Merrimack River Watershed Council

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Department of Environmental Services

Mr. Robert Varney, Commissioner
Department of Environmental Services
6 Hazen Drive
Concord, NH 03301

Nov. 3, 1989

Dear Mr. Varney:

The Merrimack River Watershed Council is submitting the attached River Nomination form for your review and approval. Through this process we hope to have the southern 15 miles of the Merrimack River in New Hampshire desinated a Community River as defined by the New Hampshire Rivers Management Program.

The Nashua Regional Planning Commission (NRPC) and the four communities fronting this reach of the River have been instrumental in the preparation of this nomination and support its intent. The communities are Nashua, Merrimack, Litchfield and Hudson.

If assistance or further information is needed please contact me at (617) 965-5100 ext.222, or Ms. Julie Cumming of the NRPC at 883-0366.

Sincerely,

Curt Laffin
Vice President

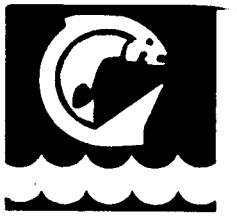
694 Main Street, West Newbury, MA 01985-1206 (508) 363-5777
54 Portsmouth Street, Concord, NH 03301-5486 (603) 224-8322

N.H. RIVERS MANAGEMENT and PROTECTION PROGRAM

Nomination for the LOWER MERRIMACK RIVER

Sponsored by:

MERRIMACK RIVER WATERSHED COUNCIL



November 1989

New Hampshire Rivers Management and Protection Program

RIVER NOMINATION FORM

This River Nomination Form has been designed for use by any individual or organization interested in providing supporting information for the designation of a river or river segment to the New Hampshire Rivers Management and Protection Program. Before a river can be recommended for designation, this nomination form, including a basic resource assessment, must be completed. Information derived from the nomination form will be used to determine whether a river is eligible for designation to the state rivers program.

Before beginning any work on a river nomination, sponsors should contact the State Rivers Coordinator in the Department of Environmental Services (DES). The Coordinator's address and telephone number are: DES, PO Box 95, 6 Hazen Drive, Concord, NH 03301 - (603) 271-3503. The Coordinator can provide initial guidance in identifying local and regional contacts and other sources of information as well as supplying continuing advice throughout the preparation of a river nomination.

The Department of Environmental Services has also developed a publication to guide sponsors through the river nomination process. "A Citizen's Guide to the New Hampshire Rivers Management and Protection Program" is available from the DES State Rivers Coordinator. The Guide provides a step-by-step explanation of the nomination process and includes a directory of federal, state, regional, and private sources of technical assistance and information.

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1. NOMINATION INFORMATION

A. Name of River: Merrimack River

B. River/River Segment Location and Length (miles):

Merrimack-Bedford Town line to Massachusetts Border

approximately 15 miles in length

C. Sponsoring Organization or Individual:

Merrimack River Watershed Council

Contact Person: Curt Laffin

Address: 9 Daniel Webster Drive, Hudson, NH 03051

Phone Number (daytime): (617) 965-5100 ext. 222

D. Recommended River Classification (see section V):

Community River

II. RESOURCES OF STATEWIDE OR LOCAL SIGNIFICANCE

A. In order to be eligible for designation to the New Hampshire Rivers Management and Protection Program, a river or river segment must contain or represent either a significant statewide or local example of a natural, managed, cultural or recreational resource. By checking the appropriate boxes below, indicate which resource values are present in this nomination. Which statement best typifies current conditions?

	Value Present and of Statewide Significance	Value Present and of Local Significance
NATURAL RESOURCES		
Geologic Resources		X
Wildlife Resources	X	
Vegetation/Natural Communities	X	
Fish Resources	X	
Water Quality		
Open Space		X
Natural Flow Characteristics		
Scenic Resources		X
MANAGED RESOURCES		
Impoundments		
Water Withdrawals/Discharges		X
Hydroelectric Resources		
CULTURAL RESOURCES		
Historical/Archaeological	X	
Community River Resources		X
RECREATIONAL RESOURCES		
Fishery		X
Boating		X
Other Recreation		X
Access		X

B. Briefly describe the significant resource values which are present and why you feel the values are significant from either a statewide or local perspective. For example, if a significant statewide recreational resource is present, identify the type and location of the resource and explain why you feel it is of statewide significance. Also, if you feel the value is threatened, explain why.

The Merrimack River Corridor Management Plan is an extensive document containing information on all aspects of the natural, physical, historic and manmade resources and characteristics of the River corridor. The following sections provide only brief descriptions of the corridor resources; however, references are made to specific sections of the Plan for additional information.

Geology: Only two rapids are found in this segment of the Merrimack River, Moores Falls in northern Merrimack/Litchfield and Cromwells Falls in southern Merrimack/Litchfield. These two areas provide opportunities for whitewater canoeing and kayaking of varying skills ranging from Class I to Class III depending on water levels.

Wildlife: The River corridor provides habitat for a diversity of wildlife species. Geese and other waterbirds use the area during migrations while some winter in the open waters. The federally endangered bald eagle is known to winter in the northern reaches of this segment and the Audubon Society of New Hampshire has identified a number of potential wintering areas along the River in Merrimack, Litchfield and Nashua. (See Map III-3, p. III-19 in the Merrimack River Corridor Management Plan.) These and other wildlife habitats are threatened by the rapid pace of development within the region. One eagle wintering area in Bedford was recently destroyed by development. The wildlife habitats provided within the River corridor are important at the local, state and even federal level and are in need of protection.

Vegetation/Natural Communities: The New Hampshire Natural Heritage Inventory has identified nine state endangered or threatened plant species and three ecological communities within the River corridor or the general area. The preservation of these species and communities is important statewide. Additionally, the shoreline vegetation needs to be protected to stabilize the bank and protect the soil from erosion, to provide a buffer between development and the River, and to maintain the visual character of the corridor. (See page III-15 for more information on vegetation within the corridor.)

Fisheries: A variety of fish species are found within this segment, most notable are the game species large and small mouth bass, carp, perch and pickerel. Local fishermen are quick to note the excellence of the bass habitat and their angling success. In addition, the Atlantic Salmon restoration program is working to reintroduce the Salmon to its historic waters within the Merrimack River basin. Restoration efforts for the American Shad have been successful in returning the species to

its historic waters in the lower reaches of the River. The addition of the fish passage facility at the Amoskeag Dam now allows the fish to pass further up the Merrimack. The successful restoration of the Atlantic salmon and the American Shad is of statewide significance. (See Page III 13 for additional information)

Open Space: Despite its location in a rapid growth region, the shores of the Merrimack River are remarkably undeveloped. The River provides open space in a densely developed area. This open space is important to the communities along its banks as well as to the region. One problem is the lack of public access to the River for utilizing the open space. Development pressure along the shores of the River is increasing as is evidenced by the increase in residential development and proposals before the planning boards. Therefore, the River is in need of protection now to ensure the future existence of open space and to provide additional public access.

Scenic Resources: The Merrimack River corridor is scenic throughout the entire segment. The difference between the view from the River and the view from the major roads is astounding. Very little development is visible from the River. The shoreline of the River is very scenic and pastoral for most of the segment. Scenic views can be obtained from the two bridges that cross the River and from the limited public access points. Once again, the scenic nature of the River and particularly the shoreline is threatened by development pressures within the region.

Water Withdrawals/Discharges: The Department of Environmental Services Water Management Bureau registers all surface and groundwater withdrawals and discharges of 20,000 gallons or greater per day. Water is withdrawn from the Merrimack River for public water supply, Pennichuck Water Works, industrial uses and irrigation for crops and recreation facilities. In addition to the State registration, all point source discharges to the River must obtain a National Pollution discharge Elimination System (NPDES) permit. NPDES permit holders that discharge directly to the Merrimack in this segment include the Merrimack and Nashua waste water treatment facilities, Public Service Company of New Hampshire's Merrimack electrical generating facility, Anheuser-Busch, Jones Chemicals and Chemical Fabrics Corporation. Discharges upstream and to tributary rivers and streams of this segment also have an impact on water quality. (See Chapter IV, Water Resources for additional information on withdrawals and discharges.)

Historic/Archeologic: This segment of the River is well endowed with archeologic and historic resources, particularly the Town of Litchfield. The resource includes prehistoric and historic Indian sites, cellar holes and cemetaries, ferry crossings, remains of the Merrimack River Navigation System and structures. Some of the best archeologic sites in the State are found in Litchfield. It is the opinion of the American Canal Society that the lock at Cromwells Falls is the best remaining specimen of the Merrimack River Navigation System and it

should be stabilized and preserved. The historic and archeologic resources found in this segment of the River have local, state and regional significance. These remaining archeologic and historic sites are also threatened by development.

Community River Resources: The Merrimack River is a significant community resource for the four communities along its bank in this segment and to the region as a whole. Recognizing the importance of the Merrimack River, the Nashua Regional Planning Commission has been committed to wise management and use of this critical resource and with the assistance of representatives from all four communities recently completed the Merrimack River Corridor Management Plan. The importance of the River is recognized in the Master Plans of each community. In addition, the communities are actively involved in protecting the River corridor and increasing public access by obtaining conservation and pedestrian easements along the shoreline. While public access is currently limited, each community is pursuing the development of additional areas and the expansion and improvement of existing facilities. Merrimack, Nashua, Litchfield and Hudson are very committed to conservation of the Merrimack River corridor. (See Chapter V, Land Use for additional information on the importance of the River to each community.)

Fisheries: The Merrimack River is important as a local fishery. Surface water in the four river communities and the region is limited to a few large ponds, rivers and streams. The River provides excellent opportunities for bass fishing by boat and from the shore and other angling opportunities within the most densely populated region of the State. Fishing on the River is limited by the lack of public access and the potential to develop additional access points is threatened by the pace of development.

Boating: This segment of the River provides opportunities for both whitewater and flatwater canoeing and kayaking, power boating and crewing. Members of the Independence Rowing Club in Nashua train for national events and the Club annually hosts two national regattas on the River. The two rapids offer challenging whitewater experiences depending on the time of year while the flatwater provides opportunities for family canoeing. Power boating is somewhat limited on the River due to shallow or rocky waters and the apparent lack of navigational information. Again, the lack of public access presents a major deterrent to boating on the River.

Other Recreation: The development of a trail system along the Merrimack River is of local and state significance. The Merrimack River corridor has been chosen as the southern terminus for the New Hampshire Heritage Trail, a north/south State multipurpose, low-lying trail to be developed by the State's youths. A trail along the River would also provide recreational opportunities in the four communities close to the population and access to the River. The opportunity to create a trail system in this segment is threatened by the rapid growth of the region. Each of the four communities is actively pursuing the development of a trail along the Merrimack and two have already obtained conservation and pedestrian easements on the River.

(See Chapter VI, Recreation for additional information on boating, fishing and other recreation opportunities.)

Access: At present there are only two formal, developed public access points in this segment. The first, Greeley Park in Nashua, provides the only access for larger motorized craft. Merrill Park in Hudson is designed as a car top access facility as is the Depot Street access in Merrimack which is currently being developed by the Town. A joint purchase by the Land conservation Investment Program and the Department of Fish and Wildlife will provide Litchfield with a car top access near the Town center. Though currently limited, there exist a number of potential public access sites along this segment. (See page V-21, Public Access, for additional information on existing and potential access to the River.)

III. COMMUNITY/PUBLIC SUPPORT

The level of community/public support which is demonstrated for a given river nomination will be an important factor in determine whether a river/segment will be recommended for legislative designation. Such support may be shown by the adoption of a town resolution, a letter from town selectmen, master plans, or documented support from other groups, either public or private (if private, explain the group's purpose of who is represented).

Describe the type of community/public support which exists for the river nomination and attach appropriate documentation.

The importance of conserving the Merrimack River to the four River front communities is clearly stated in a number of planning documents. The master plans in each community contain specific references to the River. The City of Nashua master plan recommends that conservation easements be obtained along the River and in fact some have already been obtained. Merrimack and Litchfield are currently updating their master plans and references to river conservation within the existing plans are more general such as limiting development on environmentally sensitive lands and promoting the protection of water bodies. Conservation of the Merrimack River will be stressed in each community's master plan update. The Hudson master plan identifies a number of environmentally sensitive areas for protection including shorelines, rivers, streams and ponds and recommends that development be prohibited within fifty feet of all surface waters.

In addition, Merrimack and Hudson have recently developed or updated existing recreation plans. Both plans emphasize the importance of the River as a recreational resource for fishing, boating and hiking. The Hudson plan specifically recommends obtaining conservation easements and developing a trail along the entire length of the River and improving existing and developing additional public access.

The Planning Boards in each community request conservation and pedestrian easements along the River whenever river front parcels are brought before the Board for development. This negotiating process has successfully been used to obtain easements in Nashua, Hudson and Litchfield. The Conservation Commissions in each community are very aware of the need for River conservation and each commission has been actively working to obtain shoreline easements.

The Nashua Regional Planning Commission, with assistance from local representatives, recently produced the Merrimack River Corridor Management Plan. The Corridor Plan contains a wealth of information on the River and is designed to assist the four communities in guiding and managing development within the River corridor. The NRPC fully supports conservation and protection of the River under the New Hampshire Rivers Management and Protection Program.

The Merrimack River Watershed Council (MRWC) is a private, non-profit organization in New Hampshire and Massachusetts. The mission of the MRWC is restoration and protection of the Merrimack River and its watershed through stimulation of public participation in local, state and federal agency decision making. The MRWC has and continues to be actively involved with River issues and conservation efforts in New Hampshire. In June, the group sponsored a "Source to the Sea Trip" for canoers from Franklin, New Hampshire to Newburyport, Massachusetts. The trip and its concurrent land activities brought many people to the River and increased public awareness. The MRWC supports the conservation and protection of this segment of the River under the New Hampshire Rivers Management and Protection Program.

