INTERVENOR, MERRIMACK'S, EXHIBIT LIST

ORIGINAL
N.H.P.U.C. Case No. DW 11-026
Exhibit No. #22
Witness Panel
DO NOT REMOVE FROM FILE

A. Testimony of Finlay Rothhaus (09/08/11) and attachments

B. 2002 Merrimack Master Plan-Water Resources Section

C. Charter of the Merrimack Valley Regional Water District

D. Merrimack Assets as of 12/31/10 comparison to PNNW

E. Merrimack Village District Service Area Map

F. Southwood Parcels Map-All

G. Transitional Property Map - South Merrimack

H. Transitional Property Definition

I. Vacant Industrial Property Map - South Merrimack

A

STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES PUC

Re: City of Nashua Acquisition of Pennichuck Corporation and Taking of Pennichuck Water Works, Inc.

Docket No. DW 11-026

TESTIMONY OF FINLAY C. ROTHHAUS

Q: Please state your name and public office.

A: My name is Finlay C. Rothhaus and I am Chair of the Merrimack Town Council which serves as the governing body of the Town of Merrimack ("Merrimack").

Q: Please summarize your testimony.

A: This testimony expresses the Merrimack's concern with the proposed merger acquisition of the Pennichuck Corp. by the City of Nashua as proposed in this Docket. Merrimack is concerned that this acquisition may not be in the public good. However, if certain conditions are met, Merrimack's opposition may be mitigated. The concerns are generally in five areas.

There is an issue corporate governance of the resulting city owned utility, where ratepayers are not allowed representation on the Board by right, but only at Nashua's discretion. A second issue is that Merrimack ratepayers share inordinately in the risks of owning a utility, especially one whose acquisition costs and capital expenditures are funded completely by debt. A third concern is that Nashua's control of the utility may result in discrimination against Merrimack in terms of allocation of resources, due to Merrimack having a substantial commercial/industrial district served by the core Nashua system. A fourth concern is that the issue of regionalization has not been adequately considered, due to Nashua's reluctance to adopt any regional approach to public utility water service. Last, Merrimack is concerned that the

request by Nashua for the ratepayers to fund transaction and litigation costs in the amount of 12.4 Million and the revenue stabilization in the amount of $5 Million is unfair to ratepayers outside of the City of Nashua's borders.

Q: What concerns do you have about corporate governance in the event the acquisition as proposed is stated?

A: The By-Laws of the merged corporation, which is proposed to be wholly owned by Nashua, provide for governance by a 15 person Board of Directors. Unlike publicly held corporations, there is no effective check on this governance in the form of an annual meeting or special meetings of the ratepayers. All shares are owned by the City of Nashua. Therefore, any role by the ratepayers as a whole is not contemplated. Rather the Directors have almost unfettered discretion, except with regard to certain defined limitations where Nashua's Board of Alderman can intervene. One of these limitations is that the Alderman have final say regarding capital expenditures. See Amended and Restated Articles of Incorporation, Article IX, Section 3.[1] This effectively makes that capital expenditure decision a political process. Non-Nashua ratepayers will have to bear the cost of these debt-funded capital expenditures, without any assurance they will be dealt with fairly in that political process. Additionally, Nashua appoints all Directors. None of the other ratepayer communities[2] have any role in the selection of Directors, nor can they claim the Board seat as a matter of right. Although Nashua has committed to seeking nominations from other ratepayer communities, it is under no obligation to select any of the nominees so nominated. In fact, it appears to have rejected a qualified individual proposed as a candidate by Merrimack.

[1] It is unclear to me whether the Merger Agreement and proposed Articles of Incorporation are subject to a Confidentiality Agreement. Therefore, I refer you to Exhibit A of the Merger Agreement, amended and Restated Articles of Incorporation attached to Mayor Lozeau's pre-filed testimony.

[2] The term "ratepayer communities" refers to those in the Town of Merrimack, PAC and PEU customers.

At the very least Merrimack requests that one or more Board seats be allocated to persons nominated by Merrimack.[3] Consideration should also be given to nominees by right from the other ratepayer communities of PAC and PEU.

Q: Please describe your concerns about risk sharing.

A: I believe the testimony filed by Scott Rubin for the Office of the Consumer Advocate and Mark Naylor for the PUC Staff addressed these issues better than I can. However, Merrimack has been concerned throughout these proceedings that the acquisition costs, capital expenditures and presumably operating deficits would be funded completely by debt. This assumes that Nashua will have access to the debt markets at reasonable rates indefinitely into the future. It also increases the risk that without some mechanism for equity infusions, capital requirements and operating deficits could be directly passed onto the ratepayers on a cash flow basis, something that could result in rate shock. It is unclear to Merrimack whether the PUC regulatory oversight would be sufficient in this case to anticipate and prevent such a rate shock. At least the recommendation of Mr. Rubin and some of the recommendations of Mr. Naylor address this issue in terms of forward-looking rate making mechanisms. Merrimack endorses the distinction advanced by Mr. Rubin, and reflected in Mr. Naylor's testimony, between owner-customers and non-owner customers. Rate setting methodology that recognizes that distinction is more equitable to non-owner customers, in that they will not be asked to share costs and risks of ownership while sharing none of its benefits. Also, as discussed below, Merrimack does not feel that there is any reason why it should share in the expenses incurred by Nashua in pursuing the eminent domain proceeding of $5 Million, severance costs in the amount of $2.1 Million and

[3] Merrimack has a distinct interest from PAC and PEU ratepayers, since it is part of the Nashua core system and, according to data responses filed by the Joint Petitioners, represents 4.8% of the PWW's revenue and 10.1% of the PWW's consumption (Attachment 1).

transaction costs of $5.3 Million. Nor does Merrimack understand why it and other extra-territorial ratepayer communities should fund the $5 Million rate stabilization fund, as both the OCA and PUC Staff also questioned. These are expenses and risks of ownership not contributory to the operation of the utility.

Q: Based on the above testimony, do you have any recommendation?

A: If the PUC were to approve this transaction, Merrimack adopts the recommendations of Mr. Rubin for conditions to be incorporated into the approval and enforceable by the PUC.[4] This would mitigate the risk sharing problem through the creation of distinct rate setting districts so that certain costs and benefits are allocated to the City of Nashua ratepayers, as owners. Also, Mr. Rubin's recommendations would provide for a forward-looking rate making structure that recognizes the distinction between owners-customers and non-owners customers. To the extent that they are consistent with Mr. Rubin's recommendations, Merrimack also adopts the recommendations of Mr. Naylor. On Page 15, Line 18 of Mr. Naylor's testimony, however, Mr. Naylor may have ignored that Merrimack is a separate customer class in terms of his recommended cost of service study; and the PUC should consider this possible omission when it adopts the conditions. To the extent that Mr. Naylor has recommended conditions which do not fully reflect the rate setting mechanism recommended by Mr. Rubin, we recommend the adoption of Mr. Rubin's recommendations as conditions of approval.[5]

Q: What is your concern about Nashua discriminating against Merrimack in terms of allocation of resources?

A: Merrimack's still developing, southern industrial/commercial zone borders Nashua's Route 101-A commercial corridor. If Merrimack is not represented on Pennichuck's Board, the

[4]. Mr. Rubin's recommendations are found on Pages 29-31 of Mr. Rubin's direct testimony and are not reproduced here.

[5] Mr. Naylor's recommendations are contained on Page 16 of his direct testimony and are not reproduced here.

allocation of resources, including capital expenditures, is entirely within Nashua's discretion. While this may be mitigated somewhat, if PWW is a regulated subsidiary, its parent corporation is owned by the City of Nashua and is itself unregulated. These are problems that Merrimack does not encounter at present because the Pennichuck Corporation has always been a regional-minded and responsive public utility, whose interest in responsible expansion have been encouraged by the PUC. In this regard, Merrimack also has a water district serving its central portion. Pennichuck supplies the emergency connection to that water district's water system. That water district in turn wheels Pennichuck water through the customers of Amherst and Bedford. Anheuser-Busch is its largest employer and a Pennichuck customer and receives its water by special contract. Mr. Rubin's testimony addressed the ambiguities of Nashua's position as to Anheuser-Busch at Pages 22-23.

Therefore, the previously expressed issues of risk sharing and corporate governance must be addressed in order to recognize Merrimack's unique position as a ratepayer and non-owner community.

Q: You also expressed a concern about regionalization. Could you address this?

A: Merrimack has always been concerned about the regionalization issue. In this respect, its interest extend beyond the Merrimack ratepayer community, in that it has generally been Merrimack's understanding that regionalization was in the public interest because water resources are dwindling. This is a question of vision, but this docket presents an opportunity for the PUC to address the regionalization issue. Nashua has expressed that it will only expand into communities that Pennichuck already services.[6] However, the history of Pennichuck as a regulated utility is that it has been as a first resort for distressed municipal and private water systems. If the Nashua owned utility will resist expansion, there is no such first resort. While

[6] See Response to Staff Data Request 1-32(b), attached as Attachment 2.

Merrimack has no specific recommendation in this regard, it believes that this is an issue the PUC should consider, both in determining whether this transaction is in the public's good, but also in terms of the conditions it imposes if it does find the public good served.

Q: Merrimack also expressed a concern about funding certain costs associated with the acquisition and the revenue stabilization fund, have you addressed this in previous questions and answers?

A: I addressed this in my answer on Pages 3 and 4 of my direct testimony. These concerns would be addressed if the conditions to PUC approval of this acquisition suggested by Mr. Rubin, and those of Mr. Naylor that are consistent with it, were adopted by the PUC as part of its approval.

Q: Does this conclude your testimony?

A: Yes it does.

9/8/11

Finlay C. Rothhaus

STATE OF NEW HAMPSHIRE
COUNTY OF HILLSBOROUGH

Before me appeared the above-named Finlay C. Rothhaus and made oath that the above statements are true to the best of his knowledge and belief.

9/8/11

Notary Public/~~Justice of the Peace~~
My Commission Expires:

ANNA L. McLAUGHLIN
★ NOTARY PUBLIC - NEW HAMPSHIRE ★
My Commission Expires January 27, 2015

ATTACHMENT 1

DW 11-026

City of Nashua
Pennichuck Corporation
Pennichuck Water Works, Inc.
Pennichuck East Utility, Inc.
Pittsfield Aqueduct Company

Joint Petition for Approval of the Acquisition of
Pennichuck Corporation by the City of Nashua

MERRIMACK'S TECH SESSION DATA REQUESTS TO JOINT PETITIONERS – SET 1

Date Request Received: 5/11/11
Request No. Merrimack Tech 1-1

Date of Response: 5/26/11
Witness: Donald Ware

REQUEST: Please provide the following percentages for Pennichuck Water Works and Pennichuck Corporation.

a. Acres of watershed property in Merrimack;

b. Net book value of assets in Merrimack;

c. Revenues from customers in Merrimack; and

d. Water consumption by customers Merrimack.

RESPONSE: See Attachment Merrimack Tech 1-1. In each case, the comparison is (i) between Merrimack and Pennichuck Water Works as a whole and (ii) between Merrimack and Pennichuck Corporation as a whole. Relative to watershed acreage, the watershed referred to is the Pennichuck Brook watershed, which provides about 80% of the raw water supply to the Pennichuck Water Works core water system. The Pennichuck Brook watershed consists of about 18,000 acres of land, of which Pennichuck Water Works owns about 575 acres. Of those 575 acres, about 173 acres are within the Town of Merrimack. The Southwood Company owns about 423 acres of land in the Pennichuck Brook watershed, of which about 419 acres are located within the Town of Merrimack.

	Asset Value ($1000's)	Merrimack Assets as a %	Pennichuck Brook Watershed Acres[1]	Merrimack Acres as a %	Revenues	Merrimack Revenues as a %	Consumption in CCF	Merrimack Consumption as a %
Merrimack	$ 3,030		3,417		$ 1,275,674		570,225	
PWW	$ 141,265	2.1%	17,984	19.0%	$ 28,482,443	4.5%	5,657,918	10.1%
Pennichuck	$ 181,601	1.7%	N/A	N/A	$ 33,425,858	3.8%	6,376,590	8.9%

1. The Pennichuck Brook Watershed provides about 80% of the raw water supply for the Pennichuck core water system. The acreage shown is owned by numerous owners. Pennichuck Water Works owns about 575 of the Pennichuck Brook Watershed acres. The Southwood Corporation owns about 423 of the Pennichuck Brook Watershed acres.

