Eastern Connecticut Resource Conservation and Development Area, Inc.

Eastern Connecticut Environmental Review Team Report

PARK RIVER PROJECT

North and South Branches

Hartford, Connecticut

The Park River Project

North and South Branches

Hartford, Connecticut

Environmental Review Team Report

Prepared by the
Eastern Connecticut Environmental Review Team
of the Eastern Connecticut
Resource Conservation and Development Area, Inc.

for
The City Council
Hartford, Connecticut

March 2000

CT Environmental Review Teams
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Acknowledgments

This report is an outgrowth of a request for assistance from the Hartford City Council and community groups to the Eastern Connecticut Resource Conservation and Development Area (RC&D) Executive Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The Eastern Connecticut 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 reviews took place on Tuesday, August 17 and Tuesday, August 24, 1999.

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I would also like to thank Jeanne Webb, City of Hartford, Jack Hale, Knox Park Foundation, Vivian Felton, NRCS project coordinator, Moses Taylor and Donna Walsh, RC&D staff, and Alison Guiness, RC&D board member, for their cooperation and assistance during this environmental review.

Prior to the review days, each Team member received a summary of the proposed project with location and soils maps. During the field review Team members were given maps and additional information. Some Team members made separate or follow-up field visits and Team members received additional maps after the field reviews. Following the reviews, 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 plans 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 city and landowners. This report identifies the existing resource base and evaluates its significance to potential development, and also suggests considerations that should be of concern to the city. The results of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in reviewing the urban open space along the North and South Branches of the Park River.

If you require additional information please contact:
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Introduction

Introduction

The Hartford City Council and interested community groups have requested assistance from the Eastern Connecticut Environmental Review Team in conducting an environmental review of the North and South Branches of the Park River. (Figure 1)

The North Branch Park River study area begins at the Albany Avenue bridge just south of The Greater Hartford Urban Outdoor Classroom and Nature Trail Project. This site was the subject of an ERT report completed in 1998. (Please see Appendices A & B).The North Branch Park River study continues south to Farmington Avenue where the river goes underground in a tunnel.

The South Branch Park River study follows along the river from Pope Park into West Hartford.

Also included in this report is specific information on the Goodwin Estate located on Asylum Avenue.

Objectives of the ERT Study

The objectives of this study are to provide a natural resource inventory, make recommendations for pedestrian and bicycle uses, as well as other recreational and enhancement opportunities for the north and south branches of the river. This information will be used by the City and the community to make informed decisions on positive and safe uses for this underused urban open space.

A natural resource inventory is provided for the Goodwin Estate Property and recommendations are made regarding its relationship to the river, surrounding properties and potential development of the site. This information will assist the City in their efforts to market this city-owned parcel.

The ERT Process

Through the efforts of the City Council this environmental review and report was prepared for the City of Hartford and interested community groups.

This report provides an information base and a series of recommendations and guidelines which cover the topics requested by the city and groups involved.

The review process consisted of four phases:

1. Inventory of the site's natural resources;
2. Assessment of these resources;
3. Identification of resource areas and review of plans; and
4. Presentation of education, management and land use guidelines.

The data collection phase involved both literature and field research. The field reviews were conducted on Tuesday, August 17 and Tuesday, August 24, 1999. The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other resources.

Once Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. Individual Team members then prepared and submitted their reports to the ERT coordinator for compilation into this final ERT report.

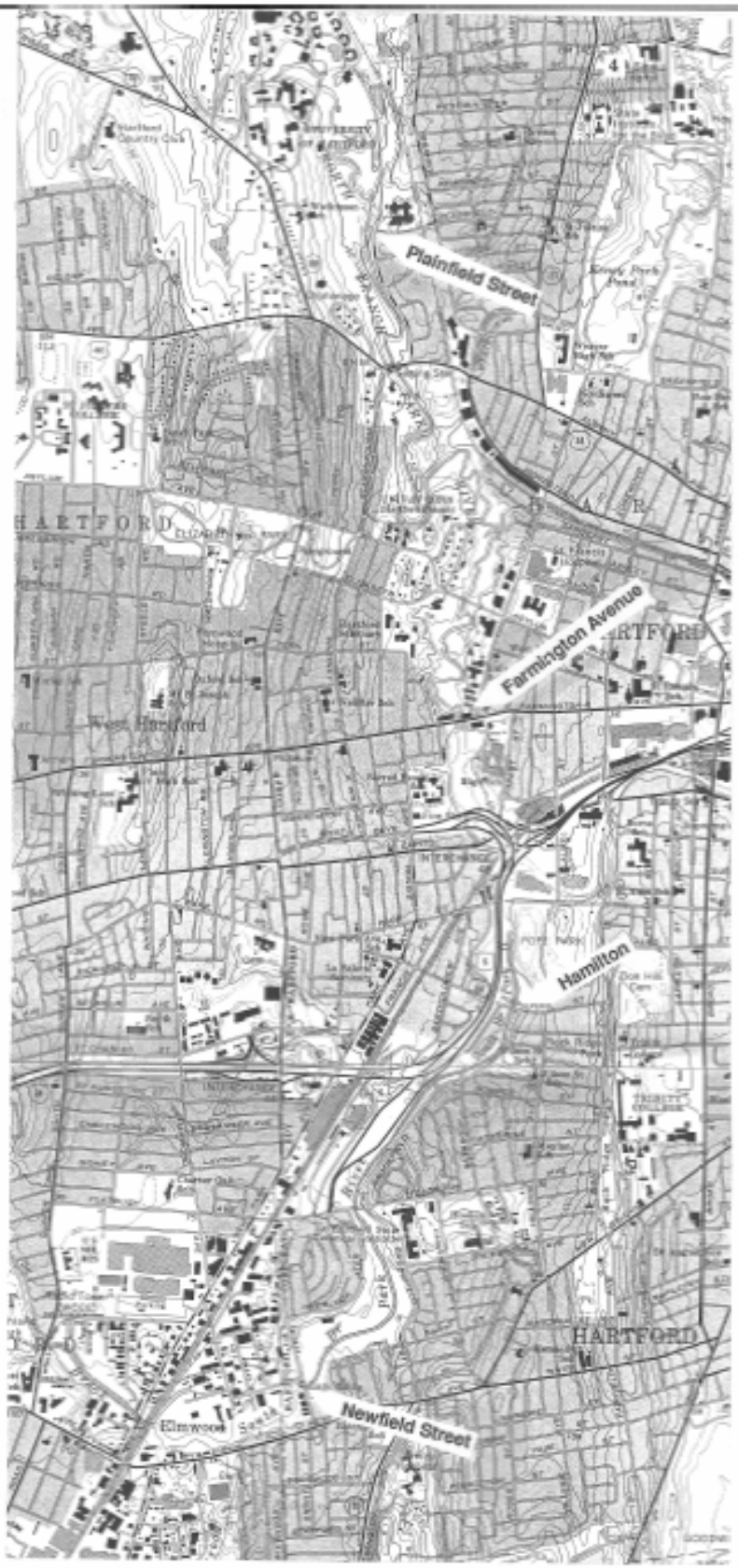


Figure 1.

Topographic Map

Scale 1" = 2000'

DEP Greenways

Assistance Center Comments

North Branch Park River

There is a surprising amount of undeveloped land in the Park River corridor. The Goodwin property offers the opportunity to protect significant riparian habitat within an urban area. Preservation of this habitat should take precedence over recreational development, although there may be ways to incorporate low-impact uses in the area. Surfacing materials should be selected for a combination of durability and compatibility with the riparian corridor.

There appear to be some established trails in the general area, some on private property. The City may want to consider the acquisition of recreational easements on these pieces, which could be purchased outright or through some kind of tax incentive. Crossing of roadways continues to be a major consideration for any trail system. The DEP is working with the state DOT to develop road crossing standards, and theDEP will keep the City informed as this issue progresses.

South Branch Park River

Many of the issues facing the City in the development of the North Branch of the Park River are repeated in the South section. Once again, there is the chance to preserve and enhance habitat in the large wetland area behind the Housing Authority. A trail could be developed inland from the direct river bank, with the possibility of adjacent agricultural use of the land. There is the potential to create a bridge, literally and figuratively, over the river to the new housing on the other side. Continuation of this trail westward could again involve crossing

private property. As suggested above, easements for recreational use could be pursued.

Where possible, the trails should link to community areas - parks, schools, churches, etc., to allow residents to walk or ride bikes from one place to another. Local stakeholders should be encouraged to continue providing input on this project.

The Park River represents a major environmental asset to the City of Hartford, as well as otfering the opportunity to enhance habitat and improve access for recreation and non-motorized transportation. A continuous series of green spaces and pathways can help to unite various neighborhoods within the City, as well as re-connecting Hartfold back to the river.

2.

Physical Characteristics

Topography and Geology

Soils Information

Wetlands and Watercourses

Topography and Geology

Topography

The two branches of the Park River are one of the principal features of Hartford, traversing the entire city in both North-South and East-West directions. (Figure G1) It is a typical urban stream as it has been significantly disturbed by the activities of "man." Both branches have been diverted into the Park River Tunnel as a flood control measure. In addition, the South Branch has been straightened and now flows in an engineered gravel and concrete artificial channel for a portion of its length. The meandering channel of the North Branch is much closer to its original, natural state, although it too has been locally modified by artificial fill. In spite of these efforts, the river continues to alter its channel in a methodical attempt to impose its own design. Banks are eroded here and there and new sandbars modify the smooth contours of the engineers' master plan. (see Figures G2a and G2b)

Bedrock Geology

Although no bedrock is exposed along the course of the river south of the University of Hartford, the area is known to be underlain by the same red-colored sedimentary rock that outcrops in the old quarry in Rock Ridge park near Trinity College (see USGS Geologic Quadrangle map 223). Similar rocks are exposed in the large roadcuts along I-84 near the Buckland Hills Mall and Dinosaur State Park in Rocky Hill. These rocks accumulated as sediments in elongated depressions 200 million years ago during the initial stages of the last opening of the Atlantic Ocean. Connecticut at the time was situated near the equator in the center of the large continent of "Pangea" and its climate was much

more arid and desert-like. A good readable account of the geologic history and environment of the deposition of these redbeds can be found in Bell's "The Face of Connecticut." (see below)

Surficial Geology

The loose unconsolidated sediments, which conceal the 200 million-year old sedimentary bedrock, were all deposited less than 30,000 years ago. The oldest material forming the gentle slopes along the western edge of the study site was deposited at the base of flowing ice, 20-30,000 years ago during the height of the last major ice age to cover Connecticut. The sediment, commonly referred to as glacial till, is abraded and ground-up underlying bedrock. It may well be several tens of feet thick and is characteristically very compact as it accumulated under the weight of several thousand feet of overlying ice.

14,000 years ago, the ice retreated north of the area. A thick deposit of sand and gravel near Rocky Hill dammed the Connecticut River forming Glacial Lake Hitchcock, which flooded much of the present Connecticut River Valley. In the vicinity of Hartford the lake level reached an elevation of 150 feet. During the thousand or so years of the lakes existence, much of the site of Hartford's future Park River was under 60 or more feet of water. Fine clay and silts settling out of the muddy glacial lake water accumulated locally to a depth of roughly 100 feet. The lake bottom sediment is very fine grained, gray to brown in color, thinly bedded and in places varved (layered) on a centimeter scale. (Figure G3

When 12,000 years ago the debris dam at Rocky Hill was breached, Glacial Lake Hitchcock drained rapidly. The streams and rivers, which had previously flowed into the Lake, now had to cut new channels across the exposed lake bottom sediments. The North and South Branches of the Park River established their present valleys at that time. Since then the rivers have meandered back and

forth across their floodplains depositing a thin (3-5 feet) blanket of fine grain sands and gravel alluvium atop the finer grained lake bottom sediments. (Figure G2c)

Geology Related Informational Resources

A very readable account of the general geologic history of Connecticut can be found in Bell's "The Face of Connecticut: The People, Geology and the Land" published as Bulletin #110 of the Connecticut Geologic and Natural History Survey. This book describes the origin and history of Mesozoic Bedrock, the glacial till and the Glacial Lake Hitchcock sediments that underlie the general area of the study site.

More detailed site specific information can be extracted from the USGS's folio I-784 of the Hartford North Quadrangle. This folio is an exceptional resource for anyone planning environmental science activities focused on the Park River area. The included maps show the distribution of:

A. Unconsolidated materials
B. Bedrock Geology
C. Contour Map of the Bedrock Surface
D. Depth to bedrock
E. Thickness of Principal Clay Unit
F. Thickness of Materials Overlying Principal Clay Unit
G. Resources of Coarse Aggregate
H. Landforms
I. Natural Land Slopes
J. Drainage Areas
K. Availability of Ground Water
L. Depth to Water Table
M. Flood Prone Areas

N. Low Flow of Streams
O. Maximum Concentration of Dissolved Solids in Surface Water
P. Location of Wells and Test Holes
Q. Sites of Solid Waste Storage and Liquid Waste Storage
R. Sanitary and Water-Related Facilities, Services and Use

The portion of the South Branch located in the Hartford South Topographic Quadrangle is not included in the compilation although similar information can be found in the Connecticut Geological and Natural History Survey Quadrangle Report, QR-20 (Deane, 1967, The Surficial Geology of the Hartford South Quadrangle).

A permanent trail along the edge of the Park River could allow hikers to see first hand the power of running water. Every year there is at least one flood that approaches a bank-full stage. It is at that time that a river accomplishes most of its work. Local schools might find it educational to study some section of the river both before and after such flood events. With this information they could answer such questions as: What size sediment moved? (paint or number a few rocks for easier identification) How fast was the water going at the peak of the flood? (a video timing floating debris between two known points can be rather accurate) Did the size and position of the sandbars change? Interesting map reading activities could be coupled with these activities. Where does the water passing the school (or other known location) come from (i.e. what is the drainage basin?) and where does it go? The ultimate question is of course who is better at designing the optimal channel - man or the River itself?

In addition, students could also be exposed to the interrelationship of ecology and hydrology. The river will cause change. Erosion and deposition accompany every flood. Some banks may collapse, perhaps destroying a favorite tree or nesting site, but at the same time new sites for vegetation will be created. If documentation such as photographs and videos are taken over a period of

several years (remember stream processes work on a time scale of several tens to hundreds of years) students and visitors to the area may well develop a true appreciation for the value of change in natural processes.

Park River Corridor
Hartford Connecticut

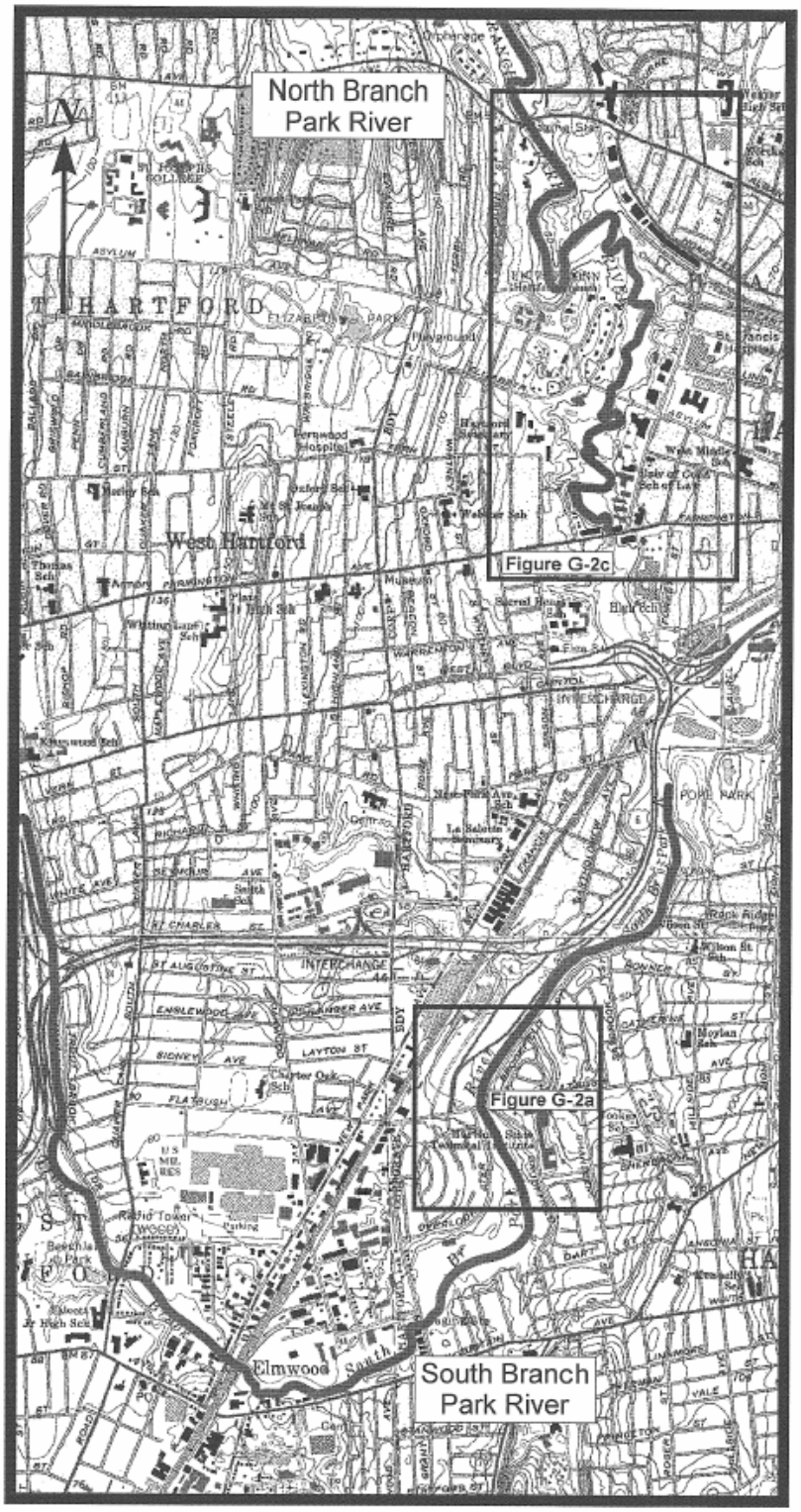


Figure G-1

Regularly Spaced Natural Sandbars Developed Along the Artificial Channel of the Park River, South Branch

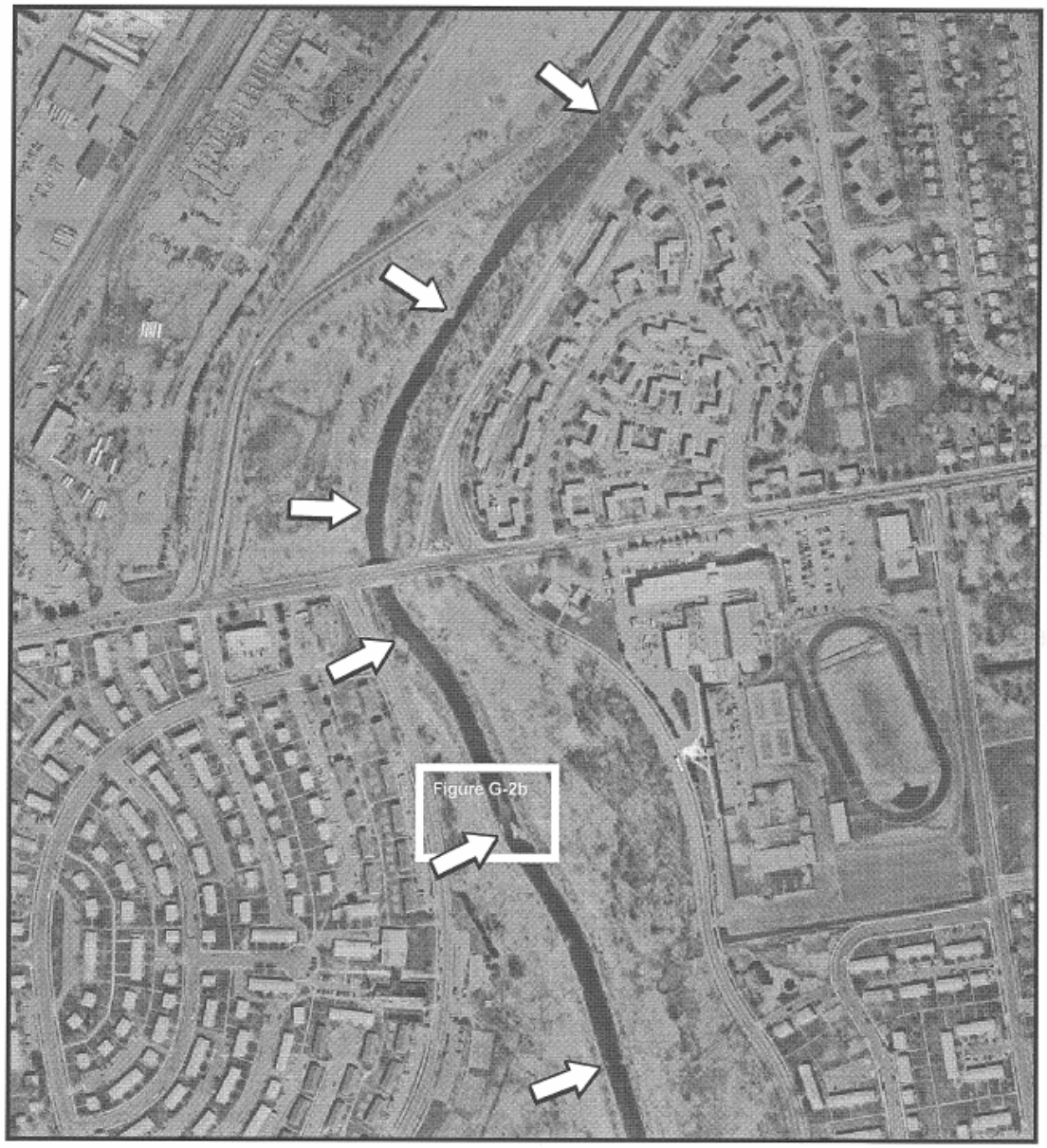


Figure G-2a

Detail view of a recently formed natural sandbar
in the engineered channel of South Branch of the Park River

