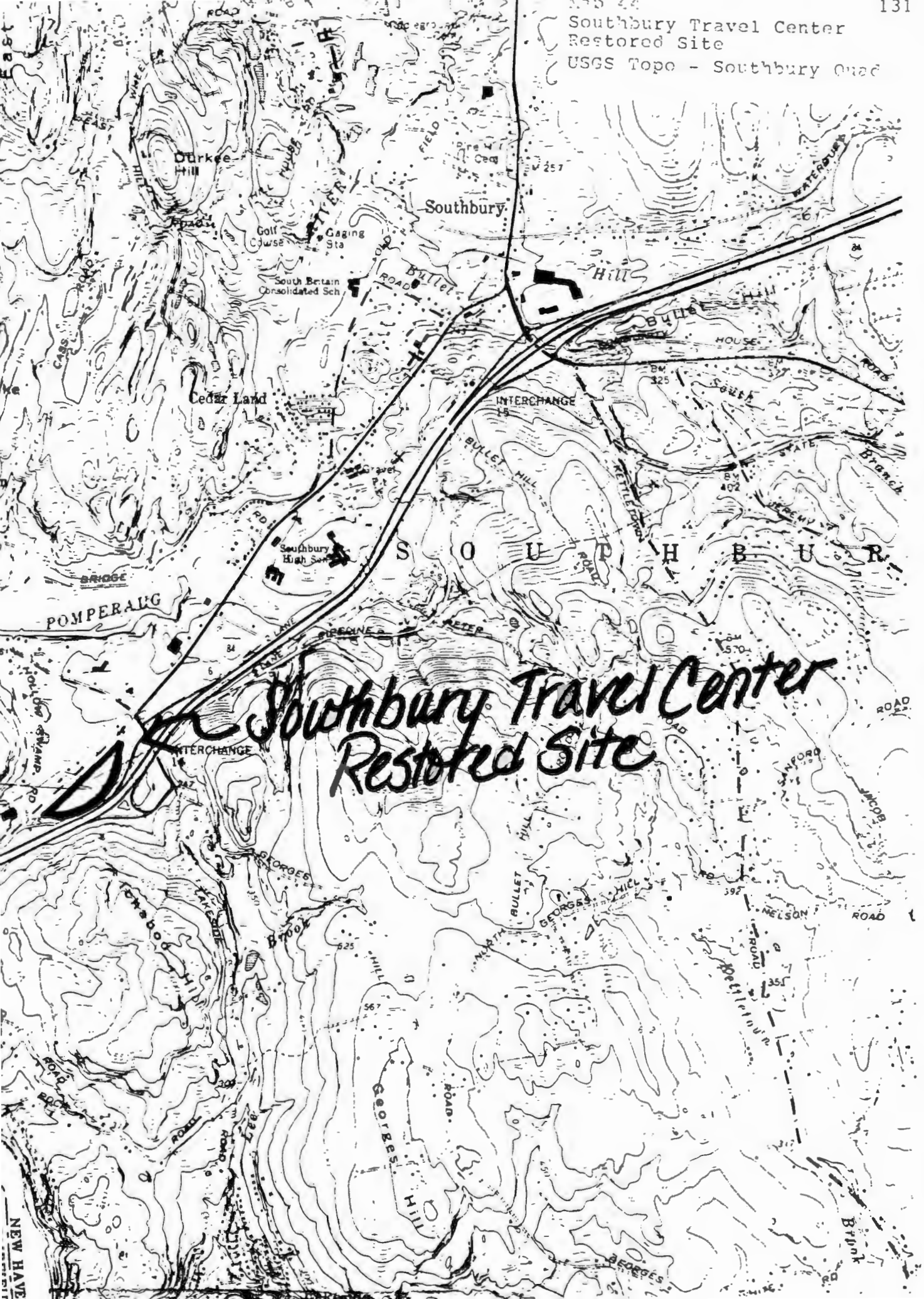
Description

This site is located about a quarter mile away from the restoration at the Travel Center. The natural site is an emergent/scrub shrub wetland, southwest of the Southbury Travel Center (see Map 47). The soils are mostly hydric according to the US SCS soils survey for the county (Map 46). This site is also zoned B2E, a business district.

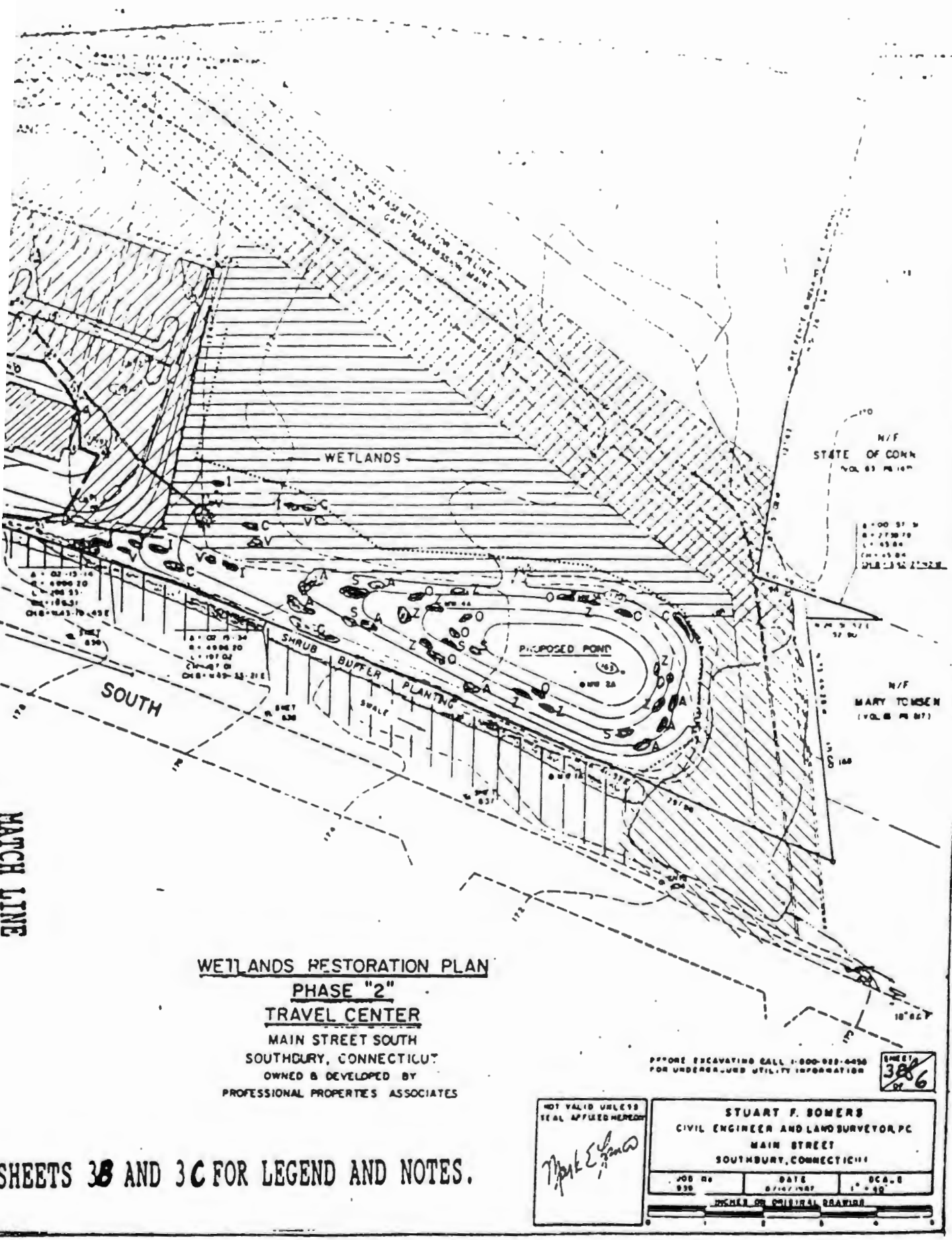
An unnamed tributary of the Pomperaug River runs through the wetland. Only one building was within 500 feet of the wetland edge. The wetland is located at the base of Horse Hill. Thus, wildlife may access the site along this woodland area. The wetland is naturally occurring, receiving its source of water from the stream, as well as from runoff from the hill and the adjacent roads.

There was little human activity noted within the mucky soils of the control wetland (see photos, page 136). However, there was a lot of trash noted in the immediately adjacent upland. The trash included rusted barrels and cans, an old bike, and some major appliances. The two adjacent roads and the trash indicated a high amount of activity in the upland.

Southbury Travel Center
Restored Site
USGS Topo - Southbury Quad



SOUTHBURY TRAVEL CENTER
Restored Site



WETLANDS RESTORATION PLAN
PHASE "2"
TRAVEL CENTER
MAIN STREET SOUTH
SOUTHBURY, CONNECTICUT
OWNED & DEVELOPED BY
PROFESSIONAL PROPERTIES ASSOCIATES

BEFORE EXCAVATING CALL 1-800-922-4455
FOR UNDERGROUND UTILITY INFORMATION

SHEET 3B OF 6

NOT VALID UNLESS SEAL AFFIXED HEREON

STUART F. BOMERS
CIVIL ENGINEER AND LAND SURVEYOR, PC
MAIN STREET
SOUTHBURY, CONNECTICUT

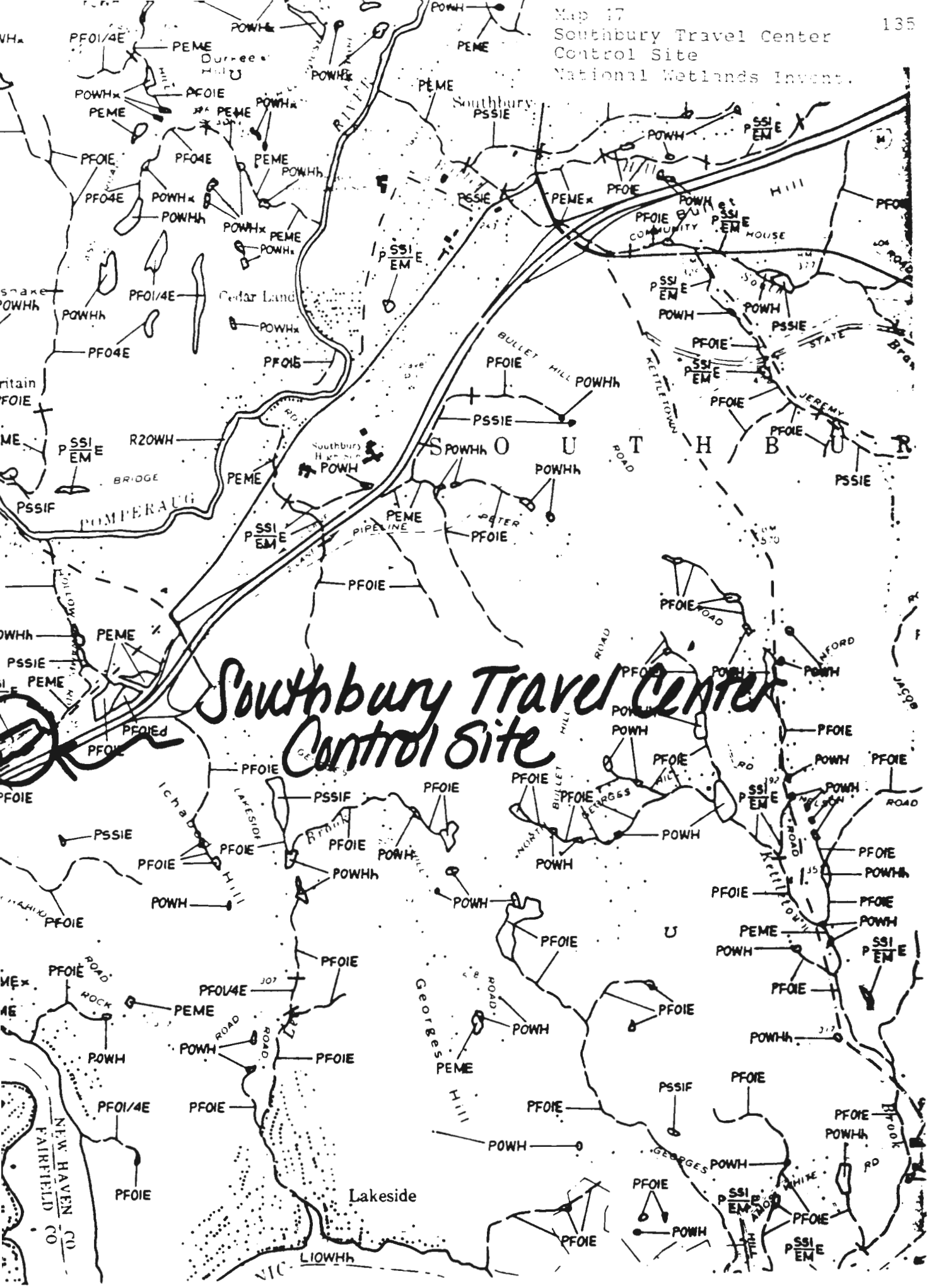
JOB NO 930 | DATE 8/10/1987 | SCALE 1" = 50'