ATTACHMENT 2

DW 11-026

City of Nashua
Pennichuck Corporation
Pennichuck Water Works, Inc.
Pennichuck East Utility, Inc.
Pittsfield Aqueduct Company

Joint Petition for Approval of the Acquisition of
Pennichuck Corporation by the City of Nashua

STAFF DATA REQUESTS – SET 1

Date Request Received: 3/25/11
Request No. Staff 1-32

Date of Response: April 1, 2011
Witness: John Patenaude

REQUEST: Re: "EXHIBIT A TO MERGER AGREEMENT" Page 63 of 127 of Appendix 2, Amended and Restated Articles of Incorporation of Pennichuck Corporation, and Article IX - Reserved Powers:

a) Please indicate what will be the criteria to be used by the Board of Aldermen in deciding to approve or reject debt financing by PAC, PEU, and PWW;

b) Please indicate if the City will pursue acquisitions of water systems by PWW, PEU, or PAC;

c) If the response to b) is yes, please identify what criteria will be used by the Board of Aldermen in deciding to approve or reject potential acquisitions;

d) Please indicate if PWSC will seek to expand its business by entering into new contracts;

e) If PWSC will seek to expand its business, please indicate if the Board of Aldermen will be required to act in any way under Article IX of the proposed Articles of Incorporation with respect to contracts that PWSC may enter into.

RESPONSE:

a.) This information is set forth in the Minutes of the meeting of the Board of Aldermen of January 11, 2011, attached hereto.

b.) After the acquisition, the City does not intend to pursue acquisitions of water systems in municipalities not currently serviced by PWW, PEU or

PAC. If requested by municipalities serviced by either PWW, PEU or PAC, the City would consider acquiring additional water systems within the requesting municipality.

c.) A list of criteria has not been developed, but it would be expected to include the benefit to the requesting municipality and to existing customers, the size of the acquisition and the economics of the transaction, i.e., ensuring that the acquisition would not generate negative cash flow.

d.) PWSC will continue to seek to expand its business by entering into new contracts.

e.) If PSWC seeks to expand its business the Board of Aldermen will not be required to act in any way under Article IX of the proposed Articles of Incorporation with respect to contracts that PWSC may enter into.

ATTACHMENT 3

DW 11-026

City of Nashua
Pennichuck Corporation
Pennichuck Water Works, Inc.
Pennichuck East Utility, Inc.
Pittsfield Aqueduct Company

Joint Petition for Approval of the Acquisition of
Pennichuck Corporation by the City of Nashua

TOWN OF MERRIMACK DATA REQUESTS TO JOINT PETITIONERS
JULY 12, 2011 TECH SESSION

Date Request Received: July 23, 2011
Request No. Merrimack Tech 2-1

Date of Response: August 3, 2011
Witnesses: John Patenaude

REQUEST: On Page 3 of Mr. Patenaude's supplemental testimony he states certain options to avoid the application of restrictions on the payment of dividends by the operating utilities and states "these options would include renegotiation or refinance of the existing debt arrangements, restructuring of the corporate ownership structure, and several methods of effecting the transfer of available cash flow to the City to support the payment of the City Acquisition Debt". Please explain what restructuring of the corporate ownership structure means in this context.

RESPONSE: Depending on the facts at the time, possible restructuring of the corporate ownership structure could include mergers or consolidations between or among the Pennichuck companies, transfers of assets or operations between or among the Pennichuck companies, or other transactions involving participation with municipal or regional governmental entities. Any such restructuring transactions would be subject to prior approval by the Commission.

I. WATER RESOURCES

1. Surface Water Resources

Surface water resources include lakes, ponds, streams, rivers, and wetlands. Surface water resources serve many important functions in a community. A community's surface waters provide for water storage, aquifer (groundwater) recharge, water supply and wildlife habitat.

Merrimack's most prominent surface water resource is the Merrimack River. The Merrimack River forms the entire western boundary of the Town and serves as a regional recreational resource and as a water supply source for Pennichuck Water Works. The Merrimack River also receives discharge from the Town's Wastewater Treatment Plant and much of its stormwater system. Another critical surface water resource is Pennichuck Brook and its associated ponds. The Pennichuck Brook system is the primary water supply source for Pennichuck Water Works who serves portions of Merrimack, the City of Nashua and other communities. Pennichuck Brook forms the southern boundary of the Town flowing between Merrimack and the City of Nashua. The Souhegan River, which bisects the Town in northern and southern halves, is also an important resource, particularly for recreation and wildlife habitat.

Wildcat Falls on the Souhegan River

Other critical surface water resources include Naticook Lake and Greens Pond. The lake and pond, along with portions of Naticook Brook are situated above one of the Town's most important aquifers in the vicinity of three of its most productive public water supply wells. Naticook Lake is also one of the Town's most important recreational resources. The Lakefront area includes the Town's only public beach and a major summer day camp at Wasserman Park; a YMCA summer camp and beach area; Veteran's Park; two public boat ramps; a private beach; and several private residences. Private beaches, public boat ramps and many private residences are also located on Baboosic.

This section of the natural resources chapter briefly examines Merrimack's surface water resources, with an emphasis on water quality, threats to water quality, and what can be done to safeguard and enhance water quality. In this endeavor, it has been discovered that a comprehensive watershed-based approach is the most effective in safeguarding water quality. Therefore, this discussion will start with a description of the major watersheds in Merrimack, followed by a discussion of rivers, streams and other water resources located within the major watersheds. Data and background information on Merrimack's surface and groundwater

resources is found in the Merrimack Water Resources Management and Protection Plan. Although this plan was prepared in 1989, much of its data is still current.

a. Watersheds, Rivers and Streams

A watershed is defined as a geographic area consisting of all land that drains to a particular body of water. Watersheds vary in size, shape, and complexity. Watersheds are delineated by identifying the highest topographic points in a given area, and determining the direction in which water will flow from these high points. All water bodies have their respective watersheds. Major rivers, such as the Merrimack River, not only have their own overall watershed, but also typically contain many sub-watersheds for each of their tributaries. For example, the Souhegan River, a tributary of the Merrimack River, has its own watershed and is one of several sub-watersheds making up the entire Merrimack River watershed.

The water quality of a water body is directly related to the land use and activities that take place within its watershed. Because the drainage area of any given water body may extend beyond a town's borders, intermunicipal coordination of land use management is important in ensuring effective management and protection of the water resource. A case in point is Baboosic Lake, which is located in both Merrimack and Amherst, with about half of its watershed area in each town.

The entire Town of Merrimack is located in the greater Merrimack River watershed, which extends from the White Mountains in northern New Hampshire southward to the northeastern corner of Massachusetts. The Merrimack's 5,010 square mile watershed is the fourth largest in New England, with 76% of this area (3,810 square miles) in New Hampshire and the remainder in northeastern Massachusetts. According to the 1990 Census, approximately 1,920,000 people live in the 203 municipalities within the watershed, a 28% increase over the 1980 population. As with most large rivers, the Merrimack River has numerous subwatersheds. 52% of the total area of Merrimack is contained in three sub-watersheds plus Baboosic Brook (24.6%), Souhegan River (15.6%), and Pennichuck Brook (11.6%). Map IV-7 shows these watershed areas, as well as their associated floodplains. Table IV-4 below provides area statistics for each watershed.

Table IV-4: Watersheds in Merrimack

Watershed	Acres in Merrimack
Merrimack River primary watershed	6,092
Baboosic Lake watershed	864
Baboosic Brook watershed	5,560
Unnamed watershed 1	392
Souhegan River watershed	3,526
Naticook Brook watershed	2,374
Unnamed watershed 2	807
Pennichuck Brook watershed	2,629
Pointer Club Brook watershed	355
Total area:	**22,600 acres**

Source: NRPC as delineated on USGS quadrangle maps.

The most significant local regulatory mechanism to safeguard Merrimack's surface water resources is the Town's Shoreland Conservation District Ordinance. In most ways, the ordinance parallels the State Shoreland Protection Act. The Shoreland Protection District applies to all lands within 250 feet of the shoreline of Baboosic Lake, Bowers Pond, Greens Pond, Holts Pond, Horseshoe Pond, Harris Pond, Naticook Lake and the Souhegan River. The most significant features of the Ordinance are a 50 foot building setback requirement from the shoreline, a limitation on tree cutting within 150 feet of the shoreline and limitations on septic system locations and impervious surface coverage.

Characteristics of Merrimack's perennial streams are summarized in Table IV-5. Stream location, length and elevation were determined from United States Geological Survey (USGS) quadrangles. All streams flowing through Merrimack have been designated by the New Hampshire Legislature as Class B waters (must meet the fishable/swimmable criterion) except for Pennichuck Brook which is Class A. Class A waters must be suitable, with treatment, for use as a public drinking water supply.

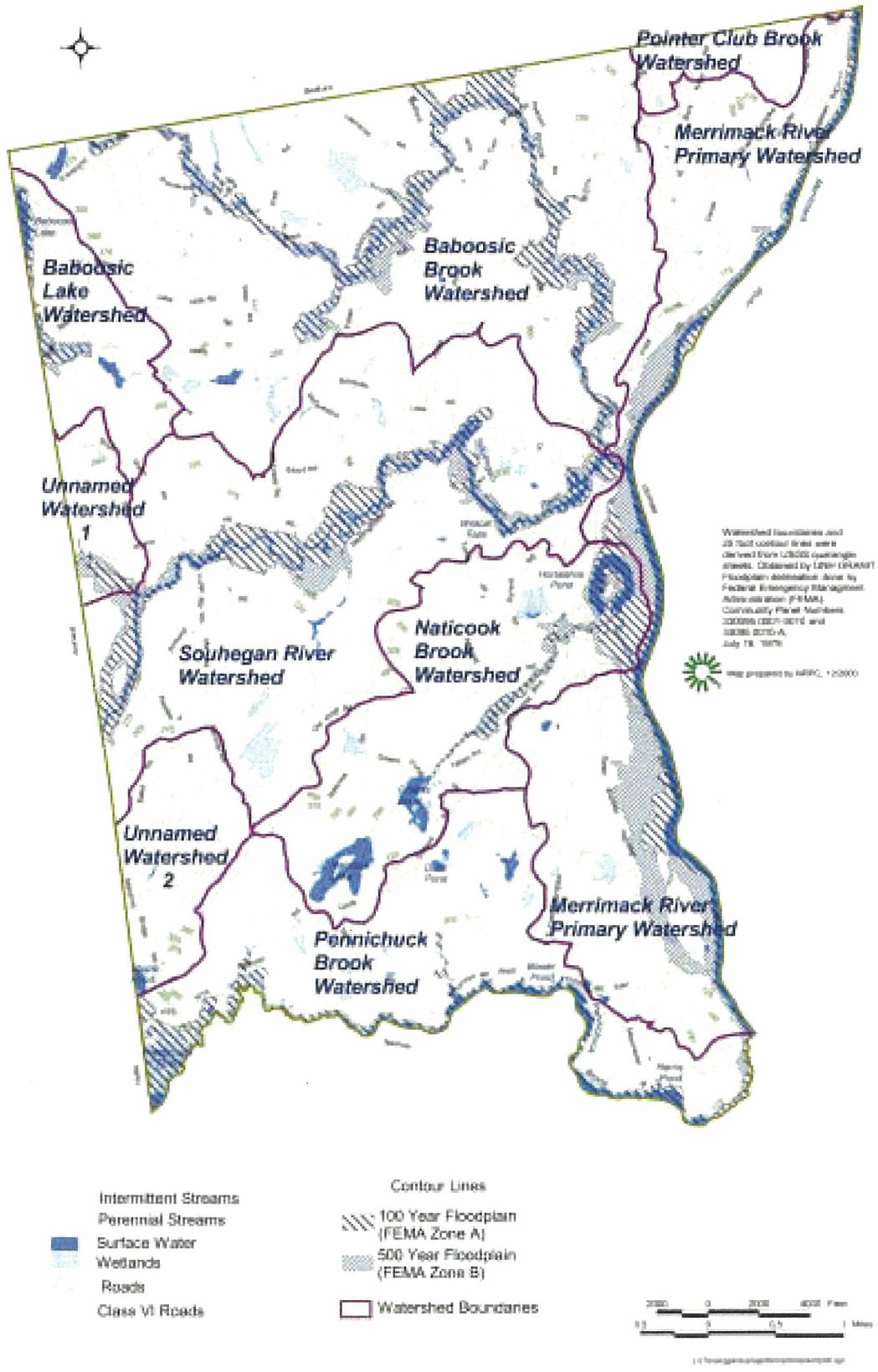
A detailed discussion of water quality issues facing Merrimack's rivers and streams is found in the "Threats to Surface and Groundwater Resources" section of this chapter.

Table IV-5: Perennial Streams In Merrimack

Name	Total Length (miles)	Length In Merrimack (miles)	Begin Elevation (aMSL)	End Elevation (aMSL)	Dammed Or Free-Flowing	Class
Baboosic Brook	9.7	7.6	240	100	dammed	B
Pointer Club Brook	0.5	0.5	---	---	free	B
Dumpling Brook	1.8	1.8	250	100	free	B
Unnamed Stream	1.2	1.2	240	200	free	B
Merrimack River	116.0	7.9	---	---	dammed	B
Unnamed Stream	1.2	1.2	340	190	free	B
Souhegan River	18.1	6.6	940	100	dammed	B
Naticook Brook	2.0	2.0	180	100	dammed	B
Unnamed Stream	1.0	0.7	270	190	free	B
Pennichuck Brook	7.9	6.4	190	100	dammed	A

Source: USGS Quadrangles.

