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SITE ENVIRONMENTAL INVENTORY AND ASSESSMENT FOR NORTH END INDUSTRIAL AREA REDEVELOPMENT STUDY

Middletown, Connecticut

April, 1993

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NORTH END INDUSTRIAL AREA REDEVELOPMENT STUDY

MIDDLETOWN, CONNECTICUT

SITE ENVIRONMENTAL INVENTORY AND ASSESSMENT

INTRODUCTION

Middletown was settled in the 1650's as an agricultural community. During the 1700's it became an active shallow-harbor port for trade with the West Indies, and the official port of entry for the Connecticut River. In the late 1800's, with the completion of the railroad, the city became a regional industrial center. During the 19th century, the North End Industrial Area flourished with early factories powered by local streams and rivers. While the City is still a regional center for commerce and employment, development trends have shifted away from the downtown area.

The City of Middletown and the Connecticut Department of Economic Development have initiated a study of the North End Industrial Area to determine the feasibility of revitalizing the area as an urban industrial park. The study generally encompasses: Miller Street, Bridge Street, North Main Street, Pease Avenue, Spring Street and Stack Street (see Figure 1). The study area contains approximately 134 acres.

This environmental inventory and assessment is akin to any initial project feasibility study whereby the developer, in this instance the City, needs to reach a certain level of comfort prior to proceeding. The goal is to identify development opportunities and constraints, potential impacts, and the measures which will be required to overcome identified impacts, including the necessary studies and permits.

This environmental inventory and assessment should be distinguished from the more formal environmental impact study. An EIS is generally prepared once a specific activity is proposed and specific impacts can be measured. In this instance, the initial feasibility study is limited to the identification of possible limitations to development caused by a variety of natural resource and cultural factors. Consequently, the following is a presentation of the research that has been conducted to date in the areas perceived to pose possible limitations to development.

HISTORICAL AND ARCHEOLOGY RESOURCES

In order to identify prehistoric and historic archaeological and architectural resources within the project area, the Office of the State Archaeologist, the Connecticut Historical Commission, the Greater Middletown Preservation Trust and the Middletown Planning and Building departments

were contacted. Mr. Nick Bellantoni, State Archeologist reported that there are no prehistoric or historic archaeological sites within the boundaries of this project. There are two prehistoric Native American sites to the north of the project area which would presumably not be impacted by any contemplated redevelopment in the area.

Expected sensitivity toward the presence of archeological sites is determined by the Office of the State archaeologist using certain predictive characteristics, maps, existing studies and surveys and field expertise. It has been determined that due to the intensive industrial development and the presence of the railroad within the project area that the probability for unknown archeological sites is very low.

There are no buildings within the project area listed on the National Register of Historic Places. The project area abuts The Main Street Historical District which contains structures listed on and consequently protected by, the National Register of Historic Places. Although none of the historical district is included in the project area, the sensitivity of this district should be addressed by any future plans. The Charles J. Arrigoni Bridge is eligible for listing on the National Register.

The Greater Middletown Preservation Trust has complied a map entitled "Historical and Archaeological Resources" dated 1979. This map is on file in the Middletown Planning Department. A publication accompanying this map lists the following notable buildings which are included in the project area:

North Main Street

East side, northern end of street: EIS Automotive Corporation(we believe this to be the former Remington Rand building which may have been occupied by EIS Automotive at one time), late 19th-early 20th century. Industrial complex. Four original buildings; including 3-story main building, auxiliary buildings and power house. Brick with arched windows and corbelled cornices. Numerous later additions.

High Street

519 Date unknown, 2 stories, frame, brownstone foundation, 3-bay-wide facade, ridge of roof faces to street.

525,529,533,537,541 Identical "developer houses", probably early 20th century, 2 stories, frame, cross-gable roofs and side porches with shed roof, variety of siding; a typical pattern in this area.

526,528 Early 20th century apartments, 3 stories, brick with wood trim, Colonial Revival detail (i.e. keystones and columned porches).

622 Early 20th century 2.5 stories, cross-gable roof, brick, belt courses and decoration in variegated brick, similar to #627.

635 Queen Anne Stick-Style, 2 stories, clapboard and wood shingle siding, good original condition, similar to #641

Grove Street

East side of street: closely sited, similar, late 19th-early 20th century houses with gable ends to street, porches with brackets and turned posts.

These notable buildings are subject to the Town's Delay of Demolition Ordinance which applies to any structure over 50 years old. The ordinance requires public notice for at least 90 days. If no one comes forward, the building can be demolished. In the alternative, if the building inspector declares that the building is an unsafe structure, there is no required public notice and the building can then be demolished.

The Department of Environmental Protection's Office of Environmental Review recommends that buildings to be demolished or renovated be inspected for potentially hazardous materials including asbestos containing materials, lead paint, and electrical equipment which may contain PCB's. If such materials are present they must be handled according to applicable Federal and State regulations.

WATER QUALITY

In order to identify the origin of surface waters for the overall project area, the DEP's "Atlas of The Public Water Supply Sources and Drainage Basins of Connecticut" dated 1992 was reviewed. The project area lies within the Connecticut River Main Stem Regional Basin and the Mattabesset River Regional Basin. Subregionally, the project area lies within the Connecticut, Mattabesset and Coginchaug River Basins (see Figure 2).

The project area abuts the Connecticut River on the east, the Mattabesset River on the north and the Coginchaug River on the west. The water quality classification for the surface waters of the Mattabesset River is C/B according to the DEP's "Water Quality Classifications Map of Connecticut" dated 1987.

A C/B classification indicates that the water quality of the river is presently C, which does not meet water quality criteria or one or more designated uses due to pollution. Consequently, the State's goal is to upgrade to B. With a classification of C, the following uses are implied: habitat for certain fish and wildlife; certain recreational activities; agricultural and industrial supply; other legitimate uses including navigation. Swimming may be precluded and one or more quality criteria or designated uses impaired.

A classification of B implies the following uses: potential drinking water supply, fish and wildlife habitat, agricultural and industrial supply and other legitimate uses including navigation. The Coginchaug River is classified as Bc which adopts the B criteria in addition to a potential use for cold water fisheries.

The Connecticut River is classified as SC/SB which adopts the C/B criteria. S identifies coastal or marine waters which include marine fish and shell fish habitat.

Groundwater within the project area is classified as GB. Consequently, the water is presumed not suitable for human consumption without treatment and can be used as industrial process water or cooling water. The State's goal is to prevent further degradation by preventing any additional discharges which would cause irreversible contamination.

FLOOD PLAIN AREAS

To investigate the extent of the Connecticut River floodplain in the vicinity of the subject property, a review of published Federal Emergency Management Agency (FEMA) maps (dated December.16, 1980 and revised July 16, 1990), DEP Stream Channel Encroachment information and The City of Middletown's topography maps (two-foot contour interval, based upon aerial photogrammetry dated April 17, 1980), was conducted in addition to field inspections, in order to assess the accuracy of the data and mapping.

The State policy regarding floodplains as articulated at section 26-68d(b)(4) of the Connecticut General Statutes is to promote long-term non intensive floodplain uses and locate utilities to discourage floodplain development. Consequently, for the purposes of this study, it is desirable to indicate areas of inconsistency between the location of the FEMA 100-year flood elevation (El.23 feet) and the location of the 23 foot contour line as indicated on the City of Middletown's topography maps and observed in the field by Milone & MacBroom, Inc. personnel. These areas of inconsistency are shown on Map 1 as Area A (south of North Main Street), Area B (Bridge Street) and Area C (factory site). The FEMA map amendment process as of October 1, 1992 would require that Application/Certification Forms along with the Town's topography be submitted to reflect the identified areas of inconsistency. Since , for the purposes of this study, FEMA's flood elevation is not being challenged, hydrological analysis would not be required.

In Area A, FEMA maps delineate both the 100 and 500 year flood elevations which include a large percentage of this area which extends south of the railroad to approximately 300 feet south of Stack Street. The more accurate City of Middletown topographic maps do not support the FEMA delineation, since the maps show that there is a high point southerly of Remington Rand and easterly of the railroad tracks. As a result, the triangular area southwesterly of the tracks in the vicinity of Pease Avenue and Stack Street seems to be out of the flood plain even though the elevation is below El. 23.

In Area B, FEMA floodplain delineation includes the railroad tracks west of Bridge Street and Connecticut Route 9 within the 100 year flood area. The City of Middletown's topography does not support this delineation (see dashed line on Map 1). Although the topography does indicate that the Bridge Street area is within the 100 year flood boundary, the railroad tracks along the area's western border are shown to be at elevation 25 feet. Field investigations conducted by Milone & MacBroom, Inc. support the conditions indicated on the Town topography maps.

To completely protect the Bridge Street area from 100 year flood events, it appears that an embankment approximately 50 feet long would be required at the northern end of this area. A small earthen embankment was observed in this area during field observations however, its elevation and stability are unknown.

In Area C, FEMA delineates both the 100 and 500 year flood elevations so as to include the entrance to the municipal landfill on Johnson Street and all of the former Remington Rand facility located at 180 Johnson Street. Spot elevations on the Town's topography map supported by Milone & MacBroom, Inc. field observations indicate that these areas are above elevation 23 feet. To protect the north side of the factory from the 100 year flood event, an embankment would be required.

WETLANDS

Identification and Delineation

The identification and delineation of wetland boundaries, and a biological survey for the subject area was conducted by Soil Science & Environmental Services, Inc. Field investigations were performed on April 1, 1993. Due to the spring flooding it will be necessary to return to the site in early summer to complete the wetland characterization, any additional information will at that point be furnished to the city. The extent and distribution of wetland resources within or adjacent to the Project Area were determined during field investigations and through remote sensing (aerial photograph interpretation). Wetland boundaries within the project were plotted using the city's official Inland Wetlands maps (see Map 1).

Wetland soils in Connecticut are generally defined as all poorly and very poorly drained soils and the soils of floodplains. The wetlands that occur to the north and west of the Middletown North End Industrial Area are all associated with the Mattabesset and Coginchaug Rivers floodplains. According to the "Soil Survey of Middlesex County, Connecticut" (USDA Soil Conservation Service) and verified by recent field observations, the floodplain soils that are present include: Carlisle muck (Ce), Saco silt loam (Sb), Rumney silt loam (Rv) and Fluvents/Landfill.

The soils found within the Project Area were identified and classified as both natural and disturbed, man-made soil types. The drainage classes of these soils range from excessively well drained to very poorly drained.

The wetland soils found on the property are predominately naturally occurring. The very poorly drained Carlisle muck (Ce) series occurs primarily in the northern portion of the Project Area, immediately to the west and north of the Middletown Landfill. These are soils that have formed in deep organic material (muck). The Saco silt loam (Sb) was also identified within the Project Area. These soils occur both within the eastern portion of the Project Area, east of the landfill and the former Remington Rand building, and along a short section of its western boundary. The Saco silt loam (Sb) are very poorly drained medium over coarse textured, friable alluvial soils

developed on floodplains. Finally, the Rumney silt loam (Rv) was identified in the eastern portion of the Project Area. These poorly drained soils, which were found associated with the Saco (Sb) series, are medium textured, friable alluvial soils developed on floodplains.

The only sizable area of undisturbed upland soils occurs east of the former Remington Rand building. These soils have developed on a glacial terrace and are the Manchester gravelly sandy loam (Mg). These are excessively well drained, coarse textured, loose glacial fluvial soils (outwash).

Disturbed soils were mapped where more than two feet of the original soil surface has been altered by man through filling, excavating or grading. The upland soils within the North End Industrial Area have for the most part been severely altered by urban development. The predominant land form that was identified was mapped as Urban land (Ur). This unit consists of areas mostly covered by buildings, paved roads and parking lots. In addition, the northern portion of the project area was mapped as Land fill. This unit consists mostly of waste materials and layers of moderately coarse to coarse textured layers of cover materials. Finally, several small, scattered areas of the project areas were mapped as Udorthents - Urban land complex (UD/Ur). These are well to moderately well drained disturbed soils found near the former Remington Rand Building and other areas throughout the project area. The map units are generally too small to separate from the Urban land (Ur) unit.

The disturbed wetland soils were mapped as the Aquents (Aq) and Fluvents/Landfill. The Aquents (Aq) are characterized by a seasonal to prolonged high groundwater table and either support or are capable of supporting wetland vegetation. One area was found to have disturbed wetland soils (Aquents). It is a narrow and elongated area located between the former Remington Rand building and the landfill. North of the playground and east of the Rand property is an old landfill area located in the floodplain. This area is mapped as Fluvents/Landfill (Fl/Landfill). For more detailed descriptions of the above soil series, their appropriate uses and limitations, refer to Appendix 1.

Classification and Description

The wetlands associated with the Project Area can be considered at two scales: the sizeable contiguous wetland system that abuts or partially occurs within the Project Area, and the wetlands within the Project Area itself which are a part of this larger system. A detailed study of the large wetland system is beyond the scope of this report. However, the large wetland system was investigated since the portions within or immediately adjacent to the Project Area can only be truly evaluated as part of the entire wetland system or "wetland unit".

The Wetland System

The North End Industrial Area shares the landscape with a large and diverse wetland system that is hydrologically connected to the Coginchaug, Mattabesset and Connecticut Rivers. This wetland system, which includes an area known as the Boggy and Round Meadows, extends from the confluence of the Mattabesset and Connecticut Rivers northerly and easterly for about two

miles to the CT Route 72 bridge over the Mattabesset River, and from the confluence of the Mattabesset and Coginchaug Rivers southerly for roughly a mile to the CT Route 72 bridge over the Coginchaug River. The approximate boundaries of the wetland system are illustrated in Figure 3. It is estimated that this wetland system spans 744 acres.

The National Wetland Inventory (NWI) Map of the region indicates that the majority of the Boggy and Round Meadows system is tidally influenced (Figure 4). The NWI maps use two types of tidal designations: modifiers (e.g. N=regular tidal) and ecological subsystems (R1=riverine, tidal). This classification is consistent with available tidal data for the region - the mean tidal range at Portland is reported to be 26.4 inches (Metzler and Tiner 1993).

Sections of this large wetland system were inspected in the spring of 1992 as part of a town-wide study of the wetlands in the Town of Cromwell. Additionally, the portions of the system within the Project Area were inspected on April 3, 1993. The latter field inspection coincided with spring floods which precluded full access to the wetlands. As a result the inventory of wetland resources was limited to areas near high ground and to the woody vegetative strata. The major emphasis of the wetlands inventory was placed on the flora, rather than fauna, because the former are more readily inventoried at this time of year, and because they strongly influence other wetland functions (see Appendix 2 for plant list). The vegetative community types within the wetland areas have been classified according to the system established by Golet (1976) (see Appendix 3).

Floristically, the 744-acre wetland unit consists of 11 wetland subclasses and 147 vegetative community components (subunits). The wetland subclass units are: deciduous wooded swamp (WS-1), sapling shrub swamp (SS-1), bushy shrub swamp (SS-2), robust shallow marsh (SM-1), narrow-leaved shallow marsh (SM-2), narrow-leaved deep marsh (DM-5), robust deep marsh (DM-6), ungrazed wet meadow (M-1), flooded flats (F-1), vegetated open water (OW-1), and unvegetated open water habitat (OW-2). The dominant wetland classes are shallow marsh, wooded swamp (WS), and shrub swamp (SS).

Below are brief descriptions of each of the wetland classes and subclasses encountered within the delineated wetland unit:

Open Water (OW): This class contains on the average 3 - 10 feet of water, and is associated with shallow and deep marshes, and the Mattabesset and Coginchaug Rivers. Two subclasses, **unvegetated open water (OW-2),** and **vegetated open water (OW-1),** occur within the wetland unit. The former are the rivers and the latter are small waterbodies interspersed throughout the wetland.

Wet Meadow (M): This class may be inundated by as much as 6 inches of surface water between late fall and early spring. Only one subclass, **ungrazed wet meadow (M-1),** is found on the site. This typically occurs in association with agricultural or post agricultural land. A wide variety of emergent vegetation are supported within this subclass, including soft rush,

jewelweed, goldenrods and joe-pye-weeds and grasses.

Shallow Marsh (SM): This class is typically inundated by less than 6 inches of water during the growing season, except during spring floods, although surface water may be absent altogether during the drier summer months. A variety of robust and emergent marsh vegetation are adapted to this hydrological regime.

Two subclasses of shallow marsh occur within the wetland unit.: **robust shallow marsh (SM-1)** and **narrow-leaved shallow marsh (SM-2)**. Sedges and wild rice dominate the former, while the latter support such plants as bulrushes, sedges and iris. This is the most extensive class within the wetland unit

Deep Marsh (DM): Surface water in this wetland class ranges from 6 inches to 3 feet during the growing season. There are two deep marsh subclasses occurring within the wetland unit. They are the **narrow-leaved deep marsh (DM-5)**, in which wild rice and river bulrush are predominant, and the **broad-leaved deep marsh (DM-6)**, in which emergents such as arrow arum and pickerelweed are dominant. Within the wetland unit these subclasses are associated with open water habitats.

Shrub Swamp (SS): Shrubby vegetation dominate this wetland class, which contains up to 1 foot of surface water during the growing season. Two subclasses are found within the wetland unit: **sapling shrub swamp (SS-1)**, dominated by alders and red maple, and **bushy shrub swamp (SS-2)**, which occurs for the most part in the northeastern section of the wetland unit, and is dominated by a wide variety of shrubs such as swamp azalea, maleberry, chokeberry, blueberry, and silky dogwood.

Wooded Swamp (WS): This is the only wetland class dominated by trees. There are typically well-defined tree, shrub and herbaceous strata present. As much as one foot of surface water may be present seasonally, although saturated roots are more typical during the majority of the growing season. Only one subclass is present within the wetland unit - **deciduous wooded swamp (WS-1)**. Silver and red maple, sycamore, cottonwood, and green ash are the dominant overstory species.

Flooded Flats (F-1): This class applies to extensive river floodplains where flooding to a depth of 12 or more inches occurs annually during late fall, winter and spring. During the summer, the soil is saturated, with a few inches of surface water occurring locally. Vegetation is usually

emergent and not as dense as associated areas.

One subclass occurs within the wetland unit: the **seasonally flooded emergent flat (F-1)**. These areas are found along the banks of the Mattabesset River in the core of the wetland system.

Wetlands within the Project Area

The majority of the wetlands that occur within the project area are associated with the Mattabesset River and are located between the former Remington Rand building and CT Route 9. These wetlands include deciduous wooded swamp (WS-1) on poorly drained and moderately well drained soils, narrow-leaved shallow marsh (SM-2), broad-leaved deep marsh (DM-6), and vegetated open water (OW-1).

The deciduous wooded swamp is typical of a floodplain forest. The dominant species in the overstory are silver and red maple, and green ash, accompanied by cottonwood, American elm, sycamore and pin oak. The woody understory is fairly sparse in some areas and includes honeysuckle, silky and grey dogwood and willows. The herbaceous layer was not inventoried due to spring flooding but is expected to be dominated by such species as sensitive fern, virginia creeper, poison ivy, dewberry, nettles and grasses.

The shallow marsh is likely to be dominated by sedges and rushes while the deep marsh is expected to support such plants as arrow-arum and pickerelweed. Again, these areas were covered with water during the field investigation (spring floods). Finally, the areas of open water occur outside the deep marsh in deeper waters.

Other wetlands within the project area include a narrow fringe of wooded swamp, shallow and deep marsh areas, and open water habitat associated with the Mattabesset and Coginchaug River. All of these wetland areas occur around the landfill to the north, east and west at the toe of slope.

Finally, a narrow and elongated wetland area occurs between the former Remington Rand building and the Middletown landfill. This area is classified as a robust shallow marsh (SM-1) but also includes areas of narrow-leaved shallow marsh (SM-2) and ungrazed wet meadow (M-1). This disturbed wetland area is dominated by sedges, rushes, common reed, cattails, goldenrods, joe-pye-weed and sensitive fern. On the day of the inspection the soils were saturated and a few areas were inundated with up to one inch of water. Discoloration of the soil surface here might indicate that this wetland area receives leachate from the landfill.

WILDLIFE UTILIZATION ON THE SITE

In order to document the potential of the wetlands and uplands within and adjacent to the project area to support a variety of wildlife species a list was prepared cataloging all the animal species that can be expected to breed or forage on the site (see Appendix 4). A larger context region was selected equal to an area with its center on the site and a radius of 2000 feet. This larger area is

selected to accommodate local migration and typical movement within home ranges and territories that might overlap with the project area.

The list was compiled using habitat data collected in the field, such as special habitat requirements (e.g., cavity trees, thick leaf litter, abundant perches, vernal pools, loose soil for burrowing, etc.). The data were then merged with habitat type, territory size requirements and known regional abundance using standard reference manuals (DeGraff and Rudis, 1983; Martin et al., 1961). Species that were identified by sightings, scats, tracks and calls are also noted (Appendix 4). The data were collected during several inspections in the spring of 1992 and during one visit in April of 1993. The latter inspection focused on the project area while the former were conducted within the large contiguous wetland system described in the above section.

Wildlife requires certain resources for survival such as shelter, food, water and range. The kind, amount and position of these resources largely determine wildlife composition and population levels. Many important vegetative food sources exist in and next to the wetlands of the site. Mast, the nuts from trees, are important for animals such as deer, squirrel and many small mammals. Many of these same trees also supply cavity nesting sites for certain birds and mammals, and as snags they provide shelter from many invertebrates. These are a prime food for woodpeckers, nuthatches and other birds.

In general, the wetlands and the uplands within the project area are expected to support a wildlife population of **low-moderate** diversity. The locally dense understory, the presence of moisture or flowing water, the moderate abundance of berry-producing shrubs are some positive features. However, the available habitat has some limitations. The contiguous wooded forest (wetland and upland) is not large enough to provide sufficient space for the territories of many breeding bird pairs, particularly area-sensitive species. However, the entire wetland unit supports a wildlife population of **high-outstanding** diversity.

WETLANDS QUALITY ASSESSMENT

This assessment evaluates a roughly 744 acre wetland unit associated with the project area for a variety of functions. The unit was identified following the guidelines of Ammann et al. (1991). For example, a unit boundary is drawn when the wetland constricts to less than 50 feet wide. For each function the wetland is rated in one of four broad categories: low, moderate, high, and outstanding. The ratings resulting from the functional evaluation of the wetland unit are summarized in Table 1.

Scientific research has proven that wetlands provide many important biological, hydrological and social functions (Mitsch and Gosselink 1986). It is necessary to quantify the relative value of a wetland in regard to these functions to design environmentally sensitive site plans and to predict with confidence the impact that proposed development will have upon a wetland system. Several models have been developed in an attempt to assess the various functional values provided by wetlands. Two of the most widely used in Connecticut is the "Method for the Evaluation of Inland Wetlands in Connecticut" (Ammann et al. 1986) (often called Bulletin #9) and the Wildlife Wetland Evaluation Model II system devised by Golet (1976). In this report an adaptation of the

Bulletin #9 is used. The design, assumptions and specific use of these models, are briefly presented in Appendix 5 and 7.

It should be emphasized that a limitation of wetland evaluation models is that they usually rate the probability that a certain function could occur at an unspecified magnitude, rather than the actual quality of that function. They simply predict the likelihood that the function is performed by the wetland. Furthermore, evaluation models cannot incorporate the sensitivity of an experienced wetland specialist, who can discern the intricate and dynamic variations of a wetland system. Therefore the model's numerical scores and the subsequent ranks produced by the interpretive guidelines put forth in this report, should not be considered as more authoritative than the empirical assessment of the wetland unit.

Results

Based upon a comparison with other wetlands in the region, the large wetland system is outstanding. According to the regional National Wetland Inventory Maps (Figure 5) the wetland is in the top 10 list in Connecticut with respect to overall size. Moreover, it contains one the most extensive tidal freshwater marsh habitats along the Connecticut River.

The National Wetland Inventory (NWI) Maps show tidal freshwater wetlands associated with the Connecticut River extending as far north as the wetland unit (Round and Boggy Meadows). According to the NWI maps eight major tidal freshwater wetland systems are located on the Connecticut River

TABLE 1: WETLANDS ASSESSMENT SUMMARY

FUNCTION	Wetland 1
Ecological Integrity	high
Wildlife habitat	**outstanding
Finfish Habitat **Streams/Rivers** **Ponds/Lakes**	 high-outstanding moderate
Educational Potential	high
Visual/Aesthetics	high
Water-Based Recreation	high-outstanding
Groundwater Potential	moderate
Nutrient Retention & Sediment Trapping **- Opportunity** **- Efficiency**	 *moderate moderate-high
Shoreline Anchoring	outstanding
Forestry Potential	*moderate-high
Urban Wetland Quality	N/A
Flood Control	*high-outstanding
Archaeology **Native Americ. Indian** **Early Industrial**	 high moderate
Noteworthiness	**"Red Flag"**

Notes:

* ratings adjusted as per best professional judgement
** the ratings used are those derived from the Golet Method (1976)
Other ratings resulting from the use of DEP Bulletin #9 (adaptation)

Tidal Freshwater Wetland	Town	Size Rank
Round Meadows	Middletown/Cromwell	1
Pecausett Meadows	Portland	2
Chapman Pond	East Haddam	1
Chester Creek	Chester	1
Whalebone Creek	Lyme	2
Selden Cove	Lyme	1
Pratt Cove	Deep River	2
Salmon Cove	East Haddam	2

Based upon a visual inspection of the NWI maps, four of these wetland systems are considerably larger than the others, and are assigned a rank of "1". The wetland unit of interest is one of them and possibly the second largest one along the Connecticut River.

There are several additional factors that make the wetland unit highly significant. First, tidal freshwater wetlands such as this one support a diverse floral community contributing significantly to use by fish and wildlife of all types. Second, this wetland is critical habitat for a variety of rare plants and animals (e.g. least bittern, American bittern, green dragon etc.; see following section). Third, this wetland contains a wild rice marsh, which is an outstanding habitat type that functions as a significant resting and feeding area for migratory waterfowl, shorebirds, and rails. Fourth, productivity within wetlands such as this one is very high for plants and animals alike (e.g black duck). Finally, the waters, tidal flats, river bed and deep marshes provide important finfish habitat especially for anadromous species such as the American shad and blueback herring.

It should be noted that although the naturally occurring wetlands found within the project area are valuable components of the larger wetland system they have been somewhat disturbed by human activities in the form of filling and dumping. Furthermore, the disturbed wetland tongue behind the former Remington Rand building contributes very little to the overall quality of the wetland unit and to the wetlands within the project area.

FINFISH HABITAT (Rivers and Ponds)

The wetland unit provides outstanding finfish habitat. Included in the unit are the lower portions of the Coginchaug and Mattabesset Rivers. Both merge with the Connecticut River at the eastern extent of the wetland unit. This confluence is critical for both anadromous and non-migratory fish. Anadromous fish ascend from salt to fresh water to spawn (Odum et al. 1984). All of these major rivers support an abundant and diverse fish community. In particular, the Mattabesset River and associated floodplain possibly provide the most important spawning area for the northern pike (Esox lucius). According to staff at the Connecticut DEP Fisheries, many anadromous fish seasonally migrate up the Connecticut River (e.g. alewife, blueback herring, lamprey, shad, rainbow smelt, sea-run brown trout). Moreover, the sheltered inlets which are part of the wetland unit likely serve as a nursery for many additional non-anadromous species such as spotted shiner, white catfish, brown bullhead, carp and chain pickerel.

While there are no known fish species whose distribution is limited to the tidal freshwater wetlands that are part of the wetland unit, these areas provide habitat for a diverse and seasonally variable association of fishes. Freshwater forms are most common, and are usually found in shallow water near vegetation. The typical families include minnows, shiners, carps, sunfishes, crappies, bass and catfishes.

Although the majority of estuarine species occur most often in the more saline reaches of the estuary, several may be found in tidal freshwater wetlands, including killifishes, bay anchovy, tidewater silverside and hogchokers.

Anadromous or migratory fish spend their adult life in salt water but move upriver to freshwater to spawn. Many of these species are of commercial importance (herring, shad, striped bass). The juveniles of many species remain in the spawning ground and use tidal freshwater wetlands as a nursery area, feeding on small invertebrates before migrating to salt water in late fall or early winter.

Marine fishes occasionally utilize tidal freshwater wetlands as nursery areas during the summer, although this group of fishes is most commonly found in salt waters. Marine fishes are not commonly found in Connecticut tidal freshwater wetlands.

Tidal freshwater wetlands are utilized by fish at different life cycle stages. Odum et al. (1984) reported the following data for New England tidal freshwater wetlands:

Function	# of fish species
Spawning ground	24
Year round habitat for resident species	20
Nursery/Juvenile habitat	11

Odum et al. (1984) noted that the tidal freshwater fish community is composed of a seasonally variable association of the following groups: freshwater, estuarine, anadromous (spawning adults and juveniles), juveniles and adult marine forms (seasonal). In summary, it is very likely that the wetland unit, which includes tidal river and marsh components, supports a diverse and abundant fish community.

ENDANGERED SPECIES AND SPECIES OF SPECIAL CONCERN

According to records at the DEP Natural Diversity Data Base (Appendix 9), two species which are afforded protective status in Connecticut are known to occur in the wetland system found within the project area. The slenderwalker (Pomatiopsis lapidaria) is a "Species of Special Concern", and the American bittern (Botaurus limicola) is "Endangered". It is likely that the former is sensitive to water quality disturbances, and the latter is sensitive to nesting site disturbances. It is impossible to quantify potential impacts to these species at this time. This will require a study of their distribution in the area, life history, and sensitivity to disturbances once the

impacts from the potential redevelopment of the North End Industrial Area are known.

In addition to the above recorded species within the project area, other protected species are reputed to occur within the large wetland system and adjacent to the Connecticut River:.

Species	State Status
Least Bittern (Ixobrychus exilis)	Threatened
Bald eagle (Haliaetus leucocephalus)	Endangered
Shortnose sturgeon (Acipenser brevirostrum)	Endangered
Green dragon (Arisaema dracontium)	Special Concern
Dwarf bulrush (Lipocarpha micrantha)	Endangered

Finally, several species that are not protected but which are considered to be rare, uncommon or of commercial importance are known to occur within the wetland unit. These include the blue-winged teal, black duck, Virginia rail, and yellow rail.

SANITARY AND STORM SEWERS

Milone & MacBroom, Inc. performed a preliminary review of plans entitled "City of Middletown Water and Sewer Department Combined Sewer Separation. North End - Northern District, Contract No.3, North Main Street Area", dated July, 1991 by Cardinal Engineering, Inc. The area subject to this proposed sewer separation is depicted on Figure 6 and includes sections of North Main St., High St., Catherine St., Grove St. and Pease Avenue. Currently, these streets are served by combined sewers, which are to be separated this year according to a water/sewer department official.

An existing sewage pump station at North Main and Johnson Street discharges into a force main along North Main Street in an easterly direction. Another pump station near the mid-point of North Main Street (on the east side) also discharges to this force main. Catch basins in the area are widely dispersed and discharge through small diameter pipe to the combined sewer main. Low flows are conveyed to treatment while high flows bypass the pump system and are conveyed to the Connecticut River untreated.

The proposed separation scheme depicted on the plans will convey storm flows from drains at

higher elevations to discharge via a low pressure conduit served by water tight manhole covers, gasketed pipe and no surface inlets subject to floodplain inundation. Drains in areas within the influence of the riverine flooding will be served by a separate system (conventional pipe, manholes) which will carry flows via an existing 48" diameter brick sewer to the existing pumping station adjacent to Connecticut Route 9. This pump station is proposed to convey only storm flows.