INCHES ON ORIGINAL DRAWING

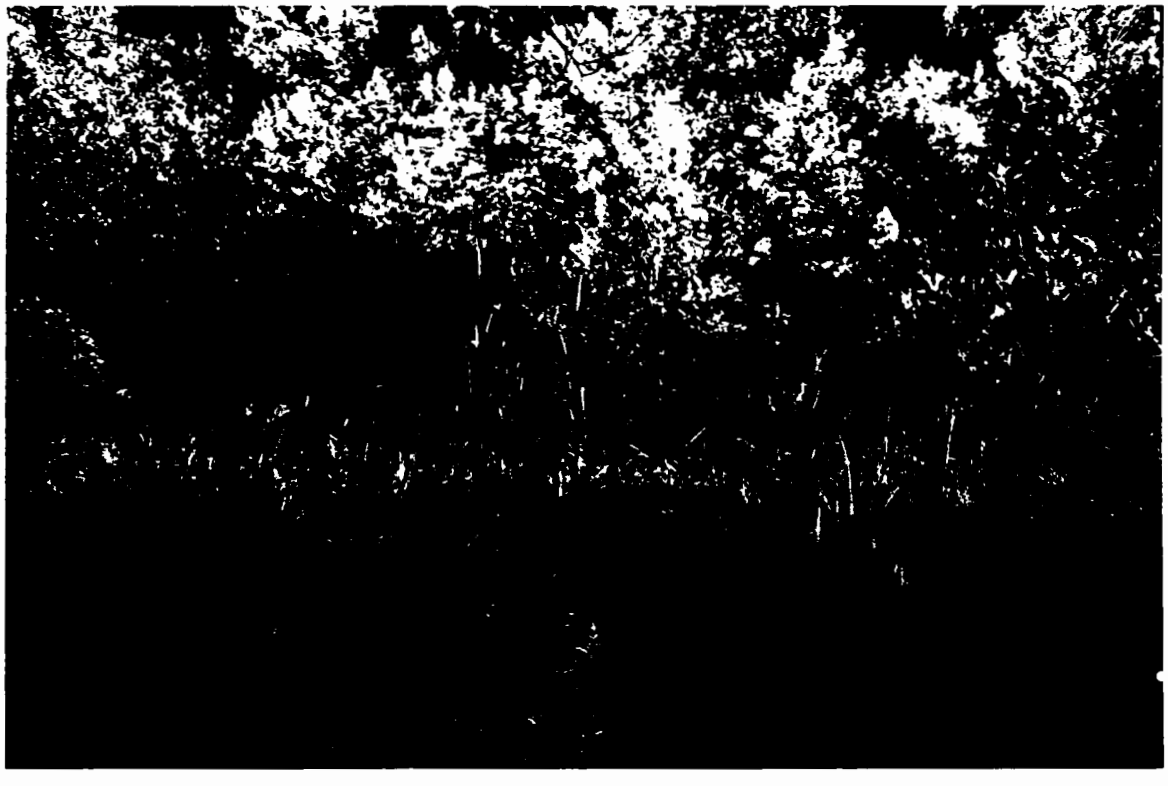
SHEETS 3B AND 3C FOR LEGEND AND NOTES.

Map 46
Southbury Travel Center
Restored and Control Sites
US SCS Soils Map

Map 17
Southbury Travel Center
Control Site
National Wetlands Invent.



SOUTHBURY TRAVEL CENTER
Control Site



Chapter Seven

DATA ANALYSIS

Chapter Seven

DATA ANALYSIS

Data Specification

The hypothesis (wetlands created or restored by humans cannot be satisfactory replacements for natural wetlands) was evaluated through an analysis of data collected in the field (as described above), together with library research, personal interviews with wetland specialists, and research of the mitigation proposals.

I researched the mitigation proposals in June and July, 1991. The permits that were available for the created/restored sites can be seen in Appendix B. I conducted the site visits during the height of the growing season, on weekend days from August 10, 1991 though September 30, 1991. The field sheets for each site can be seen in Appendix A.

The water quality information was obtained from a water quality expert at the US EPA - Region One, (Hall, personal communication: 5/5/92), for the waterbodies associated with each wetland in the study. The water quality information is listed in a table on the top of the following page.

Table 3

WATER QUALITY CLASSIFICATIONS

Waterbody	Wetland Associated With It	Class
1. Sagamore Creek	Portsmouth H.S. & Control Site	B
2. Salmon Brook	Bradgate Associates (Control)	B
3. Porcupine Brook	Rockingham Mall	B
4. Spicket River	Rockingham Mall (Control)	B
5. Crook Fall Brook	Woonsocket Route 99	A
6. Long Brook	Woonsocket Route 99 (Control)	B
7. Deep Brook	Arthur Nemon (Control)	B
8. Broad Meadow Bk.	Signal/Resco Resource Recovery	B
9. Ramshorn Brook	Signal/Resco Resource (Control)	B
10. Quinnipiac River	Cheshire Waste Water Tmt. Plant	B
11. Pequabuck River	Robertson/Tomasso & Control Site	B
12. Copts Brook	CT Route 7 (Control)	B
13. Pomperaug River	Southbury Travel Center	B

The soils information was either requested from the appropriate regional US Soil Conservation Service office, or was gathered from the US SCS soil survey itself. The soils maps for each site can be found with the according wetland site description above. Soils information could not be obtained for two sites; the Robertson Airport/Tomasso Nature Park Control Site and the Signal/Resco Resource Recovery Plant Control Site. Thus, to determine if the hydric soils comprised; a). more than 50 percent, b). between 25 and 50 percent, or c). less than 25 percent of the wetland site, I based my decision on the results of a similar site.

For example, the Signal/Resco control site was adjacent to a pond and had very mucky soils present, just like the Woonsocket

Route 99 control site. Since the Woonsocket Route 99 control site had over 50 percent hydric soils on the site, I assumed the same was true for the Signal/Resco control site. For the Robertson Airport/Tomasso Nature Park control site, the conditions were similar to the Bradgate Associates control site. Both were located adjacent to a stream, along the stream corridor. Again, since the soils information was not available for the Robertson/Tomasso site, I assumed the hydric soils covered over 50 percent of the site, as they did at the Bradgate control site.

Zoning information was gathered in the Spring of 1992. Phone calls were made to the appropriate office at the municipal halls in the communities where each wetland was located. The zoning information for each site can be seen in the table below.

Table 4

SITE ZONING CLASSIFICATION

Wetland Name	Location	Zoning Class
1. Portsmouth High School	Portsmouth, NH	SR2
2. Portsmouth High School (Control)	Portsmouth, NH	SR2
3. Bradgate Associates	Nashua, NH	R40
4. Bradgate Associates (Control)	Nashua, NH	R18
5. Rockingham Mall	Salem, NH	Com/Ind
6. Rockingham Mall (Control)	Salem, NH	Residential
7. Woonsocket Route 99	Lincoln, RI	RA40
8. Woonsocket Route 99 (Control)	Cumberland,RI	Not Avail
9. Arthur Nemon	Saco, ME	R1A

10.	Arthur Nemon (Control)	Saco, ME	Industrial
11.	Signal/Resco Resource Recovery	Millbury, MA	I 2
12.	Signal/Resco Resource (Control)	Millbury, MA	Suburban Res
13.	Cheshire WWTP	Cheshire, CT	R40
14.	Cheshire WWTP (Control)	Cheshire, CT	R80
15.	Robertson AP/Tomasso Nature Pk.	Plainville, CT	Industrial
16.	Robertson AP/Tomasso (Control)	Plainville, CT	Residential
17.	CT Route 7	Norwalk, CT	R40
18.	CT Route 7 (Control)	Norwalk, CT	R40
19.	Southbury Travel Center	Southbury, CT	B2E
20.	Southbury Travel Center (Control)	Southbury, CT	B2E

Zoning information for one site could not be obtained. The site was the Woonsocket Route 99 control site. In this case, I chose to go with the current land use that I observed, as allowed by the New Hampshire Method. Also, at the Robertson Airport/Tomasso Nature Park control site, the zoning classification given to me conflicted with the current land use at the site. As directed in the New Hampshire Method, I chose to go with the current land use classification that I observed.

Data Calculations

I next completed the calculations as described in the New Hampshire Method. I took the average of the functional value indexes (fvi) for each section: ecological integrity and wildlife habitat. I rounded them off to three points beyond the decimal. I then multiplied the fvi by the acreage of the wetland. Thus, in the New Hampshire Method, the values given to the wetlands are influenced

by the size of the wetland: the larger the wetland, the higher the fvi for that value of the wetland.

The final fvi's for both values were then added together to produce a final functional value index for the wetland. The calculations can be found on the field sheets for each site in Appendix A. These values can be used to compare the wetlands to each other. However, in this study, it is only equitable to compare the created wetlands to the control sites chosen for them. The values can be seen in the table below.

Table 5

FUNCTIONAL VALUE INDEXES

Wetland Name	Type	Size in Acres	FVI
1. Portsmouth High School	Created	1.00	1.152
2. Portsmouth High School (Control)	Natural	1.25	1.874
3. Bradgate Associates	Created	1.00	.761
4. Bradgate Associates (Control)	Natural	1.00	1.509
5. Rockingham Mall	Created	1.00	.798
6. Rockingham Mall (Control)	Natural	1.50	2.417
7. Woonsocket Route 99	Created	3.50	5.719
8. Woonsocket Route 99 (Control)	Natural	3.80	5.703
9. Arthur Nemon	Restored	.50	.450
10. Arthur Nemon (Control)	Natural	.75	1.026
11. Signal/Resco Resource Recovery	Created	.50	.515
12. Signal/Resco Resource (Control)	Natural	1.00	1.624
13. Cheshire WWTP	Created	.85	1.005
14. Cheshire WWTP (Control)	Natural	1.00	1.143

15.	Robertson AP/Tomasso Nature Pk.	Created	3.80	5.202
16.	Robertson AP/Tomasso (Control)	Natural	4.50	6.940
17.	CT Route 7	Created	3.10	3.428
18.	CT Route 7 (Control)	Natural	3.00	3.543
19.	Southbury Travel Center	Restored	.65	.642
20.	Southbury Travel Center (Control)	Natural	1.25	1.710

As can be seen, in all but one comparison, the natural, or control site, has a higher fvi than the created or restored wetland. The Woonsocket Industrial Highway (Route 99) created site was the exception. In this comparison, the created wetland had a higher combined wildlife habitat/ecological integrity fvi than the natural wetland. However, as was mentioned above, the fvi's are influenced by size. Thus, in cases where the natural wetland was larger than the created/restored wetland, the fvi would naturally be higher. That occurred with eight of the ten created/restored wetlands. Since there is a difference in eight of the comparisons, it is necessary to recompute the fvi's to determine if the natural wetlands truly have a higher fvi than the created/restored wetlands.

The only point during the calculations that the size of the wetland can influence the fvi, is at the very end, where the fvi for each of the two values (ecological integrity, wildlife habitat) is multiplied by the acreage of the wetland. Up until this point the fvi's are not in any way influenced by the size of the wetlands. Thus, if both the created/restored and natural wetlands were multiplied by the same acreage, the results would be more representative of the

true fvi's. This has been done and the results are shown in the table below:

Table 6

RE-CALCULATED FUNCTIONAL VALUE INDEXES

Wetland Name	Type	Acres	FVI
1. Portsmouth High School	Created	1.00	1.152
2. Portsmouth High School (Control)	Natural	1.00	1.499
5. Rockingham Mall	Created	1.00	.798
6. Rockingham Mall (Control)	Natural	1.00	1.611
7. Woonsocket Route 99	Created	3.50	5.719
8. Woonsocket Route 99 (Control)	Natural	3.50	5.254
9. Arthur Nemon	Restored	.50	.450
10. Arthur Nemon (Control)	Natural	.50	.683
11. Signal/Resco Resource Recovery	Created	.50	.515
12. Signal/Resco Resource (Control)	Natural	.50	.812
13. Cheshire WWTP	Created	.85	1.005
14. Cheshire WWTP (Control)	Natural	.85	.972
15. Robertson AP/Tomasso Nature Pk.	Created	3.80	5.202
16. Robertson AP/Tomasso (Control)	Natural	3.80	5.859
19. Southbury Travel Center	Restored	.65	.642
20. Southbury Travel Center (Control)	Natural	.65	.889

As can be seen by the table, the results have changed slightly. By assuming the wetlands are the same size and multiplying the fvi's of the two wetlands by the same acreage value, there is a decline in the final fvi of the control sites.

When evaluating the difference it made in the comparisons, it can be seen that two of the created wetland sites now have a higher functional value index than their natural counterparts. These two created wetlands are the Cheshire Waste Water Treatment Plant and Woonsocket Route 99.

This study has shown that in 8 of the 10 comparisons made, the natural site was determined to have a better potential wildlife habitat than the created/restored site. Thus, only 20 percent of the created/restored sites were determined to be sufficient replacements for natural wetlands when considering wildlife habitat.

Chapter Eight

CONCLUSION

Chapter Eight

CONCLUSION

It was the intention of this study to evaluate the hypothesis; human-made wetland replicas are not sufficient replacements for natural wetlands. An assessment of the potential wildlife habitat value of freshwater wetlands was performed. A comparison was used to determine if the potential wildlife habitat was better in created and restored wetlands or in natural wetlands. The tool used to evaluate the wildlife habitat value was the Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire. The results are listed in Chapter Seven, Data Analysis.