Map IV-7: Watersheds and Floodplains



b. Lakes and Ponds

Merrimack contains all or part of five (5) lakes and ponds. Table IV-6 provides some general information on Merrimack's lakes and ponds. The trophic class of a lake indicates its stage in the natural aging process, called eutrophication, that all water bodies undergo. Generally, three classifications are used: oligotrophic -- high transparency with low levels of nutrients and vegetation and high levels of dissolved oxygen; mesotrophic -- elevated levels of nutrients and vegetation and decreased levels of dissolved oxygen; and eutrophic -- low transparency, rich in nutrients, abundant aquatic vegetation and low levels of dissolved oxygen. The trophic classes also represent the manner in which most lakes age, with "young" deep lakes tending to be oligotrophic, middle-aged lakes tending to be mesotrophic, and older, shallower lakes and ponds tending to be eutrophic. The natural aging process by which lakes age and fill in with organic sediments can be accelerated by excessive nutrient loading, however, which encourages weed and algal growth, which in turn speeds up the deposition of decaying vegetation as organic sediments on the lake's bottom.

Naticook Lake

Table IV-6: Lakes And Ponds In Merrimack

Name	Length (miles)	Area (acres)	Elev. (aMSL)	Avg. Depth (feet)	Max. Depth (feet)	Trophic Class "Year"	Trophic Class "Year"	Type
Baboosic Lake	4.3	222	231	16	26	Mesotrophic (1993)	Eutrophic (1998)	Natural
Naticook Lake	2.1	72	206	N/A	20	Mesotrophic (1979)	Mesotrophic (1989)	Natural
Greens Pond	0.4	40	195	N/A	14	N/A	Eutrophic (1997)	Dammed
Horseshoe Pond	1.8	37	95	N/A	23	Eutrophic (1979)	Eutrophic (1997)	Natural
Duck Pond	0.2	8	200	N/A	N/A	N/A	N/A	N/A
Stump Pond	0.5	18	195	N/A	6	N/A	Eutrophic (1990)	Manmade

Source: USGS Quadrangles. NHDES, Water Division.

Perhaps the most significant finding from the above table is the reclassification of Baboosic Lake from mesotrophic in 1993 to eutrophic in 1998. This is indicative of accelerated eutrophication due to increased nutrient loading as a result of increasing development in the watershed. Excess phosphorus is the nutrient most likely responsible for the recent decline in the lake's water quality. The phosphorus originates from geologic materials, atmospheric deposition, waterfowl waste, fertilizer runoff, and

domestic septic systems. Water clarity has decreased due to algal blooms feeding on the high concentrations of phosphorus. Comprehensive planning and site design requirements are needed to reduce impervious surfaces, erosion, and maximize stormwater systems. Best management practices such as proper septic maintenance, reduced fertilizer application, and improved buffers around the lake should be encouraged.

According to the most recent (November 2000) lake report from the New Hampshire Department of Environmental Services, the color scale (clear, transparent water has low values, darker, cloudier water has higher values) of Baboosic Lake increased from 27 to 42 in the five-year period, while the chlorophyll-A content, an indicator of algae growth, increased fourfold from a value of 4 to a value of 16. The fact that these changes have occurred over a mere five years indicates that Baboosic Lake is increasingly at risk. None of the other lakes and ponds in Merrimack have experienced such drastic changes over such a short period of time.

In the ten-year period from 1979 to 1989, Naticook Lake's color scale increased from 10 to 21, while its chlorophyll-A content actually decreased, and its trophic class remained the same. One fact brought out by the NH DES data is that many lakes and ponds in the State have not been tested in many years. While Baboosic Lake was last tested in 1998, Greens Pond in 1997, and Horseshoe Pond in 1997, Naticook Lake was last tested in 1989, over 12 years ago. As evidenced by the data for Baboosic Lake, water quality can change rapidly, and it is in the Town's interest to have up-to-date water quality data for all its water bodies. It may be worthwhile for the Town to request that Naticook Lake be tested on a more regular basis, especially considering its value as a municipal recreational resource.

c. Wetlands

Wetlands have recently received much scientific and regulatory attention as recognition of their role in hydrologic and ecological processes has increased. Among the functions wetlands perform are aquifer recharge, flood control, erosion and sedimentation control, water purification, and provision of nursery grounds and habitat for numerous species of plants, animals and fish. A number of endangered and threatened species are found only in wetlands.

Wetland definitions vary according to the agency or organization delineating the wetland. The US Fish and Wildlife Service definition of wetlands is based on the location of the water table and the presence of standing water, the presence of plant species commonly found in wetland habitats, and soil type. Four federal agencies (the US Department of Agriculture, Natural Resource

White Pine Swamp

Conservation Service (NRCS); the Army Corps of Engineers and the Environmental Protection Agency) agreed in 1989 on a definition of wetlands that considers three parameters: soils, wetland vegetation and hydrology. The NH Wetlands Board uses a three-part definition for wetlands based on hydric (*saturated*) soils, hydrology (*water table at or near the surface*), and wetland vegetation. For purposes of regulation, Merrimack, like many communities in New Hampshire, defines wetlands as areas of poorly and very poorly drained soils. Wetland soils in Merrimack are shown on Map IV-8.

Wetlands in Merrimack represent 2,389 acres, or 11 percent, of the land area of the Town. Most of the wetlands are located near major water bodies, although several large isolated wetlands also exist. The two largest wetlands, encompassing 150 and 250 acres, are located in the Baboosic Brook watershed. Another significant wetland area, approximately 60 acres, is White Pine Swamp in southwestern Merrimack. All of the wetlands along the Merrimack River are included in the 1987 Environmental Protection Agency, Region I *Priority Wetlands in New England*. This document identifies high quality wetlands or wetlands that are vulnerable to environmental degradation. The document lists the following resource values for the Merrimack River wetlands: waterfowl; fisheries; flood storage and protection; habitat for anadromous fish (i.e., those that ascend rivers from the sea for breeding); and identification by the US Fish and Wildlife Service as a key river in the Atlantic salmon restoration program.

Regulatory methods of protecting wetlands from pollution and destruction include requirements for erosion and sedimentation control plans and enforcement of those plans, minimum setbacks for buildings and septic system leachfields, minimum vegetative buffer requirements and prime wetland designation. Merrimack's Wetland Conservation District zoning prohibits dredging, filling, erection of structures or any alteration of the terrain in areas of poorly or very poorly drained soils. Merrimack enforces the State's minimum setback requirement of 75 feet for septic leachfields. All buildings or structures which require building permits must be set back at least 40 feet from any wetland boundary.

New Hampshire Revised Statutes Annotated, Chapter 482-A:15, enables a municipality (acting through its Conservation Commission) to designate certain areas as prime wetlands. Prime wetland designation accomplishes the following:

- Identifies wetlands considered important locally by virtue of their size, unspoiled character, uniqueness, fragility and/or other special characteristics.
- Notifies landowners, developers, and the NH Wetlands Board that the municipality strongly believes that certain wetlands should remain in their natural state.
- Provides assurance that the Wetlands Board will give special consideration to applications for dredge and fill permits in prime wetlands (as long as the Conservation Commission notifies the Board that the permit application is for a proposed project in a prime wetland.)

Proposals for prime wetland designation must follow inventory and evaluation criteria as well as report and map formats established by the New Hampshire Wetlands Board. The Merrimack Conservation Commission is considering performing a functional evaluation of the Town's wetlands, which may lead to designation of prime wetlands.

2. Floodplains

Floodplains are areas adjacent to water bodies and watercourses that are susceptible to flooding during periods of excessive water runoff. Merrimack contains extensive floodplain areas, many encompassing large wetlands which facilitate flood storage. A 100-year flood is a base flood having a one-percent chance of occurring in any year. The 100-year floodplain in Merrimack includes approximately 1,600 acres or seven (7) percent of the Town. Significant floodplains border the Merrimack River and Horseshoe Pond, the Souhegan River, Baboosic Brook, and Naticook Brook below Greens Pond.

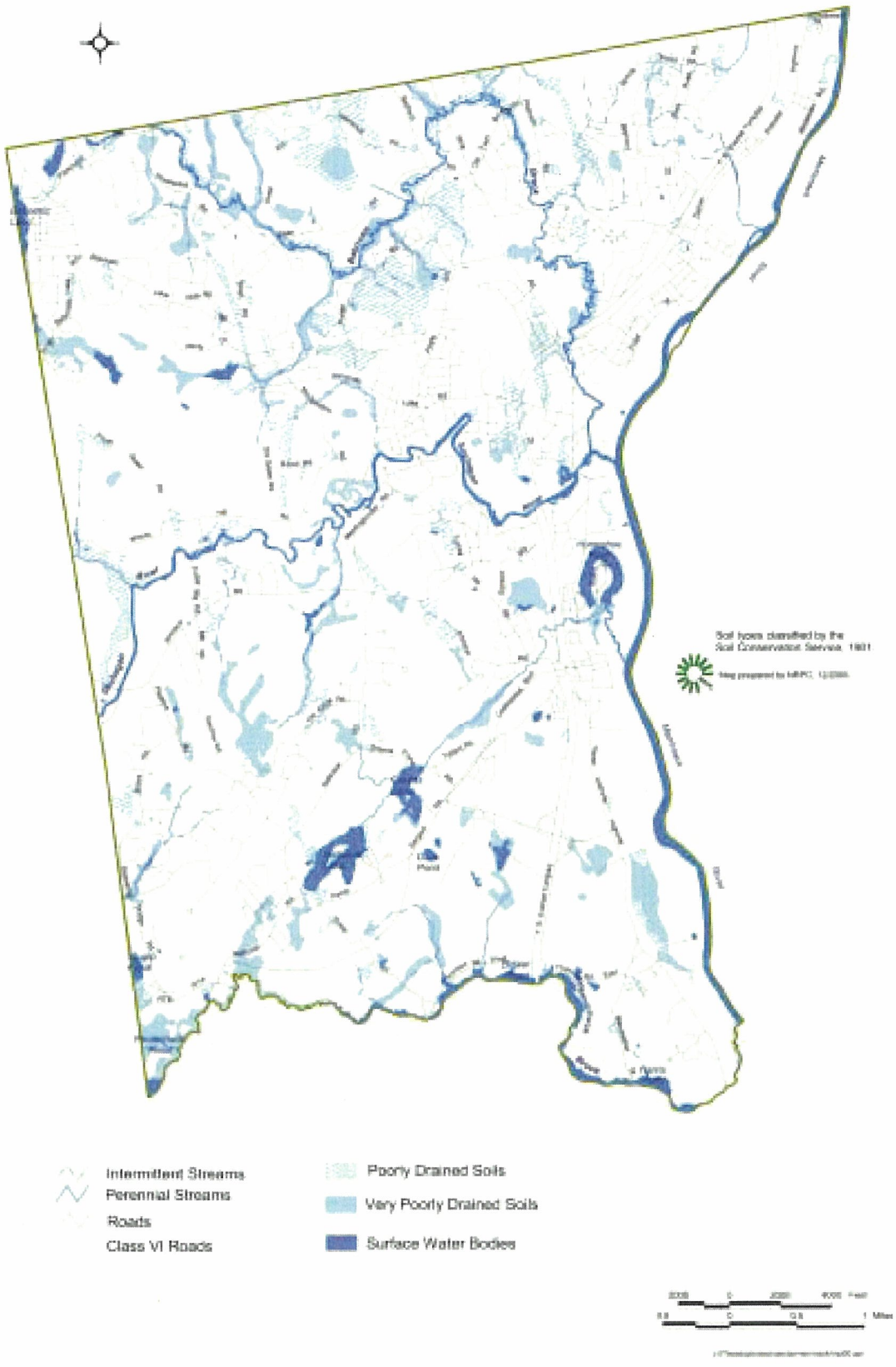
Merrimack's Flood Hazard Conservation District is an overlay district designed to minimize loss of life and property due to flooding. It prohibits fill or encroachments that would increase the base level of a flood as well as the removal of soil or other natural objects. The ordinance also contains 500-year floodplain provisions regarding the storage of industrial chemicals and hazardous materials, and the design and siting of septic systems. Merrimack's 100-year and 500-year floodplains are shown on Map IV-7.

3. Groundwater Resources

Groundwater is a very important resource in Merrimack, as 70% of Merrimack's population obtains its drinking water from wells operated by the Merrimack Village District (MVD). These wells are located in areas called aquifers, which, in the case of MVD's wells, consist of coarse sand and gravel deposits (stratified drift) that hold and have the ability to transmit large quantities of water. Though bedrock aquifers are also found in Merrimack, they are not currently being used as a source of municipal water supply. Stratified drift aquifers, which generally have the greatest potential to yield large quantities of water, underlie approximately 19 square miles or 57% of the Town. The location of these aquifers is shown on Map IV-9.