The pump stations at North Main Street will remain but are proposed to convey only sanitary sewage through the existing force main. The existing sewer is to be replaced by new PVC gravity lines.

The plans also include surface improvements to the roads in the project area. These improvements include repaving, new curbing (granite on North Main), sidewalks (typically four foot wide concrete), driveways, plantings, loam and seeding and intersection improvements. The Miller Street pump station will also be upgraded. In addition, the existing 48 inch brick sewer will be rehabilitated from just east of North Main Street to the Connecticut River.

Analysis of the proposed gravity sanitary sewer revealed that the minimum capacity will be approximately 0.4 MGD. This new line appears to be adequate for the intensity of the existing land uses. An investigation of pump station and associated force main capacity was not performed as part of this study.

Detention for storm water is not likely to be needed for this area due to its position within the floodplain. Stormwater can be discharged to the Connecticut River with minimal impact. However, due to the nature of an industrial area, storm water runoff systems should be designed considering non-point sources of pollution and with best management practices in mind.

PRELIMINARY ENVIRONMENTAL ASSESSMENT

A preliminary environmental review of the subject area was conducted by Soil Science & Environmental Services, Inc. The purpose of this assessment was to evaluate the potential for environmental liability based upon the current condition of the property and its prior use. To fulfill the objectives for the study of the 134 acre Middletown North End Industrial Area, a relatively limited assessment of the project area was conducted, with investigatory emphasis placed on past or currently utilized commercial and industrial properties. These types of land uses pose the greatest risk for causing possible subsurface contamination as a result of the storage and handling of oils, chemicals and other hazardous substances.

Archived information on the historical land uses for the project area was obtained through a review of the Middletown City Directories and Sanborn Fire Insurance Maps, on file in the State Library, in addition to information on file with the Middletown Tax Assessor and Town Clerk and at the State Department of Environmental Protection (DEP).

To determine the status of regulatory compliance for properties in the project area the following

Environmental Protection Agency regulatory data bases (available for years 1987-1989) were searched: National Priorities List (NPL); Comprehensive Environmental Response, Compensation and Liability Index System (CERCLIS); Civil Enforcement Docket (DOCKET); Emergency Response Notification System (ERNS); Facility Index System (FINDS); Resource Conservation and Recovery Information System (RCRIS); Resource Conservation and Recovery Act (RCRA) Civil Enforc Act Violator and Enforcement Case Information (RCVIOL); Toxic Release Inventory (TRI). In addition, a review of a Federal Data Base obtained throug AP Environmental Data Company of Austin, Texas (updated regularly) was conducted. In addition, a file search was conducted of DEP's Oil & Chemical Spills, Waste Engineering & Enforcement, and Leaking Underground Storage Tanks, divisions. In order to obtain current information about all commercial and industrial properties within the subject area, an environmental questionaire was mailed out.

Information gathered during the study for all of the properties within the Middletown North End Industrial Area is presented in Appendix 10. The list identifies each property according to Tax Assessor's Map, Block and Lot numbers; street address; owner and present/past land uses. Under the Remark column, information relevent to known or potential environmental concerns are listed. Based on the available data, a list of properties have been identified as having areas of environmental concern (see Map 2, and Appendix 12). Recognizing the limitations presented in Appendix 11, the following is a summary of recommendations for these properties.

Due to current or past land uses associated with a potential for contamination, a Phase I site assessment in accordance with the DEP's Transfer Act Site Assessment (TASA) guidelines is suggested for the following properties:

Middletown Emergency Management Garage
104 Bridge Street

M.A.&M., Inc.
175 North Main Street

Hubert E. Butler Construction Company
175 Johnson Street

Former Meech & Stoddard Property
48, 74 & 76 North Main Street

Middletown Builders Supply/Nutmeg Oil
120 North Main Street

Bergen Architectural Woodworking
171 North Main Street

Casserino Warehouse
Pease Avenue

Former Greenhouse Operation
4,10 Pease Ave. and 15,19 Rome Ave.

Trigo Printing
12 Pease Avenue

Brings Machine Company
50 Saint Johns Street

NAPA Auto Supplt (Former SNET Garage)
24 Stack Street

Due to current or past land uses associated with a high potential for contamination, a Phase I site assessment in accordance with the DEP's Transfer Act Site Assessment (TASA) guidelines is recommended for the following properties:

Longworth Carlson, Inc. (LCI)
55, 75 North Main Street

Ron's Sales & Service Center
90 North Main Street

Transmission Works of Middletown
170 North Main St.

Renals Machine Shop
75 Pease Avenue

Former Dry Cleaner
9/11 Rome Avenue

Former Red Wing Oil Co.
Block 17-7,Lot 2

In the event of a transfer of property, the following sites (listed as small or large quantity generators of hazardous waste or hazardous waste disposal sites that are under the jurisdiction of the Connecticut Transfer Act) are required to undergo a Phase I site assessment:

E.I.S. Division of Standard Motor Products
695 High Street

Suburban Stationers, Inc.
16 Stack Street

Middletown Manufacturing Company

29, 33 Stack Street

Auburn Manufacturing Company
Pease Ave. & Stack Street

As a result of Phase I investigations, former land uses at the following site is assumed to have caused subsurface contamination and require Phase II investigations which include testing to determine the nature and extent of possible effects on the soil and groundwater:

Depot Distributors (formerly Remington Rand Facility)
180 Johnson Street

Three landfills were once actively operated in the study area. Former landfills exist to the north of Miller Street (active in the 1950's and 1960's) and immediately south of the junction of Pease Avenue and North Main Street (active in the 1920's through the 1940's). Little information could be found about these two former landfills. In addition, the Middletown Municipal Landfill is situated at the far northerly end of Johnson Street (active form mid 1950's to 1991). A variety of hazardous substances have reportedly been disposed of at the Middletown Municipal Landfill which made this property elegible for being listed in the EPA's CERCLIS Database of hazardous waste disposal sites. Consequently, a limited Phase 1 with subsurface investigation is recommended for the landfill areas.

In addition to the preliminary investigations outlined above, Soil Sciences and Environmental Services, Inc. has prepared a Phase I Environmental Site Assessment of the former Remington Rand facility located at 180 Johnson Street. The purpose of the assessment was to identify possible environmental hazards associated with the site or neighboring properties which could impose potential liabilities on current and future owners of the property. The assessment involved a site inspection, historical research, an overview of the sites environmental setting, personal interviews and a review of available information on file at the DEP. The summary of the Phase 1 Environmental Site Assessment is presented here, the detailed report is contained in Appendix 13

SUMMARY

Phase 1 Environmental Site Assessment of the Former Remington Rand Facility

The preliminary site assessment revealed that the study site is located within an industrial area of Middletown which is situated just south of the Middletown Municipal Landfill. Since the late 1800's, the study site has been utilized by several different manufacturing firms producing bicycles, motor bicycles, automobiles, typewriters, metal goods and typewriter supplies. Between 1951 and 1971 Remington Office Machines occupied the study site and produced plaster plates, typewriter ribbon, carbon paper, uniac ribbon and microfilm. During this time they discharged untreated industrial wastes to the Mattabesset River. The industrial wastes apparently contained

ink, carbon, wax, oil, detergent, acetone, dye, clay and pigment. Apparently these wastes were generated during ink manufacturing, machining, nickel plating, metal casting, carbon coating, case hardening and other manufacturing operations. In 1969, the DEP Water Resources Commission ordered Remington Office Machines to "Discharge all waterborne industrial wastes to the Middletown Municipal (Sewer) System following adequate pretreatment ... or in lieu thereof, construct a waste treatment facility for adequately treating all waterborne industrial wastes and discharge the treated effluent to an acceptable water course." Between 1970 and 1971, Remington Office Machines moved their operation to Blue Bell, Pennsylvania. No other information regarding the study site was found on file at the DEP or listed in any of the EPA environmental regulatory databases. Various companies including EIS Brake Parts, Depot Distributors Wholesale Kitchen Cabinets and Stone Corrugated Containers have occupied the study site since Remington Office Machines vacated the property.

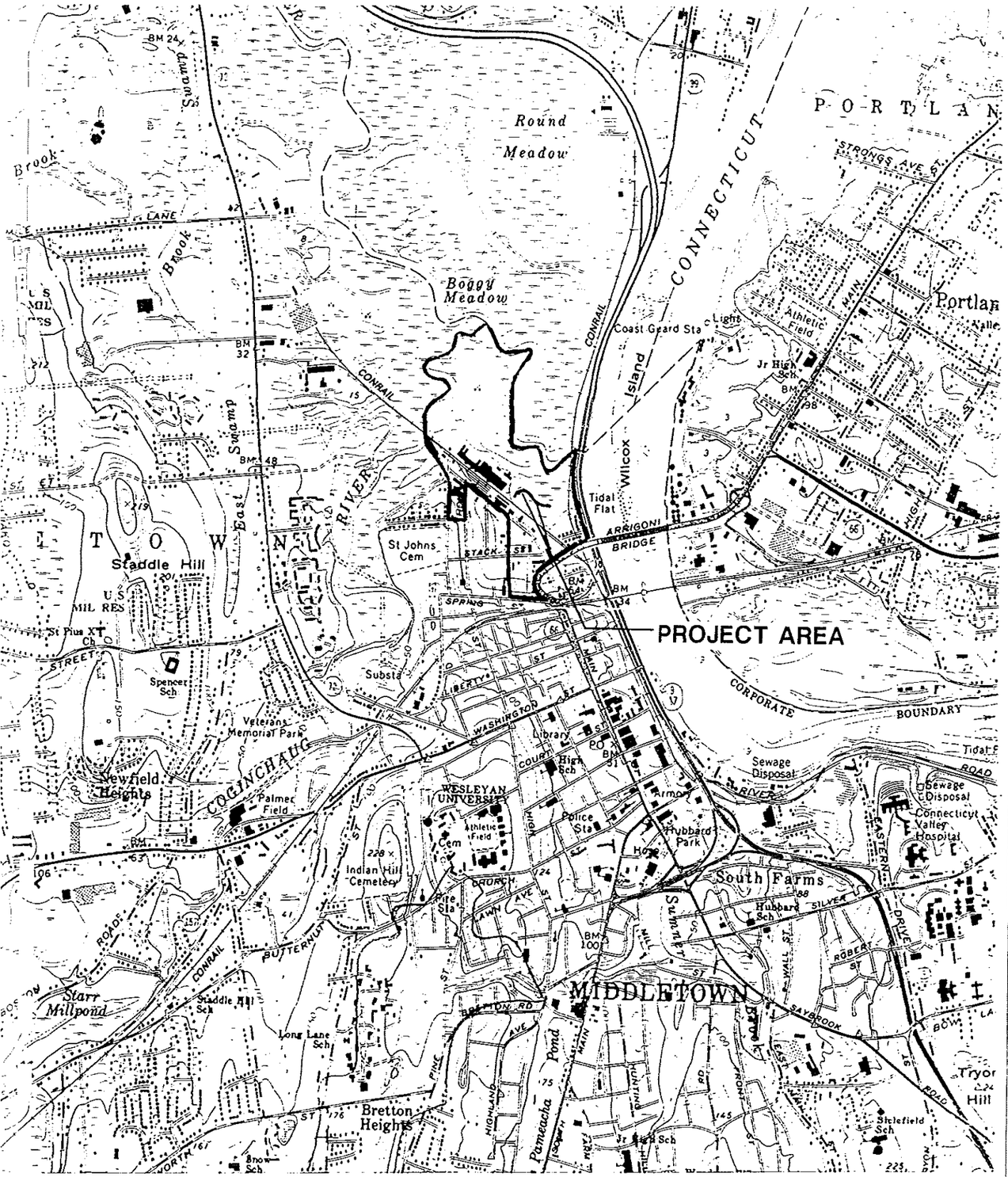
A site inspection of the former Remington Rand Facility revealed the possible presence of asbestos containing materials; peeling paint which may contain lead; possible PCB's in transformers, light ballasts and hydraulic fluids; improperly stored oils/chemicals; floor drains leading to trenches (two of which contained an unknown black liquid substance); several locations of former or present underground and aboveground storage tanks. Two separate areas with dark stained soils and distressed vegetation indicative of possible soil contamination were observed around the metal building located towards the southeastern side of the property (Figure 2, Appendix 13). Drums and other metal storage containers were observed in a fairly large fill or dump area located in the general vicinity of the Right of Way which is situated northeast of the Boiler Room Building. Furthermore, a strong methane odor indicative of landfill leachate was observed in a storm drain located near the northern corner of Building 11 which is on the northwestern side of the property.

Neighboring properties include the Middletown Municipal Landfill to the north which is an EPA listed CERCLIS or hazardous waste disposal site, the Mattabesset River and its associated wetlands to the east which are considered sensitive areas of environmental concern, the NY, NH & H RR and several commercial businesses including Standard Motor Products (EIS) to the south which is listed with the EPA as a Large Quantity Generator of Hazardous Waste, and the Hubert E. Butler Construction Company and the Coginchaug River to the west. Further to the south and southeast of the study site are several more commercial and industrial properties located within the Middletown North End Industrial Area.

Based on the information obtained in our Phase I Environmental Site Assessment, SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. recommends a Phase II Environmental Site Assessment be conducted in order to determine the nature and extent of possible subsurface soil and groundwater contamination at the study site. Environmental liabilities may exist at the

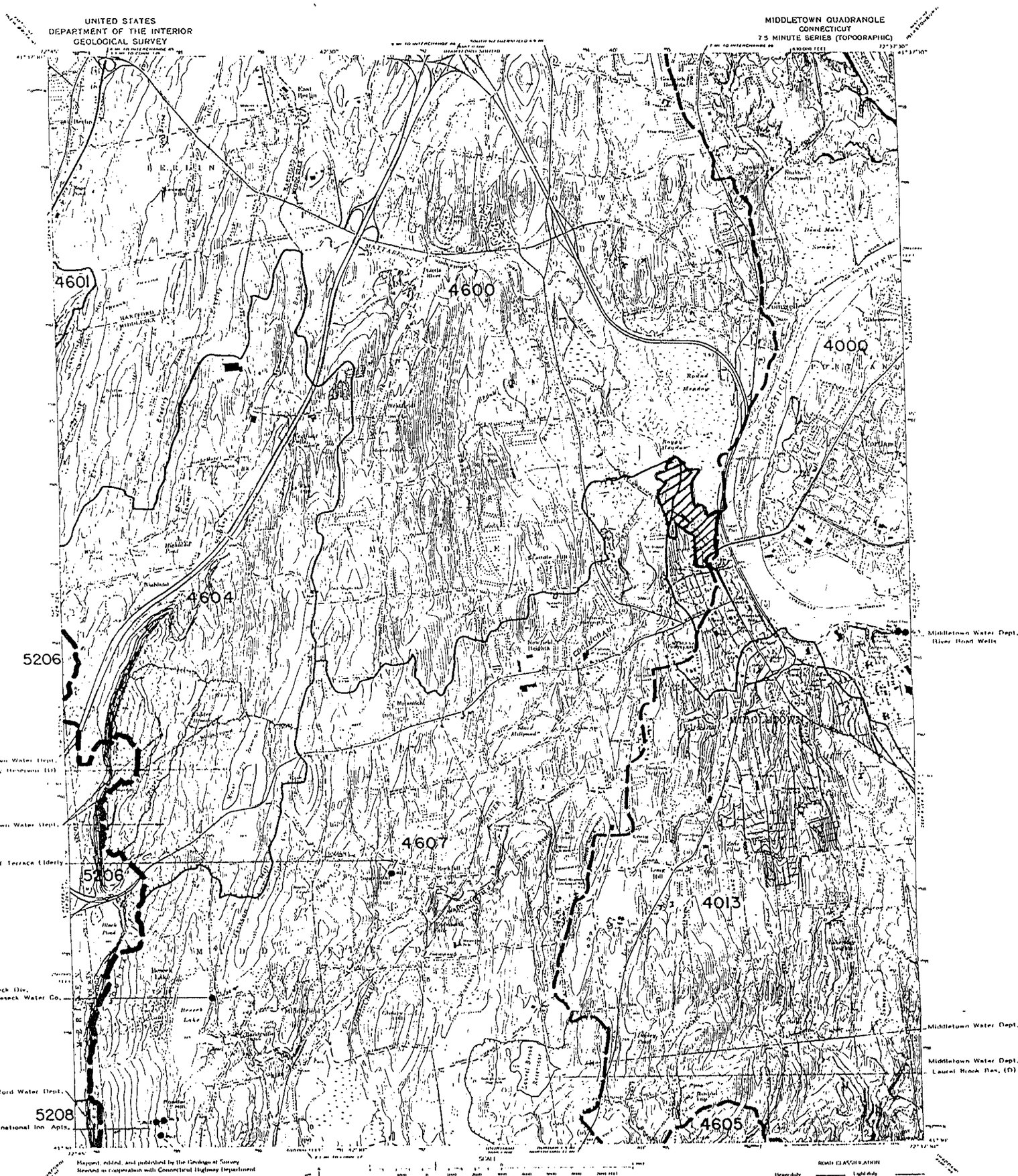
study site as a result of historical on-site land uses and possible impacts from the Middletown Municipal Landfill which borders the northern side of the study site.

FIGURES



NORTH END INDUSTRIAL AREA
REDEVELOPMENT STUDY

FIGURE 1



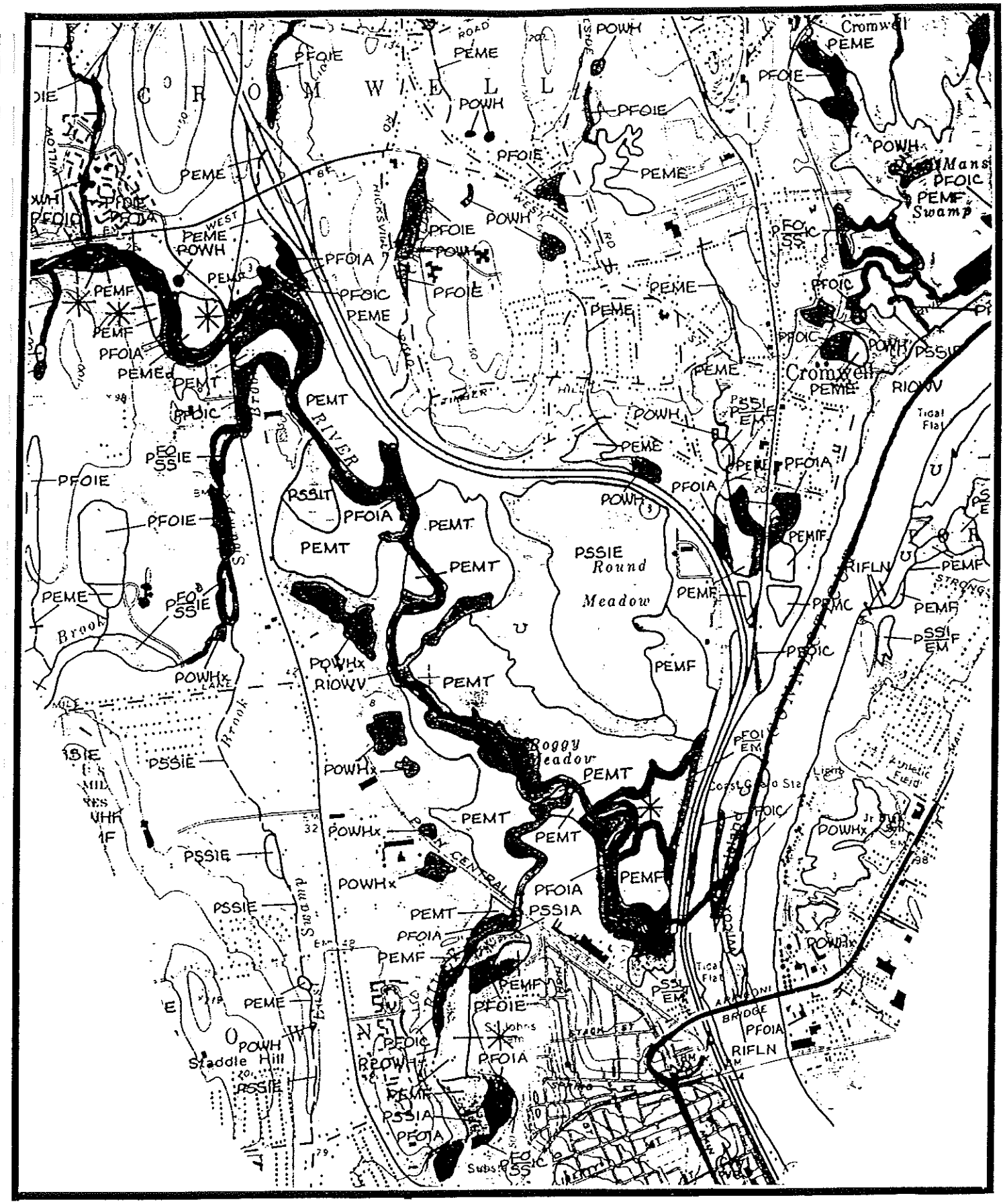
NORTHEND INDUSTRIAL AREA
REDEVELOPMENT STUDY

FIGURE 2

WILL BE COLOR REPRODUCED FOR FINAL REPORT

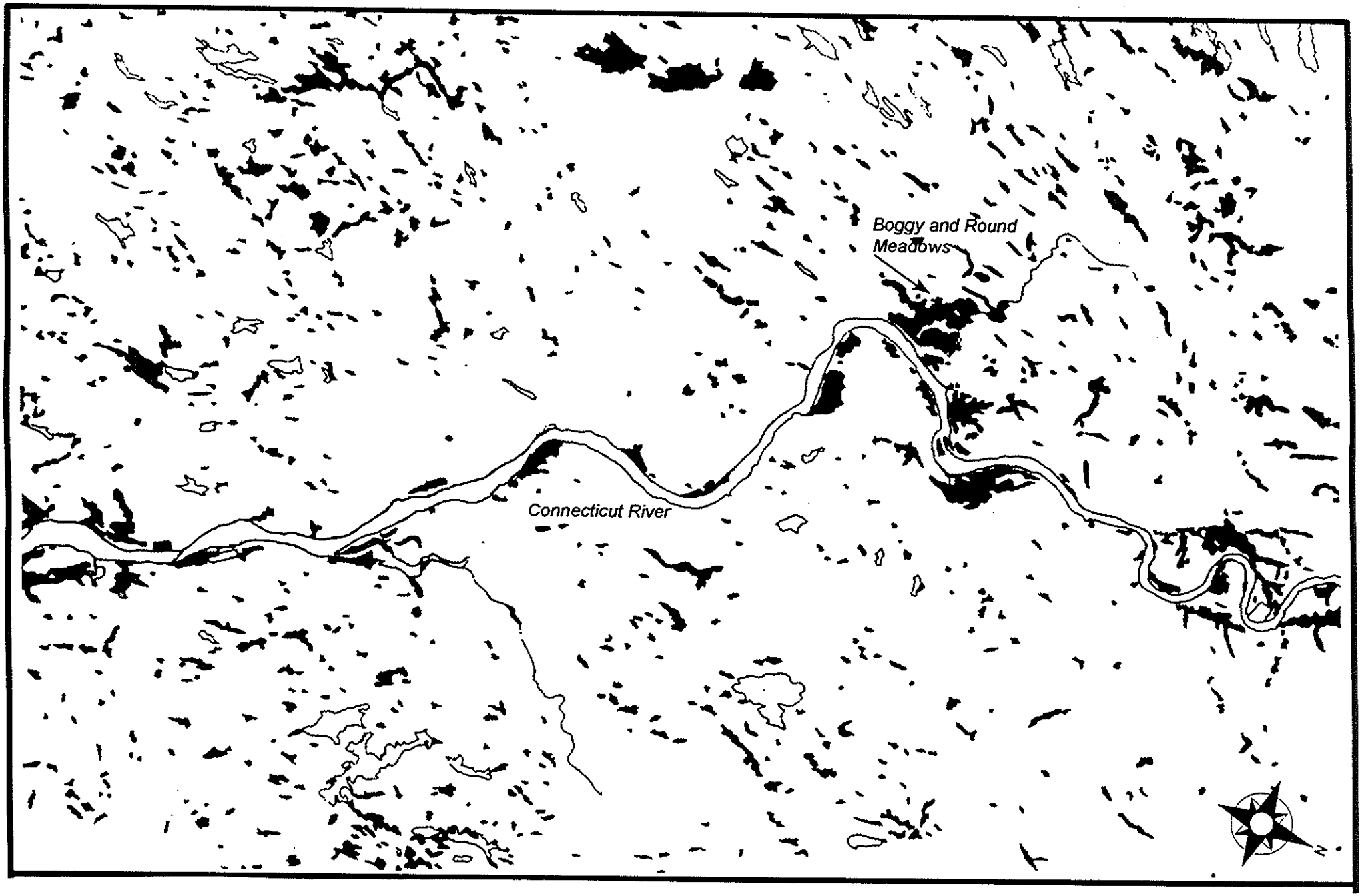
NORTHEND INDUSTRIAL AREA
REDEVELOPMENT STUDY

FIGURE 3



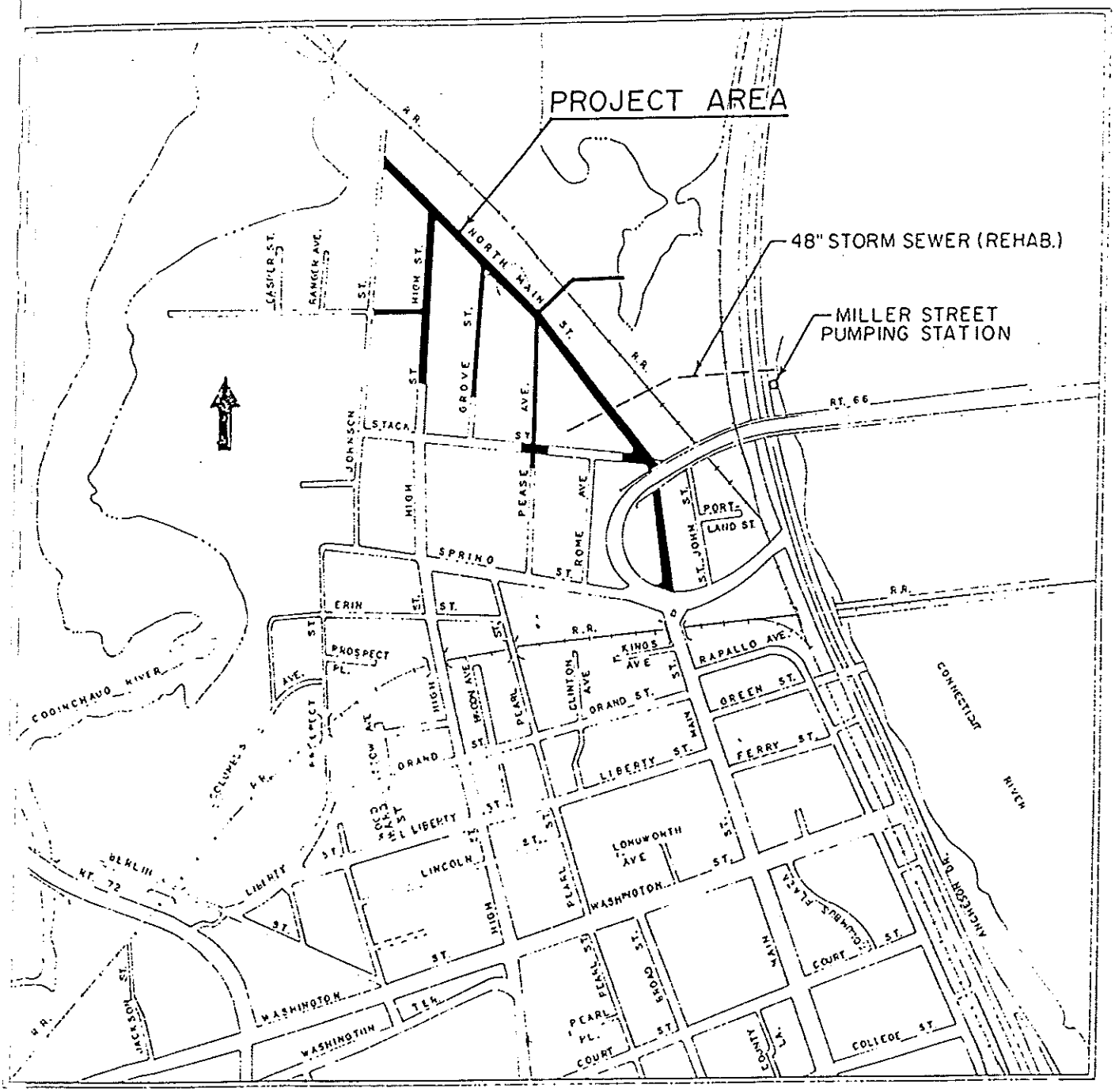
NORTH END INDUSTRIAL AREA
REDEVELOPMENT STUDY

FIGURE 4



NORTHEND INDUSTRIAL AREA
REDEVELOPMENT STUDY

FIGURE 5



LOCATION MAP

SCALE: 1" = 400'

NORTH END INDUSTRIAL AREA REDEVELOPMENT STUDY

FIGURE 6

Appendix

APPENDICES

APPENDIX 1

CARLISLE SERIES

The Carlisle series consists of very poorly drained soils formed in organic materials more than 51 inches thick. Carlisle soils are in bogs within lake till plains, lake plains, outwash plains and moraines. Size of the bogs range from small enclosed depressions to bogs of several hundred acres in size. Slope gradients are less than 2 percent.

Typically this soil has a black muck layer to a depth of 60 inches or more.

Drainage and permeability: Very poorly drained. The water table is at or near the surface in the Carlisle soil during most of the year. Typically, the soil is inundated for several weeks from fall to spring. Surface runoff is very slow. Permeability is moderately slow to moderately rapid.

Use and Vegetation: Most of this soil is in native vegetation. Much of it is in marsh grasses, including sedges, reeds, and grasses, and shrubs, including willow, alder and dogwood. Wooded areas contain elm, ash, red maple, willow, tamarack, aspen and alder. Small areas have been drained and are used for crop production.

Development Capability/Constraints:
On-site sewage disposal: severe-ponding
Shallow Excavations: severe-excess humus, ponding
Buildings with or without basements: severe-ponding, low strength
Local roads and streets: severe-ponding, low strength
Construction material: Roadfill-poor-wetness, low strength, Sand-improbable: excess humus, Gravel-improbable: excess humus, Topsoil-poor: wetness, excess humus

Taxonomic Class: Euic, mesic Typic Medisaprists

Typical Pedon: Carlisle muck

Oa1--0 to 8 inches, black muck; 10 percent fiber; weak granular structure; friable; neutral; abrupt smooth boundary.

Oa2--8 to 31 inches, dark reddish brown muck; 10 percent fiber; weak granular structure; friable; neutral; clear smooth boundary.

Oa3--31 to 46 inches, dark reddish brown muck; 25 percent fiber; massive; friable; slightly acid; clear smooth boundary.

Oa4--46 to 60 inches, dark reddish brown muck; 40 percent fiber; massive; friable; neutral.

Source of information: USDA Soil Conservation Service

LANDFILL

The Landfill soil mapping unit identifies areas used for the disposal of trash. Most areas vary from 3 to 50 acres in size. While in active use, standard practice calls for the addition of 6 inches of soil material as a cover over the trash on a daily basis. In some of the older landfills, the trash was burned and was not covered with soil material.

Lanfills require onsite investigation and evaluation if considered for other land uses. This map unit is not assigned to any capability classes.