It was determined that the potential wildlife habitat in natural wetlands was superior to that of the created/restored wetlands. It was also indicated that eighty percent of the time, the created/restored wetlands are not sufficient replacements for natural wetlands. These results concurred with similar studies described in Chapter Four, Research Hypothesis.

Since the hypothesis was determined true, it indicates that wetland replications and restorations are not fulfilling their purpose. Creations and restorations are supposed to functionally replace the altered or destroyed natural wetland. If they cannot perform the functions of a natural wetland, then they are not sufficient replacements for them.

Since these wetlands that are supposed to serve as mitigation for the destroyed natural wetlands are not functioning as well as the natural wetlands, then it is highly possible that wetlands are not being adequately protected. We are losing wetlands rather than preserving them. We are destroying them rather than replacing them. If this is the case, then there may be a problem with the mechanisms that are supposed to be protecting wetlands.

The protection of wetlands is piecemeal (Pontius, 1990: 12). Wetlands allegedly receive sufficient protection from the overlapping of federal, state, and local wetland protection efforts. However, if mitigation, the mechanism that is used by regulatory agencies to compensate for natural wetland loss, is not producing viable alternatives, then it can be suggested that the federal, state, and local protection efforts are not succeeding. Maybe protection specialists at all levels should re-evaluate the effectiveness of mitigation. There may be another alternative that will produce more promising results.

Permit applicants usually propose to compensate for wetland losses by creating a wetland from an upland habitat or by enhancing existing wetland habitats (Thompson & Williams-Dawe). This type of mitigation is attractive to developers, because it is just averaged into the cost of construction. It is also attractive to regulators because they feel they are succeeding in not allowing any further net loss of wetlands (Thompson & Williams-Dawe). However, mitigation has several problems.

One of the main problems with wetland mitigation is the lack of monitoring. "There are no wetland police...The development industry knows that" (Stevens, 1991: pp. C9). Thus, the agencies

that permit the mitigation as compensation, do not follow up to see if the artificial wetland is successful. In addition, it appears that those that are creating the wetlands, know nothing about wetland creation/restoration. "...As federal and state governments belatedly require developers and farmers to compensate for or "mitigate" any loss of wetlands they cause, inexpert, inexperienced, often less competent practitioners are rushing into the field" (Stevens, 1991: pp. C1). Some believe that wetlands cannot be created. "Based upon the limited studies of both intentional and unintentional restoration and creation projects to date, there is a general scientific consensus that no wetland can be duplicated or replicated exactly" (Kusler, 87: 3). Yet others believe that wetlands can be created, though they do not know how long it takes to create one. "No one can be positive how long it takes to establish artificial wetlands, much less how to judge a level of success sufficient to justify the avoidable destruction of natural habitats" (Thompson & Williams-Dawe).

Many of created, enhanced, or restored wetlands have been reported as successes. However, most are not really successes upon close inspection. It seems that the criteria used to evaluate success in many cases was simply whether wetland plants had established themselves on the site (Larson, 1987).

However, it is reported that <u>some</u> functions of wetlands can be created. "There appears to be a consensus among scientists and observers that certain types of wetland wildlife habitat -- primarily waterfowl and marsh bird habitat -- can be created in upland areas where the right combinations of topography and water supply are present" (COEQ, 1988: 2).

Thus, there is agreement that there are problems with wetland mitigation. If wetland mitigation is to continue, the regulatory agencies should focus more clearly on avoidance and minimization and less on compensation as an alternative. Care should also be taken to permanently preserve those wetlands that are particularly valuable to society. If there are no alternatives and wetland mitigation is the only solution, then the applicants should be required to do a study of the existing values of the wetland they are destroying (as the EPA and COE require under Section 404). They should then be responsible to create a wetland that serves those same functions. If wetlands are allowed to be restored and created, a monitoring program should be an necessary aspect of the mitigation plan. Someone should also be appointed to maintain the new wetland site. The cost of a wetland creation or restoration should not be allowed to dictate the kind of wetland created or restored. Should something go wrong in the creation/restoration attempt, there should be provisions for new action to be taken, (COEQ, 1988).

Whatever the future course of wetland protection is, it is expected that planning will take a larger role in mitigation strategies. "Under programs now under way by federal agencies, wetlands considered unsuitable for development will be better mapped, enabling planners to steer projects away from problematic areas" (Krohe, 1989: 9).

In conclusion, wetlands should be regulated not as plant communities, but rather as intricate ecosystems that provide functions for the benefit of society (Larson, 1987). Also, it is

important to keep in mind that, "The easiest kind of wetlands damage to mitigate,...is the damage that isn't allowed in the first place" (Krohe, 1989: 9)

APPENDICIES

Appendix A

FIELD SHEETS

wet meadow/ shallow marsh creation.

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SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Portsmouth High School Total area of wetland 1 acre

County Rockingham Town Portsmouth, NH Date August 10, 1991

Investigator(s) Staci Holcombe, David Hulseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.538	1	.538
2. Wildlife Habitat	.614	1	.614
3. Finfish Habitat:			
Part A - Rivers and Streams			total 1.152
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Portsmouth, N.S.

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	299, 140B, 799 (none hydric)	a. More than 50 percent b. From 25 to 50 percent (c.) Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	SR2 (single family residential, minimum 20,000') (.30) →	a. Agriculture, forestry, or similar open space zoning b. Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, pond, or lake associated with the wetland.	unnamed tributary of Sagamore Creek	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	5 buildings : 1 acre	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.	most of original wetland was filled for the ballfield	a. Less than 10 percent b. From 10 to 50 percent (c.) More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.	on aerial photo measured woodland close to this depth	a. More than 80 percent (b.) From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.	can see the wetland is being used for educational purposes, periphery is trodden	a. Low level: Few trails in use and/or sparse litter (b.) Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Portsmouth H.S.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Vai Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.
   - a. Low level: Few trails in use and/or sparse litter — 1.0
   - b. Moderate level: Some trails, scattered residences, etc. — 0.5
   - (c.) High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).
   - (a.) Less than 10 percent — 1.0
   - b. From 10 to 50 percent — 0.5
   - c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

    none could be detected
   - (a.) Less than 10 percent — 1.0
   - b. From 10 to 50 percent — 0.5
   - c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

    none are parallel & adjacent
   - (a.) None — 1.0
   - b. One or fewer — 0.5
   - c. Two or more — 0.1

12. Long-term stability.

    wetland partially dependent on dike, though its low elevation + being at base of steep hill would direct runoff toward the site (.75) →
   - a. Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0
   - b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .5375 = (6.45 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 1 acres.

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Valu Index (FVI)

QUESTIONS TO ANSWER IN THE OFFICE:

1. Ecological integrity.

Average FVI from Functional Value 1 .538

2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.

very little open water

a. More than 3 acres 1.0
b. From 0.5 to 3 acres 0.5
(c.) Less than 0.5 acre 0.1

QUESTIONS TO ANSWER IN THE FIELD:

3. Water quality of the watercourse, lake, or pond associated with the wetland.

FVI from Question V.1.3 1.0

4. Wetland diversity.

Shallow marsh & wet meadow

a. Three or more wetland classes present 1.0
(b.) Two wetland classes present 0.5
c. One wetland class present 0.1

5. Dominant wetland class.

(a.) Emergent marsh and/or shallow open water 1.0
b. Forested and/or scrub-shrub wetland 0.5
c. Scrub-shrub saturated (bog) or wet meadow 0.1

6. Interspersion of vegetation classes and/or open water.

some mixing in mitigation area

a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt 1.0
(b.) Moderate interspersion of wetland classes 0.5
c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes 0.1

Continued on next page...

Wetland Name Code _____ Portsmouth H 5.

NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.	shown in mitigation plan map next to foot ball field	a. Two or more	1.0
		(b.) One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		a. Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		(b.) Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.	detected on aerial photos, at site visit + on USGS topo map	a. More than 40 percent	1.0
		(b.) From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = [illegible] (6.138 ÷ 10) = .61

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 1 acres.

Emergent

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Portsmouth High School (Central) Total area of wetland ~1.25 acres

County Rockingham Town Portsmouth, NH Date August 31, 1991

Investigator(s) Staci Holcombe, David Hulseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.804	1.25	1.005
2. Wildlife Habitat	.695	1.25	.869
3. Finfish Habitat:			
Part A - Rivers and Streams			total 1.879
Part B - Ponds and Lakes			1.874
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

(site has succeeded to scrub shrub) Portsmouth H.S. (corridor)

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	33A, 99 & Hydric (mostly this soil type)	(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	SR2 - single family residential, minimum of 30,000 s.f. (.30)	a. Agriculture, forestry, or similar open space zoning b. Rural residential (c.) Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the water-course, pond, or lake associated with the wetland.	Sagamore Creek	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	~3 buildings : ~1.25 ac	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		(a.) More than 80 percent b. From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Portsmouth H.S (control)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Val Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.

   1 road and a few houses across the street. Rest is buffer (.75)

   a. Low level: Few trails in use and/or sparse litter — 1.0
   b. Moderate level: Some trails, scattered residences, etc. — 0.5
   c. High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

   (a.) Less than 10 percent — 1.0
   b. From 10 to 50 percent — 0.5
   c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

    (a.) Less than 10 percent — 1.0
    b. From 10 to 50 percent — 0.5
    c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

    some adjacent

    (None) — 1.0
    (b.) One or fewer — 0.5
    c. Two or more — 0.1

12. Long-term stability.

    (a) Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0
    b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .84 .75 .75 ÷ 12

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 1.25 acres.

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.846
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres b. From 0.5 to 3 acres (c.) Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.	EM has succeeded to SS. Some FO there too	a. Three or more wetland classes present (b.) Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		a. Emergent marsh and/or shallow open water (b.) Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.		a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt (b.) Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

Wetland Name [illegible] Portsmouth #3 (cor)

NEEDED FOR THIS EVALUATION:

Functional Value 2 163
WETLAND WILDLIFE HABITAT
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		a. Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		(b.) Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, **OR** other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.	hilly terrain	(a.) Two or more	1.0
		b. One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		(a.) More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .695 (6.946 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 1.25 acres.

shallow ma creation

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Bradgate Associates Total area of wetland ~1 acre

County Hillsborough Town Nashua, NH Date August 10, 1991

Investigator(s) Staci Holcombe, David Hulseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.392	1	.392
2. Wildlife Habitat	.369	1	.369
3. Finfish Habitat:			
Part A - Rivers and Streams		total	.761
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Bradgate Associates

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	[illegible] Sr, CmB, CmC, StA, CmD (hydric (wetland is mostly in this soil type)	(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	R40 (Cluster condos - attached)	a. Agriculture, forestry, or similar open space zoning b. Rural residential (c.) Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the water-course, pond, or lake associated with the wetland.	isolated/ponded wetland	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	~10 buildings : 1acre	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.		a. Less than 10 percent b. From 10 to 50 percent (c.) More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.	none at all bordering. Some on other side of the road.	a. More than 80 percent b. From 20 to 80 percent (c.) Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.	Some trash evident residences adjacent.	a. Low level: Few trails in use and/or sparse litter (b.) Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Bradgate Associates

Functional Value 1
ECOLOGICAL INTEGRITY 166
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Val Index (FVI)
QUESTIONS TO ANSWER IN THE FIELD (continued):			
8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.	wetland totally surrounded by residential development roads on all sides of wetland	a. Low level: Few trails in use and/or sparse litter b. Moderate level: Some trails, scattered residences, etc. (c.) High level: Many trails, roads, etc. within upland	1.0 0.5 0.1
9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).	alteration / wet x 100 = .50 / .70	a. Less than 10 percent b. From 10 to 50 percent (c.) More than 50 percent	1.0 0.5 0.1
10. Percent of wetland actively being drained for agriculture or other purposes.	could not detect any	(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1 0 0 5 0.1
11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).	2 roads parallel to long axis of wetland	a. None b. One or fewer (c.) Two or more	1 0 0 5 0.1
12. Long-term stability.	wetland totally surrounded by high embankment	a. Wetland appears to be naturally occurring, not impounded by dam or dike (b.) Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc.	1 0 0 5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .392 = (4.7 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 1 acres.

Wetland Name Code: Bradgate Associates

167

NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITA

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.392
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.	just around edges of the retention pond. 8 ft. deep in center	a. More than 3 acres b. From 0.5 to 3 acres (c.) less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.	if the site were not being mowed, then shallow marsh (not open water) would be the dominant class	a. Three or more wetland classes present b. Two wetland classes present (c.) One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		(a.) Emergent marsh and/or shallow open water b. Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.	in between ~ some dispersion around the edges of the pond (.30) →	a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

Wetland Name or Code _____ Bradgate Associates

NEEDED FOR THIS EVALUATION:

Functional Value 2 168

WETLAND WILDLIFE HABITAT

(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.	Salmon Brook, less than 1 mile away, other isolated wetlands in this area as well.	a. Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		(b.) Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		a. Two or more	1.0
		b. One	0.5
		(c.) None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		a. Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		(c.) Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		a. More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		(c.) Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .369 (3.692 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 1 acres.

PEMIE

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Badgate Associates (control) Total area of wetland ~1 acre

County Hillsborough Town Nashua NH Date August 31, 1991

Investigator(s) Stacy Holcombe, David Dalsberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.708	1	.708
2. Wildlife Habitat	.801	1	.801
3. Finfish Habitat:			
Part A - Rivers and Streams		total	1.509
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Bradgate Associates (control).

