

Drinking Water Infrastructure in New Hampshire:

A Capital Investment Needs Analysis



WRIGHT-PIERCE 
Engineering a Better Environment

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**DRINKING WATER INFRASTRUCTURE IN NEW
HAMPSHIRE:**

A CAPITAL INVESTMENT NEEDS ANALYSIS

FOR THE

**NEW HAMPSHIRE DEPARTMENT OF
ENVIRONMENTAL SERVICES**

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Prepared By:

**Wright-Pierce
99 Main Street
Topsham, Maine 04086**

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INTRODUCTION AND ACKNOWLEDGEMENTS

A reliable, healthful supply of drinking water supply is vitally important to the well-being, comfort, and economic opportunity of communities. This project was initiated by the NH Department of Environmental Services (NHDES) Drinking Water and Groundwater Bureau, Sarah Pillsbury, Administrator. This resulting Study Report attempts to estimate future funding needs for drinking water infrastructure for community water systems in New Hampshire. Such an attempt is prerequisite to efforts to develop sustainable funding approaches that neither bankrupt the present, nor indefinitely defer needed refurbishment and repair into the future. Most of the estimates in this report were accomplished by developing sets of example infrastructure projects for which costs were known, or which could be estimated, and then linking them through modeling to the state's existing inventory of infrastructure by category.

This effort would not have been possible without the intellectual support, advice, and practical partnership offered by many individuals, including those from within NHDES, members of the Drinking Water Capital Needs Advisory Committee, representatives of community water systems, and individuals involved in planning and design, furnishing infrastructure equipment, and in building these water facilities.

The Wright-Pierce team wishes to thank the following individuals and organizations:

- **New Hampshire Department of Environmental Services** - The DES provided vital partnership in providing access to the state's dataset of community water system infrastructure. The Department assisted with providing the complete inventories of large water storage tanks, the water main inventories of many communities, costs for surface water plants, and many other items to assist in the effort. In particular, we wish to thank Sarah Pillsbury, Robert Mann, James Tilley, Laurie Cullerot, and Cindy Klevens for their assistance and insight. James Tilley, especially, for his careful, constructively critical eye, and on-going support and guidance.

- **Water Study Advisory Committee Members** - Thanks to Advisory Committee members, Steve Del Deo, David Bernier, Brian Goetz, Jennifer Palmiotto, Kurt Blomquist, Robert Beurivage, Robert Morency, Steve Guercia, and Wade Crawshaw for their participation and helpful feedback on project issues. Special thanks to Robert Beurivage (Manchester Water Works), John Boisvert (Pennichuck Water Works) and Peter Rice (Portsmouth Water), for their contributions, both as members of the Advisory Committee, and for their assistance in providing water main inventory for their water systems and the new Portsmouth treatment plant costs.
- **The Water Community** - Special thanks to John Mahar at Tanks Unlimited, Carl Horstmann at MassTank., and Terri Strouse of Gorham Sand and Gravel for all the elements involved in the installation of the small atmospheric tanks. To Harry Hagen of A.O. Smith, and Chris Hodgson of Natgun for helping me be current with the big tanks. Thanks to Charlie Lanza of Hampstead Water, both for your example water treatment systems and for your helpful standpoint of being in the water business. Your help was very much appreciated. Thanks to Steve LaFrance of Horizon Engineering, and to Keith Pratt of Underwood Engineers, for cost examples.

There have been many others who have helped execute the study and collect field information and data. We wish to extend our thanks to all of you who have helped and supported the project.

EXECUTIVE SUMMARY

BACKGROUND

This project was completed under contract with the NH Department of Environmental Services, Drinking Water and Groundwater Bureau. The objective of the project was to produce an accurate estimate of costs to replace existing community water system infrastructure over a 20-year period. This information would possibly be used as part of a wider effort to estimate replacement costs of other water-related infrastructure.

Drinking water system replacement costs have previously been estimated through the EPA Drinking Water Infrastructure Needs Survey and Assessment (DWINSA) conducted by EPA every four years. The DWINSA relies primarily on a random sample survey of water systems, and includes community water systems and not-for-profit non-community systems. The survey results are used to allocate Drinking Water State Revolving Funds (DWSRF) to the individual states to fund infrastructure improvements. The most recent DWINSA conducted in 2007 identified over \$320.8B of need for State Community drinking water systems nationally as summarized in Table ES-1 and Figure ES-1.

States that receive a minimum 1 percent of the most recent DWSRF allotment, including New Hampshire, were given the option of not participating in the state-specific statistical portion of the 2007 DWINSA. As New Hampshire is among the 13 opt-out states, the needs of NH systems serving from 3,301 to 100,000 people are estimated by applying data derived from participating states to NH's inventory of systems. Year 2007 DWINSA estimate for NH for 20-year needs was \$847 million (including both community and non-community water systems).

