Veterans Memorial Park

Bridgeport, Connecticut

KING'S MARK ENVIRONMENTAL REVIEW TEAM REPORT

King's Mark Resource Conservation & Development Area, Inc.

Veterans Memorial Park

Bridgeport, Connecticut

Environmental Review Team Report

Prepared by the
King's Mark Environmental Review Team
of the King's Mark
Resource Conservation and Development Area, Inc.

for the

Parks and Recreation Department
Bridgeport, Connecticut

June 1996

CT Environmental Review Teams
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Acknowledgments

This report is an outgrowth of a request from the Bridgeport Parks and Recreation Department to the Fairfield County Soil and Water Conservation District (SWCD). The SWCD referred this request to the King's Mark Resource Conservation and Development Area (RC&D) Executive Council for their consideration and approval. The request was approved and the measure reviewed by the King's Mark Environmental Review Team (ERT).

The King's Mark Environmental Review Team Coordinator, Elaine Sych, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this report.

The field review took place on Thursday, January 25, 1996.

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I would also like to thank Phillip Handy, Director of Bridgeport Parks and Recreation Department for his cooperation and assistance during this environmental review.

Prior to the review day, each Team member received a summary of the proposed project, location and soils maps. During the field review the Team members were able to view additional maps and information at the parks and recreation department offices. The Team met with and were accompanied by a city official. Following the review, reports from each Team member were submitted to the ERT coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site designs or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project - all final decisions rest with the Town. This report identifies the existing resource base and evaluates its significance to the proposed development, and also suggests considerations that should be of concern to the Town. The results of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The King's Mark RC&D Executive Council hopes you will find this report of value and assistance in making your decision this gravel excavation application.

If you require additional information please contact:

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Introduction

An environmental review was requested by the Bridgeport Department of Parks and Recreation for Environmental Review Team assistance in reviewing Veterans Memorial Park. The Board of Park Commissioners is considering the development of this park as a community park.

The ±108 acre park is located on Park Avenue, Geduldig Street, Eckart Street and Madison Avenue in north Bridgeport near the Trumbull town line. The park, orginally known as Ninety Acres Park, was developed in the late 1930's with WPA assistance for the purposes of picnicking, swimming, walking and field recreation activities. The site currently contains several blocked off asphalt roads, a few trails, a pond, dam and stream, woodlands and large open fields. Vandalism, illegal dumping and uncertain usage have led the City to seek information and recommendations on the possibility of active and passive recreational opportunities suited for the park.

The ERT was asked to describe the natural resources present, and to address the limitations and suitability of the park for development of active recreation such as ballfields, (soccer, football, baseball), tennis courts, jogging trails, bocce courts, and playgrounds and passive recreation such as hiking, fishing, nature study, and picnicking.

There is also limited information in the Foretry and Vegetation section of the report that pertains to Puglio Park. Puglio Park is located on Madison Avenue and contains tennis courts, playground and a community center/library.

The Environmental Review Team Process

Through the efforts of the Bridgeport Parks and Recreation Department and the King's Mark Connecticut ERT, this environmental review and report was prepared for the City. This report primarily provides a description of certain on-site natural resources and presents planning, management, land use guidelines. The review process consisted of 4 phases:

1) Inventory of the site's natural resources (collection of data);
2) Assessment of these resources (analysis of data);
3) Identification of resource problem areas, and

4) Presentation of planning, management, land use guidelines.

The data collection phase involved both literature and field research. The ERT field review took place on January 25, 1996. Mapped data or technical reports were also perused, and specific information concerning the property was collected. Being on-site allowed some Team members to verify information and identify other resources.

Once Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. Results of this analysis enabled Team members to arrive at an informed assessment of the property's natural resource opportunities and limitations. Individual Team members then prepared and submitted their reports to the ERT coordinator for compilation into this final ERT report.

Figure 1

Site Map

Topography, Geology and Hydrogeology

Veterans Memorial Park covers approximately 108 acres of relatively undeveloped land in the northeast corner of Bridgeport. The western one-third of the park lies on the eastern flank of a half mile long north-northwest trending smooth-topped ridge. The ridge is blanketed by a thick (>15 feet) accumulation of poorly sorted compacted, bouldery glacial till. The smooth, streamlined character of the hill is typical of so-called drumlins which are thought to be formed by the mounding up of ground-up debris at the base of the last major ice sheet which covered Connecticut 40,000-15,000 years ago. The topography of the eastern two-thirds of the park is rather hummocky with several steep-sided bedrock outcrops forming a series of "knob"-like hills separated by boggy, wetland areas. The bedrock in this area is discontinuously covered by a thin layer (0-10 feet) of poorly sorted gravelly material that appears to be water reworked till. Rounded pebbles and boulders attest to some transport by flowing water. As the boundary between areas of thick smooth-surfaced till and the thin veneer of reworked deposits covering the hummocky topography is abrupt it seems likely that subglacial meltwaters eroded and slightly reworked the till that originally covered the flank of the drumloidal ridge.

The potential recreational uses of the two distinct geological and topographic areas of the park was clearly a factor in historical development of the site. The smooth-surfaced thick till is the only area readily graded, landscaped or used as open space. Currently much of this terrain is still open fields. On the other hand, the hummocky, topographically irregular eastern two-thirds of the property is presently wooded - the use for which it is most suitable. The shallow irregular bedrock underlying much of the hummocky terrain would require extensive blasting to grade areas for playing fields, etc., not to mention the drainage problems that would be encountered because of the many closed bedrock basins that would underlie any such site.

The bedrock exposed in the many outcrops scattered throughout the hummocky area is granitic gneisses and schists belonging to the Trap Falls Formation of Crowley (1968, CT Geological and Natural History Survey, Quadrangle Report #24). Mineralogically, the rocks consist of varying proportions of quartz, muscovite, plagioclase, amphibole and garnet. The presence of a small amount of sulfides, pyrite and pyrrhotite in some layers within these units is suggested by a local rusty weathering discoloration of the exposed surface of outcrops in the central

area of the park. Extensive blasting and regrading of these areas might expose some of this sulfic material to weathering which could lead to at least a temporary acidification of the water in the adjacent wetland areas.

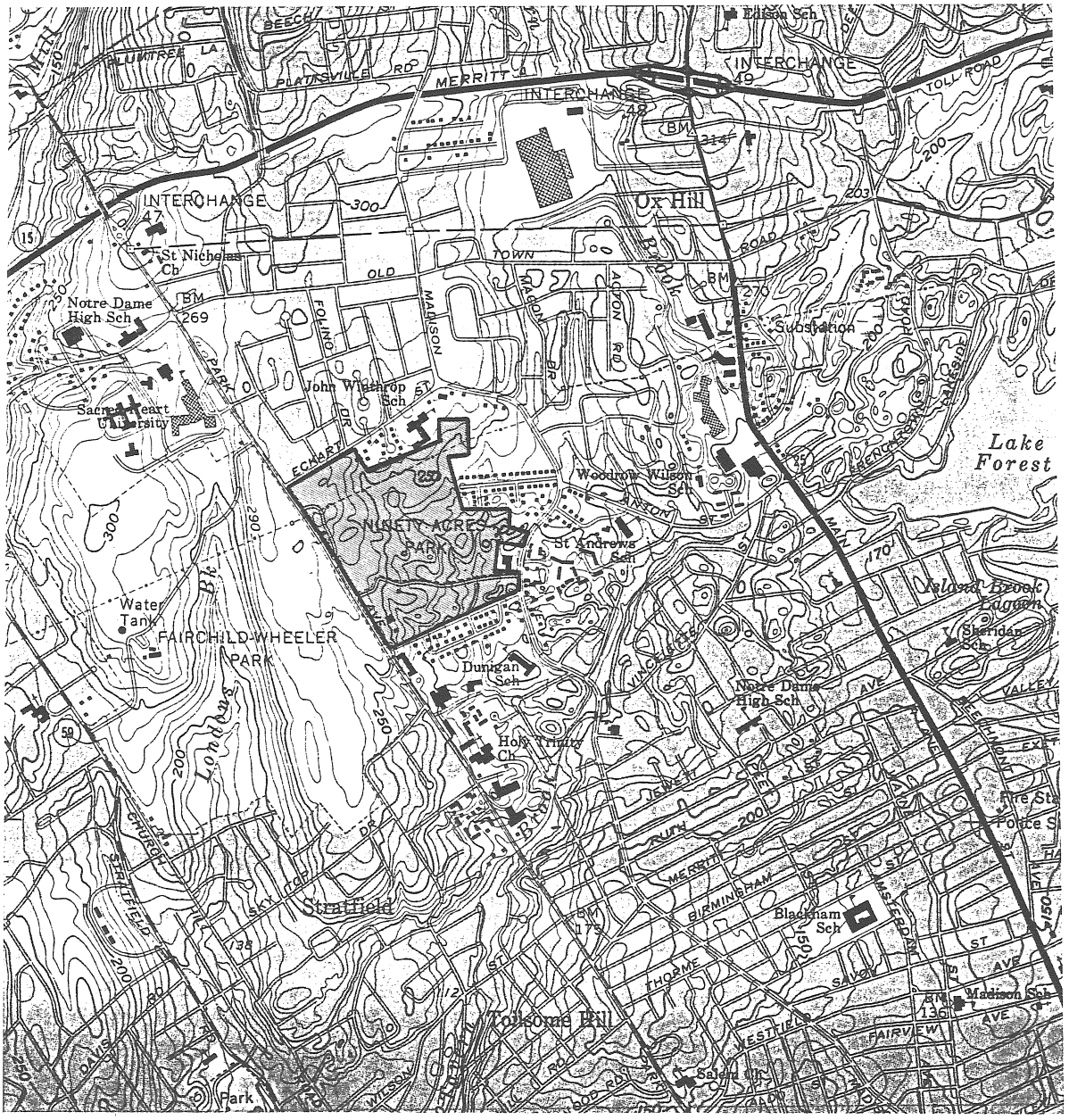
Figure 2

Location and Topographic Map

N

Scale 1" = 2000'

Approximate Site



Soil Resources

Veterans Memorial Park consists of fine sandy loams formed in glacial till uplands. The soils range in drainage from poorly to very poorly drained (Rn) to well drained (CfB). There is also a wide range in the degree of stoniness and the slopes range from 3% up to and beyond 45%. Wetlands are located throughout the central and eastern portions and they run generally north to south.

The dominant soil (CrC) for this parcel is actually a complex of two soils: Charlton and Hollis. The Charlton soil is generally greater than 60 inches deep above bedrock while the Hollis soil is shallow to bedrock with less than 20" depth. Because the two soils are so intermixed, they were mapped as a complex and only on-site investigation can determine the location of the deeper Charlton soils. The limitations of this soil complex include shallowness to bedrock, stoniness, steep slopes and sometimes wetness due to bedrock controlled terrain. Sometimes shallow depressions hold water in the fall through the spring months causing vernal pools to form. Two vernal pools were noted during the site visit: one to the southeast of Winthrop School and the second one located in the south central portion of the park. These vernal pools are important habitat used for breeding in the spring by amphibians. A wooded buffer around these pools is very important in order to maintain the ecology of these pools and habitat for the amphibians and reptiles. Any plans for this park should include the protection of these pools and their surrounding woodland buffer.

The soil unit that is best suited for recreational field development is mapped as CfB, Charlton fine sandy loam. This soil is found mostly north of the power line in the northwest corner of the park. The section of CrC soil along Park Avenue may also be suitable for recreational fields. This area includes primarily the open field. It is recommended that soil borings or test pits be dug to determine if bedrock would be a factor in development of these areas.

Aside from the aforementioned locations, the remainder of the park is not suitable for development due to the presence of bedrock, steep slopes, stones and boulders and wetlands located throughout. Most of the wetlands in the park are designated as being Rn: Ridgebury, Leicester, and Whitman extremely stony fine sandy loams. An artificial impoundment at the north end of the parcel creates a shallow area of open water with persistent and nonpersistent vegetation throughout. The stream from the pond flows in a general north to south direction and it bisects

the parcel. Another wetland was noted along the eastern edge of Veterans Memorial Park and it flows south along the western end of Ranch Drive and then the south end of Gaspee and Pomham Roads. It eventually merges with the main stream just north of the bridge behind the firehouse. Two vernal pools, as mentioned earlier, were also noted.

Some degradation of the wetlands was noted and measures should be taken to protect and enhance them. Trash and debris disposal by adjacent home owners was noted in several areas. A large amount of bulky waste was noted on the parking lot embankment behind the firehouse on Madison Avenue. Also, a lot of debris was noted along the entrance road near the firehouse along with a jet ski that had been deposited into the stream just below the bridge. All the debris needs to be removed and provisions made to exclude vehicle traffic and dumping at this entrance. Perhaps concrete blocks or concrete pillars can be placed across this entrance road if access into the park from this side is not needed. This barrier should be placed close to the turn into the rear parking lot of the firehouse.

A sand storage area located to the south of the firehouse was failing to contain the sand and deposition of sand and silt into the stream was occurring. It is recommended that this problem be addressed in the near future by the installation of containment walls of wood or concrete around the pile.

A bedrock outcrop area located in the center of the property and designated as HpE, Hollis-Rock Outcrop-Charlton complex is noteworthy and worthy of preservation for wildlife habitat and aesthetics. It is a prominent feature in the park's landscape and should be left undisturbed.

In summary, the land along Park Avenue is the most suitable area for recreational field development. It has the least amount of soil limitations for this use. Any development in this area should not extend beyond the eastern tree line of the field, a distance of approximately 400' to 450', from Park Avenue. The remainder of the park has more severe soil limitations and this section is best suited for passive recreation and open space. With its close location to Winthrop School and The Discovery Museum, this park would be ideal for environmental education and study. Existing roadways and trails make it a great area for walking and cross country skiing in the winter. The combination of wetland corridors, vernal pools and surrounding woodland makes this park great habitat for wildlife including reptiles and amphibians. Water quality is higher in its natural environment, some purifying and filtering, as well as flood control, occurs when the wetlands and adjacent buffers are maintained. The pond presents an excellent opportunity for environmental and

ecological education for students. Excavation of a small portion of this pond near its inlets will achieve removal of deposited sediments as well as increase wetland habitat diversity by providing deep open water.