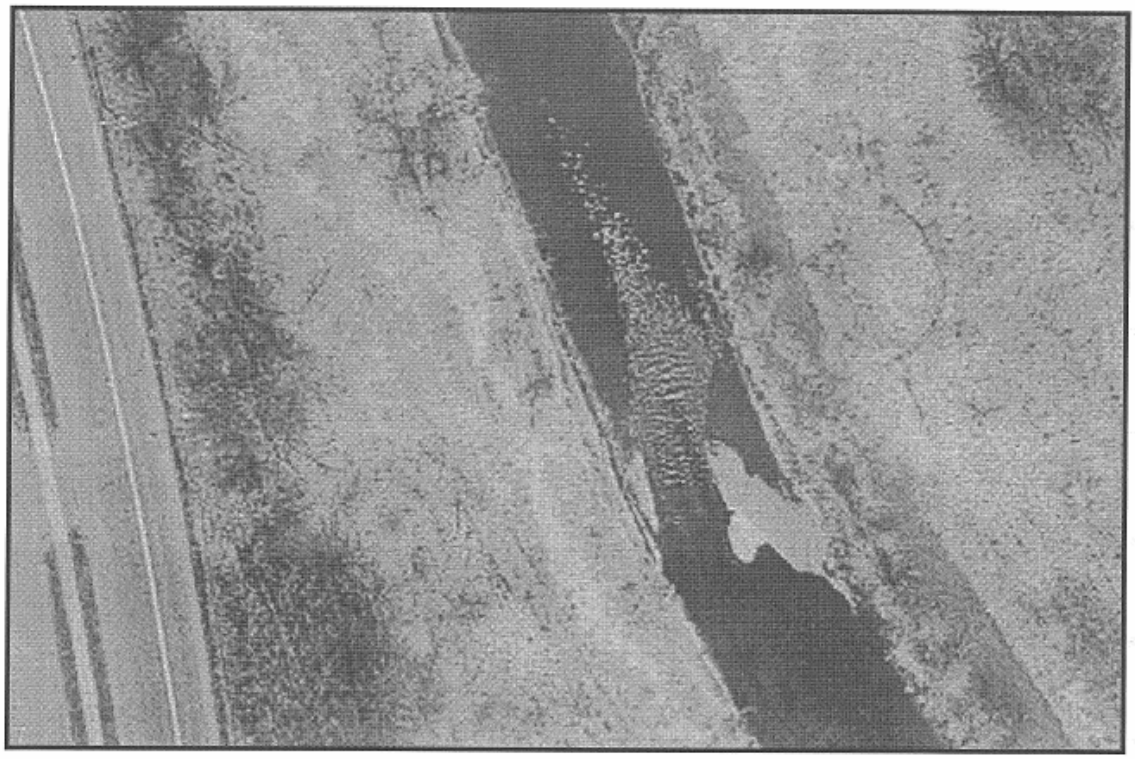
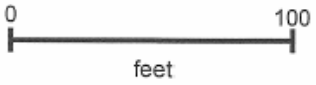


Figure G-2b



Regularly spaced natural meanders along the North Branch of the Park River

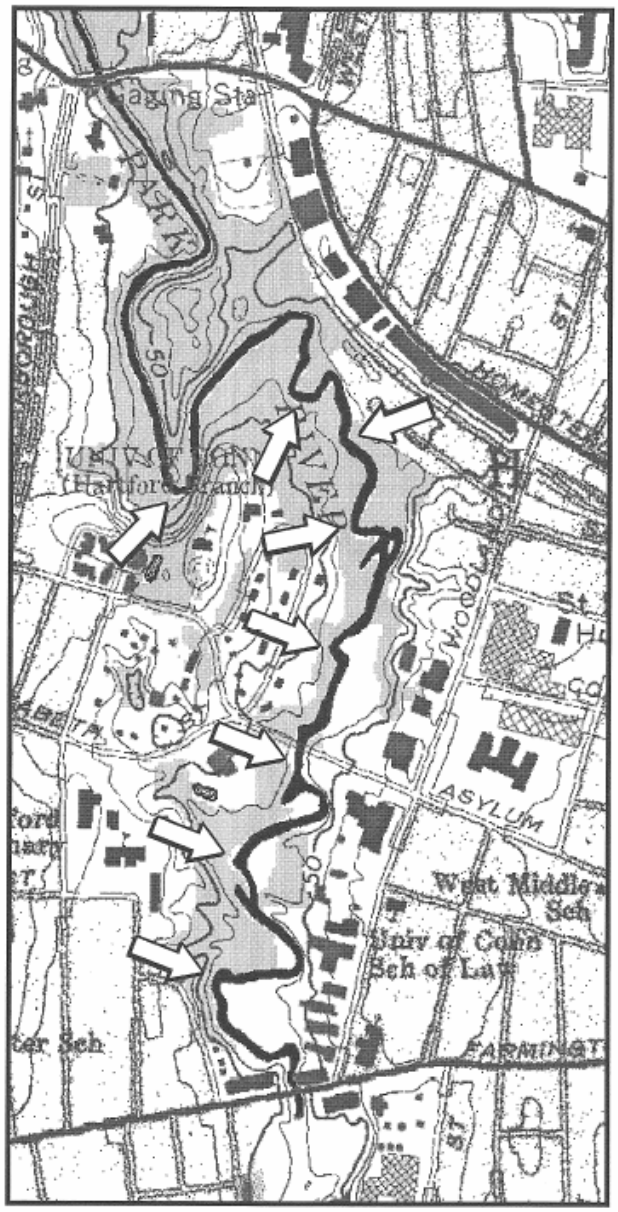


Figure G-2c

0 1000
feet

Surficial Materials
Park River Corridor
Hartford Connecticut

Recent Alluvium
Fine sand and silt

Glacial Lake Clay
Locally > 100 feet thick

Ice Contact Stratified Drift
Coarse sand and gravel

Till

0 2000
feet

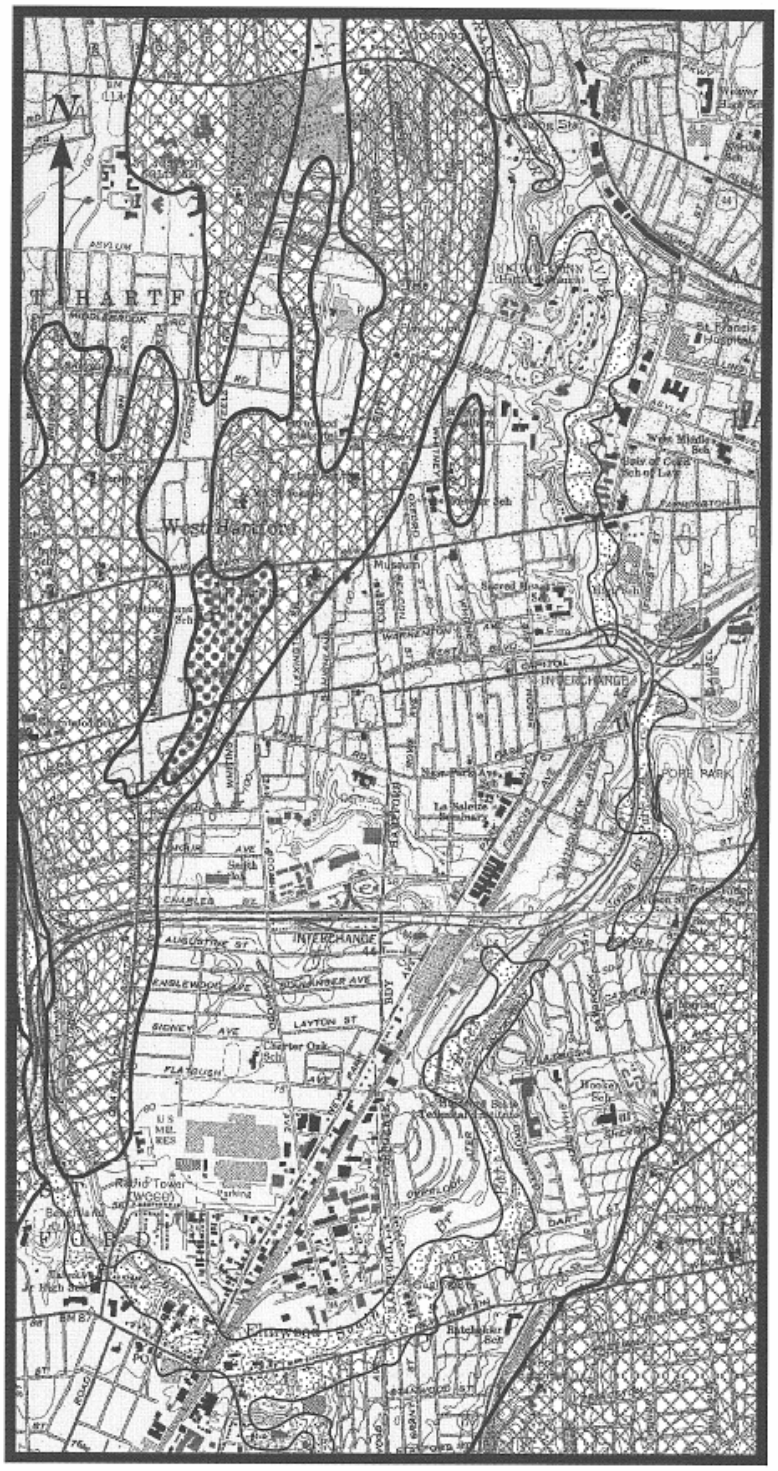


Figure G-3

Soils Information - North Branch Park River University of Hartford to Albany Avenue*

A detailed order 2 soil survey at a scale of 1:12,000 was completed for the North Branch Park River from the University of Hartford to Albany Avenue. Included in this section is the soil survey map for this project area and accompanying mapping unit descriptions. Soils interpretations may be found in Appendix C. The interpretive information includes:

Standard Interpretations

- Soil Map Legend
- Prime Farmland List
- Physical Properties of Soils Table
- Chemical Properties of the Soils Table
- Engineering Index Properties Table
- Soil Moisture Status by Depth
- Recreational Development Table
- Wildlife Habitat Table

New Urban/Recreational Interpretations

- Suitability for Pond Reservoir Area
- Suitability for Camp Areas
- Suitability for Picnic Areas
- Suitability for Off-Road Motorcycle Trails
- Suitability for Playground Areas
- Suitability for Lawn, Landscape, and Golf Fairway
- Suitability for Paths and Trails
- Potential Trees and Shrubs to Plant
- Suitability for Mechanical Site Preparation

Additionally, a wetland determination was completed for the project area and is marked on an accompanying map. As construction development plans are

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* This report was prepared in April 1999 by Shawn McVey, the USDA-NRCS Assistant State Soil Scientist.

developed and finalized a field Corps of Engineers (COE) wetland delineation may need to be scheduled and conducted to obtain required permits.

Areas identified as soil map units 9, 104, 105, 107, and 108 are CT wetlands and are the most limiting for use because of wetness. Soils in mapping unit 9 are ponded and/or have a seasonal high water table eleven months out of the year. Mapping units 104, 105, 107, and 108 are subject to frequent, brief flooding generally late fall through spring.

Wetland plants will do well on units 9, 107, and 108 and these areas are rated fair for wetland wildlife. Foot and wheeled traffic should be limited in these areas as the soils are highly susceptible to rutting.

Soil mapping units 25B, 25C, 32A, 104, and 105 are rated good for openland and woodland wildlife. Although these soils have a seasonal high water table part of the year and some are subject to flooding in early spring, the soils are well suited to mechanical site preparation and have only slight to moderate limitations for development of picnic areas and paths and trails. These units support a variety of upland and wetland plant life and as such, would provide enhanced opportunities for outdoor education and recreation. Areas of 25B, 32A, 104 and 105 would be among the best choices for locating community food gardens.

The fill areas are identified as mapping units 306 and 308. This fill material is comprised of construction debris, metal and glass covered with a thin capping of loam or silt loam. Of these mapping units, 308 has the greatest potential for use and management. Some areas of 308 have a relatively thin capping of debris underlain by platy lacustrine soil material. Many areas are not smoothed and could easily be cleaned up by grading and proper debris disposal. These areas are moderately suited to paths and trails.

SOIL MAP LEGEND
STATE OF CONNECTICUT: Detailed Soil Map Legend
North Branch of the Park River

Map symbol	Soil name
9	SCITICO, SHAKER, AND MAYBID SOILS
25B	BRANCROFT SILT LOAM, 3 TO 8 PERCENT SLOPES
25C	BRANCROFT SILT LOAM, 8 TO 15 PERCENT SLOPES
32A	HAVEN AND ENFIELD SOILS, 0 TO 3 PERCENT SLOPES
104	BASH SILT LOAM
105	HADLEY SILT LOAM
107	LIMERICK AND LIM SOILS
108	SACO SILT LOAM
306	UDORTHENTS-URBAN LAND COMPLEX
308	UDORTHENTS, SMOOTHED
W	WATER

PRIME FARMLAND
STATE OF CONNECTICUT: Detailed Soil Map Legend
North Branch of the Park River

Map symbol	Soil name
9	SCITICO, SHAKER, AND MAYBID SOILS (Farmland of statewide importance)
25B	BRANCROFT SILT LOAM, 3 TO 8 PERCENT SLOPES (Farmland of statewide importance)
25C	BRANCROFT SILT LOAM, 8 TO 15 PERCENT SLOPES (Farmland of statewide importance)
32A	HAVEN AND ENFIELD SOILS, 0 TO 3 PERCENT SLOPES
104	BASH SILT LOAM (Farmland of statewide importance)
105	HADLEY SILT LOAM
107	LIMERICK AND LIM SOILS (Farmland of statewide importance)

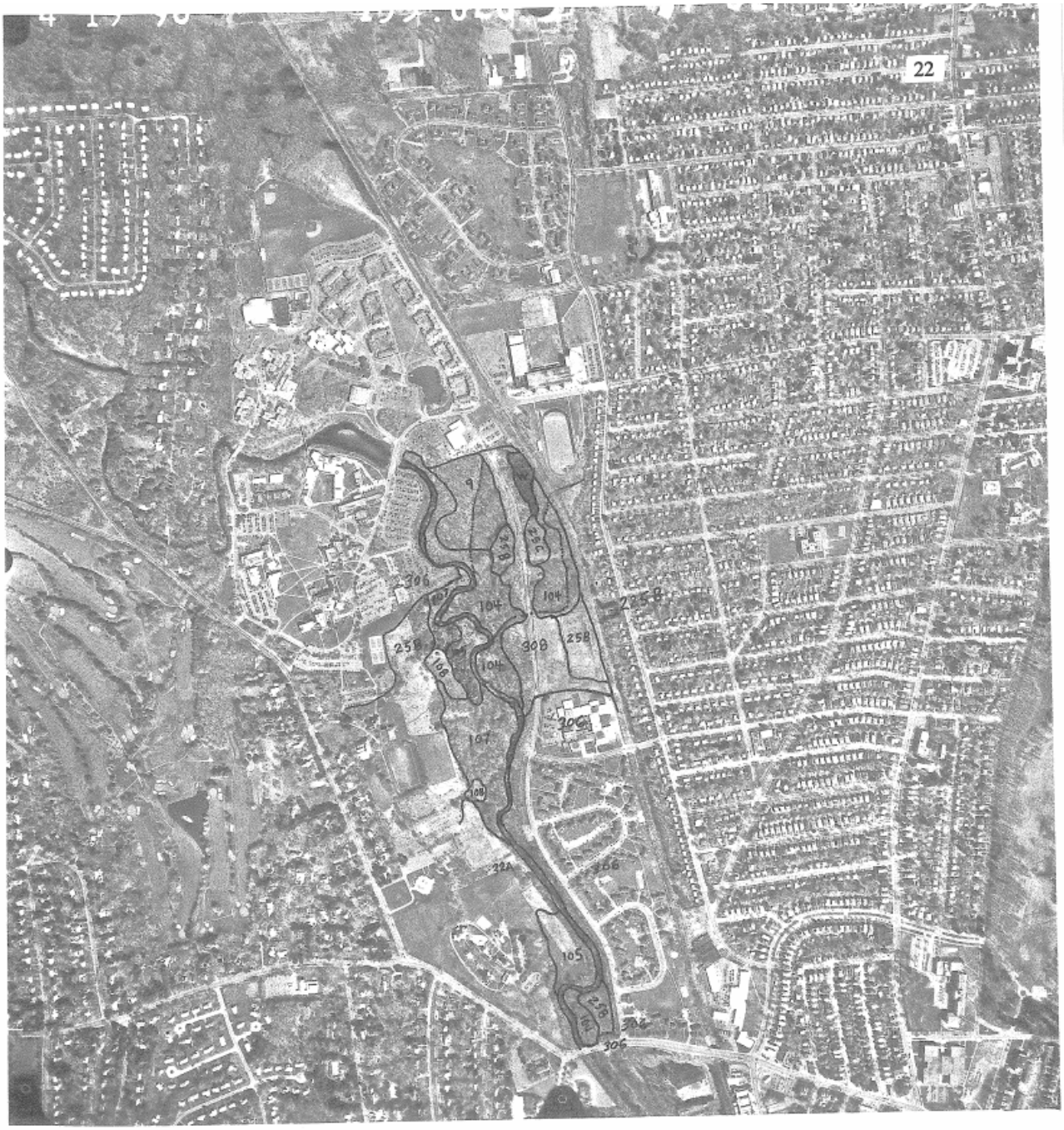


Figure 3.

1

Soils Map

North Branch Park River

(Advance Copy Subject to Change)

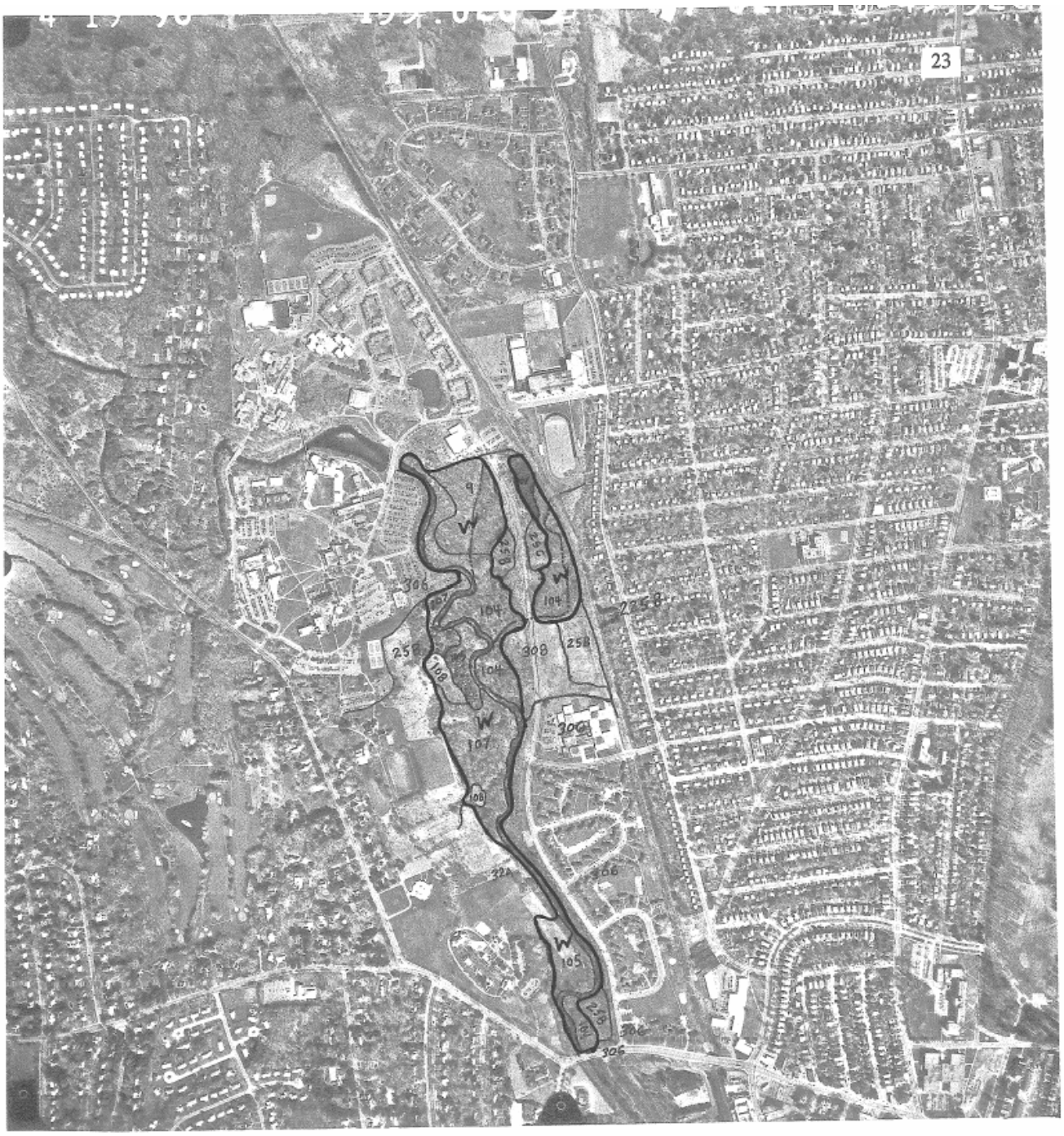


Figure 4.