IV. OTHER SUPPORTING INFORMATION

In addition to the information required by the nomination form, sponsors are encouraged to submit any other information which they believe will support the nomination of the river. Such information may include a visual presentation (for example, a slide program of the river or maps showing the location of significant resources) or studies. Use the space below to indicate what, if any, other supporting information has been submitted.

2 copies of the Merrimack River Corridor Management Plan

V. RIVER CLASSIFICATIONS

Rivers and river segments which are recommended for designation will be assigned a classification for the purpose of recommending appropriate management and protection measures to the state legislature. The river classification and corresponding management and protection measures are described below.

Review the brief description for each classification. Select the classification which most closely represents the character of the river. If the river is incompatible with any part of the description, proceed to the next classification and check to see if the river is compatible with this classification. Although a given river may contain more than one classification, the number of different classified segments within a nominated river should be kept to a minimum.

If the river is incompatible with one or two classification criteria and you feel that a higher classification is appropriate and desirable, indicate this in the comment section and explain your justification for this decision. Also indicate if more than one classification is appropriate for this river.

Your opinion on the appropriate classification and corresponding management and protection measures for the river will be considered by the Rivers Coordinator and the Rivers Management Advisory Committee. The Commissioner will make the final decision on which classification is recommended to the state legislature.

A. Natural Rivers

B. Rural Rivers

C. Community Rivers

1. Description and Classification Criteria

Community Rivers flow through the more populous areas of the state where human modification of the landscape is clearly evident. These rivers may not have unique natural features, but will have important cultural, community, scenic or recreational assets. Community Rivers must meet the following criteria:

- Occasional dams, diversion works and other man-made modifications may be present, so long as the river maintains a flowing riverine character for the majority of its length.
- The river/segment must be at least 2 miles long.
- Existing water quality must support swimming and fishing (Class B) or have the potential for restoration to this level.

- The river corridor may have been developed for the full range of forestry and agricultural uses. The corridor may also include residential, commercial and industrial development. Roads may parallel the river.

- The river should be readily accessible.

This segment of the Merrimack River is being nominated as a community river. The River meets all of the criteria except for water quality. The River is classified as Class B from the Bedford/Merrimack line to the Nashua River and Class C from the Nashua River to the state line. Existing River water quality falls short of the legislative classification in both areas. The major reason for this is the discharge of raw sewage in Manchester and the insufficient treatment of waste in Nashua. Manchester expects to have all of its interceptors constructed and operating by 1992 which would alleviate much of the problem from that region. Nashua recently upgraded its plant from a primary to a secondary treatment facility. This action will eliminate most of the problem in this region. Once these problems are eliminated, the River should be able to obtain its legislative classifications and the lower section could be upgraded to Class B. (See page IV 12-15 for additional information on point sources of pollution.)

VI. RESOURCE ASSESSMENT

Each river nomination must be accompanied by an assessment of the river's resources. Information derived through this assessment process will be used to determine whether a river/segment is eligible for designation by the state legislature. Many excellent sources of information are available to assist river sponsors in completing this resource assessment. These sources are listed in the publication, "A Citizen's Guide to the New Hampshire Rivers Management and Protection Program".

It is not necessary to confine a resource assessment to the data requests which appear below. Questions which are posed are intended to stimulate, not restrict, the development of relevant information. Elaboration of pertinent information is encouraged. Please keep in mind, however, that in order to expedite the use of the information by DES, it should be presented in the same order and according to the same format shown below. Additional information which is not specifically requested below should be included within the appropriate data category or appended to the end of the assessment.

A map of the river/segment must be included in the resource assessment. This map may be taken from a USGS quadrangle and should include an inset or locator map showing the location of the river/segment within the state.

A resource assessment should consist of written narrative, maps, photographs and any other items such as charts, diagrams, bibliography, etc., which are needed to adequately explain the information collected. Narrative descriptions and other written materials may be hand printed, however, double spaced typewritten information is preferred. When submitting photographs or photographic slides be certain they are clearly labeled or identified and properly keyed to topographic maps. Once submitted, all reports, maps, photographs, etc., become the property of DES (exclusive of copyright) and may be used at the discretion of the department for publication and presentation purposes.

A. NATURAL RESOURCES

1. Geologic Resources

Briefly describe the significant geologic resources of the river/segment and corridor. Include unique or visually interesting features (waterfalls, unusual rock formations, areas of rapids, etc.).

The eight (8) mile stretch of the Merrimack River from the Amoskeag Dam to the northern reaches of the impoundment of the Pawtucket Dam in Reeds Ferry is one of the longest stretches of free-flowing water on the River in New Hampshire. This section of the River contains fourteen (14) separate sets of rocks, rapids or riffles. Two (2) sets of rapids are located in this segment at Moores Falls and Cromwells Falls. These rapids range in difficulty from Class I to Class III depending on the water level.

One other interesting geologic feature at Moores Falls is the large boulder in the middle of the River called Old Hildreth. This rock served as an indicator of the water levels in the River.

At present, only one federally endangered species, the bald eagle, is known to be inhabiting the River corridor during the winter months. The River corridor provides the necessary elements of eagle winter habitat, perch and roost sites and open waters for fishing. Perch sites, large open branched trees, usually deciduous or pine, located on the riverbank or on one of the islands, are used by the eagles during the day and provide good viewing areas for locating food. During the evening the eagles move inland to more sheltered areas, usually conifer stands, that offer protection from the wind and harsh temperatures. Reports from the Audubon Society indicate that the Merrimack River corridor is second only to Great Bay, located in southeastern New Hampshire, in winter eagle activity. Thirty-four eagle sightings were reported in Manchester for the 1987-1988 season. That number had increased to 67 for only a portion of the 1988-1989 season. Eagle sightings for the River totaled 48 for 1987-1988 and 74 for the incomplete 1988-1989 season.

The Audubon Society has documented the use of perch and roost sites in the Merrimack River corridor, including northern sections of Merrimack and Litchfield. The information on preferred perch, roost and forage sites was used to identify potential habitat areas along the River not currently being used by the eagles. These sites were identified in Merrimack and Litchfield as far south as Pennichuck Brook. One area is located just north of Reeds Ferry in Merrimack and across the River in Litchfield and extends south to the two large islands. Other areas in Merrimack include: near the confluence of Naticook Brook and the River; the Anheuser Busch property between the railroad and the River; and Pennichuck Brook from Route 3 to the River.

Much of the documented and potential eagle wintering habitat, depicted on Map III-3, is located in close proximity to major highways and the railroad. The eagles are able to adapt and coexist with the presence and noise of the cars and trains. Human activity, however, disturbs the great birds causing them to take flight; and the presence of humans in wintering areas could have a negative effect on eagle populations within the State.

3. Vegetation/Natural Communities

List the species of plant life commonly found in the river/segment and corridor. List any rare or endangered plant species or associated habitats. Describe significant vegetative communities supported by the corridor environment.

Like the wildlife and fish species found in the Merrimack River corridor, the types of vegetation found in the corridor are likely to be those species indigenous to southern New Hampshire. Typical tree species found in the corridor would include black locust, sycamore, silver maple, red maple, birch and aspen with some spruce and pine. Red oak is another common species important in stabilizing the higher river banks. While harvesting forest products is a major industry in New Hampshire, it is unlikely that any of the parcels along the River would be used for commercial production. Since the majority of the parcels along the River are too small to make commercial harvest viable, there is little doubt that their value as development property would exceed their value as forest land. In addition to the tree species, a wide variety of grasses and shrubs can be found in the corridor.

The New Hampshire Natural Heritage Inventory is the agency responsible for identifying and recording the State's endangered and threatened plant species. Plants are ranked using the Nature Conservancy system in the same manner as animals. The Natural Heritage Inventory Program records indicate the presence of nine endangered or threatened plant species and three ecological communities located within the River corridor or the general area. The nine plants are: fall witch-grass, blunt-leaved milkweed, bald spike-rush, wild lupine, river birch, arrow-headed rattle-box, hairy stargrass, burgrass and American plum. The three ecological communities present in the study area are described below.

New England Pitch Pine - Scrub Oak Barrens - are found on sandy soil derived from glacial outwash and lakebeds. "Barrens" refers to the infertile and droughty nature of the soils. Fire plays an essential role in maintaining the characteristic open vegetation. As seen in many of the remaining barrens of the state, fire suppression results in succession to pine forests. This community has been virtually eliminated from along the Merrimack River between Nashua and Concord.

Southern New England Lake Sediment/River Terrace Forest - is a forest community of river bluffs and higher river terraces found on soils derived from wind and water deposited sediment of glacial outwash. A variety of habitats are found which support diverse plant species like hemlock, basswood, American ash, green ash, red oak, scouring rush, and Christmas fern. Undisturbed and large examples are uncommon.

Northern New England Level Bogs - are peatlands found in wet depressions and low areas with poor or no drainage, where the familiar "floating mat" develops. Bogs are a vegetation complex with deep organic soils formed from partially decomposed plant material. Bogs are open and dominated by heath-like shrubs and coniferous trees that are stunted due to the lack of nutrients in the soil.

This list of threatened plant species and unique ecological communities contains documented and historical occurrences of the species and is by no means a complete representation of the species limitations. Documented species could be found in other locations within the study corridor, as could other undocumented threatened species. The continued existence of these species and communities within the Merrimack River corridor depends on the conservation of their habitats. The general locations of these ecological communities are depicted on Map III-3.

A synopsis of the endangered and threatened plant and animal species in the River corridor can be found in Table III-1. A full definition of the Nature Conservancy rankings and the scientific names for the species can be found in Appendix A.

These grasses, shrubs and trees perform many important functions. First, they provide habitat for a diversity of wildlife species. Second, they stabilize the soil and buffer the impact of the rain thereby aiding in the prevention of soil erosion. Third, they provide a vegetative buffer that filters nutrients and sediments from and decreases the velocity of run-off. Fourth, they provide an effective screen between surrounding land uses and the River. Lastly, maintenance of a vegetative buffer preserves the natural setting and the aesthetics of the river bank.

TABLE III-1

ENDANGERED AND THREATENED SPECIES
IN THE MERRIMACK RIVER CORRIDOR

Rank	Species	Common Name
S3G5	Heterodon Platyrhinos	(Eastern Hognose Snake)
S2G5	Betula Nigra	(River Birch)
SHG5	Crotalaria Sagittalis	(Arrow-Headed Rattle-Box)
S2G5	Hypoxis Hirsuta	(Hairy Stargrass)
S2G5	Prunus Americana	(American Plum)
S2G5	Asclepias Amplexicaulis	(Blunt-Leaved Milkweed)
S3G5	Cenchrus Longispinus	(Burgrass)
SHG4	Eleocharis Erythropoda	(Bald Spike-Rush)
S2G5	Enneacanthus Obesus	(Banded Sunfish)
S3G5	Leptoloma Cognatum	(Fall Witch-Grass)
S1G5	Lupinus Perennis	(Wild Lupine)

Communities

Southern New England Lake Sediment/River Terrace Forest
New England Pitch Pine/Scrub Oak Barrens
Northern New England Level Bog

Source: New Hampshire Natural Heritage Inventory

4. Fish Resources

List the fish species commonly found in the river/segment. List any rare or endangered fish species supported by the river. Describe significant habitat areas, including location. Indicate if significant fish restoration program is on-going or planned (anadromous fish, etc.). Indicate whether significant fisheries rely on natural reproduction or stocking programs.

Fisheries

The most recent information on fish species in the Merrimack River comes from a 1971 Department of Fish and Game Project Report. A series of actual inventories conducted between the Massachusetts line and Amoskeag Falls, identified 14 species of game and non-game fish. Game species included: yellow perch, chain pickerel, brown bullhead, yellow bullhead, white perch, small mouth bass, large mouth bass, walleye, carp and rock bass. Non-game species included pumpkin seed, white sucker, golden shiner, red breasted sunfish, American eel, fall fish, and gold fish. In addition, it is possible to find some brook trout in the rocky fast waters. In 1988, the Fish and Game Department stocked rainbow trout in Manchester and in 1989 they stocked the area with rainbow and brown trout.

The New Hampshire Natural Heritage Inventory is the agency responsible for identifying and recording the locations of endangered or threatened fish species in the State. Fish species are ranked using the Nature Conservancy system in the same manner as animals. Heritage Inventory records indicate one State endangered fish species in the corridor, the banded sunfish. The banded sunfish was given a S2G5 rank which essentially means that the fish is very rare in the State, 6 to 20 occurrences, but globally secure.

Anadromous fish species such as blueback herring, alewife, American shad and Atlantic salmon are beginning to return to the River as a result of the anadromous fish restoration program begun in 1969. The program is a cooperative effort between the Massachusetts and New Hampshire state fisheries agencies, the US Fish and Wildlife Service and the National Marine Fisheries Service. The first decade of the program focused on describing and quantifying the habitat for Atlantic salmon and American shad. This analysis included projections of habitat productivity for salmon and shad and the fish passage facilities that would need to be developed to allow upstream movement. The results of the analysis projected that the habitat could support adult populations of one million shad and eleven thousand Atlantic salmon (Annual Progress Report - Merrimack River Anadromous Fish Restoration Program, 1988, USFWS, p. 3). It was also determined that six barriers on the mainstem of the Merrimack River would require fish passage facilities for shad and salmon with two additional passage facilities required for salmon only on the Pemigewasset. The goal of the restoration program is to establish a self-sustaining salmon population in the Merrimack River and its tributaries.