Source of information: USDA Soil Conservation Service

MANCHESTER SERIES

The Manchester series consists of very deep, excessively drained soils formed in a shallow, loamy sand mantle underlain by gravelly sand, water deposited glacial outwash materials. They are level to very steep soils on outwash plains, terraces, deltas, kames and eskers. The soils formed in loamy over stratified sandy and gravelly glacial outwash derived mainly from Triassic sandstone, shale, conglomerate and basalt.

Typically these soils have a reddish brown gravelly sandy loam surface layer 6 inches thick. The subsoil layer from 6 to 16 inches is yellowish red gravelly sandy loam. The substratum from 16 to 60 inches is yellowish brown stratified sand and gravel.

Drainage and permeability: Excessively drained. The water table is commonly at a depth below 6 feet. Surface runoff is slow to medium. Permeability is rapid in the surface layer and subsoil and very rapid in the substratum.

Use and Vegetation: Many areas are cleared for agricultural use and community development. Wooded areas typically support white and red oak, white pine and hickory.

Development Capability/Constraints:*
On-site sewage disposal: severe: poor filter
Shallow excavations: severe: cutbanks cave
Buildings with or without basements: slight to moderate
Local roads and streets: slight to moderate
*note: Soils on slopes exceeding 15% have severe constraints due to slope.
Construction material: Roadfill-good, Sand-probable, Gravel-probable, Topsoil-poor: too sandy, stony.

Taxonomic Class: Sandy skeletal, mixed, mesic Typic Udorthents.

Typical Pedon: Manchester gravelly sandy loam - forested.

O--1 to 0 inches, fresh and partially decomposed leaf litter.

Ap--0 to 6 inches, reddish brown gravelly sandy loam; weak granular structure; very friable; many fine and medium roots; 20 percent coarse fragments; strongly acid; clear wavy boundary.

Bw1--6 to 10 inches, yellowish red gravelly sandy loam; massive; very friable; few fine and medium roots; 25 percent coarse fragments; strongly acid; clear wavy boundary.

Bw2--10 to 16 inches, yellowish red gravelly loamy sand; single grain; loose; few roots; 30 percent coarse fragments; strongly acid; gradual wavy boundary.

2C--16 to 60 inches, reddish brown sand and gravel; single grain; loose; few fine roots; 50 percent coarse fragments; strongly acid.

Source of information: USDA Soil Conservation Service

RIPPOWAM SERIES

This soil was formerly mapped in Connecticut as Rumney.

The Rippowam series consists of deep, poorly drained soils formed in loamy, alluvial sediments. They are nearly level soils on floodplains. The soils formed in recent alluvium derived mainly from schist, gneiss or granite.

Typically, these soils have a very dark grayish brown fine sandy loam surface layer 5 inches thick. The subsoil from 5 to 27 inches is dark grayish brown, mottled fine sandy loam and sandy loam. From 27 to 60 inches the substratum is dark gray and grayish brown, loose stratified, loamy sand and very gravelly sand.

Drainage and permeability: Poorly drained. The seasonal high water table is within 0 to 18 inches of the surface from fall through spring. Surface runoff is slow. Permeability is moderate to moderately rapid in the surface layer and subsoil and rapid or very rapid in the substratum. This soil is subject to frequent flooding, mainly from fall to spring.

Use and Vegetation: Most areas are in brushy woodland consisting of alder, willow and red maple. A few areas are cleared and used mainly for hay and pasture.

Development Capabilities/Constraints:
On-site sewage disposal: severe-flooding, wetness, poor filter
Shallow excavations: severe-cutbanks cave, wetness
Buildings with or without basements: severe-flooding, wetness
Local roads and streets: severe-flooding, wetness, frost action
Construction material: Roadfill-poor: wetness, Sand-probable, Gravel-improbable: too sandy, Topsoil-poor: wetness.

Taxonomic Class: Coarse-loamy, mixed, nonacid, mesic Aeric Fluvaquents.

Typical Pedon: Rippowam fine sandy loam - woodland.

A--0 to 5 inches, very dark grayish brown fine sandy loam; weak medium granular structure; friable; many fine and medium roots; strongly acid; clear wavy boundary.

B1--5 to 12 inches, dark grayish brown fine sandy loam; distinct strong brown mottles; weak medium subangular structure; friable; few fine and medium roots; very strongly acid; clear wavy boundary.

B2--12 to 19 inches, dark gray fine sandy loam, many distinct yellowish red mottles; weak medium subangular blocky structure; friable; few roots; strongly acid; clear wavy boundary.

B3--19 to 24 inches, grayish brown sandy loam; distinct strong brown mottles; massive; friable; few roots; strongly acid; clear wavy boundary.

B4--24 to 27 inches, very dark gray sandy loam; massive; friable; few roots; medium acid; clear wavy boundary.

2C1--27 to 31 inches, dark gray loamy sand; massive; friable; medium acid; clear wavy boundary.

2C2--31 to 60 inches, grayish brown gravelly sand; single grain; loose; medium acid.

Source of information: USDA Soil Conservation Service

SACO SERIES

The Saco series consists of deep, very poorly drained soils formed in coarse-silty, alluvial sediments. The soils are on low flood plains along streams and rivers and are frequently flooded. Saco soils formed in recent alluvium derived mainly from schist, gneiss or granite.

Typically, the surface layer is very dark grayish brown mucky silt loam 6 inches thick. The substratum is dark gray and very dark gray silt loam to a depth of 60 inches or more.

Drainage and permeability: Very poorly drained. The water table is typically at or very near to the soil surface from fall through spring. The soil is subject to frequent flooding. Surface runoff is slow or very slow, and water covers some areas from late fall through early spring. Permeability is moderate.

Use and Vegetation: Most areas of this soil are wooded or idle. A few small areas are in pasture. This soil is poorly suited to cultivated crops and commercial timber production because of wetness and frequent flooding.

Development Capabilities/Constraints:
On-site sewage disposal: severe-floods, wetness
Shallow excavations: severe-floods, wetness, cutbanks cave
Buildings with or without basements: severe-floods, wetness, frost action
Local roads and streets: severe-floods, wetness, frost action
Construction material: Roadfill-poor: wetness, frost action; Sand-unsuited: excess fines; Gravel-unsuited: excess fines; Topsoil-poor: wetness

Taxonomic Class: Coarse-silty, mixed, nonacid, mesic Fluvaquentic Humaquepts

Typical Pedon: Saco silt loam - idle marsh

A--0 to 6 inches, very dark grayish brown mucky silt loam; weak fine granular structure; friable; slightly acid; gradual wavy boundary.

C1--6 to 18 inches, dark gray silt loam; few fine distinct light olive brown mottles; massive; friable; neutral; gradual wavy boundary.

C2--18 to 60 inches, very dark gray silt loam; massive; friable; neutral.

Source of information: USDA Soil Conservation Service

UDORTHENTS

Udorthents consist of well drained to moderately well drained soils that have been altered by cutting, filling, or grading. The areas either have had 2 feet or more of the upper part of the original soil removed or have more than 2 feet of fill material on top of the original soil. Made land soils can be found on any soil type but typically on glacial till plains and outwash plains and stream terraces.

These areas are mostly irregular in shape or are rectangular or long and narrow, and they generally range from 5 to 60 acres. Slopes range from 0 to 15 percent. Made land is commonly more than 60 inches thick and is 10 to 65 percent rock fragments. Reaction is very strong to slightly acid.

Drainage and permeability: Well drained to moderately well drained. The determination of the water table and permeability requires onsite investigation and evaluation..

Use and Vegetation: Determination of the suitability of this unit for any use requires onsite investigation and evaluation. Vegetation is typically sparse and stressed due to the lack of soil materials.

Development Capabilities: Determination of the suitability of this unit for any use requires onsite investigation and evaluation.

Taxonomic Class: Udorthents

Typical Pedon: Because of the variability of Made land, a typical pedon is not given.

Source of information: USDA Soil Conservation Service

URBAN LAND

The Urban land soil mapping unit consists mainly of areas that are covered by paved roads, parking lots, buildings and other structure. The areas are mostly in densely populated regions of the State. They range in size mostly from 5 to several hundred acres. Most of the original soils underlying Urban land have been altered by excavating or have been covered with fill material. Slopes range from 0 to 25 percent but are mostly 0 to 8 percent. Included with this mapping unit are small, intermingled areas of Udorthents.

This miscellaneous area requires onsite investigation and evaluation for most land uses. This map unit is not assigned to any capability classes.

Source of information: USDA Soil Conservation Service

APPENDIX 2

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.
WETLAND UNIT DATA SHEET

PROJECT NAME: North End Industrial Area, Middletown, CT

WETLAND UNIT NO.: 1A		TOWN TOPO MAP NO.:
Total Size: _11.0_ acres	Date: 4/1/93 Investigator:GTL	Aerial Photo (1990): 47/3556-58 (1986):

Weather on Day of Inspection: Warm, Sunny
Recent Precipitation: Average ___ Below ___ Above _x_

WETLAND SUBUNITS:
A) Deciduous wooded swamp (WS-1) 6.50 acres
B) Narrow-leaved shallow marsh (SM-2) 2.00 acres
C) Broad-leaved deep marsh (DM-6) 2.00 acres
* D) Vegetated Open water (OW-2) 0.50 acres

Hydrology
Seeps _x_ Sheet flow _x_ Watercourse(s) _x_ Other: _____
Discharge: Low _x_ Moderate ___ High ___

Watercourse(s) (Local Name(s): Mattabesset River)
Perennial _x_ Intermittent ___ Average width: _____ feet Average depth: _____ inches
Flows: Low ___ Moderate ___ High _x_ Streambed material: _____

Diversity: Lineal: Low _x_ Moderate ___ High ___
Cross-sectional: Low ___ Moderate _x_ High ___

Turbidity (visual): Low ___ Moderate _x_ High ___ Gradient: Low _x_ Moderate ___ High ___
pH: _____ Conductivity: _____ S Temperature: _____ C ORP: _____ mV

NOTES*: This includes the wetlands located within the project area and not the entire 744-acre wetland unit

*Additional Subunits and/or Notes on separate sheet as needed

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.
VEGETATIVE INVENTORY: WOODED SWAMPS

PROJECT NAME: North End Industrial Area, Middletown, Connecticut

WETLAND UNIT NO.:1A **SUBUNIT:** a **Date:** 4/1/93
CLASSIFICATION: WS-1 **Investigator:** GTL

TREES
Broad-leaved Deciduous

Red maple _C_	Grey birch _S_	American elm _U_	Black willow ___	Red oak ___
Sugar maple ___	Paper birch ___	Slippery elm ___	Weeping willow ___	White oak ___
Silver maple _C_	Black birch ___	Black cherry ___	White mulberry ___	Black oak ___
White ash ___	Yellow birch _S_	Hophornbeam ___	Trembling aspen ___	Pin oak _U_
Green ash _U_	Tulip poplar ___	Cottonwood _U_	Bigtooth aspen ___	Beech ___
Box elder _S_	Black gum ___	Sycamore _U_	Swamp white oak ___	Basswood ___

Shagbark hickory ___ Pignut hickory ___ Mockernut hickory ___ Bitternut hickory ___
_____ ___ _____ ___ _____ ___ _____ ___

Needle-leaved Evergreen Trees
Atlantic white cedar ___ White pine ___ Eastern hemlock ___ Norway spruce ___
Red cedar _S_ Black spruce ___ Pitch pine ___ Larch ___ _____ ___

Dead
Larger than 12" DBH ___ Less than 12" DBH ___

SHRUBS
Broad-leaved Deciduous Saplings

Red maple _M_	Grey birch _S_	Red oak ___	Trembling aspen ___	Cottonwood ___
Sugar maple ___	Yellow birch ___	White oak ___	Bigtooth aspen ___	Box elder ___
Black cherry ___	American elm _U_	Black oak ___	Swamp white oak ___	Black gum ___
White ash ___	Hophornbeam ___	Pin oak _U_	Shagbark hickory ___	Witch hazel ___
Ironwood ___	Poison Sumac ___	Beech ___	Bitternut hickory ___	Smooth alder ___

Speckled alder ___ Silver maple _M_ _____ ___ _____ ___

Tall Broad-leaved Deciduous Shrubs

Smooth alder _S_	Barberry _S_	Burningbush _S_	Mountain Holly ___	_____	___
Speckled alder ___	Bottonbush _S_	Witch hazel ___	Smooth Buckthorn ___	_____	___
Poison Sumac ___	Hazelnuts _S_	Winterberry _S_	Common Buckthorn ___	_____	___
Silky dogwood _M_	Shadbushes _S_	Honeysuckle ___	Pinxter flower ___	_____	___
Grey dogwood _U_	Spicebush _S_	Elderberry _U_	Swamp azalea _S_	_____	___
Black currant ___	Swamp rose ___	Nannyberry _S_	Red chokeberry ___	_____	___
Arrowwood _S_	Maleberry ___	Wild raisin ___	Multiflora rose _x_	_____	___

Fetter bush ___ Highbush blueberry _S_ Sweet pepperbush ___ American cranberrybush ___

Low Sparse Broad-leaved Deciduous Shrubs **Low Compact Broad-leaved Evergreen Shrub**
Hardhack ___ Meadowsweet ___ _____ ___ Sheep Laurel ___

Tall Broad-leaved Evegreen Shrub
Great Laurel ___ Mountain Laurel ___

EMERGENTS
Narrow-leaved Persistent Emergents

Sedges (Carex):	Bearded _E_	Pointed Broom ___	Hop ___	Loose-flowered ___	
	Bladder ___	Blunt Broom ___	Tussock ___	_____	___
Rushes (Juncus):	Canada ___	Soft _E_	Path ___	_____ ___	_____ ___
Blue Flag ___	Reed Canary Grass _E_	_____ ___	_____ ___		

Narrow-leaved Nonpersistent Emergents
Field Horsetail _E_ Rough Horsetail ___ Red top _E_ Wood rush _E_ _____ ___

Broad-leaved Nonpersistent Emergents

Asters (Aster):	New York ___	Small white ___	Rush ___	_____	___
	White wood ___	Flat-topped ___	Swamp ___	_____	___
Goldenrods (Solidago):	Rough-stemmed _E_	Swamp ___	_____		___
	Rough-leaved _E_	Zig-zag ___	_____		___

Abundance Codes (Percent Cover): **Abundant** (>65%) **Common** (40-64%)
Moderate (20-39%) Uncommon (5-19%) Scarce (<5%) **X observed Expected**

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.
VEGETATIVE INVENTORY: SHALLOW & DEEP MARSHES

PROJECT NAME: North End Industrial Area, Middletown, Connecticut

WETLAND UNIT NO.: 1A **SUBUNIT:** b **Date:** 4/1/93
CLASSIFICATION: SM-2 **Investigator:** GTL

TREES

Broad-leaved Deciduous

Red maple ___ Black willow ___
Pin oak ___ _____ ___
Swamp white oak ___ _____ ___

Dead

Larger than 12" DBH ___
Less than 12" DBH ___

SHRUBS

Broad-leaved Deciduous Saplings

Red maple _S_ Black willow ___ Willow _S_
Pin oak _S_ Speckled alder ___ Poison Sumac ___
Swamp white oak ___ Smooth alder _S_ _____ ___

Tall Broad-leaved Deciduous Shrubs

Speckled alder ___ _____ ___
Black willow _S_ _____ ___
Smooth alder ___ _____ ___
Bottonbush _S_ _____ ___

Low Compact Broad-leaved Deciduous Shrubs

Sweet Gale ___
Black Huckleberry ___
_____ ___
_____ ___

Low Sparse Broad-leaved Deciduous Shrubs

Hardhack ___ Meadowsweet ___ _____ ___

EMERGENTS

Robust Persistent Emergents

Broad-leaved Cattail _S_ Common Reed ___
Purple Loosestrife ___ Narrow-leaved Cattail ___ _____ ___

Narrow-leaved Persistent Emergents

Sedges (Carex): Bearded ___ Tussock ___ Shallow _X_ Pointed Broom ___ Hop ___
Bladder ___ Umbrella ___ Fringed ___ Blunt Broom ___ Fox ___
stipata ___ _____ ___ _____ ___ _____ ___ _____ ___
(Scirpus): Woolgrass _X_ Dark green Bulrush ___ Soft stem ___ _____ ___ _____ ___
(Cyperus): filicinus ___ esculentus ___ strigosus _X_ diandrus ___ _____ ___

Rushes (Juncus): Canada ___ Soft ___ Path ___ Grass-leaved ___ _____ ___
Manna Grass (Glyceria): Fowl Meadow ___ Rattlesnake ___ Reed Meadow ___ _____ ___

Blue Flag _X_ Reed Canary Grass ___ Twig rush ___ Three-way sedge ___ _____ ___
Blue Joint ___ Rice Cut-Grass ___ Rhynchospora ___ Eleocharis ___ _____ ___

Narrow-leaved Nonpersistent Emergents

Bur-reed ___ Threesqaure rush ___ Bayonet rush ___ Field Horsetail ___ _____ ___
Wild Rice ___ Soft stem bulrush ___ Sweet flag ___ Meadow Horsetail ___ _____ ___

Broad-leaved Nonpersistent Emergents

Pickerlweed _E_ Arrowhead _E_ Arrow arum _E_ Water plantain ___ Seedbox _E_
Royal Fern ___ Marsh Fern _E_ Sensitive fern _E_ Wild calla ___ Wild mint ___
Tearthumbs ___ Water hemlock ___ Water-parsnip ___ Blue vervain ___ Bedstraws ___
Smartweeds _E_ Forget-me-not _E_ Willow-herbs _E_ Marsh Mallow _E_ Swamp rose _E_
Turtlehead ___ Skunk Cabbage _E_ Monkey-flower _E_ Joe-pye-weeds _E_ Boneset ___
Mad-dog skullcap _E_ Marsh cinquefoil ___ Canada St.Johns-wort ___ _____ ___
Marsh St.Johns-wort ___ Yellow loosestrife ___ _____ ___ _____ ___
_____ ___ _____ ___ _____ ___ _____ ___
_____ ___ _____ ___ _____ ___ _____ ___
_____ ___ _____ ___ _____ ___ _____ ___

Sub-shrub Persistent Emergent

Swamp loosestrife ___

Abundance Codes (Percent Cover): Abundant (>65%) Common (40-64%)
Moderate (20-39%) Uncommon (5-19%) Scarce (<5%) X observed Expected

Miscellaneous Other Emergents
Yellow-eyed grass ___ Pipewort ___ Pitcher Plant ___ Buckbean ___ Sundews ___
Sphagnum mosses ___ _____ ___ _____ ___ _____ ___

SURFACE PLANTS
Rooted Vascular Surface Plants
White water lily ___ Yellow water lily ___ Watershield ___ Floating Heart ___

Floating Vascular Surface Plants
Small Duckweed ___ Big Duckweed ___ Watermeal ___ _____ ___

SUBMERGENTS
Rooted Vascular Submergents
Pondweeds ___ Water Milfoil ___ Fanwort ___ Wild Celery ___ Water Milfoil ___
Waterweed ___ Mermaid-weed ___ Naiad ___ Bladderwort ___ Widgeon grass ___
Eelgrass ___ Fanwort ___ _____ ___

Floating Vascular Submergents
Coontail ___ Bladderwort ___

VEGETATION DENSITY & STRUCTURE
Trees: Low ___ Moderate ___ High ___ Average DBH: ____ in. Even-aged ___ Uneven-aged ___
Shrubs: Low ___ Moderate ___ High ___ Herbs: Low ___ Moderate ___ High ___
Vertical Heterogeneity: Low ___ Moderate ___ High ___

UPLAND BUFFER
Edge (%): induced ___ inherent ___ Width: <50 feet ___ 50-100 feet ___ >100 feet ___
Density: Low ___ Moderate ___ High ___

SURFACE INUNDATION
Low ___ Moderate ___ High ___ Average water depth: _____ inches

MICROTOPOGRAPHY
Gentle ___ Pronounced ___ Extreme ___

SOILS
Soil Series: _____
Mineral ___ Muck ___ Peat ___ Leaf litter thickness: _____ inches
Thickness of Organics: <1 foot ___ 1-5 feet ___ >5 feet ___

WILDLIFE
Snags (avg. DBH): ___ inches Cavity trees ___ Fallen trees ___ Wolf trees ___
Vernal pools ___ Browse ___ Tracks ___ Scats & Pellets ___ Dens ___

NOTES: Vegetation Density and Structure not observed due to flooding

Abundance Codes (Percent Cover): Abundant (>65%) Common (40-64%)
Moderate (20-39%) Uncommon (5-19%) Scarce (<5%)

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.
VEGETATIVE INVENTORY: SHALLOW & DEEP MARSHES

PROJECT NAME: North End Industrial Area, Middletown, Connecticut

WETLAND UNIT NO.: 1A **SUBUNIT:** c **Date:** 4/1/93
CLASSIFICATION: DM-6 **Investigator:** GTL

TREES

Broad-leaved Deciduous
Red maple ___ Black willow ___
Pin oak ___ _____ ___
Swamp white oak ___ _____ ___

Dead
Larger than 12" DBH ___
Less than 12" DBH ___

SHRUBS

Broad-leaved Deciduous Saplings
Red maple ___ Black willow ___ Willow ___
Pin oak ___ Speckled alder ___ Poison Sumac ___
Swamp white oak ___ Smooth alder ___ _____ ___

Tall Broad-leaved Deciduous Shrubs
Speckled alder ___ _____ ___
Black willow ___ _____ ___
Smooth alder ___ _____ ___
Bottonbush ___ _____ ___

Low Compact Broad-leaved Deciduous Shrubs
Sweet Gale ___
Black Huckleberry ___
_____ ___
_____ ___

Low Sparse Broad-leaved Deciduous Shrubs
Hardhack ___ Meadowsweet ___ _____ ___

EMERGENTS

Robust Persistent Emergents
Broad-leaved Cattail _S_ Common Reed ___ _____ ___
Purple Loosestrife ___ Narrow-leaved Cattail ___ _____ ___

Narrow-leaved Persistent Emergents
Sedges (Carex): Bearded ___ Tussock ___ Shallow ___ Pointed Broom ___ Hop ___
Bladder ___ Umbrella ___ Fringed ___ Blunt Broom ___ Fox ___
stipata ___ _____ ___ _____ ___ _____ ___
(Scirpus): Woolgrass ___ Dark green Bulrush ___ Soft stem _E_ _____ ___
(Cyperus): filicinus ___ esculentus ___ strigosus ___ diandrus ___ _____ ___

Rushes (Juncus): Canada ___ Soft ___ Path ___ Grass-leaved ___ _____ ___
Manna Grass (Glyceria): Fowl Meadow ___ Rattlesnake ___ Reed Meadow ___ _____ ___

Blue Flag ___ Reed Canary Grass ___ Twig rush ___ Three-way sedge ___ _____ ___
Blue Joint ___ Rice Cut-Grass ___ Rhynchospora ___ Eleocharis ___ _____ ___

Narrow-leaved Nonpersistent Emergents
Bur-reed ___ Threesqaure rush ___ Bayonet rush ___ Field Horsetail ___ _____ ___
Wild Rice _E_ Soft stem bulrush ___ Sweet flag ___ Meadow Horsetail ___ _____ ___

Broad-leaved Nonpersistent Emergents
Pickerlweed _E_ Arrowhead _E_ Arrow arum _E_ Water plantain ___ Seedbox ___
Royal Fern ___ Marsh Fern ___ Sensitive fern ___ Wild calla ___ Wild mint ___
Tearthumbs ___ Water hemlock ___ Water-parsnip ___ Blue vervain ___ Bedstraws ___
Smartweeds _E_ Forget-me-not ___ Willow-herbs ___ Marsh Mallow ___ Swamp rose ___
Turtlehead ___ Skunk Cabbage ___ Monkey-flower ___ Joe-pye-weeds ___ Boneset ___
Mad-dog skullcap ___ Marsh cinquefoil ___ Canada St.Johns-wort ___ _____ ___
Marsh St.Johns-wort ___ Yellow loosestrife ___ _____ ___ _____ ___
_____ ___ _____ ___ _____ ___ _____ ___
_____ ___ _____ ___ _____ ___ _____ ___
_____ ___ _____ ___ _____ ___ _____ ___

Sub-shrub Persistent Emergent
Swamp loosestrife ___

Abundance Codes (Percent Cover): Abundant (>65%) Common (40-64%)
Moderate (20-39%) Uncommon (5-19%) Scarce (<5%) X observed Expected

Miscellaneous Other Emergents
Yellow-eyed grass ___ Pipewort ___ Pitcher Plant ___ Buckbean ___ Sundews ___
Sphagnum mosses ___ _____ ___ _____ ___ _____ ___

SURFACE PLANTS
Rooted Vascular Surface Plants
White water lily _E_ Yellow water lily _E_ Watershield ___ Floating Heart ___

Floating Vascular Surface Plants
Small Duckweed _E_ Big Duckweed ___ Watermeal _E_ _____ ___

SUBMERGENTS
Rooted Vascular Submergents
Pondweeds _E_ Water Milfoil ___ Fanwort ___ Wild Celery ___ Water Milfoil ___
Waterweed _E_ Mermaid-weed ___ Naiad ___ Bladderwort ___ Widgeon grass ___
Eelgrass ___ Fanwort ___ _____ ___

Floating Vascular Submergents
Coontail ___ Bladderwort ___

VEGETATION DENSITY & STRUCTURE
Trees: Low ___ Moderate ___ High ___ Average DBH: ____ in. Even-aged ___ Uneven-aged ___
Shrubs: Low ___ Moderate ___ High ___ Herbs: Low ___ Moderate ___ High ___
Vertical Heterogeneity: Low ___ Moderate ___ High ___

UPLAND BUFFER
Edge (%): induced ___ inherent ___ Width: <50 feet ___ 50-100 feet ___ >100 feet ___
Density: Low ___ Moderate ___ High ___

SURFACE INUNDATION
Low ___ Moderate ___ High ___ Average water depth: _____ inches

MICROTOPOGRAPHY
Gentle ___ Pronounced ___ Extreme ___

SOILS
Soil Series: _____
Mineral ___ Muck ___ Peat ___ Leaf litter thickness: _____ inches
Thickness of Organics: <1 foot ___ 1-5 feet ___ >5 feet ___

WILDLIFE
Snags (avg. DBH): ___ inches Cavity trees ___ Fallen trees ___ Wolf trees ___
Vernal pools ___ Browse ___ Tracks ___ Scats & Pellets ___ Dens ___

NOTES: Subunit flooded during inspection

Abundance Codes (Percent Cover): Abundant (>65%) Common (40-64%)
Moderate (20-39%) Uncommon (5-19%) Scarce (<5%) X observed Expected

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.
VEGETATIVE INVENTORY: OPEN WATER

PROJECT NAME: North End Industrial Area, Middletown, Connecticut

WETLAND UNIT NO.:1A **SUBUNIT:** d **Date:** 4/1/93
CLASSIFICATION: OW-2 **Investigator:** GTL

SHRUBS & TREES
Black Willow ___ _____ ___ _____ ___ _____ ___

EMERGENTS
Robust Persistent Emergents
Broad-leaved Cattail ___ Common Reed ___ _____ ___
Purple Loosestrife ___ Narrow-leaved Cattail ___ _____ ___

Narrow-leaved Persistent Emergents
Sedges (Carex): Bearded ___ Shallow ___ _____ ___
Fringed ___ Blunt Broom ___ _____ ___
(Scirpus): Dark green Bulrush ___ Soft stem bulrush ___ _____ ___
(Cyperus): filicinus ___ diandrus ___ _____ ___ _____ ___

Rushes (Juncus): Canada ___ Soft ___ _____ ___ _____ ___

Reed Canary Grass ___ Twig rush ___ Three-way sedge ___ Blue Joint ___
Rice Cut-Grass ___ Rhynchospora ___ Eleocharis ___ _____ ___

Narrow-leaved Nonpersistent Emergents
Bur-reed ___ Threesqaure rush ___ Bayonet rush ___ _____ ___
Wild Rice ___ Soft stem bulrush ___ Sweet flag ___ _____ ___

Broad-leaved Nonpersistent Emergents
Pickerlweed _E_ Arrowhead _E_ Wild calla ___ Water hemlock ___ Water-parsnip ___
Blue vervain ___ Smartweeds ___ Mad-dog skullcap ___ Willow-herbs ___ Seedbox ___
Marsh Mallow ___ Wild mint ___ Swamp milkweed ___ Joe-pye-weeds ___ Boneset ___
_____ ___ _____ ___ _____ ___ _____ ___

Sub-shrub Persistent Emergent
Swamp loosestrife ___

Miscellaneous Other Emergents
Yellow-eyed grass ___ Pipewort ___ _____ ___ _____ ___

SURFACE PLANTS
Rooted Vascular Surface Plants
White water lily _E_ Yellow water lily _E_ Watershield ___ Floating Heart ___

Floating Vascular Surface Plants
Small Duckweed _E_ Big Duckweed ___ Watermeal _E_ _____ ___

SUBMERGENTS
Rooted Vascular Submergents
Pondweeds _E_ Water Milfoil _E_ Fanwort ___ Wild Celery ___ Water Milfoil ___
Waterweed _E_ Mermaid-weed ___ Naiad ___ Bladderwort _E_ Widgeon grass ___
Eelgrass ___ Fanwort ___ _____ ___ _____ ___

Floating Vascular Submergents
Coontail ___ Bladderwort ___ _____ ___

Abundance Codes (Percent Cover): Abundant (>65%) Common (40-64%)
Moderate (20-39%) Uncommon (5-19%) Scarce (<5%) X observed Expected

APPENDIX 3

WETLAND CLASSES AND SUBCLASSES IN THE GLACIATED NORTHEAST (Golet 1974)

WETLAND CLASS	WETLAND SUBCLASS
Open Water	(OW-1) Vegetated (OW-2) Floating-leaved (OW-3) Non-vegetated
Deep Marsh	(DM-1) Dead Woody (DM-2) Shrub (DM-3) Sub-shrub (DM-4) Robust (DM-5) Narrow-leaved (DM-6) Broad-leaved
Shallow Marsh	(SM-1) Robust (SM-2) Narrow-leaved (SM-3) Broad-leaved
Meadow	(M-1) Ungrazed (M-2) Grazed
Shrub Swamp	(SS-1) Sapling (SS-2) Bushy (SS-3) Compact (SS-4) Aquatic
Wooded Swamp	(WS-1) Deciduous (WS-2) Evergreen
Bog	(BG-1A) Compact Shrub (BG-1B) Bushy Shrub (BG-2) Wooded (BG-3) Emergent

Note: Subclass (OW-2) has replaced (SM-4)
Seasonally Flooded Class (SF-1 & SF-2) has been removed

APPENDIX 4

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.
AVIAN INVENTORY

PROJECT NAME: North End Industrial Area, Middletown, Connecticut

WETLAND UNIT NO.: 1 **Date: 4/1/93**
CLASSIFICATION UNITS: 11 different types **Investigator: GTL**
Surrounding Habitat Type(s): Open Field, Hardwoods Forest, etc.