The Pie Chart below shows totals for national combined states' Community Water Systems 20-year need, from DWINSA Fourth Report to Congress, Exhibit 1.5 (Billions in January 2007 Dollars).

FIGURE ES-1

2007 EPA DWINSA ESTIMATED 20-YEAR NATIONAL NEED FOR STATES

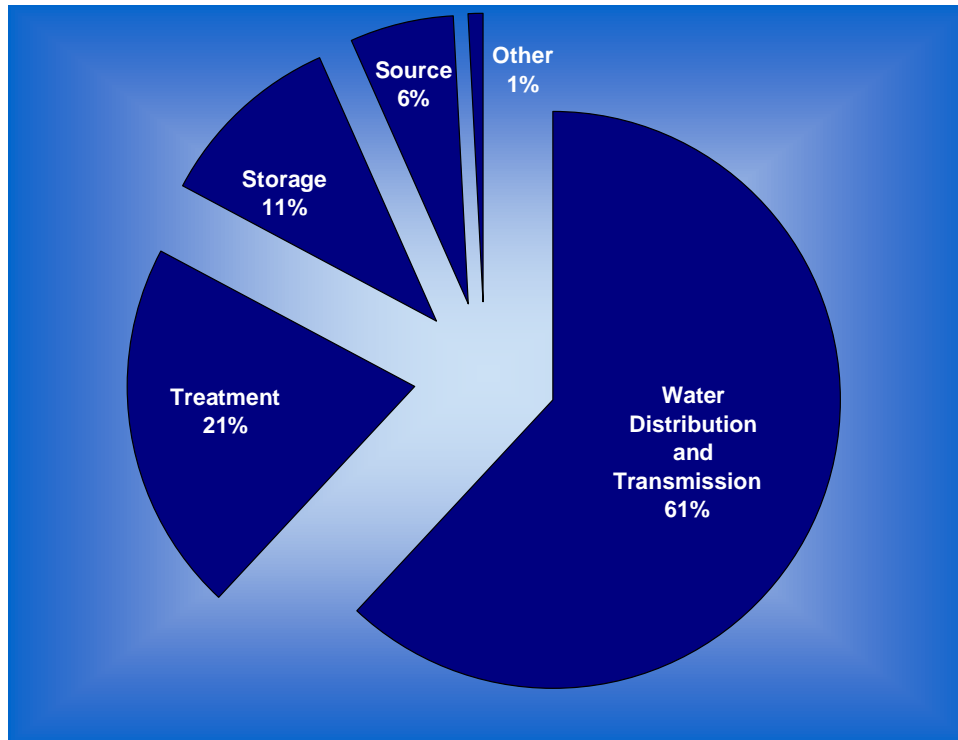


TABLE ES-1

**TOTAL 20-YEAR NATIONAL NEED (IN BILLIONS OF DOLLARS) FOR STATES
COMMUNITY WATER SYSTEMS BY SYSTEM SIZE AND TYPE**

System Size and Type	Distribution and Transmission	Treatment	Storage	Source	Other	Total Need
Large Water Systems	\$72.5	\$26.6	\$9.9	\$6.5	\$0.9	\$116.3
Medium Water Systems	\$91.5	\$29.8	\$15.9	\$7.1	\$0.8	\$145.1
Small Water Systems	\$34.7	\$10.3	\$8.5	\$5.2	\$0.6	\$59.4
Total National Need	\$198.7	\$66.8	34.4	\$18.8	\$2.3	320.8

From Exhibit 1.5 DWINSA Fourth Report to Congress
Estimated Need for All States Community Water Systems in January 2007 Dollars

GOALS AND OBJECTIVES OF THIS STUDY

In contrast with the previous EPA sponsored DWINSA cost estimates, the current study focused on community (residential) public water systems in New Hampshire. The study approach also varied in that it relied on asset inventory data and actual construction costs to the maximum extent possible. The study developed a cost model for the same basic asset groupings identified in the 2007 DWINSA with few exceptions. The goals and objectives of the study were as follows:

- Identify an accurate, reliable cost model to determine true water infrastructure needs
- Incorporate a real inventory of water infrastructure assets in the development of a cost model using NHDES' water system database
- Consider actual construction costs and asset useful life for each class of asset
- Determine the projected infrastructure need in the State of New Hampshire for the next 20-year period.

FINDINGS AND RESULTS

Table ES-2 summarizes 20-year drinking water infrastructure asset costs.