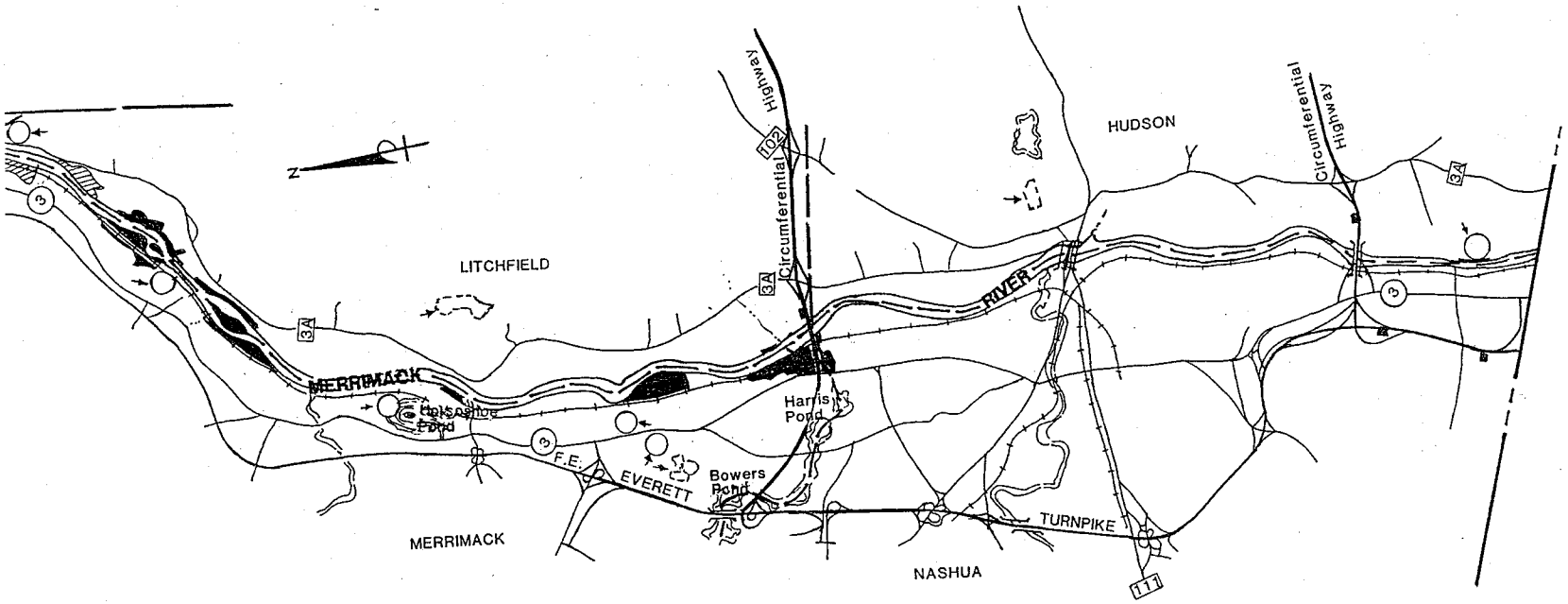
Fish passage facilities were completed at the Essex dam in Lawrence in 1982 and at the Pawtucket dam in Lowell in 1986. The passage facility at the Amoskeag dam in Manchester was scheduled to be completed during the 1988 season; however, due to delays the completion schedule was not attained. The facility is currently in the final stages of construction and is scheduled to be operating during the 1989 season. Once open, this facility will allow fish to pass upstream to Hooksett. The schedule for the construction of fish passage facilities on the two remaining dams on the main stem of the River at Hooksett Falls and Garvins Falls is tied to the number of fish passing through the facility immediately downstream. The Hooksett facility will be constructed five years after the passage of 15,000 shad at the Amoskeag facility. Likewise, the Garvins Falls passage is to be constructed five years after the passage of 15,000 shad at the Hooksett facility. The Sewalls Falls dam breached in 1984 and no longer requires a fish passage facility. In addition, a salmon trapping facility will be constructed at the Eastman Falls dam in the spring following the second year of the passage or trapping of 50 multi-sea-winter salmon at the Amoskeag fish passage facility.

American shad have been stocked in the Merrimack River system at various stages of development since 1969. Between 1969 and 1978, twenty-three million shad eggs were released at various locations along the River. Since 1978, adult shad from the Connecticut River and more recently from the Merrimack River have been trapped and released in various tributaries with acceptable spawning and nursery habitats. Returns to the Essex fish lift have increased from 5,629 in 1983 to 16,909 in 1987 with a 1988 run of 12,359 (Annual Report, 1988, p. 20). In addition, 1,289 shad were passed through the Pawtucket dam passage facility in 1988 (Annual Report, 1988, p. 20). These figures reflect the characteristics of the passage efficiency, river flow conditions, and fish-lift operations and, are not indicative of the total yearly run.

Atlantic salmon stocking began in 1975 and over three million juvenile salmon have been released into the Merrimack River system through 1987. Information on returns, however, is available only since 1982 when the fish-lift became operational at the Essex dam. Since 1982, documented Atlantic salmon runs have been as follows: 1983 - 114, 1984 - 116, 1985 - 214, 1986 - 103, and 1987 - 139 (Annual Report, 1988, p. 9). These numbers reflect the documented sport catches as well as the actual number of fish passed through the fish-lift. The 1988 run was significantly less than other years with 65 fish passing through the Essex facility with 2 salmon somehow recorded at the Pawtucket facility. At present, all the salmon trapped in the Essex facility are transported to the Nashua fish hatchery for use as brood stock.

MAP III-3

ENDANGERED AND THREATENED SPECIES
IN THE MERRIMACK RIVER CORRIDOR



Merrimack River Corridor Management Plan

SIGNIFICANT HABITATS

EAGLE HABITAT

- Documented perch, roost or forage areas
- Potential " " " "
- Threatened or Endangered Species
- Significant Ecological Community

Source: N.H. Natural Heritage Inventory
N.H. Audobon Society

5. Water Quality

a. Which state water quality classification applies to this river/segment?

CLASS A CLASS B CLASS C

Class B from the Bedford/Merrimack line to the Nashua River.
Class C from the Nashua River to the state line.

b. Using readily available information, identify the existing major causes of deficient water quality)e.g., industrial or sewage pollution, agricultural fertilizer run-off) and possible corrective measures (e.g., regulation, enforcement, land-use controls).

According to the 1987 EPA Merrimack River Watershed Protection Initiative, the 36 mile stretch of the River from Franklin to northern Manchester fully supports the water quality standards for Class B waters. In contrast, the 1988 Water Supply and Pollution Control Division New Hampshire Water Quality Report to Congress 305b reported that the section of the River from Cohas Brook in Manchester to the Nashua River does not support its Class B rating, while the sections of the River from the Amoskeag Dam to Cohas Brook and from the Nashua River to the Massachusetts border do not support their Class C ratings. All three of these River stretches violate the water quality standards for bacteria because of deficiencies in the municipal waste water treatment systems. Both Manchester and Nashua are under court orders to improve their municipal waste water treatment facilities.

Point Sources of Pollution

Manchester is in the process of installing four interceptors as part of its upgrade. The west interceptor north, tying in the northwestern section of the City, and the Piscataquog interceptor, to tie in the Town of Goffstown, are under construction and should be completed in September and October of 1991. The west interceptor south, tying in the southwestern section of the City, is scheduled for completion in October of 1991 and the northeast interceptor, serving the northeastern section of the City, in October of 1992. When completed, these projects will eliminate dry-weather discharge of raw sewage into the River. In addition to the installation of the interceptors, Manchester will also need to upgrade the capacity of the plant for waste water treatment. Since the sewer system and the storm drainage system are combined in many locations, increased flows caused by stormwater exceed the treatment capabilities of the plant and sewage is released into the River without receiving treatment. This is a common problem in the Country's older cities because of the fact that sewage and stormwater have historically been discharged directly into the rivers.

The City of Nashua is upgrading its plant from a primary to a secondary treatment system. The upgrade is complete and the system will be fully operational in the Fall of 1989. The system is capable of providing primary and secondary treatment and disinfection for all dry-weather flows up to a capacity of 16 million gallons per day

(MGD). Like Manchester, many of the storm drains and the sewers are combined, presenting a problem during periods of increased stormwater run-off. Flows exceeding the capacity of the plant will receive only primary treatment and disinfection prior to being discharged to the River.

The problem of combined sewer and stormwater drainage systems, referred to as combined sewer overflows, is being faced by most of the country's older cities. Three alternatives are currently available to rectify the situation. The first involves increasing the capacity of the treatment plant to accommodate wet-flow volumes. The second requires separating the stormwater from the sewage and would mean the installation of an entirely new piping system throughout the city. The third alternative involves the construction of a series of holding ponds to store the excess volume for treatment when flows exceed capacity. While any of these alternatives would be effective, each would require major capital expenditures.

The EPA Initiative determined that there are a total of seventy-one municipal discharges in the Merrimack River basin with a combined maximum daily discharge of 141 million gallons. This figure is based on the design flow for each plant and actual discharges are probably less. Of the seventy-one, thirty-five are located in New Hampshire and another eight discharge into the Nashua River in Massachusetts. Twenty-four of the facilities are considered major, and eleven of the major dischargers in the basin are located upstream of the study area, while nine discharge directly into the mainstem or one of its tributaries. The southern end of the New Hampshire section of the River basin is significantly influenced by upstream discharges. Appendix B contains a complete list of the municipal treatment plants in New Hampshire or in Massachusetts with an impact on the study corridor.

In addition to the municipal discharges, there are sixty-six registered industrial discharges in New Hampshire and sixteen in Massachusetts that discharge wastes to the Merrimack River or its tributaries. Of the major discharges, seventeen are located in New Hampshire or discharge to the Nashua River. The largest industrial discharger in the entire basin is Public Service Co. of New Hampshire's Merrimack electrical generating facility. The facility discharges 190 MGD of water used to cool the electrical generators and 5 MGD of water from an ash settling pond.

The numerous industrial and municipal dischargers within the Merrimack River basin have a significant impact on the quality and quantity of water in the River. The impact of the deficiencies in the Manchester and Nashua wastewater treatment plants is clearly evident in the non-attainment status of downstream River sections. In addition, repeated NPDES violations could have a cumulative and lasting impact on fish, wildlife, and humans either through ingestion or external contact while single permit violations could result in more dramatic events such as a fish kill.

As is the case with many regulations, enforcement of the NPDES effluent limitations is not as effective as it could be. Repeated NPDES permit violations usually result in a letter from the WSPCD informing the company of the violation and an order to bring the discharge into compliance. Often, the company complies with the limitations of the permit for a couple of months and then repeats the violation. Many environmental organizations regularly review NPDES effluent monitoring reports to identify repeat violations. If satisfactory results in bringing the discharge into compliance are not obtained through the state agency responsible for NPDES permits or the EPA, legal action can be brought against the facility under section 505 of the Clean Water Act. Legal action has successfully brought facilities into compliance in many areas of the country.

Non-point Sources of Pollution

The Water Supply and Pollution Control Division's (WSPCD) 1988 Non-point Source Pollution Assessment identified the following as the major non-point pollution sources (NPS) affecting the State's surface and ground water resources: 1) land disposal areas (run-off/leachate from solid waste disposal sites, septic systems), 2) construction activities, 3) urban run-off, 4) agricultural activities, and 5) leaking underground storage tanks. Other locally important sources include: 1)road salting, 2) automobile junkyards, 3) snow dumping into water bodies, 4) improperly constructed and maintained trails and logging roads, 5) household use of pesticides and other chemicals, and 6) the effects of acid precipitation and other airborne chemicals. The WSPCD is currently developing a State NPS Management Plan to address the issues of nonpoint source pollution.

In 1982, the WSPCD conducted the statewide Inventory of Groundwater and Surface Water Potential Nonpoint Pollution Sources. The inventory identified such things as surface impoundments, waste disposal sites, salt piles and salted roads, erosion sites, snow dumps, and areas with agricultural, urban and/or pesticide run-off. While the information in this inventory is almost ten years old, much of it is still valid. Additional information concerning waste sites is available in the Waste Management Division's (WMD) 1987 Waste Site Inventory. Using both of these documents, the following existing and potential nonpoint sources of pollution were identified in the study corridor.

Merrimack

In Merrimack, seven sites were identified: the Longa Disposal Site, New Hampshire Plating, Jones Chemicals, New England Chemical, Hume Pipe, Nashua Corporation and the Town's wastewater treatment facility. The Longa Disposal site is an abandoned Town landfill where sludge and an undetermined number of drums with undisclosed contents were dumped. New Hampshire Plating, an electro-plating business, ceased operations in 1985 leaving behind heavy metal plating wastes inside the plant and outside in the lagoon system. The internal clean-up has been completed and

Two waste sites are located along the River in the study corridor, Koppers and Blueline Express. The soil on the Koppers site is contaminated with creosote and phenols, from over 50 years of creosote application, that are leaching into the River. While clean-up operations at the site have improved the conditions and decreased the contaminants reaching the River, a great deal remains to be done. The Blueline Express site contains buried construction materials and hazardous wastes. Monitoring wells have been installed at the site to determine the extent of the problem.

As in Merrimack, the wastewater treatment facility stores sludge on-site and accepts septage. Run-off from the sludge storage or a septage leak or spill by a hauler are the major NPS concerns as either could have a significant impact on ground and surface waters. These activities are conducted on a concrete pad and all spills and runoff are contained and directed into the treatment system, thus minimizing the potential for impact.

Hudson

Of the four communities in the study corridor, the 1982 NPS Inventory identified the least number of potential NPS in Hudson. Agricultural uses identified in the northern section of the Town provide some potential pollution from fertilizers, pesticides, and sediments. The study also identified a potential for pesticide contamination from a golf course just south of the Sagamore Bridge.

6. Open Space

Briefly describe areas of open space found in the river/segment corridor.