GEESE & RELATIVES

- Common Loon
- Snow Goose
- Pied-billed Grebe
- * Canada Goose
- Mute Swan
- _____

MARSH DUCKS

- Gadwall
- Northern Pintail
- Wood Duck
- Northern Shoveler
- * Mallard
- American Widgeon
- Green-Winged Teal
- Blue-Winged Teal
- * Black Duck
- Harlequin Duck
- Ring-Necked Duck
- _____

DIVING DUCKS, COOTS, MERGANSERS, CORMORANTS & GALLINULES

- Common Eider
- American Coot
- Common Goldeneye
- Common Merganser
- Double-Crested Cormorant
- _____
- Ruddy Duck
- Bufflehead
- Common Moorhen
- Hooded Merganser
- Redhead
- _____

GULLS & TERNS

- * Herring Gull
- * Ring-billed Gull
- Common Tern
- Least Tern
- Laughing Gull
- Black-backed Gull
- Roseate Tern
- * Iceland Gull

RAILS

- * Virginia Rail
- Sora
- Clapper Rail
- King Rail
- Black Rail
- ? Yellow Rail

HERONS & RELATIVES

- * Great Blue Heron
- Black-Crowned Night Heron
- * American Bittern
- * Green-Backed Heron
- * Snowy Egret
- Great Egret

PLOVERS

- Ruddy Turnstone
- Piping Plover

SANDPIPERS

- * Killdeer
- * Sanderling
- * Spotted Sandpiper
- * Semipalm. Sandpiper
- * American Woodcock
- Snipe
- Solitary Sandpiper

TURKEY, GROUSE & QUAIL

- Wild Turkey
- Ringed-Necked Pheasant
- Ruffed Grouse
- Bobwhite Quail

HAWKS, EAGLES & FALCONS

- * Red-tailed Hawk
- Broad-Winged Hawk
- Bald Eagle
- Marsh Hawk
- Peregrine Falcon
- Red-shouldered Hawk
- Sharp-Shinned Hawk
- * Kestrel
- Merlin
- Osprey
- Cooper's Hawk

OWLS

- Screech Owl
- Great-Horned Owl
- Long-Eared Owl
- Barred Owl
- Saw-Whet Owl
- Short Eared Owl

DOVES, CUCKOOS & GOATSUCKERS

- * Mourning Dove
- * Rock Dove
- Yellow-billed Cuckoo
- Black-billed Cuckoo
- Whip-Poor-Will
- Chuck-Will's Widow
- Common Nighthawk
- _____

WOODPECKERS

- Hairy Woodpecker
- Red-Headed Woodpecker
- * Northern Flicker
- Yellow-bellied Sapsucker
- * Downy Woodpecker
- * Red-bellied Woodpecker
- Pileated Woodpecker
- _____

TYRANT FLYCATCHERS

- Eastern Kingbird
- Great Crested Flycatcher
- Eastern Phoebe
- * Eastern Wood-Peewee

EMPIDONAX FLYCATCHERS

- Acadian Flycatcher
- Willow Flycatcher
- Least Flycatcher
- Alder Flycatcher

SWALLOWS, SWIFTS & LARKS

- Purple Martin
- * Bank Swallow
- * Northern Rough-Winged Swallow
- Barn Swallow
- * Tree Swallow
- * Chimney Swift
- Horned Lark
- _____

Observed | Confirmed Breeder | Expected Breeder | Uncommon Occurrence | Observed on Migration | Possible User

Note: an * denotes species observed or expected to also occur within the Project Area

HUMMINGBIRDS & KINGFISHERS

- Ruby-throated Hummingbird
- Belted Kingfisher

CROWS & JAYS

- Fish Crow
- * Blue Jay
- * American Crow
- * Starling

TITMICE, CHICKADEES & NUTHATCHES

- * Black-capped Chickadee
- * Carolina Chickadee
- * White-Breasted Nuthatch
- * Tufted Titmouse
- Brown Creeper
- Red-Breasted Nuthatch

KINGLETS & GNATCATCHERS

- * Ruby-Crowned Kinglet
- Blue-gray Gnatcatcher
- * Golden-Crowned Kinglet
- _____

THRASHERS, MOCKINGBIRDS & THRUSHES

- * Brown Thrasher
- * Gray Catbird
- * American Robin
- * Wood Thrush
- Swainson's Thrush
- * Northern Mockingbird
- Eastern Bluebird
- Veery
- Hermit Thrush
- _____

WRENS

- * House Wren
- * Carolina Wren
- Marsh Wren
- Winter Wren

VIREOS

- Red-eyed Vireo
- Warbling Vireo
- Yellow Throated Vireo
- White-eyed Vireo
- Philadelphia Vireo
- Solitary Vireo

SHRIKE & WAXWINGS

- Loggerhead Shrike
- * Cedar Waxwing

WARBLERS

- Black-throated Green Warbler
- Black-Throated Blue Warbler
- * Yellow Warbler
- Ovenbird
- Pine Warbler
- Tennessee Warbler
- Wilson's Canada Warbler
- Black-n-White Warbler
- American Redstart
- * Common Yellowthroat
- * Northern Waterthrush
- Kentucky Warbler
- Mourning Warbler
- Louisiana Waterthrush
- Yellow-Breasted Chat
- * Yellow-rumped Warbler
- Northern Parula
- Canada Warbler
- Nashville Warbler
- Blackpoll Warbler
- Magnolia Warbler
- Chestnut-Sided Warbler
- Blue-Winged Warbler
- Blackburnian Warbler
- Prothonotary W.
- Cerulean Warbler
- Palm Warbler
- Bay-Breasted Warbler
- Golden-Winged Warbler
- Worm-Eating Warbler
- Prairie Warbler

BLACKBIRDS, ORIOLES & RELATIVES

- * Red-Winged Blackbird
- * Common Grackle
- Bobolink
- * European Starling
- * Brown-headed Cowbird
- * Boat-Tailed Grackle
- * Eastern Meadowlark
- * Northern Oriole

TANAGERS

- * Scarlet Tanager
- Summer Tanager

GROSBEAKS, FINCHES, SPARROWS & RELATIVES

- * House Sparrow
- * Northern Cardinal
- Purple Finch
- * Northern Junco
- * House Finch
- Evening Grosbeak

GROSBEAKS, FINCHES, SPARROWS & RELATIVES (Cont.)

- * American Goldfinch
- Indigo Bunting
- Rufous-Sided Towhee
- White-Crowned Sparrow
- Field Sparrow
- * American Tree Sparrow
- Vesper Sp.
- Fox Sparrow
- Pine Siskin
- * Rose-Breasted Grosbeak
- White-Throated Sparrow
- * Chipping Sparrow
- * Swamp Sparrow
- Grasshopper Sparrow
- * Song Sparrow

GROSBEAKS, FINCHES, SPARROWS & RELATIVES (Cont.)

- Vesper Sparrow
- Sharp-Tailed Sparrow
- _____
- Savannah Sparrow
- Seaside Sparrow
- _____

MISCELLANEOUS

- * Turkey Vulture
- Rusty Blackbird
- _____
- _____

Observed | Confirmed Breeder | Uncommon Occurrence | Expected Breeder | Observed on Migration | Possible User

Note: an * denotes species observed or expected to also occur within the Project Area

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.
FISH INVENTORY

PROJECT NAME: North End Industrial Area, Middletown, Connecticut

WETLAND UNIT NO.: 1 **Date: 4/1/93**
CLASSIFICATION UNITS: 11 different types **Investigator: GTL**
Surrounding Habitat Type(s): Open Field, Hardwoods Forest, etc.

EELS & HERRINGS

- [ ] American Eel
- [ ] Hickory Shad
- [ ] Blueback Herring*
- [ ] American Shad*

SALMONS, TROUTS, CHARS & WHITEFISH

- [ ] Round Whitefish
- [ ] Atlantic Salmon
- [ ] Brook Trout
- [ ] Rainbow Trout
- [ ] Brown Trout
- [ ] Lake Trout

PIKES

- [ ] Redfin Pickerel
- [ ] Northern Pike*
- [ ] Chain Pickerel

MINNOWS

- [ ] Goldfish
- [ ] Golden Shiner*
- [ ] Carp
- [ ] Bridled Shiner
- [ ] Cutlips Minnow
- [ ] Common Shiner*
- [ ] Bluntnose Minnow
- [ ] Fathead Minnow
- [ ] Blacknose Dace*
- [ ] Longnose Dace
- [ ] Creek Chub
- [ ] Fallfish
- [ ] Pearl Dace
- [ ] Tench
- [ ] _____

SUCKERS

- [ ] White Sucker
- [ ] Creek Chubsucker

CATFISH

- [ ] White Catfish
- [ ] Brown Bullhead*
- [ ] Black Bullhead
- [ ] Channel Catfish

STICKLEBACKS

- [ ] Fourspine Stickleback
- [ ] Threespine Stickleback
- [ ] Brook Stickleback
- [ ] Ninespine Stickleback

SEA BASSES & SUNFISHES

- [ ] White Perch
- [ ] Rock Bass
- [ ] Banded Sunfish
- [ ] Redbreast Sunfish
- [ ] Green Sunfish
- [ ] Pumpkinseed
- [ ] Bluegill
- [ ] Smallmouth Bass
- [ ] Largemouth Bass
- [ ] White Crappie
- [ ] Black Crappie
- [ ] _____

KILLIFISHES

- [ ] Banded Killifish
- [ ] Hummichog

PERCHES

- [ ] Swamp Darter
- [ ] Walleye

Confirmed Breeder | Expected Breeder | Uncommon Occurrence | Possible User

Note: an * denotes species observed or expected to also occur within the Project Area

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.
HERPTILE INVENTORY

PROJECT NAME: North End Industrial Area, Middletown, Connecticut

WETLAND UNIT NO.: 1 **Date:** 4/1/93
CLASSIFICATION UNITS: 11 different types **Investigator: GTL**
Surrounding Habitat Type(s): Open Field, Hardwoods Forest, etc.

SALAMANDERS & LIZARDS

- [ ] Mudpuppy
- [ ] Silvery Salamander
- [ ] Spotted Salamander
- [ ] * Redbacked Salamander
- [ ] Northern Spring Salamander
- [ ] Marbled Salamander
- [ ] Blue-Spotted Salamander
- [ ] Red-Spotted Newt
- [ ] Slimy Salamander
- [ ] Northern Two-lined Salamander
- [ ] Jefferson Salamander
- [ ] Tremblay's Salamander
- [ ] Northern Dusky Salamander
- [ ] Four-toed Salamander
- [ ] Five-lined Skink
- [ ] _____

TOADS & FROGS

- [ ] Eastern Spadefoot
- [ ] * Spring Peeper
- [ ] * Green Frog
- [ ] Pickerel Frog
- [ ] * Bullfrog
- [ ] * American Toad
- [ ] * Gray Treefrog
- [ ] * Wood Frog
- [ ] Fowler's Toad
- [ ] * Northern Leopard Frog

TURTLES

- [ ] * Snapping Turtle
- [ ] Stinkpot
- [ ] Spotted Turtle
- [ ] Bog Turtle
- [ ] Wood Turtle
- [ ] Eastern Box Turtle
- [ ] * Painted Turtle
- [ ] _____

SNAKES

- [ ] Northern Water Snake
- [ ] * Eastern Garter Snake
- [ ] * Northern Ringneck Snake
- [ ] Eastern Smooth Green Snake
- [ ] Northern Copperhead
- [ ] * Northern Brown Snake
- [ ] Eastern Ribbon Snake
- [ ] Eastern Worm Snake
- [ ] Black Rat Snake
- [ ] Timber Rattlesnake
- [ ] Northern Redbelly Snake
- [ ] Eastern Hognose Snake
- [ ] * Northern Black Racer
- [ ] Eastern Milk Snake

[ ] Confirmed Breeder [ ] Expected Breeder [ ] Uncommon Occurrence [ ] Potential User

Note: an * denotes species observed or expected to also occur within the Project Area

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.
MAMMAL INVENTORY

PROJECT NAME: North End Industrial Area, Middletown, Connecticut

WETLAND UNIT NO.: 1 **Date:** 4/1/93
CLASSIFICATION UNITS: 11 different types **Investigator: GTL**
Surrounding Habitat Type(s): Open Field, Hardwoods Forest, etc.

SHREWS & MOLES (Insectivores)

- * [X] Masked Shrew
- [X] Smoky Shrew
- * [X] Short-tailed Shrew
- * [X] Hairy-tailed Mole
- * [X] Star-nosed Mole
- [X] Water Shrew
- [ ] Long-tailed Shrew
- [ ] Least Shrew
- * [X] Eastern Mole
- [ ] _____

BATS

- * [X] Little Brown Myotis
- [ ] Keen's Myotis
- [ ] Small-Footed Myotis
- [ ] Silver haired Bat
- [ ] Eastern Pipistrelle
- * [X] Big Brown Bat
- [X] Red Bat
- [ ] Hoary Bat

RABBITS & HARES

- * [X] Eastern Cottontail
- [ ] New England Cottontail
- [ ] Snowshoe Hare
- [ ] European Hare

RODENTS

- * [X] Eastern Chipmunk
- [ ] Southern Flying Squirrel
- * [X] White-Footed Mouse
- * [X] Muskrat
- * [X] Meadow-Jumping Mouse
- * [X] Woodchuck
- [ ] Northern Flying Squirrel
- [X] Southern Red-Backed Vole
- [ ] Southern Bog Lemming
- [X] Woodland Jumping Mouse
- * [X] Gray Squirrel
- [ ] Beaver
- [X] Meadow Vole
- * [X] Norway Rat
- [ ] Porcupine
- [ ] Red Squirrel
- [ ] Deer Mouse
- [X] Woodland Vole
- * [X] House Mouse
- [ ] _____

CARNIVORES

- [X] Coyote
- [X] Gray Fox
- * [X] Raccoon
- [X] Ermine
- [X] Mink
- [X] River Otter
- [ ] Bobcat
- * [X] Red Fox
- [ ] Black Bear
- [ ] Fisher
- [X] Long-Tailed Weasel
- * [X] Striped Skunk

DEER & OPOSSUM

- * [X] White-Tailed Deer
- * [X] Virginia Opossum

[X] Confirmed Breeder [ ] Expected Breeder [ ] Uncommon Occurrence [ ] Potential User

Note: an * denotes species observed or expected to also occur within the Project Area

APPENDIX 5

WETLAND WILDLIFE EVALUATION METHOD (Golet, 1976)

This system is not designed to rate the suitability of a wetland as habitat for any particular wildlife species, but it is intended to measure the capacity of the wetland to support a diverse and abundant wildlife population. The model is based upon the principle that the diversity of wildlife in a given habitat is directly related to the diversity of vegetation present. Specifically, the variety of life forms (trees, shrubs, emergents, surface vegetation, submergents) is more important in this respect than is vegetative species diversity. The model defines nine habitat criteria and assigns each a "significance coefficient", which is a measure of the relative importance of each parameter in maximizing wildlife diversity and abundance. Each parameter has several possible ranks, which when multiplied by the significance coefficient, provides a subscore for the parameter. The total wetland score is obtained by summing the subscores.

The model is not designed to be used with wetlands that are smaller than 0.5 acres due to inherently weak resolving power of models such as this one in evaluating the marginal capacity of very small wetlands in fulfilling wetland values. Additionally, the 0.5 acre cutoff appears to be a critical threshold with regard to abundance and composition of wildlife populations due to habitat size requirements for breeding and foraging. Therefore, in general, any wetland not evaluated by this model should be considered of low value for wildlife habitat. Below is a brief description of the parameters of the Golet model.

Wetland Class Richness - Assesses the number of different wetland classes in the wetland. The model defines 8 different wetland classes (Open Water, Deep Marsh, Wooded Swamp, etc.) based upon the dominant vegetation types present in the wetland. Habitat value is directly related to the number of wetland classes present.

Dominant Wetland Class - Based upon the principle that certain wetland classes (e.g. Deep Marsh) provide better wildlife habitat than others (e.g. Meadow).

Size Category - In general, the quality of wildlife habitat is directly related to wetland size.

Subclass Richness - Assesses the number of different subclasses present in the wetland. The model defines 26 different wetland subclasses (Sapling Shrub Swamp, Bushy Shrub Swamp, Compact Shrub Swamp, etc.) based upon dominant vegetative types present in the wetland. Habitat value is directly related to the number of wetland subclasses present.

Site Type - Determined by the topographic and hydrologic location of the wetland (e.g. bottomland-streamside, upland-isolated). Certain topographic/hydrologic combinations (e.g. bottomland-streamside) provide better habitat than others (e.g. upland-isolated).

Surrounding Habitat - Habitat value increases with the amount of adjacent edge in forestland, agricultural or open land, or salt marsh.

Cover Type - Measures the proportion of open water and cover present in the wetland and the degree to which the two are interspersed. Habitat value is generally greatest when cover and open water are present in roughly equal amounts and interspersed in a clumped fashion.

Vegetative Interspersion - Assesses the amount of edge occurring between different vegetative subforms. In general, habitat value increases with the amount of edge present.

Wetland Juxtaposition - Assesses the degree to which the wetland is hydrologically interconnected to other wetlands in the area. Hydrologically interconnected wetlands are more valuable to wildlife than those which are hydrologically isolated.

Water Chemistry - The model considers pH as an index of potential plant productivity. It assumes that water chemistry influences the presence, abundance and distribution of aquatic plants and invertebrates that serve as food for wetland wildlife.

Golet notes that the assignment of a numerical score to a wetland is controversial, since this may be misinterpreted as suggesting that a wetland receiving a low score may be automatically selected as a candidate for development activities. However, the scores must be compared to those obtained for other wetlands in the area for comparative purposes. Furthermore, other wetland functions must be considered since their value may be completely independent of the wildlife habitat value.

For general evaluation purposes, Golet has defined the following very broad classes for the interpretation of the scores obtained from the model:

low	35.0-50.0
moderate	50.5-60.0
high	60.5-70.0
outstanding	70.5-105

APPENDIX 6

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.

WETLAND WILDLIFE EVALUATION MODEL SCORE SHEET

PROJECT NAME/LOCATION: North End Industrial Area/Middletown, CT			
WETLAND UNIT NO.: 1	**TOWN TOPO MAP:**	**INVESTIGATOR:** G.T. Logan	
RANK: OUTSTANDING	**SCORE:** 100.00	**AERIAL PHOTOGRAPH:** 90/47-3556,57,58	**DATE:** April 26, 1993

CRITERION	DATA	S.C.*	RANK	POINTS
WETLAND CLASS RICHNESS ≥ 2.5 acres	WS X SS X SM X DM X OW X BG ___ M X F ___	5	3.0	15.0
DOMINANT WETLAND CLASS	WS ___ SS ___ SM X DM ___ OW ___ BG ___ M ___ F ___	5	3.0	15.0
SIZE CATEGORY (acres)	744.2 acres	5	3.0	15.0
SUBCLASS RICHNESS ≥ 0.5 acres	WS-1 X SS-1 X SM-1 X BG-1A ___ DM-1 ___ DM-5 X WS-2 ___ SS-2 X SM-2 X BG-1B ___ DM-2 ___ DM-6 X M-1 X SS-3 ___ SM-3 ___ BG-2 ___ DM-3 ___ OW-1 X M-2 ___ SS-4 ___ F-1 X BG-3 ___ DM-4 ___ OW-2 X	4	3.0	12.0
SITE TYPE	Bottomland: deltaic X; lakeside ___; streamside X; isolated ___ Upland: lakeside ___; streamside ___; isolated ___	4	3.0	12.0
SURROUNDING HABITAT (% of border; not less than 200 feet wide)	Forest 55%; Open 12%; Urban 31%; Mining; Recreat.; Slt. Mrsh.; Waste 2%	4	2.0	8.0
		SUBTOTAL 1		77.0

*Significance Coefficient

EVALUATION SCORE SHEET - p.2

WETLAND UNIT NO.: 1

CRITERION	DATA			S.C.	RANK	POINTS
WETLAND JUXTAPOSITION	Class	Hydrol. Linked?	Distance (miles)	3	3.0	9.0
	WS-1 OW-1 Connecticut River	yes X no ___	≤1/4 mile			
COVER TYPE	Percent Cover		Distribution	2	3.0	6.0
	TYPE: 5		peripheral ___ scattered X			
VEGETATIVE INTERSPERSION	Edge Types	Unit Size	Unit Distribution	2	3.0	6.0
	many	0.1 - 89.0	peripheral ___ scattered X TYPE: 3			
WATER CHEMISTRY	pH			1	2.0	2.0
	pH > 7.4 ___ pH 5.5 - 7.4 X pH < 5.5 ___					

SUBTOTAL 2	23.0
SUBTOTAL 1	77.0
TOTAL SCORE	100.0

RANK CATEGORY	OUTSTANDING

Low: 35.0 - 50.0
Moderate: 50.5 - 60.0
High: 60.5 - 70.0
Outstanding: 70.5 - 105

APPENDIX 7

BULLETIN #9 WETLAND EVALUATION METHOD (Adaptation)

Introduction

The Method for the Evaluation of Inland Wetlands in Connecticut (a.k.a. DEP Bulletin #9) was designed solely for the assessment of all of the wetlands in a watershed or an entire town. The intended use of the model is the assessment of wetland systems in order to identify those wetland resources which may have important values for which additional protection is warranted. The model evaluates 14 wetland functions, each of which is briefly discussed below. The user collects data in the office and field and responds to a series of questions regarding each function. Each question has several alternate responses, each of which is assigned a value between 0 and 1.0. The average of the values obtained from each question is called the "Functional Value Index" (FVI). The product of the FVI and the area of the wetland being evaluated is called the "Wetland Value Unit" (WVU). The WVU is meant to serve as the point of comparison of the relative value of a wetland for a given function.

In addition to its intended use, however, the model is commonly used by environmental consultants to evaluate wetlands that fall within a project area. The problem facing environmental consultants is that virtually all assessments are performed on individual wetlands, and only rarely are all wetlands in a watershed evaluated concurrently. At present there are no models available to allow a multi-function assessment of individual wetlands. Consequently, many consultants rely simply on best professional judgement. This, however, is undesirable, since criteria are often poorly defined, if at all, results may not be reproducible, and the assessment becomes highly subjective.

In order to standardize the wetland assessment procedure, SOIL SCIENCE & ENVIRONMENTAL SERVICES, Inc., often utilizes an adaptation of Bulletin #9, which is presented below. It should be understood that this adaptation is neither condoned nor disapproved by the Connecticut Department of Environmental Protection (DEP) or any other agency or organization.

Interpretation of Results

In our adaptation of the Bulletin #9 model the FVI, not the WVU, is used for comparative purposes. There are several reasons for this. Since wetland area is considered in the calculation of the FVI for many wetland functions, there is a built-in redundancy when wetland area is again used to compute a WVU for these functions. This results in a bias (higher rating) towards larger wetlands, and a discrimination against smaller wetlands. Furthermore, we believe that it is not appropriate to consider wetland area in the assessment of certain functions. For example, evaluation of functions such as Ecological Integrity and Educational Potential should not depend on the size of the evaluation unit. A very small wetland may be ecologically intact and may serve as a high

quality educational site. Such a wetland may be more valuable with respect to these functions than larger wetlands.

Bulletin #9 does not provide any guidelines for interpretation of the Wetland Value Units. That is, the model does not indicate if a given Wetland Value Unit (WVU) suggests that a wetland is of low, moderate or high quality for a given function. Guidelines have not been established, due to concern that wetlands evaluated as low quality for a given function will be automatically identified as candidates for development.

Based upon our expertise, we have developed the following broad ranking categories to classify wetland quality based on FVI scores:

FVI	RANK
0.10 - 0.35	LOW
0.36 - 0.65	MODERATE
0.66 - 0.85	HIGH
0.86 - 1.00	OUTSTANDING

The rationale for the above ranking scheme is that the majority of wetlands in the region provide average or moderate values. Thus, the "moderate" rank category is the widest. The "low" and "high" are of intermediate width with the "low" rank being slightly wider since it is relatively easy with this model for even very small isolated wetlands to score in the 0.25 to 0.35 range. Only relatively few wetlands will qualify as "outstanding" and therefore the range is the narrowest. The above categories are the result of our extensive use of the model, and our adaptation of it, for over three hundred and fifty wetland units throughout Connecticut, including two town-wide studies.

The ranking categories are used for all but Functional Value No. 14: Noteworthiness. In this case the model attempts to raise the "Red Flag" by asking a "yes-or-no" question concerning certain wetland features which if present give them the highest value regardless of any other attribute.

As mentioned in the main body of the report, Wetland 1 was formally evaluated by the model. Below is a brief description of each wetland function evaluated. The data sheets used in the Bulletin #9 evaluation are provided in Appendix 11.

Ecological Integrity - This assesses the degree to which the wetlands and the adjacent areas have been disturbed by human activity (agricultural, residential development, filling, draining, crossings by roads or trails, etc.). In general, the

greater the ecological integrity, the more valuable the wetland will be for a variety of functions (e.g. habitat, educational potential).

Wildlife Habitat - Wetlands provide habitat for a wide variety of birds, mammals, amphibians, reptiles, and invertebrates. Wildlife habitat is the complex of vegetative and physical characteristics that provide for all the requirements of wildlife, that is shelter, food, resting, nesting and escape cover, water and space.

Finfish Habitat - Streams and Rivers - Commonly, wetlands are associated with watercourses and open water bodies. Rivers, streams, lakes and ponds provide important cover and spawning areas for fish. This function is divided into two sections: streams/rivers and lakes/ponds. The first section considers criteria such as water quality, stream width and land use in the watershed above the wetland. The second section assesses pond size, depth, transparency, and other parameters in assessing finfish habitat potential.

Educational Potential - Wetlands along with other natural areas, can provide an outdoor classroom for the instruction of many ecological principles. For example the concepts of nutrient, energy, and water cycles, adaptation and competition among living organisms can be illustrated in most wetlands. This section assesses the proximity of the wetland to schools, opportunities for safe parking and access, variety of vegetative communities, ecological integrity etc.

Visual/Esthetics - Although an assessment of the visual attractiveness of a site is somewhat subjective, the model considers a number of factors which generally enhance visual appeal (number and type of wetland classes, noise and odor levels, landform contrast, disturbance level, presence of flowering shrubs or vegetation characterized by vibrant autumn colors, etc).

Water Based Recreation - This function assesses the capacity of a wetland to offer some level of recreation for canoeing, non-powered boating, fishing, hunting and wildlife observation. The model requires the presence of a perennial stream or an open water body (pond or lake).

Flood Control - One of the more important functions of wetlands is their capacity to store storm water and thus reduce the potential for flooding downstream in the watershed. The model considers three criteria in assessing flood control: size of wetland, size of watershed above the mouth of the wetland and size of the watershed above the damage area. A damage area is defined as the nearest structure downstream of the wetland which may be damaged during storm events (building, road crossing, etc.).

Since the model due to its simplicity is not able to clearly distinguish the ability of wetlands to provide flood control it is recommended that it is only used as a

"broadbrush" tool. Should it be necessary further investigation could be undertaken utilizing other more detailed methods such as the SCS TR-20 computer program for "Project Formulation Hydrology", and TR-55, "Urban Hydrology for Small Watersheds".

Groundwater Use Potential - The hydrology of wetlands is closely linked with the hydrology of the underlying groundwater. Some wetlands serve as groundwater recharge areas, where surface water from the wetland slowly percolates down to the underlying groundwater. However, most wetlands function as discharge points, whereby groundwater is released at seep areas into the wetland. In assessing the relationship of the wetland to quality and quantity of groundwater, the model considers ground and surface water quality, the presence of downstream wells and the potential of the wetland to yield large volumes of groundwater to a dug well.

Nutrient Retention and Sediment Trapping - Many wetlands remove suspended and dissolved materials from surface water draining through them. This is accomplished by dense vegetation, organic and mineral soils and microorganisms inhabiting the soil environment. Thus, wetlands improve the quality of surface and groundwater. In assessing the pollution filtration function of a wetland, the model considers the slope, dominant land use and potential sources of excess sediments and nutrients in the watershed above the wetland. Additional criteria include the size of the wetland in relation to its watershed, whether the wetland contains areas of impounded water, and the effective flood storage of the wetland.

Shoreline Anchoring and Dissipation of Erosive Forces - Wetlands often act as a buffer between watercourses and uplands particularly where there is a potential for wave action or bank scouring due to rapid flows. This buffering reduces shoreline erosion and the accompanying sediment deposition within the watercourses.

Forestry Potential - In some parts of the country, high yielding timber harvests in wetlands are common. This is not the case in Connecticut, due to strict regulatory laws and the generally low levels of silviculture practiced in the state. The model considers the suitability of the soil for supporting heavy harvesting machinery and the dominant land use in and around the wetland. The model requires that some soils be present within the wetland that have at least a medium value for forestry.

Archeological Potential - Just as society today is water-dependent, Native American Indian societies and many early industries depended upon water on a daily basis. Thus, it is quite likely that valuable archeological sites may be located in or near wetlands. In an effort to evaluate this potential, the model considers the proximity of the wetland to fresh and/or coastal waters, perennial watercourses, prominent lookout points, areas providing potential shelter and the presence of stone walls or building foundations.

Urban Wetland Quality - Wetlands have the potential to enhance the quality of human life in an urban environment. Historically, some wetlands in urbanizing areas were left undeveloped because of severe site limitations, such as very poorly drained organic (muck) soils. As a result, the urban wetlands that remain may be among the last refuges for wildlife, as well as some of the remaining "natural" viewscapes. This function attempts to recognize the importance of wetlands in an urban setting.

Noteworthiness - Some wetlands provide habitat for flora and fauna which have been classified as rare, endangered or of special concern at the State or National level. Wetlands may also support active scientific research or may be of local interest for some other reason. The model attempts to raise the "Red Flag" by asking a "yes-or-no" question concerning certain wetland features which if present give them the highest value regardless of any other attribute.

APPENDIX 8

SOIL SCIENCE & ENVIRONMENTAL SERVICES INC.

CONNECTICUT WETLAND EVALUATION METHOD
SUMMARY SHEET

PROJECT NAME: North End Industrial Area/Middletown, CT	
WETLAND UNIT NO.: 1	**TOTAL AREA OF WETLAND:** 744.2
POTENTIAL DAMAGE AREA:	**DATE:** 4/26/93
AERIAL PHOTO: 90/47-3556, 57, 58	**INVESTIGATORS:** G.T. Logan

	FUNCTIONAL VALUE	FVI FROM DATA SHEETS	SIZE OF EVALUATION AREA (acres)	WETLAND VALUE UNITS
1	ECOLOGICAL INTEGRITY	0.83	744	617.52
2	WILDLIFE HABITAT	0.82	744	610.08
3	FINFISH HABITAT Rivers and Streams Ponds and Lakes	 0.86 0.45	 63 7	 54.18 3.15
4	EDUCATIONAL POTENTIAL	0.73	250	182.50
5	VISUAL/ESTHETIC QUALITY	0.83	400	332.00
6	WATER BASED RECREATION	0.85	744	632.40
7	FLOOD CONTROL	N/A	---	------
8	GROUNDWATER USE POTENTIAL	0.47	744	349.68
9	NUTRIENT RETENTION & SEDIMENT TRAPPING Opportunity Efficiency	 0.37 0.65	 744 744	 275.28 483.60
10	SHORELINE ANCHORING & DISSIPATION OF EROSIVE FORCES	0.91	70	63.70
11	FORESTRY POTENTIAL	0.71	100	71.00
12	ARCHEOLOGICAL POTENTIAL Natv. American Indian Industrial Site	 0.72 0.46	 10 10	 7.20 4.60
13	URBAN WETLAND QUALITY	N/A	---	------
14	NOTEWORTHINESS	1.0	744	"Red Flag"

NEEDED FOR THIS EVALUATION:

Functional Value 1
ECOLOGICAL INTEGRITY

* Soils map.
* Zoning Map.
* Water Quality Classifications Map of CT.
* Ruler or scale.
* Aerial Photo or topographic map.
* A method to calculate area. (Dot grid, planimeter, etc.)
* (Optional) map wheel.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Quality of inflow water.	Mellabessot : C/B Coginchaug : B/A Connecticut : SC/SB OTHER : A & B/A	a. High: Minimal pollution - meets or exceeds Connecticut DEP Class B or SB standards.	1.0 (0.75)
		b. Medium: Moderate pollution - meets Class C or SC Standards.	0.5
		c. Low: Severe pollution - Class D or SD standards.	0.1
2. Percent of wetland having very poorly drained soils and/or open water.		(a.) More than 50 percent.	(1.0)
		b. From 25 to 50 percent.	0.5
		c. Less than 25 percent.	0.1
3. Dominant land use zoning of wetland (see town zoning map). Use current land use if different from what is zoned.		(a.) Agriculture, forestry, or similar open space zoning.	(1.0)
		b. Single family dwelling.	0.5
		c. Commercial/industrial; high density residential	0.1
4. Ratio of the number of inhabited buildings within 500 feet of wetland edge to the total area of wetland (acres).	1:26	a. Less than 1 building:10 acres.	(1.0)
		b. From 1:10 to 1:2.	0.5
		c. More than 1 building:2 acres.	0.1
5. Percent of original wetland filled.	6-8%	a. Less than 5 percent.	1.0
		(b.) From 5 to 20 percent.	(0.5)
		c. More than 20 percent.	0.1
QUESTIONS TO ANSWER IN THE FIELD:			
6. Percent of wetland edge bordered by a buffer of woodland, abandoned farmland, or idle land at least 500 feet in width.		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.		(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.]