TABLE ES-2

PROJECTED ANNUAL WATER DISTRIBUTION NEEDS IN NEW HAMPSHIRE*

Description	Number	Est 2010 Replacement Cost of Entire Infrastructure Group (\$M)	Est Avg Useful Life	Est 20-Yr Need (\$M) *	Avg Annual Expenditure (\$M/Yr) **
Distribution and Transmission Piping					
Systems w/out Fire Protection	584 (23 w/ pop > 500)	\$471	50 & 100	\$158.8	\$7.9
Systems with Fire Protection	139				
small (pop < 500)	31	\$62	100	\$12.4	\$0.6
Medium (pop 500 - 3300)	69	\$568	100	\$113.5	\$5.7
Large (pop 3300-40,000)	36	\$2,018	100	\$403.7	\$20.2
Very Large (pop 40,000)	3	\$710	100	\$142.1	\$7.1
Subtotal Fire Protection		\$3,359		\$671.7	\$33.6
Subtotal All Piping	723	\$3,829		\$830.5	\$41.5
Atmospheric Storage					
Large Atmospheric Storage for Fire Protection	261	\$251	75	\$67.0	\$3.5
Small Atmospheric Storage for GW Supply	447 systems	\$42	30	\$27.7	\$1.4
Subtotal Atmospheric Storage		\$293		\$94.7	\$4.9
Pressure Booster Stations					
Pressure Boosting Pump Stations	115	\$43	Service Lives for each Bldg Asset Class	\$48	\$2.4
Water Treatment Facilities					
Surface Water Treatment	39	\$289	Service Lives for each Bldg Asset Class	\$261	\$13.1
Ground Water Treatment	506	\$477	Service Lives for each Bldg Asset Class	\$407	\$20.3
Total Water Treatment		\$766		\$668	\$33.4
Well Sources of Supply					
Level 1 Permit (<40 gpm), Bed Rock	903 systems	\$41	40	\$32.5	\$1.6
Level 2 Permit (>40 gpm) Bed Rock	68 systems	\$11	40	\$8.7	\$0.4
Level 1 Permit (< 40 gpm) Gravel	134 systems	\$6	25	\$5.9	\$0.3
Level 2 Permit (>40 gpm) Gravel	202 systems	\$32	25	\$24.4	\$1.2
Subtotals Groundwater Replacement	1307 systems	\$90		\$71.5	\$3.5
Total		\$5,021 M		\$1,713 M	\$85.7 M

Estimated 2010 Total Developed Costs broken out by factor for proportionate costs of Building Asset Categories, then adjusted by the 20 years over the service life.

* 20-Year need period from 2010-2030; ** in 2010 dollars

Figure ES-2, below, compares the USEPA DWINSA estimated needs for New Hampshire for 1995, 1999, 2003, and 2007 with the findings of this 2010 Study. The DWINSA needs estimates were normalized to 2010 costs using the ENR 20-City Construction Cost Index prior to plotting.