Open space can be found along the entire length of the River segment. The railroad runs adjacent to the River along the western shore. This barrier between the River and surrounding development has maintained a natural buffer along the shore that varies in width. This open space is important to maintaining the character of the River corridor. In addition, there is still a considerable amount of vacant land adjacent to the River. Most of the industries in the corridor are located close to the major roads leaving the back portions of the parcel undeveloped.

Land use along the eastern shore is dominated by agriculture. These uses in conjunction with the golf courses provide a great deal of open space near the River. Even the industrial areas have been developed to maintain the character of the corridor by providing a buffer along the River.

Hudson has two public park areas on he River, Merrill Park and Birchcroft, while a joint purchase in Litchfield by the LCIP and the Fish and Wildlife Department will provide that community with its first public access to the River. Merrimack is actively working on a number of proposals to increase access to the River and to maintain the existing open spaces. Nashua has Greeley Park and three other City owned parcels on the River. In addition, each community actively negotiates with developers for pedestrian and conservation easements along the shore of the River whenever possible.

7. Natural Flow Characteristics

Briefly describe the natural flow characteristics of the river/segment, including natural periodic variations in flow, or, if applicable, variations caused by upstream impoundments. Indicate where river/segment is free-flowing.

There are no dams located in this segment; however, water levels are affected by the Amoskeag Dam in Manchester and the Pawtucket Dam in Lowell. The pool from the Pawtucket dam reaches eighteen miles upstream to an area between Thorntons Ferry and Reeds Ferry in Merrimack.

B. MANAGED RESOURCES

1. Impoundments

List all existing dams located in the river/segment. Briefly describe these structures, including their location and effect on the river/segment and corridor.

There are no dams located in the River segment.

2. Water Withdrawals and Discharges

a. List any significant water withdrawals from the river/segment. Briefly describe their purpose (irrigation, for example) and location. Indicate if the river/segment is an existing or potential source of public water supply.

The following industries withdraw water from the Merrimack River. This information is provided by the DES WSPCD Water Management Bureau user registration program. The River is currently used as a public water supply by Pennichuck Water Works to supplement its existing source. Additional proposals for using the River have been discussed by Southern NH Water Co. and the Town of Merrimack.

USER	MUNICIPALITY	AVG. GPD (1,000)	MAX. GPD (1,000)	USE
Pennichuck Water Works	Nashua	12,500	20,000	public water supply
Tuckahoe Turf Farms	Litchfield			irrigation
Wilson Farms of NH	Litchfield		576	irrigation
Green Meadow Golf Club	Hudson	500	1,500	irrigation
Tuckahoe Turf Farm	Hudson			irrigation

b. List any state-approved surface water discharges to the river/segment and identify the source of the discharge. Note the location and condition of any known discharges occurring without state approval.

The following list contains the surface water discharges to the Merrimack River within the segment. The information comes from the DES WSPCD Water Management Bureau registration program and information on current NPDES holders.

USER	MUNICIPALITY	AVG. GPD (1,000)	MAX. GPD (1,000)	USE
Nashua Waste Water Treatment Plant	Nashua	13,000	52,000	waste water
W. R. Grace & Co.	Nashua	142	200	industrial
Anheuser-Busch, Inc.	Merrimack	2,000	4,200	industrial
Jones Chemicals, Inc.	Merrimack	144	200	industrial
Nashua Corporation	Merrimack	178	200	industrial
Merrimack Waste Water Treatment Plant	Merrimack	3,300	4,200	waste water
Atlantic Salmon Smolt Release	Litchfield			salmon release
Chemical Fabrics Corp.	Merrimack			industrial
Pheasant Lane Mall	Nashua			drainage

3. Hydroelectric Resources

List any existing hydroelectric facilities located in the river/segment. Indicate ownership and whether each facility is currently producing electricity.

There are no hydroelectric facilities in this segment.

C. CULTURAL RESOURCES

1. Historical or Archaeological Resources

List any significant historic or archaeological resources found in the river/segment corridor.

Table VII-1. Prehistoric and Historic Archaeological Sites

MAP CODE	LOCATION	SITE NAME	SITE #	PROPERTY TYPE	DATE	OWNERSHIP	INTEGRITY	STATUS	SIGNIFICANCE
1	East bank of Merr. River, south of Watts Brook, Litchfield	Three Flakes Site	NH45-28	Prehistoric archaeological site	Archaic	unknown	no		Unique as single component site where lithic tools manufactured.
2	Off Constance St., Merrimack	Brickyard	NH45-29	Historic archaeological site; brickyard	c. 1800	unknown	no		Bricks & brick fragments, most are submerged under a small pond.
3	East bank of Merr. River, Moore's Falls vicinity	Litchfield Site	NH45-1	Prehistoric archaeological site	Middle Archaic to Late Woodland	unknown	?	NHAS	Multi purpose site, tool manuf. & repair & burial ground.
4	East bank of Merr. River, Moore's Falls vicinity, Litchfield	Naticook East Bank	NH45-33	Prehistoric archaeological site	Late Archaic	unknown	?		Limited occupation during single time period. Tool manuf. or repair, food processing.
5	East bank of Merr. River, Moore's Falls vicinity, Litchfield	Two Feather Site	NH45-25	Prehistoric archaeological site	Late Archaic	unknown	?		Temporary occup. site involving tool manufacture or repair, hunting & fire-related activity.
6	East bank of Merrimack River, n.e. of Reed's Perry, Litchfield	Moore's Falls Locks		Historic archaeological site; lock remains	c. 1814	unknown	some		Three locks provided a bypass to the longest rapids on Merr. River system.
7	Colby Brook to the rear of the Colby Farm Storehouse, Litchfield	Grist Mill		Historic archaeological site; remains of grist mill	c. 1830	unknown	?		Local grist mill on Colby Brook.
8	East bank of Merr. River., overlooking Moore's Falls, Litchfield	Moore's Falls Site	NH45-75	Prehistoric archaeological site	Late Archaic?	unknown	?		Limited occupation - quartz industry, hunting, fishing, food process.
9	East bank of Merr. River, at Colby Brook, Litchfield	Colby Farm Site	NH45-45	Prehistoric archaeological site	Late Archaic-Late Woodland	unknown	?		Temporary site - hunting, fishing, food preparation & tool manuf.

Table VII-1. Prehistoric and Historic Archaeological Sites (continued)

10	East bank of Merr. River opposite Souhegan River confluence, Litchfield	Rodonis Field Site	NH45-6	Prehistoric archaeological site	Middle Woodland period	Public Service Co.	NHAS	Evidence of short term residence by small groups of people.
11	East bank of Merr. River across from Thortons Ferry, Litchfield	Litchfield Island Site	NH45-74	Prehistoric archaeological site	?	unknown ?		Site was repeatedly occupied & variety of activities practiced.
12	West bank of Merr. River, Merrimack	Cromwell's Falls Lock		Historic archaeological site; remains of lock.	c. 1814	Anheuser some Busch Co.		Best preserved of eight remaining locks on Merr. River system from Concord to Lowell; originally 21 locks.
13	East bank of Merr. River near Chase Brook, Litchfield	Smolt Site	NH45-67	Prehistoric archaeological site	Middle Archaic-Late Woodland	unknown ?		Site occupied during spring or early summer to collect plant foods seasonally.
14	East bank of Merr. River, Litchfield	Nesenkeag Site	NH45-20	Prehistoric archaeological site	Late Archaic	unknown ?		Temporary task-specific site; tool manuf. or repair, hunting or woodworking
15	East bank of Merr. River, Cromwell's Falls vic., Litchfield	Campbell Site	NH45-73	Prehistoric archaeological site	Middle Archaic, Woodland & Contact	unknown ?		Multi component prehistoric site with evidence of tool maintenance and food procurement.
16	East bank of Merr. River, between Cromwell's Falls & Chase Brook, Litchfield	Thebodeau Site	NH45-70	Prehistoric archaeological site	Middle Archaic, Late Archaic & Woodland	unknown ?	NRB	Multi component habitation site with flaked stone tools.
17	Chase Brook, just east of Rt. 3A, Litchfield	Grist Mill Site		Historic archaeological site; remains of grist mill	19th c.	unknown ?		Remains of old grist mill.

Table VII-1. Prehistoric and Historic Archaeological Sites (continued)

18	East bank of Merrimack River, Litchfield	Danforth Archaeological District		Prehistoric archaeological district.		unknown	?	NRE	Remnants of old trolley line abutments visible.
		Riverbank Site	NH45-77		Middle Archaic through historic				Tool manufacturing or maintenance.
		Danforth Field Site	NH45-78		Middle Archaic				Short term occupation, possibly for hunting or fishing.
		Danforth Sand Bank Site	NH45-56		Middle Archaic (8000-600 BP)				Tool manuf. or repair, hunting & butchering or skinning may have been practiced here.
19	East bank of Merr. River, Hudson	Asparagus Field Site	NH46-77	Prehistoric archaeological site	?	unknown	?		Tool manuf. or repair.
20	East bank of Merr. River, Hudson	Merrimack St. site	NH45-9	Prehistoric archaeological site	?	unknown	?		Thin scatter of flakes may suggest stone tool manufacture or repair.
21	East bank of Merr. River, Hudson	Kenyon Street site	NH45-10	Prehistoric archaeological site	?	unknown	?		Thin scatter of flakes may suggest stone tool manufacture or repair.
22	Confluence of Nashua & Merr. Rivers, Nashua	Nashua River Mouth Site	NH45-54	Prehistoric archaeological site	Middle Archaic - Late Woodland	unknown	?		Prehistoric site on intact land surfaces. Variety of materials recovered - stone tool manuf., cooking vessels.
23	West bank of Merrimack River near stateline, Nashua	Pheasant Lane Mall Site	NH52-2	Prehistoric archaeological site	?	private	No		Site of prehistoric quartz workshop. No subsurface artifacts recovered.

Table VII-2. Historic Sites Listed in the National Register of Historic Places.

24	West and east sides of Rt. 3 at Greeley St., Merrimack	The Signer's House & Matthew Thornton Cemetery	n/a	House and cemetery	c.1770 & c.1742	Private	Yes	NRHP	Late Georgian style structure with associations with Matthew Thornton. Oldest cemetery in town, includes grave of Thornton and good concentration of early gravestones.
25	Derry Road, Hudson	Hills House	n/a	House	1890	Hudson School District	Yes	NRHP	Excellent example of Shingle Style summer dwelling; designed by Boston architect Hubert Ripley.
26	Library St., Hudson	Hills Memorial Library	n/a	Library	1909	Trustees of Hills Memorial Library	Yes	NRHP	Constructed of native materials in Tudor style. Designed by Hubert Ripley of Boston.
27	Derry St., Hudson	G.O. Sanders House	n/a	House	1873	Private	Yes	NRHP	One of the best surviving examples of French Second Empire style in the state.
28	Center of Nashua, north of Nashua River & 3/4 mi. west of Merrimack River	Nashville Hist. District	n/a	District	1800-1930	Mixed	Yes	NRHP	Broad representation of '19th & early 20th century styles including many high style. Historical associations with individuals important to commercial & industrial development of Nashua.
29	Temple St., Nashua	Hillsborough County Courthouse	n/a	Courthouse	1901	County	Yes	NRHP	Typical early 20th century institutional structure in Classical Revival style.
30	Main St., Nashua	Hunt Memorial Library	n/a	Library	1903	Nashua Public Library	Yes	NRHP	One of the early designs of internationally known architect, Ralph Adams Cram. Important state example of Gothic style.

Table VII-2. Historic Sites Listed in the National Register of Historic Places (continued)

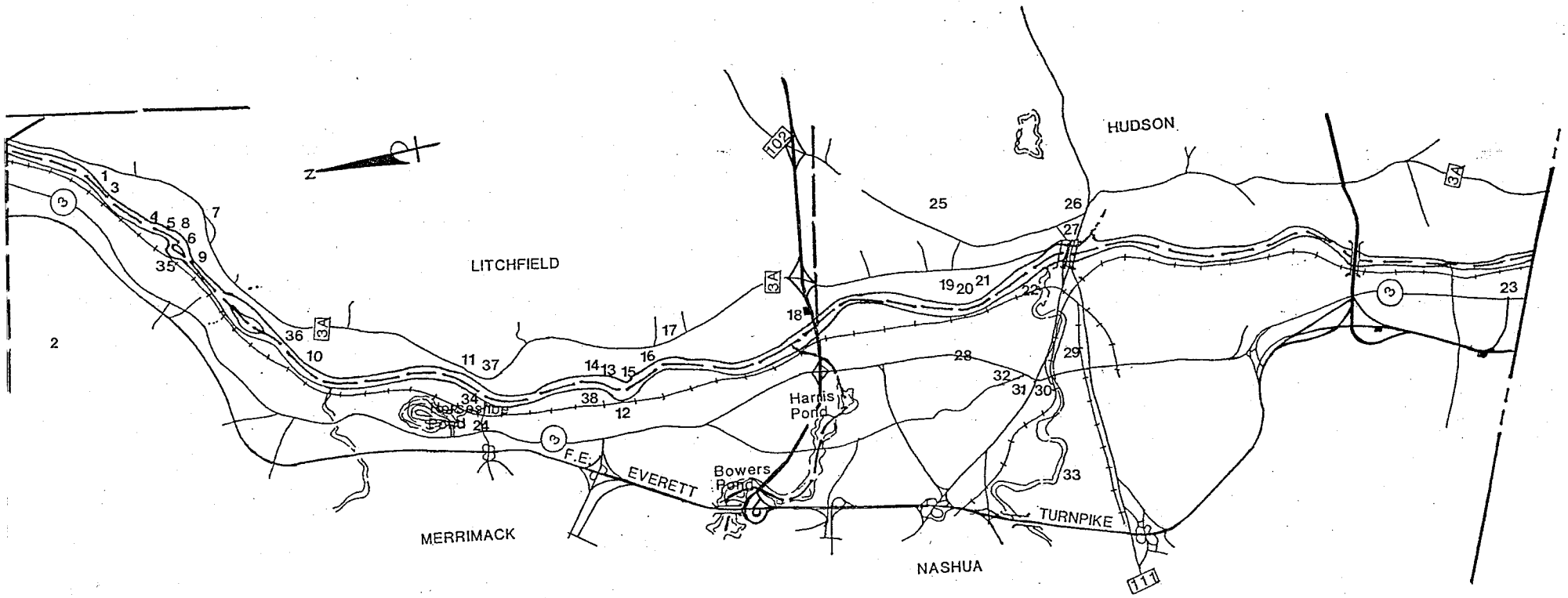
31 Abbot Square, Nashua	Abbot-Spaulding House	n/a	House	1804 & 1905	Nashua Historical Society	Yes	NRHP	Important example of Federal and Colonial Revival periods of architecture in Nashua.
32 Concord St., Nashua	Gen. George Stark House	n/a	House	c. 1850	First Church of Christ, Scientist	Yes	NRHP	One of the finest dwellings in the Italian villa style in New Hampshire.
33 Factory & Pine Sts., Nashua	Nashua Manufacturing Company Historic District	n/a	Mill District	1823-1948	Private & public	Yes	NRHP	Nashua's first & largest textile mill; good example of late 19th c. industrial design.