Connecticut Wetland/Wetland Determination
(Advance Copy Subject to Change)

Soils Information - North Branch Park River
Plainfield Street to Farmington Avenue

This section contains a copy of the soil map for the project area along the North Branch Park River from Plainfield Street to Farmington Avenue, including the Goodwin Estate parcel (Figures 5 & 6). Also enclosed are map unit descriptions and soil interpretations (Appendix D) :

Standard Interpretations (for the entire parcel)

- Soil Map Legend
- Prime Farmland List
- Building Site Development Table
- Wildlife Habitat Table
- Water Features Table
- Physical Properties of the Soils Table
- Chemical Properties of the Soils Table
- Recreational Development Table

New Urban/Recreational Interpretations (for the entire parcel)

- Suitability for Paths and Trails
- Suitability for Picnic Areas
- Suitability for Camp Areas
- Suitability for Playgrounds

Standard Interpretations (Goodwin Estate)

- Soil Features
- Engineering Index Properties

New Urban/Recreational Interpretations (Goodwin Estate)

- Suitability for Local Roads and Streets
- Suitability for Shallow Excavations
- Suitability for Lawns and Landscaping
- Suitability for Dwellings with Basements
- Suitability for Dwellings without Basements
- Suitability for Small Commercial Buildings

Wetland determination and delineation were not a part of this soils inventory. As construction/development plans are developed and finalized, wetland delineation will need to be conducted to determine the extent of State of Connecticut wetlands. Map units 9, 104, 106, and 108 are dominated by soils considered to be Connecticut wetlands. A field Federal Army Corps of Engineers (COE) wetland delineation may also be necessary in order to obtain required permits.

Areas identified as soil map units 9 and 108 are the most limiting for use because of wetness. These soils are ponded and/or have a seasonal high water table eleven months out of the year. In addition, unit 108 is subject to brief, frequent flooding during the fall, winter, and spring. These areas are, however, well suited to development of pond reservoirs because of the soil's clay content and seasonal high water table. Wetland plants will do well in these areas and are rated fair for wetland wildlife. Foot and wheeled traffic should be limited in these areas as the soils are highly susceptible to rutting.

Soil map units 25B, 25C, 28B, 29B, 82B, 82C, and 106 are rated good for openland and woodland wildlife. Map units 82D and 104 are rated fair for openland and woodland wildlife.

Map units 25C, 82C, 82D, 104, 108, 304, 306 have very limited suitability for paths and trails because they erode easily. Map unit 9 has very limited suitability for paths and trails because of wetness. Map unit 25B is somewhat limited for paths and trails because of wetness. Map units 28B, 29B, and 82B have no limitations for paths and trails. Careful location of trails and proper engineering can reduce the erosion hazard and minimize wetness problems.

The altered soils areas are identified as mapping units 304, 306, and 308. Further onsite investigation would be necessary to determine the composition of materials at any given location.

On the Goodwin Estate property, only the 29B mapping unit has unlimited suitability for dwellings with or without basements and local roads and streets. The 82C, 82D, and 104 units, which are in woodland, have very limited suitability for dwellings with basements and local roads and streets because of wetness and slope. In addition, the 104 unit is subject to flooding.

SOIL MAP LEGEND
STATE OF CONNECTICUT: Detailed Soil Map Legend
North Branch/Goodwin Estate

Map symbol	Soil name
9	SCITICO, SHAKER, AND MAYBID SOILS
25B	BRANCROFT SILT LOAM, 3 TO 8 PERCENT SLOPES
25C	BRANCROFT SILT LOAM, 8 TO 15 PERCENT SLOPES
28B	ELMRIDGE FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES
29B	AGAWAM FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES
82B	BROADBROOK SILT LOAM, 3 TO 8 PERCENT SLOPES
82C	BROADBROOK SILT LOAM, 8 TO 15 PERCENT SLOPES
82D	BROADBROOK SILT LOAM, 15 TO 25 PERCENT SLOPES
104	BASH SILT LOAM
106	WINOOSKI SILT LOAM
108	SACO SILT LOAM
225B	BRANCROFT-URBAN LAND COMPLEX, 0 TO 8 PERCENT SLOPES
304	TYPIC UDORTHENTS, LOAMY, STEEP
306	UDORTHENTS-URBAN LAND COMPLEX
307	URBAN LAND
308	UDORTHENTS, SMOOTHED
W	WATER

Figure 5.

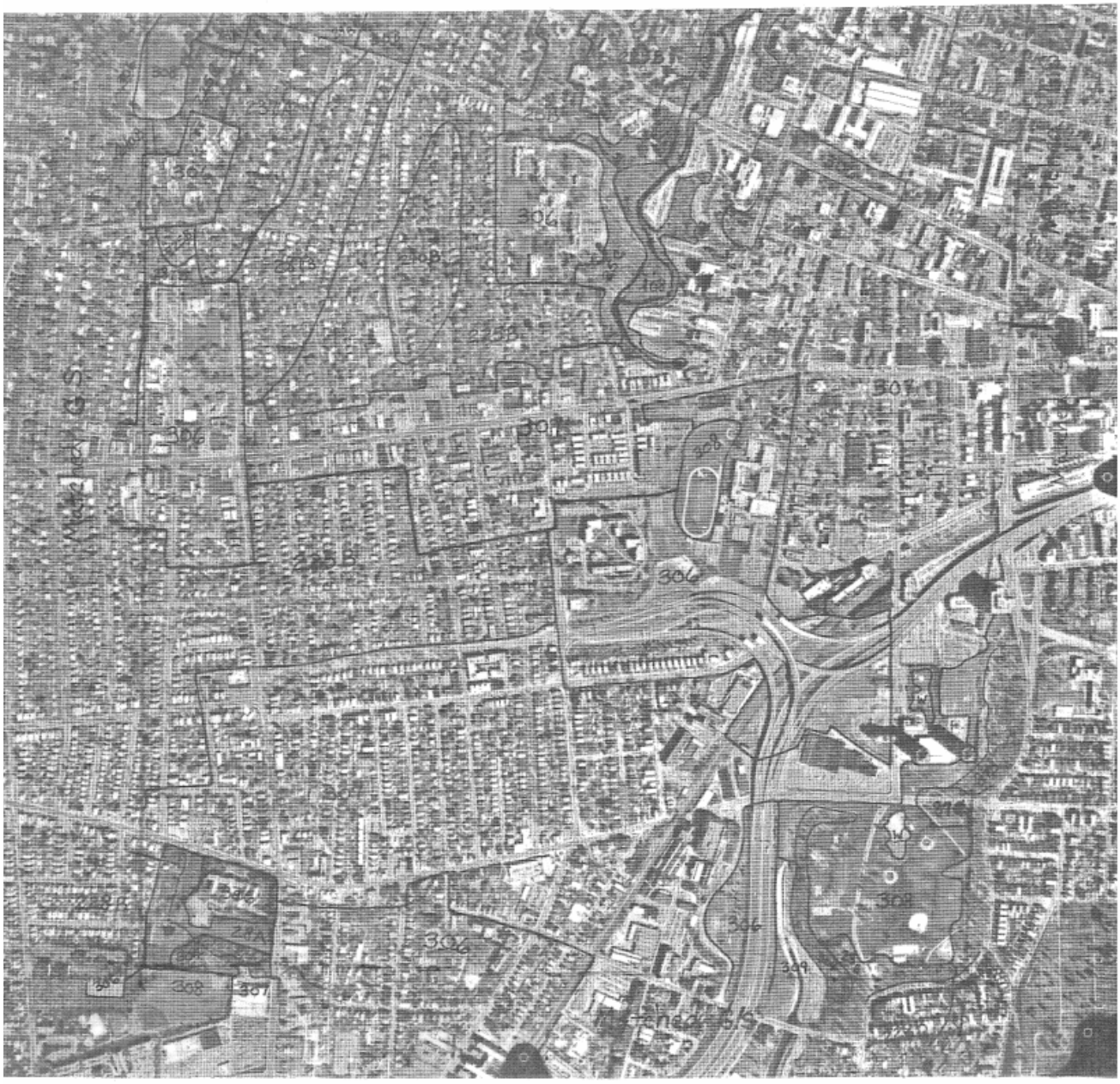
Soils Map

Scale 1:12,000

Figure 6.

Soils Map

Scale 1:12,000



Soils Information - South Branch Park River*

A detailed order 2 soil survey at a scale of 1:12,000 was completed for the South Branch of the Park River. Included in this section is the soil survey map (Figure 7) for this project area and accompanying mapping unit descriptions and soil interpretations (Appendix E). The interpretive information includes:

Standard Interpretations

- Soil Map Legend
- Prime Farmland List
- Physical Properties of Soils Table
- Chemical Properties of the Soils Table
- Engineering Index Properties Table
- Soil Moisture Status by Depth
- Recreational Development Table
- Wildlife Habitat Table

New Urban/Recreational Interpretations

- Suitability for Pond Reservoir Area
- Suitability for Camp Areas
- Suitability for Picnic Areas
- Suitability for Off-Road Motorcycle Trails
- Suitability for Playground Areas
- Suitability for Paths and Trails
- Potential Trees and Shrubs to Plant
- Suitability for Lawn, Landscape, and Golf Fairway
- Suitability for Mechanical Site Preparation

Sampling for possible heavy metal contamination was not done at this time and needs to be completed prior to recommending siting of community food gardens or playground areas. The sampling is being scheduled with DEP and it is hoped that the sampling and testing will be completed soon.

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* This report was prepared in April 1999 by Shawn McVey, the USDA-NRCS Assistant State Soil Scientist.

Additionally, a wetland determination was completed for the project area and is marked on an accompanying map. As construction/development plans are developed and finalized, a field Corps of Engineers (COE) wetland delineation may need to be scheduled and conducted to obtain required permits.

Areas identified as soil map unit 9 are CT wetlands and are the most limiting for use because of wetness. These soils are ponded and/or have a seasonal high water table eleven months out of the year. These areas are, however, well suited to development of pond reservoir areas because of the fines content and seasonal high water table. Wetland plants will do well in these areas and the area is rated fair for wetland wildlife. Foot and wheeled traffic should be limited in these areas as the soils are highly susceptible to rutting.

Soil mapping units 25A, 25B, and 25C are rated good for openland and woodland wildlife. Areas of 25A and 25B would be among the best choices for locating community food gardens. Although these soils have a seasonal high water table October through April, the soils are well suited to mechanical site preparation and have only moderate limitations for development of picnic areas and paths and trails.

The fill areas are identified as mapping units 304. 308, and 309. This fill material is comprised of construction debris, metal and glass covered with a thin capping of loam or silt loam. Of these mapping units, 308 has the greatest potential for use and management. Some areas of 308 have a relatively thick capping of silt loam soil and may be suitable for community food gardens pending heavy metal testing. The most probable site for this is located on the east side of the Park River. These areas are moderately suited to paths and trails.

SOIL MAP LEGEND
STATE OF CONNECTICUT: Detailed Soil Map Legend
South Branch of the Park River

Map symbol	Soil name
9	SCITICO, SHAKER, AND MAYBID SOILS
25A	BRANCROFT SILT LOAM, 0 TO 3 PERCENT SLOPES
25B	BRANCROFT SILT LOAM, 3 TO 8 PERCENT SLOPES
25C	BRANCROFT SILT LOAM, 8 TO 15 PERCENT SLOPES
304	TYPIC UDORTHENTS, LOAMY, STEEP
306	UDORTHENTS-URBAN LAND COMPLEX
307	URBAN LAND
308	UDORTHENTS, SMOOTHED
309	UDORTHENTS, FLOOD CONTROL
W	WATER

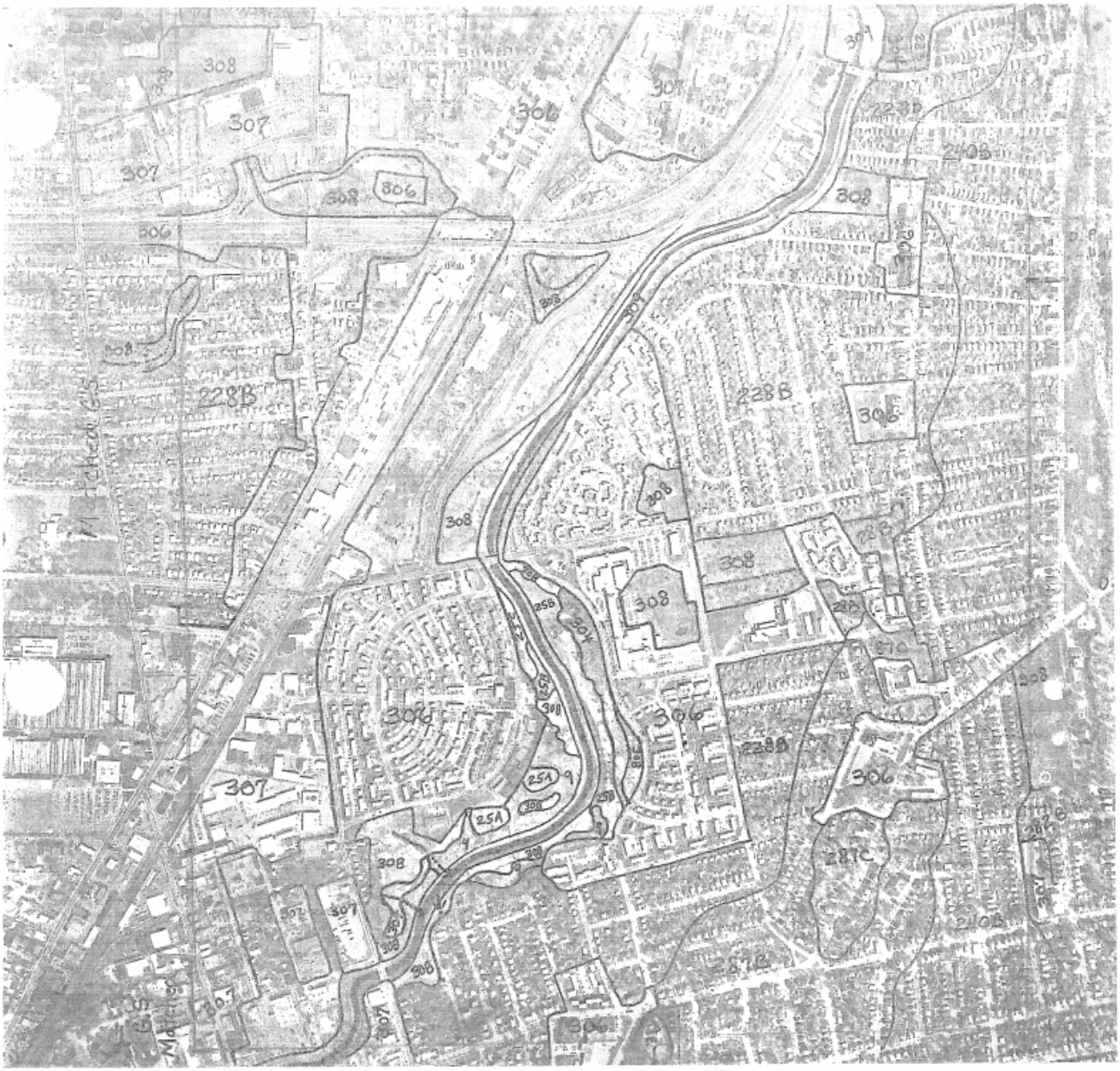
PRIME FARMLAND
STATE OF CONNECTICUT: Detailed Soil Map Legend
South Branch of the Park River

Map symbol	Soil name
9	SCITICO, SHAKER, AND MAYBID SOILS (Farmland of statewide importance)
25A	BRANCROFT SILT LOAM, 0 TO 3 PERCENT SLOPES (Farmland of statewide importance)
25B	BRANCROFT SILT LOAM, 3 TO 8 PERCENT SLOPES (Farmland of statewide importance)
25C	BRANCROFT SILT LOAM, 8 TO 15 PERCENT SLOPES (Farmland of statewide importance)

Figure 7.

Soils Map

South Branch Park River
Advance Copy Subject to Change



Wetlands and Watercourses - The Goodwin Estate

Natural Resource Inventory (Wetlands and Watercourses)

The primary wetland and/or watercourse resource on this property is the North Branch of the Park River and its floodplain. The North Branch's watershed encompasses western Hartford, eastern West Hartford and a majority of Bloomfield. It flows south from the subject property to Farmington Avenue where it has been culverted and shortly thereafter joins the South Branch to form the mainstream of the Park River. The Park River then flows under the city of Hartford to the east to join the Connecticut River. The North Branch exists within a densely populated area with a high level of impervious surfaces. These conditions have negatively impacted the biological and hydrological characteristics of the river.

Because of the high level of impervious surfaces within this urban watershed, infiltration of stormwater runoff is decreased with a corresponding increase in water volume and velocities within the North Branch channel. Typically, there can be expected a decrease in water quality resulting from the several contaminants known to exist in urban stormwater runoff. The natural hydrology of the river is further effected by the many flood control structures that exist in its northern reaches.

This historical increase in channel volumes and velocities, and contaminants has had a marked influence on the aquatic biology of the river. Please refer to the Fisheries section of this report for further information on this topic.

For a review of the forestry, wildlife and soil resources of the floodplain refer to other sections of this ERT report.

Development Limitations

The primary development limitations relative to wetland and watercourse resources on this parcel include the presence of soil types regulated under the Connecticut Inland Wetland and Watercourses Act, as well as the presence of a Flood Plain District regulated by the Greater Hartford Flood Commission.

Please refer to Figure 8 for a representation of the extent of regulated soils on this parcel. The soils are indicated as being "alluvial and floodplain" soils and have been formed as a result of the regular flooding and sediment deposition by the river. Inspection of this area shortly after Tropical Storm Floyd revealed several indicators of the recent inundation of this floodplain. Activities which may effect this regulated area should be reviewed by the Hartford Inland Wetlands Agency for permit determination.

Indicated on Figure 9 is that area of the subject parcel below elevation 51.92 NGVD which has been determined to be a "headpool ponding area" (see attached agreement), wherein land development is regulated in order to maintain the hydraulic capacity of the Albany Avenue culvert. Use of this area would fall under the jurisdiction of the Greater Hartford Flood Commission (see attached agreement).

If state funds are to be used for the re-development of this property, a review by the DEP - Inland Water Resources Division would be required to determine compliance with Flood Management sections of the Connecticut General Statutes (Section 25-68b).