To preserve the natural features of this park would greatly benefit Bridgeport. Extra efforts and measures must be taken to eliminate garbage and debris dumping. All access points into the park should be modified to exclude all motorized vehicle traffic into the park. If the limitations of the soil resource base is understood and respected, this park would remain as one of the environmental jewels in the city of Bridgeport.

Figure 3

Soils Map

N

Scale 1" = 1320'

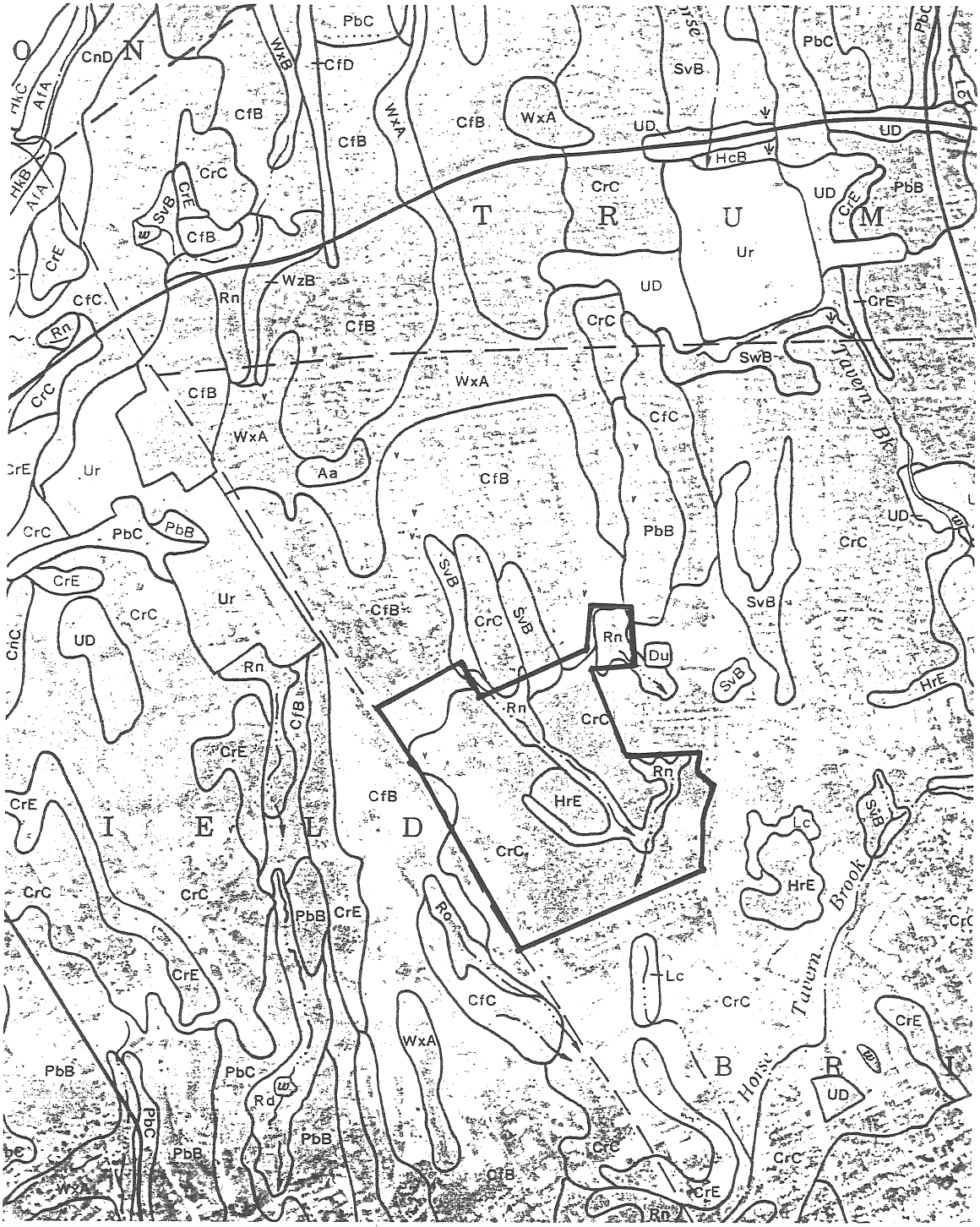


Figure 4

NONTECHNICAL SOILS DESCRIPTION REPORT
Ninty Acres Park, Bridgeport, CT

Map Symbol	Soil name and description
CfB	Charlton fine sandy loam, 3 to 8 percent slopes These soils have slight limitations for cultivated crops. They are well drained soils with a moderate to high water holding capacity for plant growth. They are subject to erosion if left unprotected. MA0002 THE GLOUCESTER SERIES CONSISTS OF SOMEWHAT EXCESSIVELY DRAINED SOILS ON UPLANDS. THEY FORMED IN GLACIAL TILL DERIVED MAINLY FROM GRANITE AND GNEISS. TYPICALLY, THEY HAVE A VERY DARK GRAYISH BROWN SANDY LOAM SURFACE LAYER 4 INCHES THICK. THE SUBSOIL FROM 4 TO 13 INCHES IS DARK YELLOWISH BROWN GRAVELLY SANDY LOAM AND FROM 13 TO 27 INCHES IS LIGHT YELLOWISH BROWN GRAVELLY LOAMY SAND. THE SUBSTRATUM, FROM 27 TO 60 INCHES, IS LIGHT YELLOWISH BROWN VERY GRAVELLY LOAMY COARSE SAND. SLOPES RANGE 0 TO 50 PERCENT. This unit consists of gently sloping, well drained soils. The Canton soils formed in sandy deposits over friable sandy gravelly till and the Charlton soils formed in friable loamy till. It is on the crests and side slopes of upland hills and ridges. Bedrock is commonly more than 60 inches below the surface. The water table is commonly below a depth of six feet in these soils. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil, and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid throughout. Surface runoff is medium and the available water capacity is moderate. These soils are well suited to community development.
CrC	Charlton-Hollis fine sandy loams, very rocky, 3 to 15 percent slopes These soils have major limitations for cultivated crops. They are generally considered unsuitable for agriculture without major alterations or expensive management practices. These soils contain one or more of the following limitations: steepness, stoniness/rockiness, depth to bedrock, or wetness.

NONTECHNICAL SOILS DESCRIPTION REPORT
Ninty Acres Park, Bridgeport, CT

Map Symbol	Soil name and description
	This map unit consists of very deep and shallow gently sloping to sloping, well drained and somewhat excessively drained soils on hills and ridges of glacial till uplands. The areas of this map unit are mostly irregular in shape. Slopes are mostly complex and 100 to 200 feet long. Stones cover 1 to 8 percent of the surface, which is marked by a few narrow, intermittent drainageways and small, wet depressions. This map unit is about 55 percent Charlton soils, 20 percent Hollis soils, 15 percent other soils, and 10 percent exposed bedrock. The Charlton and Hollis soils are in such a complex pattern that it was not practical to map them separately. The water table in this unit is commonly at a depth of more than 6 feet. The available water capacity is moderate in the Charlton soils and very low or low in the Hollis soils. Both soils have moderate or moderately rapid permeability and medium to rapid runoff. Hard unweathered schist bedrock is at a depth of 14 inches in some areas. These soils are well suited to community development in areas of the deeper soil. They are not suited where there are shallow depths to bedrock and rock outcrops.
Du	Dumps These soils have major limitations for cultivated crops. They are generally considered unsuitable for agriculture without major alterations or expensive management practices. These soils contain one or more of the following limitations: steepness, stoniness/rockiness, depth to bedrock, or wetness. CT0303 DUMPS ARE UNEVEN OR GRADED PILES OF REFUSE AND TRASH THAT WITHOUT MAJOR RECLAMATION ARE INCAPABLE OF SUPPORTING PLANTS. THEY ARE COMPOSED OF A WIDE VARIETY OF WASTE MATERIALS, INCLUDING INORGANIC AND ORGANIC SUBSTANCES AND BIODEGRADABLE AND RESISTANT MATERIALS. DUMPS COMMONLY ARE ALTERNATE LAYERS OF COMPACTED TRASH AND SOIL MATERIAL OR BURNED TRASH. SLOPES RANGE FROM 0 TO 15 PERCENT.

NONTECHNICAL SOILS DESCRIPTION REPORT
Ninty Acres Park, Bridgeport, CT

Map Symbol	Soil name and description
	These miscellaneous areas are man-made and are mainly used for disposal of trash. They are commonly called landfills or sanitary landfills. Most are on outwash terraces or adjacent to streams. Bedrock is commonly not present in dumps except in a few smaller dumps where there maybe bedrock outcrops. The water table is generally very deep but in some cases excavations have been made to the water table. A few dumps along larger streams are subject to flooding. Dumps require on-site investigation and evaluation if they are to be considered for other uses. Permeability and depth to water tables are important items to consider while evaluating dumps for other uses. This unit requires onsite investigation and evaluation for community development uses.
HrE	Hollis-Rock Outcrop-Charlton complex, 15 to 45 percent slopes These soils have major limitations for cultivated crops. They are generally considered unsuitable for agriculture without major alterations or expensive management practices. These soils contain one or more of the following limitations: steepness, stoniness/rockiness, depth to bedrock, or wetness. This complex consists of moderately steep to steep, somewhat excessively drained and well drained soils and areas of exposed bedrock. The soils of this complex formed in loamy glacial till. They are in long and narrow or irregularly shaped areas and on hills and ridges of glacial till uplands. Depth to bedrock varies from less than 20 inches to more than 60 inches below the surface. Stones and boulders cover 8 to 25 percent of the surface, which is marked by narrow, intermittent drainageways and a few small, wet depressions. These soils and the exposed rock are in such a complex pattern that it was not practical to map them separately. The water table in this complex is commonly below a depth of 6 feet. Permeability is moderate or moderately rapid in the surface, subsoil and substratum. Surface runoff is rapid and the available water capacity is very low or low in the Hollis soils and moderate in the Charlton soils.

Map Symbol	Soil name and description
	These soils are well suited to community development in areas of the deeper soil. They are not suited to community development where there are shallow depths to bedrock, rock outcrops or in areas where slope exceeds 25 percent.
Rn	Ridgebury, Leicester, and Whitman extremely stony fine sandy loams These soils have major limitations for cultivated crops. They are generally considered unsuitable for agriculture without major alterations or expensive management practices. These soils contain one or more of the following limitations: steepness, stoniness/rockiness, depth to bedrock, or wetness. These nearly level, poorly drained and very poorly drained soils formed in compact and friable loamy glacial till. They are in depressions and drainageways of glacial till uplands. Depth to bedrock is commonly more than 60 inches below the surface. From 8 to 25 percent of the surface of these soils are covered with stones and boulders. The soils were mapped together because they have no significant differences in use and management. These soils have a seasonal high water table at or near the surface from fall through spring. Permeability is moderate or moderately rapid in the surface layer and subsoil of these soils. The permeability is slow to very slow in the substratum of the Ridgebury and Whitman soils and moderately rapid in the substratum of the Leicester soils. Runoff is slow. The available water capacity is moderate in these soils. These soils are poorly suited to community development. The major limitation is the high water table.
SvB	Sutton fine sandy loam, 3 to 8 percent slopes These soils have slight limitations for cultivated crops. They are moderately well drained soils with a moderate to high water holding capacity for plant growth. They are subject to erosion when left unprotected. The seasonal high water table may be a limitation for some crops, and prohibit early spring planting and late fall harvests.

NONTECHNICAL SOILS DESCRIPTION REPORT
Ninty Acres Park, Bridgeport, CT

Map Symbol	Soil name and description
	CT0019 THE SUTTON SERIES CONSISTS OF VERY DEEP, MODERATELY WELL DRAINED SOILS ON UPLANDS. THEY FORMED IN GLACIAL TILL DERIVED MAINLY FROM SCHIST AND GNEISS. TYPICALLY, THESE SOILS HAVE A VERY DARK GRAYISH BROWN FINE SANDY LOAM SURFACE LAYER 6 INCHES THICK. THE SUBSOIL FROM 6 TO 28 INCHES IS DARK BROWN AND YELLOWISH BROWN FINE SANDY LOAM WITH MOTTLES BELOW 12 INCHES. THE SUBSTRATUM FROM 28 TO 60 INCHES IS BROWN FIRM GRAVELLY FINE SANDY LOAM AND LIGHT OLIVE BROWN FRIABLE GRAVELLY SANDY LOAM. SLOPES RANGE FROM 0 TO 15 PERCENT. This gently sloping, moderately well drained soil formed in loamy glacial till. It is near the base of hills and in depressions of glacial till uplands. Depth to bedrock is commonly more than 60 inches below the surface. The soil has a seasonal high water table at a depth of about 20 inches from fall to spring. Permeability is moderate in the surface layer and subsoil and moderately rapid in the substratum. Surface runoff is medium and the available water capacity is moderate. These soils are fairly suited to community development. The primary limitation is the seasonal high water table.
W	Water

Figure 5

RECREATIONAL DEVELOPMENT
Ninty Acres Park, Bridgeport, CT

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CfB:					
Charlton	Slight	Slight	Moderate: slope, small stones	Slight	Slight
CrC:					
Charlton	Moderate: slope, large stones	Moderate: slope, large stones	Severe: large stones, slope	Slight	Moderate: large stones, slope
Hollis	Severe: depth to rock	Severe: depth to rock	Severe: large stones, slope, depth to rock	Slight	Severe: depth to rock
Du:					
Dumps.					
HrE:					
Hollis	Severe: slope, large stones, depth to rock	Severe: slope, large stones, depth to rock	Severe: large stones, slope, depth to rock	Severe: slope	Severe: slope, depth to rock
Rock Outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: depth to rock
Charlton	Severe: slope, large stones	Severe: slope, large stones	Severe: large stones, slope	Severe: slope	Severe: slope
Rn:					
Ridgebury	Severe: large stones, wetness, percs slowly	Severe: large stones, wetness, percs slowly	Severe: wetness, large stones, small stones	Severe: wetness	Severe: wetness

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

RECREATIONAL DEVELOPMENT--Continued
Ninty Acres Park, Bridgeport, CT

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Leicester	Severe: large stones, wetness	Severe: wetness, large stones	Severe: large stones, wetness	Severe: wetness	Severe: wetness
Whitman	Severe: large stones, ponding	Severe: large stones, ponding	Severe: ponding, large stones	Severe: ponding	Severe: large stones, ponding
SvB: Sutton	Moderate: wetness	Moderate: wetness	Moderate: slope, small stones	Moderate: wetness	Moderate: wetness

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

RECREATIONAL DEVELOPMENT

Endnote -- RECREATIONAL DEVELOPMENT

The soils of the survey area are rated in this report according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In this report the degree of soil limitation is expressed as "Slight," "Moderate," or "Severe." "Slight" means that soil properties are generally favorable and that limitations are minor and easily overcome. "Moderate" means that limitations can be overcome or alleviated by planning, design, or special maintenance. "Severe" means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in this report can be supplemented by information available in other reports, for example, interpretations for septic tank absorption fields in the Sanitary Facilities report and interpretations for dwellings without basements and for local roads and streets in the Building Site Development report.