Table VII-3. Other Historic Sites

34 East bank of Merr. River, Litchfield (Merrimack landing in N. Perry Rd. vicinity)	Thornton's Ferry		Site of early ferry crossing.					Site of ferry operated in 1700s by Matthew Thornton, one of signers of the Declaration of Ind.
35 West side of Merr. River, at Depot St., Merrimack	Reed's Ferry		Site of early ferry crossing.					
36 West side of Rt. 3A, Litchfield	Century Farm		House & barn	c. 1780	Private	yes	Hist. Surv. Form	A fine example of the Georgian style; Litchfield's most substantial late 18th c. house.
37 East side of Rt. 3A, Litchfield	Litchfield Town Center		A district of civic structures.	1844-1924	Public/ Private	yes	Hist. Surv. Form	Litchfield Town Hall (1851); Community Church (1844); Library (1924) and several fine older residences.
38 West side of Merr. River at Cromwells Falls or Thorntons Ferry vic., Merrimack	Cromwells Trading Post	NH45-5	Site of Indian trading post.	by 1656	unknown	?		One of earliest trading posts on Merr. River. Burned in 1665.

MAP VII-1

HISTORIC RESOURCES
MERRIMACK RIVER CORRIDOR



HISTORIC RESOURCES

2. Community Resources

Briefly describe how the river/segment is recognized as a significant community resource.

The Merrimack River is an important resource to the four River communities, the region and the state. Recognition of the multiple values of the River and the need for conservation is increasing. This has resulted in the formal recognition of the River in the master plans of the four River communities, recommendations for additional protection mechanisms and the use of zoning, subdivision and site plan regulations to provide buffers and obtain easements along the River. In addition, the NRPC with the assistance of representatives from the four River communities recently completed the Merrimack River Corridor Management Plan. The Plan is designed to assist the communities in guiding and managing development along the River.

The River serves many purposes and uses in the region. Pennichuck Water Works withdraws water from the River to supplement its supply source. It provides many recreational opportunities to the residents of the corridor. A number of industries within the corridor withdraw water for use during processing. Other withdrawals are for irrigation of crops or recreational facilities such as golf courses. Conversely, the River is used for waste disposal by the City of Nashua and the Town of Merrimack. The River is a significant community resource.

D. RECREATIONAL RESOURCES

1. Fishing, Boating and Other Recreation

a. List any recreational areas and facilities located in the river-segment or corridor. Indicate ownership, if known.

NAME	MUNICIPALITY	OWNER
Greeley Park boat ramp	Nashua	City of Nashua
Nashua Country Club 18 hole golf course	Nashua	Private
Independence Rowing Club rowing club	Nashua	Private
Depot Street Access car top canoes and boats	Merrimack	Town of Merrimack
Passaconaway Golf Course 18 hole golf course	Litchfield	Private
Merrill Park car top boats and canoes	Hudson	Town of Hudson
Birchcroft Park	Hudson	Town of Hudson
Greenmeadow Golf Course 36 hole golf course	Hudson	Private

b. List current recreational activities by type.

Boating: canoeing, kayaking, rowing and power boating

Hiking: hiking along the shore of the River

Fishing: from shore and by boat

c. Describe existing recreational potential.

The Merrimack River provides a multitude of recreation opportunities that are currently underutilized. While the River is used for boating and canoeing, the potential exists to increase these activities through providing additional public access and by increasing awareness of the recreational potential.

Fishing is another activity that is currently taking place on the River at a level well below what could be supported. Public access is again a major obstacle to overcome to increase angling opportunities. Access needs to be obtained for boats and for fishing from the shoreline.

Hiking along the River is currently limited, again by public access. There are only a few locations where parks or pedestrian/conservation easements allow hiking. Great potential exists for developing a hiking trail the entire length of the segment that could become part of the New Hampshire Heritage Trail.

Swimming in the River is currently out of the question due to water quality. There may come a time in the future, however, when it does become viable activity. Once raw sewage is no longer discharged into the River the water quality should improve to a level that may permit swimming and other water contact activities. It is important to recognize the potential of this opportunity to preserve the prime swimming locations before they are developed.

(Additional information on existing and potential recreational use of the river can be fund in Chapter IV, Recreation.)

2. Access

List any existing public access points located in the river/segment corridor. Include type of access provided and ownership, if known.

Public Access

The Merrimack River, as well as all the rivers in New Hampshire, are by statute public waters and therefore entrusted to the State for public use. The legal basis for public access to public waters is contained in RSA 271:20 which states: "All natural bodies of fresh water having an area of 20 acres or more are public waters, and are held in trust by the State for public use; and no corporation or individual shall have or exercise in any such body of water any rights or privileges not common to all the citizens of this State." In further support of public access, the NH Supreme Court ruled that any member of the public "may exercise a common law right to boat, bathe, fish, fowl, skate and cut ice in and on its public waters" (Wicher v. State 87 NH 405, 409 (1935)) Despite such status, the historic development of lands adjacent to the rivers has been controlled by private property owners. Such ownership has served to limit and restrict opportunities for public access even though rivers are public property. In addition, Governor Gregg is concerned with the lack of public access to the State's public waters. As such, he has requested the Council on Resources and Development to conduct an inventory of existing public access points and facilities and to develop a plan to improve public access to the State's waters. The Plan is to be completed by December 31, 1989.

The Nashua region is one of the fastest growing areas in the State. The increase in population has resulted in increased demand for recreational opportunities. The Merrimack River can support many opportunities to meet this demand for such things as fishing, boating, hiking, picnicking, bird watching and cross country skiing. At present, there is only one public boat launching facility on the River located in Greeley Park. Merrill Park in Hudson provides areas for picnicking and a car top boat access. Another public area in Hudson, Birchcroft, provides no direct access to the River and is at the present undeveloped. Both of these areas in Hudson provide opportunities for recreational use, however, they are significantly underutilized. One public access area is currently being developed in Merrimack, the Depot Street access, and will include an area for picnicking and a car top boat access. These existing access points are discussed in the following sections and are depicted on Map V-5.

Greeley Park (Nashua)

Greeley Park is located in northeastern Nashua and contains the only public Merrimack River boat launch in the study corridor. The over 2,500 feet of river frontage lies east of the railroad tracks and is completely wooded with the exception of the cut for the boat ramp. The boat ramp, with a paved approach and a concrete pad into the water, is capable of handling most boats. Access to the site is across a dirt road and parking is limited, particularly near the boat ramp itself. The boat ramp is not accessible from the main section of the park. The facility is accessible via a different road through a residential neighborhood. Signage for the boat ramp is nonexistent, making

it almost impossible to find for anyone not familiar with the area. In addition, the gate to the park is often locked. There is also a history of vandalism of parked cars at the site.

Currently, the City has no plans to upgrade this section of Greeley Park, though it is working to obtain conservation and pedestrian easements on adjacent properties. Simple improvements to the area include providing better signage and increased security. More extensive future improvements would be to provide additional parking and restroom facilities. The site has a great deal of potential for increased recreational use. The facility provides access to a lengthy stretch of flat water that could be used by the region's residents and by the recreation department to teach paddling to the City's youth.

Merrill Park (Hudson)

Merrill Park, located in downtown Hudson, encompasses 9.3 acres with approximately 1,100 feet of river frontage. A master plan developed for the park includes recommendations for a boat ramp in the northern portion of the site; two parking areas with a total of 37 spaces; picnic tables and seating; scenic overlooks; and a series of interconnected trails. Funding for the improvements is limited, and present site development consists of the access road and a few picnic tables. An informal car top boat access is located at the southern end of the site. Erosion is a problem at this site and the path down to the River needs to be stabilized before an even deeper gully results.

A recreation plan is currently being prepared for the Town. that places a high priority on implementing the Merrill Park plan. The Town should pursue available funding from the New Hampshire Fish and Game Department for development of the site. The funds, distributed based on a 25-75 percent local-state match, can be used to construct public access to the State's lakes and rivers, including boat ramps.

Depot Street (Merrimack)

The Depot Street/Reeds Ferry Landing access is currently being developed by the Town of Merrimack. The site, owned by the Town, is reached through a concrete tunnel under the railroad tracks. The extent of the Town's ownership along the River is unknown but is estimated at between eighty to one-hundred-fifty feet. A conceptual design plan for the site was developed by the Merrimack Timely Information Network (TIN) of the Merrimack River Watershed Council (MRWC). A copy of the conceptual design prepared for the site can be found in Appendix E. The facility being developed will include a picnic area, a small boat launching area for car top craft and a hiking trail proposed to run along the River through conservation and pedestrian easements. Advantages of the site include: location at the end of a stretch of white water for canoes and kayaks; access to a 5 mile stretch of flat water downstream; improved emergency vehicle access to the River; and it avoids an at-grade crossing of the railroad tracks. Proposed parking for the facility could be located on a parcel currently owned by Guilford Transportation. Before the facility can be developed, drainage problems on the site will need to be corrected.

While public access is currently very limited, a number of potential access points can be found along the River.

Birchcroft (Hudson)

Birchcroft is a 5.3 acre site with approximately 1,000 feet of river frontage. The steep riverbank, however, limits the potential of the site for boat access. Entrance to the site is through a residential neighborhood, and no parking is provided. The site is primarily wooded and contains both a sewer easement and a powerline easement. Use of the site is limited by the easements and the steep bank. The draft recreation plan recommends developing the site for scenic views and hiking.

This site at present is underutilized. The existing utility easements create a natural trail through the parcel. Lookouts over the River could be developed at a minimal cost to the Town. The area could serve the surrounding residential neighborhood, which currently does not have any formal recreation areas.

Twin Bridge Recreation and Municipal Complex (Merrimack)

A conceptual plan was developed for this area by the local TIN group of the MRWC for additional River access near the Town center in conjunction with the design for the Depot Street access. The proposed site encompasses about 130 acres of land, includes some Town owned property and is served by existing roads. Accomplishing the proposal would require the Town to purchase additional property and to resolve any problems associated with the existence of a former landfill on a portion of the site.

The proposed site extends from just south of the Souhegan River to the section of the River just south of a large island. Approximately 0.8 of a mile of river frontage is included in the proposal to be used for passive recreational activities such as hiking, picnicking and fishing, with one boat launch area. The proposal for the larger municipal complex, west of the tracks, includes: baseball, softball, soccer and football fields; track facilities; tennis, volleyball and basketball; an open air amphitheater for summer plays, concerts and other public events; and a central facility that will house the park offices, a community center, and an indoor pool.

While immediate actions on the proposal are limited by the former landfill and the need to assemble the numerous parcels, the plan is a significant tool for long range improvement of the riverfront. The proposed recreation and municipal facilities complex would address a number of the Town's recreational needs identified in the Parks and Recreation Plan while conserving the riverfront.

Thorntons Ferry (Merrimack)

The Thorntons Ferry site, located east of Exit 11 off the Everett Turnpike, is an historic public access to the Merrimack River. The North Ferry Road, which passes under the railroad tracks and leads to the River, was constructed in 1891 and is still owned by the Town. The underpass beneath the railroad tracks eliminates the need for an at grade crossing. The property itself slopes gently to the River at the convergence of Naticook Brook and the River. Because of these gentle slopes, the site is well suited to the development of a boat launching facility.