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	Rp, WnC, CmC, HsB, CaB (↳ hydric - (most of wetlands on this soil type)	(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	R-18 ~ single family residential w/a min. lot size of 18,000 □' (.30) →	a. Agriculture, forestry, or similar open space zoning b. Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, pond, or lake associated with the wetland.	Salmon Brook	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	~ 6 buildings : 1 acre	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		a. More than 80 percent b. From 20 to 80 percent (c.) Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Bradyate Associates (Control)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.

   a. Low level: Few trails in use and/or sparse litter — 1.0
   (b) Moderate level: Some trails, scattered residences, etc. — 0.5
   c. High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

   (a.) Less than 10 percent — 1.0
   b. From 10 to 50 percent — 0.5
   c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

    (a.) Less than 10 percent — 1 0
    b. From 10 to 50 percent — 0 5
    c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland). one adjacent + parallel

    a. None — 1 0
    (b.) One or fewer — 0 5
    c. Two or more — 0 1

12. Long-term stability.

    (a.) Wetland appears to be naturally occurring, not impounded by dam or dike — 1 0
    b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0 5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .708 (8.5÷12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 1 acres.

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Valu Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.708
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres (b.) From 0.5 to 3 acres c. Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.	Mostly emergent some Shrub evident (.30)	a. Three or more wetland classes present b. Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		(a.) Emergent marsh and/or shallow open water b. Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.		(a.) At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

Wetland Name Code: Bridgute Associates Property

NEEDED FOR THIS EVALUATION:

Functional Value 2 173
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		(a.) Two or more	1.0
		b. One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.	travel lanes under road + along stream. Corridor is at least 50' wide.	(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.	probably about 20% along stream	a. More than 40 percent	1.0
		(b.) From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .801 (8.008 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 1 acres.

Emergent/Scrub Shrub Created

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Rockingham Mall Total area of wetland [illegible] acres

County Rockingham Town Salem NH Date August 31, 1991

Investigator(s) Staci Holcombe, David Huseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.425	1	.425
2. Wildlife Habitat	.373	1	.373
3. Finfish Habitat:			total .798
Part A - Rivers and Streams			
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	26A, 314A, 699 ↑ hydric	a. More than 50 percent (b.) From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	Commercial/Industrial	a. Agriculture, forestry, or similar open space zoning b. Rural residential (c.) Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the water-course, pond, or lake associated with the wetland.	"b" Porcupine Brook because the wetland is being used as flood storage for runoff from the parkinglots.	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards (b.) Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	1 buildings : 1 acre	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.	filled 6 acres	a. Less than 10 percent b. From 10 to 50 percent (c.) More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		a. More than 80 percent b. From 20 to 80 percent (c.) Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.	all fenced in	(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

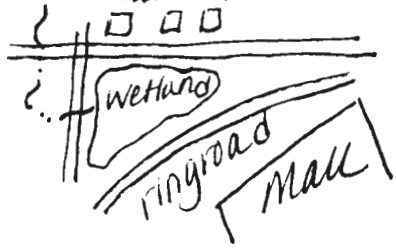
Continued on next page...

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.

HW. + Mall + Roads + Residences



a. Low level: Few trails in use and/or sparse litter — 1.0
b. Moderate level: Some trails, scattered residences, etc. — 0.5
(c.) High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

(a.) Less than 10 percent — 1.0
b. From 10 to 50 percent — 0.5
c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

(a.) Less than 10 percent — 1.0
b. From 10 to 50 percent — 0.5
c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

adjacent + parallel to several

a. None — 1.0
b. One or fewer — 0.5
(c.) Two or more — 0.1

12. Long-term stability.

Wetland in man-made ditch, with high slopes, all fenced in. High dikes.

a. Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0
(b.) Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .425 (5.1 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 1 acres.

Wetland Name: Code: ~~Small~~ Rockingham Mall 177

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITAT

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE OFFICE:

1. Ecological integrity.

   Average FVI from Functional Value 1 → .425

2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.

   a. More than 3 acres — 1.0
   b. From 0.5 to 3 acres — 0.5
   (c.) Less than 0.5 acre — 0.1

QUESTIONS TO ANSWER IN THE FIELD:

3. Water quality of the watercourse, lake, or pond associated with the wetland.

   FVI from Question V.1.3 → .5

4. Wetland diversity.

   EM SS described in plan, mostly EM → (.30)

   a. Three or more wetland classes present — 1.0
   b. Two wetland classes present — 0.5
   c. One wetland class present — 0.1

5. Dominant wetland class.

   (a.) Emergent marsh and/or shallow open water — 1.0
   b. Forested and/or scrub-shrub wetland — 0.5
   c. Scrub-shrub saturated (bog) or wet meadow — 0.1

6. Interspersion of vegetation classes and/or open water.

   a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt — 1.0
   b. Moderate interspersion of wetland classes — 0.5
   (c.) Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes — 0.1

Continued on next page...

Wetland Name Code: Rockingham Mall

NEEDED FOR THIS EVALUATION:

Functional Value 2 178

WETLAND WILDLIFE HABITAT

(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, **OR** other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		a. Two or more	1.0
		b. One	0.5
		(c.) None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.	whole area fenced in.	a. Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		(c.) Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		a. More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		(c.) Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .373 (3.725 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 1 acres.

EM155

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Rockingham Mall (commercial site) Total area of wetland ~1.5 acres

County Rockingham Town Salem, NH Date August 31, 1991

Investigator(s) Staci Holcombe, David Hulseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.883	1.5	1.325
2. Wildlife Habitat	.728	1.5	1.092
3. Finfish Habitat:			
Part A - Rivers and Streams		total	2.417
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Rockingham Mall (cont'd)

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional) (At end of Vets Memorial Highway)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	26A, 395 (hydric (mostly all this soil))	(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	Residential	a. Agriculture, forestry, or similar open space zoning (b.) Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the water-course, pond, or lake associated with the wetland.	Spicket River	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	~ 2 houses : 3 acres	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		(a.) More than 80 percent b. From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Wetland Name Code: Rockingham Mall (CC7)

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NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITA

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Valu Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.883
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres b. From 0.5 to 3 acres (c.) Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.		a. Three or more wetland classes present (b.) Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		a. Emergent marsh and/or shallow open water (b.) Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1 0 0 5 0 1
6. Interspersion of vegetation classes and/or open water.	mostly SS, some patches of EM (.30) →	a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1 0 0 5 0 1

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Rockingham Mall Control

Functional Value 1
ECOLOGICAL INTEGRITY
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Val Index (FVI)
QUESTIONS TO ANSWER IN THE FIELD (continued):			
8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.	dead end street - 2 houses	(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some trails, scattered residences, etc. c. High level: Many trails, roads, etc. within upland	1.0 0.5 0.1
9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).		(a) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
10. Percent of wetland actively being drained for agriculture or other purposes.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).		(a) None b. One or fewer c. Two or more	1.0 0.5 0.1
12. Long-term stability.		(a.) Wetland appears to be naturally occurring, not impounded by dam or dike b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc.	1.0 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .883 (10.6 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 1.5 acres.

Wetland Name Code: _____ Rockingham Mall (Comm'l Sr.

NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITAT
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.	Lots of hills	(a.) Two or more	1.0
		b. One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		(a.) More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .728 (7.283 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 1.5 acres.

Emergent/Scrub S, Created

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code (Rte 99) Woonsocket Industrial Highway Total area of wetland ~3.5 acres

County Providence Town Lincoln, RI Date August 24, 1991

Investigator(s) Staci Holcombe, David Huseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.758	3.5	2.653
2. Wildlife Habitat	.876	3.5	3.066
3. Finfish Habitat:			
Part A - Rivers and Streams		total	5.719
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Rte. 99

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	CeC, Rf, Aa hydric	a. More than 50 percent (b.) From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	RA40 (sfr, min 40,000 sf)	a. Agriculture, forestry, or similar open space zoning (b.) Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the water-course, pond, or lake associated with the wetland.	Crook Fall Brook	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	1 building : 3.5 acres	a. Less than 1 bldg: 10 acres (<0.10) (b.) From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) c. More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.	6.7 acres impacted 1.9 + 1.3 + 3.5 acres created	a. Less than 10 percent b. From 10 to 50 percent (c.) More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.	surrounded by other wetlands and woods	(a.) More than 80 percent b. From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.	could hear shots being fired in adjacent woods during site visit. Can tell that people have visited the site because of the crushed vegetation on the hillside	(.75) a. Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Rte. 99

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE FIELD (continued):			
8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evidenced by litter, bike trails, roads, residences, etc.	highway to west, road to north	a. Low level: Few trails in use and/or sparse litter	1.0
		(b.) Moderate level: Some trails, scattered residences, etc.	0.5
		c. High level: Many trails, roads, etc. within upland	0.1
9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).	no phragmities, no loosestrife, no mowing	(a.) Less than 10 percent	1.0
		b. From 10 to 50 percent	0.5
		c. More than 50 percent	0.1
10. Percent of wetland actively being drained for agriculture or other purposes.	none detected	(a.) Less than 10 percent	1.0
		b. From 10 to 50 percent	0.5
		c. More than 50 percent	0.1
11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).	highway is parallel to long axis of wetland	a. None	1.0
		(b.) One or fewer	0.5
		c. Two or more	0.1
12. Long-term stability.	high banking surrounding, however low elevation and surrounding wetlands give evidence that a wetland would occur here naturally	a. Wetland appears to be naturally occurring, not impounded by dam or dike (.75) →	1.0
		b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc.	0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .758 (9.1 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 3.5 acres.

Wetland Name Code: _____ Rte 99

187

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Valu Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.758
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres (b.) From 0.5 to 3 acres c. Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.	5S, EM	a. Three or more wetland classes present (b.) Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		(a.) Emergent marsh and/or shallow open water b. Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.	see mitigation map	(a.) At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

NEEDED FOR THIS EVALUATION:

Functional Value 2 188
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.	adjacent wetlands, also connected by perennial stream, see mitigation map	(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, **OR** other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.	a few uplands evident.	(a.) Two or more	1.0
		b. One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		(a.) More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .876 (7.758 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 3.5 acres.

Energetix / Chilli Site

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code (Rte 99) Woonsocket Ind. HW (control) Total area of wetland ~3.80 acres

County Providence Town Cumberland, RI Date September 28, 1991

Investigator(s) Staci Holcombe

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.883	3.80	3.355
2. Wildlife Habitat	.618	3.80	2.348
3. Finfish Habitat:			
Part A - Rivers and Streams		total	5.703
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

(CH Pond Road) Rte 99 (Control)

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1 190
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	Rf, CkC ← hydric	(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	land use is rural residential	a. Agriculture, forestry, or similar open space zoning (b.) Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, pond, or lake associated with the wetland.	unnamed tributary of Long Brook	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	6houses : 3.8acres	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		(a.) More than 80 percent b. From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Rte 49 (control) Functional Value 1

ECOLOGICAL INTEGRITY (continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE FIELD (continued):			
8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter	1.0
		b. Moderate level: Some trails, scattered residences, etc.	0.5
		c. High level: Many trails, roads, etc. within upland	0.1
9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).		(a.) Less than 10 percent	1.0
		b. From 10 to 50 percent	0.5
		c. More than 50 percent	0.1
10. Percent of wetland actively being drained for agriculture or other purposes.		(a.) Less than 10 percent	1.0
		b. From 10 to 50 percent	0.5
		c. More than 50 percent	0.1
11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).		(a.) None	1.0
		b. One or fewer	0.5
		c. Two or more	0.1
12. Long-term stability.		(a.) Wetland appears to be naturally occurring, not impounded by dam or dike	1.0
		b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc.	0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .883 (10.6 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 3.80 acres.

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Valu Index (FVI)

QUESTIONS TO ANSWER IN THE OFFICE:

1. Ecological integrity.

Average FVI from Functional Value 1 .883

2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.

a. More than 3 acres 1.0
b. From 0.5 to 3 acres 0.5
(c.) Less than 0.5 acre 0.1

QUESTIONS TO ANSWER IN THE FIELD:

3. Water quality of the watercourse, lake, or pond associated with the wetland.

FVI from Question V.1.3 1.0

4. Wetland diversity.

a. Three or more wetland classes present 1.0
(b.) Two wetland classes present 0.5
c. One wetland class present 0.1

5. Dominant wetland class.

a. Emergent marsh and/or shallow open water 1.0
(b.) Forested and/or scrub-shrub wetland 0.5
c. Scrub-shrub saturated (bog) or wet meadow 0.1

6. Interspersion of vegetation classes and/or open water.

a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt 1.0
b. Moderate interspersion of wetland classes 0.5
(c.) Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes 0.1

Continued on next page...