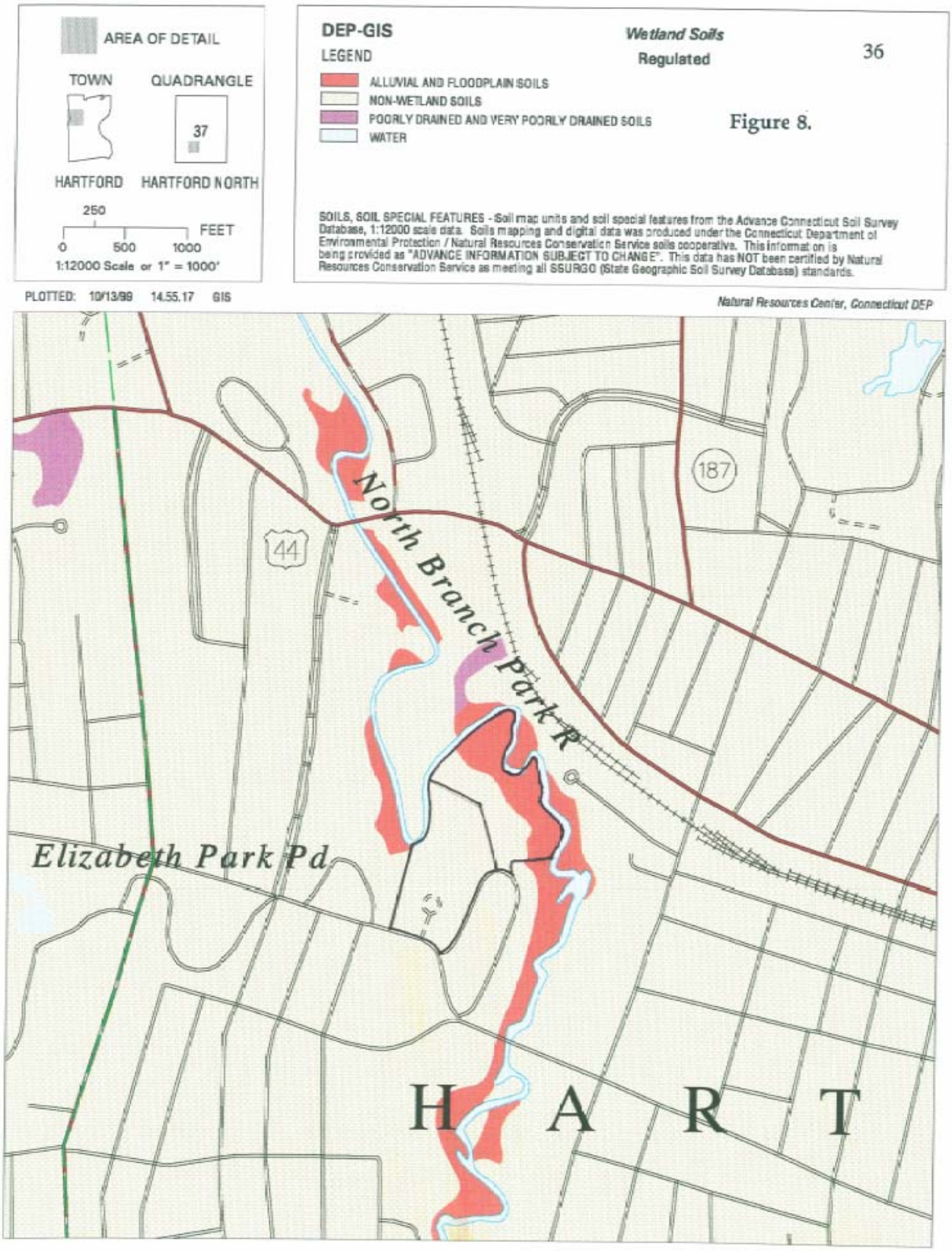
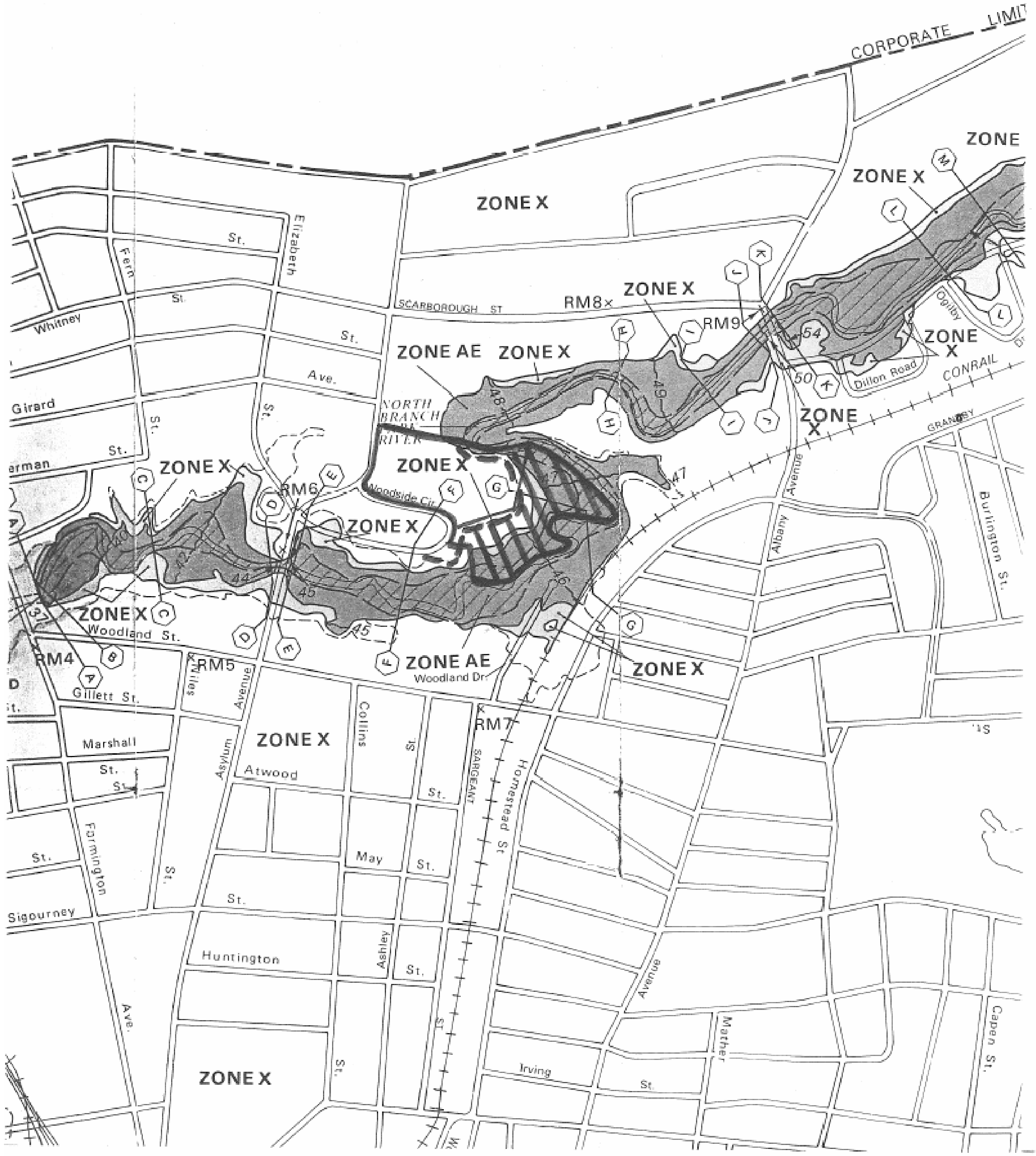

AREA OF DETAIL
TOWN
QUADRANGLE
37
HARTFORD
HARTFORD NORTH
250
FEET
0
500
1000
1:12000 Scale or 1" = 1000'
DEP-GIS
LEGEND
Wetland Soils
Regulated
ALLUVIAL AND FLOODPLAIN SOILS
NON-WETLAND SOILS
POORLY DRAINED AND VERY POORLY DRAINED SOILS
WATER
36
SOILS, SOIL SPECIAL FEATURES - Soil map units and soil special features from the Advance Connecticut Soil Survey Database, 1:12000 scale data. Soils mapping and digital data was produced under the Connecticut Department of Environmental Protection / Natural Resources Conservation Service soils cooperative. This information is being provided as "ADVANCE INFORMATION SUBJECT TO CHANGE". This data has NOT been certified by Natural Resources Conservation Service as meeting all SSURGO (State Geographic Soil Survey Database) standards.
PLOTTED: 10/13/99 14.55.17 GIS
Natural Resources Center, Connecticut DEP
44
187
North Branch Park R
Elizabeth Park Pd
H A R T

Figure 8.

Figure 9.


CORPORATE LIMIT
ZONE X
ZONE X
ZONE X
ZONE AE
ZONE X
ZONE X
ZONE X
ZONE X
ZONE X
ZONE AE
ZONE X
ZONE X
ZONE X
ZONE
ZONE X
ZONE X
SCARBOROUGH ST
RM4
RM5
RM6
RM7
RM8
RM9
NORTH BRANCH RIVER
Woodside Cir.
Woodland St.
Woodland Dr.
Dillon Road
CONRAIL
GRANBY
Elizabeth
Fern
Whitney
Girard
Gillett St.
Marshall
Farmington
Sigourney
Asylum
Avenue
Atwood
Collins
May
St.
Huntington
Ashley
SARGEANT
Homestead St
Albany
Avenue
Burlington St.
Mather
Capen St.
Irving
Ogilby
Niles
Ave.

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year flood plain.
ZONE D	Areas in which flood hazards are undetermined.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet*

D — D — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone*

RM7X — Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for flood insurance and flood plain management purposes; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside Special Flood Hazard Areas. The coastal flooding elevations shown may differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Elevation reference marks are described in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of 0.0 NGVD.

Coastal base flood elevations shown on this map include the effects of wave action.

For adjoining map panels see separately printed Map Index.

MAP REPOSITORY

City Planning Department, City Hall, Hartford, Connecticut, 06103.

(Maps available for reference only, not for distribution)

INITIAL IDENTIFICATION:

JULY 1, 1970

FLOOD HAZARD BOUNDARY MAP REVISIONS:

NONE

FLOOD INSURANCE RATE MAP EFFECTIVE:

JULY 1, 1974

FLOOD INSURANCE RATE MAP REVISIONS:

September 29, 1978 -to reflect curvilinear flood boundary and to add special flood hazard areas.

December 4, 1986 -to lower base flood elevations, to change special flood hazard areas, to add roads and road names.

Required flood storage area below elevation 51.92 NGVD as noted in a formal agreement between the Army Corps of Engineers and the City of Hartford.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE

1000 0 1000 FEET

AGREEMENT BETWEEN
THE UNITED STATES OF AMERICA
AND
THE GREATER HARTFORD FLOOD COMMISSION
FOR LOCAL COOPERATION AT
THE PARK RIVER LOCAL FLOOD PROTECTION PROJECT
HARTFORD, CONNECTICUT

THIS AGREEMENT entered into this 30th day of December, 1974 by and between the UNITED STATES OF AMERICA (hereinafter called the "Government"), represented by the Contracting Officer executing this agreement, and the CITY OF HARTFORD (hereinafter called the "City"), acting by and through the GREATER HARTFORD FLOOD COMMISSION, WITNESSETH THAT:

WHEREAS, construction of the Park River Local Flood Protection Project (hereinafter called the "Project") was authorized by the Flood Control Act approved 13 August 1968, Public Law 90-483, 90th Congress, S.3710; and

WHEREAS, the City hereby represents that it has the authority and capability to furnish the non-Federal cooperation required by the Federal legislation authorizing the Project and by other applicable law.

NOW, THEREFORE, the parties agree as follows:

1. The City agrees that, if the Government shall commence construction of the Park River Local Flood Protection Project substantially in accordance with Federal legislation authorizing such Project, Section 203 of the Flood Control Act of 1968, Public Law 90-483, approved 13 August 1968, the City shall, in consideration of the Government commencing construction of such Project, fulfill the requirements of non-Federal cooperation specified in such legislation, to wit:

a. Provide, without cost to the United States, all lands, easements, and rights-of-way required for construction and operation of the works, including lands for pumping stations and spoil disposal areas;

b. Hold and save the United States free from damages due to the construction works, except damages which are attributable to the fault or negligence of the United States or its contractors;

c. Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army;

d. Upon completion of the conduit construction, replace pavements, sidewalks, drainage and other appurtenances, including those at Broad Street, Flower Street, Laurel Street, and Farmington Avenue, and bear the cost of removal, replacement, and modification to sewers, drains, utilities, or highways beyond the area required for excavation and construction of the projects;

e. Prevent changes in the headpool ponding areas which would decrease the effectiveness of the improvements and if ponding areas and capacities are impaired, promptly substitute equivalent storage capacity; and

f. Undertake all practical measures to prevent pollution from entering the Park River conduit system.

2. The City further agrees to comply with requirements of non-Federal cooperation specified in Sections 210 and 305 of Public Law 91-646, 91st Congress, S. 1, approved 2 January 1971, known as the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," to wit:

a. Fair and reasonable relocation payments and assistance shall be provided to or for displaced persons, as are required to be provided by a Federal agency under Sections 202, 203 and 204 of Public Law 91-646.

b. Relocation assistance programs offering the services described in Section 205 of Public Law 91-646 shall be provided to such displaced persons.

c. Within a reasonable period of time prior to displacement, decent, safe, and sanitary replacement dwellings will be available to displaced persons in accordance with Section 205 (c) (3) of Public Law 91-646.

d. In acquiring real property the City will be guided, to the greatest extent possible under its laws, by the land acquisition policies in Section 301 and the provisions of Section 302 of Public Law 91-646; and

e. Property owners will be paid or reimbursed for necessary expenses as specified in Sections 303 and 304 of Public Law 91-646.

3. The City hereby gives the Government a right to enter upon, at reasonable times and in a reasonable manner, lands which the City owns or controls, for access to the Project for the purpose of inspection, and for the purpose of operating, repairing and maintaining the Project, if such inspection shows that the City for any reason is failing to repair and maintain the Project in accordance with the assurances hereunder and has persisted in such failure after a reasonable notice in writing by the Government delivered to City officials. No operation, repair and maintenance by the Government in such event shall operate to relieve the City of responsibility to meet its obligations as set forth in paragraph 1 of this agreement, or to preclude the Government from pursuing any other remedy at law or equity.

4. This agreement is subject to the approval of the Secretary of the Army.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

By _____
JOHN H. MASON
Colonel, Corps of Engineers
Division Engineer
Contracting Officer

DATE: 30 December 1974

APPROVED:
WOODROW BERGE
Director of Real Estate

FOR The Secretary of the Army

CITY OF HARTFORD
THE GREATER HARTFORD FLOOD COMMISSION

By _____
Harold F. Keith, Chairman
Greater Hartford Flood Commission

D-244

I have reviewed the foregoing agreement and have considered the effect of Section 221 of the Flood Control Act of 1970, Public Law 91-611, and I am satisfied that the City of Hartford can fully comply with the provisions of said agreement.

Alexander G. Goodfarb
Corporation Counsel

CERTIFICATE

I, Robert J. Gallivan, do hereby certify that I am the City Clerk of the City of Hartford, Connecticut, named herein; that John F. DeLucco, H. Ward Pinney, Harry R. Holland, Aldo F. Provera, Harold F. Keith, Lyonel H. Putnam, Mario Navarra, and _____, who authorized the signing of this Agreement on behalf of the City of Hartford, were then and there the members of the Greater Hartford Flood Commission and that said Agreement was duly signed for and on behalf of the City of Hartford by virtue of their authority and is within the scope of their statutory powers.

IN WITNESS WHEREOF, I have hereunto affixed my hand and the seal of the City of Hartford, this 24th day of December, 1974.

Robert J. Gallivan
City Clerk

City Seal

3.

Biological Characteristics

The Natural Diversity Data Base
Forestry Review
Wildlife Resources
Aquatic Resources

The Natural Diversity Data Base

The Natural Diversity Data Base maps and files regarding the project area have been reviewed. According to our 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 biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Environmental & Geographic Information 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 substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

It is now possible to conduct an initial endangered species review using the "State and Federal Listed Species and Significant Natural Communities" maps available for viewing through each town's Town Hall. The Town Planner should have a copy of the map and instructions on how to use the maps. This map shows the generalized locations for listed species and communities as gray-shaded areas on a 1:24,000 scale map of the town.

Forestry Review - North Branch of the Park River and the Goodwin Estate

This section covers the wooded acres along the North Branch of the Park River south of the University of Hartford. For the purposes of this report, this area is divided into four sections. The first section is the wooded area bordering the river north of Albany Avenue. The second section is the wooded area east of the river and north of Woodland Circle that is owned by Greater Hartford Flood Commission (GHFC). The third section consists of the two largely wooded parcels west of the river known as the Goodwin Estate and the Goodwin Woods. The fourth section consists of those areas along the river south of the Goodwin Woods and the GHFC lands and north of the tunnel opening, where the river begins its flow beneath the city.

Use of the accompanying maps (Figures 10 and 11) will be helpful in following this report.

Section One: North of Albany Avenue

Along this section of the river, the woodland occurs in a somewhat narrow band along each bank. Along the eastern bank there is a natural terrace, the top of which is elevated some 10 - 20 feet above the river. The western bank is fairly level and is only a couple of feet above the river channel. This bank shows signs of frequent flooding. There are many large trees dominating these wooded strips along both banks, with white ash, cottonwood, box elder and sycamore being the more common large species. In addition, American elm, red maple, glossy buckthorn, crabapple, black cherry and flowering dogwood trees are also present,

mostly as understory trees. The vegetation along the part of the eastern bank nearest to Mark Twain Drive is thicker and shrubbier, as a result of the being opened to sunlight by the road and the development across the road. Once inside this shrubby outer band, the mix of tree species and tree sizes give this section a great deal of structural and visual diversity.

Due to this diversity of tree sizes and species and the amount of wildlife present, along this stretch of the river one can get a sense of being in a "forested oasis." However, as neither strip of woodland along either bank is very wide, and as the slope off of the terrace on the one bank is steep and the most of the opposite bank is wet, opportunities for public use within these streamside woods is somewhat limited.

Section Two: The Greater Hartford Flood Commission Parcel

This is a fairly large, 15 to 20 acre parcel, located along the east side of the river from just south of Albany Avenue to just north of Woodland Circle. North-south running railroad tracks behind the industrial properties along Homestead Avenue define the eastern border of this section, and also contribute to its isolation and relative lack of disturbance. The western border of this property is defined by the river, which takes a rather sharp bend about 1,000 feet south of Albany Avenue and flows nearly completely around the small hill that makes up the major share of this parcel. This change in the course of the river results in a hairpin turn that allows an individual to stand in certain spots and see different parts of the river flowing in opposite directions. This is only one of the elements that give this parcel of land its attraction.

For much of this section of the river, there is a steep slope along the eastern bank that runs from river to the top of a terrace. This is the same terrace as mentioned in the previous section. The terrace runs across Albany Avenue and continues

on to become the small hill around which the river winds. From the bottom to the top of the slope, the change in elevation is about 20 feet. In the straight-running stretch of the river south of the Albany Avenue bridge, there is a shelf of land of about 30 to 100 feet in width between the base of the slope and the river itself.

Along this 1,000 foot, straight-running stretch of river, the land at the top of the terrace shows the effects of significant disturbance. These disturbances include use as an access way for motor vehicles and, possibly, some form of commercial use. The soil has been heavily altered through digging, as a part of the installation of an underground sewer main. The construction of the adjacent electrical substation may have also had an impact.

As a result, the trees in this area tend to be small and weedy, with black locust, red maple, hickory and black birch predominating along the top and sides of the slope, and crabapples, white ash, red maple and American elm being frequent on the shelf along the river's edge. The shrub layer is very thick, with glossy buckthorn, viburnum, Japanese honeysuckle, multiflora rose and sprouts of black cherry common. Passage through this site is difficult.

Aesthetically, the land looks very attractive from the outside, such as when viewed down the river from the Albany Avenue bridge. However, once within this stretch, the jumble of vegetation and the difficulty of travel tempers any enthusiasm for its outward appearance.

This pattern of disturbance remains visible in the vegetation south along the sewer main and east out to the railroad tracks. In addition, the parcel of land that is between the sewer line and the railroad tracks and that is fenced off, which also belongs to the GHFC, shows the effects of a separate disturbance, more extensive and more recent than the burial of the sewer main. Presumably, this disturbance is associated with the creation of flood retention space.

The sewer main crosses the river and enters into the Goodwin Woods south of the small hill, at a point in which the river is flowing northeastward. South of the fenced off flood retention area and north of the development on Woodland Circle is a small stand of young mixed hardwoods. The river is no longer terraced in the vicinity of Woodland Circle, and the elevation above the river is only about 5 to 10 feet. The land bordering the river adjacent to Woodland Circle is marshy and dominated by phragmites and large silver maples.

The small hill, bordered by the buried sewer main to the east and by the bend of the river to the north, west and south, is a very different and interesting piece of land. At its high point, it is about 40 feet above the river. The hill is a continuation of the terrace that runs south from Albany Avenue, and is about 600 feet across and about 800 - 900 feet long. Altogether, it comprises an estimated 12 acres. At the northern end of this hill, where the river first bends, the slope down to the river is at its steepest. As the river moves around this hill, the height of the hill decreases and the slope of the bank becomes less steep.

There are several features that make this area interesting and attractive. The first is the trees. For the most part, they are large, mature hardwoods that together constitute a vigorous, healthy, well-stocked stand. The largest trees within this stand are white oaks. These white oaks are particularly well-formed, with most over 40 inches in diameter. These large white oaks have the wide spreading crowns normally associated with trees grown in the open. They appear to be in good shape, without major problems in their trunks or crowns. There are perhaps between one and two dozen white oaks of this type scattered throughout this area. Interspersed among the white oaks are large red oaks and sugar maples, 24 to 36 inches in diameter, with the tall, straight trunks and narrow crowns associated with forest grown trees. It is likely that these maples and red oaks grew up following the establishment of the white oaks, but while the white oaks were still young.

Other tree species are present on this hill, including hickories, pin oaks, beech, yellow and black birch and, along the river, silver maple, white ash, cottonwood and sycamore. The understory tends to be rather open, and includes arrowwood viburnum, glossy buckthorn, Japanese barberry, winterberry holly and black cherry. There are also scattered conifers, including hemlocks and white pines. The ground is covered in patches by groundcovers that have escaped from cultivation, including moneywort, pachysandra, English ivy and vine euonymus.

The second feature that a visitor might notice is the remnant of an old trail system. The pathways can be discerned from the presence of cinders in the soil, the lack of vegetation in the pathways and the grading of the landscape. When followed down to the river, these trails come together at the remnant of an old brownstone bridge abutment.

In the trail system there may be some explanation for kinds of trees found in this parcel, and their location. Certainly, from the absence of stumps and the unique structural composition of this stand of trees, it does not appear that the vegetation currently on this property came about from the usual processes of most southern New England woodlands - such as recovery from fire, agricultural abandonment or intensive harvesting. Nor has there been significant recent disturbance. It is possible that these woods have a uniquely urban origin, reflective of Hartford as it was in the eighteenth or nineteenth century.

For example, it may be that the white oaks were planted to provide the basis of a wooded arcade, whether as part of a private estate or as part of a public park system. A small cluster of pine trees planted at the high point of the hill, at the first bend of the river adjacent to the remnant pathway, is highly suggestive of landscape plantings that were continued over time. The crabapples found along the stretch of river just south of Albany Avenue might also be a legacy of this

effort. It must be stressed that these are only suggestions as to this site's history. Extensive research would be needed, into past ownership, into town hall and historical society records as to past use, and, possibly, into tree ages and stand dynamics, before any reasonably acceptable description of this site's past could be offered.