Merrimack has adopted an aquifer conservation (overlay) district designed to "protect, preserve and maintain the existing and potential groundwater supply and recharge areas within the known aquifer from adverse development or land use practices." The district is divided into two sub-areas: (1) the wellhead protection areas; and (2) the balance of the aquifer district. The regulations and standards for the wellhead protection areas are stricter than those for the remainder of the district. The district allows recreation, residential development and commercial operations that do not discharge wastes on site. Discharge of wastes is limited to septic system leachate from one- or two-family residences. Use of septic systems by commercial and industrial operations is not specifically allowed but may be permitted by action of the Zoning Board of Adjustment. Several types of businesses are prohibited (e.g. junkyards, automotive service and repair shops). Storage and handling of toxic materials is also restricted (e.g. no underground storage tanks within 1,000 feet of a municipal well, no storage of toxic chemicals for sale or distribution) in addition to the provisions regarding underground storage

Map IV–8: Wetland Soils

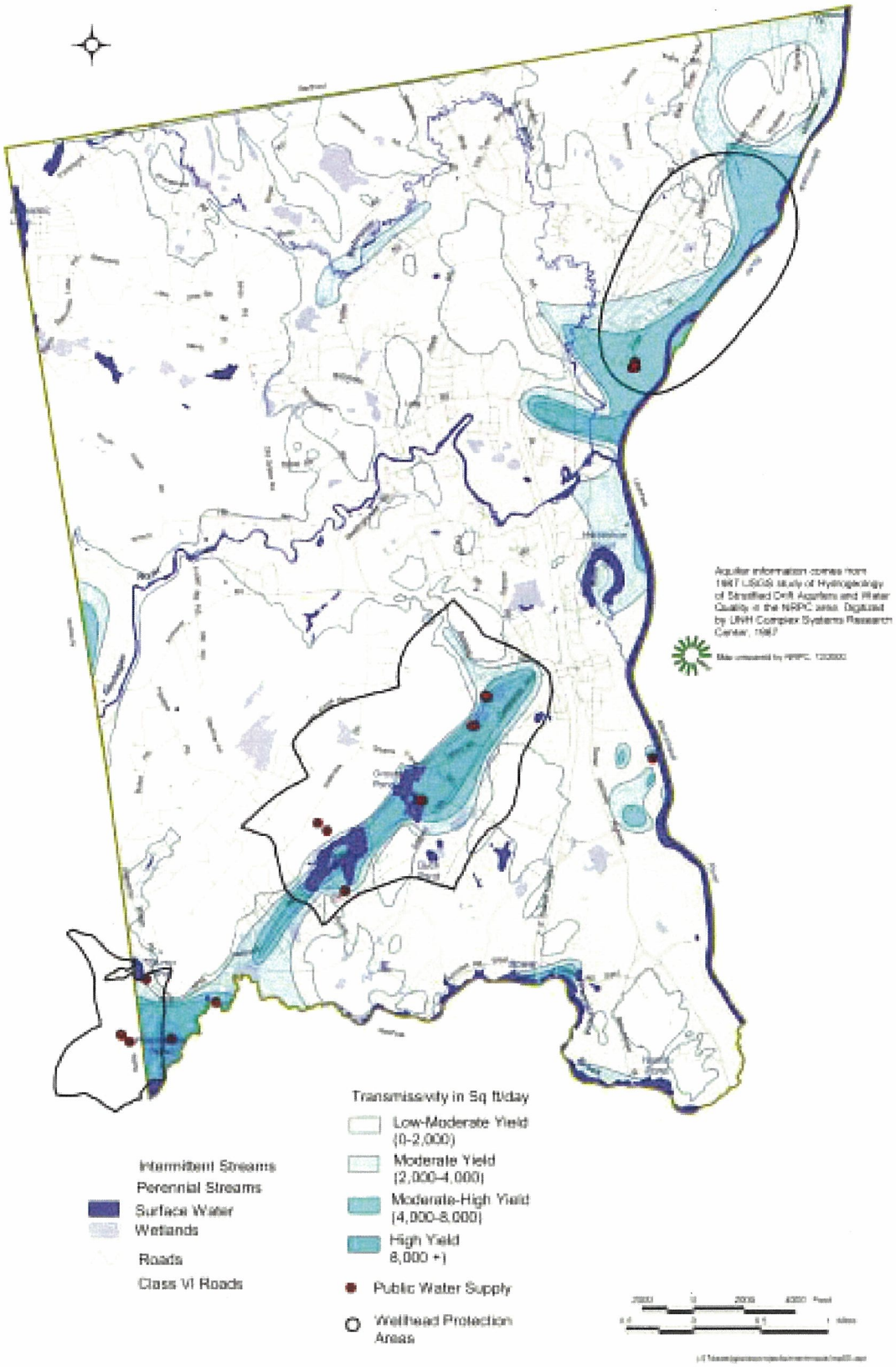


tanks and toxic materials administered by the Merrimack Fire Department and the State Department of Environmental Services.

Merrimack's groundwater resources are part of an extensive system of stratified drift deposits that extend beyond the Town's corporate boundaries. The use of the ground water, and of the land overlying it, in one community may affect the quality and quantity of the ground water in other communities. The Nashua Regional Planning Commission examined intermunicipal ground water resources and focused on aquifers with the greatest potential to sustain high yield wells. The Intermunicipal Aquifer Study for the Nashua Regional Planning Commission Region, completed in September 1990, identifies "high-yield intermunicipal aquifers" as those stratified drift aquifers which: (1) cross a municipal boundary; (2) have a saturated thickness equal to or greater than 40 feet; and (3) have a transmissivity of 2,000 square feet per day or greater. Transmissivity is a measure of how readily water moves through stratified drift deposits; the higher the transmissivity, the greater the potential yield from a well placed in a given location.

Two areas in Merrimack are highlighted by the study. The "Souhegan River aquifer", underlies portions of Amherst, Milford, Hollis, Nashua and Merrimack. This coarse, thick, extensive deposit lies under the Route 101A corridor, which is extensively developed through Nashua and Merrimack and is rapidly developing westward. The "Merrimack-Litchfield aquifer" is a deposit spanning the Merrimack River into the northern sections of both communities. In Merrimack, industrial and commercial land uses predominate over the aquifer. In Litchfield, much of the land over the aquifer is zoned for commercial uses, but development is limited by the absence of public sewer. The NRPC study identifies known groundwater contamination sites and potential contamination sources in the intermunicipal aquifer communities and summarizes land use regulations applicable to groundwater protection. The study concludes with recommendations for coordinating land use regulations and informing neighboring communities of proposed developments posing potential threats to groundwater resources. This relates to Merrimack in that a large portion of this intermunicipal aquifer is located in Merrimack, and, as groundwater does not recognize political boundaries, pollution in one town could end up affecting other towns.

Map IV-9: Stratified Drift Aquifers and Wellhead Protection Areas



a. The Merrimack Village District Wells and the Future of Merrimack's Water Supply

As previously mentioned, most of Merrimack obtains its drinking water from wells operated by the Merrimack Village District. The MVD's Master Plan has three major goals:

- Assure an adequate quantity of water for the long-term planning period
- Improve the quality of water delivered and protect water sources from contamination
- Plan for emergencies

The MVD operates seven (7) wells, three of which are located in the Naticook Brook aquifer, which is roughly aligned with the Silver Lake fault zone which extends northeasterly into Merrimack from Silver Lake in Hollis. The Naticook Brook aquifer portion of the Silver Lake fault zone is Merrimack's most important groundwater resource, supplying over half of Merrimack's total drinking water supply. Due to the type of sand and gravel deposits found along the fault zone, it is the only place in Merrimack where major production wells are possible.

Until 1999, peak summer demand for water had been increasing rapidly. If the current rate of increase in peak demand were allowed to continue, the MVD reports that it will not be able to supply the Town with water when it approaches and reaches build-out. However, by limiting the allowable peak demand, the MVD believes it will be able to supply the Town with water through build-out without further expansions to the water supply system. Since there are no additional well sites within Merrimack's borders or in neighboring towns that can easily be used, it is critical to limit peak demand. There are also no feasible surface water sources that are not cost-prohibitive. Strategies to reduce demand are discussed below, following a discussion of Merrimack's most important aquifer, where peak demand is perhaps having the greatest adverse impact on groundwater levels.

In recent years, it has been discovered that groundwater levels in the Naticook Brook aquifer have been declining, despite the fact that the MVD has not increased its pumping rates, and average precipitation has remained relatively steady over the period studied. Additional groundwater (in excess of 575 million gallons per year) cannot be withdrawn from the aquifer in a drought year. A water budget study recently discovered that approximately 150 million gallons per year are unaccounted for, based on slower groundwater recovery in the aquifer observed over the last ten years.

The MVD formed the Naticook Aquifer Advisory Ad Hoc Committee in 1999 to address these issues. The Committee investigated several possible causes for the slow recovery in groundwater levels:

- Export of water from the basin via the sewer system
- Export of water from the basin via storm drainage
- Industrial pumping of groundwater

- Increased losses from vegetative evapo-transpiration

The Committee soon ruled out evapo-transpiration as a possible cause, and concluded that the causes for the aquifer's slow recovery during drought years included stormwater losses due to imperviousness, industrial withdrawals and sewer export to downstream basins. To address these issues, the Committee developed a list of recommendations to prevent further losses from the aquifer and to address increasing demand for water. These recommendations include:

- Address imperviousness in subdivision and site plan regulations.
- Develop a review checklist for subdivisions and site plans that incorporates recharge protection and demand management protections. The checklist would address best management practices (BMPs) for stormwater control and treatment.
- Identify opportunities to improve infiltration in existing impervious areas.
- Evaluate limitations on further sewering in the Naticook basin.
- Address existing and future large quantity withdrawals in the basin, especially by commercial and industrial users.
- Investigate the effectiveness and feasibility of raising Greens Pond for enhancing storage in the aquifer.

The Committee found that outside irrigation of lawns, coupled with the increasing size of lawns in recent subdivisions, is a major factor in increases in demand. In its "Demand Management Strategy", the Committee reports that:

> *"One problem is that new developments typically remove all trees for sale, stockpile topsoil and sell a significant portion which leaves large tracts of land shadeless and with little topsoil, a recipe for high irrigation demand. This results in homeowners who are forced to have extensive lawn areas, whether they desire it or not. Because of the limited amount of topsoil left in most cases, typically an inch or less, the extensive areas of grass are also highly water, pesicide and fertilizer dependent. An attractive, low maintenance, low water/pesticide/ fertilizer lawn requires a good sub-base which is not available in most cases of existing subdivisions."*

This Master Plan recommends that the Planning Board investigate regulations or landscape design guidelines that would require or encourage developers to leave more topsoil and vegetation in place when sites are developed. In this way, irrigation demand may be reduced, which will help to address the wider problem of declining groundwater levels. The MVD is also investigating the possibility that the odd/even watering restriction remain in place permanently.

The other major issue facing groundwater quantity and quality is impervious surfaces and stormwater runoff. The presence of large areas of impervious surfaces on a site reduces the ability of water to percolate into the ground, and increases the chances for groundwater contamination due to contaminants in stormwater runoff. It is estimated that approximately 12-15% of the land area in the Naticook Brook aquifer

wellhead protection area is impervious. Any further increase in impervious coverage in this area and throughout Merrimack could contribute to degradation of groundwater quality. The subdivision and site plan regulations could be amended to better address this issue by:

- reducing the amount of impervious surfaces (such as parking lots and other paved areas) that can be placed on the land
- requiring adequate treatment of stormwater before it reaches surface and groundwaters, and
- ensuring that post-development total runoff does not exceed pre-development total runoff

Another action that can be taken to address groundwater protection is the acquisition of land in the wellhead protection areas. As mentioned in the conservation priorities section of this chapter, two of Merrimack's highest priority parcels are located within the wellhead protection area of the wells in the Naticook Brook aquifer. Another priority parcel is located upgradient from two wells in northeastern Merrimack adjacent to the Merrimack River. Purchase of these parcels would help to protect Merrimack's vital groundwater supply.

Merrimack has recently developed two wells (7 and 8) in nearby Hollis to supplement the overall water supply and offset losses resulting from the closure of well 6, which was closed due to the discovery of volatile organic compounds (VOCs) in the vicinity of the well. This contamination plume was found to come from the former Merrimack Industrial Metals operation. Wells 7 and 8 are located in the Naticook Brook aquifer about one and a half miles southwest of wells 1, 2 and 3 near Naticook Lake and Greens Pond.

An aeration system is now being planned for well 6. MVD's consultants report that concentrations of VOCs in the aquifer are quite low and will be completely removed by the planned aeration. A separate pump and treat system at Merrimack Industrial Metals has created a hydraulic barrier between the groundwater at the Merrimack Industrial Metals site and well 6. The goal is to bring well 6 back on line, thereby increasing the amount of water available to Merrimack residents and helping to ensure MVD's ability to meet the water supply demands of a built-out Merrimack. A Groundwater Use Plan has been submitted to NHDES that would phase-in the use of well 6 over a four-year period.