CAMP AREAS require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

PICNIC AREAS are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

PLAYGROUNDS require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or hardpan should be considered.

PATHS AND TRAILS for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, and not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

GOLF FAIRWAYS are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Figure 6

WILDLIFE HABITAT
Ninty Acres Park, Bridgeport, CT

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
CfB:												
Charlton--------	FAIR	GOOD	GOOD	GOOD	GOOD	---	POOR	VERY POOR	GOOD	GOOD	VERY POOR	---
CrC:												
Charlton--------	VERY POOR	POOR	GOOD	GOOD	GOOD	---	VERY POOR	VERY POOR	POOR	GOOD	VERY POOR	---
Hollis----------	VERY POOR	POOR	FAIR	POOR	POOR	---	VERY POOR	VERY POOR	POOR	POOR	VERY POOR	---
Du:												
Dumps.												
HrE:												
Hollis----------	VERY POOR	VERY POOR	FAIR	POOR	POOR	---	VERY POOR	VERY POOR	VERY POOR	POOR	VERY POOR	---
Rock Outcrop----	VERY POOR	VERY POOR	VERY POOR	VERY POOR	VERY POOR	VERY POOR	VERY POOR	VERY POOR	VERY POOR	VERY POOR	VERY POOR	VERY POOR
Charlton--------	VERY POOR	VERY POOR	GOOD	GOOD	GOOD	---	VERY POOR	VERY POOR	POOR	FAIR	VERY POOR	---
Rn:												
Ridgebury-------	VERY POOR	VERY POOR	FAIR	FAIR	FAIR	---	GOOD	FAIR	POOR	FAIR	FAIR	---
Leicester-------	VERY POOR	VERY POOR	FAIR	FAIR	FAIR	---	GOOD	FAIR	POOR	FAIR	FAIR	---
Whitman---------	VERY POOR	VERY POOR	POOR	POOR	POOR	---	GOOD	FAIR	VERY POOR	POOR	FAIR	---
SvB:												
Sutton----------	FAIR	GOOD	GOOD	GOOD	GOOD	---	POOR	VERY POOR	GOOD	GOOD	VERY POOR	---

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

WILDLIFE HABITAT

Endnote -- WILDLIFE HABITAT

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In this report the soils are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The potential of the soil is rated "Good," "Fair," "Poor," or "Very poor." A rating of "Good" indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of "Fair" indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of "Poor" indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of "Very poor" indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible. The elements of wildlife habitat are described in the following paragraphs.

GRAIN AND SEED CROPS are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

GRASSES AND LEGUMES are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

WILD HERBACEOUS PLANTS are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

HARDWOOD TREES and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated are Russian-olive, autumn-olive, and crabapple.

CONIFEROUS PLANTS furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

SHRUBS are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, bitterbrush, snowberry, and big sagebrush.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

WILDLIFE HABITAT

Endnote -- WILDLIFE HABITAT--Continued

WETLAND PLANTS are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

SHALLOW WATER AREAS have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds. The habitat for various kinds of wildlife is described in the following paragraphs.

HABITAT FOR OPENLAND WILDLIFE consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

HABITAT FOR WOODLAND WILDLIFE consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

HABITAT FOR WETLAND WILDLIFE consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

HABITAT FOR RANGELAND WILDLIFE consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, deer, sage grouse, meadowlark, and lark bunting.

Wetland Resources

Included are observations of the wetland resources, the impacts that the proposed activities may have on those resources and recommendations for future development of this parcel given these possible impacts.

Existing Conditions

The wetlands and watercourses on this parcel of land form the headwaters for an unnamed tributary which flows south to Horse Tavern Brook then joins with Londons Brook to form the Rooster River in Fairfield, and from there flows south to form the boundary between Bridgeport and Fairfield before flowing into Long Island Sound as Ash Creek.

A majority of the wetlands on this site are associated with three palmately arranged watercourses which converge in the southern portion of the parcel. Three such wetland areas combine for a total of approximately two acres. There are also two much smaller areas which appear to be a unique type of wetland commonly referred to as a "vernal pool." Refer to the accompanying map Figure 7) for general locations of these wetlands and watercourses. These locations were derived from aerial photograph interpretation and limited field investigation due to existing snow cover at the time of the field review. A more detailed wetland survey should be undertaken prior to any future development that may occur near these areas.

Wetland Functional Values

The wetland areas on this parcel should be considered of high value if only for their "noteworthiness" in that they are a rare resource in Bridgeport. These wetlands serve other valuable functions such as pollutant sinks and flood control. These two functions are critical at this location because of the urban setting they are situated in. Urban areas commonly generate many forms of "nonpoint source" pollution such as excessive sediment, oil, grease and other toxic fluids and compounds deposited on roads and parking lots by cars and trucks; as well as excessive fertilizer, pesticides and herbicides commonly applied to lawn areas. Wetlands have been proven to be effective "sinks" or depositories for such pollutants even to a point were they are "treated" and transformed into less-harmful constituents. Being situated along watercourses, these wetland areas also can act to

detain stormwater runoff during rain events, effectively reducing flood levels downstream.

The general value of these wetlands and watercourses for the support of wildlife is more specifically addressed in the Wildlife Resources section of this report. However, it would not hurt to repeat that the two areas likely to be "vernal pools" routinely have the highest value for wildlife support. Vernal pools are small, shallow, circular depressions in the landscape which fill with water during periods of high Spring meltwater and storm-water runoff, becoming drier during the warm summer months. True vernal pools support abundant and diverse wildlife populations. Much of this wildlife is dependent on these areas for one or more periods of their life cycle. Because of the absence of permanent water, fish do not live in these ephemeral pools, making these areas very attractive to invertebrate and amphibian populations. The possibility that rare and endangered wildlife can be found in these pools is significant. Additionally, being an area of such high biological productivity, vernal pools provide an abundant source of food for upland wildlife species.

A primary value of the watercourses themselves is that they commonly serve as attractants and travel corridors for various species of wildlife (see Wildlife Resources section).

In addition, the wetlands on this parcel have high educational value due to the close proximity of the Winthrop School. Wetland areas like these can serve as fascinating "outdoor classrooms" and can give children first hand knowledge in the fields of natural history, biology, hydrology, etc.

Proposed Activities

This site is under consideration for development as a passive and active recreation area. Targeting the following discussion on a particular proposed activity is difficult given that these categories of use contain a wide range of possibilities which conceivably could include everything from an afternoon hike to the construction of a baseball stadium. Therefore, some minimum protection standards and recommendations are offered which will serve to protect these valuable wetland resources.

To maintain and enhance the environmental quality of these wetlands and watercourses it is recommended that a minimum "buffer area" of at least 100 feet remain undeveloped around the wetlands and on either side of the watercourses. If

their value as a wildlife corridor is to be preserved, a larger buffer area of 200 feet would be recommended.

The large, diverse wetland area created as a result of the dam construction should generally be maintained in its current condition. It seems to be undergoing a "successionary" change from open water habitat to emergent (floating or rooted in standing water) vegetation to shrub and small woody vegetation and eventually to larger trees. This diversity is beneficial to wildlife and beneficial to people who may enjoy observing that wildlife. Periodic dredging of a small portion of this relic pond, preferably that area of the pond with the deepest water, may act to maintain this diversity and keep the pond from reverting totally to a wooded wetland.

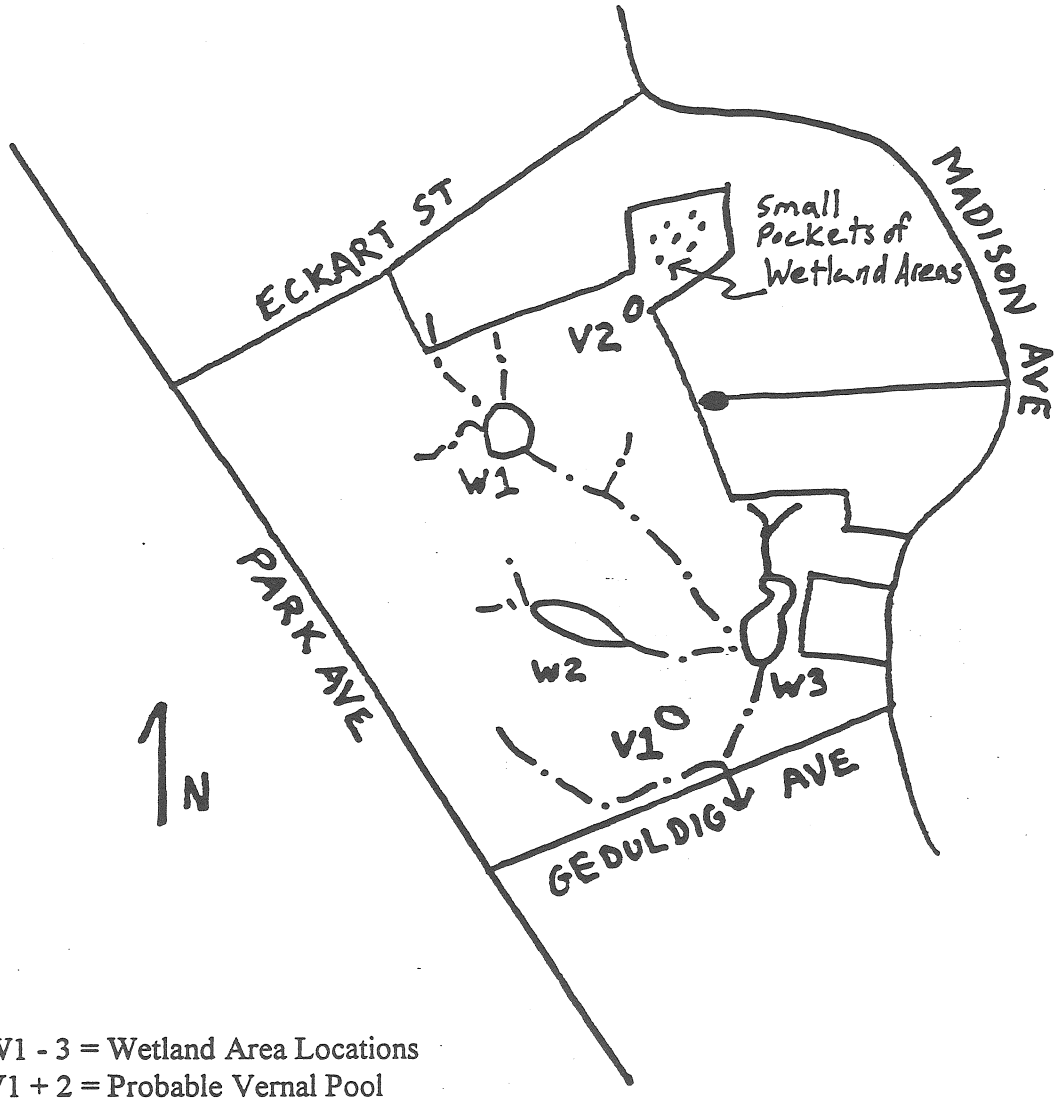
Several unimproved stream crossings were observed within the park. Most are located in the power line right-of-way and one is located further to the south, upstream of the main bridge. It was apparent that all-terrain vehicles were utilizing these crossings. Some erosion of the stream banks was evident. To prevent excessive sedimentation downstream of these crossings, it is recommended that they be structurally improved or be discouraged from use.

Figure 7

Approximate Wetlands and Watercourses Location

N

Scale 1" = 1000'



W1 - 3 = Wetland Area Locations
V1 + 2 = Probable Vernal Pool Locations

Fisheries Resources

Site Description

Veterans Memorial Park contains approximately 1600 linear feet of unnamed stream on which a dam had been constructed to create a 0.9 acre pond. These waterbodies provide tributary flow to Horse Tavern Brook.

Through Veterans Memorial Park, the unnamed stream is contained within a channel approximately 10 feet in width having bank full flow depths averaging 1 foot. Moderate to steep stream gradient produces surface flow predominated by shallow riffle interspersed by moving pool. Stream substrate is composed of small boulder, cobble, gravel, and coarse sand. Dense growths of hardwoods and woody shrubs predominate as riparian vegetation and provide the stream a nearly complete canopy. Physical in-stream habitat is provided by undercut banks and fallen woody debris.

Aquatic habitat within a large portion of the unnamed pond has been eliminated by sediment accumulation and plant growth. The pond as begun reverting to a wetland through the eutrophication process. It is likely that the eutrophication process has been accelerated by development within the watershed.

With the exception of Veterans Memorial Park, land within the immediate watershed of the unnamed pond and stream has been extensively developed primarily as residential housing. Soil erosion and deposition, roadway runoff, and dissolved nutrients originating from developed areas within the watershed have impacted water quality to a reported 1987 classification of Class B/A surface waters.