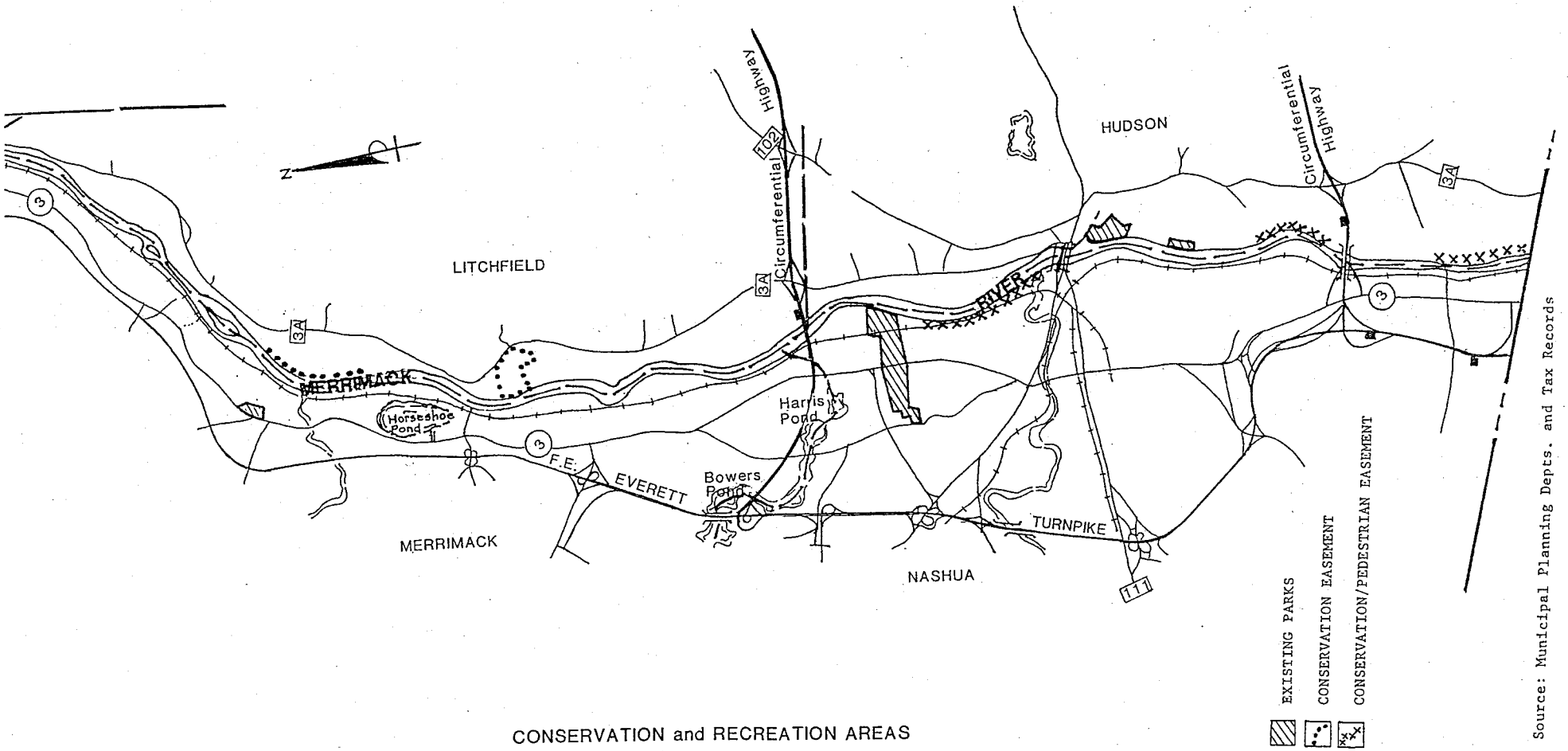
The Leach Property (Litchfield)

The Town of Litchfield is currently working with TNHL staff on an application for funding to purchase a 6.8 acre parcel located on the River across the street from the library and with approximately 800 feet of River frontage. The parcel contains prime agricultural soils and has been targeted by the TNHL as a property of statewide importance. As part of the application process, the New Hampshire Fish and Game Department conducted a site analysis and found the site favorable for the development of a car top boat launching facility. The site is well located for public use as it is near the Town center. A limited amount of parking, mostly on weekends, could be shared with the Town Hall and the library. Parking will have to be developed on site, however, to accommodate use of the site by boats and trailers.

Successful development of a trail system and of these public access areas depends a great deal upon the ability to provide adequate parking. Without parking, it will be difficult for people to utilize the recreation areas provided. The development of the larger public access/park areas is also important to the development of the trail. The areas provide locations for accessing the trail as well as the River along with opportunities for picnicking, birdwatching, nature study and other passive forms of River recreation.

MAP VI-1

CONSERVATION AND RECREATION AREAS ON THE MERRIMACK RIVER



CONSERVATION and RECREATION AREAS

Source: Municipal Planning Depts. and Tax Records

E. OTHER RESOURCES

1. Scenic Characteristics

Briefly describe significant scenic focal points along the river/segment corridor (i.e., indicate the location of views to and from the river).

Scenic Views and Vistas

Essentially, the entire Merrimack River corridor can be considered scenic, particularly those areas accessible to the public. There are, however, areas that are less scenic than others due to the presence of buildings, industrial developments, and other obtrusions on the landscape. Scenic views, north and south, can be obtained when crossing the Taylor Falls and Sagamore bridges in Nashua. Greeley Park, in Nashua, and Merrill Park, in Hudson, also offer scenic views of the River and direct public access.

From the river itself, almost the entire riverbank is scenic in some manner. The banks of the River rise to a level where much of the development is blocked from view. Development can only be seen in those locations where buildings and parking areas are located directly at the top of the riverbank and are not screened by any type of vegetation. In addition, the River provides the opportunity to view many species of birds and other wildlife.

Riverbank developments can be designed to fit into the natural landscape. Buildings, structures and other site developments, for example, can be setback from the top of the bank and screened from the River by a vegetative buffer. The Sanders Corporation development in south Hudson provides a good example of effective use of setbacks and vegetative screens. The development can barely be seen from across the River. Height limitations for buildings and structures can also be used to conserve the visual integrity of an area. In addition, planting vegetative buffers around existing developed areas will screen the development from the River and help stabilize the soil. Clearcuts or extensive thinning of existing tree stands can have negative impacts on the visual quality of a view or vista as well as create situations ripe for erosion. On the other hand, selective cuts and thinning can open up views that have been obstructed by growth. Proper site planning can ensure developments that are designed and constructed to fit harmoniously into the landscape.

2. Land Use

Identify municipalities with existing master plans and/or zoning ordinances within the river/segment corridor. Identify local land use controls which affect the river/segment corridor (i.e., zoning, easements, subdivision regulations).

Existing Zoning

Zoning is the principal tool available to municipalities for managing land use. Upon adoption of the general statement of objectives and the land use section of the community's master plan, municipalities are granted the authority to zone by RSA 674:16 "for the purpose of promoting the health, safety or the general welfare of the community..." The power to zone includes the right to adopt innovative land use controls such as cluster development, performance standards and environmental characteristics zoning. One stated purpose for zoning that applies to river corridor management is "to assure proper use of natural resources..." (RSA 674:17). Therefore, the basis for protecting the River corridor through the use of zoning is established in State statutes as well as within the powers of the localities.

Each of the four communities has an adopted master plan and zoning ordinances including subdivision and site plan review regulations. Master plan references for the use and protection of rivers and the existing zoning regulations affecting the River corridor are briefly discussed below. Existing zoning for each community's portion of the study corridor is depicted on Maps V-1,2,3 and 4. A summary of the specific zoning requirements of the districts within the River corridor is provided in Appendix D. The information in this section is presented as an overview of the four communities' regulations. More detailed information can be obtained by examining the regulations of the individual communities.

Nashua

The City of Nashua recognizes and clearly states in its master plan the importance of conserving the Merrimack River. The Master Plan identifies the following implementation mechanisms for achieving the recommendations:

- amend and revise the existing ordinances and zoning districts;
- introduce new ordinances;
- conduct studies toward creating new zoning districts;
- and use available mechanisms such as easements and acquisition to protect conservation lands.

The City of Nashua 1985 Master Plan recommends that conservation easements be obtained along the Merrimack River, and that the existing industrial land north of Greeley Park be developed for recreation if the area is not developed for residential use. Strategies outlined in the Plan to implement the recommendations include:

- o encourage public access and/or conservation easements along land abutting ponds, rivers and major streams;
- o insure the protection of unique natural resources such as wildlife habitats, wetlands, aquifers and vistas;
- o and insure that only appropriate and compatible uses are located along or contiguous to unique natural resources.

The Nashua section of the River corridor contains 5 zoning districts: GB - general business, GI - general industrial, R9 - suburban residence, RA - urban residence class A and RB - urban residence class B. Map V-1 shows the location of each district with relationship to the River. The following is a brief description of the permitted uses within each district:

GB - retail food, drug, clothing and hardware stores, restaurants, personal services, movie theaters, business and professional offices, business services, auto dealerships, printers, churches and temples, schools, municipal buildings, city outdoor recreational facilities, historical associations or societies, sewage treatment plants, refuse facilities and bus or railroad passenger terminals.

GI - communications and television towers, printers, construction industries, manufacturing, bakeries, laundries and dry cleaners, rail yards, wholesale trade and distributing, research and development facilities, sewage treatment plants, refuse facilities, public utilities, churches and temples, municipal buildings, city outdoor recreational facilities, outdoor concerts, motor freight terminals and warehousing, bus or railroad passenger terminals and open storage of raw materials.

R9 - single family residential, churches and temples, schools, municipal buildings, nonprofit county, hunting, fishing, boating, tennis, swimming or golf club, city outdoor recreational facilities, historical associations or societies, hospitals, sewage treatment plants, refuse facilities and public utilities, and minor home occupations.

RA - same as R9.

RB - same as R9 plus: duplexes, rest, convalescent and nursing homes.

Minimum standards for the GB and GI districts are as follows: minimum lot size 10,000 and 5,000 square feet respectively; minimum frontage 50 feet; and maximum building height 60 feet. Minimum lot size is the major difference between the districts, 9,000, 7,500 and 6,000 square feet respectively for R9, RA and RB.

Cluster developments are allowed in the R9 and RA districts by special exception of the zoning board of adjustment (ZBA) for single family and multi-family developments on ten acres or more of land. The City has a floodplain district, however, there are no shoreline or aquifer protection regulations. A wetlands protection ordinance is currently in formulation and anticipated in late 1989.

Merrimack

The Town of Merrimack is currently updating its master plan; however, the 1982 Master Plan contains a number of policies that have an impact on the Merrimack River and corridor development. These policies include:

- o limiting and controlling development in environmentally sensitive areas such as steep slopes, greater then 15%, floodplains, wetlands, public water supply areas and poor soils;
- o securing open space areas for community needs, such as recreation or watershed protection, or channeling development away from environmentally important open spaces;
- o and maintaining and enhancing environmental standards to insure air, water and overall quality.

In 1987, the Town updated its Parks and Recreation Plan. The Plan projects community recreational needs based on State population based recreation standards and the existing recreational facilities in the Town. The results of the analysis indicate a need for developing hiking trails and improving boat/fishing access. The Merrimack River and its corridor can fill both of these needs. Hiking trails can be developed along the riverbank while the development of additional access to the River can increase opportunities for boating and fishing.

The majority of the land directly adjacent to the River in Merrimack is zoned industrial, C, the exception being the far northern portion which is zoned residential, A. Other areas adjacent to the industrial district are zoned residential, A, and general business, B-1. Merrimack zoning is depicted on Map V-2. The uses permitted within each district include:

- C - manufacturing; warehouse and wholesale uses; offices larger than 10,000 square feet; public utilities; gas stations; sales, service and repair of machinery and transportation equipment; freight and trucking establishments; contractors yards; bulk fuel storage and distribution; printing establishments; and breweries and bottling plants.
- B-1 retail sales and services; business, professional and banking offices; research and development; restaurants, cafes and bars; and hotels and motels.
- A - single-family, two-family and multi-family dwellings and home occupations.

In the C district, minimum lot size for commercial buildings is 20,000 square feet. There is no minimum lot size for industrial developments; however, floor area ratios cannot exceed 0.4 for a one-story building or 0.8 for a two-story building and buildings must be setback a minimum of 100 feet from D.W. Highway. In addition, all developments within this district must be served by Town water and sewer. Minimum lot size in the B-1 district is 20,000 square feet with 125 feet of frontage. Floor area ratios in this district are the same as the industrial district. Minimum lot size requirements are based on soil type and the presence of Town water and sewer. Cluster development of one, two and four unit residential structures is allowed in Merrimack with a 15 acre minimum parcel size on Town water and sewer. In addition, Merrimack has adopted a number of regulations to protect its natural resources, such as the flood hazard conservation district, a wetland conservation district and an aquifer conservation district. The Town does not have any type of shoreline protection.

Litchfield

Litchfield's 1981 master plan, currently being updated, establishes two policies relating to conservation of the Merrimack River and its corridor:

- o promote the adequate protection of water bodies, water courses, wetland areas, aquifer recharge areas and other portions of the community deemed important to the hydrologic cycle and to the supply of water;

- o and encourage the conservation and protection of areas important as wildlife habitats.

The master plan recognizes the need for an increase in water-based recreational activities and identifies the Merrimack River as an appropriate location for boating and canoeing. The implementation section of the Plan specifically recommends obtaining lands or rights-of-way to provide access to the Merrimack River for water recreational use.

Four zoning districts can be found along the Merrimack River in Litchfield: the northern commercial (NC), the southwestern commercial (SC), the transitional (T) and the residential/agricultural (RA). These zones are depicted on Map V-3. The following uses are permitted within each district:

NC banks; retail food, hardware and clothing establishments; restaurants (not fast food); professional offices; health care facilities; personal services and offices; hotels and motels; indoor theaters; churches and temples; schools, nurseries and daycare centers; and funeral homes. Automobile services and gas stations are permitted only by special exception.

SC same as NC plus: civic centers; retail sales of motor vehicles, supplies and equipment but not repairs; and research and testing laboratories.

RA single family residences and duplexes; agriculture and related uses; mobile homes in mobile home parks; and utility structures. Private recreation facilities such as golf courses and country clubs are permitted as special exceptions.

T single family and duplexes prior to March 14, 1989; schools, daycare, business or trade schools; lodges and fraternal orders; professional offices; agriculture; and public or non-profit recreational facilities. Private or profit recreational facilities, banks and mixed use residential/commercial are permitted as a special exception.