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 wetland edge as evidenced 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 wetland.	0.1
9. Percent of wetland plant community presently being altered by mowing, grazing, farming, ditching or other activity.		(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 agricultural 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 or railroad crossings per 500 feet of wetland (measured along long axis of wetland).	Compromise for large wetland	a. One or fewer.	1.0 (0.75)
		b. Two.	0.5
		c. Three or more.	0.1
12. Long-term stability.		(a.) Wetland appears to be naturally occurring, or 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
		c. Wetland appears to be almost entirely the result of artificial impoundment.	0.1

FVI FOR FUNCTIONAL VALUE 1 = Average of column D = 10/12 = 0.83

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

NEEDED FOR THIS EVALUATION:

* Topographic map or aerial photograph.
* Ruler or scale.
* A method to calculate area. (Dot grid, planimeter, etc.)
* Field visit to establish/verify wetland diversity type.

Functional Value 2
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.		(FVI from FUNCTIONAL VALUE 1)	0.83
2. Wetland size.	≃ 744 acres	(a) More than 10 acres. b. From 3 to 10 acres. c. Less than 3 acres.	1.0 0.5 0.1
3. Area of shallow permanent open water including streams (less than 6 feet deep) in or adjacent to wetland.	≃ 71 acres	(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:			
4. Number of wetland classes.	6 classes	(a) Three or more. b. Two. c. One.	(1.0) 0.5 0.1
5. Dominant wetland class.	marsh	(a) Semi-permanent flooded emergent (marsh), shallow open water. b. Forested and/or scrub shrub wetlands. c. Scrub shrub saturated (bog), seasonally flooded emergent (wet meadow).	(1.0) 0.5 0.1
6. Number of islands or inclusions of upland within wetland.	compromise for wetland size and irregular boundary	a. Three or more. (b) One or two. c. None.	1.0 0.5 0.1
7. 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. b. Access partially blocked by busy roads, urban areas, or other obstructions. c. Ground access blocked by roads, urban areas, or other obstructions.	(1.0) 0.5 0.1
8. Percent of wetland edge bordered by upland wildlife habitat (brushland, woodland, farmland, or idle land) at least 500 feet in width.	67%	(a) More than 40 percent. b. From 10 to 40 percent. c. Less than 10 percent.	(1.0) 0.5 0.1

FVI FOR FUNCTIONAL VALUE 2 = Average of column D = 6.58/8 = 0.82

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

NEEDED FOR THIS EVALUATION:

Functional Value 3
FINFISH HABITAT
Streams and Rivers

* Water Quality Classification Map of Connecticut.
* Anadromous Fish Runs of Connecticut 1989 map.
* DEP Fisheries Bureau fish stocking & anadromous fish plans.

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

<u>PART A - STREAMS AND RIVERS</u> PLEASE NOTE: If investigation reveals no year-round stream is present enter zero for this function (Column 'D' on summary sheet) and proceed to part B.

QUESTIONS TO ANSWER IN THE OFFICE:

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
1. Water quality of stream.	compromise for variable classes	a. High: minimal pollution - meets or exceeds Connecticut DEP Class B or SB standards.	1.0 (0.75)
		b. Medium: moderate pollution - meets Class C or SC standards.	0.5
		c. Low: severe pollution - Class D or SD quality.	0.1
2. Barrier to anadromous fish passage (such as dams, waterfalls, etc.) between stream reach being evaluated and Long Island Sound. (Refer to Anadromous Fish map).		(a.) No barrier(s) present or if present equipped with fish ladders or other provisions for fish passage.	(1.0)
		b. Barrier(s) present without provision for fish passage.	0.1
3. Highest stream order within wetland.		(a.) Third order or higher.	(1.0)
		b. Second order.	0.5
		c. First order.	0.1
4. Dominant land use in all of the watershed above, and/or contributing to, the wetland.	not counting headwaters from Conn. River	a. Woodland, wetland, or abandoned farmland, or wetland being evaluated is at top of watershed.	1.0 (0.75)
		b. Active farmland, or rural residential.	0.5
		c. Urban and heavily developed suburban areas.	0.1

QUESTIONS TO ANSWER IN THE FIELD:

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
5. Stream width.	variable. portions >100' compromise	a. More than 100 feet.	1.0 (0.75)
		b. From 2 to 100 feet.	0.5
		c. Less than 2 feet.	0.1

[Continued on next page.]

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART A - STREAMS AND RIVERS (continued)			
6. Available shade.		a. Woodland, scrubland, or other tall vegetation provides shade to all or significant portions of the stream.	1.0
		b. Portions of the stream bank unvegetated or vegetation too low (<6') to provide shade.	0.5
		c. Major portions of stream banks' vegetation too low (<6') to provide shade.	0.1
7. Physical character of stream associated with wetland.		a. Stream is in a natural channel, either a meandering low gradient (less than 0.2 percent) stream OR moderate to high (0.2 percent or higher) gradient stream with pools and riffles.	1.0
		b. Portions of stream recently modified OR stream formerly channelized but has regained some natural channel features through the onset of meandering, the regrowth of instream vegetation, or the addition of cover objects such as rocks and snags.	0.5
		c. Stream has recently been channelized OR stream is confined in a nonvegetated chute or pipe.	0.1

[Continued on next page.]

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART A - STREAMS AND RIVERS (continued)			
8. Abundance of cover objects.		(a) Abundant - more than 70 percent of water area contains cover objects such as submerged logs, undercut banks and floating or submerged vegetation (might be seasonal).	(1.0)
		b. Moderately abundant - from 30 to 70 percent of water area contains cover objects.	0.5
		c. Scarce - less than 30 percent of the water area contains cover objects.	0.1
9. Spawning areas.		(a) If low gradient, slow moving stream there are abundant areas of grass and low growing emergent vegetation present which are flooded several weeks in the spring OR if a medium or high gradient stream, there are abundant areas of gravel suitable for spawning.	(1.0)
		b. Moderate amount of spawning areas present.	0.5
		c. No spawning areas present.	0.1

FVI FOR FUNCTIONAL VALUE 3 = Average of column D, for part A = 7.75/9 = 0.86

EVALUATION AREA FOR PART A = FUNCTIONAL VALUE 3 = Area of stream or river within wetland = _____

PLEASE CONTINUE ON TO NEXT PAGE - PART B

NEEDED FOR THIS EVALUATION:

* A submergible object to check water transparency (i.e.: secchi disk).
* State of Connecticut Water Quality Classifications Map.
* State of Connecticut map of Anadromous Fish Runs of CT 1989.
* A method to calculate area. (Dot grid, planimeter, etc.)

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

PART B - LAKES AND PONDS PLEASE NOTE: If no lake or pond is present enter zero for this function (Column 'D' on summary sheet) and proceed to next functional value.

QUESTIONS TO ANSWER IN THE OFFICE:

1. Water quality of pond or lake.

   Several "ill-channel" permanently inundated areas (OW-1 & OW-2) see text

   a. High: minimal pollution - meets or exceeds Connecticut DEP Class B or SB standards. — 1.0
   b. Medium: moderate pollution - meets Class C or SC standards. — 0.5 — (0.75)
   c. Low: severe pollution - Class D or SD quality. — 0.1

2. Barrier to anadromous fish passage (such as dams, waterfalls, etc.) between pond or lake being evaluated and Long Island Sound. (Refer to Anadromous Fish map).

   (a) No barrier(s) present or if present equipped with fish ladders or other provisions for fish passage. — (1.0)
   b. Barrier(s) present without provision for fish passage. — 0.1

3. Total area of pond or lake including areas of rooted submerged and emergent vegetation.

   4-5 acres

   a. More than 100 acres. — 1.0
   (b) From 3 to 100 acres. — (0.5)
   c. Less than 3 acres. — 0.1

QUESTIONS TO ANSWER IN THE FIELD:

4. Maximum depth.

   3-4

   a. More than 20 feet. — 1.0
   b. From 4 to 20 feet. — 0.5
   c. Less than 4 feet. — 0.1 — (0.25)

5. Transparency (depth at which a submerged object can still be seen).

   a. More than 13 feet. — 1.0
   b. From 7 to 13 feet. — 0.5
   (c) Less than 7 feet. — (0.1)

6. Percent of pond or lake having rooted submerged or emergent vegetation.

   mostly

   a. From 15 to 50 percent. — 1.0
   (b) More than 50 percent or less than 15 percent. — (0.1)

FVI FOR PART B = Average of column D for Part B = 2.7/6 = 0.45

EVALUATION AREA FOR PART B = FUNCTIONAL VALUE 3 = Area of pond or lake being evaluated = _____.

NEEDED FOR THIS EVALUATION:

Functional Value 4
EDUCATIONAL POTENTIAL

* Local town road map or topographic map showing schools.
* Knowledge of any management activities by local Nature Centers, Audubon Society, Scouting groups, Garden Clubs, etc.

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.		(FVI from FUNCTIONAL VALUE 1)	0.83
2. Proximity of potential educational site to schools.	mostly	a. Within 5-15 minute walking distance.	1.0
		(b) Within half hour drive.	(0.5)
		c. More than half hour drive.	0.1
3. Level of ecological management.	A PORTION IS A DEP MANAGED AREA	a. Wetland within an organized nature study center or wildlife management area.	1.0 — (0.75)
		b. Wetland managed secondarily for wildlife.	0.5
		c. Area not under ecological management.	0.1

QUESTIONS TO ANSWER IN THE FIELD:

Location of potential educational site: DEP Land.

4. Proximity of potential educational site to other plant communities.		a. Upland forest or abandoned farmland in various stages of secondary succession within short walk to potential educational site.	(1.0)
		b. Potential educational site is not within short walk to other plant communities.	0.1
5. Off road parking at potential educational site suitable for school buses.		(a.) Wetland within walking distance of existing or easily developed parking area that is within 300 feet of educational site.	(1.0)
		b. Moderate expense required to develop parking area within 300 feet of educational site.	0.5
		c. Parking within 300 feet of educational site not feasible or expensive to develop because of traffic flow, soil suitability, or other problems.	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):

6. Number of wetland types or classes accessible or potentially accessible for study at potential educational site.		a. Four or more.	1.0
		b. Two or three.	0.5
		c. One or none.	0.1
7. Access to perennial stream at potential educational site.		a. Direct access available.	1.0
		b. Water access not available but feasible to develop.	0.5
		c. Perennial stream not present or access not feasible.	0.1
8. Access to pond or lake at potential educational site.	other areas of wetland	a. Direct access available.	1.0
		b. Access not available but feasible to develop.	0.5
			0.25
		c. Pond or lake not present or access not feasible.	0.1
9. Student safety.	flooding, saturated soils	a. No known safety hazards such as busy roads, steep embankments, railroad trestle, etc. within potential educational site.	1.0
			0.75
		b. One or more safety hazards present which could be overcome at moderate expense.	0.5
		c. Obvious safety hazard which would be difficult and/or expensive to overcome.	0.1
10. Public access to potential educational site.		a. Public access prohibited or controlled. Interference with study area or equipment unlikely.	1.0
		b. Some access by general public but at a level which will not greatly interfere with class.	0.5
		c. Unlimited public access. Interference with study area likely.	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):			
11. Visual/esthetic quality of potential education site.		a. Undisturbed and natural. No esthetic detractors such as litter, abandoned cars, landfills, road noise, etc.	(1.0)
		b. Limited disturbance. Minor detractors present.	0.5
		c. Severe disturbance: Major detractors present.	0.1

FVI FOR FUNCTIONAL VALUE 4 = Average of column D = 8.08/11 = 0.73

EVALUATION AREA FOR FUNCTIONAL VALUE 4 = AREA* of probable educational site = _____.

* AREA - AREA may represent the entire wetland itself or, if the wetland is quite large, it is possible that only a portion of it will be used (consider: accessibility, visibility, diversity, etc.).

Conversely, if the AREA is adjacent to, or has a transition to upland that is noteworthy and potentially valuable for study area, you may include these areas in your overall AREA tally. It may turn out that more than the actual wetland size will be counted. Be sure to note in the space below how you arrived with your AREA calculation if it is different from the wetland size.

COMMENTS:

NEEDED FOR THIS EVALUATION:

* Field trip is absolutely necessary as all questions are answered on-site.
* Ability to make an on-site assessment of the best, most usable viewing area(s).

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

ALL QUESTIONS TO BE ANSWERED IN THE FIELD:

Location of primary viewing site(s): DEP managed Land. (Typically this will be road crossings where the public has the opportunity to view the wetlands at least on a driveby basis.)

A	B	C	D
1. Number of wetland classes visible from primary viewing location(s).		(a.) Three or more.	(1.0)
		b. Two.	0.5
		c. One.	0.1
2. Dominant wetland class. visible from primary viewing location.		(a.) Semipermanent flooded emergent (marsh), shallow open water.	(1.0)
		b. Scrub shrub.	0.5
		c. Forested.	0.1
3. Noise level at primary viewing location(s).	ROUTE 9	a. Low: bird, wildlife and other naturally occurring sounds predominate.	1.0
			(0.75)
		b. Moderate: some traffic or other noise audible.	0.5
		c. Loud: continuous traffic, factories or similar noises.	0.1
4. Odors present at primary viewing location(s).	OCCASSIONALLY: SEWAGE TREATMENT PLANT	a. Natural odors only (Note: Some natural odors may be unpleasant).	1.0
		(b.) Some unnatural odors present such as auto exhaust.	(0.5)
		c. Unnatural odors distinct and noticeably unpleasant.	0.1
5. Approximate extent of open water visible from primary viewing location(s).		(a.) More than 3 acres or 300 feet of stream.	(1.0)
		b. From 1 to 3 acres or 100-300 feet of stream.	0.5
		c. Less than 1 acre or 100 feet of stream.	0.1
6. General appearance of the wetland and surrounding land use(s) visible from primary viewing location(s).		(a.) Undisturbed and natural. No visual detractors present such as litter, abandoned cars, etc.	(1.0)
		b. Limited disturbance in and/or around wetland. Minor visual detractors present.	0.5
		c. Severe disturbance. Major visual detractors present such as landfills, abandoned gravel pits, etc.	0.1

[Continued on next page.]

NEEDED FOR THIS EVALUATION:

Functional Value 5
VISUAL/ESTHETIC QUALITY
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
ALL QUESTIONS TO BE ANSWERED IN THE FIELD (continued):			
7. Landform contrast visible from primary viewing location(s).		a. Wetland provides dramatic visual contrast with surrounding topography such as trap rock ridges.	1.0
		(b) Wetland provides some visual contrast with surrounding topography.	(0.5) *
		c. Wetland provides no visual contrast with surrounding topography.	0.1
8. Dominant surrounding land use visible from primary viewing location(s).		a. Woodland, agricultural land and/or well-landscaped residential or commercial areas.	1.0
			(0.75)
		b. Other residential and commercial areas of ordinary visual quality.	0.5
		c. Urban and built up areas of low visual quality.	0.1 *
9. The sum of the wetland area dominated by: A) flowering trees or shrubs, OR trees or shrubs which turn vibrant colors in fall, OR B) areas of emergent vegetation, OR C) floating leaved vegetation.		(a) More than 5 acres.	(1.0)
		b. From 1 to 5 acres.	0.5
		c. Less than 1 acre.	0.1 *
10. Wetland wildlife habitat.		FVI from FUNCTIONAL VALUE 2	0.82

NOTE: Please be sure to specify the date of the field review as foliage will vary greatly with the seasons.

FVI FOR FUNCTIONAL VALUE 5 = Average of column D = 2.32/10 = 0.83

EVALUATION AREA FOR FUNCTIONAL VALUE 5 = Total area of wetland visible* from primary viewing location(s) = _____.

* - you may need to measure this area from your work maps as it may only be a percent of the actual wetland size.

NEEDED FOR THIS EVALUATION:

Functional Value 6
WATER BASED RECREATION IN WATERCOURSE ASSOCIATED WITH WETLANDS
(Canoeing, Nonpowered Boating, Fishing Hunting and Wildlife Observation)

* State of Connecticut Water Quality Classifications Map.
* DEP Fisheries Bureau fish stocking & anadromous fish plans.
* Familiarization with watercourse through the seasons.
* Topographic map, aerial photographs or other means, including a field walk, to assess the length of canoeable stream.

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

PLEASE NOTE: If no year round stream, pond or lake is present enter zero for this function (Column 'D' on summary sheet) and proceed to the next functional value.

QUESTIONS TO ANSWER IN THE OFFICE:

A	B	C	D
1. Water quality of watercourse.	variable	a. High: minimal pollution meets or exceeds Connecticut DEP Class B or SB standards.	1.0
			0.75 (circled, handwritten)
		b. Medium: moderate pollution - meets Class C or SC standards.	0.5
		c. Low: severe pollution - Class D or SD quality.	0.1
2. Fishing.		a. (circled) Wetland located on state stocked stream or lake.	1.0 (circled)
		b. Wetland located on stream or lake which is used occasionally for warm water fishing.	0.5
		c. Wetland located on stream or lake which is seldom used for fishing because of poor water quality, lack of access, insufficient depth, etc.	0.1
3. Hunting.		a. (circled) Wetland is in an area where hunting is permitted.	1.0 (circled)
		b. Wetland is in an area where hunting is prohibited.	0.1
4. Opportunities for wildlife observation.		FVI from FUNCTIONAL VALUE 2	0.82

[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:

5. Canoe and boat passage (if watercourse is not now, or could not be, made accessible to the public, then this question is not applicable).		a. Watercourse is at least 10 feet wide and one foot deep and is free of obstructions for canoeing and/or nonpowered boating, and passage through wetland is part of 2 mile reach OR pond or lake is suitable for non-powered boating use.	1.0
		b. Watercourse contains some year-round and/or seasonally exposed obstructions and/or shallow areas which hinder the use of canoes and/or nonpowered boats in part of 2 mile reach.	0.5
		c. Watercourse is too small and shallow and/or contains obstructions which prohibit the use of canoes and/or nonpowered boats in part of 2 mile reach OR pond or lake is not suitable for non-powered boating use.	0.1
6. Off road public parking at potential recreation site.	Variable: large wetlands	a. Existing or easily developed parking area within 150 feet of water's edge.	1.0
			0.75
		b. Moderate expense required to develop parking area within 150 feet of water's edge.	0.5
		c. Parking within 150 feet of water not feasible or expensive to develop or potential recreational benefits do not appear to justify development of parking area.	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)			
7. Access to water at potential recreation site for canoeing or fishing (good site: to launch a boat, to stand and cast for fish, to observe wildlife).	variable: large wetland	a. Direct access to water available or easily developed.	1.0
		(b) Direct access to water would require moderate expense to develop.	(0.5)
		c. Direct access would require major expense to develop or obtain or is not suitable to develop.	0.1
8. Visual/esthetic quality of potential recreational site.		(a.) Undisturbed and natural - no esthetic detractors present such as litter, abandoned cars, land fills, road noise, etc.	(1.0)
		b. Limited disturbance in and/or around wetland - minor esthetic detractors present.	0.5
		c. Severe disturbance - major esthetic detractors present.	0.1

FVI FOR FUNCTIONAL VALUE 6 = Average of column D = 6.22/8.0 = 0.85

EVALUATION AREA FOR FUNCTIONAL VALUE 6 = Area of wetland evaluated for water based recreation* = _____.
* birding, hunting, field walks may use entire wetland.

NEEDED FOR THIS EVALUATION:

Functional Value 7
FLOOD CONTROL

* A method to calculate area (dot grid, planimeter, etc.).
* DEP Drainage Basin Maps (for watershed delineation base information and starting points).
* Topographic map of the study area.
* Ability to delineate watershed (See Appendix F).
* Ability to understand elevations on a topographic map or site plan.

ALL WORK TO BE COMPLETED IN THE OFFICE:

1. Establish the size of the wetland. WETLAND IS TOO LARGE FOR THIS METHOD. ASSUMED HIGH

2. Establish the size of the total drainage area above the mouth of the wetland.

3. Establish the size of the <u>total</u> drainage area above the damage area*. (This will include all acreage in Question 2 as well as the acreage in the drainage between the mouth of the wetland and the damage area.)

4. Calculate the answer for Ratio A = _____.

   and for Ratio B = _____.

5. Follow down the appropriate Ratio A column to the row that most closely approximates the Ratio B value. Your answer is the FVI for this function.

RATIO B: Area of Wetland (answer to #1) divided by Total drainage area above damage area (answer to #3)	RATIO A: <u>Total drainage area above the mouth of wetland (answer to question 2)</u> / Total drainage area above damage area (answer to question 3)		
	<u>RATIO A: >.50</u>	<u>.16 < RATIO A: <.50</u>	<u>RATIO A: <.16</u>
	FVI	FVI	FVI
.002	.10	.08	.04
.005	.24	.20	.12
.010	.34	.28	.16
.020	.48	.38	.24
.025	.56	.48	.28
.033	.66	.58	.32
.050	.74	.64	.36
.067	.80	.70	.40
.100	.88	.78	.44
.200	.98	.88	.48

* Damage Area in this case is assumed to be <u>every</u> road crossing of a wetland and/or watercourse - until it can be shown otherwise; in other words every single road crossing is a potential damage area until it can be shown no damage will result from the storm event. The damage area may also be any or all structures within the floodplain of the 100 year storm event (see Flood Insurance Rate Maps).

FVI FOR FUNCTIONAL VALUE 7 = _____.

EVALUATION AREA FOR FUNCTIONAL VALUE 7 = Area of wetland = _____.

NEEDED FOR THIS EVALUATION:

Functional Value 8
GROUNDWATER USE POTENTIAL

* Community Water Systems in CT Map.
* Ground Water Availability in CT Map.
* Water Quality Classifications map series 1:50,000 scale OR
* Water Quality Classifications Map of CT 1:125,000 scale.

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

NOTE: Evaluate this function only if the wetland is situated directly above or upstream of a stratified drift aquifer. If there is no downstream aquifer in your drainage study area mark zero on the Summary Sheet and proceed to the next function.

ALL QUESTIONS TO BE ANSWERED IN THE OFFICE:

1. Existing public water supply wells.	– River East Water Co., Portland –	a. There is/are high yield well(s) in a stratified drift aquifer downstream from the wetland.	1.0
		(b.) There is/are small yield well(s) in a stratified drift aquifer downstream from the wetland.	(0.5)
		c. There are no downstream wells in stratified drift.	0.1
2. Potential public water supply.		a. Wetland is located on an unconsolidated aquifer of Coarse-grained Stratified Drift(CGSD), CGSD overlain by Fine-Grained Stratified Drift(FGSD), or CGSD overlying FGSD.	1.0
		(b) Wetland not located on one of the above aquifer types.	(0.1)
3. Groundwater quality.	variable	a. Meets or exceeds Connecticut DEP Class GA standards.	1.0 (0.75)
		b. Meets Class GB standards.	0.5
		c. Meets Class GC or GD standards or is classified as saline.	0.1
4. Water quality of watercourse associated with wetland.	variable	a. Meets or exceeds Connecticut DEP Class A standards.	1.0 (0.75)
		b. Meets Class B standards.	0.5
		c. Meets Class C or D standards.	0.1

(Continued on next page.)

NEEDED FOR THIS EVALUATION:

Functional Value 9
NUTRIENT RETENTION AND SEDIMENT TRAPPING

* A method to calculate slope.
* Topographic or land use map, or recent aerial photographs.
* A method to calculate area. (Dot grid, Planimeter, etc.)
* Water Quality Classifications Map.
* Completion of Flood Control Functional Value.
* Knowledge or familiarity with the area regarding extent and type of current development.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART A - OPPORTUNITY FOR NUTRIENT RETENTION AND SEDIMENT TRAPPING			
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Average slope of watershed which contributes to the wetland.		a. Steep: greater than 8%.	1.0
		b. Moderate: from 3 to 8%.	0.5
		c. Low: less than 3%.	0.1
2. Dominant land use in watershed which contributes to the wetland.		a. Active cropland or pastureland.	1.0
		b. Urban land, suburban land and rural residential.	0.25
		c. Woodland, wetland, or abandoned farmland.	0.1
QUESTIONS TO ANSWER IN THE FIELD:			
3. Potential sources of excess nutrients in the watershed which contributes to the wetland.		a. Large areas of active cropland and pastureland, many dairies or other livestock operations, sewage treatment plants or numerous on site septic systems within 100 feet of stream.	1.0
		b. Watershed is predominantly urban or contains some areas of active cropland, one or two dairies or other livestock operations or a few onsite septic systems within 100 feet of stream.	0.5
		c. Watershed predominantly forested or otherwise undeveloped.	0.25 0.1
4. Potential sources of excess sediment in watershed above wetland.		a. Large areas of active cropland, construction sites, eroding road banks, road sands from storm drains & like areas.	1.0
		b. Some areas of active cropland, a few construction sites, some road sands from storm drainage, and similar areas.	0.5
		c. Watershed predominantly forested or otherwise undeveloped.	0.1

FVI FOR PART A - Average of Column D = 1.5/4 = 0.37 = FVI (A).

[PART B follows on next page.]

NEEDED FOR THIS EVALUATION:

Functional Value 10
SHORELINE ANCHORING and DISSIPATION of EROSIVE FORCES

* Field trip is absolutely necessary as all questions are answered on-site.
* (Optional) Map wheel to measure stream shoreline.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
ALL QUESTIONS TO BE ANSWERED IN THE FIELD:			
1. Wetland morphology.	variable	a. No distinct shoreline or bank evident between watercourse and wetland or upland. Wetland grades from aquatic bed and/or marsh (emergent vegetation) landward to shrub swamp or wooded swamp.	1.0 (0.75)
		b. Distinct shoreline or bank evident between watercourse and wetland or upland. Shoreline or bank presently showing minimal signs of erosion.	0.5
		c. Distinct shoreline or bank evident between watercourse and wetland or upland. Shoreline or bank presently showing signs of severe erosion.	0.1
2. Width of wetland bordering watercourse.		(a) More than 10 feet.	(1.0)
		b. From 3 to 10 feet.	0.5
		c. Less than 3 feet.	0.1
(Remember: In CT a pond or lake with inflow and outflow is considered a watercourse.)			
3. Vegetation density of wetland bordering watercourse.		(a.) High: more than 90 percent ground cover.	(1.0)
		b. Moderate: from 70-90 percent round cover.	0.5
		c. Low: less than 70 percent.	0.1

FVI FOR FUNCTIONAL VALUE 10 = Average of column D = 2.75/3 = 0.91

EVALUATION AREA FOR FUNCTIONAL VALUE 10 = $\frac{L \times 10^* \text{ FEET}}{43{,}560 \text{ SQ. FT./ACRE}}$ = _____.

Where L = Length of watercourse (stream or lake) shoreline within wetland in feet. Shoreline of stream equals length of stream X 2 (number of banks).

Where 10* is a constant stream width multiplier regardless of actual width of watercourse. Since this is a first cut evaluation, this average is used. You may elect to use the actual width in this step, but be sure that which ever you elect, you do so consistently throughout the entire evaluation.

NEEDED FOR THIS EVALUATION:

Functional Value 11
FORESTRY POTENTIAL

* Soils map.
* Topographic or land use map, or recent aerial photographs.
* Knowledge of local land ownership through familiarity or tax maps.
* Drainage Class and Agricultural and Forestry Values of Wetland Soils Appendix.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
ALL QUESTIONS TO BE ANSWERED IN THE OFFICE:			
PLEASE NOTE: If no soils have at least a medium value for forestry enter zero for this function in column 'D' on the Summary Sheet and proceed.			
1. Area(s) of wetland having soils with at least a medium value for forestry.		(a) More than 10 acres. b. From 5 to 10 acres. c. Less than 5 acres.	(1.0) 0.5 0.1
2. Dominant land use of wetland soils having at least a medium value for forestry.		(a) More than 10 acres presently in woodland. b. From 5 to 10 acres presently in woodland. c. Less than 5 acres in woodland.	(1.0) 0.5 0.1
3. Dominant land use within 500 feet of wetland edge.	variable	a. Woodland or agriculture. b. Rural residential (scattered single family dwellings). c. Urban and built-up.	1.0 (0.75) 0.5 0.1
4. Dominant land ownership pattern of wetland soils having at least medium value for forestry.		a. Included in one or two large private holdings, state owned forestland, or land owned by a timber company. (b.) All other land ownership.	1.0 (0.1)

FVI FOR FUNCTIONAL VALUE 11 = Average of Column D = 2.85/4 0.71

EVALUATION AREA FOR FUNCTIONAL VALUE 11 = Area of wetland soils having at least medium value for forestry = _____.

NEEDED FOR THIS EVALUATION:

Functional Value 12
ARCHEOLOGICAL SITE POTENTIAL

* Soils map.
* Connecticut Soil Legend or Soil Catenas of CT.
* Topographic map or aerial photographs.
* Knowledge of local landscape through familiarity with area.
* Drainage Class of Wetland Soils Appendix.
* Review of town historical map.
* Contact with State Archeologist.

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

PART A - NATIVE AMERICAN HABITAT SITE

QUESTION TO BE ANSWERED IN THE OFFICE:

1. Soil type at potential site. (site would most likely border wetland.) — several sites
   - (a.) Sandy, Excessively-, Somewhat Excessively, and well drained soils. — (1.0)
   - b. Sandy, moderately well drained soils. — 0.5
   - c. Somewhat-, Poorly, and Very Poorly drained soils. — 0.1

QUESTIONS TO BE ANSWERED IN THE FIELD:

2. Proximity of stone mounds or stone remains and/or bedrock outcrops for shelter to potential site/freshwater location.
   - (a.) < one half mile. — (1.0)
   - b. > one half mile. — 0.1

3. Proximity of potential site to a prominent knoll, lookout or prime vantage point.
   - a. < 440* yards. — 1.0
   - (b.) between 440 and 880 yards — (0.5)
   - c. > 880 yards. — 0.1

4. Proximity of potential site to fresh and/or coastal waters.
   - (a.) 0 to 150 yards. — (1.0)
   - b. 151 - 440 yards. — 0.5
   - c. > 440 yards. — 0.1

5. Average land slope of potential site within one quarter mile of freshwater. — variable
   - a. Flat: 0 - 3% — 1.0 (0.75)
   - b. Moderate: 3 - 8% — 0.5
   - c. Steep: > 8% — 0.1

6. Natural waterfalls at site.
   - a. Yes — 1.0
   - (b.) No — (0.1)

FVI FOR PART A = Average of Column D = 4.35/6 = 0.72

EVALUATION AREA FOR FUNCTIONAL VALUE 12 = #Area of potential site for Habitat = _____.