Aquatic Resources

The fisheries resources of either the pond or stream have never been formally investigated by the Fisheries Division. Given it's physical characteristics, the fin fish population of the unnamed stream is anticipated to be composed of blacknose dace, tessellated darter, and white sucker. These species are commonly associated with cold water streams of slightly impaired water quality.

Being largely wetland, the unnamed pond is not anticipated to support a fin fish population.

Impacts

Development within the immediate watershed has severely impacted water quality. Additional land use change associated with the proposed development of Veterans Memorial Park have the potential to promote further impacts to water quality and aquatic resources should mitigative measures not be implemented. Anticipated impacts include:

1) Soil erosion and subsequent sedimentation through increased runoff from unvegetated areas. Excessive erosion and sedimentation can degrade water quality and physical habitat in turn impacting the resident fin fish population.

2) Influx of stormwater drainage may cause aquatic habitat degradation due to the release of "pollutants" from developed areas; such pollutants include gasoline, oil, heavy metals, road salt, fine silts, and coarse sediments.

3) Removal of riparian vegetation along stream courses can result in the following:

- remove the natural "filter" effect of vegetation which has the ability to prevent sediment, nutrients, fertilizers, and other non-point source pollutants from upland sources from entry into streams; such non-point pollutants can degrade water and habitat quality;

- increase stream water temperature during the summer months (thermal loading) while decreasing winter water temperatures to levels where there may be a complete cover of ice;

- decrease streambank stability thereby increasing instream siltation and aquatic habitat degradation;

- eliminate or drastically decrease the supply of large woody debris to the stream; such material provides critical instream habitat features for numerous species of aquatic organisms;

- reduce a substantial proportion of food for aquatic insects which in turn constitutes a reduction in a significant proportion of food available for resident stream fish;

- stimulate excessive aquatic plant growth;

- decrease of the riparian corridor's ability to serve as a "reservoir" storing surplus runoff for gradual release back into streams during summer and early fall base or low flow periods.

Recommendations

The following should be considered in effort to mitigate impacts potentially affecting the aquatic resources found in the waterbodies within Veteran's Memorial Park:

1) Develop a remediation plan for the unnamed pond based on one of the following alternatives:

a) dredge the pond to a minimum depth of six feet and average depth of three feet; such water depths should provide suitable habitat for a viable warm water aquatic community, or

b) remove the dam and reestablish a stream channel through the remnant pond site, or

c) allow the pond to completely revert to a wetland; wetlands are an invaluable mechanism for water quality improvement given a natural capability to filter nutrients and other dissolved materials from water.

2) Maintain, at a minimum, a 100 foot open space buffer zone along park developments closest encroachment to each waterbody. Activities resulting in alteration of riparian habitat should not be allowed within these zones. Research has indicated that buffer zones of this width prevent damage to aquatic ecosystems as buffers absorb surface runoff, and the pollutants they may carry, before they enter wetlands and aquatic habitats. Please refer to attached documentation which presents Fishery Division policy and position regarding riparian buffers (see Appendix A).

3) Establish a comprehensive erosion and sediment control plan with mitigative measures (hay bales, silt fence, etc.) to be installed prior to and maintained through all development phases; land disturbance and clearing should be kept to a minimum with all disturbed areas being protected from storm events and restabilized as soon as possible.

4) Design and implement an effective stormwater management plan to contain storm water runoff on-site and not allow discharge directly into surface waterbodies; the stormwater detention basins/ponds should not be constructed in watercourses rather

be located in upland areas.

5) Limit any permitted activities adjacent to riparian buffers to historic low precipitation periods of the year; reduced precipitation periods of summer - early fall provide the least hazardous conditions to work near sensitive aquatic environments.

6) Limit liming, fertilizing, and the introduction of chemicals to developed land susceptible to runoff into watercourses.

Dam Review

An inspection of the dam at Veterans Memorial Park was conducted subsequent to the ERT field review date. The existing dam structure is approximately 118' long with a spillway length of 16'. The dam is approximately 4' in height with a centrally located spillway. The dam is constructed of masonry and concrete. At the time of inspection there was no impoundment contained by the dam.

Previous DEP records reveal that the dam has leaked significantly for the past 30 years or more. There are numerous voids throughout the dam such that containing a permanent impoundment is virtually impossible. The dam is essentially in need of complete restoration due to the extent of deterioration that has occurred to this point.

The dam as it exists appears to pose no threat to downstream properties in its present condition and it is not likely to pose any hazard in the future should it be rebuilt. Therefore, no dam construction permit would be required from the DEP to repair/replace the dam should the City of Bridgeport choose to do so. The dam may be left as is without any apparent risk. Any dam construction activity would be subject to the jurisdiction of the City of Bridgeport's local authority.

Forestry and Vegetation

The review area is approximately 106 acres with 90 acres in Veterans Memorial Park (formerly known as Ninety Acre Park) and 16 acres in Puglio Park located in the city of Bridgeport. Acreages for the properties were scaled from aerial photographs. The vegetation description for the adjoining parks can be divided into seven cover types.

Type A - Open - 10 acres
Type B - Field - 10 acres
Type C - Mixed Hardwood Poletimber/Sawtimber - 15 acres
Type D - Mixed Hardwood Sawtimber - 50 acres
Type E - Wetland Forest - 12 acres
Type F - Utility Right-of-Way - 3 acres
Type G - Developed Land - 6 acres

The distributions of the cover types between the two parks are:

Puglio Park	
Type A	6 acres
Type B	5 acres
Type C	2 acres
Type E	1 acres
Type G	2 acres
Total	16 acres

Veterans Memorial Park	
Type A	4 acres
Type B	5 acres
Type C	13 acres
Type D	50 acres
Type E	11 acres
Type G	4 acres
Total	90 acres

These types are described in detail under the heading Vegetative Type Description. Overall most of the area is heavily wooded with tree species common to Southern New England.

The unique feature of the site is the historical aspect of Veterans Memorial Park where the overstory forest has remained undeveloped for the 59 years since the City of Bridgeport has constructed improvements. (The park opened in 1937.)

The economical value of the wood products in the area range from high to low. Of greater value is the role the forest plays in the aesthetics, the storm water storage capacity of the landscape, the wildlife habitat diversity, and the dispersed

recreational opportunities of the region.

Vegetative Type Descriptions

Type A : Open - This type is comprised of three parcels, one in Puglio Park and two in Veterans Memorial Park. The Puglio Park parcel is a former dump site used by the city's Park Department for bulky waste. The ground cover vegetation could not be seen due to snow cover present during the site walk. The occurrences of vegetation is spotty because of the disturbed soil. Shrub species present are highbush blueberry, brambles, red stemmed dogwood, sweet fern, Japanese knotweed, multiflora rose, staghorn sumac, and winterberry. Trees present as seedlings and saplings are aspen, gray and white birches, red cedar, pin cherry, and red maple. Vines such as bittersweet, Virginia creeper, grape, greenbriar and poison ivy are present on the trees and shrubs. The same vegetation occurs on this type in Veteran's Memorial Park.

Type B : Field - This type is comprised of three parcels, one in Veterans Memorial Park and two in Puglio Park. The parcels in Puglio Park are old fields that are reverting to woodland. The species listed in Type A occur around the edges of the fields. The Veterans Memorial parcel appears to be mowed annually and maintained as a grassland. The ground cover vegetation could not be seen due to the snow cover present during the site walk.

Type C : Mixed Hardwood Poletimber/Sawtimber - This type appears to be a two-aged forest with scattered sawtimber-sized trees of beech, hickory, red and sugar maples, black, red and white oaks, and yellow poplar. The poletimber component consists of apple, alder, aspen, gray and white birches, black and pin cherries, cottonwood, elm, Norway, red and sugar maples, yellow poplar, black, pin, red, scarlet and white oaks, sassafras, Tree of Heaven, black tupelo and weeping willow. Shrubs species present are barberry, elderberry, honeysuckle, multiflora rose, witch hazel and winged euonymous. Vines present bittersweet, Virginia creeper, grape, greenbriar and poison ivy.

Type D: Mixed Hardwood Sawtimber - The tree species which make up the canopy of this type are white ash, beech, black, white and yellow birches, elm, hickories, red and sugar maples, black, pin, red, scarlet, swamp white and white oaks, sassafras, and black tupelo. These trees in the Veterans Park are at least 80 years old and

represent the oldest tree growth on the park. The understory contains a variety of seedlings and saplings of the overstory species. The most prevalent are beech and sugar maple. Shrub species present are dogwood and winged euonymous.

Type E: Wetland Forest - This type is a mixed hardwood sawtimber forest occurring on poorly drained soils with a seasonally high water table. The predominant species are white ash, elm, black gum, red maple, pin and swamp white oaks. Shrubs present are spicebush, winterberry and witch hazel.

Type F : Utility Right-of-Way - The vegetation present in this type are the same as Type C. The periodic maintenance of the vegetation limits the tree growth to sapling size and favors the development of the shrub species.

Type G : Developed Land - This type are the areas on the site where structures and improvements have been built. On Puglio Park there are a library, tennis courts and parking lots. On the Veterans Memorial there are the museum complex, a fire station and parking lots.

Management Considerations

Several factors have to considered in the maintenance of a forest. Wetland soils will have the water table close to the surface. This allows for shallow root penetration into the soil which increases the potential for windthrow of trees to occur. Light thinnings of trees on these soils may help to improve the stability of the remaining trees. Openings and clearings in and along wetlands should be avoided. These soils are more sensitive to such disturbances. Alterations in the wetlands which permanently change the water table and or restrict the natural drainage may have a negative impact on the vegetation in and around these sensitive areas.

Trees which are presently unhealthy and not growing vigorously due to crowded conditions and old age are more susceptible to further degradation from the stresses of development activities and environmental factors. It would be beneficial to remove these undesirable trees to reduce the competition with healthier desirable trees for sunlight, water and nutrients. This improvement thinning is designed to allow the remaining trees to improve over time in health, vigor, quality and stability. Properly implemented, these thinnings can also improve the aesthetics of the area,

the wildlife habitat and provide wood products.

The trees in sawtimber Type D on Veterans Memorial Park are approaching their maximum "average" age. Yellow poplar and black oaks, which make up the majority of Type D, generally do maintain their vigor for more than 100 to 125 years. As they approach this age their susceptibility to insects and diseases such as Gypsy moth defoliation increases. If it is the desire of the city to maintain these trees as a major component of the park, than some form of silvicultural (forest management) activity may be an option that should be explored. Some plans will have to be made to answer the question of what should be done to keep the forest healthy and diverse.

Any tree harvesting, whether it is done for forest management or site clearing, should take into consideration the value of the potential wood products. The proper marketing of these products should be planned for. A public assistance forester or a private consulting forester may be of assistance in either on the ground planning or the marketing of potential wood products.

Attached are publications dealing with protecting trees during construction, improvement cutting, tree hazards in recreation sites and marketing wood products from municipal lands. (See Appendix B for the improvement cutting and stumpage survey information, the other publications were too long to include in this report and were given separately to the requesting agency.)

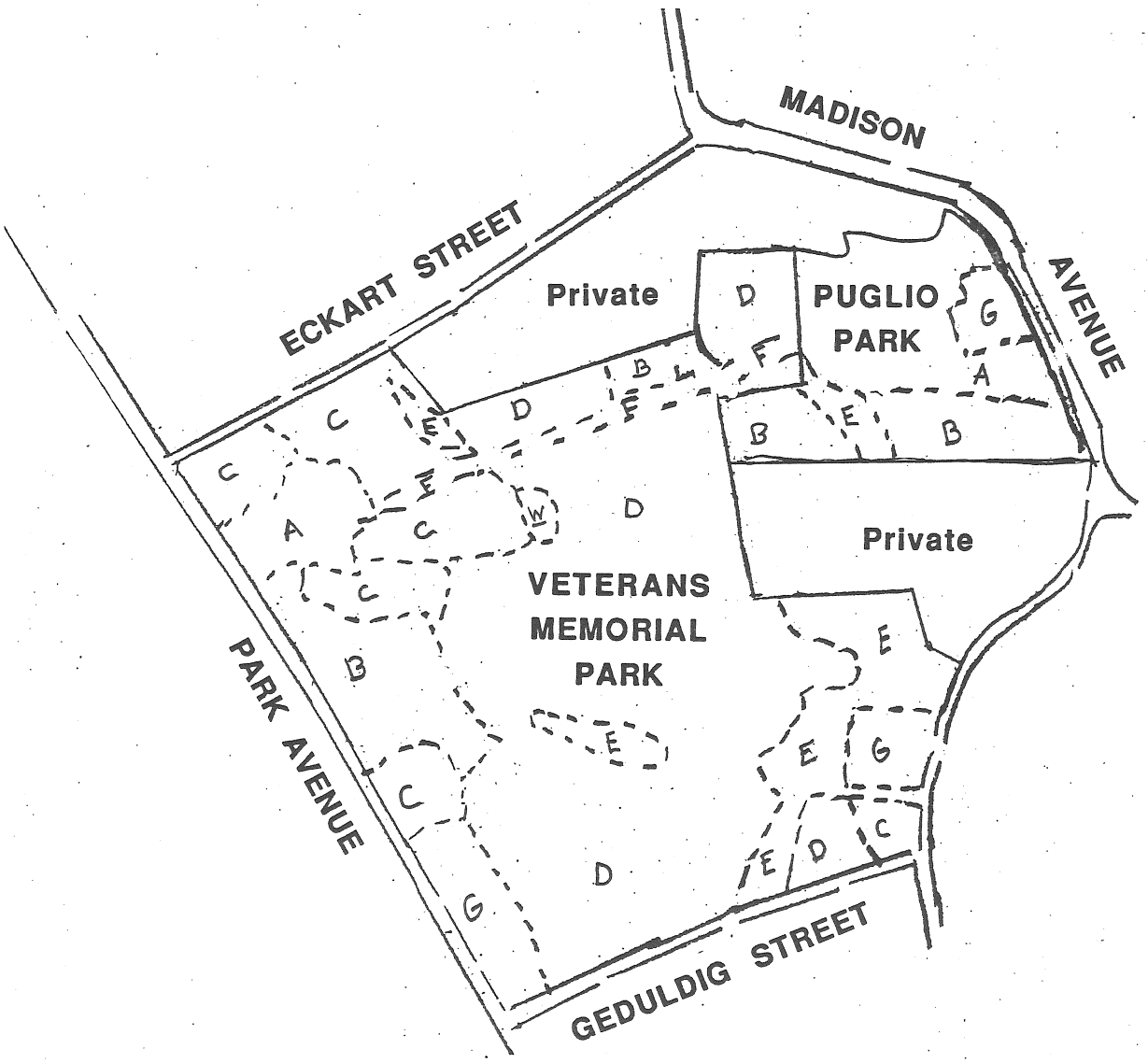
Figure 8

Vegetation Type Map

N

Scale 1" = 640'

Park Boundary
Type Boundary
Water Body



Wildlife Resources

The report will address the following wildlife resource issues:

1) current conditions;
2) projected impacts, landscape view and considerations concerning forest fragmentation and wildlife diversity; and
3) management considerations.