Wetland Name Code: Rte. 99 (control)

NEEDED FOR THIS EVALUATION:

Functional Value 2 193

WETLAND WILDLIFE HABITAT

(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, **OR** other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		a. Two or more	1.0
		b. One	0.5
		(c.) None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		(a.) More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .618 (6.183 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 3.8 acres.

scrub shrub/emerge restoration 194

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Arthur Nemon Total area of wetland .5 acres

County York Town Saco, ME Date 8/31/91

Investigator(s) Staci Holcombe, David Hulseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.600 N/A	.5	300
2. Wildlife Habitat	.300	.5	.150
3. Finfish Habitat:			
Part A - Rivers and Streams		Total	.450
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Arthur Vernon

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	Sc, AdB hydric (mostly)	(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	R1A (1acre)	a. Agriculture, forestry, or similar open space zoning (b.) Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the water-course, pond, or lake associated with the wetland.	isolated wetland	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	~11 buildings : 5 acres	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.	.5 acres filled, .5 acres restored	a. Less than 10 percent b. From 10 to 50 percent (c.) More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		a. More than 80 percent b. From 20 to 80 percent (c.) Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.	very small amount of trash; trodden vegetation, indicating it was traveled over	(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Arthur Nemon

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE FIELD (continued):			
8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evidenced by litter, bike trails, roads, residences, etc.	2 roads quite a few residences but not quite as intense as others	a. Low level: Few trails in use and/or sparse litter b. Moderate level: Some trails, scattered residences, etc. c. High level: Many trails, roads, etc. within upland	1.0 0.5 0.1
9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).		a. Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
10. Percent of wetland actively being drained for agriculture or other purposes.		a. Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).	2 parallel	a. None b. One or fewer c. Two or more	1.0 0.5 0.1
12. Long-term stability.		a. Wetland appears to be naturally occurring, not impounded by dam or dike b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc.	1.0 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = (1.20 ÷ 12) .600

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = .5 acres.

Wetland Name Code: _____ Arthur Vernon

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Valu Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			.600 1.000
1. Ecological integrity.		Average FVI from Functional Value 1	
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres b. From 0.5 to 3 acres (c.) Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.	wet meadow (or EM,SS)	a. Three or more wetland classes present (.60)→ b. Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		a. Emergent marsh and/or shallow open water b. Forested and/or scrub-shrub wetland (c.) Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.		a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes (c.) Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

Wetland Name Code: Arthur (Vernon)

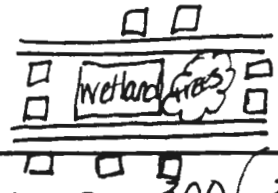
NEEDED FOR THIS EVALUATION:

Functional Value 2 198

WETLAND WILDLIFE HABITA

(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		a. Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		(b.) Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		a. Two or more	1.0
		b. One	0.5
		(c.) None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		a. Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		(c.) Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.	small woodland, 50' deep, adjacent	a. More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		(c.) Less than 10 percent	0.1



AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .300 (3 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = .5 acres.

Shrub Shrub/emergent 199

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Arthur Nemon (Control) Total area of wetland ~.75 acres

County York Town Saco, ME Date August 31, 1991

Investigator(s) Staci Holcombe, David Hulseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.725	.75	.544
2. Wildlife Habitat	.643	.75	.482
3. Finfish Habitat:			total 1.026
Part A - Rivers and Streams			
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

(at Rts 112 & 95)

Nemon (Control)

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

(Split into 1 EM & 1 SS site)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Valu Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	CrB, Na ↑ hydric (mostly	(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	Commercial/ Industrial	a. Agriculture, forestry, or similar open space zoning b. Rural residential (c.) Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the water-course, pond, or lake associated with the wetland.	Deep Brook	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	1/Building : 1.75ac	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.	1 side of SS has road, 1 side of EM has highway (Rte 95) rest is buffer	a. More than 80 percent (b.) From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

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Nemon (control)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Vai Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.	Small emergent wetland is adjacent to highway, rest is buffered	a. Low level: Few trails in use and/or sparse litter (b.) Moderate level: Some trails, scattered residences, etc. c. High level: Many trails, roads, etc. within upland	1.0 0.5 0.1
9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
10. Percent of wetland actively being drained for agriculture or other purposes.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).	Highway adjacent to emergent	a. None (b.) One or fewer c. Two or more	1.0 0.5 0.1
12. Long-term stability.		(a.) Wetland appears to be naturally occurring, not impounded by dam or dike b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc.	1.0 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .725 (8.7÷12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = .75 acres.

Wetland Name Code: _____ Nemon (control)

NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		a. Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		(b.) Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, **OR** other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.	lots of hills & bumps	(a) Two or more	1.0
		b. One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.	surrounding large scrub shrub wetland, also ample access from emergent area	(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.	taking into consideration the size of the large wetland	(a.) More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .643 (6.425 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = .75 acres.

Wetland Value Code: _____ Nemon (control)

NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITA.

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE OFFICE:

1. Ecological integrity.

   Average FVI from Functional Value 1 — .725

2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.

   a. More than 3 acres — 1.0
   b. From 0.5 to 3 acres — 0.5
   (c.) Less than 0.5 acre — 0.1

QUESTIONS TO ANSWER IN THE FIELD:

3. Water quality of the watercourse, lake, or pond associated with the wetland.

   FVI from Question V.1.3 — 1.0

4. Wetland diversity. EM + SS present, though not together; 2 separate sites

   a. Three or more wetland classes present — 1.0
   (b.) Two wetland classes present — 0.5
   c. One wetland class present — 0.1

5. Dominant wetland class. Larger site was the scrub shrub site, adjacent to woodlands

   a. Emergent marsh and/or shallow open water — 1.0
   (b.) Forested and/or scrub-shrub wetland — 0.5
   c. Scrub-shrub saturated (bog) or wet meadow — 0.1

6. Interspersion of vegetation classes and/or open water. 2 were separate

   a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt — 1.0
   b. Moderate interspersion of wetland classes — 0.5
   (c.) Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes — 0.1

Continued on next page...

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Signal/Resource Recovery Facility Total area of wetland 24,000 ft² = .5 ac

County Worcester Town Millbury, MA Date August 24, 1991

Investigator(s) _____

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.500	.5	.250
2. Wildlife Habitat	.530	.5	.265
3. Finfish Habitat:			total .515
Part A - Rivers and Streams			
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Signal / Resco

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	115B, 32B (hydric)	a. More than 50 percent (b.) From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	I2	a. Agriculture, forestry, or similar open space zoning b. Rural residential (c.) Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, pond, or lake associated with the wetland.	Broad Meadow Brook / Dorothy Pond	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	5 buildings : 5 acres	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.	21,500 □' destroyed; 25,000 □' created	a. Less than 10 percent b. From 10 to 50 percent (c.) More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.	wetland to the river	a. More than 80 percent (b.) From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Signal/Resco

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evidenced by litter, bike trails, roads, residences, etc.

   Mass pike, Rte 20, and Facility cover 3 of the 4 sides of the wetland

   a. Low level: Few trails in use and/or sparse litter — 1.0
   b. Moderate level: Some trails, scattered residences, etc. — 0.5
   (c.) High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

   some purple loosestrife

   a. Less than 10 percent — 1.0
   (b.) From 10 to 50 percent — 0.5
   c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

    (a.) Less than 10 percent — 1.0
    b. From 10 to 50 percent — 0.5
    c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

    access road crosses wetland and runs parallel.

    a. None — 1.0
    b. One or fewer — 0.5
    (c.) Two or more — 0.1

12. Long-term stability.

    low elevation & adjacent stream seem to make wetland stable

    (a.) Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0
    b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

Ground seemed quite dry, even with all the rain in the area experienced from "Hurricane Bob" on 8/20/91

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .5 AVG (6.0 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = .5 acres.

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE OFFICE:

1. Ecological integrity.

   Average FVI from Functional Value 1 — .500

2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.

   a. More than 3 acres — 1.0
   b. From 0.5 to 3 acres — 0.5
   (c.) Less than 0.5 acre — 0.1

QUESTIONS TO ANSWER IN THE FIELD:

3. Water quality of the watercourse, lake, or pond associated with the wetland.

   FVI from Question V.1.3 — 1.0

4. Wetland diversity. mainly scrub shrub, but some emergent vegetation present.

   a. Three or more wetland classes present — 1.0
   (b) Two wetland classes present — 0.5
   c. One wetland class present — 0.1

5. Dominant wetland class.

   a. Emergent marsh and/or shallow open water — 1.0
   b. Forested and/or scrub-shrub wetland — 0.5
   (c.) Scrub-shrub saturated (bog) or wet meadow — 0.1

6. Interspersion of vegetation classes and/or open water.

   a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt — 1.0
   b. Moderate interspersion of wetland classes — 0.5
   (c.) Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes — 0.1

Continued on next page...

Wetland Name/Code: Signal/Kesco

NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITAT
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.	other wetlands on site + those connected by the stream	(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.	a few "mounds" - higher patches of brush	(a.) Two or more	1.0
		b. One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.	some access along stream corridor. But bounded by roads on 3 sides, recovery facility on 4th side	a. Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		(b.) Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.	woodland along east side of wetland	a. More than 40 percent	1.0
		(b.) From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .530 (5.3 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = .5 acres.

Scrub shrub/ emergent

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Signal/Resco (control site) Total area of wetland ~1 acre

County Worcester Town Millbury, MA Date September 28, 1991

Investigator(s) David Huseberg, Staci Holcombe.

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.958	1	.958
2. Wildlife Habitat	.666	1	.666
3. Finfish Habitat:			Total = 1.624
Part A - Rivers and Streams			
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Signal/Resco (control)

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.		(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	Suburban Residential	a. Agriculture, forestry, or similar open space zoning (b.) Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, pond, or lake associated with the wetland.	unnamed tributary of Ramshorn Brook	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	1 acre : 0 buildings	(a.) Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) c. More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		(a.) More than 80 percent b. From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.	none in wetland. Lots of deer sign.	(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Signal/Resci (comm)

ECOLOGICAL INTEGRITY
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evidenced by litter, bike trails, roads, residences, etc.

   hiking trails for hunting too.

   (a.) Low level: Few trails in use and/or sparse litter — 1.0
   b. Moderate level: Some trails, scattered residences, etc. — 0.5
   c. High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

   (a.) Less than 10 percent — 1.0
   b. From 10 to 50 percent — 0.5
   c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

    (a) Less than 10 percent — 1.0
    b. From 10 to 50 percent — 0.5
    c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

    (a) None — 1.0
    b. One or fewer — 0.5
    c. Two or more — 0.1

12. Long-term stability.

    (a.) Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0
    b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .958 11.5 ÷ 12

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 1 acres.

Wetland Name/Code: Signal/Resci Control

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.958
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres b. From 0.5 to 3 acres (c.) Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.		a. Three or more wetland classes present (b.) Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.	some emergent and scrub shrub, but lots of trees + milk too (.30) →	a. Emergent marsh and/or shallow open water b. Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.	some interspersion (.30) →	a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		a. Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		(b.) Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, **OR** other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.	Lots of hills/bumps	(a.) Two or more	1.0
		b. One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		(a.) More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .666 (6.658 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 1 acres.

Buttonbush Shrub Creation

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Cheshire Waste Water Trmt. Plt. Total area of wetland .85 acres

County New Haven Town Cheshire, CT Date August 17, 1991

Investigator(s) Staci Holcombe, David Hulseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.629	.85	.535
2. Wildlife Habitat	.553	.85	.470
3. Finfish Habitat:			
Part A - Rivers and Streams		total	1.005
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	Eh, PnA, BoA (none are hydric soils)	a. More than 50 percent b. From 25 to 50 percent (c.) Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	R40	a. Agriculture, forestry, or similar open space zoning (b.) Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, pond, or lake associated with the wetland.	Associated w/ Quinnipiac River	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	3 buildings : 1 acre	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.	.65 filled : .85 created	a. Less than 10 percent b. From 10 to 50 percent (c.) More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		a. More than 80 percent (b.) From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Cheshire WWTP

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evidenced by litter, bike trails, roads, residences, etc.

athletic fields nearby, scattered residences, tire tracks adjacent to wetlands (at base of dike)

a. Low level: Few trails in use and/or sparse litter — 1.0
(b.) Moderate level: Some trails, scattered residences, etc. — 0.5
c. High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

some mowing adjacent to wetland & at base of dike

(a.) Less than 10 percent — 1.0
b. From 10 to 50 percent — 0.5
c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

(a.) Less than 10 percent — 1.0
b. From 10 to 50 percent — 0.5
c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

(a.) None — 1.0
b. One or fewer — 0.5
c. Two or more — 0.1

12. Long-term stability.

wetland slightly dependant on dike, but for most part occurring naturally.

a. Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0 — (.75)
→ (.75)
b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .629 (7.55 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = .85 acres.

Wetland Name Code: Cheshire WWTP

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITAT

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.629
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres b. From 0.5 to 3 acres (c.) Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.		a. Three or more wetland classes present b. Two wetland classes present (c.) One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		a. Emergent marsh and/or shallow open water (b) Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.		a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes (c.) Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

Wetland Name Code: _____ Cheshire WWTP

NEEDED FOR THIS EVALUATION:

Functional Value 2 218
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.	on other side of Quinnipiac River	(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		a. Two or more	1.0
		b. One	0.5
		(c.) None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.	along adjacent stream corridor	(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		(a.) More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .553 (5.529 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = .85 acres.

scrub shrub

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Cheshire WWTP (Control Site) Total area of wetland ~1 acre

County New Haven Town Meriden, CT Date 9/20/91

Investigator(s) Staci Holcombe, David Hulseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.675	1	.675
2. Wildlife Habitat	.468	1	.468
3. Finfish Habitat:			total 1.143
Part A - Rivers and Streams			
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

(located off Reservoir Road)

Cheshire Control

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.		a. More than 50 percent (b.) From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	R-80	a. Agriculture, forestry, or similar open space zoning (b.) Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, pond, or lake associated with the wetland.	isolated wetland	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	6:1 acre	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.	none evident	(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.	~50%	a. More than 80 percent (b.) From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.	Small amount of trash (75)	a. Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Cheshire Control

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE FIELD (continued):			
8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.	3 houses w/in 500 feet (.75)	a. Low level: Few trails in use and/or sparse litter b. Moderate level: Some trails, scattered residences, etc. c. High level: Many trails, roads, etc. within upland	1.0 0.5 0.1
9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
10. Percent of wetland actively being drained for agriculture or other purposes.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).	parking lot	a. None (b.) One or fewer c. Two or more	1.0 0.5 0.1
12. Long-term stability.	beaver dam	a. Wetland appears to be naturally occurring, not impounded by dam or dike (b.) Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc.	1.0 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .675 (8.1 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 1 acres.