* - 440 yards equals one quarter of a mile.

- Area may be only the size of a small encampment we know today (especially if it was a transitory location as opposed to a group village that was returned to annually) that is, a few brush shelters or the shelter area of rock outcrops added to the area of a fire ring and so on.

[PART B follows on next page.]

NEEDED FOR THIS EVALUATION:

* Research of town historical map(s).
* Contact with State Archeologist.

Functional Value 12
ARCHEOLOGICAL SITE POTENTIAL
(continued)

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
PART B - POTENTIAL HISTORICAL INDUSTRIAL SITE			
ALL QUESTIONS TO BE ANSWERED IN THE FIELD:			
1. Proximity of potential site to year round water course.		(a) 0 to 50 yards. b. 51 - 100 yards. c. > 100 yards.	(1.0) 0.5 0.1
2. Visible stone wall and/or foundation structures.	Unknown but possible	a. Yes* b. No	1.0 (0.5) 0.1
3. Existence of mill pond at site.	Unknown but possible	a. Presence of pond or pond site AND remains of dam. b. Presence of pond or pond site OR remains of dam. c. No apparent remains of pond or of dam.	1.0 0.5 (0.25) 0.1
4. Natural falls/ bedrock outcroppings at site.		a. Yes (b. No)	1.0 (0.1)

* - Note: If old or stone foundation or structure walls are encountered in the field, the State Archeologist should definitely be contacted for an evaluation of the site's significance. (However, the state archeologist does not need to know about the stone walls that lined so many old fields.)

FVI FOR PART B = Average of Column D = 1.85/4 = 0.46

EVALUATION AREA FOR FUNCTIONAL VALUE 12 = Area* of potential site for Industrial Site = _____.

* - Area here may be the size of the foundation structure and/or footprint of the building as well as other factors that may have been necessary for production: remains of old roads, stone abutments for former bridges over streams and creeks, etc.

NEEDED FOR THIS EVALUATION:

Functional Value 13
URBAN WETLAND QUALITY

* Topographic or land use map, or recent aerial photographs.
* Water Quality Classifications map series 1:50,000 scale OR
* Water Quality Classifications Map of CT 1:125,000 scale.
* Town Zoning Map.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO BE ANSWERED IN THE OFFICE:			
1. Quality of inflow water.	N/A	a. Meets or exceeds Connecticut DEP Class A standards.	1.0
		b. Meets Class B standards.	0.5
		c. Meets Class C or D standards.	0.1
2. Proximity of wetland to schools.		a. Within short walking distance.	1.0
		b. Within 20 minute drive.	0.5
		c. More than 20 minute drive.	0.1
ALL QUESTIONS TO BE ANSWERED IN THE FIELD:			
3. Dominant wetland class.		a. Semipermanent flooded emergent (marsh), shallow open water.	1.0
		b. Forested and/or scrub shrub wetlands.	0.5
		c. Scrub shrub saturated (bog), seasonally flooded emergent (wet meadow).	0.1
4. Stream corridor vegetation (within 15 feet on each side of stream).		a. Wetland borders a stream, and >75% of the stream corridor is in shrubs, trees, and herbaceous vegetation for 1,000' upstream and downstream of the wetland.	1.0
		b. Wetland borders a stream and between 25% & 75% of stream corridor is in shrubs, trees, and herbaceous vegetation for 1,000' upstream and downstream of the wetland.	0.5
		c. Less than 25% of the stream corridor is in shrubs, trees, and herbaceous vegetation for 1,000' upstream and downstream of the wetland; OR wetland not bordering a stream.	0.1

[Continued on next page.]

NEEDED FOR THIS EVALUATION:

Functional Value 13
URBAN WETLAND QUALITY
(continued)

* Topographic or land use map, or recent aerial photographs.
* Water Quality Classifications map series 1:50,000 scale OR
* Water Quality Classifications Map of CT 1:125,000 scale.
* Town Zoning Map.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
5. Access to perennial stream, pond or lake at potential educational site.		a. Direct access available. b. Water access not available but feasible to develop. c. Perennial stream not present or access not feasible.	1.0 0.5 0.1
6. Dominant wetland class visible from primary viewing location.		a. Semipermanent flooded emergent (marsh), shallow open water. b. Scrub shrub. c. Forested.	1.0 0.5 0.1
7. The sum of the wetland area dominated by: A) flowering trees or shrubs, OR trees or shrubs which turn vibrant colors in fall, OR B) areas of emergent vegetation, OR C) floating leaved vegetation.		a. More than 1/2 acres. b. From 1/2 to 1/4 acres. c. Less than 1/4 acre.	1.0 0.5 0.1
8. General appearance of the wetland visible from the primary viewing location(s).		a. No major detractors (such as litter) or detractors could be removed. b. Some detractors present which could not easily be removed. c. Major detractors which could not easily be removed.	1.0 0.5 0.1

FVI FOR FUNCTIONAL VALUE 13 = Average of Column D = _____.

EVALUATION AREA FOR FUNCTIONAL VALUE 13 = Area of wetland = _____.

NEEDED FOR THIS EVALUATION:

Functional Value 14
NOTEWORTHINESS

* Contact with Natural Diversity Data Base.
* Knowledge of any management activities by local Nature Centers, Audubon Society, Scouting groups, Garden Clubs, etc.
* Completed evaluations for all other wetlands in this watershed.
* Contact with State Geologist.

A Evaluation Questions	B Computations or Actual Value	C Evaluation Criteria	D Functional Value Index (FVI)
QUESTIONS TO ANSWER IN THE OFFICE:			
1. Wetland contains critical habitat for a state or federally listed threatened or endangered species.	Least Bittern, American Bittern, Slender walker etc.	(a. Yes) b. No	(1.0) 0.0
2. Wetland is known to be a study site for scientific research.	in the past	(a. Yes) b. No	(1.0) 0.0
3. Wetland is included on a state or federal list of natural landmarks.		(a. Yes) b. No	(1.0) 0.0
4. Wetland has local significance because it contains the highest number of WVU's within the study area for one or more functional values.		(a. Yes) b. No	(1.0) 0.0
5. Wetland has local significance because it has a documented biological, geological, or other feature which is locally rare or unique.		(a. Yes) b. No	(1.0) 0.0
6. Wetland presently in agricultural use.		a. Yes (b. No)	1.0 (0.0)

FVI FOR FUNCTIONAL VALUE 14 = 1.0 if the FVI for any question is equal to 1.0, otherwise the FVI for FUNCTIONAL VALUE 14 is 0.0 = 1.0 "RED FLAG"

EVALUATION AREA FOR FUNCTIONAL VALUE 14 = Total area of wetland = _____.

APPENDIX 9

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WILDLIFE DIVISION

SESSIONS WOODS WILDLIFE MANAGEMENT AREA
P.O. BOX 1550 • BURLINGTON, CT 06013 - 1550
TELEPHONE (203) 584-9830 • FAX (203) 584-1396

April 28, 1993

Mr. George T. Logan
Soil Science & Environmental Services, Inc.
104 Elm Street
Cheshire, Connecticut 06410

Dear Mr. Logan:

Your request for information pertaining to the redevelopment of the North End Industrial area in Middletown, Connecticut was recently forwarded to me by Ms. Dawn McKay (DEP-NRC Natural Diversity Data Base). As she indicated to you, the state endangered American bittern (Botaurus lentiginosus) and the slenderwalker (Pomatiopsis lapidaria) a state species of special concern have both been documented in the proposed project area.

Without a more detailed project proposal which includes proposed activities and a schedule for completing these activities, it is impossible for me to comment on the impacts development of this area would have on this wetland bird or aquatic invertebrate species.

If you would like more information on either of these species or how specific activities may impact them, please feel free to contact me. The Wildlife Division has not conducted an on-site survey of this location and contact with this office should not be considered a substitute for site surveys that may be required for environmental assessments or CEPA reviews.

Sincerely,

Jenny Dickson

Jenny Dickson
Wildlife Biologist

JD/mk

cc: D. McKay

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

NATURAL RESOURCES CENTER
165 Capitol Avenue, Room 553
Hartford, Connecticut 06106
Natural Diversity Data Base

April 22, 1993

George T. Logan
Soil Science & Environmental Services, Inc.
104 Elm Street
Cheshire, CT 06410

Re: Feasibility study for the redevelopment of the north end industrial area in Middletown, Connecticut.

Dear Mr. Logan:

According to our information, there may be two state listed species which occur within the proposed project boundaries. The species are:

Species	Date Last Observed	State Status
Pomatiopsis lapidaria (American Bittern)	1990	Special Concern
Botaurus limicola (Slenderwalker)	1974	Endangered

I have forwarded your letter to Jenny Dickson (DEP-Wildlife). She will provide further comments regarding the invertebrate and bird species.

In addition, this area is adjacent to and may include Silver Maple floodplain forests and freshwater tidal wetlands, both critical habitat in Connecticut. The extent of these two habitats and the proposed impacts of additional development need to be determined in order to adequately address your request.

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultation with the

Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

Please contact me if you have further questions (566-3540). Thank you for consulting the Natural Diversity Data Base.

Sincerely,

Dawn M. McKay

Dawn M. McKay
Biologist/Environmental
Analyst III

DMM/dmt

cc: Jenny Dickson

THE MIDDLETOWN PRESS

Founded Sept. 29, 1884

Mack W. Stewart, *Publisher*
David Scribner, *Editor*
Tom Hennick, *Associate Editor*
Lucas Held, *Associate Editor*

Editorials

Briefly noted

Connecticut's world treasure

We knew it all along. Now it's official. The lower stem of the Connecticut River has been recognized as one of the "Last Great Places" in the western hemisphere, so designated by a massive international Nature Conservancy project intended to preserve endangered regional ecosystems.

The tidelands of the Connecticut are one of 40 areas to achieve this designation. Among them are landscapes as familiar as Block Island and the southern Berkshires and as exotic as The Condor Bioreserve in Ecuador and The Sulawesi Bioreserve in Indonesia.

In naming these special places, the Nature Conservancy is encouraging the adoption of a new ecosystem approach to protecting the lower 37 miles of the river and its eight major tributaries in the Middlesex County. Environmental scientists have for years called for conservation efforts of wider scope. It is not enough, they say, to protect the individual jewels of a region — the Chapman's Ponds, the Whalebone Creeks and the Higby Mountains. Each sub-unit of an ecosystem is related to every other sub-unit. What happens in a Berlin farmer's field eventually affects a lower-county salt marsh. They are part of an organic entity.

"The Last Great Places" represents a fundamental shift in conservation efforts. "It is an attempt to bridge the cultural and perceptual divide between people and nature," according to Claudia Polsky, project coordinator for the Conservancy's Middletown office.

And not a moment too soon. For as Polsky notes, paraphrasing Henry David Thoreau, when a landscape is lessened, the human soul is diminished. We need not bow to the end of a season.

APPENDIX 10

Bridge Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-15A	-	102/104	City of Middletown, Emergency Mgt.	Present use - Garage/Warehouse State of CT Highway Garage (1955-1975) Valley Fuel Oil (1924- ?)	
20	17-15B	4	103	Liljedahl	Residence - 3 family dates from on or before 1889	
		3	109	Spivey	Residence - 2 family dates from on or before 1889	Oil heat
		2	111	Talevi	Residence - 2 family dates from or before 1889	Oil heat
	17-15	1	115	Mt. Hope F.B.H. Church of God of America	Residence	
		2	121	Waters	Residence - 3 family dates from or before 1889	
		3	125	Mc Arthur	Residence - 3 family dates from or before 1889	
		4	127	D'Alessandro	Residence - 2 family dates from or before 1889	Oil heat
		5	129	D'Alessandro	Residence - 2 family	Oil heat
		5	131	D'Alessandro	Residence, to rear of lot dates from or before 1889	
		5	133	Alfredo's Riverside Restaurant	Residence	Oil heat
		5A	135	Lepore & Deluca	Residence - 2 family	Oil heat

Bridge Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-15	5B	141	Alfredo's Riverside Restaurant	Restaurant (1965 to present) Riverside Grill (1940 to 1965)	
		6		City of Middletown	Vacant	
		7		City of Middletown	Vacant	
		8		City of Middletown	Vacant	

Catherine Street

19	17-1	1A	-	Ferrara	Vacant for long time	
		1	18-20	Ferrara	Residence - 2 family dates from or before 1924	Oil heat

High Street

19	17-1	20	649-651	Standard Motor Products (EIS)	Parking lot Residential (1924-1970)	
		19	653-655	Standard Motor Products (EIS)	Parking lot Residential (1924-1970)	
		18	657-659	Standard Motor Products (EIS)	Parking lot Residential (1924-1970)	
		16-17	661	Standard Motor Products (EIS)	Parking lot Residential (1924-1970)	

High Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
19	17-1	10 (Lots 4-15)	695	Standard Motor Products (EIS)	Brake Mfg. (1985 to present) Parker-Hannifin Corp., E.I.S. (1930's to 1985) Residential dwellings were formerly at addresses 663, 667, 669, 673, 675 & 681 (1924-1955) Middletown Silk Mfg. (1926-1936)	14 tanks exist., 3 tanks removed
	17-2	18	-	Standard Motor Products (EIS)	Parking lot	
		19	-	Standard Motor Products (EIS)	Parking lot	
		20	-	Standard Motor Products (EIS)	Parking lot	

Johnson Street

19	17-5	117	-	City of Middletown	Sewer Pump Station	
		118	161	Butler, Butler Construction Co.	(1974 to present) Industrial yard Residential dwelling (1920-1974)	
		120	175	Butler, Butler Construction Co.	(1965 to present) Garage/Industrial yard (owned from 1965 to present) CT Valley Welding Co. (1955) Gasket Materials Corp. (1947-1950) CT Co., The (1917-1934) powerhouse, Street RR NY, NH & H Railroad (1913) shop erected in 1860	3 - 3000 gallon oil/petro tanks
18	12-2	14	-	City of Middletown	Vacant	Middletown Municipal Landfill
		15	-	City of Middletown	Vacant	Middletown Municipal Landfill
		16	-	City of Middletown	Vacant	Middletown Municipal Landfill

Johnson Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
18	12-1	2	-	Staniszewski	Vacant - swamp	
18	12-2	15A	-	VanSands & Roberts	Vacant	Middletown Municipal Landfill
		15B	-	Avery	Vacant	Middletown Municipal Landfill
		15c	-	Scovill	Vacant	Middletown Municipal Landfill
		15D	-	Scovill	Vacant	Middletown Municipal Landfill
20	17-1	2	-	Standard Motor Products (EIS)	Vacant River Industries Corp. (1975)	
		3	-	Standard Motor Products (EIS)	Vacant	
19	17-7	2A	172	Ferrera	Vacant Residencial dwelling (1913-1975)	

Miller Street

20	17-15	1	12	Janis & Moreland	Residence - 4 family From or before 1889	Oil heat
		R/W	16	R.O.W. NY, NH & H Railroad		
	12-2	1	18	City of Middletown	Parking Area Former City disposal area - solid waste (1950's to 1960's) Residence from or before 1889 to 1950	
		2	20		Residence from or before 1924 to 1950	
		3	22	Turner	Residence - 2 family From or before 1889	

Miller Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	12-2	4	26	Turner	Residence - 2 family From or before 1889	Oil heat
		5	30	Hart	Residence - 2 family From or before 1889	Oil heat
		6	32	State of CT	Residence - 1 family	Oil heat
		7	50	Perry	Residence - 1 family	Recent house
		8		City of Middletown	Park with lawn/forest Former City disposal area - solid waste (1950's to 1960's)	Old landfill
		9		City of Middletown	Vacant	
		10		City of Middletown	Vacant	
	17-15C	1	15	Evans	Residence - 1 family From or before 1889	Oil heat
		2	17	Jones	Residence - 1 family From or before 1889	Oil heat
		3	19	Turner	Residence - 1 family From or before 1889	
		4	21	Hart	Vacant Former residence 1930 to 1984	
20	17-15C	5	-	Citicorp Mortgage Co.	Vacant Residence present in 1889	
		6-7	25 & 27	Richmond & Spencer	Residences - two 1 families Both residences shown dating from or before 1889	Oil heat

Miller Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-15C	8	31	Kilgore	Residence - 1 family From or before 1889	
		9	79	Hart & Roper	Residence - 2 family From or before 1889	Oil heat
		10	77	Hart & Roper	Residence - 2 family From or before 1889	Oil heat

North Main Street

20	17-10A	-	33-35	State of CT	Vacant	
		7-8-9	55	Leibman	Longworth Carlson Inc.- Auto sales/service	Listed on RCRA Haz Waste Reg 3 - oil/petro tanks removed
			49	Northend Radiator Service	Radiator Repair Shop (1984-1989)	
			51	Fitzgibbons	Bottler (on or before 1930-1935)	
			53	Longworth Carlson, Inc.	Car Dealership (1924-1945)	
			55	Longworth Carlson, Inc.	Car sales/service (1945-1992) Original construction 1893	
	17-4	1	-	Longworth Carlson Inc. Vacant	Parking lot	Gas tank and oil tank removed

NOTE: Companies listed at # 75 may have been on Block 17-4, Lots 1, 2 & 4A

			75	LCI Super Service	Gasoline Service Station (1955-1960) PX Auto Supply (1950) Red Wing Gas Co.- Auto accessories (1935-1945) Middletown Car Cleaning Co. (1935) Kabatznick Furniture Store-Warehouse (1935) Red Wing Auto Service, Inc.-Red Wing Gas (1930)	Former Gas Station

North Main Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-4		79	Longworth Carlson, Inc.	Body shop (1960-1965) Franco's Wholesale Tire & Recapping, Inc. (1955)	
		4A	81	Leibman	Vacant	Old Landfill
		4	91	Longworth Carlson Inc.	Vacant (Small old wood structure) Gay-Paree Poodle Parlor (1975-1981) Top Hat Barber Shop (1970) Jim's Oil Service, Inc. (1960-1965)	
			125		Presently vacant Middlesex Tire & Battery Service (1965) Argosy Industry Co. - Enamelers (1960) City solid waste disposal area - on or before 1924 to 30's or 40's	Old Landfill
	17-2	25	171	Bergen	Bergen Architectual Woodworking (1982 to present)	Solvents/Glue used on-site DOT Identified site as potential area of concern
		23-24	175	M. A. & M. Inc.	Builders, office, warehouse (1955 to present) Moncara, Aresco & Mazzatta, Inc. Building dates from 1920+	Old gas tank present on property
		21-22		Standard Motor Products (EIS)	Vacant (Parking lot)	
	17-7	1	-	O'Connor	Warehouse - brick (Partially Occupied) CT Valley Coach & Frame Ltd.- Auto repair	
			48	Meech & Stoddard, Inc.	Grain mill (on or before 1889 to 1960) Whitmore Electric Co. (1935)	

North Main Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-7	1	74		Meech & Stoddard-Warehouse (1945-1981) Sears Roebuck & Co.-Warehouse (1970-75) Red Wing-Storage Warehouse (1935-40) Red Wing Automobile Service Co.-Sales/ service (1930) Red Wing Gas Company	
		1	- 76	O'Connor	Unoccupied Warehouse - metal Meech & Stoddard, Inc.-Flour/feed (1930-1970) Red Wing Heating Oil Co. (1930)	
		1AA	82	McCormack & Annino	Neighborhood Package Store (1981 to present) Grogg Shop-Package store (1965-1975) Curtins Package Store (1955) Meech & Stoddard, Inc.- Beverages (1940-1950)	
		2	-	Meyer	Unoccupied Red Wing Oil Co. (1938)	Empty oil tanks Reported Soil Contamination
		3	90	Judkins	Ron's Sale & Service Center- Car Sales/service (Presently) Reliable Automotive Trans. Sys.- Sales/service (1991) CT Supply (1989) Egeter Battery (1955-1984) Rocky's Service Station (1950) Jim's Oil Service (1945) Camp's Service Gasoline (1940) Building dates from 1930+s	Former Gas Station 3 - gas tanks removed
		3A	-	City of Middletown Sewer interceptor	Pump station	
		4	-	Middletown Builders Supply	3 bay garage built 1986	

North Main Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-7	4A	-	Middletown Builders Supply		
		6A	110	Middletown Builders Supply, M.S.R., Inc.	Mason supplies (1993) Middletown Auto Parts (1970-1984) Babagallo Mfg- Clothes Mfg (1966) Rayco Products, Inc.- Bathroom fixtures (1955) American Coal Co. (1930-1955)	3,000 gal. diesel tank 2,000 gal. gas tank Wash/Service Trucks on-site Floor Drains Present
		6	120	Middletown Builders Supply/ Nutmeg Oil	Lumber yard (1975 to present) Nutmeg Oil Company (present listing) Middletown Builders Supply and Fuel Co. (1955-1975)	Tank
		7	170	Lafreniere	Transmission Works of Middletown (1981-present) Ferrero's Garage (1955-1975)	Former Gas Station Removed three 3,000 gal gas tanks Solvents & Transmission Oils handled on-site
		7A	-	Standard Motor Products (EIS)	Parking lot	
		8	-	Standard Motor Products (EIS)	Parking lot	
		1A	-	Standard Motor Products (EIS)	Parking lot	
	12-2	13A	-	City of Middletown	Muncipal Landfill	Middletown Municipal Landfill
		13	-	Depot Industries Inc.	Warehouse EIS Plant #3 (1975) ?	Former Remington Rand Facility See Phase I by SS&ES, INC.

Pease Avenue

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-10	16	2	Filanda	Residence - 2 family Dates from on or before 1924	Oil heat
		15	4	Sullivan	Residence - 2 family Residence dates from on or before 1924 Greco the Florist (1930-1955) Greenhouses in rear of lot; maps 1924, 1930+s	Oil heat
		14	10	Lewis	Vacant Greenhouses present on 1930+s map	Former Greenhouses Fill or vent pipe to tank observed on-site
		13	12	Amato	Trigo Printing-Print shop (1984 to present) Brings Machine Products (1980) Eagle Safe & Security Corp. (1975) New England Stamp Co. (1970) Amato's Hobby Center-Sales/ repair (1955-1970) Building dates from or before 1940	Print Shop
		12	14-16	Amato	Residence - 5 family Dates from or before 1930	
		11	-	Casserino Note: Building is located on Block 17-10, Lots 10 and 11	Casserino Warehouse-Moving/storage (1970 to present) Laurel Fashions (1975-1981) Auburn Mfg. Co. Chas. L. Jarvis Mfg-machine tools (1940-1960) Portland Silk Co. (1901-1935)	Former Tool & Die Co. 1,500 gal. oil tank abandoned
	17-4	48	-	Longworth Carlson Inc. Note: Listed as 24r Stack Street	Vacant Reinhold, Wm. H. & Sons-Paper Mfrs., envelopes (1945-50) Aled Tool & Eng. Co. Mfg. (1960) City solid waste disposal area (Sanborn Maps 1924 & 1930+s)	Old Landfill

Rome Avenue

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-10	1	9-11	Fortuna	Residence - 2 family Dates from 1930+s Small dry cleaner bldg in rear (dates from 1930+s)	Former Dry Cleaners Oil heat
		2	15	Wiernasz	Gene's Tv & Electronics (1984 to present) Greco's Flower Shop (1950-1981)	
		3	19	BKW Realty	Residence - 1 family Greco's Greenhouses (1965-1975) Greenhouses (map from 1930+s)	Former Greenhouses
		4	23	Trotta	Residence- 4 family Dates from on or before 1940)	
		5	21	Oyen	Residence - 1 family Dates from on or before 1930	Oil heat
		6	31-33	Misenti	Residence - 4 family Dates from on or before 1940	
	17-10A	-	-	State of CT	Land adjacent to Rt 66 Residence formerly at 18 Rome Ave. (1930-35)	
		11	40	Cucia	Residence - 3 family Dates from on or before 1930	Oil heat
		10	42-44	Termine	Residence - 3 family Dates from on or before 1940	Oil heat

St. Johns Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-13	11	-	State of CT	Vacant At one time contained in Meech & Stoddard complex. Former Factory/warehouse (Cassone Paper Co.) Large fire destroyed bldg in 1966	
		12		Conrail Corp.	Old railroad depot, Meech & Stoddard	

Spring Street

20			26	Note: Auto repair garage was formerly to rear of 26 Spring St. (1930) Presently Route 66		
20	17-10A	2	28-30	Wendry	Residence - 2 family Dates from on or before 1924	Oil heat
		1	32-34	Grilb	Residence - 2 family Dates from on or before 1924	Oil heat
			32-34 rear	Grilb	Residence - 1 family	Oil heat
	17-10	22	38-40	Franco, Franco & Bissonnette	Residence - 3 family Barber/grocer (1930-1955) Dates from on or before 1924	Oil heat
		21	44	Foster	Residence - 1 family Bldg dates from on or before 1924	
		20	46-48	Connelly	Residence - 2 family Dates from on or before 1924	Oil heat
		19	50-52	Phillips	Residence - 3 family Dates from on or before 1924	
		18	54-56	Mazzotta	Residence - 2 family Dates from on or before 1924	

Spring Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-10	17	58-60	Mazzotta	Residence - 2 family Dates from on or before 1924	

Stack Street

20	17-4	2	16	Surburban Stationers Investment Co.	Surburban Office Furniture-Office/ furniture (1986 to present) Jackson Pontiac/Bridgeside Pontiac (1981-1986) Jackson Motor Co. (1935-1981) Victor AutoBody Works (1960) Building dates from 1926	Long time Auto Service Center EPA RCRA Haz Waste Reg.
		3	24	Baker	NAPA North Auto Parts Bld remodeled 1987 Auburn Mfg. Co. (1975-1984) SNET Co. Garage (1940-1955) Usher Motor Car Co. (1930) Building dates from 1926	Former Garage
			24r	Likely was Block 17-4, Lot 4B	Reinhold, Wm. H. & Sons-Paper Mfrs., envelopes (1945-50) Allied Tool & Eng. Co. Mfg. (1960)	
			38	Baker	Middlesex Truck & Van Equib Showboat Automotive Retailing-Auto reconditioning (1987) Building erected 1987	
	17-10	8	-	Longworth Carlson Inc.	Vacant Naomi Dress Co. Mfg. (1955-1960) Nickson Metal Works (1950) May have been the site of Middletown Mfg. Co., 1940-1950+s	
		7A	29/33	M & L Realty	Middletown Mfg. Co.-Metal boxes (1940 to present)	EPA RCRA Haz Waste Reg.

Stack Street

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
		10	-	Mittelman	Auburn Mfg. Co.-Gaskets, washers, packing, seals (1936-present) Auburn Chemical Co. (1955) Portland Silk Mill-Silk weaving (1890-1936)	35 year old 5,000 gal. UST

NOT IN PROJECT AREA, BUT ADJACENT -- ACROSS THE STREET
Spring and Pease Streets

Tax Assessor's Map	Block	Lot	Street Address	Present Owner	Land Use/ Company Name	Remarks
20	17-9	1	66 Spring	City of Middletown	Commodore Macdonough School Dates from or before 1935	5000 gal. oil tank, removed two 2000 gal. oil tanks in 1987
20	17-3	30	75 Pease	Renals	Machine shop (1984 to present) Old bldg listed as sinking on old dump site on assesor's card Macs Garage (1975) Wesleyan Potters Assn. (1970) Laurels Fashions, Inc. (1965-1970) Aristocrat Cleaners and Dyers, Inc. (1935-1960) Middlesex Tool & Dye Co. (1945)	Machine Shop Former Cleaners & Dyers
		28	85		Stielau Oil Company (present) Laurel State Glass Inc. (1975-1984) Mickey's Oil Service (1970)	
20	17-13	10A	50 St. Johns St.		Brings Machine Products	Machine Shop

APPENDIX 11

LIMITATIONS

This Preliminary Environmental Review has been prepared for the exclusive use of the City of Middletown. Conclusions and recommendations made by SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. were based solely on the limited information referenced in this report. SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. did not conduct any soil or groundwater testing in order to confirm or deny our findings. Further research and detailed site walks on each individual property would be required in order to accurately identify potential areas of environmental concern within the Middletown North End Industrial Area. Due to the preliminary nature of this investigation it is possible that other areas of environmental concern may exist in the project area. For instance, residential properties utilizing underground fuel oil storage tanks may pose environmental risks and should be investigated on a case by case basis. Furthermore, possible plumbing, electrical, structural integrity, asbestos, lead paint and radon gas problems were not investigated in this Preliminary Environmental Review. If any additional information becomes available concerning this project it should be provided to SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. so that the conclusions and recommendations in this report may be reviewed and revised accordingly. No other warranty, expressed or implied, is made.

APPENDIX 12

City of Middletown, North End Industrial Area (4/2/93)

The following properties have been idenitified as areas of environmental concern.

Property: **Auburn Manufacturing Co.**
Address: - Stack Street Block: 17-10 Lot: 10
Land Use: Manufacture of gaskets, washers, packing & sealing.
Years in operation: 1936 to present.
Former site of Portland Silk Mill (1890-1936)
Remarks: Recorded on EPA RCRA Haz Waste Registration (GEN 1)
Raw materials- leather, foam, cured asbestos, rubber, plastic, vinyl, wool, fiberglass, silicon.
Use of solvents.
35 year old 5,000 gal. UST present on site

Property: **Bergen Architectual Woodworking**
Address: 171 North Main Street Block: 17-2 Lot: 25
Land Use: woodworking
Years in operation: 1982 to present
Remarks: Solvents and glues used on-site
DOT identified property as a potential area of concern.

Property: **Brings Machine Co.**
Address: 50 St. Johns Street Block: 17-13A Lot: 10A
Land Use: Machine Shop

Property: **Butler Construction Co.**
Address: 161 & 175 Johnson Street Block: 17-5 Lots: 118 & 120
Land use: Industrial yard with garage.
Years in operation: 1965 to present
(Former land uses included welding shop, gasket mfg, and listed as powerhouse for railway. Building dates from 1800's)
Remarks: Listed in DEP, Underground Storage Tank Unit.
Three steel 3000 gal. oil/petro underground storage tanks.
Presently exceeding their life expectancies, all listed for 15 years and installed between 1963 and 1966.

Property: **Casserino Warehouse Moving & Storage**
Adrress: - Pease Avenue Block: 17-10 Lot: 11
Land Use: Warehousing
Years in operation: 1970-present.
Remarks: Former Jarvis Tool & Die Company (1940-1960).
Former Portland Silk Manufacturing (1890-1936).
Abandoned 1,500 gal. oil tank present on site.

Property: **City of Middletown Emergency Mgt. Garage**
Address: Bridge Street Block: 17-15A Lot: -
Land use: Storage garage
Former State Highway Garage (1955-1975)
Former Valley Fuel Oil (1920's)
Remarks: Old building

Property: **City of Middletown Municipal Landfill**
Address: North end of Johnson Street. Block 12-2, Lots 13a-16
Land use: Municipal solid waste landfill.
Years in operation: Mid 1950's to January 1991
Remarks: Landfill accepted asbestos and Metal Hydroxide Sludge
Currently listed on EPA's CERCLIS Database as a former hazardous waste disposal site.