Current Conditions

The following wildlife were observed or evidence of their presence confirmed by identifying tracks, scat, calls, or other sign: white-tailed deer, coyote, red fox, domestic dog and cat, cottontail rabbit, gray squirrel, white-footed mouse, meadow vole, red-tailed hawk, mallard, ruffed grouse, mourning dove, mockingbird, black-capped chickadee, northern cardinal, downy woodpecker, and American crow. These observations occurred in the winter months and the species listed are indicative of typical wintering wildlife. Seasonal observations would yield a more diverse number of wildlife using the park, especially during the breeding season and the fall migration.

The vegetation types (see Forest Resources section) of the park can be categorized as mixed hardwoods (50 acres, saw-timber sized), mixed hardwoods (15 acres, pole-sized), wetland forest (10 acres), fields (15 acres, mowed), and pond (.9 acre). These vegetation types collectively provide diverse habitats for wildlife. Their proximity to each other in a continuous fashion adds to their value as wildlife habitat. Sizeable tracts of land with diverse vegetative stages, like this one, are increasing important in urbanizing regions of Connecticut.

There is a distinct lack of winter cover (evergreens or dense understory conditions) throughout the property.

When looking at a land use cover map of the Veterans Memorial Park area (Figure 9), it becomes quite apparent that it is surrounded by urban development. The size of the park and its associated vegetation types provide functional habitat for many common forest-dwelling wildlife, as well as having the potential for having some less common birds that require larger forests. Unfortunately, no current or historical breeding bird information was available for the property. As the surroundings become further developed and natural areas are divided into smaller,

isolated pieces, this property will increase in value as wildlife habitat.

The powerline right-of-way and the adjoining open space lands provide potential corridors for movement by the inhabiting terrestrial wildlife between the Veterans Memorial Park and other habitats. Most terrestrial wildlife, unlike avian wildlife, require vegetated corridors for dispersal, feeding or breeding purposes.

The man-made pond located in the park is heavily silted, however it is providing a marsh-like environment for wetland dwelling wildlife. The pond's shallow water environment is suitable for dabbling ducks, muskrats and an occasional heron. Dredging a small portion of the pond to create some deeper pools may enhance conditions for fish (consult DEP Fisheries Division). The north side of the pond looks well suited for a wetland boardwalk. This pond adds habitat diversity to the property, especially because of the lack of beaver activity in the surrounding landscape. The rocky brook that flows through the property provides wildlife with seepy conditions and adds a riparian mix to the uplands. The small vernal pools (see Wetland Resources section) scattered throughout the upland areas serve as salamander breeding habitat, as well as adding the diversity of a wetland plant community. The wet areas scattered throughout the property are collectively important, because as urbanization of the surrounding landscape continues, they decline in numbers through filling, piping, or draining.

Projected Impacts

The impacts to wildlife from park development are difficult to predict because of the limited specific information provided. Any activity in the park which further reduces the size of the forest will adversely affect wildlife, especially the forest-dependent species. The amount of forest interior area (the size of the core forest) should be maximized. As the interior forest areas decreases because of roads, parking lots, or other developments, parasitic wildlife such as the cowbird and generalist predators such as crows, bluejays and raccoons will increase and affect the forest interior wildlife which require larger unfragmented forests.

As the land surrounding the park continues to become urbanized, the habitats of the park may serve as important refugia for wildlife.

Proper planning is required now to ensure that the park is not over-developed and its wildlife habitat value reduced. There are several studies in urban ecology which show a strong relationship between shrinking forest size and high human use leading to a declining function as meaningful reserves for area-sensitive wildlife

(Bond, 1957, Levensen 1981, O'Meara 1984, Askins et al. 1987). As forests shrink in size and are fragmented, migratory birds still utilize the smaller forests but may no longer breed in them because of higher nest predation, parasitism and marginal habitat size (Blake and Karr 1984).

Management Recommendations

The following recommendations are limited by the lack of specific development plans.

1) If the forest cover of the park is reduced, it should occur along the fringes of the property in order to maintain as large an interior forest areas as possible. Ball fields, paved areas, or buildings should be placed along the fringes of the park property rather than through the center of the forest.

2) With neighboring schools adjacent to the park, the property can serve as an outdoor classroom. Educational trail systems can be laid out and utilized by the teachers and students for learning about forest and wildlife ecology.

3) Forest resources inventory and management should be considered for the park using DEP forestry guidelines. This will enable the park managers to maintain a data base for the property and make informed decisions about what types of management actions may be necessary for the property to maintain a healthy forest ecosystem. For wildlife habitat enhancement, an increase in the winter cover is needed and selective thinning of the forest to favor understory development should be considered for the upland areas.

4) An area which includes the man-made pond should be delineated for possible development of an outdoor classroom for the Winthrop School and other area schools. The outdoor classroom concept is becoming popular throughout the state and Veterans Memorial Park is an ideal setting for one.

5) Depending on future use, planned trail systems should not criss-cross the entire property. Wildlife need not only the habitat, but also places they can seek seclusion from perpetual human disturbance. This is especially needed in urban sites. It is important to have sections of the property with minimal disturbance from hikers or

walkers. Also, a leash requirement for all pets entering the park is important especially during the breeding seasons.

Wildlife areas that are close to urban centers are gaining in popularity. Public opinion surveys of urban residents of five metropolitan areas in New York state indicated that 96 percent of the respondents felt that it was important for their children to learn about nature and 73 percent were interested in wildlife in their backyard or neighborhood area (Brown et al. 1979). The Veterans Memorial Park area can be a place to learn about wildlife and enjoy wildlife in its natural setting within city boundaries.

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AREA OF DETAIL

TOWN: BRIDGEPORT

QUADRANGLE: 109 BRIDGEPORT

500 FEET

0 1000 2000

1:24000 Scale or 1" = 2000'

PLOTTED: 02/09/96 13.23.30 GIS

DEP-GIS *Connecticut Land Use and Land Cover (Satellite Imagery)*

ninety-acres park 40

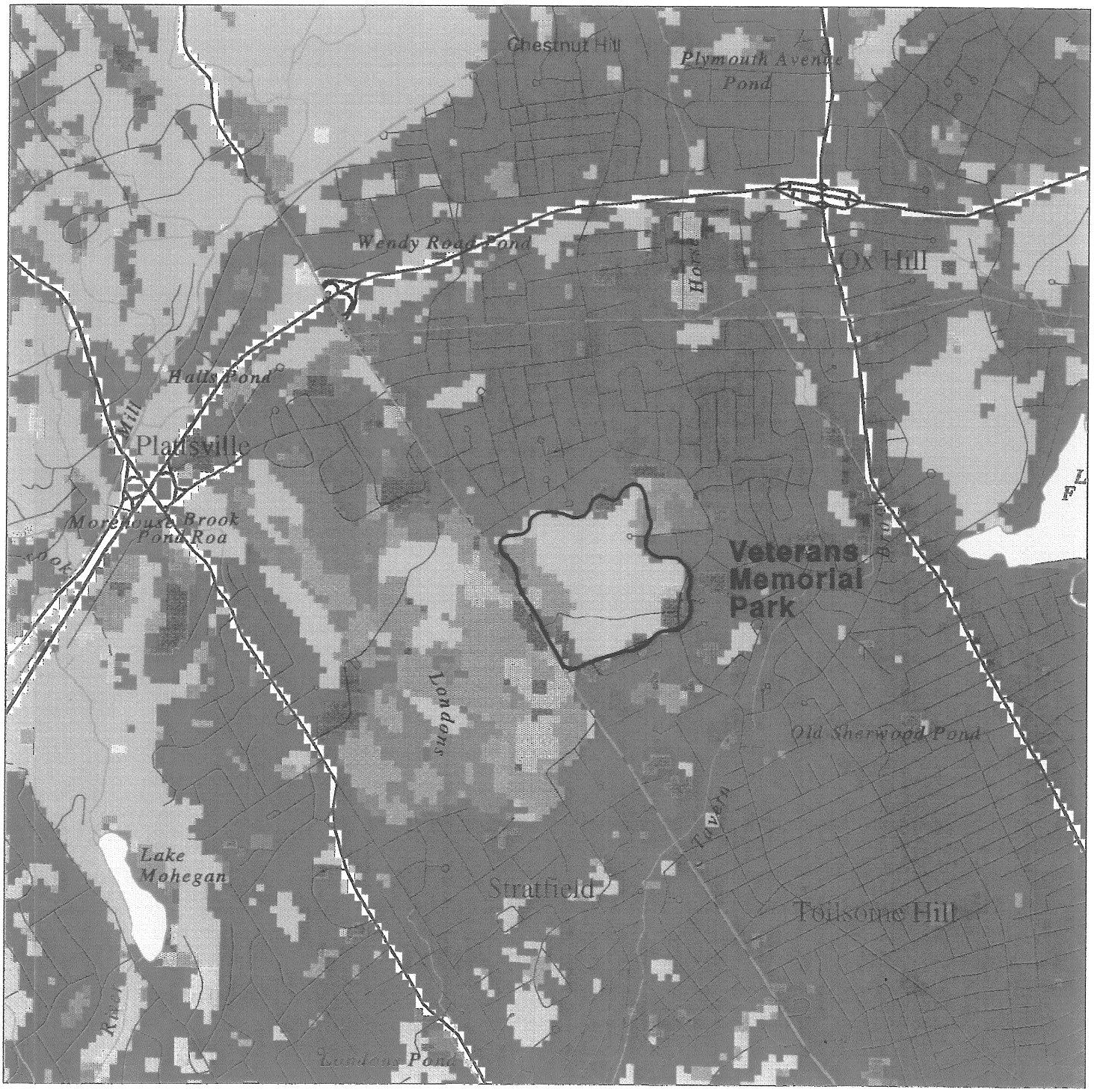
LEGEND

IMPERV SURFACE	GRASS/TOBACCO	MAJOR ROADS
H DEN RES/COM	DECID FOREST	
MED DEN RES	CONIF FOREST	
ROOF	DEEP WATER	
PAVEMENT	SHALLOW WATER	
TURF/GRASS	NON-FOR WETLAND	
SOIL/GRASS/HAY	FOREST WETLAND	
GRASS/HAY/PAST	BARREN LAND	
SOIL/CORN	BARE SOIL	
GRASS/CORN	LOW COAST MARSH	
SOIL/TOBACCO	HI COAST MARSH	

Figure 9

Land Use Map

Natural Resources Center, Connecticut DEP



The Natural Diversity Data Base

The Natural Diversity Data Base maps and files have been reviewed for the property. According to the information, there are no known extant populations of Federal or State Endangered, Threatened or Special Concern Species that occur at the site in question.

Natural Diversity Data Base information includes all information regarding critical biological 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. Consultations with the Data Base should not be substitutes 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.

Also be advised that this is a preliminary review and not a final determination. A more detailed review may be conducted as part of any subsequent environmental permit applications submitted to DEP for the proposed site.

Archaeological Review

A review of the State of Connecticut Archaeological Site Files and Maps shows no known prehistoric archaeological site on the park property, however, Site 51-14 is located on Sacred Heart University land adjacent to the park. Our files provide scant information on the nature of this archaeological site, except that cultural materials had been discovered in the past and date to an unknown prehistoric time period.

Veterans Memorial Park (formerly Ninety Acres Park) was not included as part of the State Historic Preservation Office's recently undertaken statewide inventory of municipal parks, and therefor, does not appear to meet National Register of Historic Places criteria for landscape architecture. Likewise, the Museum of Arts & Sciences lacks historic and architectural significance and is not eligible for the National Register.

The Captain Brooks House, located behind (north of) the Discovery Museum is listed on the State Register of Historic Places. Since the Captain Brooks House was relocated to its current site from elsewhere in Bridgeport, the area immediately surrounding the structure does not possess historic archaeological sensitivity.

The Office of State Archaeology and the Connecticut Historical Commission highly advise the City of Bridgeport to consult with Charles Brilvitch, Municipal Historian, regarding the possibility that the park's acreage was once the lands associated with a 19th century estate. If so, the house (and outbuildings) is no longer extant, but its former location may possess historic archaeological sensitivity. If so, an archaeological testing of the area may be warranted. This could be conducted in part as a public educational program, during the park's summer activities. Hence, providing a professional archaeological survey of the park's history, while providing an opportunity for local residents to become more aware of their archaeological heritage.

In summary, our files contain little evidence for archaeological sites in the park property and the probability is low-to-moderate that an undiscovered site may be located during the park development process. Nonetheless, contact with the municipal historian may indicate historic components that should be investigated prior to construction activities. This archaeological fieldwork can be coordinated with local educators and city officials to provide educational opportunities for students and the interested public while historic preservational management plans are implemented.

State Park Planner Review

The future use of this park will depend upon three basic factors: 1) physical constraints/opportunities presented by the site, 2) available moneys for development and maintenance, and 3) neighborhood support/opposition.