Wetland Name Code: _____ Cheshire WWTP Comm 222

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITAT

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.675
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres b. From 0.5 to 3 acres (c.) Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.		a. Three or more wetland classes present b. Two wetland classes present (c.) One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		a. Emergent marsh and/or shallow open water b. Forested and/or scrub-shrub wetland (c.) Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.		a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes (c.) Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

Wetland Name Code: _____ Cheshire WWTP Control

NEEDED FOR THIS EVALUATION:

Functional Value 2 223
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		a. Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		(b.) Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		a. Two or more	1.0
		b. One	0.5
		(c.) None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		(a.) More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .468 (4.675 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 1 acres.

Emergent/scrub shrub creation

224

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Robertson Airport / Tomasso Nature Park Total area of wetland 3.8 acres

County Hartford Town Plainville, CT Date August 17, 1991

Investigator(s) Staci Holcombe, David Huseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.563	3.8	2.139
2. Wildlife Habitat	.806	3.8	3.063
3. Finfish Habitat:			
Part A - Rivers and Streams		total	5.202
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Robertson Airport

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	PmA Canhyanc	(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	Restricted Industrial	a. Agriculture, forestry, or similar open space zoning b. Rural residential (c.) Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the water-course, pond, or lake associated with the wetland.	Pequabuck River Note: site is adjacent to Hazzardous Waste landfill?	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	~ 14 buildings : 3.8 ac	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.	fill 3.6 ac	a. Less than 10 percent b. From 10 to 50 percent (c.) More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.	aerial photo: bordered by landfill, runway, + salvage yard. ½ only bordered by stream corridor	a. More than 80 percent b. From 20 to 80 percent (c.) Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

ECOLOGICAL INTEGRITY
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Val Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.

   trails, residences, landfill, airport

   a. Low level: Few trails in use and/or sparse litter — 1.0
   b. Moderate level: Some trails, scattered residences, etc. — 0.5
   (c.) High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

   (a.) Less than 10 percent — 1.0
   b. From 10 to 50 percent — 0.5
   c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

    (a.) Less than 10 percent — 1.0
    b. From 10 to 50 percent — 0.5
    c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

    no roads / RR's that are parallel and adjacent, one stream w/in (aerial photo)

    a. None — 1.0
    (b.) One or fewer — 0.5
    c. Two or more — 0.1

12. Long-term stability.

    (.75) →
    a. Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0
    b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .563 (6.75 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 3.8 acres.

Wetland Name Code: _____ Robertson Airport

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Valu Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.565
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres (b.) From 0.5 to 3 acres c. Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.	Pequabuck River	FVI from Question V.1.3	1.0
4. Wetland diversity.		a. Three or more wetland classes present (b) Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		(a.) Emergent marsh and/or shallow open water b. Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.		(a.) At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

Wetland Name Code: _____ Robertson Airport

NEEDED FOR THIS EVALUATION:

Functional Value 2 228
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.	Aerial Photos	(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.	small man-made islands of rocks (for close-up observation?).	(a.) Two or more	1.0
		b. One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.	one travel lane along wooded stream corridor (aerial photos)	(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.	only that one stream channel (wooded area)	a. More than 40 percent	1.0
		(b.) From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .806 (8.063 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 3.8 acres.

scrub shrub/ emergent

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Robertson/Tomasso (control) Total area of wetland ~4.5 acres

County Hartford Town Plainville, CT Date September 20, 1992

Investigator(s) Staci Holcombe, David Hauseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.779	4.5	3.506
2. Wildlife Habitat	.763	4.5	3.434
3. Finfish Habitat:			total 6.940
Part A - Rivers and Streams			
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

(off Farmington Rd)

Robert Dr. / Terrace Court

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional) (SS has been overgrown by some forest)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.		(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	½ zoned floodplain, ½ zoned industrial (restricted). However, present land use is rural residential	a. Agriculture, forestry, or similar open space zoning (b.) Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, pond, or lake associated with the wetland.	unnamed tributary of the Pequabuck River.	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	4 homes : 4.5 acres	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		a. More than 80 percent (b.) From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Robertson / Tomasso Control

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Val Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.

   few residences (.75) →

   a. Low level: Few trails in use and/or sparse litter — 1.0
   b. Moderate level: Some trails, scattered residences, etc. — 0.5
   c. High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

   (a) Less than 10 percent — 1.0
   b. From 10 to 50 percent — 0.5
   c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

    (a) Less than 10 percent — 1.0
    b. From 10 to 50 percent — 0.5
    c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

    1 crosses

    a. None — 1.0
    (b) One or fewer — 0.5
    c. Two or more — 0.1

12. Long-term stability.

    (a) Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0
    b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .779 (9.35 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 4.5 acres.

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.779
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.	estimated .75ac	a. More than 3 acres (b.) From 0.5 to 3 acres c. Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.	EM/SS/FO (some forested has grown in).	(.75) → a. Three or more wetland classes present b. Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		a. Emergent marsh and/or shallow open water (b.) Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.		(a.) At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.	none were seen	a. Two or more	1.0
		b. One	0.5
		(c.) None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		(a.) More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .763 (7.629 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 4.5 acres.

Emergent / Scrub Shrub creation

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code CT. D.O.T - Route 7 Total area of wetland 3.1 acres

County Fairfield Town Norwalk, CT Date August 17, 1991

Investigator(s) Staci Holcombe, David Huseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.533	3.1	1.652
2. Wildlife Habitat	.573	3.1	1.776
3. Finfish Habitat:			
Part A - Rivers and Streams		total	3.428
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

CT Rte. 7

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	CrC, CfB, Rn, HpC ← hydric	a. More than 50 percent b. From 25 to 50 percent (c.) Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	R40	a. Agriculture, forestry, or similar open space zoning (b.) Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the water-course, pond, or lake associated with the wetland.	- isolated wetlands. source - intermitten unnamed stream - This project involved work on Silvermine River, but these wetlands are not connected to it.	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	~ 10 buildings : 3.1 ac	a. Less than 1 bldg: 10 acres (<0.10) (b.) From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) c. More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.	4.18 ac filled	a. Less than 10 percent b. From 10 to 50 percent (c.) More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.	very little because W+S is bordered by high rock cliff + E by road. Area is not accessible to wildlife	a. More than 80 percent b. From 20 to 80 percent (c.) Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evidenced by litter, bike trails, roads, residences, etc.

   construction at present then roadway activity; scattered residences all around

   a. Low level: Few trails in use and/or sparse litter — 1.0
   b. Moderate level: Some trails, scattered residences, etc. — 0.5
   (c.) High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

   none evident

   (a.) Less than 10 percent — 1.0
   b. From 10 to 50 percent — 0.5
   c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

    none detected

    (a.) Less than 10 percent — 1.0
    b. From 10 to 50 percent — 0.5
    c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

    CT Rte 7

    a. None — 1.0
    (b.) One or fewer — 0.5
    c. Two or more — 0.1

12. Long-term stability.

    there is a wetland on other side of Rd. - dependent on high cliffs

    a. Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0
    (b.) Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .533 (6.4 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 3.1 acres.

Wetland Value Code: _____ @ Rte 7 237

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Va Index (FVI
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.535
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres (b.) From 0.5 to 3 acres c. Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.	EM/SS	a. Three or more wetland classes present (b.) Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		(a.) Emergent marsh and/or shallow open water b. Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.	see map (site vegetation description)	a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt (b.) Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

Wetland Name or Code: _____

NEEDED FOR THIS EVALUATION:

CJ Rte 7

Functional Value 2

WETLAND WILDLIFE HABITA

(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.	wetlands on opposite side of road and nearby. Wetlands across road are connected to this one by piping	a. Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		(b.) Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.	see map	(a.) Two or more	1.0
		b. One	0.5
		c. None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.	blocked almost completely by cliffs + road	a. Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		(c.) Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		a. More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		(c.) Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .573 (5.733 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 31 acres.

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code CT DOT, Rte 7 (control site) Total area of wetland ~3 acres

County Fairfield Town Wilton, CT Date September 30, 1991

Investigator(s) Staci Holcombe, [illegible]

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.683	3	2.049
2. Wildlife Habitat	.498	3	1.494
3. Finfish Habitat:			
Part A - Rivers and Streams		total	3.543
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional) (North of Graham Hill Road)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	Rn, Aa, UD Hydric	(a.) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	R40	a. Agriculture, forestry, or similar open space zoning (b.) Rural residential c. Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, pond, or lake associated with the wetland.	Copts Brook	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	5 houses : 3ac	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.	none evident	(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.		a. More than 80 percent (b.) From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.		(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

CT Rte 7 corridor

ECOLOGICAL INTEGRITY
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evidenced by litter, bike trails, roads, residences, etc.

   1 road crosses surrounding rural residential neighborhood

   a. Low level: Few trails in use and/or sparse litter — 1.0
   (b.) Moderate level: Some trails, scattered residences, etc. — 0.5
   c. High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

   dominated by phragmites no mowing

   a. Less than 10 percent — 1.0
   b. From 10 to 50 percent — 0.5
   (c.) More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

    none evident

    (a.) Less than 10 percent — 1.0
    b. From 10 to 50 percent — 0.5
    c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

    1 crosses wetland

    a. None — 1.0
    (b.) One or fewer — 0.5
    c. Two or more — 0.1

12. Long-term stability.

    occurring naturally along stream corridor

    (a.) Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0
    b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .683 (8.2÷12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 3 acres.

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Va Index (FVI
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.683
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres b. From 0.5 to 3 acres (c.) Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.		a. Three or more wetland classes present (b) Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		a. Emergent marsh and/or shallow open water (b) Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.		a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt b. Moderate interspersion of wetland classes (c.) Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

Wetland Name Code: _____ (I Rte 7 (control)

NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		a. Two or more	1.0
		b. One	0.5
		(c.) None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		a. Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		(b.) Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		a. More than 40 percent	1.0
		(b.) From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .498 (4.983 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 3 acres.

55, March restoration

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Southbury Travel Center Total area of wetland .65 acres

County New Haven Town Southbury, CT Date August 17, 1991

Investigator(s) Staci Holcombe, David Huseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.525	.65	.341
2. Wildlife Habitat	.463	.65	.301
3. Finfish Habitat:			
Part A - Rivers and Streams		total	.642
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Southbury Travel Center 245

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE OFFICE:

1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.

   Rb, ~~AfA~~, UD, Nn ↖ hydric (most of site is this soil type)

   (a.) More than 50 percent 1.0
   b. From 25 to 50 percent 0.5
   c. Less than 25 percent 0.1

2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.

   B2E - business

   a. Agriculture, forestry, or similar open space zoning 1.0
   b. Rural residential 0.5
   (c.) Commercial/industrial, high density residential 0.1

QUESTIONS TO ANSWER IN THE FIELD:

3. Water quality of the watercourse, pond, or lake associated with the wetland.

   unnamed tributary of Pomperaug ~~Brook~~ River

   (a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards 1.0
   b. Medium: Moderate pollution. Actual water quality is below Class B standards 0.5

4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).

   ~ 9 : 1 ac

   a. Less than 1 bldg: 10 acres (<0.10) 1.0
   b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) 0.5
   (c.) More than 1 bldg: 2 acres (>0.5) 0.1

5. Percent of original wetland filled.

   filled 1.1 ac

   a. Less than 10 percent 1.0
   b. From 10 to 50 percent 0.5
   (c.) More than 50 percent 0.1

6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.

   surrounded by roads and Travel center

   a. More than 80 percent 1.0
   b. From 20 to 80 percent 0.5
   (c.) Less than 20 percent 0.1

7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.

   old silt fence - lots of old rusted cable + barrels

   (a.) Low level: Few trails in use and/or sparse litter 1.0
   b. Moderate level: Some used trails, roads, etc. 0.5
   c. High level: Many trails, roads, etc. within wetland 0.1

Continued on next page...

Scarborough Travel Center

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE FIELD (continued):

8. Level of human activity IN **UPLAND** within 500 feet of the wetland edge as evidenced by litter, bike trails, roads, residences, etc.

surrounded by travel center and roads on all sides

a. Low level: Few trails in use and/or sparse litter — 1.0
b. Moderate level: Some trails, scattered residences, etc. — 0.5
(c.) High level: Many trails, roads, etc. within upland — 0.1

9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).

mowing of the upland edges of the wetland (.30) much of the southwestern wetlands full of phragmites (dominant)

a. Less than 10 percent — 1.0
b. From 10 to 50 percent — 0.5
c. More than 50 percent — 0.1

10. Percent of wetland actively being drained for agriculture or other purposes.

farm across street though draining is not evident

(a.) Less than 10 percent — 1.0
b. From 10 to 50 percent — 0.5
c. More than 50 percent — 0.1

11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).

only one road is adjacent + parallel

a. None — 1.0
(b.) One or fewer — 0.5
c. Two or more — 0.1

12. Long-term stability.

high uplands around, no man-made dikings, except for ~~railroad~~ highways, up on hills. Appears that most runoff from surrounding area would end up draining to here.