A minimum of 150 feet of frontage is required in the southwestern and the northwestern commercial zones, however, 500 feet of frontage is required along Route 3A in the northwestern district. Minimum lot size is to be determined by the Planning Board during site plan review. In addition, uses within these districts are governed by a series of performance standards including such things as no discernible vibrations off-site or noise not to exceed 75 decibels off-site. The minimum lot size in the RA district is 43,560 square feet for a single family residence and 65,340 square feet for a duplex; frontage is 150 and 200 feet respectively. Cluster developments are not allowed in any district. In addition, the Town has adopted floodplain and wetland regulations, however, they have not adopted any aquifer or shoreline protection regulations.

Hudson

The natural resources section of the 1987 Hudson Master Plan identifies a number of environmentally sensitive areas including: areas within 75 feet of a surface water body or way; areas within 50 feet of wetlands; and areas within 50 feet of the floodplain. The plan recommends prohibiting development within the floodway and within 50 feet of surface waters. The Town is currently developing a comprehensive recreation plan. The recreation plan contains a number of recommendations for the Merrimack River including:

- obtaining conservation easements along the entire length of the River and developing a trail network;
- implementing the master plan for Merrill Park as a top priority for the Town;
- linking the Birchcroft site with other conservation easements along the River to create the trail network;
- and developing public access to the River in the northern section of the Town.

As in Merrimack, the plan projects existing and future recreational needs of the community based on population and State standards. Again, the two areas where the Merrimack River could provide recreational opportunities to meet the excess demand are boating/fishing and hiking trails.

Five zoning districts are adjacent to the Merrimack River in Hudson: A-1 and A-2 - residential, B-2 - business highway, C - industrial and D - rural. These zones are depicted on Map V-4. The majority of the land adjacent to the River is zoned A-1 and A-2. Permitted uses within these districts include:

A-1 single-family residences and duplexes; churches and temples; daycare centers and schools; nonprofit recreational facilities; public utilities; and funeral homes.

A-2 same as A-1 plus: hospitals and sanitariums.

B-2 multi-family residential; Town buildings except equipment garages; retail hardware, furniture, apparel and dry goods; restaurants; kennels and veterinarians; car dealerships and automotive repair; communication and television towers; hotels and motels; indoor theaters; convalescent and nursing homes; light manufacturing; and airports and heliports.

C many of the B-1 uses plus: heavy manufacturing; trucking service and warehousing; business and professional offices; mining and quarrying; and parking and storage of heavy trucks.

D a mixture of uses found in the residential, business and industrial districts such as residential uses, daycare centers and schools, indoor theaters, business and professional offices, mining and quarrying, light and heavy manufacturing, plus: cemeteries; planned shopping centers on 8 acres or more; automotive repair; town equipment garage; and power plants and refuse facilities.

Minimum lot size and frontage requirements in the RA district are based on the type of residential structure, single-family vs. multi-family, and the presence of Town water and sewer. The absolute minimum is 30,000 square feet for a single-family dwelling with water and sewer and 120 feet of frontage. Minimum lot sizes and frontages for the business and industrial districts are initially the same as for the residential districts; however, additional requirements under the site plan review regulations, for such things as parking and open space (a minimum requirement 35% of the lot), can increase the required lot size based on the size of the proposed development.

Planned residential development, clustering, is allowed only in the residential districts for 1,2,3 and 4 unit residential buildings. In addition, the Town has a good wetlands protection ordinance and adequate floodplain regulations, however, it has no regulations for shoreline or aquifer protection.

As described, a variety of zoning districts are found in the River corridor. Some districts restrict land uses only to residential uses while others allow a multitude of industrial and commercial developments. The large percentage of industrially and commercially zoned land within the corridor, particularly those areas directly adjacent to the River, creates a situation that could have a profound negative impact on the River. Contamination of the River and of the groundwater has already occurred within the study corridor from existing development. Additional development with the potential for negative impacts will only increase the likelihood of some eventual contamination.

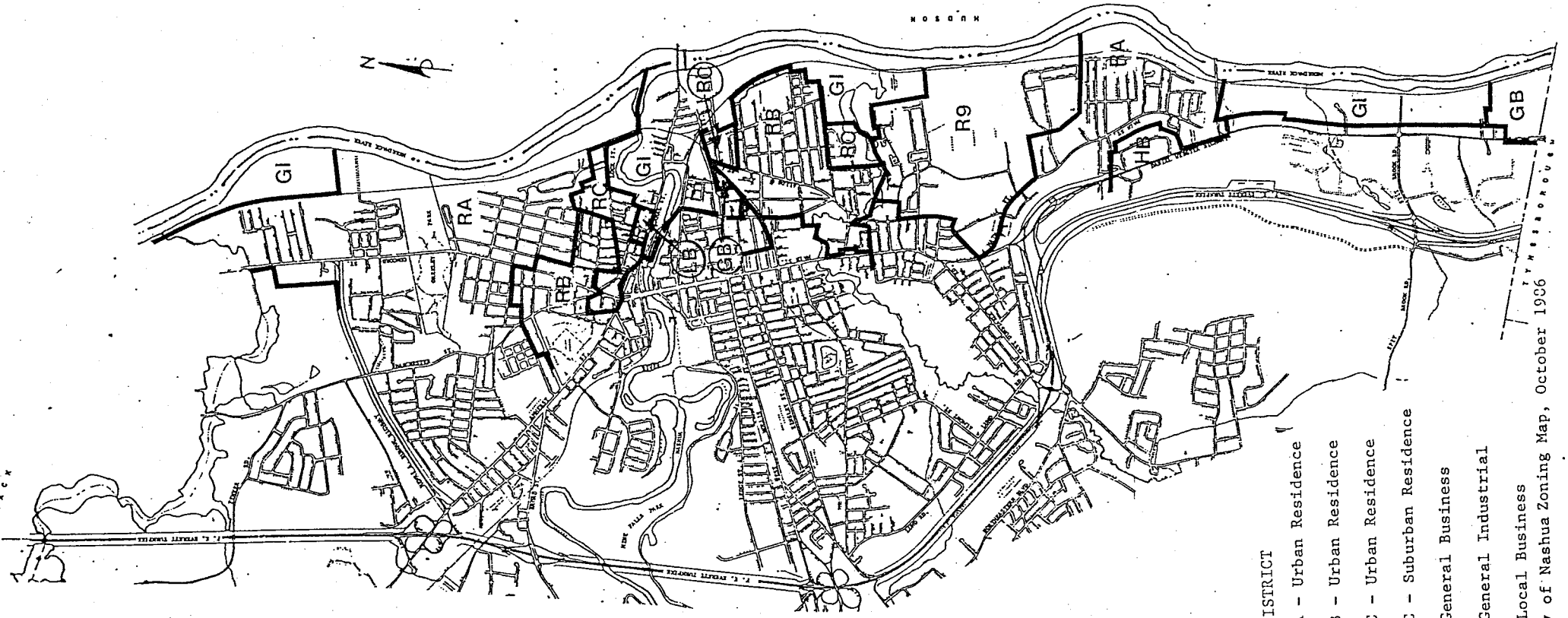
Shoreline protection regulations could be effectively used to protect the River corridor from the negative impacts of future development and to ameliorate the impacts of existing developments. For example, requiring minimum setbacks for site developments and maintenance of vegetative buffers can decrease the impact of riverfront development. These requirements protect water quality by providing a filter strip between the development and the River while maintaining the aesthetic character of the corridor. Maintenance of the vegetative buffer can also protect the River from negative impacts of existing land uses. Limitations placed on the types of uses allowed within the shoreline zone will ensure that those land uses and activities that pose a significant threat to the River, such as landfills and junkyards, will be prohibited from the corridor thereby decreasing the potential impacts.

Wetland and floodplain protection regulations can also provide crucial protection to the River and its tributaries. The benefits of wetland and floodplain protection have already been discussed. Floodplains best support low intensity uses such as recreation to preserve their capacity to transmit floodwaters and to minimize economic losses. Wetlands perform important functions such as water storage and water purification. All of the communities have some level of floodplain protection; however, that protection could be strengthened by not allowing floodplain areas to be used to satisfy minimum lot size requirements. In addition, the floodplain district should be a self-contained overlay district that applies to all land areas not a component of the subdivision regulations.

Aquifer protection regulations can protect the Merrimack River since the entire study corridor is identified as an aquifer. Aquifer protection districts generally limit uses within the district to those that have little potential to contaminate the groundwater resource. Additional restrictions regulate development practices to prevent contamination. Uses that threaten groundwater resources also threaten surface water resources both directly and indirectly since groundwater flows into surface waters. Therefore, the benefits of protecting groundwater resources will also accrue to surface waters. Merrimack is the only one of the four communities with an aquifer protection ordinance.

MAP V-1

NASHUA ZONING



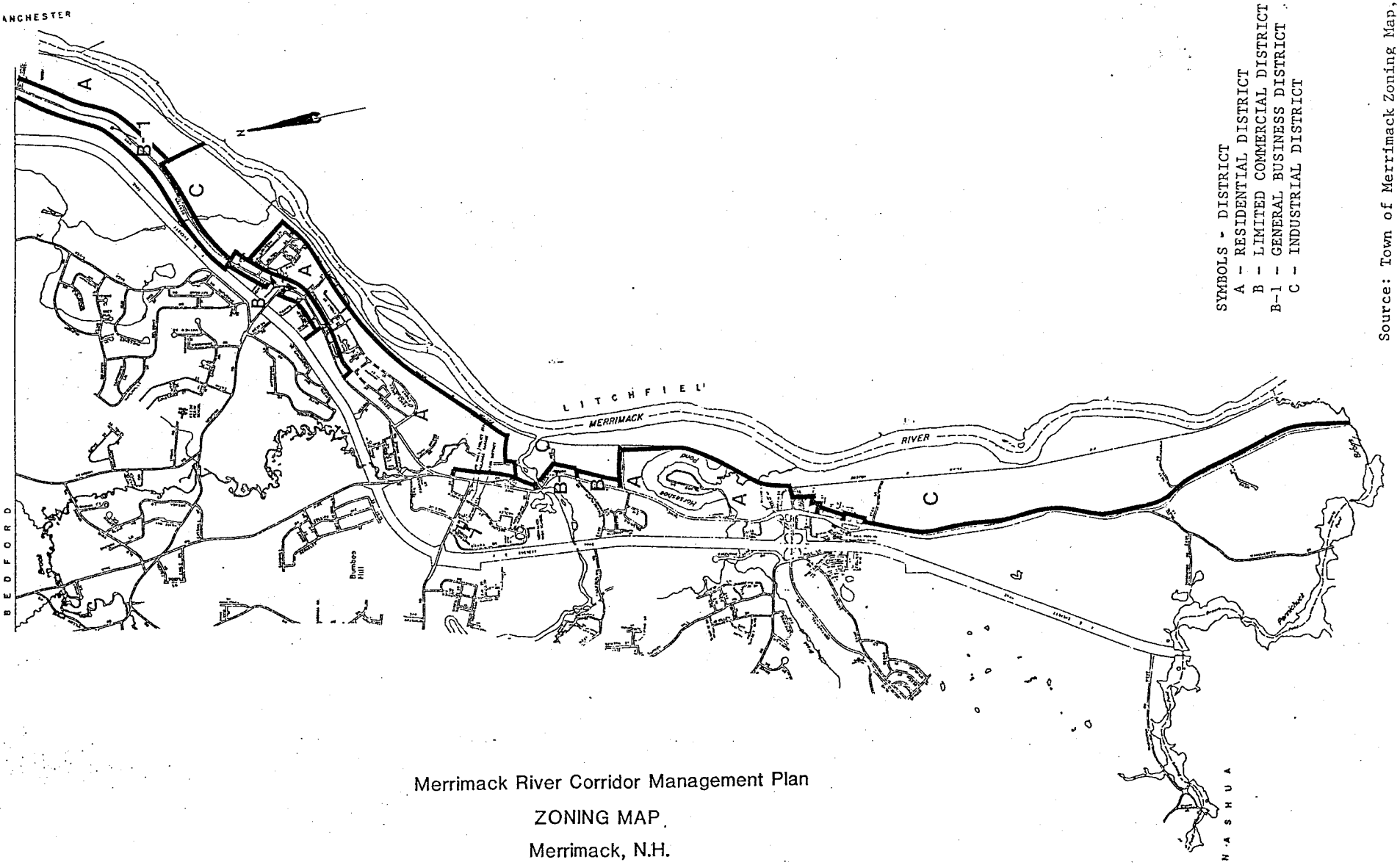
Merrimack River Corridor Management Plan

ZONING MAP

Nashua, N.H.