Property: **City of Middletown Former Landfill**
Address: 18 Miller Street Block: 17-15B Lots: 1, 2, 8 & 9
Land use: Former solid waste landfill.
Presently City of Middletown park/playground. Grassed near Miller Street and forested to rear.
Years in operation: 1950's and 1960's (?)
1965 aerial photo reveals use of area as dump for refrigerators and household appliances.
Remarks: City converted landfill to park in 1960's

Property: **Depot Distributors/Former Remington Rand Site**
Address: 180 Johnson Street
Block: 12-2 Lot: 13
Land use: Historic Manufacturing of Bicycles, Cars, Typewriters and Office Supplies. Presently used as warehouse
Years in operation: Building dates from late 1800's.
Remarks: Potential contaminants include: Lead Paint, Asbestos, PCB's, Heavy Metals. Old Dump, UST's and Industrial Discharge to Mattabesset River

Property: **Former dry cleaner -**
Address: 9/11 Rome Avenue Block: 17-10 Lot: 1
Land Use: Two family residence
Years in operation: House dates from 1930's
Remarks: Small building to rear of lot identified as dry cleaners on map dated from 1930's

Property: **Former Meech & Stoddard Buildings**
Address: 48, 74 & 76 North Main Street
Block: 17-7 Lots: 1 Block 17-13 Lot: 12
Land use: Former feed and grain storage, warehouses
Years in operation: 1800's to present
Remarks: Presently the two buidings are underutilized.
Auto repair operation in one building.
Large fire in 1966 destroyed factory/warehouse on Block 17-3, Lot 12 (Cassone Paper Co.)

Property: **Former public dump**
Address: Area to south of intersection of North Main Street and Pease Avenue.
Block: 17-4 Lots: 4, 4A & 4B (uncertain as to exact location)
Years in operation: 1920's to 1940's (?)
Remarks: Area is presently vacant lot.
Portion of site once contained a tire & battery service center.
Two maps dating from 1920's identified this area as a public dump.

Property: **Former greenhouse operation**
Address: 4 & 10 Pease Avenue and 15 & 19 Rome Ave.
Block: 17-10 Lots: 2, 3, 14 & 15
Land Use: Former Greco Greenhouses
Years in operation: 1920's through later 1970's
Remarks: Greenhouse areas are now vacant or converted to residential/commercial use
Fill or Vent pipe to a possible underground tank observed on-site
Possible soil contamination from use of pesticides

Property: **Longworth Carlson, Inc. - Former Car Dealer**
Address: 49, 51, 53 & 55 North Main Street
Block: 17-10A Lots: 7, 8, & 9
Land Use: Auto sales/service.
Years in operation: 1945 to 1992
Remarks: Listed at DEP, Underground Storage Tank Unit.
Three tanks: 8000 gal gas tank & 550 gal waste oil tank removed in 1991. 1000 gal oil/petro tank remaining.
Recorded on EPA RCRA Haz Waste Registration (Gen 3)

Property: **Longworth Carlson, Inc. - Former Gas Station**
Address: 75 & 79 North Main St. Block: 17-4 Lot: 1
Land Use: Auto sales/service, gas station
Years in operation: 1930's to 1980's
Remarks: In 1991 2 tanks removed: 30,000 gal gas tank & 275 gal waste oil tank. 80 yds. soil removed. DEP report states all known hydrocarbon contamination was removed.
Tire re-capping also occurred on-site.

Property: **M.A. & M., Inc.**
Adrress: 175 North Main Street Block: 17-2 Lot: 23-24
Land Use: Construction Co. office/warehouse
Years in operation: 1955-present.
Remarks: Old gas tank not in use but present on property.

Property: **Middletown Builders Supply, Nutmeg Oil**
Address: 120 North Main Street
Block: 17-7 Lots: 4, 4A, 6 & 6A
Land Use: Lumber yard. Oil delivery service.
Years in operation: 1955 to present
Remarks: Underground tanks: 3000 gal diesal installed 1979, 2000 gal gas installed 1980, 2000 gal tank removed and replaced in 1991
Truck Wash/Servicing Conducted on-site.
Floor Drains Present

Property: **Middletown Manufacturing Co.**
Address: 27/29/33 Stack Street Block: 17-10 Lot: 7A
Land Use: Manufacturer of metal products.
Years in operation: 1940 to present.
Remarks: Recorded on EPA RCRA Haz Waste Registration.

Property: **NAPA Auto Supply** - Former Garage
Address: 24 Stack Street
Land Use: Auto parts supply store (1987 to present)
Years in operation: Building dates to early 1900's
Remarks: Operated as SNET garage (1940-1955)
Formerly Usher Motor Co. (1930)

Property: **Former Redwing Oil Company**
Adrress: - North Main Street Block: 17-7 Lot: 2
Land Use: Heating oil distribution.
Years in operation: 1930 - 1940's?.
Remarks: Reportedly empty verticle oil tanks present.
A utility company reported soil contamination while drilling a utility pole near the site.
Letter from DEP to owner (8/15/88) calling for removal of tanks and mentions apparent extensive ground contamination.

Property: **Renals Machine Shop** - Former Cleaners & Dyers
Address: 75 Pease Avenue Block: 17-3 Lot: 30
Land Use: Machine shop
Years in operation: 1984 to present
Remarks: Former Aristocrat Cleaners and Dyers (1935-1960)
Possibly built on old dump site - Building sinking
(According to Tax Assessor Records)

Property: **Ron's Sale & Service Center** - Former Gas Station
Address: 90 North Main Street Block: 17-7 Lot: 3
Years in operation: 1930's to present
Remarks: Gasoline service station operated from 1930's to 1980's.
Fire on 6/7/80 did extensive damage to building.
In 1988 4 tanks removed: 6000, 5000 & 3000 gal gas tanks and 275 gal waste oil tank. 440 yds soil were also removed.
Since 1980's site has been used for auto sales/repair

Property: **Standard Motor Products, E. I. S.**
Address: 695 High Street Block: 17-1 Lots: 4 thru 15
Land use: Factory, manufacture of brake components.
Years in operation: 1930's to present.
Prior to 1985 it was Parker Hannifin Corp., E. I. S.
Former site of Middletown Silk Mfg. (1926-1936)
Remarks: General machining, drilling & milling.
Raw materials mostly cast iron & aluminum.
Historic use of oils and solvents.
Recorded on EPA RCRA Haz Waste Registration (Generator 1)
Once sited 14 to 17 tanks: 3 have been removed.
Record of spills/incidents: Air Compliance Violation

Property: **Suburban Stationers Inc.**-Former Jackson Motors and Bridgeside/Prime Pontiac.
Address: 16 Stack St. Block: 17-4 Lot: 2
Land use: Historic auto sales/service.
Years in operation: 1920's to 1980's for auto use.
In 1988 site was converted to office furniture sales.
Remarks: Recored on EPA RCRA Haz Waste Registration.

Property: **Transmission Works of Middletown** (Former gas station)
Address: 170 North Main St. Block: 17-7 Lot: 7
Land Use: Gas station/auto repair
Years in operation: 1955 to present
Remarks: Removed three 3000 gallon gas tanks. One 500 gal waste oil tank in use. (1980)
Solvents and Transmission Oils reportedly handled on-site

Property: **Trigo Printing**
Address: 12 Pease Avenue Block: 17-10 Lot: 13
Land Use: Print shop
Years in operation: 1984 to present
Remarks: Former uses include machine shop, stamp company

APPENDIX 13

Phase I
Environmental Site Assessment

of

Former Remington Rand Facility
180 Johnson Street
Middletown, CT

April 6, 1993

Prepared By:

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SS & ES, INC. Job No. HW-93-6-MDT-1

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1.0 INTRODUCTION

In accordance with your request, SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. conducted a Phase I Environmental Site Assessment of the former Remington Rand facility located at 180 Johnson Street in Middletown, CT. The purpose of this investigation was to identify possible environmental hazards associated with this site or neighboring properties which could impose potential liabilities on current and future owners of the real estate. The Phase I Environmental Site Assessment was performed as part of the feasibility study for the Middletown North End Industrial Area Redevelopment Project and also to fulfill lending institution requirements for the possible future purchase of the property. The Phase I Environmental Assessment included a site inspection, historical research, an overview of the sites environmental setting, personal interviews and a review of available information on file at the Connecticut Department of Environmental Protection (DEP) in Hartford, CT.

In addition, a Federal Data Base Report was obtained through AP Environmental Data Company of Austin, Texas. This report is a compilation of information from key federal Environmental Protection Agency (EPA) environmental regulatory databases which are updated regularly. The following key federal EPA environmental regulatory databases were searched: National Priorities List (NPL); Comprehensive Environmental Response, Compensation, and Liability Index System (CERCLIS); Civil Enforcement Docket (DOCKET); Emergency Response Notification System (ERNS); Facility Index System (FINDS); Resource Conservation and Recovery Information System (RCRIS); RCRA Violator and Enforcement Case Information (RCVIOL) and Toxic Release Inventory (TRI): for the years 1987, 1988 & 1989.

This report was performed to satisfy the lending institution requirements for a Phase I Transfer Act Site Assessment. The assessment was completed in accordance with the Transfer Act Site Assessment (TASA) procedures outlined by the Connecticut Department of Environmental Protection, dated June, 1989. The purpose of our investigation was to identify and evaluate possible environmental liabilities or

hazards, such as the release of hazardous substances or oil and chemical spills. This Phase I Environmental Site Assessment report should not be construed as a regulatory compliance audit. This assessment does not define the extent of contamination if present, nor does it identify the source of contamination. However, it does provide a valuable overall evaluation of potential environmental risks associated with the property.

The conclusions are based upon information obtained through a review of present and past land uses acquired from local and state records, a visual site inspection, interviews with current/past owners and neighbors, and an examination of the Middletown Health Department files, DEP records, EPA database files and aerial photos. The information compiled during interviews and through record searches has been assumed to be correct and complete to date. SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. does not assume responsibility for the discovery and elimination of any contamination or future contamination found at 180 Johnson Street in Middletown, CT. In the event of an error or omission in our assessment, SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. can only be held liable for damages amounting to the fee for our services.

2.0 SITE LOCATION AND ZONING

The study site is located on the northern end of Johnson Street and east of the intersection of North Main Street with Johnson Street in Middletown, CT. The study site is bounded by the Middletown Landfill to the north, undeveloped wetlands and the Mattabesset River to the east, the NY, NH & H RR and several commercial businesses including Standard Motor Products (EIS) to the south, and the Hubert E. Butler Construction Company and the Coginchaug River further to the west. The study site is shown in Figure 1, Locus Map, a portion of the Connecticut Light & Power, the Hartford Electric Light and the Southern New England Telephone Company maps dated May 1976. The subject parcel is located within an area of Middletown that is zoned Industrial Redevelopment Area.

3.0 SITE DESCRIPTION

The Middletown Tax Assessors Office lists the study site as being located on North Main Street (Map No. 20, Block 12-2, Lot 13) and consisting of approximately 455,539 Square Feet or 10.458 acres of land. A roughly 175,000 square foot building complex with four outbuildings presently exist on the property. The main building complex consists of approximately eleven attached building structures made of wood, metal and brick. An 11,550 sq. ft. brick Boiler Building, a 2,400 sq. ft. metal Quonset Building and a few sheds or storage buildings also exist on the property. See Figure 2, Site Map. A brief description of each building follows:

Building

1 - Factory, two story, built 1897,
First floor utilized for manufacturing and as a machine shop
Second floor utilized for woodworking, body making, trimming, painting, raw stock storage, assembling, pattern and carpentry, and experimental department

2 - Mill, Storage, Grinding and Hardening, Black Smith Shop & Case Hardening, one story, built prior to 1900.

3 - Storage, Dinette, Assembling, Press Department, Brazing Room, one story, built prior to 1900. Also has a one story Machine Shop addition.

4 - Nickel Plating, Storage, one story, built prior to 1900.

5 - Ink Manufacturing, Japan Room, Foundry, one story, built prior to 1900.

6 - Plumbing, Mill, Old Balance Room, two story, built 1897.
First floor utilized as Engine Room and General Storage
Second floor utilized as Engine/Dynamo Room, and Carpenter Shop

7 - Boiler House, one story, built 1897.

8 - Manufacturing and Shipping/Receiving, two story, built 1926.

9 - Office and Maintenance, two story, built 1935.
Office located on second floor.

10- Carbon Coating, one story , built 1926.

11- Use of this building is unknown, one story, built 1934.

The remainder of the study site consists of primarily paved driveways and parking areas, except for a dirt path around the southeastern part of the building and grassed areas between some of the buildings. The office area or northwestern portion of the building complex is heated by natural gas and the remainder of the building is presently unheated. The building was formerly heated by two oil fired steam furnaces located in the boiler room building which is situated on the eastern side of the property. Apparently the boilers utilized coal and then later fuel oil to heat the main building complex. One underground storage tank is known to exist at the study site and three former underground storage tank locations have also been identified on the property. In addition, two above ground storage tanks are located southeast of the Boiler Room Building (Building 7). City water, sanitary sewer, natural gas, telephone and electric utilities are available to the study site. However, portions of the facilities sewage disposal and/or floor drainage systems may still be connected to on-site disposal systems. Dye tests would have to be conducted in order to determine the discharge locations of the floor drains and sewage disposal systems.

4.0 ENVIRONMENTAL SETTING

This section of the report describes the general environmental condition in the area

of the study site. This information is necessary in order to evaluate the possible effects of current and historical land uses on the environment.

4.1 Site Topography

The study site is located at an elevation of approximately 15 to 25 feet above mean sea level. The surface topography of the study site gently slopes down in a northeasterly direction. Slopes on the site range from approximately 0 to 3 percent. A topographic map of the site is shown in Figure 3, Topography Map, taken from the USGS Topographic Map of the Middletown, CT Quadrangle, dated 1984.

4.2 Site Hydrology

The study site is located in both the Mattabesset River Drainage Basin (4600) and the Coginchaug River Drainage Basin (4607), both of which are subbasins of the Connecticut River Major Basin. Reviews of the DEP Atlas of the Public Water Supply Sources and Drainage Basins of Connecticut, dated 1982, and the DEP's Water Quality Classifications Map for the South Central Coast Basin, dated August 1983, revealed no public water supply wells or reservoirs located in either the Mattabesset River Drainage Basin or the Coginchaug River Drainage Basin within one mile of the study site.

The direction of groundwater flow can be controlled by topography, bedrock geology, surface water and development impacts. We assume the groundwater flow direction to coincide with the bedrock topography of the site, which generally slopes downward from southwest to northeast. However, hydrology in the general area of the study site may be greatly impacted from the Middletown Municipal Landfill which is located in adjacent to the study. The exact groundwater flow direction can only be determined after surveying the elevations of the groundwater in at least three or more locations on the study site. See Bedrock Contour Map, Figure 4, taken from the Bedrock Contour Map of the Bedrock Surface for the Middletown, CT Quadrangle, dated 1976.

4.3 Soil Types

According to the Soil Conservation Service's Soil Survey of Middlesex County, Connecticut, the soils on the study site have been identified as primarily Urban Land (Ur) and also some Podunk fine sandy loam (Ps), Rumney fine sandy loam (Ru) and Udorthents, smoothed (UD) soils on the easterly side of the property. Urban land consists of areas where urban structures such as buildings, roads and parking lots, cover more than 85 percent of the surface. Podunk fine sandy loam is a moderately well drained, moderately coarse over coarse textured, friable over loose alluvial soil developed on floodplains. In 1979, the Podunk soil series was reclassified in CT to Pootatuck fine sandy loam. Rumney fine sandy loam is a poorly drained, moderately coarse over coarse textured, friable over loose alluvial soil developed on floodplains. In 1979, the Rumney soil series was reclassified in CT to Rippowam fine sandy loam. Udorthents, smoothed is a well to moderately well drained disturbed soil that has had two (2) feet or more of its original soil surface excavated or filled. For further information about soil properties, refer to the USDA Soil Conservation Service Report, Soil Survey of Middlesex County, CT. (See Figure 5, Soil Survey Map)

4.4 Surficial Geology

According to the DEP Water Resources (Bulletin 31) Geohydrologic Map of the Lower Connecticut River Basin, the study site is situated within an area composed of fine-grained stratified drift. These are sorted sediments deposited by or in glacial meltwaters. Materials range principally from clay to very fine sand. In the Middletown-Berlin area material is predominantly glacial-lake clay. This unit is generally unproductive except in restricted areas where lenses of fine to medium sand occur. In such areas, yields to screened wells range from 20 to 200 gallons per minute. The Water Resources Geohydrologic Map indicates that the saturated thickness of the stratified drift beneath the study site is approximately 10 to 40 feet thick.

4.5 Bedrock Geology

According to the USGS/DEP Bedrock Geology Map of Connecticut, dated 1985, the bedrock which underlies the study site has been mapped as reddish-brown Portland Arkose (Jp). Arkose is a red to brown, medium to coarse grained, sandstone-like, sedimentary rock containing quartz, feldspar, and rock fragments. It is the most common sedimentary rock of the Central Lowlands; locally known as brownstone. Brownstone was quarried for use as building stone.

4.6 Sensitive Areas

The Mattabesset River and its associated wetlands to the northeast of the study site are considered sensitive areas of environmental concern. Wetlands are considered sensitive areas of environmental concern since they provide habitat for many species of flora and fauna, filter pollutants from surface waters and provide stormwater retention to help prevent flooding. Watercourses not only provide habitat for many species of plants and animals but they also provide base flow for downstream waterbodies, recharge water resource aquifer areas and offer some recreational potential. Thus the Mattabesset River and its associated wetlands should be considered sensitive areas of environmental concern associated with the study site. Care should be taken to prevent any discharges of contaminants into the watercourse and associated wetlands which might negatively impact sensitive aquatic systems located downstream of the study site.

5.0 HISTORIC USES OF THE STUDY SITE AND ADJACENT PROPERTIES

Historical information pertaining to the study site was compiled from a review of the following sources: 1) information obtained from the Middletown Town Hall which included tax records, deeds and permits; 2) City Directories found on file at the State Library in Hartford, CT; 3) Sanborn Fire Insurance Maps found also found on file at the State Library in Hartford, CT.

5.1 Town Hall Records

According to the Land Records in the Middletown Town Hall Assessors Office, 180 Johnson Street is currently owned by Depot Distributors, Inc. (Vol.944, Pg.249). Depot Distributors purchased the study site in December of 1990. However, people familiar with the study site speculate that the property has just recently been forced into involuntary bankruptcy (early March). Apparently Fleet Bank currently holds the mortgage for the property.

5.2 City Directory's and Sanborn Fire Insurance Maps

The building which presently exists at the study site was built in 1897 for the Keating Wheel and Automobile Company which manufactured bicycles and then automobiles at the study site until 1900. Apparently the Keating Wheel Company produced the first motor bicycle in the country and was the only automobile manufacturer in the City of Middletown. Between 1900 and 1908 the Eisenhuth Horseless Vehicle Company also manufactured automobiles at the study site. Starting in 1909 Noiseless Typewriter Company, Inc. began manufacturing typewriters at the study site. The Middletown city directory's indicated that the Noiseless Typewriter Company's office was located at 701 High Street in Middletown, CT. In the mid 1920's the name of the typewriter manufacturing company was changed to Remington Noiseless Typewriter Corporation and in the late 1920's the name was changed again to Remington Rand Incorporated. According to the RFP, apparently there was a bitter labor dispute in the 1930's which ultimately led to the demise of the typewriter manufacturing industry in Middletown. For approximately five years during the mid 1940's a company named Andover Kent Aviation Corporation manufactured metal goods at the study site.

Around 1951 Remington Rand Office Machines began producing office supplies such as plaster plates, typewriter ribbon, carbon paper, uniac ribbon and microfilm at the study site until around 1970. According to a letter which was found on file at the DEP Hazardous Waste Unit, dated December 29, 1983, Remington Office Machines moved their operation to Blue Bell, Pennsylvania between 1970 to 1971.

Apparently Forest City Realty Company then purchased the property and leased building space to E.I.S. Automotive Company for storage. Also, first floor space in Building #9 was leased to a Schwartz family for storage of their car collection. In 1978, Parker Hannifin Corporation who was the parent company of the E.I.S. Brake Parts Division purchased the property from Forest City Realty.

In May of 1984, Anthony J. Sessa purchased the property from Parker-Hannifin Foundation (E.I.S.). In September of 1984, Ronald R. Johnston purchased the property from Anthony J. Sessa. Mr. Johnson apparently rented space to Depot Distributors of New England and Newtown Manufacturing & Building Supply Corporation in 1987 and 1988 respectively. Depot Distributors was a wholesale manufacturer of kitchen cabinets and New Town Manufacturing was in the window business. In December of 1990 Depot Distributors, Inc. purchased the property but has since reportedly gone into bankruptcy. Both Depot Distributors (346-5222) and New Town Manufacturing (344-1350) no longer occupy the building complex.

The Sanborn Fire Insurance Maps indicated that three former underground storage tanks were located on the study site. One gasoline tank was located northwest of Building 1 and another gasoline tank was located northeast of Building 8. A former crude oil tank was located northeast of Building 4. In addition, electrical transformers were formerly located northeast of Building 4. Other historical areas of concern identified on the Sanborn Maps include an Oil House which was reportedly located southeast of Building 1, an Oil Reclaiming Building which was situated north of Building 8 and a former Cleaning Castings Building which was located northeast of Building 10. It is likely that these buildings could have had oils or chemicals stored or handled within them. Detailed investigations around these buildings should be conducted in order to identify any possible areas of subsurface contamination. See Figure 2, Site Map, for the approximate locations of these former structures.

5.3 Middletown Health Department Files

On April 1, 1993, SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. interviewed Leon F. Vinci who is the Director of Health with the Middletown Health Department. According to Mr. Monopoli, no environmental problems have been reported at the study site for the last 20 years in which he has worked for the town.

On April 7, 1993, SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. conducted a telephone interview James Monopoli who is a Public Health Sanitarian with the Middletown Health Department. Mr. Monopoli stated that approximately 200 bags of asbestos pipe insulation and floor tiles are located in the Boiler Room Building (Building 7) at the study site. Apparently Depot Distributors obtained both a permit from the State Health Department for asbestos abatement and a permit from the DEP for asbestos disposal associated with the removal of asbestos from the buildings at the study site. Mr. Monopoli claimed that the asbestos abatement stopped when Depot Distributors ran into financial problems.

5.4 Middletown Fire Department

On March 29, 1993, SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. conducted a telephone interview with Jim Chubbuck who is the Deputy Fire Marshall with Middletown Fire Department. Mr. Chubbuck stated that no fire or tank failure incidents have been reported to the best of his knowledge for the past ten to twenty years since he has been working with that department.

5.5 History and Land Uses of Adjacent Properties

The study site is located within a mixed residential, commercial and industrial area of Middletown. The current land uses of properties located adjacent to the study site include the Middletown Landfill to the north, undeveloped wetlands and the Mattabesset River to the east, the NY, NH & H RR and several commercial businesses including Standard Motor Products (E.I.S.) to the south, and the Hubert

E. Butler Construction Company and the Coginchaug River further to the west.

The Middletown Municipal Landfill consists of approximately 21 acres of land where mixed wastes have been deposited since the early 1950's. Three groundwater wells exist at the landfill and several soil and groundwater contaminants have been detected on the property. Prior to the landfill the property was once part of the Noiseless Typewriter Company's property and consisted mostly of wetlands. The area where the entrance road to the landfill is located was at one time a baseball field.

The EIS division of Standard Motor Products manufactures automobile brakes and wheel cylinders. They operate three shifts and employ approximately 200 people. They are presently moving their operation to their Berlin facility. Historically, their Middletown plant has been at 695 High Street since the early 1930's. The oldest part of the EIS building was built in 1926, with several additions added to the main building.

The Hubert E. Butler Construction Company has existed at 175 Johnson Street since 1965. Prior to 1965 CT Valley Welding Company, Gasket Materials Corp. and the Connecticut Company have occupied this site.

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. does not perform legal title searches and, if additional information is required, a thorough title search should be performed by an Attorney or other qualified person. Historical information was obtained through the Price & Lee and Johnson City Directories on file at the State Library in Hartford, CT, Sanborn Fire Insurance Maps and records in the Middletown Town Hall.

6.0 SITE INSPECTION

On March 22 and 26, 1993, SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. performed site inspections of the former Remington Rand Facility located at 180

Johnson Street in Middletown, CT. The current tenants of the building complex include: Stone Container Corporation (346-7567), All American Moving & Storage, Inc. (347-2450), David A. Lenz Landscape Service (347-5929) and Ronald E. Foose Company (346-9617) which is a painting/wallpapering contractor who operates his business in the boiler room building. The majority of the first floor of the main building complex is utilized by Stone Container Corporation to store corrugated cardboard box containers. Stone manufactures its corrugated cardboard containers in its Portland facility located on 74 Pickering Street. Building 9 is presently utilized by All American Moving & Storage, Inc. for office space and storage of furniture. David A. Lenz Landscape Service occupies the metal Quonset Building (Y-2) located northweast of Building 8. Ronald E. Foose Company occupies Building 6.

A visual inspection of the interior of the main building complex revealed possible lead paint and asbestos throughout most of the building. Floor drains were observed in Building 5 and the addition between Building 8 and Building 1. Trenches were also observed in the addition between Building 8 and Building 1 and in Building 10. The trenches contained a black liquid substance. A concrete settling vault was also observed in Building 10. Two carts holding asbestos were observed on the first floor in Building 8 at the time of our site inspection. A strong odor was noticed during the inspection of Building 5. Fill pipes were observed in Buildings 4 and 8. Florescent light fixture ballasts, transformers, hydraulic fluid in the elevator and an underground tank possibly located near a concrete structure in Building 8 may all possibly contain polychlorinated biphenyls (PCB's). Dust present in Buildings 4, 5 and 10 may contain heavy metals from nickel plating, metal casting and carbon coating operations which were conducted in those buildings.

A visual inspection of the exterior of the building complex revealed a 20,000 gallon above ground storage tank located southeast of the Boiler Room Building. According to Ray Ledger of Stone Container Corp., "the 20,000 gallon above ground fuel oil tank which has not been utilized for a while is approximately half full of oil. Mr. Ledger also stated that the 20,000 gallon above ground storage tank has a lot of water in it". A 1,000 gallon above ground storage tank is located on the

southeastern side of Building 7. A strong odor was observed in a storm drain located in the driveway on the northwestern side of the building. The odor was believed to be possibly originating from leachate associated with the Middletown Municipal Landfill which is situated just north of the former Remington Rand building. A floor drain was observed in the Quonset Building where David A. Lenz Landscape Service is located. The floor drain in the Quonset Building should be investigated for possible contamination associated with fertilizers, pesticides and herbicides which might have been spilled or discharged into the subsurface. Vent and fill pipes to a underground storage tank were observed on the northeastern side of Building 8. Cement saddles to a former above ground storage tank were observed near the fence located south of Building 5. Stained soils and distressed vegetation were observed on both sides of the metal passageway building located southeast of Building 5. Improperly stored oils/chemicals exist in the cinder block building located southeast of Building 5. Oils/chemicals identified in the cinder block building include: one 5 gallon bottle of HCL Acid and several drums and pails of grease and other unknown/unmarked oils and/or chemicals. Four or five large transformers were observed on the property at the time of our site inspection. These old transformers may contain PCB cooling oils.

Finally, drums and other metal storage containers were observed in a fill or dump area located in the general vicinity of the Right of Way which is situated northeast of the Boiler Room Building. An area with dark stained soils was discovered just north of the boiler building. An employee of David Lenz Landscape Service, indicated that the DEP had investigated the stained soil area approximately two years ago but didn't issue any orders for clean-up. SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. was unable to obtain any further information to confirm or deny if the DEP had investigated this potentially contaminated area.

7.0 DEP AND EPA RECORD SEARCH

The DEP's Water Quality Classifications Map for the Connecticut River Basin, dated August 1983, was reviewed. The DEP has designated the groundwater in the area

of the study site as Class GB. The DEP Water Compliance Unit describes GB as "Ground waters within highly urbanized areas or areas of intense industrial activity and where public water supply service is available. This groundwater may not be suitable for direct human consumption due to waste discharges, spills or leaks of chemicals or land use impacts. The state's immediate goal is to prevent further degradation of the groundwater quality by preventing any additional discharges which would cause irreversible contamination." The DEP has designated the surface water quality of the Coginchaug River as Class Bc and the surface water quality of the Mattabesset River as Class C/B. The "Bc" classification indicates that the Coginchaug River is suitable for its intended purpose, which is a cold water fishery. The "C/B" surface water quality classification of the Mattabesset River indicates that this surface water is "Presently not meeting water quality criteria or one or more designated uses due to pollution. The surface water quality goal for the Mattabesset River is Class B. See Figure 6, DEP Water Quality Map.

The DEP's Leachate and Wastewater Discharge Sources Map for the Connecticut River Basin, dated February 1987, was reviewed. The Leachate and Wastewater Discharge Sources Map revealed two leachate sources in both the Mattabesset River Drainage Basin (4600) and the Coginchaug River Drainage Basin (4607), within one half mile of the study site. The listed leachate sources are the City of Middletown mixed waste landfill and the former Armetta bulky waste landfill. Do to the Armetta Landfill's distance from the study site, topographic position and separation from the study site by the Coginchaug River which acts as hydrologic barrier, it is unlikely that the former Armetta bulky waste landfill could impact the study site. However, there is a likelihood that the study site is being impacted by the Middletown Municipal Landfill due to it's close proximity and topographic position relative to the study site. (See Figure 7, DEP Leachate & Wastewater Discharge Map)

A review of the CT DEP Inventory of Hazardous Waste Sites in Connecticut, dated January, 1987, a review of the CT DEP superfund dynamic inventory addendum, dated February 4, 1993, a review of the EPA's Superfund Program "CERCLIS", dated

April 1, 1993, and a review of the EPA's National Priority List for Connecticut, dated April 6, 1993, revealed two listed hazardous waste/superfund sites in the Mattabesset River (4600) and the Coginchaug River Drainage Basins (4607), within one mile of the study site. The listed sites are the Middletown Municipal Landfill and J.J. Vinci Coal Company.

The Middletown Municipal Landfill is situated adjacent to the study site at the north end of Johnson Street in Middletown, CT. The property is also referred to as the North End Landfill and the Middletown Landfill. A record search conducted at the DEP Hazardous Waste Unit revealed a NUS Corporation Preliminary Assessment (PA) report, dated April 1983, and a Final Screening Site Inspection (SI) report, dated October 1991, which were found in the Superfund Files. According to these federal reports the landfill occupies 21 acres of land in the center of a 26-acre parcel located at the confluence of the Coginchaug and Mattabesset Rivers. The landfill was added to CERCLIS on June 9, 1981, following notification to EPA by Pratt & Whitney Aircraft Group, Manufacturing Division that the Middletown Municipal Landfill accepted metal hydroxide waste generated by that company from 1966 to 1976.

According to NUS Corporation, the Middletown Municipal Landfill was established on undeveloped land owned by the City of Middletown in the mid-1950's. Apparently, the landfill accepted mixed municipal sewage treatment plant sludge and mixed municipal and industrial waste from as early as 1966 until 1987. The following industrial wastes have been disposed of at the Middletown Municipal Landfill: asbestos (reportedly double-bagged and buried at the base of the day's fill), treated metal hydroxide sludge (also referred to as rolling and tumbling sludge), medical incinerator ash, and cutting and soluble oils. According to NUS Corporation, DEP personnel have inspected the Middletown Landfill regularly. Apparently from November 27, 1984 to June 3, 1986, the City of Middletown was found to be in violation of state regulations and permit conditions on at least nine separate occasions. Violations involved: leachate generation, insufficient daily cover, blowing litter, and inadequate facilities for on-site employees. The landfill facility closed on January 1, 1991, but is currently used by the City of Middletown as a

municipal bulky waste landfill and as a recyclable materials transfer station.