Section Three: the Goodwin Estate and the Goodwin Woods

Although the Goodwin Estate and the Goodwin Woods abut one another and are included together in one section, the characteristics of these parcels are distinctly different. However, the fact that both are wooded down to the edge of the river and lie directly across from the small hill in the GHFC Parcel, gives good reason to consider them together.

The wooded portion of the Goodwin Estate is on a steep slope that rises more than 50 feet above the river. This slope holds several very large (> 40" dbh) red oaks which, due to advanced decay in their trunks and the presence of several large, dead limbs, can be considered as being decadent in condition. There is also a large component of healthy, medium-sized (16" - 30" dbh) beech trees on the slope, along with several black birch trees, 10" - 20" in diameter. The understory is sparse, with frequent groundcover of the species noted in Section Two.

At the top of the slope are the grounds of the Goodwin Estate itself. In former times, the Estate grounds were obviously extensively maintained. It is also apparent that in recent times the maintenance of the grounds extends minimally beyond mowing the lawn. On the grounds, there are several large hemlocks that are on the verge of succumbing to the combined effects of the hemlock woolly adelgid, drought and scale insects. The other numerous, large shade trees on the property appear to be in reasonably good shape, though in need of some care.

The Goodwin Woods does not contain the steep slopes found elsewhere along the river. At its high point, it is barely 20 feet above the river. Much of the Goodwin Woods is in the floodplain. There is a slight increase in elevation that runs roughly through the middle of the property, approximately parallel to the river. This change in elevation is reflected in a change in the types of trees found above and below this rise.

In the floodplain part of the property, large (> 30" dbh) cottonwoods dominate, with large sycamores, silver maple and bitternut hickory also present. The understory is fairly patchy. As the elevation increases, the numbers of pin oaks, red maple and black cherry also increase. The trees above the floodplain tend to be younger and smaller (10" - 20" dbh). Where the sewer main crosses the floodplain, there has been a berm constructed that supports shrubs and small trees. Past the floodplain, where the sewer main passes through the higher elevation land, open patches and large, field grown trees are noticeable. In the area disturbed by the sewer main, the trees found include box elders, sycamores and black locusts.

Remnants of an old fence line are also present in this parcel, at about the highland edge of the floodplain. These remnants are suggestive of an agricultural history within this parcel.

Section Four: South of the Goodwin Woods and the GHFC Property, to the Tunnel

While this section is the largest of the four sections in terms of length, there are few large forested parcels. For the most part, along both banks of the river throughout this section, the wooded strips that line the river are very narrow. In the case of the parking lot southeast of Asylum Avenue and two of the

properties along Woodland Street (Eighty-five Woodland Street Corporation and St. Francis Hospital), development runs right up to the river bank. In the case of the two properties on Woodland Street, floodwalls have been built right next to the river.

This section of the river is not terraced as it is in the other three sections. The tree species to be found along the river here are the typical floodplain species mentioned earlier, including cottonwood, box elder and American elm.

The parcel of land west of the river and south of Asylum Avenue, behind the Connecticut Historical Society, is fairly heavily wooded and may warrant a closer inspection. It was not visited in the course of preparing this report.

Discussion

The land described in Sections One and Two have significant potential to become key parts of a walking trail system, or of some other use that would allow people to enjoy nature in an informal, unscheduled manner. The parcels in Section Three also have a great deal of potential along these lines. However, without bridging the river, it would not be easy to connect these parcels in with plans for Sections One and Two. The opportunities for use of the several properties in Section Four in connection with the use of these other sections do not appear great from this initial overview.

Whatever the use designed for these lands, there are significant concerns that must be considered. From a forest use perspective, the most significant are:

- **Poison Ivy.** It is rampant on all of these parcels, and is apt to remain a problem under any use. Disturbance and increased access are only likely to increase its presence.

- **Hazard Trees.** The large, decadent oaks along the back of the Goodwin Estate present clear examples of potentially hazardous trees. Such trees should be identified and given particular attention while plans are being drawn. A tree becomes hazardous in part because of the condition of the tree, and in part due to the likelihood of a target being present when the tree or tree part fails. Potentially hazardous trees can be dealt with in the planning stage either by stipulating improvement in their condition, or by keeping activities out of the immediate vicinity of those trees.

- **Invasive Exotics.** Plant species like glossy buckthorn, Japanese barberry, burning bush and Japanese honeysuckle have earned the label of "invasive exotic." This designation means that they have the ability to be opportunistic and to spread rapidly, out-competing more desirable, native species. Also, efforts to remove or control these plants are usually difficult at best.

The understory of the woodlands in these sections is full of species deemed to be invasive exotics. Any new disturbance, such as trail development, tree removals or changes in the soils, is apt to increase their presence. It has become Department of Environmental Protection Policy not to foster the growth or spread of these species whenever possible.

That said, it should also be noted that all visitors to these sites might not view these invasive exotics in a negative light. For example, in the Goodwin woods, when following along the trail that runs on top of the berm covering the sewer line, one is essentially walking through a tunnel of glossy buckthorn. To the casual visitor, this is a very attractive feature of the property. Likewise, these plants add to the food supply of the wildlife using the site.

- **Vandalism, Littering and Erosion.** Increased access to the wooded parcels will likely increase the amount of vandalism and littering that will occur. As it is, there is a particularly sorry example of racist graffiti carved into an oak tree in the GHFC parcel. Erosion will likely result if the trails are heavily used or if ATV's and other motorized sport vehicles take advantage of the trails and use them for access to the parcels.

Conclusion

Despite all of these potential problems, there is much to recommend continued consideration of these sites. The presence of so much contiguous woodland in the City of Hartford is, by itself, worthy of interest. The characteristics of the stand of trees on top of the small hill in the GHFC parcel are both visually attractive and intensely intriguing. Further investigations as to what the site contains, and how to develop it so that visitors can appreciate what it holds, are apt to prove valuable.

A Partial List of Plants Found Along the North Branch of the Park River*

Trees

box elder	*Acer negundo*
Norway maple	*A. platanoides*
red maple	*A. Rubrum*
silver maple	*A. saccharinum*
sugar maple	*A. saccharum*
yellow birch	*Betula alleghaniensis*
black birch	*B. lenta*
paper birch	*B. papyrifera*
musclewood	*Carpinus caroliniana*
bitternut hickory	*Carya cordiformis*
shagbark hickory	*C. ovata*
beech	*Fagus grandifolia*
white ash	*Fraxinus americana*
black locust	*Gleditsia traicanthos*
crabapple	*Malus* sp.
white mulberry	*Morus alba*
sycamore	*Platanus occidentalis*
red pine	*Pinus resinosa*
eastern white pine	*P. strobus*
Scotch pine	*P. sylvestri*
cottonwood	*Populus deltoides*
black cherry	*Prunus serotina*
white oak	*Quercus alba*
pin oak	*Q. palustris*
red oak	*Q. rubra*
sassafras	*Sassafras albidum*
basswood	*Tilia americana*
hemlock	*Tsuga candensis*
American elm	*Ulmus americana*

* Largely a list of observed plants; not intended to be an exhaustive list.

Shrubs

Japanese barberry	*Berberis thunbergii*
burning bush	*Euonymus alata*
winterberry holly	*Ilex verticillata*
Tartarian honeysuckle	*Lonicera tatarica*
glossy buckthorn	*Rhamnus frangula*
poison ivy	*Rhus toxicodendron*
multiflora rose	*Rosa multiflora*
arrowwood viburnum	*Viburnum recognitum*

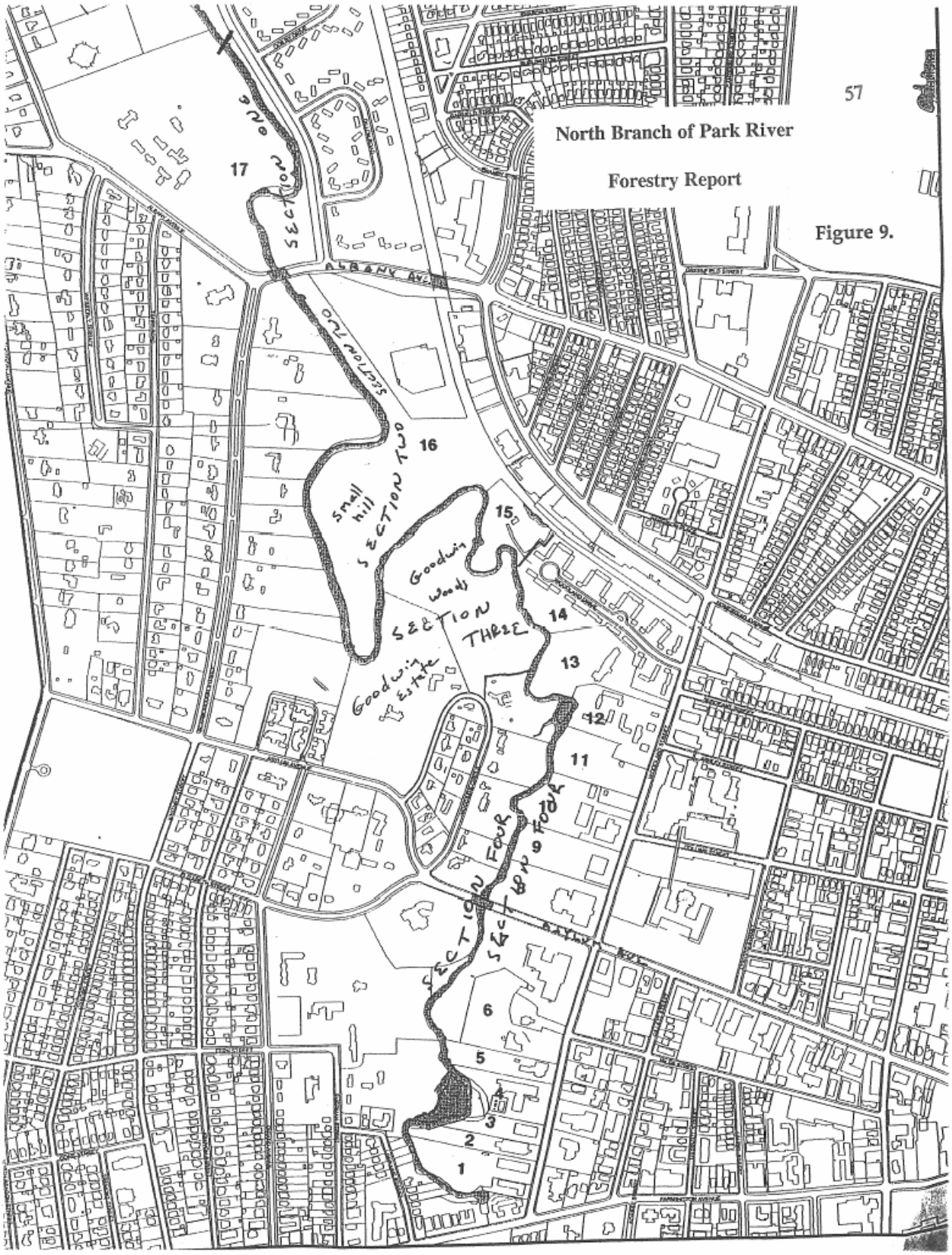
Groundcovers

wintercreeper euonymus	*Euonymus fortunei*
English ivy	*Hedera helix*
moneywort	*Lysimachia nummularia*
pachysandra	*Pachysandra terminalis*

North Branch of Park River

Forestry Report

Figure 9.



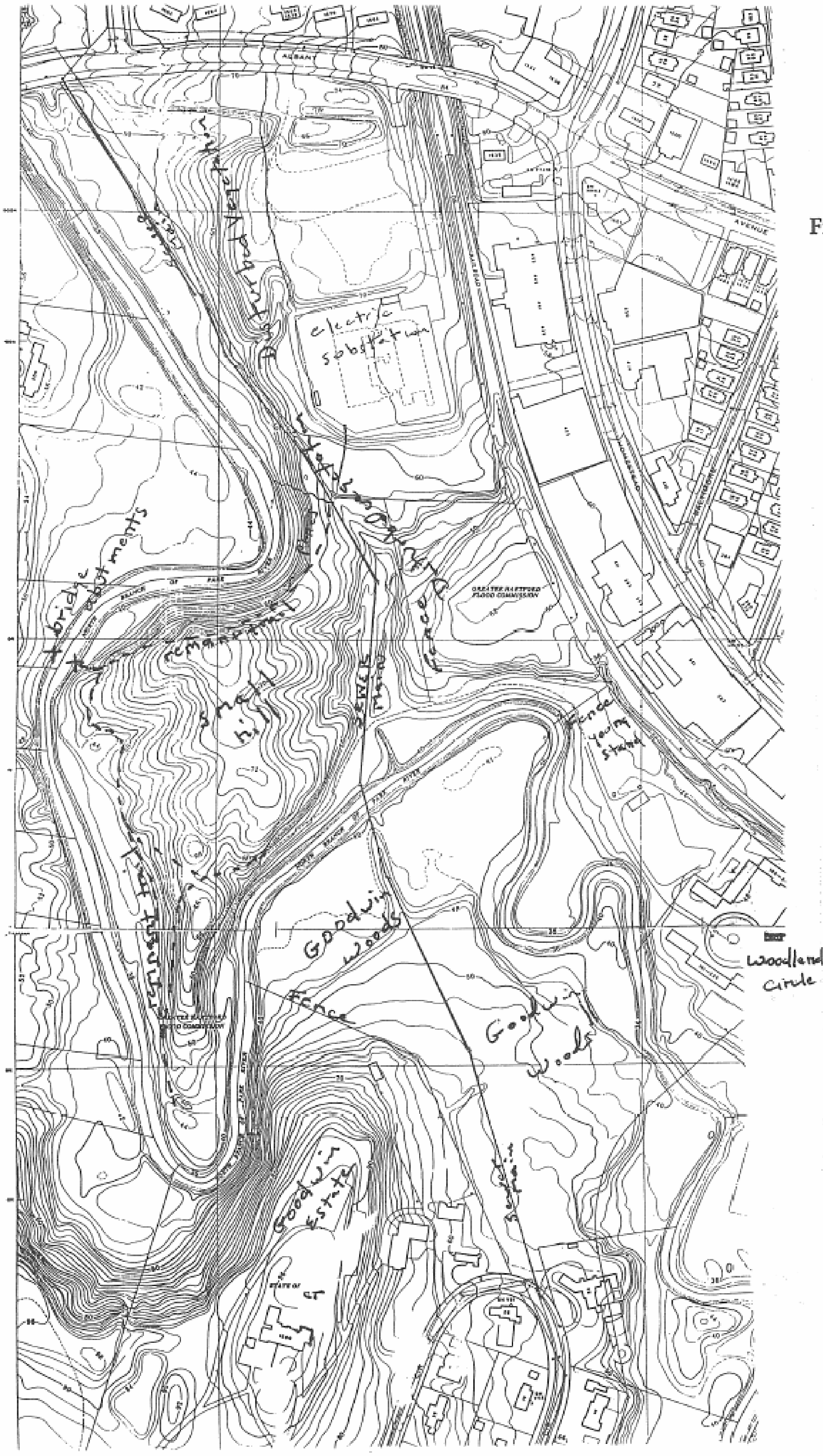

ALBANY
AVENUE
electric substation
bridge abutments
small hill
GREATER HARTFORD FLOOD COMMISSION
Fence
young stand
Goodwin Woods
Goodwin Woods
Fence
Goodwin Estate
STATE OF CT
Woodland Circle

Figure 10.

Forestry Review - South Branch of the Park River

Overview

The south branch of the Park River has been modified much more heavily than the north branch. This is true of the river itself, the riverbanks and the vegetation growing along the river. To some extent, the land adjacent to this section of the river is a "blank slate", which can be modified to make it a very attractive and well-used trail.

Overlook Terrace Section

It is very important, in any decisions about developing a trail along this section of the river, to know what the plans are concerning the enhancement of fish and wildlife habitat along the river. In other sections of this report and in the appendix are discussions on this subject, with contributions by Don Mysling concerning fisheries, Peter Picone regarding terrestrial wildlife, and Mitch Michaud concerning forests and vegetation (see Appendix F).

In these reports, Picone and Michaud discuss what the likely natural forest would be in this area, and the native plants currently present. Both rate the area highly as a candidate for forest restoration, with Picone recommending active intervention in the removal of invasive exotics and Michaud suggesting forest plantings. However, both writers are encouraging the growth of trees and shrubs along the rip-rapped stream banks. Due to the likelihood of debris falling into the river, including, eventually, large tree trunks, this course of action may be rejected as contrary to the flood control aims of the existing stream modification work.

The re-growth of the native vegetation along the river is an important consideration in any trail that might be built along the river. If the vegetation is allowed to grow up through the rip-rap, then the trail might be set further away from the edge of the bank, to allow shade from the riverbank trees to fall on the trail. Side trails to overlook areas might then be included in the trail plan. If the riverbank vegetation is to be controlled, the trail might be laid out closer to the river, perhaps with a fence used to protect people from falling off of the edge.

In either case, the flat, terraced area above the riverbank presents excellent opportunities for a carefully planned, well-planted, riverside pathway. For example, a landscape planting of a row of native shade trees appropriate to the site, such as pin oak or shagbark hickory, has the potential to create a very attractive arcade. If these trees were planted along side the trail, away from the river, these trees would also help identify the trail as "belonging" to the river. Alternatively, a more closely spaced planting of forest seedlings can be used to create a grove of trees and shrubs through which the trail might run. Either way, the plants can be chosen so as to emphasize diversity, site appropriateness and value to wildlife.

Judging from the condition of the cottonwoods and other trees that have grown on their own on the top of this terrace, this site has the potential to support the growth of large, healthy trees. However, soil testing for pH and nutrient availability would be recommended, so as to avoid such common problems as iron deficiency in pin oak. Watering and other maintenance efforts during establishment period would also be critical. This establishment period should be considered as being at least five years in length.

Wildlife Resources

Introduction

This report will address the wildlife resources of the subject areas with an eye towards current conditions concerning the wildlife habitat quality, potential wildlife impacts, habitat enhancement opportunities, and reducing wildlife-related impacts.

Background

Property along rivers including its vegetation, soil characteristics, patch size and human disturbance factors weighs heavily on the quantity and quality of wildlife species that utilize it. In urbanized cities such as Hartford, indirect and direct impacts to wildlife on rivers have included bankside vegetation removal, channelization, floodplain filling, culverting, piping underground, invasive plant establishment, water quality degradation through combined sewer overflow, urban runoff, littering and roaming unleashed house pets.

For reference purposes the sections of the river were divided into the following areas:

North Branch of the Park River

Area #1 - Plainfield Street south to Albany Street bridge.

Area # 2 - Albany Street bridge south to Farmington Avenue (North Branch of Park river). Proposed uses of river open space includes pedestrian/bicycle trail.

Area # 3 - Goodwin Estate

South Branch of the Park River

Area # 4 - Pope Park; Park Street south to Hamilton Street
Area # 5 - Hamilton Street, along Brookfield Street, south to Flatbush Avenue
Area #6 - Flatbush Avenue to Newfield Avenue
Area #7 - Partly in West Hartford, Dexter Avenue

Site Inspection Findings

Area #1 - At the Albany Street bridge, a great blue heron was sighted perched on a tree branch fallen in the river. Three large carp were observed swimming in the shallow water of the bridge's shadow. Several mallards were spotted in the river. The habitat conditions along the west side of the river is of higher quality than the east side which is infested with invasive non-natives such as glossy buckthorn. Most of the vegetated riverside corridor is a good migratory pathway for birds in the fall and spring of the year. White-tailed deer, coyote and fox sign was also found in this wooded buffer.

Area #2 - The river south of Albany Street bridge to Farmington Avenue has extensive floodplain. Vegetation is dense in some locations and soil conditions appear to be very moist. Site inspections of the river were made at various locations along the stretch where access was available. A female wood duck and five ducklings were observed along Woodland Street. Two great blue herons and a belted kingfisher were spotted hunting along the water's edge.

Area # 3 - Wildlife sign noted on the Goodwin Estate included: white-tailed deer, raccoon, gray squirrel, American robin, blue jay, northern flicker, mourning dove, American goldfinch, catbird, black-capped chickadee, tufted titmouse and American crow. Habitat conditions varied from very good along the river to

impacted around the abandoned dwelling. As an urban wildlife habitat, the Goodwin Estate is a valuable property because it provides upland habitat connection to a floodplain corridor. Older hardwood trees (especially red oak) can be found in the upland forest along with large woody debris on the forest floor which is atypical of forested areas in heavily urbanized areas. This property is a highly valuable area for its urban wildlife habitat. Invasive non-native plants need to be managed to avoid further habitat degradation. Tallied invasive non-natives include: privet, winged euonymus, tartarian honeysuckle, Japanese barberry, glossy buckthorn, multiflora rose, and oriental bittersweet.