(a.) Wetland appears to be naturally occurring, not impounded by dam or dike — 1.0
b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc. — 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .525 (6.3 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 1.65 acres.

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)

QUESTIONS TO ANSWER IN THE OFFICE:

1. Ecological integrity.

   Average FVI from Functional Value 1 — .525

2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.

   a. More than 3 acres — 1.0
   (b.) From 0.5 to 3 acres — 0.5
   c. Less than 0.5 acre — 0.1

QUESTIONS TO ANSWER IN THE FIELD:

3. Water quality of the watercourse, lake, or pond associated with the wetland.

   FVI from Question V.1.3 — 1.0

4. Wetland diversity.

   a. Three or more wetland classes present — 1.0
   (b.) Two wetland classes present — 0.5
   c. One wetland class present — 0.1

5. Dominant wetland class.

   a. Emergent marsh and/or shallow open water — 1.0
   (b.) Forested and/or scrub-shrub wetland — 0.5
   c. Scrub-shrub saturated (bog) or wet meadow — 0.1

6. Interspersion of vegetation classes and/or open water.

   some mixing around the edges of the pond & wetland types (30) →

   a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt — 1.0
   b. Moderate interspersion of wetland classes — 0.5
   c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes — 0.1

Continued on next page...

NEEDED FOR THIS EVALUATION:

Functional Value 2 248
WETLAND WILDLIFE HABITAT
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.	some wetlands across the street.	(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		a. Two or more	1.0
		b. One	0.5
		(c.) None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.	site surrounded by roads - see topo map	a. Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		(c.) Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		a. More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		(c.) Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .463 (4.625 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = .65 acres.

EM/55

SUMMARY SHEET FOR THE N.H. METHOD

Wetland name or code Southbury Travel Ctr (control) Total area of wetland ~1.25 acres

County New Haven Town Southbury, CT Date September 20, 1991

Investigator(s) Staci Holcombe + David Hulseberg

A Functional Value	B FVI From Data Sheets	C Size of Evaluation Area (Acres)	D Wetland Value Units B x C
1. Ecological Integrity	.725	1.25	.906
2. Wildlife Habitat	.643	1.25	.804
3. Finfish Habitat:			
Part A - Rivers and Streams		total	1.710
Part B - Ponds and Lakes			
4. Educational Potential			
5. Visual/Aesthetic Quality			
6. Water Based Recreation			
7. Flood Control Potential			
8. Ground Water Use Potential			
9. Sediment Trapping			
10. Nutrient Attenuation			
11. Shoreline Anchoring and Dissipation of Erosive Forces			
12. Urban Quality of Life			
B: Wildlife Habitat			
C: Educational Opportunity			
D: Visual/Aesthetic Quality			
E: Water Based Recreation			
13. Historical Site Potential			
14. Noteworthiness			

Southbury Travel Center (Control)

NEEDED FOR THIS EVALUATION:

- Zoning map
- SCS soils map
- N.H. Water Quality Report to Congress 305(b)
- USGS topographic map or recent aerial photograph
- A method to calculate area (Dot grid, planimeter, etc.)
- Ruler or scale
- Map wheel (Optional) (off Hollow Swamp Road)

Functional Value 1
ECOLOGICAL INTEGRITY

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Percent of wetland having very poorly drained soils or Hydric A soils and/or open water.	AfB, AA, HSE & hydric (mostly this soil type)	(a) More than 50 percent b. From 25 to 50 percent c. Less than 25 percent	1.0 0.5 0.1
2. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.	B2E - business	a. Agriculture, forestry, or similar open space zoning b. Rural residential (c.) Commercial/industrial, high density residential	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the water-course, pond, or lake associated with the wetland.	unnamed tributary of Pomperaug River	(a.) High: Minimal pollution. Actual water quality meets or exceeds Class A or B standards b. Medium: Moderate pollution. Actual water quality is below Class B standards	1.0 0.5
4. Ratio of the number of occupied buildings within 500 feet of the wetland edge to the total area of the wetland (acres).	1 building : 1.25 ac	a. Less than 1 bldg: 10 acres (<0.10) b. From 1 bldg: 10 acres to 1 bldg: 2 acres (0.10-0.50) (c.) More than 1 bldg: 2 acres (>0.5)	1.0 0.5 0.1
5. Percent of original wetland filled.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
6. Percent of wetland edge bordered by a buffer of woodland or idle land at least 500 feet in width.	about 75%	a. More than 80 percent (b.) From 20 to 80 percent c. Less than 20 percent	1.0 0.5 0.1
7. Level of human activity **WITHIN WETLAND** as evidenced by litter, bike trails, roads, residences, etc.	low level in wetland	(a.) Low level: Few trails in use and/or sparse litter b. Moderate level: Some used trails, roads, etc. c. High level: Many trails, roads, etc. within wetland	1.0 0.5 0.1

Continued on next page...

Scituate Travel Ctr (control)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE FIELD (continued):			
8. Level of human activity **IN UPLAND** within 500 feet of the wetland edge as evi denced by litter, bike trails, roads, residences, etc.	trash adj to + some small amt in (including rusted barrels + major appliances), access road to business	a. Low level: Few trails in use and/or sparse litter (b.) Moderate level: Some trails, scattered residences, etc. c. High level: Many trails, roads, etc. within upland	1.0 0.5 0.1
9. Percent of wetland plant community presently being altered by mowing, grazing, farming, or other activity. (Include areas now dominated by phragmites or purple loosestrife).		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
10. Percent of wetland actively being drained for agriculture or other purposes.		(a.) Less than 10 percent b. From 10 to 50 percent c. More than 50 percent	1.0 0.5 0.1
11. Number of public road and/or railroad crossings per 500 feet of wetland (measured along long axis of wetland).	road - access to business	a. None (b.) One or fewer c. Two or more	1.0 0.5 0.1
12. Long-term stability.		(a.) Wetland appears to be naturally occurring, not impounded by dam or dike b. Wetland appears to be somewhat dependent on artificial diking by dam, road, fill, etc.	1.0 0.5

AVERAGE FVI FOR FUNCTIONAL VALUE 1 = Average of column D = .725 (8.7 ÷ 12)

EVALUATION AREA FOR FUNCTIONAL VALUE 1 = Total area of wetland = 1.25 acres.

NEEDED FOR THIS EVALUATION:

- USGS topographic map
- Land use map and/or recent aerial photographs
- Ruler or scale
- A method to calculate area (Dot grid, planimeter, etc.)
- N.H. Water Quality Report to Congress 305(b)

Functional Value 2
WETLAND WILDLIFE HABITA.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index F.V.I.
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Ecological integrity.		Average FVI from Functional Value 1	.725
2. Area of shallow permanent open water (less than 6 feet deep) including streams in or adjacent to wetland.		a. More than 3 acres b. From 0.5 to 3 acres (c.) Less than 0.5 acre	1.0 0.5 0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Water quality of the watercourse, lake, or pond associated with the wetland.		FVI from Question V.1.3	1.0
4. Wetland diversity.		a. Three or more wetland classes present (b.) Two wetland classes present c. One wetland class present	1.0 0.5 0.1
5. Dominant wetland class.		a. Emergent marsh and/or shallow open water (b.) Forested and/or scrub-shrub wetland c. Scrub-shrub saturated (bog) or wet meadow	1.0 0.5 0.1
6. Interspersion of vegetation classes and/or open water.		a. At least two wetland classes highly interspersed. Areas of each class scattered within wetland like a patchwork quilt (b.) Moderate interspersion of wetland classes c. Low degree of interspersion. Each wetland class is more or less contiguous and separate from the other classes	1.0 0.5 0.1

Continued on next page...

NEEDED FOR THIS EVALUATION:

Functional Value 2
WETLAND WILDLIFE HABITA
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
7. Wetland juxtaposition.		(a.) Wetland connected to other wetlands within a 1 mile radius by perennial stream or lake	1.0
		b. Wetland connected to other wetlands within a 1 to 3 mile radius by perennial stream or lake, OR other unconnected wetlands are present within a 1 mile radius	0.5
		c. Wetland not hydrologically connected to other wetlands within 3 miles and no other unconnected wetlands within 1 mile	0.1
8. Number of islands or inclusions of upland within wetland.		a. Two or more	1.0
		b. One	0.5
		(c.) None	0.1
9. Wildlife access to other wetlands (overland). Travel lanes should be 50-100 feet wide.		(a.) Free access along well vegetated stream corridor, woodland, or lakeshore	1.0
		b. Access partially blocked by roads, urban areas, or other obstructions	0.5
		c. Access blocked by roads, urban areas, or other obstructions	0.1
10. Percent of wetland edge bordered by upland wildlife habitat (brush, woodland, active farmland, or idle land) at least 500 feet in width.		(a.) More than 40 percent	1.0
		b. From 10 to 40 percent	0.5
		c. Less than 10 percent	0.1

AVERAGE FVI FOR FUNCTIONAL VALUE 2 = Average of column D = .643 (6.425 ÷ 10)

EVALUATION AREA FOR FUNCTIONAL VALUE 2 = Total area of wetland = 1.25 acres.

Appendix B

PERMITS

DEPARTMENT OF THE ARMY PERMIT

Permittee Rhode Island Dept. of Transportation, James R. Capaldi, State Office Building, Providence, Rhode Island 02903

Permit No. RI-PAWT-87-041 APPLICATION NUMBER: 12-86-852

Issuing Office New England Division

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

place fill in waters and wetland in conjunction with the construction of the Woonsocket Industrial Highway, Route 99. The project involves the placement of fill material within 5 freshwater wetland sites adjacent to the Crook Fall Brook totaling 7.2 acres. In addition, temporary fill will impact 0.2 acres of wetland adjacent to the Blackstone River. Approximately 141,200 cubic yards of fill will be placed within the 5 wetland areas whereas, approximately 770 cubic yards of temporary fill will be placed below ordinary high water in order to facilitate bridge construction across the Blackstone River. In accordance with the attached plans entitled "Woonsocket Industrial Highway/Route 99 at Cumberland, Lincoln, Woonsocket, Providence County, State of Rhode Island" in 18 sheets dated 1/5/87.

Project Location:

In wetlands adjacent to Crook Fall Brook and the Blackstone River
At Lincoln and Cumberland, Rhode Island

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on December 31, 1990. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. All areas of wetlands which are disturbed during construction shall be restored to their approximate original elevation (but not higher) and condition by careful protection, and or removal, and replacement of existing soil and vegetation. In addition, if upland clearing, grubbing or other construction activity results in or may result in soil erosion with transport and deposition into wetland, devices such as hay bales, sediment trenches, etc., shall be installed and properly maintained to minimize such impacts during construction. These devices must be removed when no longer needed.

Further Information: (SPECIAL CONDITIONS CONTINUED ON PAGE 4

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

(PERMITTEE)	*(DATE)*

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

(DISTRICT ENGINEER) STANLEY J. MURPHY, MAJOR	9 FEB 87 *(DATE)*

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE)	*(DATE)*

☆U.S. GOVERNMENT PRINTING OFFICE: 1986 — 717-425

Application No. 23-85-610 Permit Number MA-WORS-85-177

Name of Applicant Signal Environmental Systems, Inc.

Effective Date September 12, 1985

Expiration Date (*If applicable*)

DEPARTMENT OF THE ARMY
PERMIT

Referring to written request dated August 6, 1985 for a permit to:

( ) Perform work in or affecting navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (*33 U.S.C. 403*);

(X) Discharge dredged or fill material into waters of the United States upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Clean Water Act (*33 U.S.C. 1344*);

( ) Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (*86 Stat. 1052; P.L. 92-532*);

Signal Environmental Systems, Inc.
Liberty Lane
Hampton, New Hampshire 03842

is hereby authorized by the Secretary of the Army:

to

place approximately 400 cubic yards of material into a 21,500 sq. ft. wetland area in order to construct a solid waste resource recovery facility. In addition a 25,000 sq. ft. wetland area will be created, as compensation for the wetlands being filled.

in tributary to Broad Meadow Brook

at Millbury, Massachusetts

in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit (*on drawings, give file number or other definite identification marks.*)

"Millbury Resource Recovery Facility"

in 4 undated sheets.

subject to the following conditions:

1. General Conditions:

a. That all activities identified and authorized herein shall be consistent with the terms and conditions of this permit; and that any activities not specifically identified and authorized herein shall constitute a violation of the terms and conditions of this permit which may result in the modification, suspension or revocation of this permit, in whole or in part, as set forth more specifically in General Conditions j or k hereto, and in the institution of such legal proceedings as the United States Government may consider appropriate, whether or not this permit has been previously modified, suspended or revoked in whole or in part.

b. That all activities authorized herein shall, if they involve, during their construction or operation, any discharge pollutants into waters of the United States or ocean waters, be at all times consistent with applicable water quality standar effluent limitations and standards of performance, prohibitions, pretreatment standards and management practices establi ed pursuant to the Clean Water Act (*33 U.S.C. 1344*), the Marine Protection, Research and Sanctuaries Act of 1972 (*P.L. 92-532, 86 Stat. 1052*), or pursuant to applicable State and local law.