In 1983, the Middletown Public Works Department (PWD) installed three groundwater monitoring wells on the northeast, southeast, and west sides of the landfill. According to NUS Corporation's SI Report, the wells were installed in accordance with the provisions set forth in a 1983 DEP Permit to vertically expand the municipal solid waste disposal area at the Middletown Landfill. Apparently the PWD installed three overburden groundwater monitoring wells constructed of 6-inch diameter polyvinyl chloride (PVC) pipe (if screened, interval unknown) which were inserted into excavated holes and backfilled with stone. The wells were set at 6 to 8 feet below the ground surface. Apparently, the wells are not capped or locked, and two of the three well pipes are broken off at the surface.

Groundwater, surface water and soil samples have been collected at the Middletown Municipal Landfill by PWD and NUS Corporation. Analysis of groundwater samples collected by the PWD from 1983 to 1990 revealed several volatile organic compounds (VOC's), including benzene (up to 24 parts per billion (ppb)), chlorobenzene (up to 63 ppb), chloroethane (up to 128 ppb), and toluene (up to 48 ppb). Analysis of groundwater, surface water and soil samples by NUS Corporation on April 16, 1991, revealed several VOC's and inorganic elements in the groundwater, including benzene (up to approx. 15 ppb), chlorobenzene (up to 33 ppb), chloroethane (22 ppb), barium (up to 650 ppb) and chromium (approx. 4 ppb). Surface water samples contained VOC's, cyanide (12.9 ppb), and inorganic elements, including: arsenic (up to approx. 3.1 ppb) and barium (376 ppb). Analysis of soil samples collected around the landfill revealed several VOC's including chlorobenzene (up to 130 ppb) and ethylbenzene (up to 61 ppb). Several polynuclear aromatic hydrocarbons were also detected in the soil samples at concentrations ranging from approximately 160 ppb to 43,000 ppb. In addition, inorganic elements detected in soil samples collected by NUS Corporation included lead (up to 70.7 ppm) and zinc (up to 117 ppm). Furthermore, the NUS Corporation observed blowing litter and numerous leachate outbreaks with associated stained soils on the west, south and east sides of the landfill during their site investigation of the property in 1991. Based on the compounds and elements

detected at the landfill, the number of groundwater users within 4 miles of the property, and the proximity of the Coginchaug River and Mattabesset Rivers, NUS Corporation concluded that continued investigative work under CERCLA is recommended at the Middletown Municipal Landfill.

The other listed CERCLIS or hazardous waste disposal site which is located within one mile of the study site is the J.J. Vinci Coal Company. However, do to this company's distance from the study site, topographic position and separation from the study site by the Coginchaug River which acts as hydrologic barrier, it is unlikely that any possible contaminants associated with this company could have impacted the study site.

A Federal Data Base Report was obtained through AP Environmental Data Company of Austin, Texas. This report is a compilation of information from key federal Environmental Protection Agency (EPA) environmental regulatory databases which are updated regularly. The following federal EPA databases were searched for zip code 06457: National Priorities List (NPL); Comprehensive Environmental Response, Compensation, and Liability Index System (CERCLIS); Civil Enforcement Docket (DOCKET); Emergency Response Notification System (ERNS); Facility Index System (FINDS); Resource Conservation and Recovery Information System (RCRIS); RCRA Violator and Enforcement Case Information (RCVIOL) and Toxic Release Inventory (TRI): for the years 1987, 1988 & 1989. Information obtained from these sources are discussed below.

National Priorities List

This is a list (often called the Superfund list) of uncontrolled or abandoned hazardous waste disposal sites most in need of cleanup; the list is updated annually by the United States Environmental Protection Agency, based primarily on how a site scores using the Hazard Ranking System. A review of the April 6, 1993, National Priorities List revealed no Superfund sites located within the stated area.

Comprehensive Environmental Response, Compensation, and Liability Index System

This is a list of sites which EPA has investigated or is currently investigating as having the potential for releasing hazardous substances into the environment. This computerized system contains the basic information about and current status of a site being cleaned up under the National Contingency Plan. A review of the April 1, 1993, CERCLIS Database revealed one site located in the Mattabesset River (4600) and the Coginchaug River Drainage Basins (4607), within one mile of the study site. The listed site is the Middletown Municipal Landfill located off North Main Street in Middletown, CT. This site is located just north of the study site and appears to present a potential environmental liability.

Civil Enforcement Docket

The Civil Enforcement Docket is the EPA's system for tracking civil judicial cases filed on the Agency's behalf by the Department of Justice. This Docket contains information on civil cases filed from 1972 to the present. No DOCKET site listings were reported in the Mattabesset River (4600) and the Coginchaug River Drainage Basins (4607), within one mile of the study site.

Emergency Response Notification System

The EPA Emergency Response Notification System serves to store information on releases of oil and hazardous substances. Releases are recorded in the ERNS when they are initially reported to the federal government by any party. ERNS combines data from the National Response Center and the EPA. A review of the EPA's October 19, 1992 ERNS Database revealed two listings of incidents of oil released near the Arrigoni or Portland Bridge. No reported quantities were listed for either of the two incidents.

RCRA Violator and Enforcement Case Information

RCRA Violator and Enforcement Case Information is taken from the EPA's Hazardous Waste Data Management System (HWDMS) Database which served to track the status of registrations, permits, enforcement activities, and financial data of those regulated under RCRA. This system has been replaced by RCRIS. However, the HWDMS violation history is more complete than RCRIS and thus has been included with the RCRIS violation and enforcement reports. Information extracted from this database on 03/15/91, revealed the following listed facilities within the Middletown North-end Industrial Park Area:

EIS Brake Parts div. of Standard Motor Products
Middletown Manufacturing Co.

Toxic Release Inventory

The EPA Toxic Release Inventory database contains emissions data for those companies having to report their emissions according to SARA Title III Section 302 requirements. No sites located within the Middletown North-end Industrial Park Area were listed on the 1987, 1988 or 1989 Toxic Release Inventories.

On March 16, 1993, SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. conducted record searches at the DEP in Hartford, CT. Record searches were performed at the DEP's Oil and Chemical Spills Unit, Water Compliance Unit, Underground Storage Tank Unit, PCB Unit, Air Compliance Unit and Hazardous Waste Unit for 180 Johnson Street and surrounding properties. No reports were found on file at the DEP indicating oil or chemical spills or registered underground storage tanks at the study site. However, a letter found on file at the DEP Water Compliance Unit which was written by DEP Environmental Analyst T.R. Botti Jr., dated February 26, 1992, indicated that Remington Rand discharged an untreated industrial waste to the Mattabesset River around the 1960's. Mr. Botti

recommended in his letter that the Remington Rand site be assessed for any residual contamination resulting from this reported discharge. According to a P-5 form found on file at the DEP Hazardous Waste Unit Remington Office Machines discharged ink, carbon, wax, oil, detergent, acetone, dye, clay and pigment to the Sebethe River (Mattabesset). Two orders which were issued to Remington Office Machines were found on file at the DEP Water Compliance Unit. In 1969, the DEP Water Resources Commission ordered Remington Office Machines to "Discharge all waterborne industrial wastes to the Middletown Municipal (Sewer) System following adequate pretreatment ... or in lieu thereof, construct a waste treatment facility for adequately treating all waterborne industrial wastes and discharge the treated effluent to an acceptable water course."

A record search at the DEP for other properties located in the general vicinity of the study site revealed several oil chemical spill reports, underground storage tank removals and other sensitive environmental issues within the Middletown North End Industrial Park Area. This information is presented in a Preliminary Environmental Review of the Middletown North End Industrial Park Area, dated April 8, 1993, which was prepared by our firm. However, the possible impacts from these reported incidents appear relatively minor compared to the environmental concerns identified on the study site and possible impacts to the study site from the Middletown Municipal Landfill.

8.0 CONCLUSIONS

In conclusion, SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. performed a site inspection, reviewed historical records, conducted personal interviews and researched the Connecticut Department of Environmental Protection records and the Federal Environmental Protection Agency records on file for the former Remington Rand facility located at 180 Johnson Street along with surrounding properties in Middletown, CT. Our preliminary site assessment revealed that the study site is located within an industrial area of Middletown which is situated just south of the Middletown Municipal Landfill.

Since the late 1800's, the study site has been utilized by several different manufacturing firms producing bicycles, motor bicycles, automobiles, typewriters, metal goods and typewriter supplies. Between the 1951 and 1971 Remington Office Machines occupied the study site and produced plaster plates, typewriter ribbon, carbon paper, uniac ribbon and microfilm. During this time they discharged untreated industrial wastes to the Mattabesset River. The industrial wastes apparently contained ink, carbon, wax, oil, detergent, acetone, dye, clay and pigment. Apparently these wastes were generated during ink manufacturing, machining, nickel plating, metal casting, carbon coating, case hardening and other manufacturing operations. In 1969, the DEP Water Resources Commission ordered Remington Office Machines to "Discharge all waterborne industrial wastes to the Middletown Municipal (Sewer) System following adequate pretreatment ... or in lieu thereof, construct a waste treatment facility for adequately treating all waterborne industrial wastes and discharge the treated effluent to an acceptable water course." Between 1970 and 1971, Remington Office Machines moved their operation to Blue Bell, Pennsylvania. No other information regarding the study site was found on file at the DEP or listed in any of the EPA environmental regulatory databases. Various companies including EIS Brake Parts, Depot Distributors Wholesale Kitchen Cabinets and Stone Corrugated Containers have occupied the study site since Remington Office Machines vacated the property.

A site inspection of the former Remington Rand Facility revealed possible asbestos containing materials; peeling paint which may contain lead; possible PCB's in transformers, light ballasts and hydraulic fluids; improperly stored oils/chemicals; floor drains/trenches (two of which contained an unknown black liquid substance); several locations of former or present underground and aboveground storage tanks. Two separate areas with dark stained soils and distressed vegetation indicative of possible soil contamination were observed around the metal building located towards the southeastern side of the property. Drums and other metal storage containers were observed in a fairly large fill or dump area located in the general vicinity of the Right of Way which is situated northeast of the Boiler Room Building. Furthermore, a strong methane odor indicative of landfill leachate was observed in a storm drain located near the northern corner of Building 11 which is on the

northwestern side of the property.

Neighboring properties include the Middletown Municipal Landfill to the north which is an EPA listed CERCLIS or hazardous waste disposal site, the Mattabesset River and its associated wetlands to the east which are considered sensitive areas of environmental concern, the NY, NH & H RR and several commercial businesses including Standard Motor Products (EIS) to the south which is listed with the EPA as a Large Quantity Generator of Hazardous Waste, and the Hubert E. Butler Construction Company and the Coginchaug River to the west. Further to the south and southeast of the study site are several more commercial and industrial properties located within the Middletown North End Industrial Area.

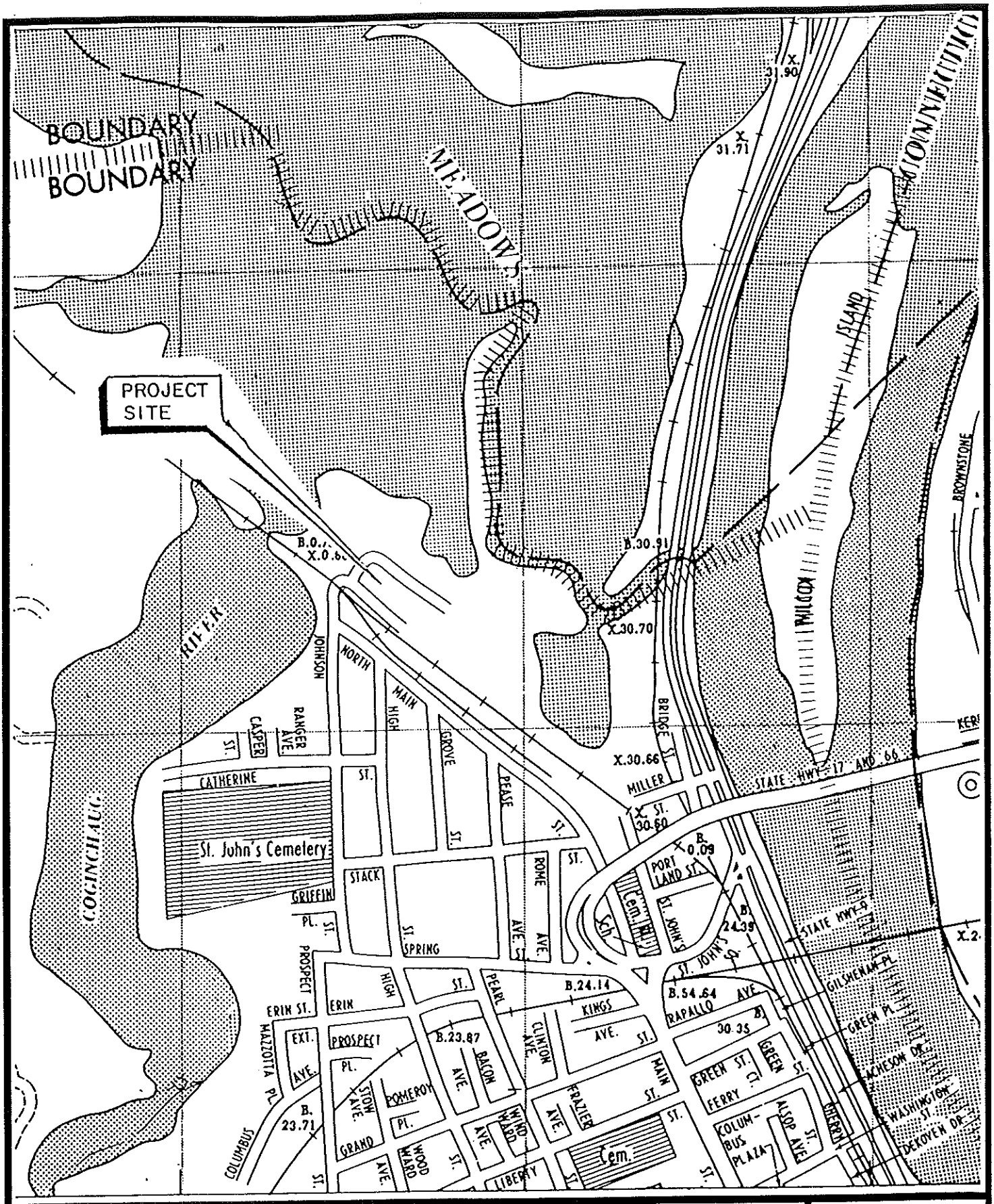
9.0 RECOMMENDATIONS

Based on the information obtained in our Phase I Environmental Site Assessment, SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. recommends a Phase II Environmental Site Assessment be conducted in order to determine the nature and extent of possible subsurface soil and groundwater contamination at the study site. Environmental liabilities may exist at the study site as a result of historical on-site land uses and possible impacts from the Middletown Municipal Landfill which borders the northern side of the study site.

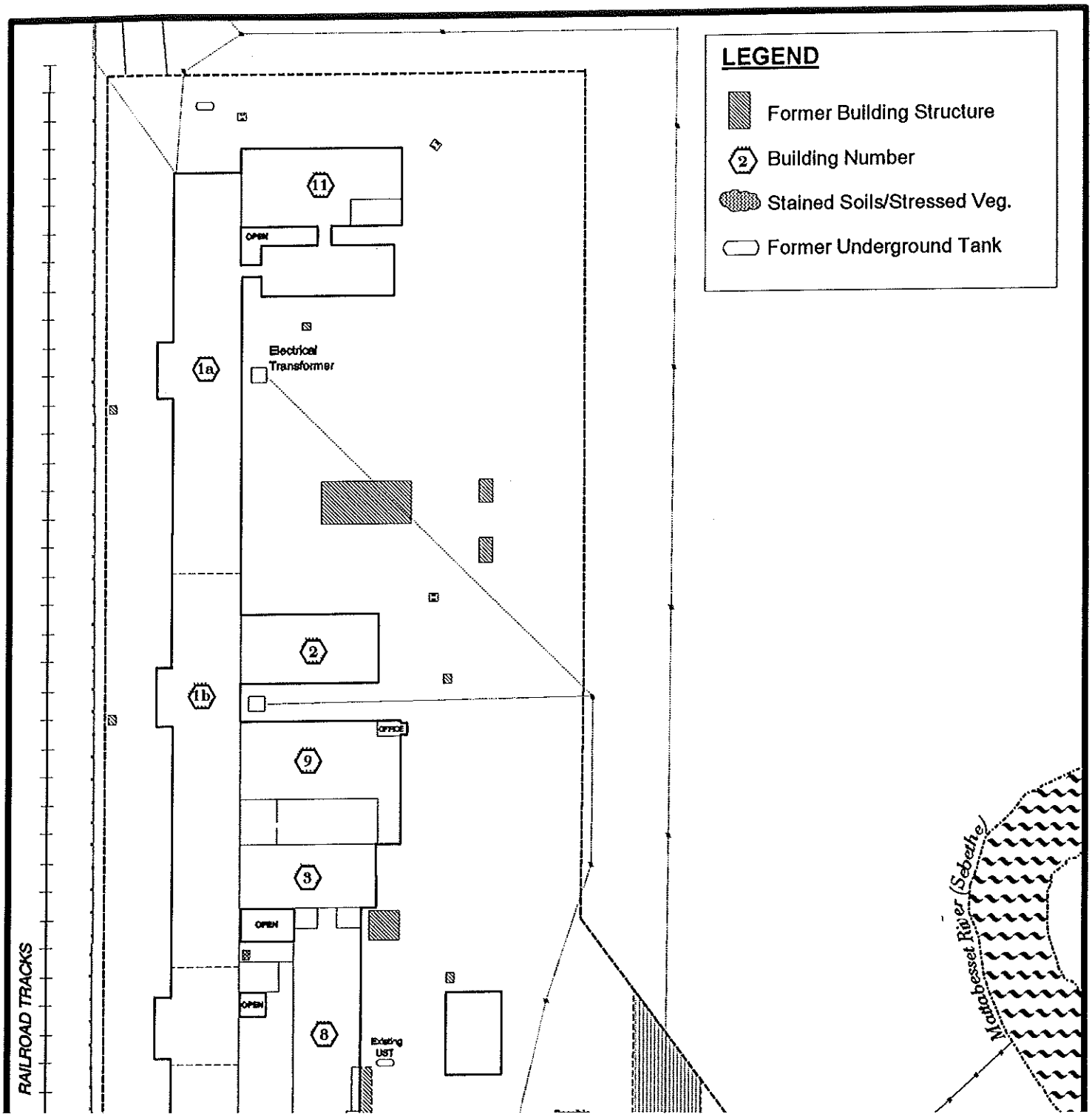
10.0 LIMITATIONS

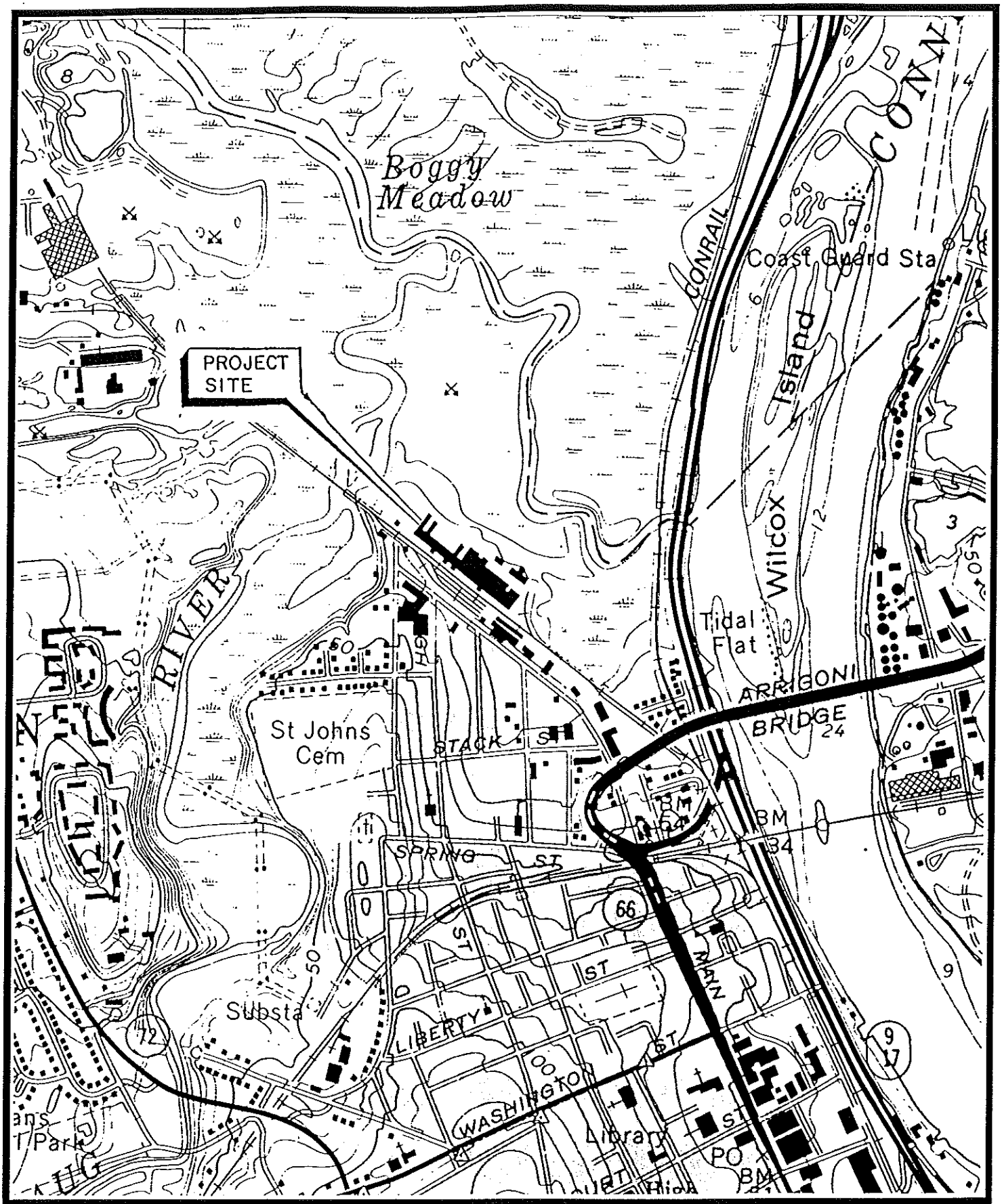
This assessment has been prepared for the exclusive use of the City of Middletown as part of the feasibility study for the Middletown North End Industrial Area Redevelopment Project. The conclusions and recommendations provided by SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. are based solely on information referenced in this report. Possible plumbing, electrical, structural integrity, asbestos, lead paint and radon gas problems were not investigated in this assessment. No subsurface soil or groundwater testing was conducted to confirm our findings. If

any additional information becomes available concerning this site it should be provided to SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC. so that the conclusions and recommendations in this report may be reviewed and revised accordingly. No other warranty, expressed or implied, is made.

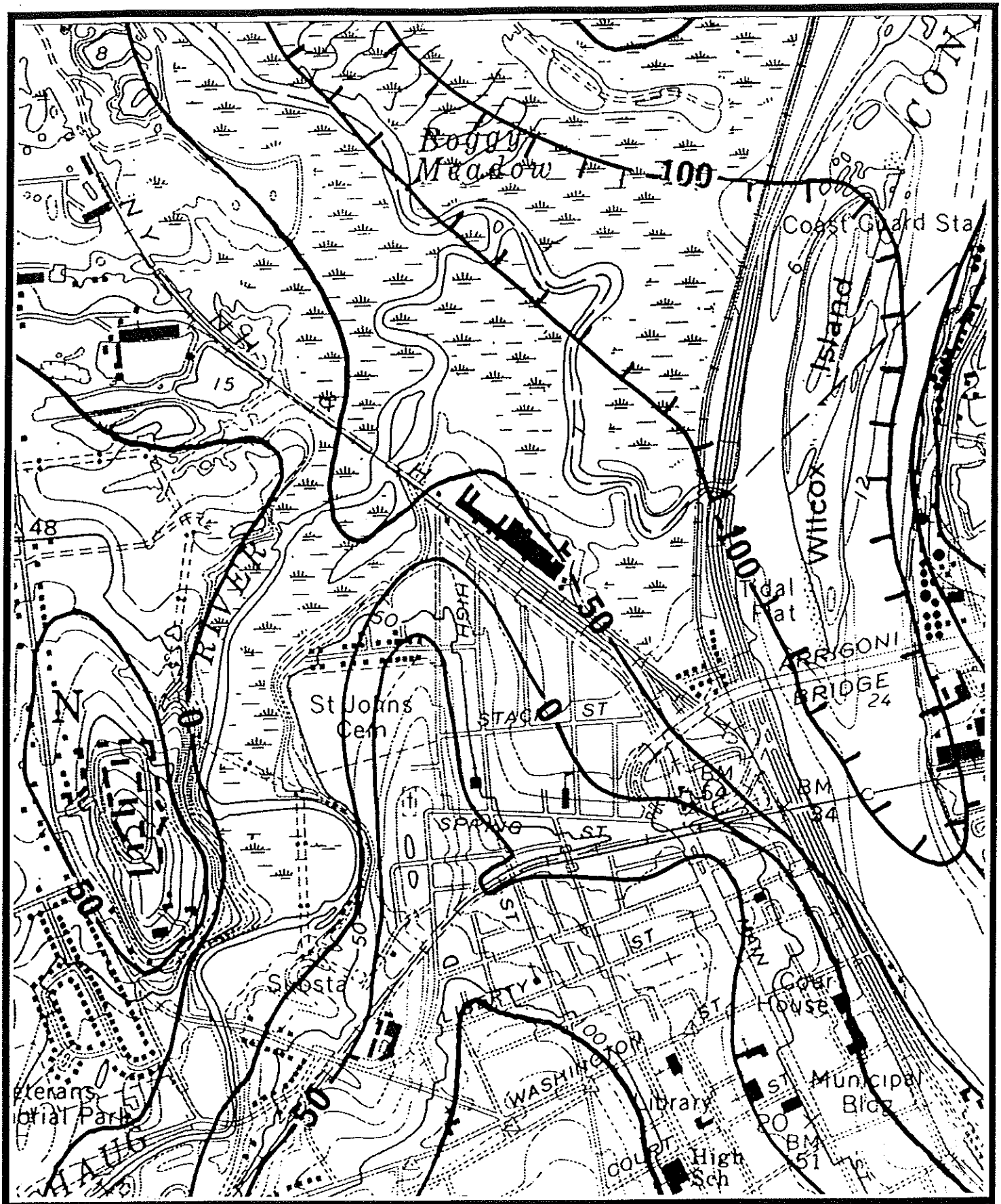


SOIL SCIENCE & ENVIRONMENTAL SERVICES, INC.	Locus Map Former Remington Rand Facility Middletown, Connecticut.	Date: 4/6/93 **Figure 1**


LEGEND
Former Building Structure
Building Number
Stained Soils/Stressed Veg.
Former Underground Tank
RAILROAD TRACKS
11
OPEN
Electrical Transformer
1a
2
1b
OFFICE
9
3
OPEN
OPEN
8
Existing UST
Mattabesset River (Sebethe)



SOIL SCIENCE & ENVIRONMENTAL SERVICES, INC.	Topography Map Former Remington Rand Facility Middletown, Connecticut.	Date: 4/6/93 **Figure 3**



SOIL SCIENCE & ENVIRONMENTAL SERVICES, INC.	Bedrock Contour Map Former Remington Rand Facility Middletown, Connecticut.	Date: 4/6/93 **Figure 4**

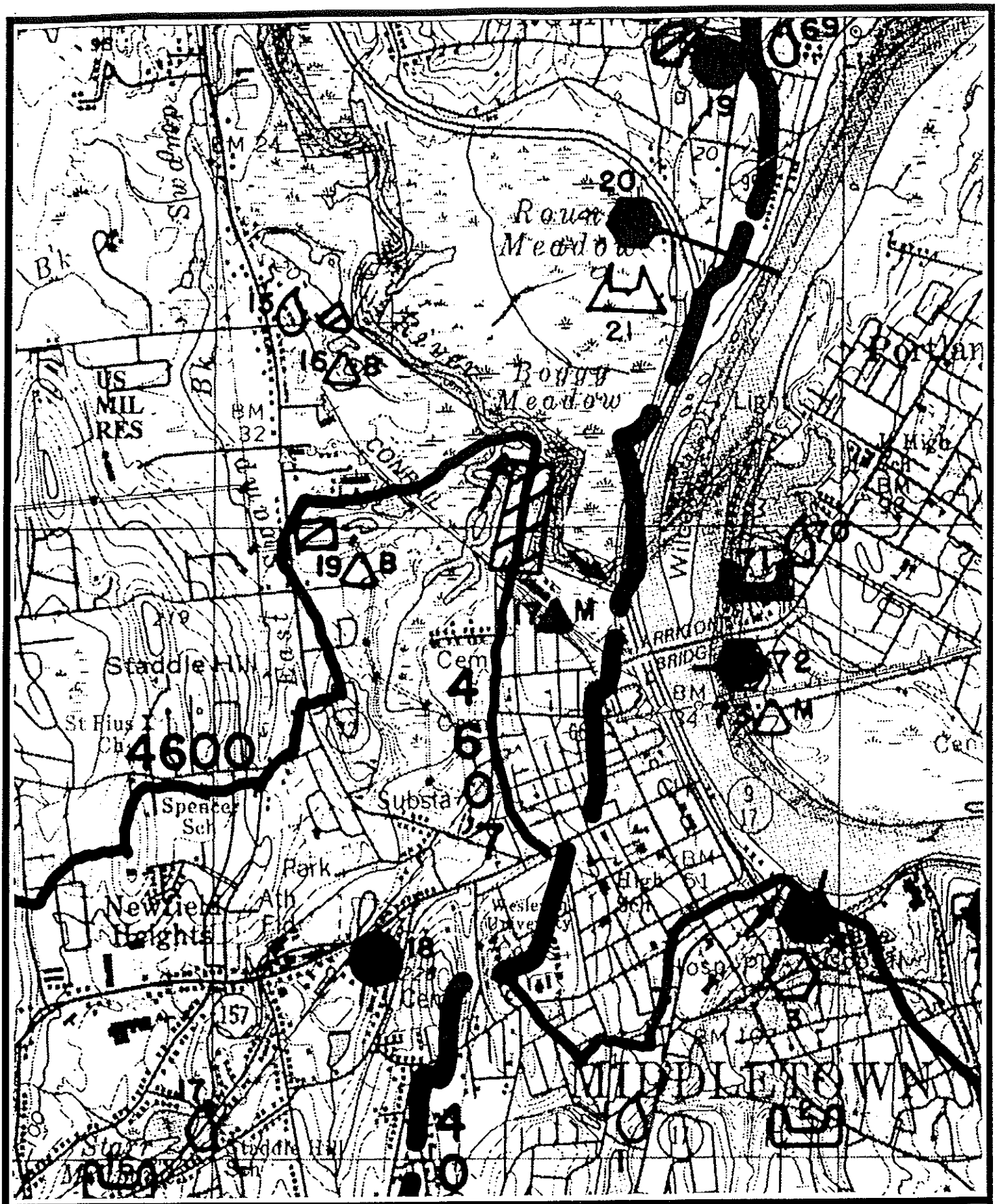
SOIL SCIENCE & ENVIRONMENTAL SERVICES, INC.

Soil Survey Map
Former Remington Rand Facility
Middletown, Connecticut.

Date: 4/6/93

Figure 5

SOIL SCIENCE & ENVIRONMENTAL SERVICES, INC.	DEP Water Quality Map Former Remington Rand Facility Middletown, Connecticut.	Date: 4/6/93 **Figure 6**



SOIL SCIENCE & ENVIRONMENTAL SERVICES, INC.	DEP Leachate and Wastewater Discharge Map Former Remington Rand Facility Middletown, Connecticut.	Date: 4/6/93 **Figure 7**