Area # 4 - This area includes Pope Park which contains mostly manicured fields but some forested areas along the fringes. The Team biologist assisted local residents in placing a screech owl nest box and several house wren boxes in 1998 in the Park. Two of the wren nestboxes were missing upon inspection. The screech owl box was still intact up in a pin oak tree in the patch of woods on the western side of the park. Wildlife observed on the park grounds included bluejay, crow, European starling, house sparrow, cottontail rabbit, northern oriole, rock dove (pigeon), ring-billed gull and gray squirrel. At the Hamilton Street bridge crossing, the Team biologist observed a great blue heron hunting for fish; a green heron perched on a shopping cart in the river; and a belted kingfisher perched on a dead branch overhanging the river. Blacknosed dace appeared to be in abundance in the river.

Area # 5 - This area includes Hamilton Street which parallels the river along its eastern side - along Brookfield Street - south to the Flatbush Avenue intersection. The river is highly channelized with cement sides. This is a highly degraded riparian corridor.

Vegetation is mostly invasive non-natives. Most of the riparian zone is comprised of tar and concrete which does not offer much in terms of wildlife habitat or migratory pathway. Short of radically altering these areas and restoring

the riparian zone, it will remain highly degraded for wildlife. There are some adjoining properties , however that have some potential to benefit the river's wildlife. McDonnough Elementary School's property on Brookfield Street has a small forested patch which is being used as an outdoor classroom area and it provides some upland habitat. The Team biologist observed wildlife such as catbird, bluejay, cardinal, American goldfinch, house sparrow, gray squirrel, and cottontail rabbit using this small forested area. The I-84 corridor which is on the west side of the river provides some young reverting fields and habitat for wildlife including white-tailed deer. In total, there is a substantial piece of property of young reverting fields along I-84 in this area which can be managed for early successional wildlife species, including migratory American woodcock.

Area # 6 - This area includes the South Branch of the Park River from the Brookfield/Flatbush Avenue intersection to the Newfield street bridge. Although the river itself is highly degraded because of the channelization and invasion of non-native plants, there is a substantial amount of town or state-owned property asscciated with this section. The banks of the river have slowly revegetated with trees, shrubs, and herbaceous plants. Some natives such as silver maple, red maple, American elm, silky dogwood, elderberry, and cottonwood have grown into the engineered banks of the river. Unfortunately, many invasive non-natives have also infiltrated these areas. In particular, Japanese knotweed is throughout. The western side of the river contains a reverting field which is unique to this urban area. This unmowed reverting field is good habitat for wildlife that utilize early successional habitats. Maintaining this area as reverting field will require mowing every two to three years to prevent large trees from growing up. The herbaceous vegetation included many beneficial species of goldenrods which provide nectar for migrating monarch butterflies. Also, milkweed the larval food source of the monarch butterfly was abundant throughout the field.

Area # 7 - Part of this area is in West Hartford. From Newfield street to New Park Avenue, the area is very urbanized and the river is enclosed on both sides. Riverside buffer vegetation is currently being impacted from earth removal and piles of sand and gravel. The river's section between Quaker Lane South and New Park Avenue appears to receive some maintenance and vegetation management in the form of selective herbiciding of streamside trees and mowing. The quality of the river in this section appears to be improved and in better condition than most of the downstream stretch. Mallard, American robin, northern catbird and belted kingfisher were observed along this stretch. A variety of native fruiting shrubs were observed along this area.

Discussion of Habitat Conditions

The wildlife habit conditions of this river corridor (Area #1, 2 and 3 - Plainfield Street to Farmington Avenue) vary from very good to impoverished. Riparian zones (natural areas adjoining water systems) are usually generally high in productivity and species diversity. Wildlife benefit from riparian zones in many ways. Riparian zones can serve as migratory pathways for migratory wildlife or be a major part of the local habitat for resident wildlife.

Land use changes over the years have altered the riparian zone in detrimental ways and in some cases in beneficial ways. The wildlife found during site inspections show some indication of habitat quality but the absence of some species such as the red-shouldered hawk which require larger undisturbed forested floodplains indicate some limitation to the habitat quality. Undisturbed riparian zones play an important role in the maintenance of water quality, aquatic habitat, and quality habitat (Thomas et al. 1979, Barton et al. 1985, Naiman et al. 1993, Stocek 1994). The river's corridor (1000 feet on either side) has been impacted by filling and altering of it's floodplain and wetlands. The water that flows in the river has also been impacted by a variety of sources

including combined sewer overflows and urban runoff . It can be expected that the fish species that inhabit the water will be those that are more tolerant of reduced water quality (see Aquatic Resources section). Wildlife such as great blue herons, belted kingfishers, and river otter may opportunistically hunt for fish in these waters because of their quantity, not necessarily their quality. In general, however it is a good indication to see many of the wildlife species such as the great blue heron and belted kingfisher in such an urbanized section of Connecticut.

Major Wildlife Concerns Arising From Trail Development

Development of a high use pedestrian / bicycle trail along the river from Albany Street bridge south to Farmington Avenue will result in a degradation of the habitat conditions for wildlife. Except for a short stretch from Plainfield Street to the Albany Street bridge (Area #l), there isn't enough upland area to justify the placement of a trail which includes high pedestrian use and bicycle use. A small hiking trail using existing ground conditions may be feasible but will require a lot of vegetation maintenance and may only be open seasonally because of wet conditions.

Given that the North and South Branches of the Park river and their adjoining riparian zones have been heavily disturbed and developed over the years, development of new roads or trails in or near the rivers should be carefully reviewed and located so that it does not lead to increased damage and degradation.

Increased human traffic next the river is a wildlife concern. There are several studies in wildlife ecology that indicate a strong relationship between shrinking forests and high human use leading to declining function as meaningful

reserves for area-sensitive wildlife (wildlife that require larger unbroken parcels) (Bond 1957, Levenson 1981, Hohne 1981, Askins et al. 1987). As forest and habitats shrink in size, they are less viable as breeding places for area-sensitive wildlife and an increase in predation and parasitism of nests occurs (Blake and Karr 1985).

Recommendations to Lessen Impacts

The trails should strive to not exacerbate negative impacts through floodplain filling, wetland filling or lead to excessive interruptions of wildlife from high use of trails through remaining natural areas. Trail designers should designate higher use trails (those that include bicycling, rollerblading) in more degraded areas. The higher use trails can be placed in areas closer to impacted areas (i.e. channelized South Branch of Park River along Pope Park and Brookfield Street). The higher use trails should stay out of floodplains and wetlands such as Areas #2 and #3.

The following categories of trails are recommended:

High use trail

- Intensive use including bicycling, rollerblading, skateboarding
- Trail Surface - hard surface, heavily compacted, paved
- Areas - outside of floodplains, in impacted areas, noisy and developed areas

Medium use trail

- Walking, hiking, birdwatching, passive recreation
- Trail Surface - stone dust, gravel, wood

Light use trail

- Foot path, tranquil nature hiking, birdwatching
- Trail Surface - natural leaf litter, wood chips

Canoe trail

- Develop access points and exit points for canoeists
- Trail Surface - the river, access or exit points (woodchips, gravel)

High use trails can be established in Area #4, #5, and #6. Area # 4 (Park Street to Hamilton Street) contains a cemented channelized section to the South Branch of the Park River. Area #5 (Hamilton Street, along Brookfield, to Flatbush) has potential for a high use trail along Brookfield Street and the river. At Flatbush Avenue bridge (Area #6) the high use trail may have to go to the west side of the river through the reverting fields. A pedestrian bridge was mentioned as a possibility to connect back over to the east side of the river. This will allow the trail to loop back to Flatbush Avenue.

On the west side of the river, the high use trail should be maintained away from the river's channelized slope to prevent erosion. The river's banks in this stretch are man made. The banks have been contoured, graded and top dressed with gravel. The banks of the river have revegetated with mostly non native invasive species with occasional patches of native vegetation. Selective use of herbicides may be needed to control some of the invasives, especially the Japanese knotweed. The high use trail should be kept back from the river's banks (albeit manmade banks) by at least 50 feet. The 50 feet should be measured from the top of the bank. Adjoining small trails that lead to the river off of the main trail can be placed appropriately to allow a canoeist, walker, hiker or fisherman access to the river. A high use trail can be placed along Overlook Terrace with parking and access from the abandoned playground area.

Other Wildlife Impacts

As trails are developed, users will include dog walkers. Although there are leash laws to help keep dogs under control of the owners, non-compliance is prevalent throughout (Picone, personal observation). Unleashed dogs not only become dangers and nuisances to trail users but also become problems for wildlife. Dog impacts to wildlife are worst during nesting seasons. Ground nesting birds can be disrupted and nests destroyed or abandoned because of harassment by unleashed dogs. In small urban areas, dogs chasing deer can also become a problem because they don't have a large area to escape to. Dog droppings in and around the trail can detract from a pleasurable walk. The impacts of unleashed dogs to people and the environment is usually downplayed by most people, however it is a very serious problem that increases every year as more and more people own pets. It behooves trail designers and maintainers to restrict dogs from being allowed on the trails from April 1 through September 30. Signage should be developed to educate trail users on why dogs are not allowed during the nesting season.

Develop a Canoeable Trail

Some river sections are best suited to have a canoeable trail in place of a walkable trail. Canoeable trails can be less intrusive and no alteration of streamside vegetation is needed except for clearance of trees and logs in the river's channel. Sections of the river that have considerable wetlands and floodplains adjoining should be restricted to canoeing/kayaking. Sections of the river that are canoeable can introduce urban residents to a quiet and peaceful way to enjoy nature. Canoe access points should be identified and improved for accessibility. Local conservation groups should be encouraged to establish and maintain canoeable pathways through various sections. Canoeing or kayaking can be a fun way to see wildlife and enjoy the river.

Develop an Access Guide

A guide or booklet should be developed which describes locations, various trails, and access points and convey the rules and regulations about trail use, ecological concerns and the need to respect private landowner's rights. Included should be a section on the concept of "packing out what you pack in" and how citizens can be watchdogs for keeping the river and the environment clean.

Creation of a Connected Greenway

Along with suitable trail development, the City of Hartford should acquire available properties along the North and South Branches of the Park River to help interconnect a greenway to maintain valuable riparian zone. As urbanization continues, the riparian areas will be further degraded if not protected and managed. A greenway connected to other greenways helps maintain habitat areas for wildlife, especially during migratory periods.

Vegetation Management

The habitat quality of the riparian zone and adjoining upland areas are somewhat degraded by invasive non-native plants, such as tree of heaven, Norway maple, winged euonymus, autumn olive, Japanese knotweed, and garlic mustard to name a few. Removal or management of these invasives is warranted and should be considered as part of the maintenance of future trails. Invasives can be opportunistically removed during the construction phase of the trails and managed against throughout the future trail maintenance. Controlling invasive non-natives will require a diligent application of mechanical removal by hand, pick and shovel, and tractor (back-hoe). Selective application of herbicides may also be necessary for some of the particularly aggressive non-

natives such as Japanese knotweed. Please contact Todd Mervosh of the Connecticut Agricultural Experiment Station for assistance on herbicides at (860) 683-4984. Many non-native invasives originate from nearby plantings along the streets or yards of residences. Traditionally planted invasives such as Norway maple and winged euonymus escape into the surrounding woodlots and outcompete the native vegetation for growing space. The following invasive non-natives should not be planted and removed whenever feasible:

Norway Maple (*Acer platanoides*)
Tree of Heaven (*Ailanthus altissima*)
Catalpa (*Catalpa spp.*)
Autumn Olive (*Elaeagnus umbellata*)
Winged Euonymus (*Euonymus alata*)
Privet (*Ligustrum spp.*)
Amur Honeysuckle (*Lonicera mackii*)
Morrow's Honeysuckle (*Lonicera morrowii*)
Tartarian Honeysuckle (*Lonicera tartarica*)
Common buckthorn (*Rhamnus cathartica*)
Glossy buckthorn (*Rhamnus frangula*)
Multiflora rose (*Rosa multiflora*)
Asiatic bittersweet (*Celastrus orbiculatus*)
Japanese Honeysuckle (*Lonicera japonica*)

Other Wildlife Habitat Enhancements

Nesting structures can be placed in appropriate habitats along the North and South Branches of the Park River. Nest boxes that benefit house wrens, chickadees, screech owls wood ducks and gray squirrels can be placed in suitable habitat (the Team biologist is available for consultation).

Plantings of native trees and shrubs that provide increased seasonal food sources can enhance conditions for wildlife. Creation of wildlife thickets and winter cover can also benefit area wildlife. Creation of wildflower meadows for butterflies and other wildlife can be created and maintained. Snag trees can be encouraged in appropriate areas for snag-dependent wildlife such as woodpeckers and flying squirrels.

In Conclusion

Creation of riverside trails help urban residents gain access to natural areas in their communities. Careful placement and management of these trails is necessary to balance the use and protection of natural resources. The challenge for trail planners is to increase opportunities for passive and active recreation yet reduce impacts to the existing conditions for wildlife. This report has attempted to shed light on potential wildlife impacts associated with riverside trails and means in which to minimize impacts. The environmental review area was broken down into seven areas and each area was critiqued for its existing conditions, limitations and potential enhancements. It is hoped that prudent development of trails occurs with careful consideration to wildlife impacts.

Given the complexities of developing trails along rivers and buffer areas, one suggestion might be to develop one trail (i.e. Annie Fisher Elementary School section from University of Hartford to Albany Street) and monitor its use and associated problems for a couple of years. This will enable trail planners to adjust future trails to best fit the needs of urban residents. A "pilot trail" concept can help trail planners work out any unforeseen problems before full scale development is implemented. The Team biologist is available for further consultation.

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Aquatic Resources - North Branch Park River

Site Description

The North Branch Park River Project, sponsored by the City of Hartford, proposes development of a bicycle/pedestrian trail along a 2.5 + mile reach of the North Branch Park River southerly from Plainfield Street to Farmington Avenue, Hartford. Through this reach, the river is contained in a channel nearly 40 feet in top of bank width and normal flow depths averaging 1.5 feet. The low to moderate gradient, meandering channel creates surface flow predominated by moving pool interspersed by shallow riffle. Stream substrate is composed of cobble, gravel, coarse sand, and sand-silt fines.

Despite extensive development in the watershed, dense growths of hardwoods and woody shrubs predominate as riparian vegetation and provide the North Branch Park River with a nearly complete canopy. Physical in-stream habitat is provided by the water depth in pools, undercut banks, and fallen or overhanging riparian vegetation.

The extensive watershed development (as exemplified in several stormwater drainage discharges) has however, impacted water quality. The Department of Environmental Protection classifies the North Branch Park River as Class C/A surface waters. Designated uses for surface water of this classification are certain fish and wildlife habitat, certain recreational activities, agricultural, industrial and other legitimate uses including navigation; swimming may be precluded. Although not currently meeting water quality criteria, the goal for Class C/A waters is an improvement in water quality to Class AA, A, or Class B depending upon uses designated for the watercourse.

Aquatic Resources

Based upon channel grade, morphology, and substrate composition, the North Branch Park River is classified as cool water resource. The Fisheries Division has formally surveyed the river's fish population with the most recent survey conducted August 23, 1988. The river reach surveyed was in the vicinity of the Annie Fisher School and Watkinson School. Species collected included redfin pickerel (*Esox americanus*), common shiner (*Luxilus cornutus*), spottail shiner (*Notropis hudsonius*), tessellated darter (*Etheostoma olmstedi*), common carp (*Cyprinus carpio*), white sucker (*Catostomus commersolli*), and American eel (*Anguilla rostrata*). These species are native to cool water rivers and streams in Connecticut. In addition, the following warmwater lake and pond species were observed: largemouth bass (*Micropterus salmoides*), pumpkinseed sunfish (*Lepomis gibbosus*), redbreast sunfish (*Lepomis auritus*), and rock bass (*Ambloplites rupestris*). These species are likely to have emigrated from lakes or ponds within the immediate watershed. A copy of the survey results follows.

Impacts

The concept of a bicycle/pedestrian trail along the North Branch Park River can prove beneficial in that it can provide an opportunity for a large number of people to become acquainted with or be given a better appreciation or understanding of habitats and resources associated with riverine systems. However, unlike the increasingly popular multi-use trail development along abandoned railway lines ("rails-to-trails"), significant lengths of the proposed bicycle/pedestrian trail along the North Branch Park River will be established in undeveloped riparian habitats adjacent the river. The alteration of the relatively few remaining undisturbed riparian habitats in the mid-basin of the North Branch Park River can promote adverse impacts to riverine habitats; these specifically resulting from:

- Removal of riparian vegetation eliminates the natural "filtering" effect of vegetation which has the ability to prevent sediments, nutrients, fertilizers, and other non-point source pollutants from upland sources from entry into streams. Non-point source pollutants reportedly are a significant factor in preventing the North Branch Park River from attaining established water quality goals. Riparian vegetation removal also increases stream water temperature during the summer months (thermal loading); decreases stream bank stability thereby increasing surface water siltation and habitat degradation; eliminates or drastically reduces the supply of large woody debris provided to streams (such material provides critical physical habitat features for numerous species of aquatic organisms; reduces a substantial proportion of food for aquatic insects which in turn constitutes a reduction in a significant proportion of food available for resident fish); stimulates excessive aquatic plant growth; and decreases the riparian corridor's ability to serve as a "reservoir" storing surplus runoff for gradual release back into the streams during summer and early fall low flow periods.
- Construction of permanent "hard" structures such as a paved trail or bridges within an active river flood plain can alter flood flow hydraulics in a manner leading to soil erosion and subsequent sediment transport. Excessive erosion, sediment transport and sediment deposition associated with river bank failure can degrade both water quality and physical habitat, in turn affecting the resident fish population. Specifically, excessive siltation has the potential to cause a depletion of oxygen within the water column; disrupt fish respiration and gill function; reduce water depth resulting in a reduction of habitats used by fish for feeding, cover, and spawning; reduce fish egg survival; reduce aquatic insect production; and promote aquatic plant growth.

Recommendations

To be least impacting, bicycle/pedestrian trail development along the North Branch Park River should be done in accordance with the following provisions:

- Trails should maintain, at a minimum, a 100 foot buffer of undisturbed habitat adjacent to the North Branch Park River. The buffer zone boundaries should be measured from either, (1) the edge of riparian inland wetland as determined by Connecticut inland wetland soil delineation methods or (2) in the absence of riparian wetlands, the edge of the stream or reservoir bank based upon bank-full conditions. Research has indicated that a buffer zone of this width prevents damage to aquatic ecosystems that are supportive of diverse species assemblages. Buffers absorb surface runoff, and the pollutants they may carry, before they enter wetlands or surface waters. Please refer to the attached documentation presenting Fisheries Division policy and position regarding riparian buffers for additional information.
- Trail crossing(s) of the North Branch Park River should make use of existing crossing structures. If new stream crossing(s) are required, crossing structures should be of span bridge or arch culvert design. These structures most adequately preserve physical in-stream habitat and do not create impediments to fish migration. Ideally, required stream crossings should be located at the site of previous crossings. New crossings should approach streams at a 90° angle.
- Pedestrian traffic should be limited to authorized trails only. The development of unauthorized trails should not be allowed and be eliminated if they are noted.
- Establish a trail maintenance plan to conduct routine trail inspections and make corrective repairs to those situations potentially causing erosion and sediment events.

- Signage should be erected along the trail(s) at select locations to describe the function of key features of the river such as pools, riffles, riparian area, and the consequence of stormwater discharges. An initial scheme for such signage could include:

    - For trail locations with clear vantages of the North Branch Park River or river crossing(s)
        - **Stream habitat overview.** A key characteristic of any productive in-stream habitat is diversity. It is imperative that the proper blend of water depths, water velocities, and substrate types be present together to form the necessary food production, spawning incubation, and cover areas that combine to form a complete stream habitat.
        - **Pools.** Loosely defined, a pool is a region of deeper, slower moving water with fine bed materials. With overhanging banks and vegetation, pools provide cover, shelter, and resting areas primarily for larger finfish. During low flows pools can become isolated pockets of water which allow survival of finfish and other aquatic organisms.
        - **Riffles.** Areas of shallower, faster moving water with coarser bed materials. Riffles are most often associated with "white water", a turbulence which adds oxygen to water. Riffles tend to support higher densities of aquatic insects and are thus important areas of finfish food production. Riffles also serve as a spawning site for most stream finfish. Due to competition and predation, juvenile and small sized finfish tend to inhabit riffles.

- For placement along trail adjacent to the North Branch Park River floodplain

    - **Riparian area.** The riparian area is that section of land which adjoins the river channel. A well vegetated riparian area is critical to the health of the river ecosystem. Roots of trees, shrubs, and grasses bind the river bank soils and provide a resistance to the erosive forces of flowing water. Stems and leaves of river bank vegetation provide shade which prevents high water temperatures. Leaves, stems, and other plant parts that fall into the river provide food for aquatic insects. Large woody debris that fall into the river enhance physical habitat. Abundant riparian vegetation softens rainfall and enables the riparian area to serve as a reservoir storing surplus runoff for a gradual release to the river during low flow periods of summer and early fall. The riparian area is a natural filter which removes nutrients, sediments, and other non-point source pollutants from overland runoff.

- For placement at trail crossing of known stormwater discharges

    - **Stormwater discharge.** Urban development typically results in large impervious areas such as roadways, sidewalks, parking lots, and rooftops that shed water during rainstorms. Unlike vegetated areas, where water can soak into the ground after storms, runoff from impervious areas of urban areas increase the amount and velocity of water runoff causing dramatic fluctuations of river flow resulting in bank erosion, damage to riparian vegetation, and widening of the river channel. This will result in lower water depths during non-storm periods, higher

than normal water levels during wet weather periods, and higher water temperatures.