The property consists of a largely wooded tract of gently to moderately sloping land, surrounding a central area of shallow to bedrock soils. It is also crossed by a power line and by several wetland corridors, on one of which a small impoundment has been developed. Therefore the most appropriate use of most of the park would be to remain in a wooded condition, offering trails and perhaps children's fishing derby opportunity at the pond if deep enough to support fish. The best location for intensive development would be along Park Avenue where easy vehicular access and relatively gentle slopes and open or recently-reverted fields should pose comparatively few costs or site preparation difficulties.

Bridgeport then must decide how much it can or wishes to spend on development and on continuing upkeep of improved property. Ball fields can be expensive to develop and also to maintain. Therefore development of several casual field areas in the open area immediately north of the Discovery Museum parking lot may be the most efficient use of funding which may be available.

Lastly, neighborhood reaction must be considered, in view of the history of opposition to development of the property. Fortunately the most logical place for ball field development seemingly is along Park Avenue as discussed above, facing Fairchild-Wheeler Park across the street in Fairfield. Thus potential neighborhood opposition should be defused.

Planning Considerations

History and Description of Property

The park was officially dedicated in 1937 as Ninety-Acres Park, at a time when Bridgeport and much of the surrounding region was much more rural and open. Today, the recently renamed Veterans Memorial Park is situated amid the most densely urbanized region in the State. The property is located adjacent to Park Avenue between Eckart and Geduldig Streets. Portions of the park stretch as far east as Madison Avenue. On the opposite side of Park Avenue is the Town of Fairfield and Fairchild Wheeler Golf Course. The Bridgeport Discovery Museum occupies the park's southwest corner through a lease agreement with the Department of Parks and Recreation. Original plans for the park called for a swimming pool, baseball diamonds, and a sports stadium. Later proposals included a golf course, bath house, skating rink, Little League facility, and a soccer complex. Currently, with the exception of a large open field adjacent to Park Avenue, a softball field in the northeast corner, and a man-made pond and dam in the center, the park is largely undeveloped, heavily wooded, and underutilized. This combination has made the area susceptible to discarded unwanted or stolen items such as refrigerators, lawnmowers, and automobiles.

Profile of Bridgeport and the Region

Located in southwestern Connecticut and on the northern shore of Long Island Sound, Bridgeport is at the center of a metropolitan region of approximately 300,000 people. Despite its compactness (covering less than 16 square miles of landmass), Bridgeport is the most heavily and densely populated city in the State (141,686 residents at 8,911 persons per square mile). Similar to other metropolitan areas across the nation, the Greater Bridgeport Region experienced a profound expansion of new residents and development during the 20th century. However, as Table A indicates, Bridgeport's population peaked sometime during the 1950s and has been in decline ever since. The Region overall, meanwhile, reached its pinnacle during the 1970s. Yet, the latest State Office of Policy and Management (OPM) projections have the city and regional population rebounding during the early half of the next century (see Table B).

Table A
REGIONAL POPULATION TRENDS
TOTAL POPULATION

CITY/YEAR	1930	1940	1950	1960	1970	1980	1990
Bridgeport	146,716	147,121	158,709	156,748	156,542	142,546	141,686
Easton	1,013	1,262	2,165	3,407	4,885	5,962	6,303
Fairfield	17,218	21,135	30,489	46,183	56,487	54,849	53,418
Monroe	1,221	1,728	2,892	6,402	12,047	14,010	16,896
Stratford	19,212	22,580	33,428	45,012	49,775	50,541	49,389
Trumbull	3,624	5,294	8,641	20,379	31,394	32,989	32,016
REGION	189,004	199,120	236,324	278,131	311,130	300,897	299,708

SOURCE: U.S. Bureau of Census

Table B
REGIONAL POPULATION TRENDS
OPM PROJECTED POPULATION (1990 - 2020)

CITY/YEAR	1990	1995	2000	2005	2010	2015	2020
Bridgeport	141,686	138,010	137,860	139,880	142,560	146,720	151,120
Easton	6,303	6,210	6,110	6,060	6,090	6,160	6,270
Fairfield	53,418	53,820	53,890	53,880	53,790	53,860	54,250
Monroe	16,896	17,470	17,940	18,400	18,940	19,520	20,100
Stratford	49,389	49,820	49,810	49,500	49,190	49,110	49,270
Trumbull	32,016	32,560	32,790	32,710	32,550	32,500	32,680
REGION	299,708	297,890	298,400	300,430	303,120	307,870	313,690

SOURCE: Connecticut Office of Policy and Management (OPM)

Given the significantly high density of the region, available land for open space is at a premium. Of the Region's 93,120 acres, 19.2 percent or 17,876 acres is considered to be public or privately owned open space. A large majority of the open space that is privately owned (11,414 acres) is located in the Region's two northernmost Towns of Easton and Monroe. Nonschool municipally-own open space within the Region totals 5,037 acres, 719 of which is located in Bridgeport. The rehabilitation of Veteran's Memorial Park, therefore, would not only be beneficial for the Region as a whole, but represents a golden opportunity to establish a natural preserve virtually in the middle of a major urban core.

Surrounding Land-Use Element

Veterans Memorial Park is located in the north end of Bridgeport. The surrounding neighborhood consists predominantly of single-family residences that are zoned as A-Residence, with some multi-family housing located to the east of the park that is zoned for C-Residence. A small concentration of general businesses (i.e. convenience stores, service station, pharmacy, and barber shop) are located to the northeast of the park where Eckart Street intersects with Madison Avenue. These parcels are designated as Business Number 3 and 4 Zones. Winthrop Middle School is located adjacent to the park on the northeast corner.

Traffic and Transportation Considerations

Veterans Memorial Park is located in the northend of the City of Bridgeport. It is roughly bounded by Park Avenue to the west, Madison Avenue to the east, Eckart Street to the north and Geduldig Street to the south. Vehicle access is via Park Avenue and Madison Avenue. An internal park road connects these two access points.

Traffic volumes along the streets near the park reflect the densely developed nature of this section of Bridgeport. Park Avenue is an arterial with between 11,000-to 12,000 vehicles per day (vpd) passing the park area. The average daily traffic volume on Madison Avenue is about 5,200 vpd near the park access road; however, higher volumes are recorded north and south of this location. Eckart Street and Geduldig Street provide a connection between the higher function roads of Park Avenue and Madison Avenue. Both are relatively short and serve the residential neighborhoods located on the streets. Because of this, traffic volumes are, by comparison, low, in the 2,000-to-3,000 vpd range. Average daily traffic volumes for the general area are shown on the attached map.

Traffic flow is good with only minimal congestion problems during the evening peak hours. The high volumes recorded on Park Avenue are accommodated by the road's width which facilitates movement. However, the width of the roadway allows motorists to travel at a high rate speed and in excess of the posted speed limit. Along Madison Avenue, operations are good and travelers experience little delay. Travel on Eckart Street and Geduldig Street is typical for short, local, residential streets.

The intersection of Park Avenue and Geduldig Street has been identified as a high accident area. A large contributing factor to the accident history is the limited

sight distance for vehicles entering Park Avenue from Geduldig Street, and vehicles turning left from Park Avenue onto Geduldig Street. The vertical curve north of the intersection is substandard and the impact of the vertical curve reduces the sight distance to the intersection for vehicles traveling southbound on Park Avenue. Additionally, there is a limited sight distance for the vehicles turning left from Geduldig Street onto Park Avenue. Accident records from the Bridgeport and the Fairfield Police Departments show a total of 38 accidents occurring at this intersection between 1990 and 1994. There was a fatal accident at the intersection in 1990.

To rectify this safety problem, an improvement project was developed. The project will provide adequate stopping sight distance on Park Avenue, north of Geduldig Street by lowering the roadway. The length of the project is approximately 680 feet on Park Avenue, 175 feet to the south and 505 feet to the north of intersection of Geduldig Street. Pavement markings would be revised and new signs installed. After construction, two lanes in the southbound direction will be provided with left turning vehicles separated from through vehicles.

At present, day-to-day use of the park is somewhat limited. The rehabilitation and redevelopment of the park will increase its use and visitation by residents of Bridgeport. To estimate the expected amount of traffic generated by a rehabilitated park, the **Trip Generation Manual**, published by the Institute of Transportation Engineers (ITE) was reviewed. This manual is a compilation of traffic generation studies conducted throughout the United States for a wide variety of land use categories. It is intended to be a tool for planners, traffic engineers, zoning boards and others interested in estimating the number of vehicle trips generated by a particular use. One of the land use categories contained in the manual is for "City Park."

The ITE describes the "City Park" land use as "owned and operated by a city. The city parks surveyed varied widely as to location and type and amount of facilities." Because of this, the actual amount of traffic generated by the park will vary depending on how it is developed and what facilities are provided. However, the ITE traffic generation rates provide a way of determining the potential traffic impact from rehabilitating the park.

The Bridgeport Park and Recreation Department stated that Veteran's Memorial Park is approximately 108 acres. This size was used as the independent variable for estimating daily traffic:

- Typical Weekday = 290 vehicle trips.
- Sunday = 640 vehicle trips.

These vehicle trips would be distributed to the adjacent street network. Which ones are used depends on where park access roads and park facilities are located. Most of the added traffic will use Park Avenue and Madison Avenue. A likely distribution would show the following pattern:

- ≈ 70% of generated traffic would use Park Avenue with about half travelling to the north and half to the south. This would add about 100 vehicles to Park Avenue north of the park and 100 vehicles to the south.

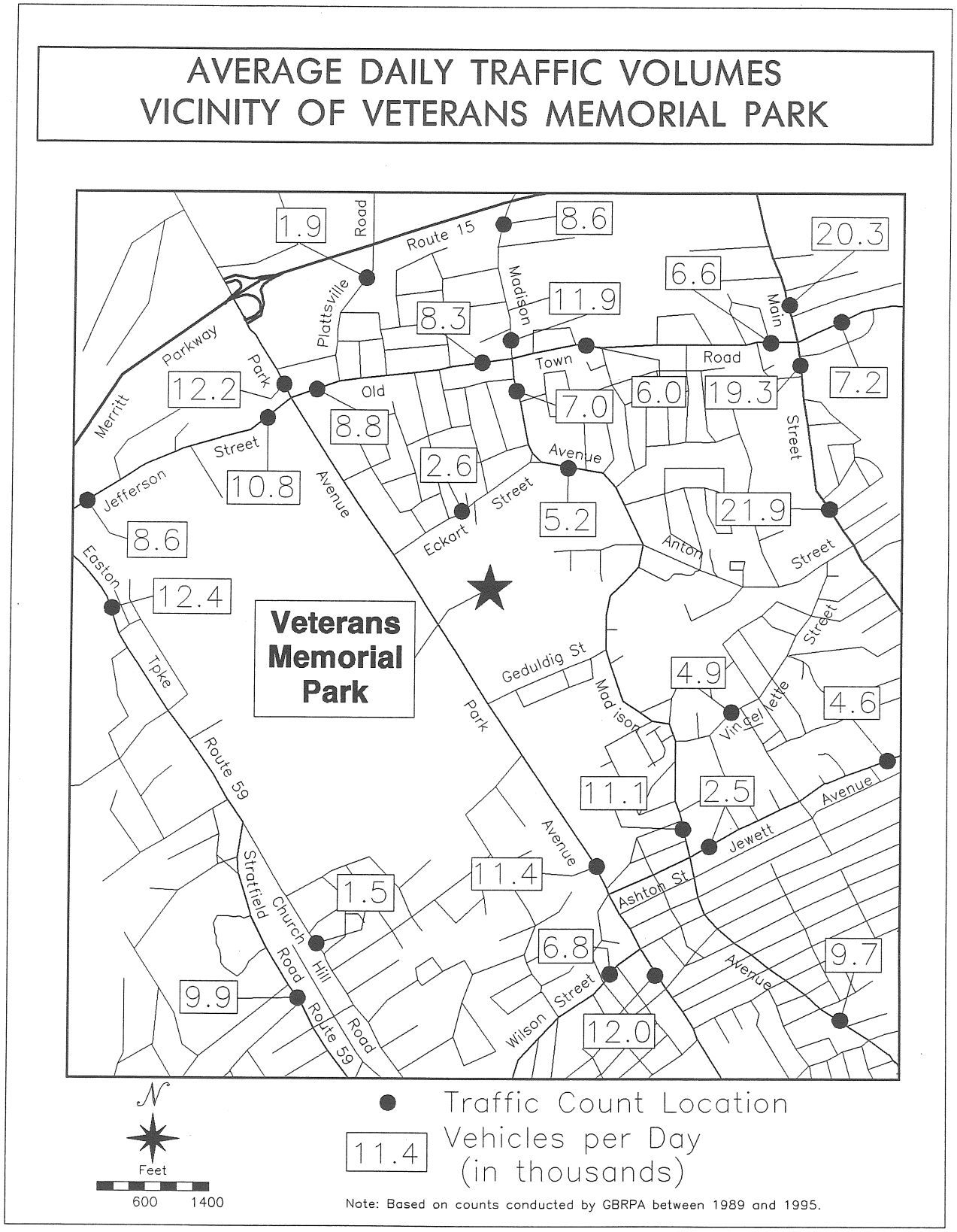
- ≈ 30% of generated traffic would use Madison Avenue with about half travelling to the north and half to the south. This would add about 45 vehicles to Madison Avenue north of the park and 45 vehicles to the south.

A few vehicles would use either Eckart Street or Geduldig Street but would not adversely affect flow on these streets. It is also likely that a high percentage of park-generated traffic that would use either road would be local traffic, that is, they live in the neighborhoods served by these roads. Regardless, the amount of traffic expected to be generated is not a substantial amount and would not cause any apparent deterioration in traffic flow or increase in safety hazard.

It is expected that over the course of the day, 50% of the these trips would enter the park and 50% would exit. No data are available for estimating the hourly distribution of traffic. However, traffic to and from parks generally occurs at times other than when the adjacent street traffic peaks. Park-generated traffic would generally be highest sometime between 12:00 noon and 5:00 PM. This may vary depending on the scheduling of events at the park, such as organized ball games which may be scheduled in the evening.