4. Threats to Surface and Groundwater Resources

Rivers, streams, lakes, ponds and groundwater resources face a myriad of threats. The two main categories of pollution are point source and non-point source pollution. Point sources of pollution are those that can be traced back to an identifiable source, such as a pipe or sewer outfall. Non-point sources of pollution are more diffuse in origin, such as agricultural and urban stormwater runoff, septic system effluent, snow dumps, road salt, soil erosion, etc. The State of New Hampshire, Department of Environmental Services, in its publication "New

Hampshire NonPoint Source Management Plan", lists the various forms of non-point source pollution in order of priority for abatement efforts. The list is based on the following factors:

- Danger to public health
- Magnitude and pervasiveness of the potential threat
- Potential impacts to receiving waters
- Professional judgement
- Ability of existing regulatory programs to control pollution
- Adequacy of existing education programs to promote pollution control
- Public perception
- Comments of Non-Point Source Management Plan Subcommittee

The list, in order of priority, is: 1) Urban (stormwater) runoff; 2) Hydrologic and habitat modifications; 3) Subsurface systems; 4) Junk, salvage, and reclamation yards; 5) Construction activities; 6) Marinas; 7) Road maintenance; 8) Unlined landfills; 9) Land disposal of biosolids; 10) Land disposal of septage; 11) Agricultural activities; 12) Timber harvesting; 13) Resource Extraction; 14) Storage tanks (above ground and underground); and 15) Golf courses and landscaping.

This section briefly examines some of the issues and trends in point and non-point source pollution and actions that can be taken to address this pollution. The focus is on non-point source pollution, and urban runoff in particular, now acknowledged as being the most serious threat facing surface and groundwater resources today. The recommendations that follow this discussion mention several "best management practices" (BMPs) that address non-point source pollution and stormwater runoff in particular. BMPs are variously defined as technical guidelines for preventing pollution caused by particular activities, and recommended treatment or operational techniques to prevent or reduce pollution. Some of the major sources of surface and groundwater contamination include:

a. Road Salt

Increased concern about water quality led Merrimack to adopt a reduced salt use policy in 1984. No-salt routes generally encompass areas adjacent to public water supplies, the Merrimack Village District wells and Pennichuck Brook as well as areas where on-site wells are located near roadways. Other areas are treated with a mixture of salt and sand. Merrimack has been a leader in the use of liquid calcium chloride, which melts ice and snow faster than salt, to pre-wet the sand or salt applied to roadways.

The Town salt storage facility on Turkey Hill Road is a three-sided, roofed, dirt-floored structure. The State Department of Transportation, which maintains the FEE Turnpike, operates under a clear pavement policy. The State uses a completely enclosed salt storage structure near Exit 11 east of the FEE Turnpike.

Excessive salting of roads and improper salt storage create the potential for sodium, calcium and chloride contamination of the ground water, which can pose health threats to humans, endanger animals and plants, and corrode metal and concrete.

b. Subsurface Sanitary Waste Disposal

Septic system failures from improper design, installation, or maintenance allow nutrients, particularly nitrogen and sometimes bacteria and viruses to leach into water resources. The first receptor of these contaminants is often a nearby private well, but surface waters may also be affected. Septic system leachate, along with stormwater runoff, may contribute to excessive algae growth in surface waters which, in turn, decreases the amount of oxygen available to fish, decreases sunlight penetration and clogs waterways. In most cases, older septic systems and cesspools pose the greatest threat to groundwater and surface water quality. The EPA considers new systems meeting today's heightened standards to be passive and durable systems that can provide acceptable treatment despite a lack of attention by the owner.

Approximately 60 percent of Merrimack's land area is served by on-site sanitary waste disposal systems. Planning board records show that septic system replacements have increased from 36-37 annually in the late 1970s to over 50 per year since 1987 (1987, 60; 1988, 77; 1989, 50; 1990, 65; through April 1991, 22). It can be presumed that most of these were replacements of failed systems although the precise causes of failure are not known. System failure may result from improper design, installation, or maintenance.

c. Stormwater Runoff

The development of land for residential, commercial or industrial purposes necessarily increases the amount of impervious surface area within any given site due to the construction of buildings, roads, driveways, parking lots and other improvements. Impervious surfaces reduce the natural infiltration of stormwater into the ground, thereby, reducing recharge of groundwater resources. This is particularly true where stormwater is discharged into a storm drainage system that exports stormwater off site and out of a watershed. Development can also reduce groundwater recharge through increased evaporation that can result from land clearing. Where increased imperviousness results in direct stormwater discharges into streams and rivers, the result is often alteration of the natural flow of the stream, causing erosion and sedimentation, loss of aquatic wildlife habitat and increased flood hazards. Stormwater runoff is also a principal nonpoint contamination source of surface and groundwaters.

Potential contaminants found in stormwater runoff include: nutrients, such as phosphorous, heavy metals, floatables and solids, pathogens such as virus and bacteria, organic compounds including oils, grease, MBTE, and pesticides and herbicides. All of these materials singly and in combination can lead to the degradation of surface and groundwaters.

The United States Environmental Protection Agency (EPA), through a program called the National Pollutant Discharge Elimination System (NPDES), aims to prevent and control non-point pollutant sources. The first phase of this program, appropriately referred to as the "Phase 1 Stormwater Rules," regulated the municipal stormwater systems and discharges of medium and large municipalities (those with populations greater than 100,000).

d. Phase II Stormwater Rules

The Phase II rules, which go into effect in March of 2003, will focus on stormwater systems within the urbanized areas of municipalities with populations less than 100,000. In addition, the Phase II rules will also impact construction activities between 1 and 5 acres, whereas Phase 1 regulated construction activities of greater than 5 acres. In order to comply with Phase II requirements, regulated municipalities such as Merrimack must submit a Notice of Intent (NOI) by March 2003. This NOI must include a stormwater management plan that addresses the six minimum control measures required by the EPA.

The six minimum control measures are: 1) Public education and outreach; 2) Public participation and involvement; 3) Illicit discharge detection and elimination; 4) Construction site runoff control; 5) Post-construction runoff control; and 6) Pollution prevention and housekeeping.

The Phase II rules mention the "operator", who is the entity responsible for maintaining stormwater conveyances and drainage systems. Stormwater conveyances include anything that can carry water, including ditches and swales. In most communities, these activities fall under the purview of the Department of Public Works or Highway Department.

The stormwater management plan must be designed to reduce the discharge of pollutants to the maximum extent practicable to protect water quality and to satisfy the water quality requirements of the Clean Water Act. Though stormwater management plans must be submitted by March 2003, full implementation is required by 2008, giving communities 5 years in which to implement their plans.

The preparation of a stormwater management plan that addresses the 6 minimum controls will take time and the coordination of many in municipal government and the private sector. It may be advisable to establish a "Phase II Committee" to begin to address these matters well before the March 2003 plan deadline approaches.

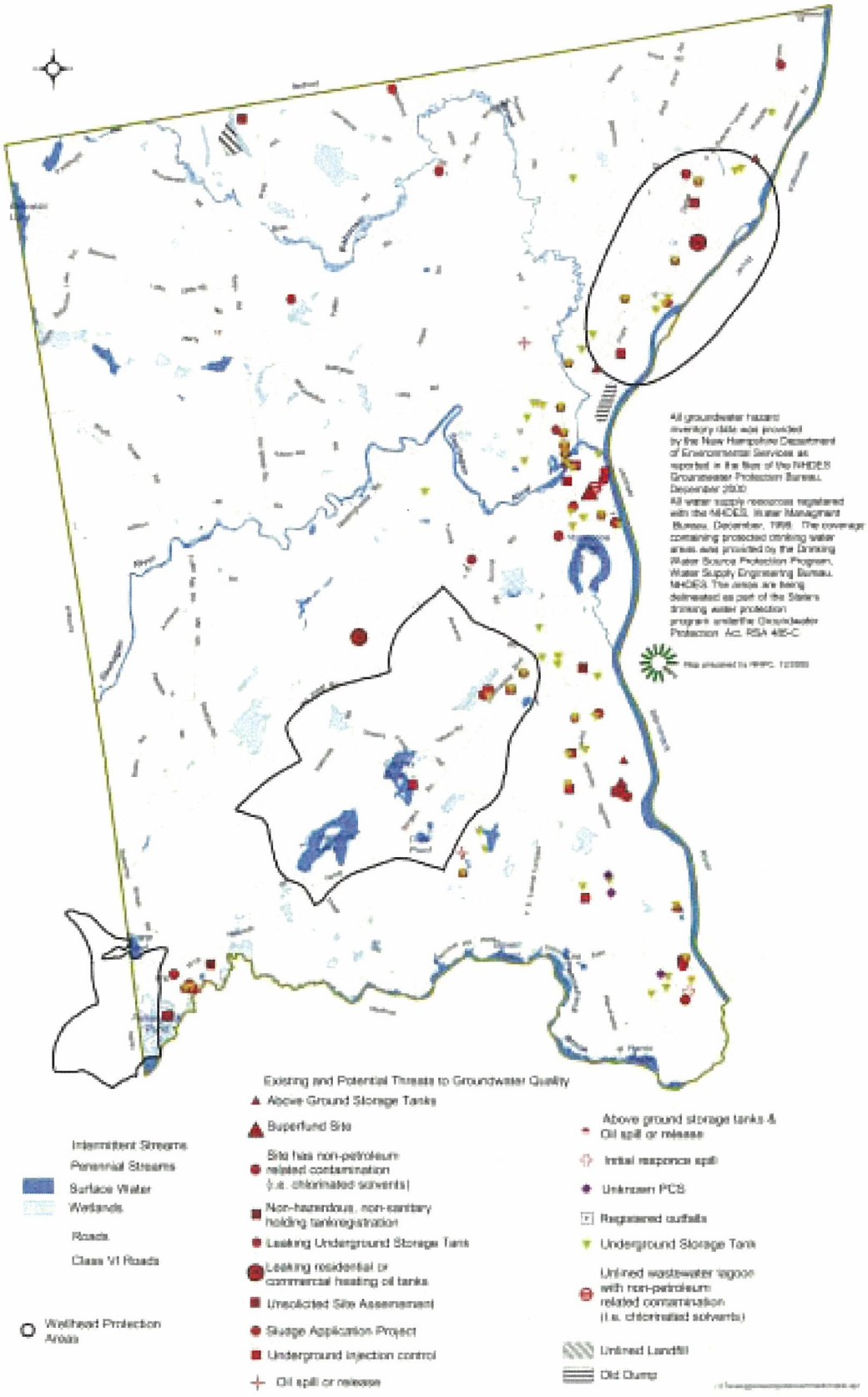
e. Underground Storage Tanks

Leaks in improperly equipped underground storage tanks (USTs) are difficult to detect and may go unnoticed for a long time. Even a small leak of only a few gallons can contaminate millions of gallons of ground water. The State regulates USTs where the cumulative volume of all tanks at the facility is 1,100 gallons or more. Some tanks, including those containing non-petroleum based chemicals and those containing heating oil for on-site residential consumption are exempted. As of 2000, 96 USTs in Merrimack were registered with the NH Department of Environmental Services, Water Supply and Pollution Control Division. Abandoned tanks may exist along the Route 3, a major carrier of north-south traffic before the construction of the FEE Turnpike.

f. Waste Sites

Contaminants from waste disposal sites and sites contaminated by industrial activities can leach into surface and ground waters. The NHDES 1987 Waste Site Inventory identified the following waste sites in Merrimack: 1) municipal landfill; 2) four facilities regulated by the Resource Conservation and Recovery Act (New Hampshire Plating; 3) Jones Chemicals, Inc.; 4) Nashua Corp.; and 5) Harcross Chemical Co.); and three other sites 6) (Longa Disposal Area; 7) Hume Pipe Co.; and 8) New England Circuits). The Corbin Property, not listed in the Waste Site Inventory, was at one time a private dump, and sludge is known to be buried on site. In addition, the Merrimack Village District's Well Number 6 is currently closed due to the presence of volatile organic compounds in the vicinity. Information about many of these sites is limited. A summary of available information is contained in the Merrimack Water Resources Management and Protection Plan. Map IV-10 shows the location of actual and potential point and non-point pollution sources in Merrimack.

Map IV-10: Existing and Potential Threats to Groundwater Quality



J. CONCLUSIONS AND RECOMMENDATIONS

During the master planning process, an emphasis was placed on the management and protection of Merrimack's surface and groundwater resources, particularly to protecting the Town's major aquifers and to increasing access to and protection of the Souhegan and Merrimack Rivers. The preservation of forest and woodlands and open space generally has also been of particular concern. By enhancing conservation and management of these resources, other objectives can be achieved as well, including wildlife conservation, retention of rural character and increased recreational opportunities.

Because many of the threats to priority resources are directly related to land development, a key element in achieving preservation of these natural resource priorities is strategic land acquisition. State, federal and private grants and assistance should be pursued where possible. Equally important is the adoption of land use regulations and changes to existing regulations that would enhance protection of important natural resources. Where land acquisition or regulation is not practical or appropriate, alternate means of enhancing natural resource protection including public education and the encouragement of private conservation initiatives should be pursued. The recommendations provided below address each of these natural resource management and protection approaches.