The quality of river water can be significantly affected by stormwater discharge. Motor oil, grease, gasoline, and sediment are commonly found in stormwater drainage. In addition, a variety of fertilizers and pesticides are used to maintain lawns and gardens; these substances often find their way into stormwater.

Native finfish and other aquatic life cannot survive in rivers severely impacted by stormwater runoff.

In conclusion, efforts begun by the City of Hartford North Branch Park River Project should, in consort with local groups, be expanded to create a North Branch Park River "greenway." The greenway concept would be a connection of properties both of private and public ownership fronting the river with the intent of preserving or enhancing riparian habitats. The historic degradation or elimination of riparian habitats have a direct correlation to impairment of river habitat quality. With recent improvements to discharge quality, the protection of riparian habitats as can be achieved through a greenway is key to complete restoration of North Branch Park River habitats and resources.

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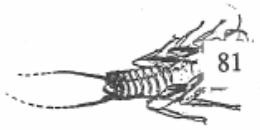
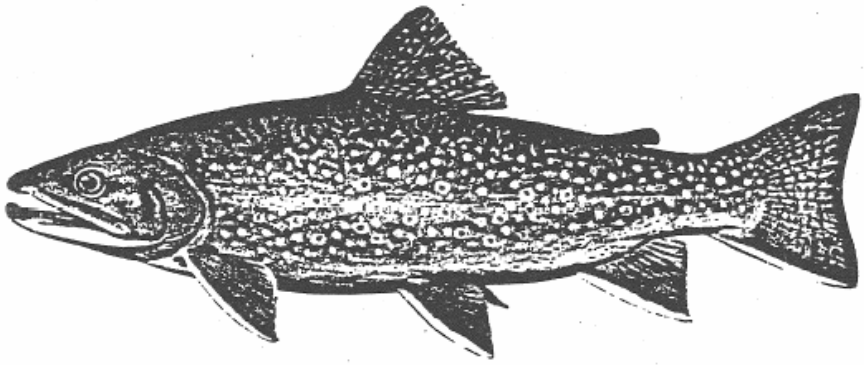
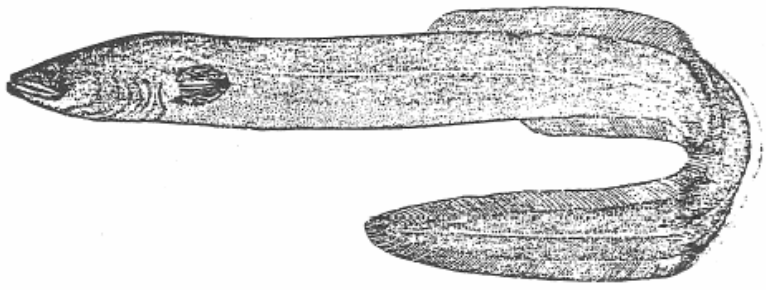


A Survey of Connecticut Streams and Rivers – Farmington River, Park River and Stony Brook Drainages





by:
Neal T. Hagstrom, William B. Gerrish, Edward A. Machowski
and William A. Hyatt

STATE OF CONNECTICUT, Department of Environmental Protection
Inland Fisheries Division, Hartford, CT 06106

Appendix C

Species codes used on Stream Survey data summary sheets.

Common Name	Code
Sunfish	
Banded Sunfish	BS
Black Crappie	BC
Bluegill Sunfish	BG
Green Sunfish	GR
Hybrid Sunfish	HY
BGxPS	BP
BGxRS	RG
PSxRS	RP
Largemouth Bass	LM
Pumpkinseed	PS
Redbreast Sunfish	RS
Rock Bass	RB
Smallmouth Bass	SM
White Crappie	WH
Trout	
Atlantic Salmon	AS
Brook Trout	BK
Brown Trout	BN
Kokanee	KO
Lake Trout	LT
Rainbow Trout	RW
Salm-brown	SB
Herring	
Alewife	AL
American Shad	SA
Blueback Herring	BH
Gizzard Shad	GI
Hickory Shad	HS
Bass	
Striped Bass	BA
White Perch	WP
Perch	
Walleye	WA
Yellow Perch	YP
Swamp Darter	SD
Tesselated Darter	TD
Catfish	
Black Bullhead	BU
Brown Bullhead	BB
Channel Catfish	CC
White Catfish	WC
Yellow Bullhead	YB
Pike	
Chain Pickerel	CP
Grass Pickerel	GP
Northern Pike	NP
Suckers	
Creek Chubsucker	OH
White Sucker	WS
Minnows	
Blacknose Dace	BL
Bluntnose Minnow	BM
Bridled Shiner	BD
Carp	CA
Common Shiner	CS
Creek Chub	CR
Cutlips Minnow	CM
Fallfish	FA
Fathead Minnow	FM
Golden Orfe	GO
Golden Shiner	GS
Goldfish	GF
Grass Carp	GC
Longnose Dace	LD
Pearl Dace	PD
Spottail Shiner	SS
Stoneroller	SR
Tench	TE
Killifish	
Banded Killifish	KI
Mummichog	MU
Sheepshead Minnow	SP
Striped Killifish	SK
Sticklebacks	
Brook Stickleback	BO
Fourspine Stickleback	FS
Ninespine Stickleback	NS
Threespine Stickleback	TS
Miscellaneous	
American Eel	AE
Atlantic Needlefish	NE
Atlantic Silversides	SI
Atlantic Sturgeon	ST
Bowfin	BW
Bay Anchovy	AN
Brook Lamprey	LA
Central Mudminnow	MM
Hogchocker	HO
Rainbow Smelt	RA
Sea Lamprey	SL
Shortnose Sturgeon	SN
Slimy Sculpin	SC
Tidewater Silversides	TI
Tomcod	TO

LOCATION NAME: NORTH PARK RIVER SITE #: 1
DESCRIPTION : NORTH OF ALBANY AVE BRIDGE 50 M 83

SAMPLE LENGTH: 150.00 (M) SAMPLE DATE: 08/23/88

STREAM CHARACTERISTICS

PHYSICAL		CHEMICAL	MEAN	STD
MAX WATER TEMP .....(C).		DO .....(mg/l).	8.10 ..	0.36
AIR/WATER TEMP RATIO ..(%).	1.13	pH	7.80 ..	0.00
CANOPY COVER .....(%).	90.00	COND ....(uS/cm3).	800.00 ..	0.00
STREAM DISCHARGE .....(M3).	4.27	ALK .(mg CaCO3/l).	85.77 ..	0.90
STREAM VELOCITY ...(m/Sec).	0.20			

	MEAN	STD
STREAM WIDTH ...(M).....	8.18 ..	25.67
STREAM DEPTH ..(CM).....	23.55 ..	19.96
DOMINANT SUBSTRATE TYPE ...	1	
TYPE 3 SUBSTRATE	20.00 (%)	
TYPE 3 EMBEDDNESS	80.00 (%)	
POOL/RIFFLE RATIO	(%)	
TOTAL SHELTER	40.95 (M2)	

BIOLOGICAL

SPECIES CODE	N	SE	SPECIES CODE	N	SE	SPECIES CODE	N	SE
BS			SD			LD		
BC			TD	265.0	25.48	PD		
BG			WA			SS	217.0	6.56
GR			WP			SR		
HY			YP			TE		
BP			BU			KI		
RG			BB			MU		
RP			CC			SP		
LM	4.0	0.00	WC			SK		
PS	48.0	1.86	YB			BO		
RS	50.0	3.08	CP			FS		
RB	78.0	4.36	GP	2.0	0.00	NS		
SM			NP			TS		
WH			OH			AE	71.0	0.00
SA			WS	111.0	4.51	NE		
BK			BL			SI		
BN			BM			ST		
KO			BD			BW		
LT			CA	6.0	0.00	AN		
RW			CS	71.0	0.00	LA		
SB			CR			MM		
AL			CM			HO		
AS			FA			RA		
AH			FM			SL		
H			GO			SN		
GI			GS			SC		
HS			GF			TI		
BA			GC			TO		

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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Aquatic Resources - Goodwin Estate

Site Description

The ±17 acre Goodwin Estate contains a ±2,500 foot reach of the North Branch Park River northerly of Asylum Avenue, Hartford. Through this reach, the river is contained in a sinuous channel nearly 40 feet in top of bank width and normal flow depths averaging 1.5 feet. The low to moderate gradient, meandering channel creates surface flow predominated by moving pool interspersed by shallow riffle. Stream substrate is composed of cobble, gravel, coarse sand, and sand-silt fines.

An unnamed tributary stream enters northerly to the North Branch Park River at a point approximately midway in the river segment within the Goodwin Estate. The stream is similar in character to the North Branch Park River although it is significantly smaller being some 15 feet in top of bank width and normal flow depths averaging 1 foot or less.

Despite extensive development in the watershed, dense growths of hardwoods and woody shrubs predominate as riparian vegetation on the Goodwin Estate and provide the North Branch Park River with a nearly complete canopy. Physical in-stream habitat is provided by the water depth in pools, undercut banks, and fallen or overhanging riparian vegetation.

The extensive watershed development (as exemplified in stormwater drainage discharges) has however, impacted water quality. The Department of Environmental Protection classifies the North Branch Park River as Class C/A

surface waters. Designated uses for surface water of this classification are certain fish and wildlife habitat, certain recreational activities, agricultural, industrial and other legitimate uses including navigation; swimming may be precluded. Although not currently meeting water quality criteria, the goal for Class C/A waters is an improvement in water quality to Class AA, A, or Class B depending upon uses designated for the watercourse.

Aquatic Resources

Based upon channel grade, morphology, and substrate composition, the North Branch Park River is classified as a cool water resource. The Fisheries Division has formally surveyed the river's fish population with the most recent survey conducted August 23, 1988. The river reach surveyed was in the vicinity of the Annie Fisher School and Watkinson School located approximately one stream mile north of the Goodwin Estate. Species collected included redfin pickerel (*Esox americanus*), common shiner (*Luxilus cornutus*), spottail shiner (*Notropis hudsonius*), tessellated darter (*Etheostoma olmstedi*), common carp (*Cyprinus carpio*), white sucker (*Catostomus commersoni*), and American eel (*Anguilla rostrata*). These species are native to cool water rivers and streams in Connecticut. In addition, the following warmwater lake and pond species were observed: largemouth bass (*Micropterus salmoides*), pumpkinseed sunfish (*Lepomis gibbosus*), redbreast sunfish (*Lepomis auritus*), and rock bass (*Ambloplites rupestris*). These species are likely to have emigrated from lakes or ponds within the immediate watershed. A copy of the survey results is attached (see previous section). A fishery population of a similar species makeup is anticipated to inhabit the North Branch Park River through the Goodwin Estate.

Impacts

The City of Hartford has proposed a reuse of the abandoned Goodwin Estate suggesting either a low density residential development or conference center.

Despite being previously developed, the Goodwin Estate remains as one of the relatively few remaining undisturbed riparian habitats in the mid-basin of the North Branch Park River. Continued land use change within the remaining forested areas of the basin, such as that currently proposed through development of a residential development or conference center, has the potential to adversely impact aquatic habitats and resources should mitigative measures not be implemented. Anticipated impacts include:

- Removal of riparian vegetation eliminates the natural "filtering" effect of vegetation which has the ability to prevent sediments, nutrients, fertilizers, and other non-point source pollutants from upland sources from entry into streams. Non-point source pollutants reportedly are a significant factor in preventing the North Branch Park River from attaining established water quality goals. Riparian vegetation removal also increases stream water temperature during the summer months (thermal loading); decreases stream bank stability thereby increasing surface water siltation and habitat degradation; eliminates or drastically reduces the supply of large woody debris provided to streams (such material provides critical physical habitat features for numerous species of aquatic organisms; reduces a substantial proportion of food for aquatic insects which in turn constitutes a reduction in a significant proportion of food available for resident fish); stimulates excessive aquatic plant growth; and decreases the riparian corridor's ability to serve as a "reservoir" storing surplus runoff for gradual release back into the streams during summer and early fall low flow periods.
- Construction of permanent "hard" structures such as a paved parking areas or structure within or adjacent to active river flood plain can alter flood flow hydraulics in a manner leading to soil erosion and subsequent sediment transport. Excessive erosion, sediment transport and sediment deposition associated with river bank failure can degrade both water quality and physical habitat, in turn affecting the resident fish population. Specifically, excessive

siltation has the potential to cause a depletion of oxygen within the water column; disrupt fish respiration and gill function; reduce water depth resulting in a reduction of habitats used by fish for feeding, cover, and spawning; reduce fish egg survival; reduce aquatic insect production; and promote aquatic plant growth.

- An 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.
- Nutrient enrichment from fertilizer runoff from manicured lawns will stimulate aquatic plant growth. Herbicide runoff from manicured areas may result in fish kills and water quality degradation.

Recommendations

To be least impacting, redevelopment of the site should not exceed the existing development "foot print." Should redevelopment exceed the limits of the existing footprint it should be done in accordance with the following provisions:

- Maintain, at a minimum, a 100 foot buffer of undisturbed habitat adjacent to the North Branch Park River. The buffer zone boundaries should be measured from either, (1) the edge of riparian inland wetland as determined by Connecticut inland wetland soil delineation methods or (2) in the absence of riparian wetlands, the edge of the stream or reservoir bank based upon bank-full conditions. Research has indicated that a buffer zone of this width prevents damage to aquatic ecosystems that are supportive of diverse species assemblages. Buffers absorb surface runoff, and the pollutants they may carry, before they enter wetlands or surface waters. Please refer to the attached documentation presenting Fisheries Division policy and position regarding riparian buffers for additional information.

- Institute a phased development of the site with an approved and completely functional stormwater management system installed initially. Fisheries Division staff admittedly lack the ability to determine the site specific efficacy of stormwater detention basins and defer such an evaluation to the Environmental Review Team member(s) with such expertise. However, the Division does recommend that the stormwater detention basins be enhanced with a "biofilter" capability to further the system's capacity for nutrient removal.
- Establish comprehensive erosion and sediment control plans with mitigative measures (haybales, silt fence, etc.) to be installed prior to and maintained through all development phases. Land clearing and other disturbance should be kept to a minimum with all disturbed areas being protected from storm events and restabilized in a timely manner.
- Limit liming, fertilizing, and the introduction of chemicals to developed land susceptible to runoff into streams or wetlands.
- Limit regulated activities adjacent to riparian buffer zones to historic low precipitation periods of the year. Reduced precipitation periods of summer to early fall provide the least hazardous conditions when working near sensitive aquatic environments.

Aquatic Resources - South Branch Park River**

Aquatic Habitat Description

The South Branch Park River through the evaluated reach had been previously altered for flood control. The trapezoidal channel averages 65 feet in top of bank width and of 1.5 feet in average depth. Surface flow through the altered channel is predominated by moving pool with few areas of riffle. River substrate is composed of the cobble-sized rip rap imbedded with sand-silt fines. Riparian vegetation along the river channel is composed of a narrow band of trees and mowed field.

Extensive development within the South Branch Park River watershed coupled with flood control modifications have significantly reduced the diversity and function of habitats both within the stream channel and riparian area and has impacted river water quality. The South Branch Park River is rated as *Class C/B* surface waters in Water Quality Standards of the Department of Environmental Protection. This classification denotes the watercourse is presently not meeting *Class B* water quality criteria or one or more designated uses. The water quality goal is achievement of *Class B* criteria and attainment of *Class B* designated uses which include recreational use, fish and wildlife habitat, agricultural and industrial supply and other legitimate uses including navigation.

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* This report was prepared May 1999 and looked at the South Branch Park River between Newfield Street and Flatbush Avenue.

Aquatic Resources

Fisheries resource surveys of the South Branch Park River are limited to a single survey conducted on August 1, 1988. The survey site encompassed a 150 meter section of the South Branch Park River in the vicinity of the Newfield Avenue Bridge. Within the survey segment the river was found to support grass pickerel *(Esox americanus)*, common shiner *(Luxilus cornutus)*, spottail shiner *(Notropis hudsonius)*, blacknose dace *(Rhinichthys atratulus)*, banded killifish *(Fundulus diaphanus)*, tessellated darter *(Etheostoma olmstedi)*, white sucker *(Catastomus commersoni)*, carp *(Cyprinus carpio)* and American eel *(Anguilla rostrata)*. These fish species are commonly associated with cool-water rivers in Connecticut and are tolerant of impoverished habitat or water quality.
In addition to riverine fish species, the surveys revealed the presence of the following cool or warm water species: largemouth bass *(Micropterus salmoides)*, bluegill *(Lepomis macrochirus)*, pumpkinseed *(Lepomis gibbosus)* and redbreast sunfish *(Lepomis auritus)*. These species are likely to be permanent residents in South Branch Park River impoundments and transient through free flowing river reaches.

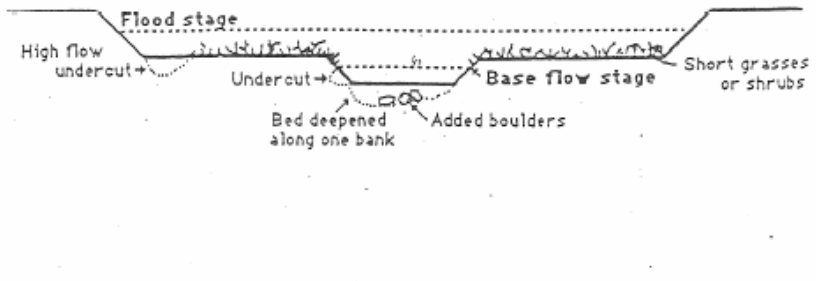
Resource Impacts

Previous modification to the South Branch Park River channel in the form of rip-rap lining the channel side slopes and regrading of the channel bed, resulted in significant instream and riparian habitat alteration thereby limiting habitat diversity. Lack of in-stream habitat diversity is reflected in the limited diversity of the fish population through the more intensively altered stream reach compared to other streams in the immediate watershed which have been surveyed by the Fisheries Division. A unique opportunity exists in the South Branch of the Park River Project to enhance in-stream habitat to a condition supportive of a diverse aquatic species complex.

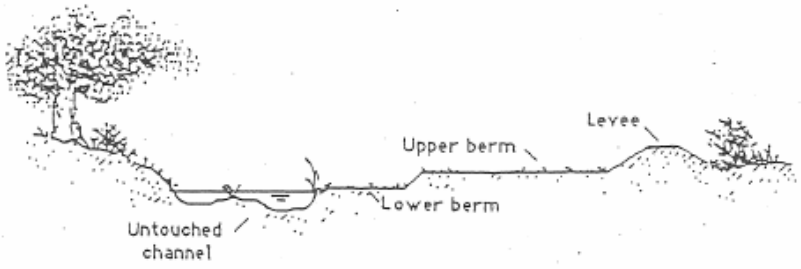
Mitigative Recommendations

The following measures are recommended to enhance habitat within the South Branch Park River:

1. Reconfigure the channel cross-section to a "multi-stage" design similar to that depicted in Figure 11 . A multi-stage channel incorporates a low flow channel, capable of carrying base flows of up to the 2-year storm frequency, within a flood channel of larger dimension. Such a design has proven successful in conveying flood flows while concentrating flows during periods of limited precipitation.



Design modified from Bovee (1982).



Design modified from Lewis and Williams (1984).

Figure 11. Examples of multi-stage channel design.

2. The low flow channel of the "multi-stage" design should be created with a meandering morphology. Literature suggests a general "rule of thumb" approach of setting meanders with channel crossovers at a spacing of 5 to 7 channel widths apart. It may be necessary to construct structures such as alternating wing deflectors, depicted in Figure 12 or small boulder groupings in order to maintain the meander pattern.

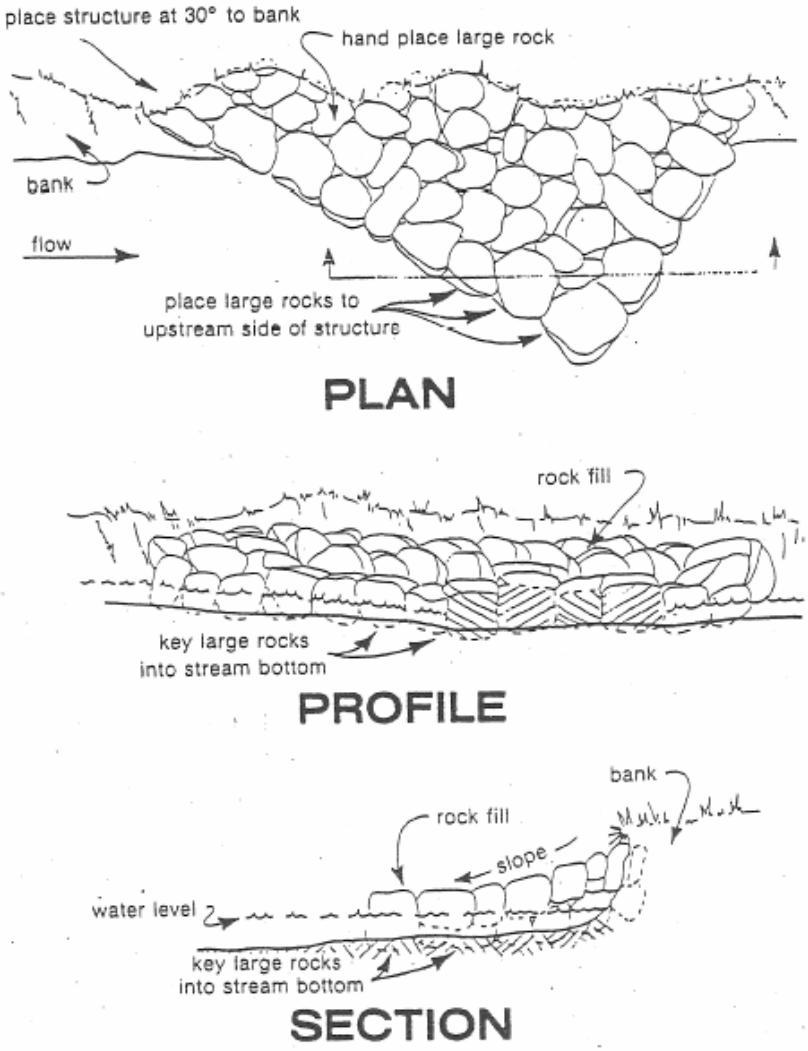


Figure12. Wing deflector detail. From Miller and Tibbot 1983.