Parking for the park visitors appears to be limited. Vehicles park along Park Avenue on the dirt strip between the edge of pavement and the stonewall on the park's perimeter. Some park visitors may park in a lot adjacent to the Discovery Museum (Bridgeport Museum of Arts, Science and Industry [MASI]) but this lot is more likely needed for visitors to the museum. Once the park is rehabilitated,

Figure 10


AVERAGE DAILY TRAFFIC VOLUMES
VICINITY OF VETERANS MEMORIAL PARK
Veterans Memorial Park
1.9
Road
Route 15
8.6
20.3
6.6
Plattsville
8.3
Madison
11.9
Main
Parkway
Park
Town
Road
12.2
Old
7.0
6.0
19.3
7.2
Merritt
8.8
Street
Avenue
2.6
Jefferson
10.8
Avenue
Eckart
Street
5.2
21.9
Street
8.6
Anton
Street
Easton
12.4
Street
Tpke
Geduldig St
4.9
Madison
Vingelette
4.6
Park
Route 59
11.1
2.5
Avenue
Avenue
Jewett
Stratfield
Church
Hill
Road
11.4
Ashton St
1.5
6.8
9.7
Avenue
9.9
Route 59
Road
Wilson
Street
12.0
Traffic Count Location
11.4
Vehicles per Day
(in thousands)
Feet
600
1400
Note: Based on counts conducted by GBRPA between 1989 and 1995.

parking along Park Avenue should be discouraged. The dirt strip should be landscaped and parking should be prohibited. The concern with using this area for parking is one of safety: there is no control along the strip so vehicles pull in and out anywhere, and parking maneuvers encroach onto Park Avenue. These factors increase conflict points between vehicles and increase the potential for accidents. Off-street parking areas should be established within the park and, preferably, near or adjacent to developed facilities.

Existing Plans and Policies

Conservation and Development Policies Plan for Connecticut, 1992-1997 (OPM):

The State Plan, under it's policy of promoting the proper management of land as well as physical and human resources, includes Veteran's Park, along with Fairchild Wheeler Golf Course, as one of it's "Areas of Environmental Concern." Under this classification, the park is designated as *Existing Preserved Open Space* which ranks it as a "Conservation Priority 1." As a top priority, therefore, the statewide strategy as it pertains to Veteran's Park, is limited to those acquisitions, improvements, and structural developments which are consistent with long-term preservation of the natural resource and open space values of the site, and for appropriate public use and enjoyment. The area immediately surrounding the park and golf course, meanwhile, is classified as a *Urban Preservation Area*, making it a "Development Priority 2." Included among the objectives for this category is the promotion of an urban forestry program that "... utilizes trees and other plants to enhance municipal streets, pocket parks, and recreational areas and to ameliorate the effects of urban development."

Regional Parks & Recreation Study (1992):

Conducted by the Greater Bridgeport Regional Planning Agency (GBRPA), the study, as it addresses the City of Bridgeport, found mixed results. Based strictly on percent of overall landmass, the study found the city to have adequate recreation space available. However, when overall density is factored in (residents per acre), it was determined that the city did not have an adequate amount of land set aside for recreational purposes.

Bridgeport Master Plan (1986):

The plan envisions the utilization of the park for educational purposes by

developing programs and facilities that address environmental concerns. Objectives include working with nature groups in the area (i.e. Audubon Society) to develop educational programs, bird sanctuaries, and a passive educational system.

Connecticut Statewide Comprehensive Outdoor Recreation Plan (SCORP; 1993-1998):

In relation to the Greater Bridgeport Planning Region, this plan addresses the shortages of adequate active recreational facilities, such as athletic fields and courts.

Future Plan for Veteran's Memorial Park - Considerations

As the *Proposals for Future Usage Planning at Veterans Memorial and Puglio Parks* submitted by the North End Association (November 1, 1995) points out - future plans for developing the park must seriously consider and meet three criteria, namely funding, consensus, and ensuring the public trust. In regards to funding, the primary issue is not over securing funds to develop the park, but rather the implementation of a long-term fiscal plan after renovations are complete that will ensure that the property does not deteriorate back to its present state. The City of Bridgeport's financial difficulties have been well documented. As such, funding assistance provided by the City is not at all certain. Should the City become involved, they would insist that the rejuvenated Veteran's Park become a citywide park open and available to all residents. Alternative funding options to be explored would include the consideration of involving land conservation organizations such as the Trust for Public Land (or TPL).

Furthermore, the proposal states that any future plan for the park must be agreed-upon and have broad-based support among various interest groups located throughout the city. The City of Bridgeport, in particular, will demand this broad participation before allocating any dollars to the project. Finally, developing an effective and comprehensive plan requires farsightedness. This involves gauging how the park will be utilized not only a year from now, but in 10, 20, and beyond 30 years.

Several considerations, therefore, must be carefully reviewed before going forward with any plan for rehabilitating the property, most prominently being to what extent and intensity should development occur. Given the current natural amenities of the park, coupled with the surrounding land-use characteristics, demographics, and fiscal constraints, the Master Plan of Development of Veteran's Memorial Park should advocate the following:

1. **Keep Infrastructure to a Minimum:** For numerous reasons, the park should largely remain as a natural preserve, limiting public facilities to two or three restrooms, wood park benches along the trail system, and other low maintenance items. From an environmental standpoint, it is one of the few remaining open areas of its type within the lower sections of the Region with a relatively undisturbed habitat. From a fiscal point of view, limiting development would ensure that long-term cost for upkeep and maintenance remain low.

2. **Limit Active Recreational Activities to the Perimeter of the Park:** Given the undisturbed nature of the park's interior, it should be left in it's natural state as much as possible. Picnic tables, barbecue pits, etc. should be limited to the more open areas along Park Avenue and behind the school. The open field along Park Avenue can be graded for a soccer field while softball diamonds can put in place behind the middle school. The interior of the park, meanwhile, should be limited to more passive uses, such as hiking trails, with posted signs along the routes explaining the various foliage that are native to the area.

3. **Address Ways of Ensuring that the Park is Used on a Continual basis:** Encouraging to the greatest extent possible, family oriented recreational activities that continue through to dusk would reduce incidences of vandalism as well as discourage undesirable loitering.

4. **Minimize Operations and Maintenance Burdens on the City:** The City of Bridgeport can ill afford to provide major services to keep the park operating. Alternative revenue-generating methods should be explored, such as funding these costs partially by concessions located at the Discovery Museum.

5. **Plan for Appropriate Emergency Vehicular Access:** Proper access must be provided that would enable emergency vehicles such as fire engines or ambulances to enter the park should the need arise. Existing roads that lead into the park can provide the access.

6. **Implement Appropriate Security Measures to Ensure Park Safety:** Existing

roads into the park should be restricted to patrol vehicles, EMS, or fire engines. Access to these roads can be controlled with gates at all entry points. Erect wooden posts in the middle of footpaths where they intersect or cross roads to deter vehicles from entering the paths. Finally, an aesthetically designed barrier along Park Avenue and other access points should be constructed to deter people from entering after park hours.

Appendix A

Fisheries Policy and Position Statements

DEPARTMENT OF ENVIRONMENTAL PROTECTION
INLAND FISHERIES DIVISION

POLICY STATEMENT
RIPARIAN CORRIDOR PROTECTION

I. INTRODUCTION, GOALS, AND OBJECTIVE

Alteration and exploitation of riparian corridors in Connecticut is a common event that significantly degrades stream water quality and quantity. Inasmuch as riparian ecosystems play a critical role in maintaining aquatic resource productivity and diversity, the Inland Fisheries Division (Division) recognizes that rigorous efforts are required to preserve, protect, and restore these valuable resources. Consequently, a riparian corridor protection policy has been developed to achieve the following goals and objective:

Goals

Maintain Biologically Diverse Stream and Riparian Ecosystems, and

Maintain and Improve Stream Water Quality and Water Quantity.

Objective

Establish Uniform Riparian Corridor Buffer Zone Guidelines.

II. DEFINITIONS

For the purpose of implementing a statewide riparian corridor protection policy, the following definitions are established:

Riparian Corridor: A land area contiguous with and parallel to an intermittent or perennial stream.

Buffer Zone: An undisturbed, naturally vegetated area adjacent to or contained within a riparian corridor that serves to attenuate the effects of development.

Perennial Stream: A stream that maintains a constant perceptible flow of water within its channel throughout the year.

Intermittent Stream: A stream that flows only in direct response to precipitation or which is seasonally dry.

III. RIPARIAN FUNCTION

Naturally vegetated riparian ecosystems perform a variety of unique functions essential to a healthy instream aquatic environment. The delineation and importance of riparian functions are herein described. Vegetated riparian ecosystems:

* Naturally filter sediments, nutrients, fertilizers, and other nonpoint source pollutants from overland runoff.

* Maintain stream water temperatures suitable for spawning, egg and fry incubation, and rearing of resident finfish.

* Stabilize stream banks and stream channels thereby reducing instream erosion and aquatic habitat degradation.

* Supply large woody debris to streams providing critical instream habitat features for aquatic organisms.

* Provide a substantial food source for aquatic insects which represent a significant proportion of food for resident finfish.

* Serve as a reservoir, storing surplus runoff for gradual release into streams during summer and early fall base flow periods.

IV. RIPARIAN CORRIDOR BUFFER ZONE GUIDELINES

Recognizing the critical roles of riparian corridors, the Division provides buffer zone guidelines that are designed to bring uniformity and consistency to environmental review. The guidelines are simple, effective, and easy to administer. The following standard setting procedure should be used to calculate buffer zone widths.

Perennial Stream: A buffer zone 100 feet in width should be maintained along each side.

Intermittent Stream: A buffer zone 50 feet in width should be maintained along each side.

Buffer zone boundaries should be measured from either, (1) edge of riparian inland wetland as determined by Connecticut inland wetland soil delineation methods or (2) in the absence of a riparian wetland, the edge of the stream bank based on bank–full flow conditions.

The riparian corridor buffer zone should be retained in a naturally vegetated and undisturbed condition. All activities that pose a significant pollution threat to the stream ecosystem should be prohibited.

Where the Division policy is not in consonance with local regulations and policies regarding riparian corridor buffer zone widths and allowable development uses within these areas, local authorities should be encouraged to adopt the more restrictive regulations and policies.

12/13/91
Date

James C. Moulton
Acting Director

POSITION STATEMENT
UTILIZATION OF 100 FOOT BUFFER ZONES TO PROTECT RIPARIAN AREAS IN CONNECTICUT

BY
BRIAN D. MURPHY
TECHNICAL ASSISTANCE BIOLOGIST
INLAND FISHERIES DIVISION

I. INTRODUCTION

One tenet of the Inland Fisheries Division Policy on Riparian Corridor Protection is the utilization of a 100 foot buffer zone as a minimum setback along perennial streams. The adoption of such a policy is sure to be controversial. Laymen, developers and natural resource professionals alike will ask questions such as: Why was a standard setting method adopted? What's magical about 100 feet? Will 100 feet be sufficiently protective, or will it be overly protective? In response, this paper outlines the ramifications of adopting a riparian corridor policy including the use of a 100 foot buffer zone.

II. STANDARD SETTING VERSUS SITE SPECIFIC BUFFER ZONES

There are two approaches for determining buffer zone width; standard setting and site specific. Standard setting methods define an area extending from the streambank edge or highwater mark to some landward fixed point boundary. Site specific methods utilize formulas that incorporate and consider special site specific land characteristics, hence, the calculation of a variable width buffer zone. In both case, buffers are employed to define an area in which development is prohibited or limited.

A major advantage of standard setting methods is that they are easy to delineate and administer, thereby improving the consistency and quality of environmental assessments. Furthermore, valuable staff time would not be required to determine site specific buffer zones along each and every watercourse of concern.

The exact width of a buffer zone required for riparian corridor protection is widely disputed (Bottom et al. 1985 and Brinson et al. 1981). Buffer width recommendations found in the literature vary from as little as 25 feet to as great as 300 feet (Palfrey et al. 1982). The 100 foot buffer is widely accepted in Connecticut having been adopted by numerous inland wetland and conservation commissions as an appropriate minimum setback regulation for streambelts. In addition, Division staff have been recommending the utilization of the 100 foot buffer zone to protect streambelts since the early 1980's. Scientific research has not been generated to dispute the adequacy of utilizing 100 foot buffer zones to protect Connecticut's riparian corridors. In fact, to ensure that riparian functions are not significantly altered, recent scientific information points towards maintaining buffer zones that would be at a minimum, 100 feet in width (see section III).

Site specific methods define buffer widths according to the character and sensitivity of adjacent streamside lands. These buffer widths, also referred to as "floating buffers," consider physical site characteristics such as slope, soil type, and vegetative cover. The advantage of site specific methods is that buffer widths are designed using site characteristics and not an arbitrary predetermined width. Unfortunately, there is no "one" universally accepted formula or model and none have been developed for use in Connecticut. Most formulas are based on the degree to which sediment can be removed or filtered by natural vegetation, thus, the primary useage is sediment control. Other weaknesses of site specific techniques are (1) all areas must be evaluated on a case-by case basis and, (2) the subjectivity of different techniques (i.e. if the evaluation technique is inadequate, the buffer width will also be inadequate).

Additionally, these formulas only concentrate on one specific riparian function at a time and do not take into account multiple riparian functions, especially those of inland fisheries values as discussed in Section III. Consequently, site specific formulas approach riparian function on a single dimension rather than taking a more realistic, holistic approach.

In the absence of a scientific model to determine buffer widths suitable to protect Connecticut's riparian corridors, the utilization of a standard setting method is environmentally and politically prudent.

III. RIPARIAN FUNCTION

To assess the efficacy of a 100 foot buffer zone, the literature was searched to identify studies which have applied a quantitative approach to buffer width determination. Literature was searched for studies which both support and dispute the 100 foot zone. The following is a summary "by riparian function" of quantitative studies which assess buffer widths.