c. That when the activity authorized herein involves a discharge during its construction or operation, or any pollutant (*including dredged or fill material*), into waters of the United States, the authorized activity shall, if applicable water quality standards are revised or modified during the term of this permit, be modified, if necessary, to conform with such revised or modified water quality standards within 6 months of the effective date of any revision or modification of water quality standards, or as directed by an implementation plan contained in such revised or modified standards, or within such longer period of time as the District Engineer, in consultation with the Regional Administrator of the Environmental Protection Agency, may determine to be reasonable under the circumstances.

d. That the discharge will not destroy a threatened or endangered species as identified under the Endangered Species Act, or endanger the critical habitat of such species.

e. That the permittee agrees to make every reasonable effort to prosecute the construction or operation of the work authorized herein in a manner so as to minimize any adverse impact on fish, wildlife, and natural environmental values.

f. That the permittee agrees that he will prosecute the construction or work authorized herein in a manner so as to minimize any degradation of water quality.

g. That the permittee shall allow the District Engineer or his authorized representative(s) or designee(s) to make periodic inspections at any time deemed necessary in order to assure that the activity being performed under authority of this permit is in accordance with the terms and conditions prescribed herein.

h. That the permittee shall maintain the structure or work authorized herein in good condition and in reasonable accordance with the plans and drawings attached hereto.

i. That this permit does not convey any property rights, either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations.

j. That this permit does not obviate the requirement to obtain state or local assent required by law for the activity authorized herein.

k. That this permit may be either modified, suspended or revoked in whole or in part pursuant to the policies and procedures of 33 CFR 325.7.

l. That in issuing this permit, the Government has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be materially false, materially incomplete or inaccurate, this permit may be modified, suspended or revoked, in whole or in part, and/or the Government may, in addition, institute appropriate legal proceedings.

m. That any modification, suspension, or revocation of this permit shall not be the basis for any claim for damages against the United States.

n. That the permittee shall notify the District Engineer at what time the activity authorized herein will be commenced, as far in advance of the time of commencement as the District Engineer may specify, and of any suspension of work, if for a period of more than one week, resumption of work and its completion.

o. That if the activity authorized herein is not completed on or before 31st day of Dec., 19 81, (*three years from the date of issuance of this permit unless otherwise specified*) this permit, if not previously revoked or specifically extended, shall automatically expire.

p. That this permit does not authorize or approve the construction of particular structures, the authorization or approval of which may require authorization by the Congress or other agencies of the Federal Government.

q. That if and when the permittee desires to abandon the activity authorized herein, unless such abandonment is part of a transfer procedure by which the permittee is transferring his interests herein to a third party pursuant to General Condition t hereof, he must restore the area to a condition satisfactory to the District Engineer.

r. That if the recording of this permit is possible under applicable State or local law, the permittee shall take such action as may be necessary to record this permit with the Register of Deeds or other appropriate official charged with the responsibility for maintaining records of title to and interests in real property.

s. That there shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein.

t. That this permit may not be transferred to a third party without prior written notice to the District Engineer, either by the transferee's written agreement to comply with all terms and conditions of this permit or by the transferee subscribing to this permit in the space provided below and thereby agreeing to comply with all terms and conditions of this permit. In addition, if the permittee transfers the interests authorized herein by conveyance of realty, the deed shall reference this permit and the terms and conditions specified herein and this permit shall be recorded along with the deed with the Register of Deeds or other appropriate official.

u. That if the permittee during prosecution of the work authorized herein, encounters a previously unidentified archeological or other cultural resource within the area subject to Department of the Army jurisdiction that might be eligible for listing in the National Register of Historic Places, he shall immediately notify the district engineer.

II. Special Conditions: (*Here list conditions relating specifically to the proposed structure or work authorized by this permit*):

a. The attached Water Quality Certification is hereby made a part of this permit.

b. A 25,000 square foot wetland area will be created, as compensation for the wetlands being filled.

937 0054

The following Special Conditions will be applicable when appropriate:

STRUCTURES IN OR AFFECTING NAVIGABLE WATERS OF THE UNITED STATES:

a. That this permit does not authorize the interference with any existing or proposed Federal project and that the permittee shall not be entitled to compensation for damage or injury to the structures or work authorized herein which may be caused by or result from existing or future operations undertaken by the United States in the public interest.

b. That no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized by this permit.

c. That if the display of lights and signals on any structure or work authorized herein is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the permittee.

d. That the permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the authorized structure or work, shall, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the waterway to its former conditions. If the permittee fails to comply with the direction of the Secretary of the Army or his authorized representative, the Secretary or his designee may restore the waterway to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.

e. Structures for Small Boats: That permittee hereby recognizes the possibility that the structure permitted herein may be subject to damage by wave wash from passing vessels. The issuance of this permit does not relieve the permittee from taking all proper steps to insure the integrity of the structure permitted herein and the safety of boats moored thereto from damage by wave wash and the permittee shall not hold the United States liable for any such damage.

MAINTENANCE DREDGING:

a. That when the work authorized herein includes periodic maintenance dredging, it may be performed under this permit for _____ years from the date of issuance of this permit (*ten years unless otherwise indicated*);

b. That the permittee will advise the District Engineer in writing at least two weeks before he intends to undertake any maintenance dredging.

DISCHARGES OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES:

a. That the discharge will be carried out in conformity with the goals and objectives of the EPA Guidelines established pursuant to Section 404(b) of the Clean Water Act and published in 40 CFR 230;

b. That the discharge will consist of suitable material free from toxic pollutants in toxic amounts.

c. That the fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution.

DISPOSAL OF DREDGED MATERIAL INTO OCEAN WATERS:

a. That the disposal will be carried out in conformity with the goals, objectives, and requirements of the EPA criteria established pursuant to Section 102 of the Marine Protection, Research and Sanctuaries Act of 1972, published in 40 CFR 220-228.

b. That the permittee shall place a copy of this permit in a conspicuous place in the vessel to be used for the transportation and/or disposal of the dredged material as authorized herein.

This permit shall become effective on the date of the District Engineer's signature.

Permittee hereby accepts and agrees to comply with the terms and conditions of this permit.

Alfred B. Scaramelli
PERMITTEE

9/11/85
DATE

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

EDWARD D. HAMMOND, LTC
DISTRICT ENGINEER,
U.S. ARMY, CORPS OF ENGINEERS

9/12/85
DATE

Transferee hereby agrees to comply with the terms and conditions of this permit.

TRANSFEREE

DATE

U.S. GOVERNMENT PRINTING OFFICE: 1985 O - 474-110

DEPARTMENT OF THE ARMY PERMIT

Permittee Stephen Barton, Connecticut Dept. of Transportation
P.O. Drawer A, Wethersfield, CT 06109-0801

Permit No. CT- APPLICATION NUMBER: 14-85-874-88-R

Issuing Office New England Division

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

This project is the second in a series to complete the relocation of Route 7 from Norwalk to Danbury, Connecticut. This permit authorizes the placement of fill material within 10 freshwater wetland sites, totalling 7.8 acres. In addition, 2.89 acres of Deering Pond will be filled and approximately 1,200 feet of the Silvermine River will be relocated to support the highway embankment.

(DESCRIPTION OF WORK CONTINUED ON PAGE 1-A)

Project Location:

In Norwalk River
At Norwalk, Connecticut

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on 31 December 1991 **. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.**

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

Mitigation measures include wetland replacement [illegible] acres of emergent marsh and shrub wetlands along the Norwalk River within the project right-of-way, and the restoration of a 1,050 foot reach of the Silvermine River. This reach presently does not convey the average daily flows since the river currently flows directly into Deering Pond. The purpose of the project is to provide adequate service to the travelling public in the Norwalk area and better access to the Merritt Parkway.

Site 1

This site is located between the Norwalk River and existing southbound on-ramp to Route 7, just south of New Caanan Avenue. At this site a 1.1 acre emergent marsh and shrub wetland will be created by excavation, deposition of a minimum of 12" of organic substrate, planting 25% of the area with shrubs, and seeding the area with herbaceous emergent vegetation.

Site 2

At this site, the Route 7 mainline will cross Deering Pond, causing fill encroachment into 2.9 acres of the pond. A 171' bridge consisting of two 85.5' spans and a center pier support will be built over the river. An upland animal passage way, and two shallow emergent habitat areas will be constructed on both sides of the embankment.

Site 3

This site is located east of Riverview Drive between Broad Street and Perry Avenue at the Silvermine River. Approximately 1,200 feet of the existing channel will be filled or abandoned, and approximately 890' of new channel will be constructed. The new channel will consist of a 30' bottom width for low flows which is designed to create a meandering thalweg. Riffle and pool complexes will be incorporated into the channel. In addition, the original (now abandoned) streambed of the Silvermine River, west of Deering Pond, will be restored as a mitigation. A 1,050 foot reach of the river will be the new permanent low-flow channel.

Site 4

The construction of the eastbound and westbound detour roads and ramps will require filling of 1.24 acres of wetlands. These wetlands are located near the Merritt Parkway overpass of Perry Avenue. The three wetlands are located northwest, northeast and southeast of the crossing of these two roads. A wetland creation area will be constructed at site 4 totalling 0.60 acres.

Site 5

The construction of a ramp northwest of the Route 7- Merritt Parkway interchange will necessitate the filling of 0.94 acres of wetlands, consisting of about 0.62 acres of wooded swamp and 0.32 acres of marsh. The impacted wetland system consists of three small interconnected wetlands.

Site 6

This site is located north of the Merritt Parkway near Louden Street. Two wetland parcels will be impacted by the construction. North of Louden Street, ramp construction will impact 0.40 acres of wetland. South of Louden Street, the ramp will impact 0.29 acres of wetland. A new drainage system under the ramps will also be installed.

Site 7

This site is located along the NUSCO power lines between Louden Street and Seir Hill Road. A total of 4.18 acres of wetland will be filled for the construction of Route 7. Two wetland creation areas, totalling approximately 3.8 acres, will also be constructed at Site 7.

Site 8

The Route 7 project will require relocating Oakwood Avenue to the west of the new highway. The north edge of a small wetland will be filled to accommodate this relocation. The total wetland area impacted is approximately 0.15 acres, comprised of shrub and wooded swamp.

Site 9

Wetland impacts at this site consist of three wetland areas. Approximately 0.38 acres of wooded swamp between Oakwood Avenue and Glover Avenue will be filled by the Route 7 embankment. The highway construction and relocated Grist Mill Road will necessitate the filling of 0.18 acres of wooded swamp. The third wetland fill area is near the intersection of Oakwood Avenue and Grist Mill Road. The relocation of Grist Mill Road will result in the filling of 0.3 acres of wooded swamp.

Site 10

This mitigation site is located north of Deering Pond along the east side of the proposed Route 7 highway. The mitigation will consist of two creation areas. The northern area will total 0.70 acres and will initially be utilized as a sedimentation basin. Following construction, it will be cleaned out and vegetated to create an emergent marsh wetland. South of Perry Road, a 200' long narrow riprap and grass drainage swale will be constructed to divert the highway runoff from the northern marsh wetland to Deering Pond.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

(SPECIAL CONDITIONS LISTED ON PAGE 4)

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension or revocation of this permit.

4. Reliance on Applicant's Data. The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

_____ _____

(PERMITTEE) *(DATE)*

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

William J. Leden — August 8, 1988

(DISTRICT ENGINEER) *(DATE)*

for Stanley J. Murphy, LTC
Corps of Engineers

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____ _____

(TRANSFEREE) *(DATE)*

★U.S. GOVERNMENT PRINTING OFFICE: 1986 — 717-488

DEPARTMENT OF THE ARMY PERMIT

Permittee Professional Properties Associates, One Pemp[illegible] Office Park, Suite 30[illegible]
Southbury, Connecticut 06488

Permit No CT-SOBY-87-[illegible] APPLICATION NUMBER: [illegible]

Issuing Office New England Division

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

discharge 4000 cubic yards of fill into 1.1 acres of wetland in conjunction with the development of "phase 2" of a Travel Center, including a bus station and parking area for the purpose of providing a commuter bus service and commuter parking for the Town of Southbury and vicinity.

In accordance with the attached plans entitled "Site Development Plan Phase "2", Travel Center Main Street South, Southbury, Connecticut Owned and Developed by Professional Properties Associates" in 6 pages dated "8/4/87".

Project Location:

Southbury, Ct at the southwest corner of Connecticut Route 172 and Main Street South.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on December 31, 1990. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

5. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

6. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

7. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. All areas of wetlands which are disturbed during construction shall be restored to their approximate original elevation (but not higher) and condition by careful protection, and or removal, and replacement of existing soil and vegetation. In addition, if upland clearing, grubbing or other construction activity results in or may result in soil erosion with transport and deposition into wetland, devices such as hay bales, sediment trenches, etc., shall be installed and properly maintained to minimize such impacts during construction. These devices must be removed when no longer needed.

Further Information: (SPECIAL CONDITIONS CONTINUED ON PAGE 4)

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability: In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

PROFESSIONAL PROPERTIES ASSOCIATES, INC.

William E Rubio — 11/4/87

(PERMITTEE) *(DATE)*

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

William E Rubio — 2 Nov 1987

(DISTRICT ENGINEER) *(DATE)*

STANLEY J. MURPHY, LTC.
CORPS OF ENGINEERS

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE) *(DATE)*

U.S. GOVERNMENT PRINTING OFFICE: 1986 — 717-425

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