3. Establishment of pool and riffle habitat. A 1:1 pool to riffle ratio has long been considered an optimal stream condition. As with meander establishment distances of the pool-riffle sequence are most readily set on the rule of thumb approach of 5 to 7 channel widths apart. Pools can be created by structures such as the vortex rock weir as depicted in Figure 13. Vortex rock weirs provide for impounding for pools yet allow for unimpeded fish migration.

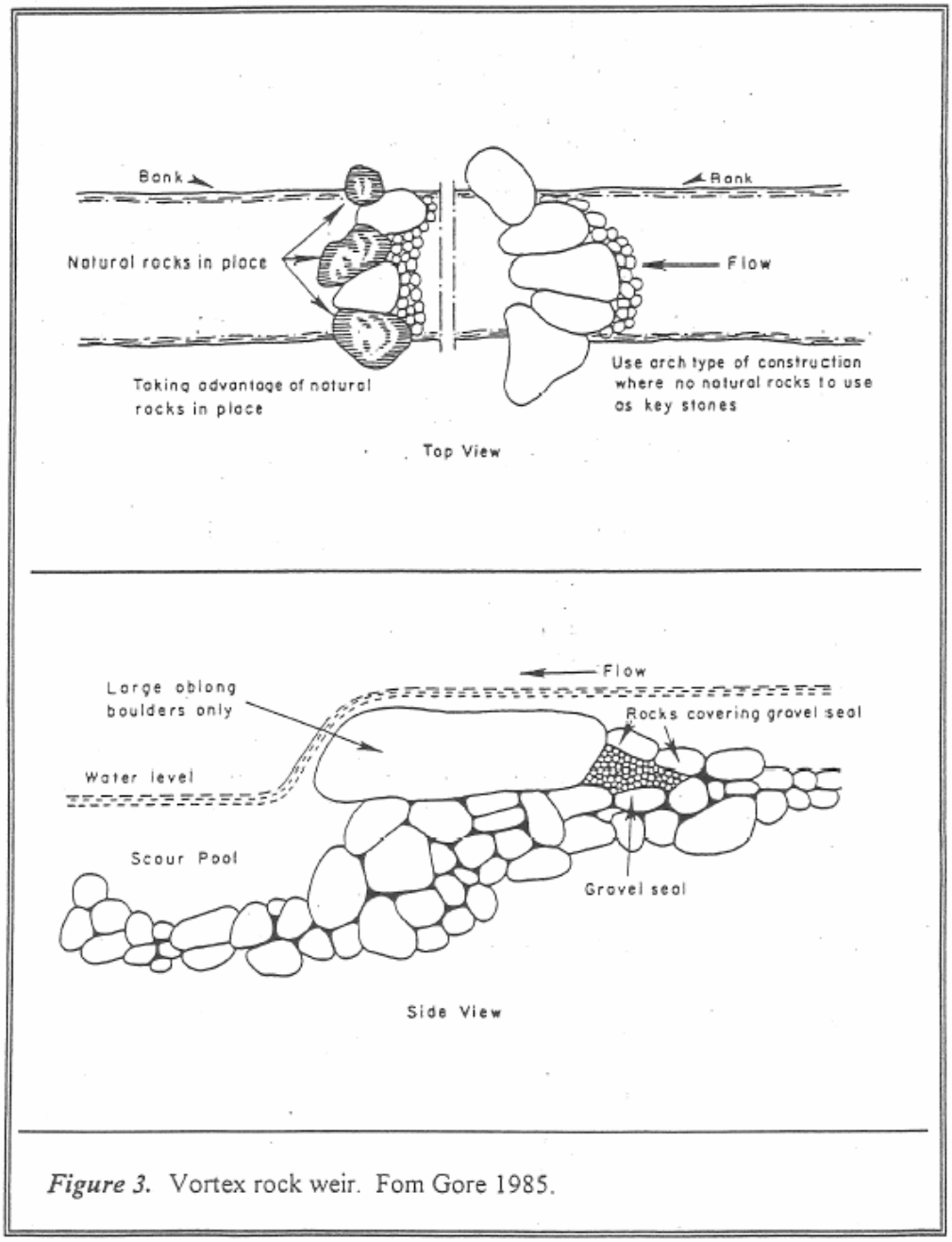


Figure 3. Vortex rock weir. Fom Gore 1985.

4. The river bed should be reconstructed with a heterogeneous sized mix of materials replacing the uniform substrate which currently exists. River substrate materials of a variety of sizes, from cobble up to small boulders, creates a micro-habitat diversity essential for a more complete development of the aquatic insect population and increase areas for fish reproduction, juvenile rearing and cover. This will require material to be brought in from an off-site source and be combined with the existing substrate.

5. Vegetation should be allowed to develop along the channel banks. The vegetation should be of a diverse species mix of trees, shrubs, and low growing cover (i.e. vines). Species selected for establishment should be similar to those native to the immediate watershed.

6. In effort to protect South Branch Park River habitats and resources located downstream, unconfined in-stream activities (those activities not occurring within a dewatered or isolated work area) should be scheduled for the time period of June 1 through September 30.

References

Gordon, N.D., McMahon, T. and Finlayson, B. *1992. Stream Hydrology, An Introduction for Ecologists.* New York: John Wiley & Sons.

Gore, J.A. 1985. *The Restoration of Rivers and Streams, Theories and Experience.* Boston: Butterworth Publishers.

Miller, J.G., and Tibbot, R. *1983. Fish Habitat Improvement for Streams.* Harrisburg, PA: Pennsylvania Fish Commission.

4.

Cultural Resources

Cultural Resource Review

A review of the State of Connecticut Archaeological Site Files and Maps shows one prehistoric archaeological resource in the project area. A Native American encampment along the North Branch of the Park River on University of Hartford property. This camp represents early hunters-gatherers utilizing the natural resources of the area at some unknown time period in the past. Field review indicates that topographic and environmental features of the project area suggest a high sensitivity for undiscovered prehistoric archaeological sites wherever urban development has not had a previous adverse effect on these cultural resources.

Nonetheless, urban expansion, including industrial and manufacturing history of the City of Hartford, may have left its own fingerprint on the landscape of the area. The Society for Industrial Archaeology (1981) has recognized the Park River in Hartford as an important industrial district (ca. 1890's). The firms that occupied buildings along the Park River combined with Colt Armory in establishing Hartford's reputation as a fountainhead of innovation in 19th-century metalworking technology. Sharp's Rifle Manufacturing Co., an offshoot of Robbins and Lawrence of Windsor, VT, built the first factory here in 1852, followed by Pratt and Whitney (gauges and machine tools) and Weed Sewing Machine Co. in the 1860's, Pope Manufacturing Co. (bicycles) and Hartford Machine Screw Co. in the 1870's, and Pratt and Whitney Aircraft in the 1920's. The earliest structures do not survive, and those that continue to stand now house offices and warehouses.

The factories form an almost continuous wall along the north side of Capitol Avenue. The Park River defined the northern boundary of the factory district; recent construction to channel the river underground caused demolition of

many industrial structures. These factories include the Pratt and Cady Plant which began in 1878 as the Steam Boiler and Appliance Co., making steam traps and checks valves patented by Rufus N. Pratt, a relative of Francis Pratt of Pratt and Whitney. Existing structures include Charles Perkins' Arrow Electric Plant built in 1912. Royal Typewriter Factory (1907) burned to the ground in the last decade.

While the City of Hartford reviews the Park River Branches and the Goodwin Estate as part of a natural resources inventory, the Office of State Archaeology (OAS) highly recommends that the city coordinate with the Connecticut Historical Commission and the Connecticut History Museum in the inventory of industrial and historical resources.

The Goodwin Estate is on the National Register of Historic Places and presents both archaeological and historic opportunities. Although the mansion suffered a devastating fire, the grounds surrounding the structure may contain archaeological remnants of the Goodwin occupation, which represents a "Golden Era" of Hartford's West End neighborhood.

The Office of State Archaeology maintains comprehensive files containing elementary and secondary school curriculums. The OAS office would be more than pleased to work with the Eastern Connecticut RC&D Area and other interested parties in coordinating workshops, tours, presentations and other educational opportunities. The Park River Industrial District offers an important resource for understanding local Hartford history, and especially sites and buildings that city students are familiar with. The OAS office is prepared to offer educational programs relating to the history of Hartford and the Park River area.

5.
Planning Review

CRCOG Sponsored Transportation Projects in the Vicinity of the North Branch Park River

Route 44/Albany Avenue

CRCOG recently sponsored a study that addressed congestion and safety concerns to Route 44/Albany Avenue, and looked at potential improvements along this heavily traveled commuter route.

There are improvements proposed at the intersection of Bloomfield Avenue and Route 44. The project would relocate the intersection entrance slightly, and increase the turn radius for traffic turning from Bloomfield Avenue onto Farmington Avenue, thus improving driver visibility and overall safety of the intersection.

The bridge on Route 44/Albany Avenue that crosses the North Branch of the Park River was recently rebuilt, and thus there are no changes proposed for that site at present. However, there is a signal at that point, and it may be possible to introduce a pedestrian crossing into the light sequence. (The Team planner has not studied the site closely enough to determine whether a pedestrian crossing at stream grade or street grade is more appropriate).

There are proposed improvements to Mark Twain Drive in order to reconnect the Drive to the University of Hartford.

Asylum Avenue

CRCOG is not involved in any projects that include improvements to Asylum Avenue at this point in time.

Planning Review - South Branch Park River

This review will focus on four topics:

- Coordination of project with *Plan of Development for the Capitol Region;*
- Coordination of project with plans and projects coordinated through the Capitol Region Council of Governments (CRCOG);
- Other projects in the study area; and
- Additional comments.

Coordination of Project with *The Plan of Development for the Capitol Region of Connecticut* (the 1988 Plan is currently in effect; the 2000 Plan is underway).

The South Branch of the Park River study proposes to: 1) continue the greenway/trail/outdoor classroom initiated along the North Branch of the Park River; 2) explore opportunities for a pedestrian/bicycle trails and new land uses; and 3) restore the River channel and habitat. These actions would reinforce a number of regional goals. Most importantly, the project supports two important land use goals: it will provide amenities to existing residential areas to help stabilize them, and may encourage infill development in this urban area, where land is underutilized. It is an ambitious project; particularly the restoration of the channel and habitat.

Regional Goal: Improve Water Quality

CRCOG supports efforts to improve the quality of watercourses and waterbodies, to meet State standards. By restoring natural river features, such as riffling, pooling, bank structure, and vegetation, water quality may be improved. However, this is an ambitious project that will require much interagency cooperation. It seems that adequate maintenance of the area will be critical for to

success. Also, the goals of the project should be clearly defined. It would be good to identify examples of such projects in urban settings.

Regional Goal. Promote acquisition and preservation of open space areas, especially near areas of urban concentration.

The South Branch flows through the Charter Oak-Zion neighborhood, and is also adjacent to the Parkville neighborhood. These neighborhoods have limited access to active recreation facilities, and virtually no access to natural areas. In its present condition, the River corridor does not attract users, and, in many instances, serves as a barrier. Enhancing the habitat would provide a unique natural resource to adjacent neighborhoods, and support the curriculum of nearby schools.

Regional Goal: Provide amenities to support revitalization of established residential areas.

If the River corridor is redesigned to accommodate some pedestrian/bicycle facilities and new land uses, it will connect the neighborhood to adjacent activities, thus promoting activity in the area, and possibly encouraging additional investment.

Regional Goal: Discourage structural development in thefloodplain, and encourage preservation of floodplain areas.

CRCOG supports projects that are in accordance with these goals. However, the Park River was channelized and enclosed for stretches, thus altering natural bank elevations, and it may be difficult to determine where structural development is appropriate. Project planners will need to continue to protect adjacent areas from flooding.

Coordination of Project with Plans and Projects Initiated/Managed through CRCOG.

A. Transportation and Community and Systems Preservation Grant (TCSP)*.

Through combined efforts, the Capitol Region Council of Governments and the City of Hartford were awarded a $480,000 grant by the Federal Highway Administration. The grant will fund a comprehensive process in which the links between transportation, land use, and economic development at the neighborhood and regional level will be examined. The study will address three prototypical communities in the Region: urban, suburban, and rural. The urban model is the Parkville neighborhood in Hartford, adjacent to but cut off from the South Branch of the Park River by I-84. Transportation improvements are one component of the TCSP study. Thus, there may be opportunities for coordination between the TCSP study and the South Branch project.

These components of the TCSP study may provide opportunities for coordination with the South Branch project:

- Parkville seeks to reinforce the urban, pedestrian nature of the neighborhood and will create design standards and incentives to support this.

- Parkville seeks to reconnect itself to Downtown Hartford: the I-84 corridor cuts it off on many sides. The community seeks to plan and design for increased and enhanced bicycle use and supporting amenities. Coordination between neighborhood groups, business groups, municipal officials, and other organizations will be extensive throughout the process.

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* TCSP is an initiative consisting of research and grants to assist communities as they address the interrelated problems involving transportation, land development, environmental protection, public safety, and economic development. The grants are awarded by the U.S. Department of Transportation in conjunction with TEA-21, the 6-year surface transportation law signed last year, that is a renewal of ISTEA.

Thus, there may be opportunities to plan for pedestrian and bicycle links between Parkville and Downtown and surrounding neighborhoods.

• Tie proposed new busway to neighborhood economic development plans.

Contact:	Linda Osten, Capitol Region Council of Governments, Project Manager TCSP, (860)522-2217 x28.

B. New Britain-West HIartford busway (economic development).

The Hartford West Major Investment Study (MIS), initiated by Connecticut Department of Transportion (CONNDOT) in conjunction with CRCOG and Central Connecticut Regional Planning Agency, reviewed alternatives for relieving congestion along I-84. One of the studies needs was that bus rapid transit be initiated along the I-84 corridor from New Britain to Hartford, within a limited access busway: the former New Britain rail line. The busway would include stops in Elmwood (West Hartford) and Parkville (Hartford). The proposed busway is a "hybrid package" that includes planning for land use policies to support transit-oriented economic development. This project will be integrated with the TCSP study.

Contacts:	Judith Cantwell, Conn. Dept. of Transportation, Office of Environmental Planning (860)594-2922.

Contacts:	Ralph Steadman, Conn. Dept. of Transportation, Temporary Project Manager (new one will soon be assigned) (860)594-2924.

Note: The South Branch of the Park River comes close to the rail bed/proposed busway near exits 45 (Flatbush Avenue) and 46 (Sisson Avenue). Opportunities may exist for linkage between the two projects, both for physical connections and funding. Project planners for the South Branch study should contact CONNDOT planners soon. At this point, CONNDOT has initiated the Draft Environmental Impact Study for the busway, and planners have met with local government representatives along the corridor.

C. Westside Access Study (I-85 ramp improvements).

The Hartford West MIS also recommended changes to several I-84 interchanges in the area of the South Branch of the Park River. In addition to improvements in safety and ramp connections, the study proposed reducing the size and scale of interchanges, such as the Flatbush Ave. ramp, which is designed as a high speed facility. Since this ramp abuts the River, any reduction in scale would provide more opportunities for greenspace and a pedestrian/bike trail along the River.

Contact:	Rich Linnemann, Conn. Dept. of Transportation, Office of Intermodal Planning (860)594-2144.

D. Capitol Region Bike Initiative

This Capitol Region Bike Initiative has been ongoing throughout 1999. Its primary goals are to improve the Region's existing bicycle routes and identify planning studies needed to implement additions to the system. An additional priority is to "identify, promote, and improve good radial routes for commuter cyclists in and out of Hartford Center" *(Bike Plan: Draft Recommendations)*. Future routes along the North and South Branches of the Park River could have potential as commuter routes, providing links in the inter-regional trail system.

Contact:	Sandy Fry, Capitol Region Council of Governments, Transportation Department, 522-2217 x20.

SUMMARY

There are many public projects listed under **Coordination of Project with Plans and Projects Initiated/Managed through CRCOG.** To the extent that these projects and their impacts can be understood, and coordination with project sponsors undertaken, opportunities to improve the outcome of the South Branch of the Park River project may be maximized.

Other Proposed Projects in the Study Area

New Crown Cinemas Multiplex on New Park Ave.

Crown Theatres is investing $20 million to construct a 1 7-screen theatre complex on Park Ave., just south of I-84 near exit 45. This private sector project is well underway. The site is just west of the South Branch study area. This is a major change in land use in the vicinity, and could perhaps be targeted as a potential destination within a greenway. The project includes substantial surface parking. If runoff is not adequately controlled, it will negatively impact the River.

Additional Comments

Transportation Infrastructure

Given the new development and land use changes anticipated in the project vicinity, a paved bikeway/trail seems both desirable and appropriate. Such a path could be a viable route for recreational users, shoppers, and neighborhood commutes. The paved path could be supplemented by paved or unpaved trails linked to adjacent sites, such as schools, major employment sites, residential areas, habitat areas, or community gardens.

Siting a Greenway/Path

The Team members felt, and the Team planner would concur, that a path on the west bank seems most feasible. The rationale: the banks on the east side are steeper, and the west side offers greater access to open space and potential for acquisition/easements. A buffer should be preserved between the path and riparian habitat. Intensive study of parcel maps will be required to determine

how land assemblage and easement opportunities could be pursued. There is one substantial barrier to continuity on the west side: development on Wellington Street between Olive and Hamilton Streets appears to block access along the River.

Path Design

A bike path will be a success to the extent that individuals use it, and feel safe and pleasant doing so. This is particularly important in an urban setting. This means that entrances should be clearly marked, and the path should be designed, planted, and maintained for safety (good visibility; minimum of dense undergrowth along paths; and well-maintained vegetation). Unless these goals can be achieved, the path will not function optimally.

Small links to the path would afford users more direct contact with the River. These sites could provide opportunities for bird viewing and seating.

Linking Origin and Destination Points

As indicated earlier, there is a wealth of proposed projects in the project vicinity. To add value for the community, the path could be connected to the following sites:

Schools:

- Mary Hooker School.
- Batchelder School (create trail connection from end of Clernont or Brinley Streets).
- Prince School/Hartford Technical College.
- McDonough School (could create access through Harbison Playground).

Residential Areas:

• Redevelopment of Charter Oak Terrace, east of South Park River. A pedestrian bridge from this neighborhood across the River would be required.

• The broader Charter Oak-Zion neighborhood, and Parkville to the north. A series of well placed pedestrian bridges, with clear access from the neighborhood, would be required to transport people across the River to the path/trail.

Other sites:

• If the path is intended to meet community needs, connections to shopping areas and employment sites is desirable. For example, on the west side of the River, 55 acres of the forrner Charter Oaks Housing site is planned for new economic development. This is a natural choice for connection to a greenway.

A critical question: to what extent can the South Branch project incorporate connections to these sites? Individual sites that are linked to the trail should contribute resources for planning and constructing connections. If connections are to be adequately planned, the project would need to take on a broader scope, akin to a master plan. This would necessitate substantially greater resources than may be currently anticipated.

Funding

This is a comprehensive project, and a wide range of funding sources may be accessible. South Branch project sponsors should consider coordinating funding efforts with other project sponsors. Funding from TEA-2 1 and State Open Space Acquisition Grants are two of many options.

Habitat Restoration

It may be difficult to restore habitat to the desired level along the entire River corridor. One alternative: limited sites could be targeted for intensive habitat renewal efforts. These could be sited near connections to schools, and school groups could participate in monitoring and maintenance.

Additional Issues

- The water quality of this section of the River is impaired. If efforts to upgrade it are undertaken, the quality of upstream sources and flows should be assessed, i.e., is substantial impairment occurring because of degradation in the study area, or from sites upstream?
- Community gardens would be an excellent land use addition to this corridor. Soil information for the area indicates that there are not prime or important farmland soils along the corridor, possibly due to degradation from development. However, soil could be reconditioned. Funding opportunities to start gardening programs should be pursued.
- Terrace escarpments, particularly on the east bank, will require preservation.
- An additional issue: what is the feasibility of creating a connecting greenway between the North and South Branches of the Park River?

Appendix A-F

Please contact the ERT Office at 860-345-3977 for Appendix Information

ABOUT THE TEAM

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a varety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area — an 86 town region.

The services of the Team are available as a public service at no cost to Connecticut towns.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

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 project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

Environmental reviews may be requested by the chief elected official of a municipality or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the chairman of your local Soil and Water Conservation District and the ERT Coordinator. A request form should be completely filled out and should include the required materials. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 860-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.