Figure ES-2: NH 20-Year Needs: EPA DWINSA Estimated Compared with Study Result

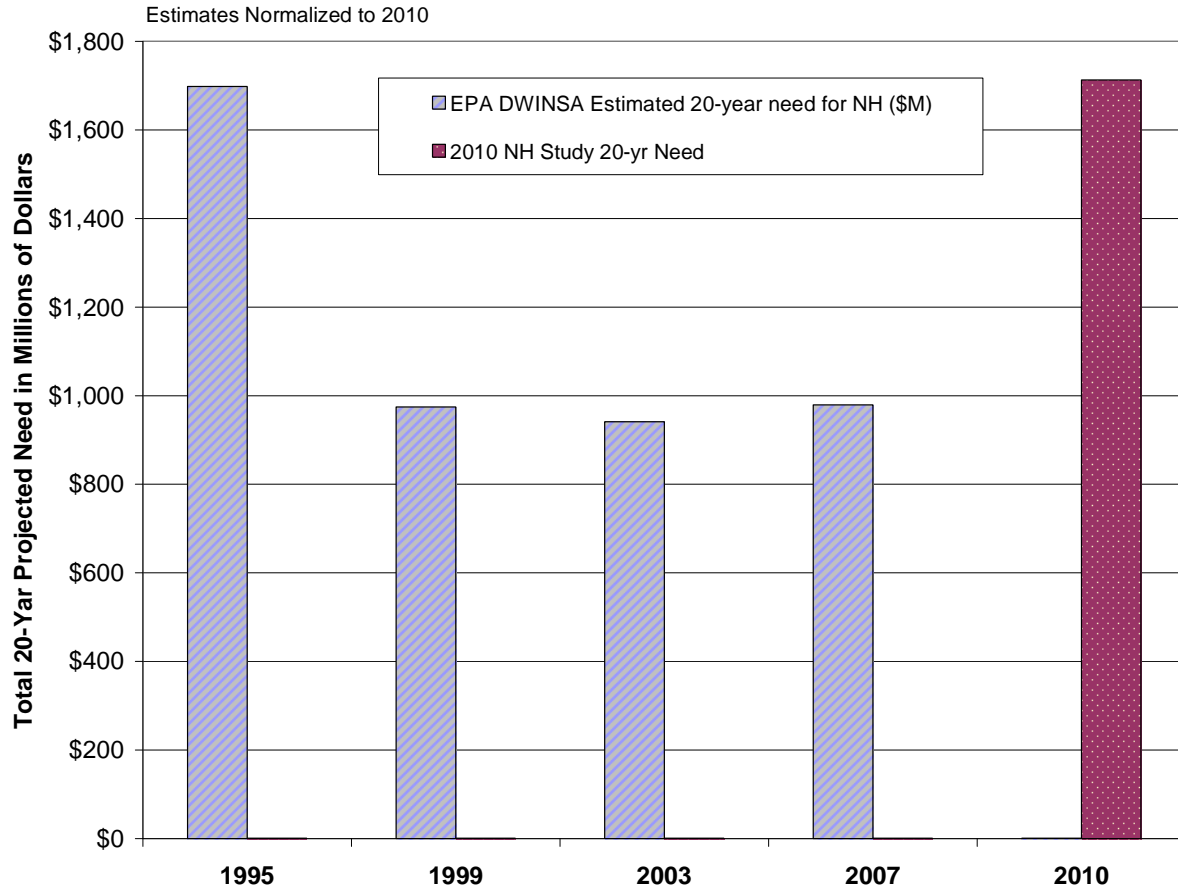
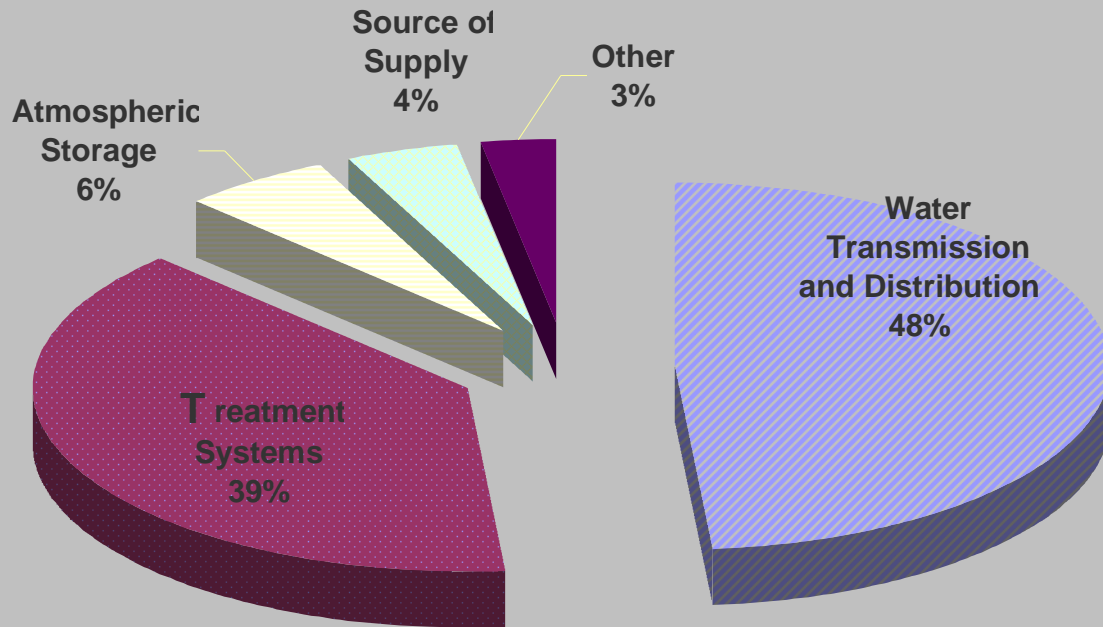


Figure ES-3 shows that infrastructure value in New Hampshire is greater than the historical EPA estimates since 1999. For the \$1713 million 20-year funding need, Figure ES-3 shows how it is apportioned amongst the various infrastructure asset categories.

Figure ES-3: Apportionment of \$1713 M 20-Year Funding Need by Infrastructure Type



The 2007 DWINSA survey identified \$850 million as the 20-year funding need for New Hampshire. When adjusted to 2010 dollars, this value was approximately \$980 million. The revised 20-year need identified in this report was approximately \$1713 million dollars.

Figure ES-3 shows that it is the water distribution and transmission infrastructure that comprise the largest share of funding need (48%), followed by treatment (39%) (groundwater treatment constitutes the greater share at \$407M compared to surface water treatment at \$261M). The order of these two largest asset categories is consistent with the order seen for DWINSA results in Figure ES-1. The wide disparity in cost percentage determined for these two categories in the two studies highlights the significant difference in methodology.