MAP V-2

MERRIMACK ZONING



SYMBOLS - DISTRICT
A - RESIDENTIAL DISTRICT
B - LIMITED COMMERCIAL DISTRICT
B-1 - GENERAL BUSINESS DISTRICT
C - INDUSTRIAL DISTRICT

Source: Town of Merrimack Zoning Map, May 1986

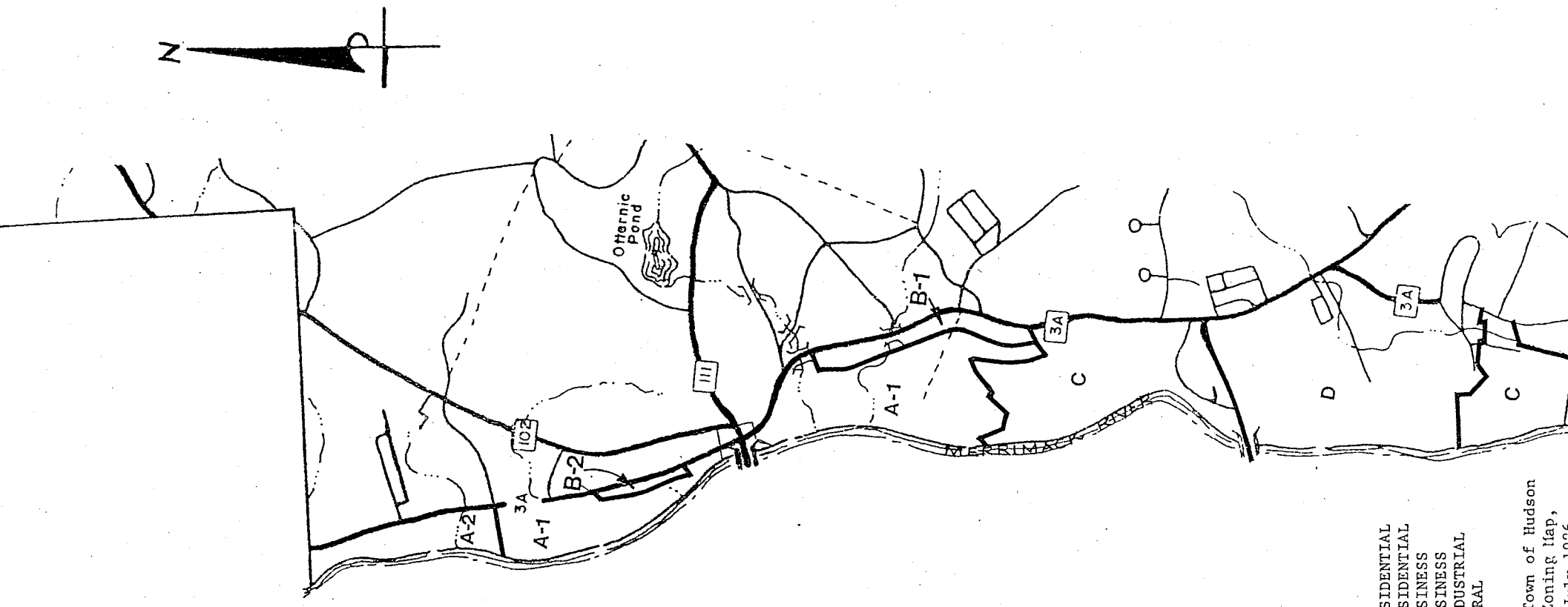
Merrimack River Corridor Management Plan

ZONING MAP

Merrimack, N.H.

MAP V-4

HUDSON ZONING



A-1 RESIDENTIAL
A-2 RESIDENTIAL
B-1 BUSINESS
B-2 BUSINESS
C INDUSTRIAL
D RURAL

Source: Town of Hudson Zoning Map, July 1986

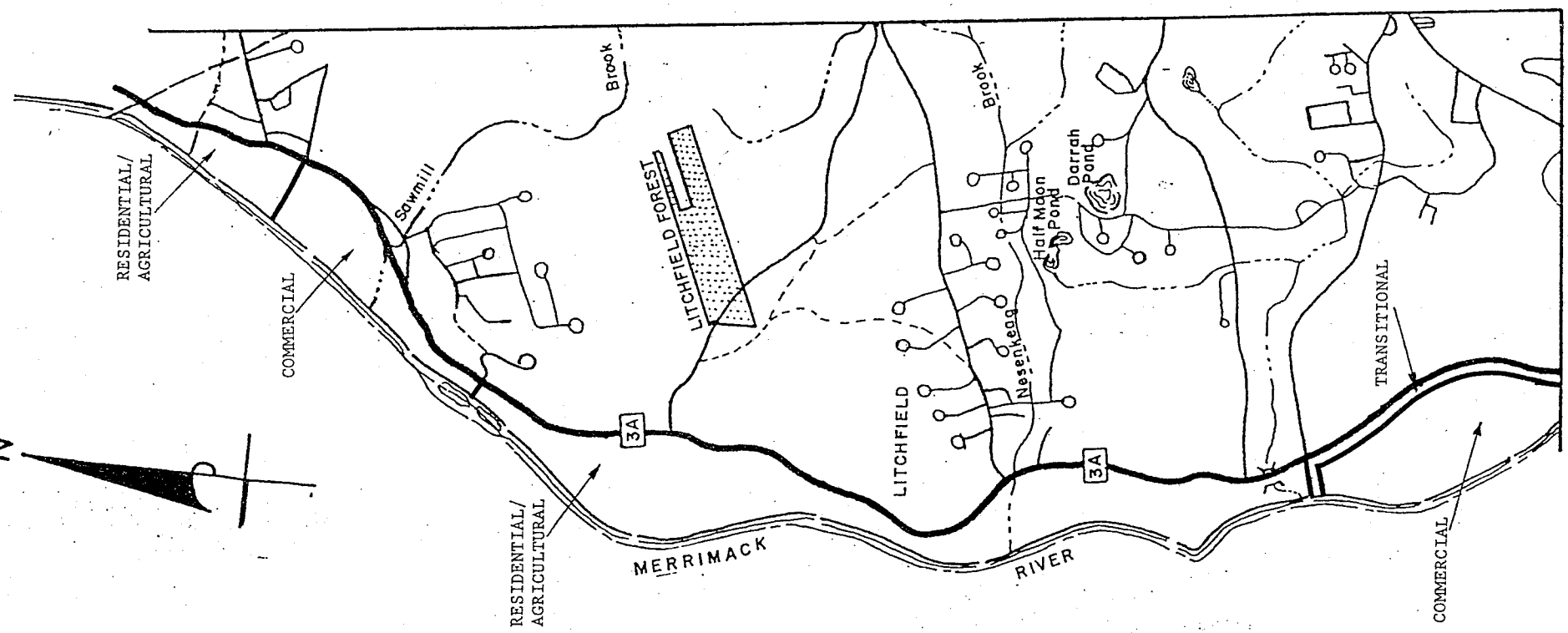
Merrimack River Corridor Management Plan

ZONING MAP

Hudson, N.H.

MAP V-3

LITCHFIELD ZONING



Source: Town of Litchfield Zoning Map, March 1989

Merrimack River Corridor Management Plan
ZONING MAP
Litchfield, N.H.

3. Corridor Development

Briefly describe the development of the river/segment corridor. Indicate the type and location of significant developments within the corridor, including roads, utility crossings, bridges, commercial and industrial developments, and housing.

Land Use

Existing land use adjacent to the river is dominated by industrial development on the west, including the railroad, and agricultural and residential development on the east. Development patterns are different in each of the four communities, therefore, land use for each community is discussed individually below. The potential for change in land use adjacent to the River is also discussed.

Nashua

Nashua's riverfront development is predominantly industrial. The railroad extends the entire length of the River and the majority of the parcels east of the tracks are undeveloped leaving a natural greenspace or buffer. This buffer is quite narrow in some areas due to the close proximity of the tracks to the River. Land use, north to south, is industrial from the Merrimack-Nashua line to the boundary of Greeley Park. This site contains the no longer operational Koppers creosote facility. Soil on the site is contaminated with creosote which is leaching into the river. Clean-up efforts have improved the situation but more remains to be done. A section of Greeley Park, owned by the City, is located east of the tracks and is the site of the only boat ramp in the study corridor. Three privately owned parcels are located east of the tracks between the park and Thoreau's Landing, a condominium development located just north of the confluence of the Nashua and Merrimack Rivers. While the development is close to the River, the City obtained a conservation easement along the River during the development review process.

The land directly north and south of the Taylor Falls Bridge is vacant and owned by the City. Moving south one would find industrial land use, followed by the city sewage treatment plant, the Nashua Country Club and residential development. The land directly north and south of the Sagamore bridge is owned by the State and is open space. South of this, land use adjacent to the tracks is predominantly industrial with commercial development along the Massachusetts border, the Pheasant Lane Mall.

The City owns three parcels adjacent to the River: Greeley Park, and two parcels adjacent to the Taylor Falls Bridge. Greeley Park provides the only access to the River at this time. The parcel south of the Taylor Falls Bridge is contaminated with asbestos. This parcel could be developed for recreational use in the future when the asbestos on the site has been contained. The parcel north of the bridge is located at the confluence of the Nashua and Merrimack Rivers and also has the potential for recreational development.

With the exception of the few parcels adjacent to the River not owned by the railroad or the City, there is likely to be little change in the existing land use patterns along the River. Two areas of concern are three parcels east of the tracks south of the Nashua Country Club and the Kopper's property north of Greeley Park. One parcel near the Country Club has already been platted for residential development. Future plans for the Kopper's property are unknown at this point.

Merrimack

Industrial land uses dominate the parcels adjacent to the River in Merrimack. As in Nashua, the railroad extends the entire length of the River, land use east of the tracks is either industrial or vacant except for the parcels where the Waste Water Treatment Facility (WWTF) is located.

West of the railroad tracks, land use is again predominantly industrial. There are some residential and commercial uses in the Reeds Ferry area and in the northernmost section of the Town to the Bedford line. Town owned land is restricted to the WWTF and to a small parcel along the River in Reeds Ferry off of Depot Street. This parcel is currently being developed to provide public access, and will include a boat launching area for car top boats and a picnic area.

Where the railroad is close to the River, it provides somewhat of a protective buffer against future development. Two parcels east of the tracks, owned by the Town of Merrimack, are the site of the WWTF. Another large parcel is owned by Anheuser Busch, and they have no plans at this time to develop the land east of the tracks. Additional large parcels of industrial land, currently undeveloped or underdeveloped, provide the opportunity for future development east of the tracks in the Thorntons Ferry area and behind Horseshoe Pond. One other parcel with development potential is the Longa property, which contains an old Town landfill. A conceptual design for the area provides for River access including a boat ramp for large motor boats and a hiking trail that would connect up with the Depot Street access. Formal plans for the site cannot be made until it is fully evaluated and determined to be safe.

Litchfield

Land use along the River in Litchfield is dominated by agriculture except for three areas of residential development. The first area is just south of the Manchester line. Naticook Landing is the second residential area that will contain fifty homes and an eighteen-hole golf course when completed. The third very short stretch, Broadview, is located just north of Talent Road and contains thirty-four lots.

Because of the predominance of agricultural land in large parcels, Litchfield is the area in the study corridor with the greatest potential for future change. This change is already occurring as evidenced by the increase in residential subdivision in the past ten years. In addition, the eastern shore is not afforded the natural buffer provided on the western shore by the railroad tracks. The southern portion of the River corridor was recently rezoned from agricultural to commercial; thus, future development in this region is likely to be commercial in nature. The remaining area zoned agricultural will probably be developed for residential use.

Hudson

The diversity of land uses along the River is greatest in Hudson. The northern section of the Town is predominantly agricultural. Residential land uses dominate the areas north and south of the Taylor Falls Bridge. South of the residential concentration the dominant land use is industrial to the Sagamore Bridge. South of the bridge is a 36-hole golf course, a short stretch of residential development and an industrial development extending to the State line.

The Town owns two parcels with River frontage, Merrill Park and Birchcroft. Merrill Park contains 9.3 acres and includes a few picnic tables and a car top boat access. Birchcroft measures 5.3 acres in size and is currently undeveloped.

Changes in land use within the Hudson portion of the River corridor will most likely take place in the northern section which is currently agricultural. Another location where change may occur is the large parcel owned by Digital Equipment Corporation, the former Saint Anthony's Friary site.

The City of Nashua currently requests conservation easements along water bodies and wetlands through negotiations with the developer. The same practice is used in Litchfield and Hudson. Without a formal requirement, however, it is often difficult to convince developers to go along with the idea of a greenbelt along the River. A formal requirement for conservation easements along the River would give planning boards the support needed in dealing with developers and would also ensure consistency in the width of the conservation easement. The Hudson Planning Board has successfully obtained conservation and pedestrian easements along the River through the Sanders property and the neighboring subdivision and through the Sagamore Industrial Park. Litchfield is the community with the greatest potential to take advantage of this option because it has the greatest amount of undeveloped land. Given the growth and development pressures in the region, much of this land will likely be converted to more intense uses within the next ten years.

Road Systems

The Merrimack River is bounded on the east and west by US Route 3A and NH Route 3 respectively. Route 3 is a Class I highway for the entire study corridor while Route 3A is Class I through Hudson and Class II in Litchfield. These routes run north-south, parallel to the River. NH Route 111, the major east-west route through the study area, traverses Hudson, crosses into Nashua via the Taylor Falls Bridge and then parallels the Nashua River into Massachusetts. Other Routes include NH Route 102 which runs northeast from Hudson to Londonderry and NH Route 101A which runs northwest through Nashua into Milford. Two bridges, the Taylor Falls Bridge and the Sagamore Bridge, provide River crossings between Nashua and Hudson. These roads provide major arterial access to the entire River corridor.

While the major arterials provide access to the River corridor, access to the River is provided by collector and local roads, generally through subdivisions. The access provided by these roads is extremely limited, however, as the streets are generally separated from the River by private lots. Even in the locations where there is public access to the River, such as Merrill Park in Hudson, the entrance to the park is through a subdivision and parking is limited. This situation often causes problems with local residents of the neighborhood.

One future highway project that would have a significant impact on the River and the four communities is the proposed Circumferential Highway. The proposed limited access project will route traffic around the City of Nashua by diverting traffic from the Everett Turnpike at Exit 9 on the Nashua/Merrimack line, crossing the River into Litchfield, moving south into Hudson, crossing the River again at the Sagamore Bridge and joining up with the Turnpike at a new Exit 2. Interchanges will be provided from the highway to Route 3A in Litchfield and Hudson. As part of the proposal, the New Hampshire Department of Transportation (DOT) has agreed to acquire land for access to the Merrimack River in Hudson. The route preferred by the DOT, crossing above Pennichuck Brook and the ponds, could have a significant negative impact on the Brook which serves as the principal water source for Pennichuck Water Works. In addition, the two bridges resulting from the proposal will have a significant impact on the visual quality of the River corridor. The highway will also increase access by major arterials with the addition of the interchanges in Nashua, Merrimack, Litchfield and Hudson.

REGIONAL PERSPECTIVE
MERRIMACK RIVER CORRIDOR