1. Land Acquisition

The Master Plan Advisory Committee has placed a priority on land acquisition to provide for open space preservation, retention of rural character, access to and protection of surface waters (especially the Merrimack and Souhegan Rivers), preservation of wildlife habitats, protection of groundwater resources and recreation. Land acquisition can be accomplished either in fee or through the acquisition of easements. The resources of the Town are, of course, limited and with land ownership come certain duties of management, maintenance and care. Also, land acquired for conservation purposes may no longer be available for alternative public or private uses. For these reasons, a land acquisition strategy should be pursued that places the highest priority on the acquisition of lands that can, when managed for conservation purposes, accomplish the widest range of objectives. A recommended series of priority areas for acquisition are identified below:

- Undeveloped parcels within the large forest block generally located south of Amherst Road, west of Naticook Road and north of Peaslee Road. This area contains one of the largest remaining forest blocks in Merrimack. The area is partially located within the sensitive Naticook Basin and Wellhead Protection areas for MVD wells 1, 2 & 3. Town owned land abuts privately held undeveloped portions of the area. In addition, the area contains important wetlands including part of White Pine Swamp, scenic areas and remaining portions of the historic "Old Kings Highway". Extensive areas of undeveloped land and the prominence of Blodgett Hill help define the rural character of this portion of Merrimack. Further, the proximity of the forested land in this area to several existing residential neighborhoods enhances its recreational value. This area includes the top priority land acquisition parcels identified by the MCC during the 2000 REPP process.
- Undeveloped parcels within the large forest block in the vicinity of South Grader Road. This forest block has significant conservation potential because it is the

largest remaining in Merrimack. Approximately 190 acres of land in the area is currently under MCC management, it has a diverse landscape including large wetland areas and steep hillsides and the area abuts protected forestland in Amherst. In addition, due to numerous development constraints, the area has less immediate development potential than other forested areas of Town. This portion of Merrimack is extensively used for passive recreation and for hunting. Acquisitions in portions of this area could also serve to protect Baboosic Lake from potentially adverse development related impacts.

- Undeveloped lands along the Merrimack River. The Town currently owns approximately 50 acres of land on the shores of the Merrimack River that include two boat ramps, and three islands within the river that contain another 25 to 30 acres of land. In addition, the Town currently has a public access easement in an area south of the confluence of the Merrimack and Souhegan Rivers. Another riverfront parcel adjacent to Town-owned land is owned by the Merrimack River Watershed Association. Merrimack riverfront lands include extensive wooded areas that provide for a variety of wildlife including bald eagle perching and roosting sites. A number of undeveloped areas are comprised of prime agricultural soils. These lands offer recreational opportunities for hiking, boating, fishing and other recreational activities. Conservation of these lands can help to protect the River from contaminants contained in stormwater runoff, protect the banks from erosion and preserve the natural beauty of the shoreland. Portions of Merrimack riverfront land were priority land acquisition parcels identified by the MCC during the 2000 REPP process.
- Undeveloped lands along the Souhegan River. The Town and School District currently own several acres of land on the both sides of the Souhegan River including three parks, conservation land and undeveloped land behind the High School. Conservation and access easements have also been obtained from two shoreland residential developments. In addition, there are extensive areas of privately held conservation and recreational land along the river including a former Boy Scout camp and land held as common open space as a part of residential cluster developments. The land adjacent to the Souhegan River varies considerably, including heavily wooded areas, wetlands, floodplain areas and open meadows that provide habitat for a diversity of wildlife. Much of the land was once farmed and a number of undeveloped lands are made up of prime agricultural soils.

The remaining undeveloped land along the Souhegan River together with existing public and privately owned conservation and recreational land, offers the opportunity for the development of a corridor of conservation and recreational land that would bisect the Town from the large forest blocks at its western border with Amherst to the Merrimack River. This *greenway* or *greenbelt* would provide a corridor that would help to prevent the fragmentation of important wildlife habitats while offering numerous recreational opportunities for hiking, canoeing, fishing and other recreational activities in the heart of Town. As with the Merrimack River, conservation of these lands would also help to protect the river from sediment and contaminants, protect the banks, and preserve the natural beauty of the shoreland and surrounding areas. Portions of this area near the Merrimack River were priority land acquisition parcels identified by the MCC during the 2000 REPP process.

2. Regulatory Initiatives

The following regulatory initiatives should be pursued by the Planning Board:

a. Stormwater Management

The development of land for residential, commercial or industrial purposes necessarily increases the amount of impervious surface area within any given site due to the construction of buildings, roads, driveways, parking lots and other improvements. Impervious surfaces reduce the natural infiltration of stormwater into the ground, thereby reducing recharge of groundwater resources. This is particularly true where stormwater is discharged into a storm drainage system that exports stormwater off of a site and out of a watershed. Development can also reduce groundwater recharge through increased evaporation that can result from land clearing. Where increased imperviousness results in direct stormwater discharges into streams and rivers, the result is often alteration of the natural flow of the stream, causing erosion and sedimentation, loss of aquatic wildlife habitat and increased flood hazards. Stormwater runoff is also a principal nonpoint contamination source of surface and groundwater. The principal tools the Town has to address the way in which land is developed with regard to stormwater management and road, driveway and parking lot design, are the Subdivision and Site Plan Regulations and the Zoning Ordinance. Therefore, these regulations should be reviewed and amended as necessary to:

- Ensure that post-development runoff does not exceed pre-development runoff by requiring on-site stormwater retention. Where on-site retention is not possible or practical, efforts should be made to retain the stormwater within the same watershed.
- Reduce imperviousness in site design, where appropriate, by encouraging design features such as smaller parking lots, reduced road and driveway dimensions, the use of parking garages on larger sites, the use of pervious paving materials where practical and other measures to reduce overall imperviousness. Certainly, any changes made to existing regulations should not compromise public safety.
- Develop a review checklist for subdivisions and site plans that incorporates recharge protection and demand management protections. The checklist would address best management practices (BMPs) for stormwater control and treatment.
- Ensure adequate treatment of stormwater before it reaches surface and groundwater.
- Establish a "Phase II Stormwater Rules" Committee to develop the Stormwater Management Plan and Notice of Intent (NOI) required by the US EPA by March, 2003.
- Establish an inspection system to ensure continued operation of required stormwater management systems.

b. Open Space, Landscaping & Design

- Consider adopting a "Conservation Development Ordinance" or "Open Space Development Ordinance" for low-density subdivisions using septic systems, in which a certain percentage of the tract being subdivided must be set-aside as permanently protected open space without increasing overall densities. Currently, the Town permits residential "cluster" developments that allow open space to be set aside by permitting smaller individual lot sizes and reduced frontages. Such developments, however, are not permitted for developments on septic systems. If developed carefully, low-density open space developments can result in significant open space conservation, helping to reduce fragmentation of forests and wildlife habitat while also reducing impervious surface areas by requiring less road and driveway development. Conservation or open space developments also result in less land clearing and, due to increased flexibility in design, can minimize impacts to wetlands and other natural features.
- Amend the site plan and subdivision regulations to minimize disruption of natural vegetation. Clear cutting or the near clear cutting of vegetation should be restricted, especially within the wellhead protection areas. Excessive removal of natural vegetation, especially large trees, can reduce groundwater recharge through increased evaporation, increase erosion and sedimentation impacts to surface waters during construction and increase stormwater runoff. Further, the removal of natural vegetation frequently results in its replacement with extensive lawn areas and nonnative plant species. Large lawns and extensive landscaping with nonnative plant species often require increased watering in the summer months which increases pressure on water supply during peak demand periods. Such landscaping also often requires the increased use of fertilizers that can adversely impact surface and groundwater. The retention of existing natural vegetation also helps to protect wildlife habitat and preserve the rural character and natural beauty of much of Merrimack.
- Amend the subdivision and site plan regulations to limit or prohibit the removal and export of topsoil. Failure to adequately replace topsoil in areas intended for landscaping increases the difficulty of establishing new lawns and planting areas, thereby requiring more water and fertilizer to be used, especially during summer months. Increased outdoor watering places increased stress on the public water supply and increased fertilizer use can degrade surface and groundwater resources
- Amend the subdivision and site plan regulations to encourage increased use of native and drought resistant plant species. Native plant species and other drought resistant plant species are more capable of surviving during summer months with little or no additional watering. Such species also typically require little or no additional fertilizer. Native plant species are particularly adapted to the area's climate and also tend to be more beneficial to wildlife than foreign plant species.
- Amend the subdivision and site plan regulations to limit the use of deicing compounds and to require that any pesticides or insecticides to be applied in

new commercial, industrial or multi-family residential projects are applied by a licensed professional so as to protect the Town's water supply from overuse and contamination.

3. Non-Regulatory Initiatives

a. Open Space and Forest Conservation

- Consider implementing an educational and assistance program, most likely through the Conservation Commission, to encourage larger landowners to maintain privately held forest land and open space through the development of forest management plans and estate planning, especially for parcels in current use. Sound forest management plans can enable landowners to derive some economic return from undeveloped woodland while often improving the health of forests themselves. Tax advantages can also be realized through the imposition of voluntary easements and other development restrictions on property to provide for permanent conservation. Through such measures, the pressure to sell land for development purposes could be reduced. Educational materials and assistance are available from a variety of sources including the Society for the Protection of New Hampshire Forests and the University of New Hampshire.

b. Water Resources Conservation and Protection

- Identify opportunities to improve infiltration and stormwater management in existing developed areas. Amending subdivision and site plan regulations as recommended above could minimize potential adverse impacts to surface and groundwater that could result from future development. However, surface and groundwater resources have already been impacted and will continue to be impacted by existing development. Improvements to existing public and private stormwater systems can reduce existing threats to water resources. Grants available for this purpose should be pursued whenever practical.
- Evaluate limitations on further sewering in the Naticook basin. The extension of public sewer further into the Naticook Basin could impact this important water resource area primarily through the potential for the net export of water out of the basin. Existing high-density residential development on septic systems adjacent to Naticook Lake, however, may pose a threat to both surface and groundwater. These areas may benefit from the extension public sewer. The potential threats and benefits of further sewer extensions into the Naticook Basin should be evaluated before any improvements are implemented.
- The Town and the Merrimack Village District should work with the State to address existing and future large quantity groundwater withdrawals in Wellhead areas, especially within the Naticook basin, by commercial and industrial users. Large quantity private withdrawals of groundwater can significantly impact the public water supply, however, such withdrawals are not currently regulated or controlled at the local level.

- The Merrimack Village District should investigate the effectiveness and feasibility of raising Greens Pond for enhancing storage in the Naticook Basin aquifer.
- The Town and the Merrimack Village District should continue to work with residents and businesses, especially in Wellhead and Shoreline areas, to encourage individual water resource protection measures such as water conservation, proper septic system maintenance and proper waste disposal practices.

C

CHARTER OF THE
MERRIMACK VALLEY REGIONAL WATER DISTRICT
(As approved April 29, 2004)

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membership in the District shall, upon written notice from the Board, be deemed to have withdrawn. Any Member may voluntarily withdraw from District membership upon a vote of its Governing Body approving a resolution to that effect which receives a simple majority vote and upon 60 days notice thereof to the Board of Directors. However, in circumstances in which the withdrawal will cause the District and/or the withdrawing Member to seek and obtain PUC or other regulatory agency approval, no withdrawal shall become effective until such approval has been granted. Withdrawal shall not affect the District's Franchise Areas, Service Areas or Non-District Territories or its authority to provide water service within the boundaries of the withdrawing municipality or to charge for services therein. Following withdrawal from the district, nothing shall preclude a former member from exercising its powers of eminent domain under RSA-38 to acquire district property.

d) **Municipalization** - A municipality which becomes a Member does not thereby grant any rights in or relinquish control over the assets or operation of any Water Supply, Transmission, Treatment and Distribution System owned or operated by the Member or any village district located within the municipal boundaries of such Member. Moreover, so long as it remains a Member, any Member municipality may continue to exercise its powers of eminent domain to obtain local control of Water Supply, Transmission, Treatment and Distribution System assets within its municipal boundaries which are not already owned or operated by said Member or a village district within said Member municipality's boundaries, EXCEPT for Water Supply, Transmission, Treatment and Distribution System assets which are owned by the District.