Sediment Control

Width, slope and vegetation have been cited as important factors in determining effectiveness of buffer zones as sediment filters (Karr and Schlosser 1977). Wong and McCuen (1981), who developed and applied a mathematical model to a 47 acre watershed, found that a 150 foot zone along a 3% slope reduced sediment transport to streams by 90%. Mannering and Johnson (1974) passed sediment laden water through a 49.2 foot strip of bluegrass and found that 54% of sediment was removed from the water. Trimble and Sartz (1957) developed recommendations as to width of buffer areas between logging roads and streams to reduce sediment load. They determined a minimum strip of 50 feet was required on level land with the width increasing 4 feet for each 1% slope increase. Buffer widths as determined by Trimble and Sartz (1957) have been characterized as evaluated guesses rather than empirically defined widths (Karr and Schlosser 1977). Rodgers et al. (1976) state that slopes greater than 10% are too steep to allow any significant detention of runoff and sediment regardless of buffer width. After a critical review of the literature, Karr and Schlosser (1977) determined that the size and type of vegetative buffer strip needed to remove a given fraction of the overland sediment load cannot be universally quantified. Existing literature does suggest that 100 foot riparian buffers will assist with sediment entrapment, although efficacy will vary according to site conditions.

Temperature Control

Brown and Brazier (1973) evaluated the efficacy of buffer widths required to ameliorate stream water temperature change. They concluded that angular canopy density (ACD), a measure of the ability of vegetation to provide shading, is the only buffer area parameter correlated with temperature control. Results show that maximum angular canopy density or maximum shading ability is reached within a width of 80 feet. Study sites were 9 small mountain streams in Oregon that contained a conifer riparian vegetative complex. Whether or not maximum angular canopy density is reached within 80 feet in a typical Connecticut deciduous forest riparian zone is doubtful. Tree height in Connecticut riparian zones is smaller than in Oregon (Scarpino, personal communication), therefore buffers greater than 80 feet in width would be required for temperature maintenance in Connecticut.

Nutrient Removal

Nutrient enrichment is caused by phosphorous and nitrogen transport from, among other things, fertilized lands and underground septic systems. Most research on nutrient enrichment has focused on overland surface flow. Karr and Schlosser (1977) report that 88% of all nitrogen and 96% of all phosphorous reaching watercourses in "agricultural watersheds" were found to be attached to sediment particles; thus, successful nutrient removal can be accomplished through successful sediment removal. There are conflicting reports on the ability of buffer widths to remove nutrients with most research being tested on grass plots. Butler et al. (1974) as cited by Karr and Schlosser (1977) found that a 150 foot buffer width of reed canary grass with a 6% slope caused reductions in phosphate and nitrate concentrations of between 0–20%. Wilson and Lehman (1966) as cited by Karr and Schlosser (1977) in a

study of effluent applied to 300 m grass plots found that nitrogen and phosphorous concentrations were reduced 4 and 6%, respectively. Studies on subsurface runoff as cited in Clark (1977) found high concentrations of nitrates at 100 feet from septic systems with unacceptable levels at 150 feet. Clark (1977) recommended that a 300 foot setback be used whenever possible, with a 150 setback considered adequate to avoid nitrate pollution. Environmental Perspective Newsletter (1991) states that experts who commonly work with the 100 foot buffer zone set by the Massachusetts Wetlands Protection Act are increasingly finding that it is insufficient since many pollutants routinely travel distances far greater than 100 feet with nitrate-nitrogen derived from septic systems moving distances of greater than 1000 feet. Research indicates that the adoption of 100 foot buffer widths for Connecticut riparian zones will assist with the nutrient assimilation; albeit, complete removal of all nutrients may not be achieved.

Large Woody Debris

The input of large woody debris (LWD) to streams from riparian zones, defined as fallen trees greater than 3 m in length and 10 cm in diameter has been recently heralded as extremely critical to stream habitat diversity as well as stream channel maintenance. Research on large woody debris input has mainly been accomplished in the Pacific Northwest in relation to timber harvests. Murphy and Koski (1989) in a study of seven Alaskan watersheds determined that almost all (99%) identified sources of LWD were within 100 feet of the streambank. Bottom et al. 1983 as cited by Budd et al. (1987) confirm that in Oregon most woody structure in streams is derived from within 100 feet of the bank. Based on research done within old-growth forests, the Alaska region of the National Marine Fisheries Service, recognizing the importance of LWD to salmonid habitat, issued a policy statement in 1988 advocating the protection of riparian habitat through the retention of buffer strips not less than 100 feet in width (Murphy and Koski 1989). All research findings support the use of a 100 foot buffer zone in Connecticut for large woody debris input.

Food Supply

Erman et al. (1977) conducted an evaluation of logging impacts and subsequent sediment input to 62 streams in California. Benthic invertebrate populations (the primary food source of stream fishes) in streams with no riparian buffer strips were compared to populations in streams with buffer widths of up to 100 feet. Results showed that buffer strips less than 100 feet in width were ineffective as protective measures for invertebrate populations since sediment input reduced overall diversity of benthic invertebrates. Buffer strips greater than 100 feet in width afforded protection equivalent to conditions observed in unlogged streams. The ultimate significance of these findings is that fish growth and survival may be directly impacted along streams with inadequate sized riparian buffer zones. All research supports the feasibility of implementing a 100 foot buffer zone in Connecticut to maintain aquatic food supplies.

Streamflow Maintenance

The importance of riparian ecosystems in terms of streamflow maintenance has been widely recognized (Bottom et al. 1985). In Connecticut, riparian zones comprised of wetlands are of major importance in the hydrologic regime. Riparian wetlands store surplus flood waters thus dampening stream discharge fluctuations. Peak flood flows are then gradually released reducing the severity of downstream flooding. Some riparian wetlands also act as important groundwater discharge or recharge areas. Groundwater discharge to streams during drier seasonal conditions is termed low flow augmentation. The survival of fish communities, especially coldwater salmonid populations is highly dependent upon low flow augmentation (Bottom et al. 1985). Research, although documenting the importance of riparian zones as areas critical to streamflow maintenance, has not investigated specific riparian buffer widths required to provide the most effective storage and release of stream flows.

IV. OTHER POLICY CONSIDERATIONS

Measurement Determination

The proposed policy states that buffer zone boundaries should be measured from either the edge of the riparian inland wetland as determined by Connecticut inland wetland soil delineation methods or in the absence of a riparian wetland, the edge of the streambank based on bank-full flow conditions. This boundary demarcation is absolutely necessary to ensure that all riparian wetlands are protected. For example, if all measurements were to start from the perennial stream edge and extend landward for a distance of 100 feet, many riparian zones that contain expansive wetlands greater than 100 feet in width would be left unprotected.

Also, since boundary demarcation includes wetland delineation, the ultimate width of the buffer will vary according to site specific features. Consequently, buffer width determination as stated by Division policy is a "hybridization" of both standard setting and site specific methods. This hybridization of methods is advantageous since it acknowledges the sensitivity of streamside wetlands.

Home Rule

Where the Division policy is not in consonance with local regulations and policies regarding riparian corridor buffer zone widths, local authorities would be encouraged to adopt the more restrictive regulations and policies. This feature incorporates flexibility to acknowledge the importance of local "home rule" regulations or policies already in accepted practice. Conversely, towns and cities without accepted policies and regulations could choose to enact the Division policy.

Allowable Uses in Buffer Zones

The Division policy states that "the riparian corridor buffer zone should be retained in a naturally vegetated and undisturbed condition and that all activities that pose a significant pollution threat to the stream ecosystem should be prohibited." In essence, the buffer zone becomes an area where no development should be allowed. For this policy to be effective, there should be no exceptions, a blanket restriction of all uses would be recommended. Further clarification and more precise definitions of allowable uses will, however, be required in the future if the policy evolves into a departmental regulation.

Recently, the Connecticut Supreme Court has ruled that local agencies can prohibit specific development within buffer zones. The *Lizotte v. Conservation Commission of the Town of Somers, 216 Conn.320 (1990)* decision ruled that the construction or maintenance of any septic system, tank, leach field, dry well, chemical waste disposal system, manure storage area or other pollution source within 150 feet of the nearest edge of a watercourse or inland wetland's seasonal high water level can be prohibited (Wetlands Watch 1990). If this decision is a precursor of the future, Connecticut courts will continue to the support the use of buffers, especially those which restrict or prohibit detrimental activities.

V. CONCLUSIONS

The following actions are required to preserve, protect, and restore Connecticut's riparian corridors:

1. The Inland Fisheries Division needs to adopt and implement the proposed policy so that staff can use it as a guideline to assist cities, towns, developers and private landowners with making sound land use decisions. This policy will act to solidify a collective position concerning riparian corridor protection.

2. While the proposed policy in its "current form," represents a recommendation from the CTDEP Inland Fisheries Division, the ultimate goal of the Division should be to progressively implement this policy as either a CTDEP regulation or State of Connecticut statute.

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Appendix B

Forestry Management Information

CONNECTICUT DIVISION OF FORESTRY
FOREST PRACTICE DESCRIPTION

Improvement Cuttings

An improvement cutting is just that - a cutting intended to improve the forest condition. It is a type of intermediate cut made in older stands for the purpose of controlling the growth, composition, and quality of a forest stand by removing trees of undesirable species, form, or condition from the main canopy.

Improvement cuts can be done in stands which are either even or unevenaged, regardless of species composition, so long as the purpose and goal of the cuts is for the elimination of poorer trees to favor the good trees. These types of cuttings are not designed for the regeneration of the stand.

Wood products may or may not be a result of an improvement cut, although, realistically, economics usually plays a role in the decision to practice management. Products are usually pulpwood, cordwood, or sawlogs.

Typically, the traditional thinnings in a pole stand would be classified as an improvement cut, as well as what many landowners call a "selective" timber harvest. Technically and correctly used, "selection" has as its goal the regeneration of an unevenaged stand, whereas an improvement cut is not intended to regenerate a stand, even though some regeneration may occur.

The key things to remember about improvement cuts are: 1) cutting is done in stands past the sapling stage; 2) eliminate poor trees to favor the good ones; and 3) removals should come from the main stand canopy.

11/90

SOUTHERN NEW ENGLAND STUMPAGE PRICE SURVEY RESULTS
FOURTH QUARTER– 1995

The table below summarizes reported prices paid for standing timber during the fourth quarter of 1995. Prices for sawtimber are in $ per thousand board feet. Pulpwood and fuelwood are reported in $ per cord, biomass in $ per ton. The ***Range*** shows the high and low prices reported. Half of the prices reported are below the ***Median***; half are above.

Reporting is voluntary, and this is not a complete record of sale activity in the southern New England region. A total of 106 timber sales was reported for the fourth quarter of 1995. Sale characteristics (in percent):

Size		Type		Reported by	
< 50 Mbf	31%	Lump sum	66%	Consulting foresters	32%
51-100	29	Mill-tally	23	Public lands foresters	7
>100 Mbf	29	No data	11	Industrial foresters	12
No data	11			Loggers	35
				Sawmills	9
				No data	5

	EAST OF CONN. RIVER			WEST OF CONN. RIVER		
SPECIES	No. Reports	Median	Range	No. Reports	Median	Range
Red oak	41	**250**	125 - 525	19	**300**	80 - 550
White oak	26	**100**	50 - 200	5	**110**	90 - 200
Other oaks	29	**120**	40 - 240	7	**80**	50 - 200
Ash	18	**125**	50 - 200	15	**150**	100 - 260
Cherry	4	**80**	50 - 125	11	**200**	100 - 500
Sugar maple	7	**85**	75 - 150	12	**150**	100 - 300
Red maple	18	**40**	20 - 150	13	**40**	5 - 60
Yellow birch	6	**60**	35 - 200	9	**65**	40 - 155
Black birch	12	**50**	30 - 100	10	**50**	20 - 155
Paper birch	5	**40**	35 - 50	9	**40**	20 - 100
Beech	5	**35**	20 - 50	9	**30**	5 - 70
Pallet Hdwd	14	**35**	30 - 55	12	**43**	5 - 70
Other hdwd	6	**30**	20 - 60	4	**30**	5 - 100
White pine	35	**60**	30 - 350	18	**65**	30 -125
Red pine	6	**50**	40 - 80	4	**42**	25 - 65
Hemlock	15	**35**	15 - 55	16	**37**	10 - 150
Spruce	2	**81**	40 - 123	5	**50**	25 - 70
Other sfwd	1	**37**	37	———	———	———
Fuelwood ($/cd)	27	**8**	0 - 12	17	**7**	0 - 20
Pulpwood ($/cd)	2	**0**	0	3	**0**	0 - 6
Biomass ($/ton)	———	———	———	———	———	———

This survey is a result of joint efforts of Cooperative Extension and the state forestry agencies in CT and MA.

ABOUT THE TEAM

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, soil scientists, foresters, climatologists and landscape architects, recreational specialists, engineers and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC&D) Area - an 83 town area serving western Connecticut.

As a public service activity, the Team is available to serve towns within the King's Mark RC&D Area - **free of charge.**

Purpose of the Environmental Review Team

The Environmental Review Team is available to assist towns in the review of sites proposed for major land use activities or natural resource inventories for critical areas. For example, the ERT has been involved in the review of a wide range of significant land use activities including subdivisions, sanitary landfills, commercial and industrial developments and recreation/open space projects.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision making. This is done through identifying the natural resource base of the site and highlighting opportunities and limitations for the proposed land use.

Requesting an Environmental Review

Environmental reviews may be requested by the chief elected official of a municipality or the chairman of an administrative agency such as planning and zoning, conservation or inland wetlands. Environmental Review Request Forms are available at your local Soil and Water Conservation District and through the King's Mark ERT Coordinator. This request form must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer allowing the Team to enter the property for the purposes of a review and a statement identifying the specific areas of concern the Team members should investigate. When this request is reviewed by the local Soil and Water Conservation District and approved by the King's Mark RC&D Executive Council, the Team will undertake the review. At present, the ERT can undertake approximately two reviews per month depending on scheduling and Team member availability.

For additional information regarding the Environmental Review Team, please contact the King's Mark ERT Coordinator, Connecticut Environmental Review Team, P.O. Box 70, Haddam, CT 06438. The telephone number is 860-345-3977.