ARTICLE 6
BOARD OF DIRECTORS

a) **Representation** - The Board of Directors shall consist of one voting representative and one alternate from each Member of the District. The alternate present at a meeting shall vote if the voting representative is absent or disqualified from voting. Directors shall be residents of the Member municipalities which they represent and shall be elected or appointed and removed by each Member in such manner as shall be determined by the Governing Body of the Member. The Chief Executive Officer of the District shall be an ex-officio member of the Board of Directors, without vote, whether voting by Director or by Customer. All Directors entitled to vote who are present at a meeting shall vote on every issue put to a vote.

b) **Vote Apportionment** - Each Director shall ordinarily be entitled to cast one vote

(which shall hereinafter be described as a "Vote by Director" or "Voting by Director"). However, whenever this Charter provides that the Directors shall "Vote by Customer" or "Voting by Customer", the Director representing a Member shall be assigned the number of votes equal to the number of Customers residing in that Member municipality, except that each Director representing a Member in which no Customers reside shall nevertheless be assigned one (1) vote.

c) **Term of Office** - Each Director (including alternates), except the CEO of the District, shall serve for a term determined by the Governing Body of the Member which the Director represents. Directors shall continue to serve until their successors are appointed or elected and have qualified. In the event of resignation, death, disability or removal of a Director representing any Member, a successor may be appointed by the Governing Body of such Member for the unexpired portion of the term. No Director who is a voting representative, except the CEO of the District, shall be permitted to serve more than ten consecutive years.

d) **Vote by Proxy** - Directors shall not vote by proxy.

e) **Salary** - Directors (including alternates), except ex officio Directors, shall receive a sum of $1,000 per year for their services, payable quarterly. Any Director may waive such salary, and shall do so if required by law.

f) **Officers and Meetings** - The CEO of the District shall be the permanent Chairman of the Board of Directors. The Board of Directors shall elect a vice-chairman and a secretary, who shall be elected from the membership of the Board of Directors and who shall hold office for one year or until their successors are elected and have qualified. The Board of Directors shall hold regular meetings at least monthly. Special meetings shall be held whenever called by the Chairman or upon the written request of any three (3) Directors. Committees of the Board of Directors may meet as often as they shall consider prudent to conduct their business.

g) **Bylaws and Rules** - The Board of Directors shall adopt and may amend such bylaws and rules of procedure for the conduct of its affairs as it deems appropriate. Such rules shall not require that motions be seconded to be in order for action by the Board (or any committee thereof). In addition, such rules shall make provision for the permitted attendance at any public or non-public session of the Board of the members of the Governing Body of a Member or of the members of any committee or other representative body designed by the Governing Body of a Member for such purposes unless a majority of the Board votes by Director and by Customer to exclude such persons from such session. Finally, such rules shall provide that any Director may, as a matter of right, call for a brief recess, subject

to the call of the Chair, for the purpose of consulting with the members of that Member's Governing Body or the members of any committee or other representative body thereof designed by the Governing Body of a Member for such purposes.

h) **Powers and Duties** - The Board of Directors shall have the general superintendence and control of the affairs of the District.

i) **Committees** - The Board shall establish such committees as may be necessary for the business of the District. The Board shall, at a minimum, establish the following standing committees, and it shall determine their numbers and terms and appoint their members, which may include Directors, members of the Operations Group, representatives from the general populace of the Member municipalities, and outside experts:

1. A committee on resource planning and land use management to study and monitor matters of land use, including land acquisition and sale, regional growth and development, and the protection of existing and future water sources and supply for the District, and to make recommendations to the Board with respect to specific land use issues as are consistent with the Resource Plan;

2. A committee on consumer affairs to consult with the Board and the Office of Customer Affairs established pursuant to this Charter on matters concerning the interests of Customers and potential Customers;

3. A committee (which shall not include the CEO) to identify, review the qualifications of, and nominate candidates to serve as CEO of the District, to review applications of Eligible Members to become Members, to make nominations for officers and members of the committees of the Boards and, at least annually, to review the compensation and performance of the CEO;

4. A committee on capital improvements to study and monitor capital improvements to the District's Water Supply, Transmission, Treatment and Distribution System and to make recommendations to the Board with respect to specific issues as are consistent with the Capital Improvements Plan;

5. A committee (which shall include the CEO) to study and monitor employee compensation; and

6. A committee (which shall not include the CEO) to select auditors for the District and to receive and review their reports.

Each committee shall elect its own officers. Committees shall coordinate their activities with each other. Minutes of committee meetings shall be filed with the Board of Directors. Each committee shall report to the Board on its activities from time to time as required by the Board.

j) **Quorum and Voting** – A quorum of the Board of Directors for purposes of a Vote by Director shall consist of sixty percent (60%) of the Directors. A quorum of the Board of Directors for purposes of a Vote by Customer shall consist of Directors representing sixty percent (60%) of the Customers. Except as otherwise required by law or as provided in this Charter, all votes of the Directors, whether Voting by Director or Voting by Customer, shall be determined by a majority of the votes cast by Directors present and voting at a meeting at which a quorum is present. In addition, except as provided below or elsewhere in this Charter, all matters determined by the Board shall be accomplished by Voting by Director.

1. The following matters shall be determined by a two-thirds vote of the entire Board Voting by Director:

   A. The adoption of the District's Resource Plan and any amendments thereto;

   B. The acquisition, sale or other transfer of real property;

   C. The admission to membership in the District after June 1, 2005 of any new Member;

D. The decision to enter into a new bulk water contract or to alter an existing bulk water contract (except that rates shall be determined by Voting by Customer);

E. The selection of a Chief Executive Officer for the District.

2. The following matters shall be determined by a majority vote of the Board Voting by Customer:

A. The adoption of the District's Capital Improvements Plan and any amendments thereto;

B. The issuance, refunding or advance payment of Bonds;

C. Any establishment of fees, rates, charges or tariffs.

D. Any amendment or procedural or other subsidiary motion on a matter subject to a vote by Customer.

3. The sale or other transfer of any portion of the District's active Water Supply, Transmission, Treatment and Distribution System shall be determined by a two-thirds vote of the entire Board Voting by Director, including the affirmative vote of the Directors representing all Members in which such facilities lie.

4. The sale or other transfer of real property within four hundred (400) feet of any water body, including connected surface wetlands, shall be subject to the provisions of Article 19(c) and shall require two-thirds vote of the Board Voting both by Director and by Customer.

k) **Agendas** - Except as otherwise provided for in the Board's rules of procedure, agendas for each regular or special meeting of the Board shall be provided to the Clerk of each Member municipality not less than seven (7) days in advance of the meeting. Notwithstanding the aforesaid, unless otherwise required by law or as provided in this Charter, the failure to make a timely filing of an agenda or the failure to include an item of business in the agenda shall not affect the legality of any meeting of the Board or the business conducted thereat.

EXHIBIT A

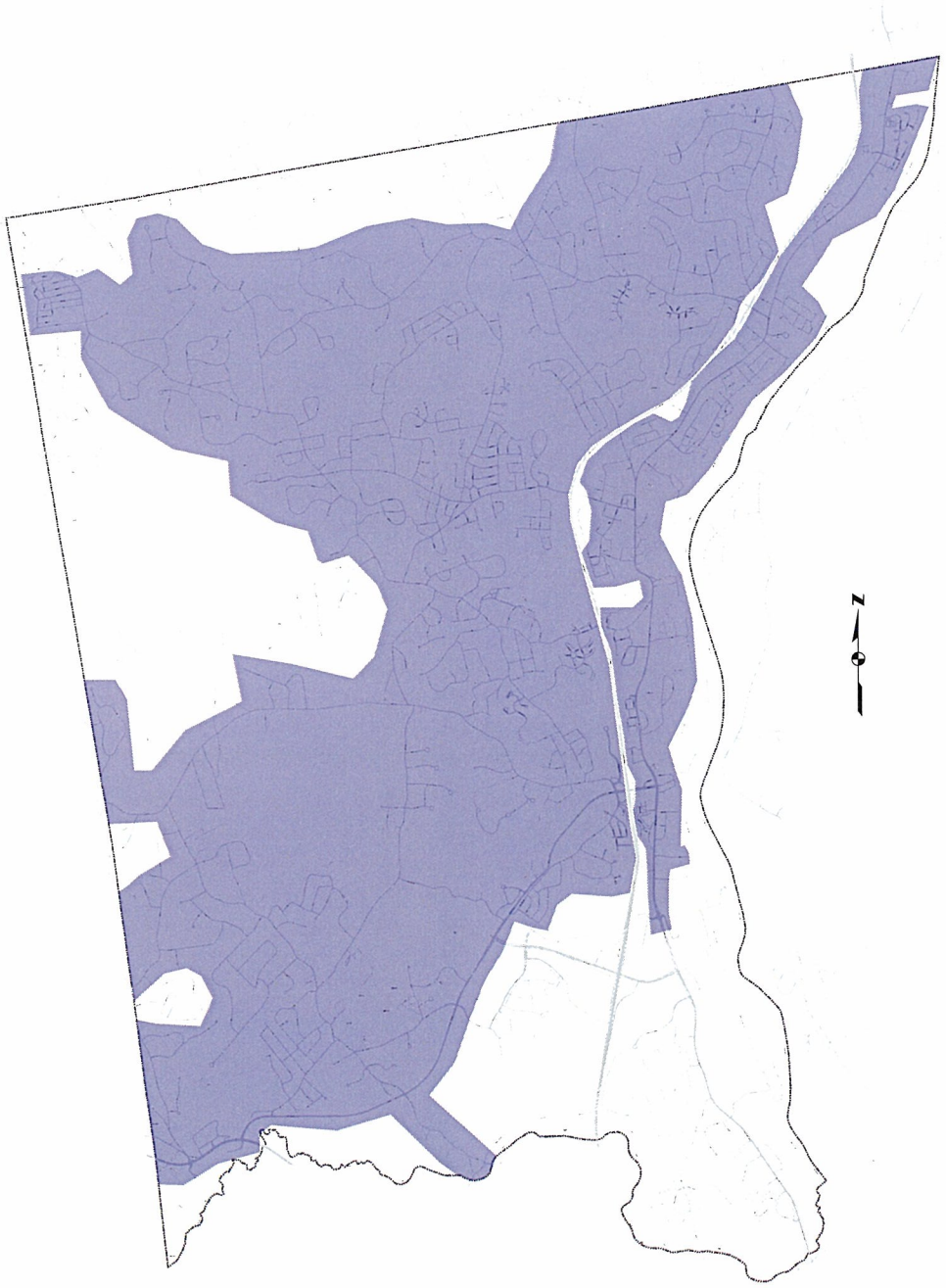
LIST OF MEMBERS

Signature of Authorized Representative of

Name of Member	Member's Governing Body
Jean-Guy J Gerzevske	Pelham
Tom Dolan	Londonderry
Frederick T Hoad	Pittsfield
Brian S. McCann	Nashua
	Bedford
	Amherst
Raymond C Reglin Jr	Litchfield

	Cost (As of 12.31.10) Assets	Net Book Value (As of 12.31.10) Assets
PEU	25,676,895.08	20,473,917.08
PAC	2,909,502.09	2,062,132.23
PWW	130,630,449.38	93,269,980.01
	159,216,846.55	**115,806,029.32**
Merrimack	7,336,707.99	3,030,469.31
Merrimack % of Total Penn Corp Regulated Utilities:	4.61%	2.62%
Merrimack % of Total PWW:	5.62%	3.25%

Municipal Water Supply Areas



Generalized Merrimack Village District Service Area

1 inch = 2,000 feet

0 1,800 3,600 7,200 10,800 14,400 Feet

Southwood Corp Parcels

All

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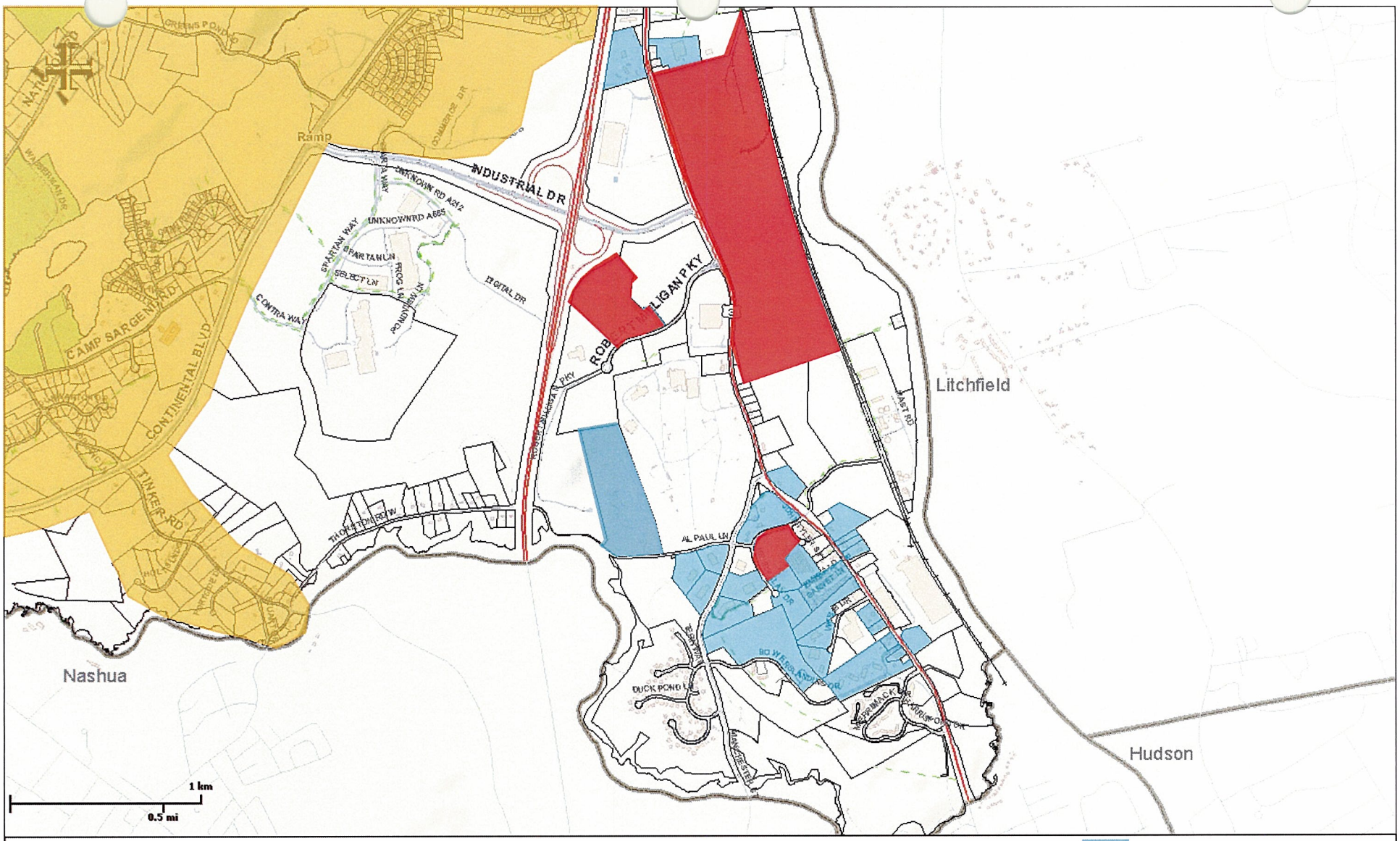

Transitional Parcels (Southern DW Highway Corridor)

Outside of MVD Service Area, South Merrimack

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Transitional Property

27 Parcels, total area of 262 +/- acres

Transitional Property not likely for redevelopment

Generalized MVD Water Service Area

** Transitional Properties—Utilizing the assessor's database, the Town's transitional properties were identified as properties more likely to attract redevelopment activity. In this case, transitional properties included those that had an assessed value below that of the median value for the given land use type. (From Draft Economic Development Chapter of 2012 Master Plan)

- The development of real estate in the Town of Merrimack since 1990 has occurred at an average annual rate of about 140 acres per year. Applying this annual rate to the remaining supply of privately-owned vacant land, the Town would reach a built-out status in 26 years.

- Transitional Properties—Utilizing the assessor's database, the Town's transitional properties were identified as properties more likely to attract redevelopment activity. In this case, transitional properties included those that had an assessed value below that of the median value for the given land use type. More than 6,500 acres were identified, comprised primarily of single family residential properties, which make up 76% of the total supply of transitional acres (Appendix 3). However, industrial, institutional, and commercial uses also comprise almost 1,000 acres, or 15% of the total supply. These parcels also tend to be relatively small, typically less than five acres in size.

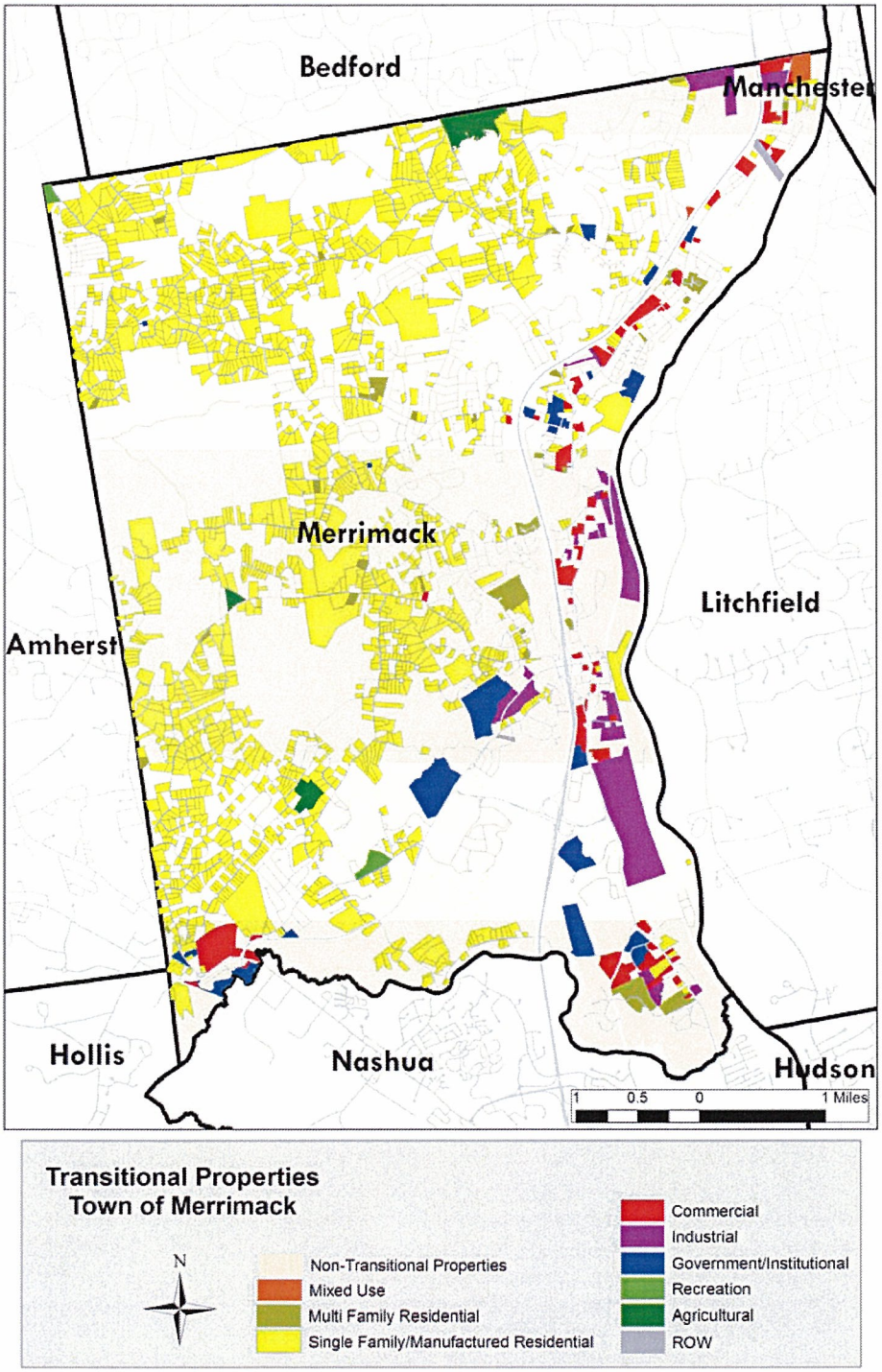
Constraints

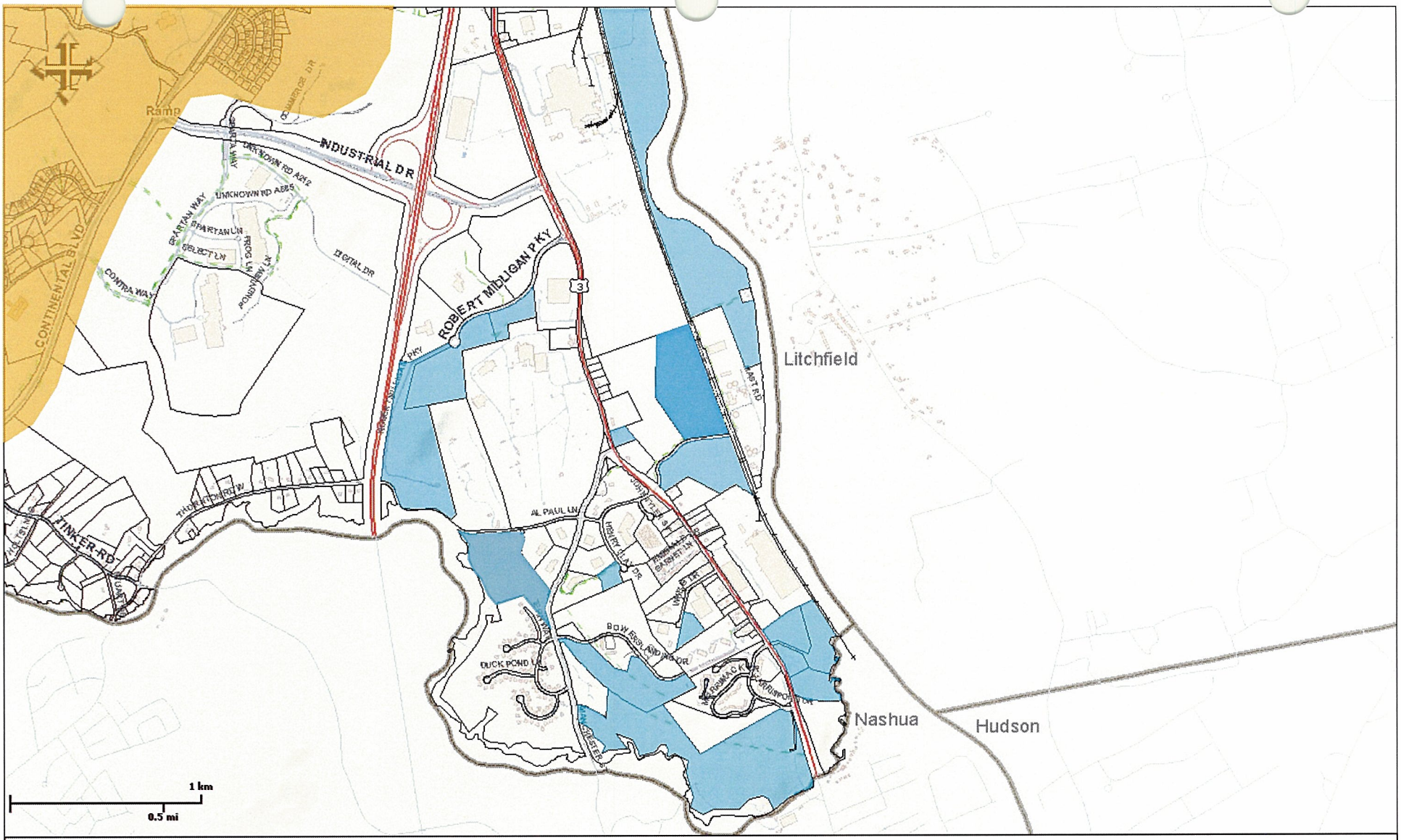
- Zoning—Based on a review of the Town's land use regulations, Merrimack's zoning code represents a common style of Euclidean land use regulation. This style is common in many communities throughout the United States and focuses on segregating land uses by type, scale, and function. As the community's land use patterns have evolved over time, however, the zoning code does not appear to have evolved in tandem. In some cases, the zoning requirements of a given parcel may be inhibiting the repositioning of a property to a new "highest and best use."

- Development Review Process—The Town's real estate development review process is sometimes described by public officials and private businesses as opaque or inconsistent. Assuming this description is accurate, such conditions inhibit the redevelopment of properties or the repositioning of marginal uses to adapt to changes in the current economy. This is due to a perception that the development review process is too challenging to allow for a feasible project, and subsequently discourages developers and property owners from creating new or redeveloped real estate.

- Real Estate Market Conditions—Commercial real estate market conditions in Merrimack can be characterized by relatively low rents and relatively high sale prices and replacement costs. Low rents discourage property owners from rehabilitating their existing space or creating new space, as it may be infeasible to recoup the accompanying costs. Relatively high sale prices, however, indicate that some buyers believe the property can be repositioned in order to generate higher rents or that the existing income stream is sufficient to justify the purchase price. Nevertheless, based on the minimal supply of newer commercial properties in Merrimack, such instances are relatively uncommon.

Appendix 3


Bedford
Manchester
Merrimack
Litchfield
Amherst
Hollis
Nashua
Hudson
1 0.5 0 1 Miles
Transitional Properties
Town of Merrimack
N
Non-Transitional Properties
Mixed Use
Multi Family Residential
Single Family/Manufactured Residential
Commercial
Industrial
Government/Institutional
Recreation
Agricultural
ROW



Privately Owned Vacant Parcels (Industrial)

Outside of MVD Service Area, South Merrimack

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Vacant Industrial Property

16 Parcels, total area of 415.73 acres

Generalized MVD Water Service Area

PENNICHUCK WW FRANCHISE OUTLINED IN GREEN MARKER

Privately Owned Vacant Parcels (Industrial)

Outside of MVD Service Area, South Merrimack

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Vacant Industrial Property

16 Parcels, total area of 415.73 acres

Generalized MVD Water Service Area

MERRIMACK EXHIBIT J