

Section 1

Introduction

ENGINEERING FEASIBILITY AND COST ANALYSES OF NITROGEN REDUCTION FROM SELECTED POTWS IN MASSACHUSETTS

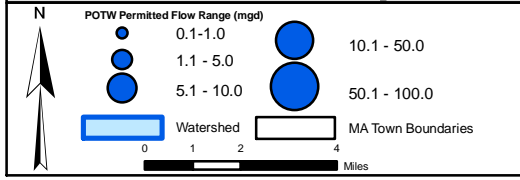
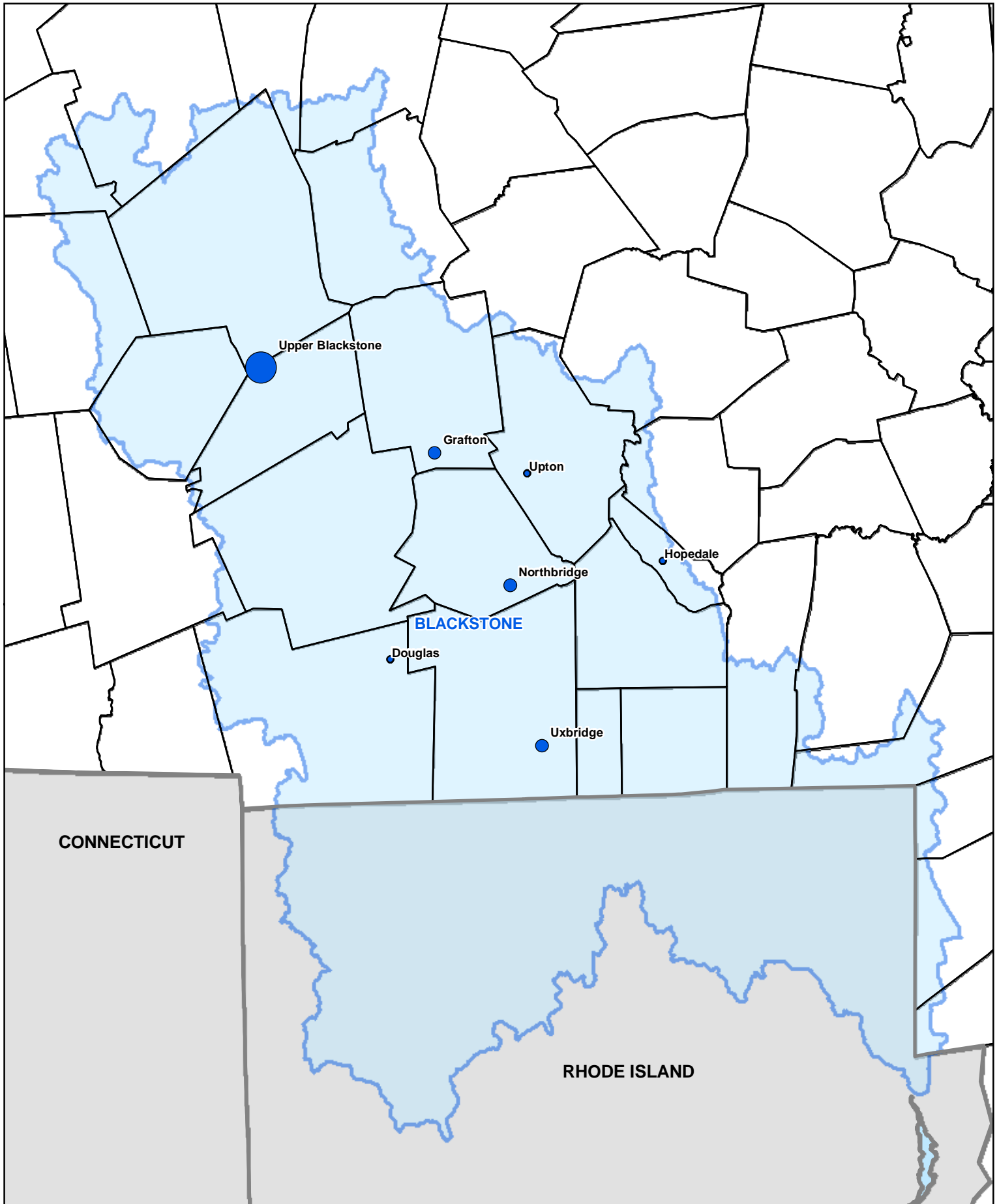
SECTION 1 - INTRODUCTION

1.1 BACKGROUND

The states of Connecticut and Rhode Island have established nitrogen removal programs to improve water quality in Long Island Sound and Narragansett Bay, respectively. Central and western Massachusetts have a number of Publicly Owned Treatment Works (POTWs) that discharge within the Connecticut River (and four of its tributaries), the Blackstone River, and the Ten Mile River watersheds, all of which eventually flow to either Long Island Sound or Narragansett Bay, but historically have not been subjected to effluent nitrogen limits.

Due to the natural attenuation of nitrogen in the environment, a pound of nitrogen discharged in Massachusetts does not necessarily equate to a pound discharged in Long Island Sound or Narragansett Bay. The actual impact of nitrogen discharged by the Massachusetts facilities to the interstate watersheds has not been sufficiently determined, but there is enough evidence to support review, evaluation and cost assessment of treatment options to reduce nitrogen and assess costs to decrease the nitrogen contribution from the POTWs in Massachusetts. This report evaluates the point sources of nitrogen from twenty-one POTWs in central and western Massachusetts. These facilities and their corresponding capacities are listed in the table below and their locations are shown in Figures 1.1-1, 1.1-2 and 1.1-3.

Many of the facilities included in this study may also be facing future limits on other parameters including phosphorus and certain metals resulting in the need for advanced treatment. The focus of this report is strictly on nitrogen removal and thus evaluations and costs estimates only consider the impacts of nitrogen removal on these facilities. In addition, any baseline improvements to existing, aging processes are not included in the estimate.

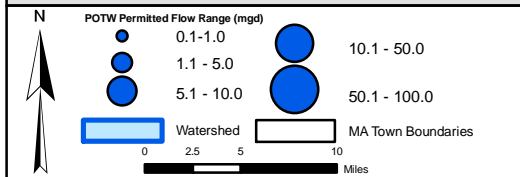
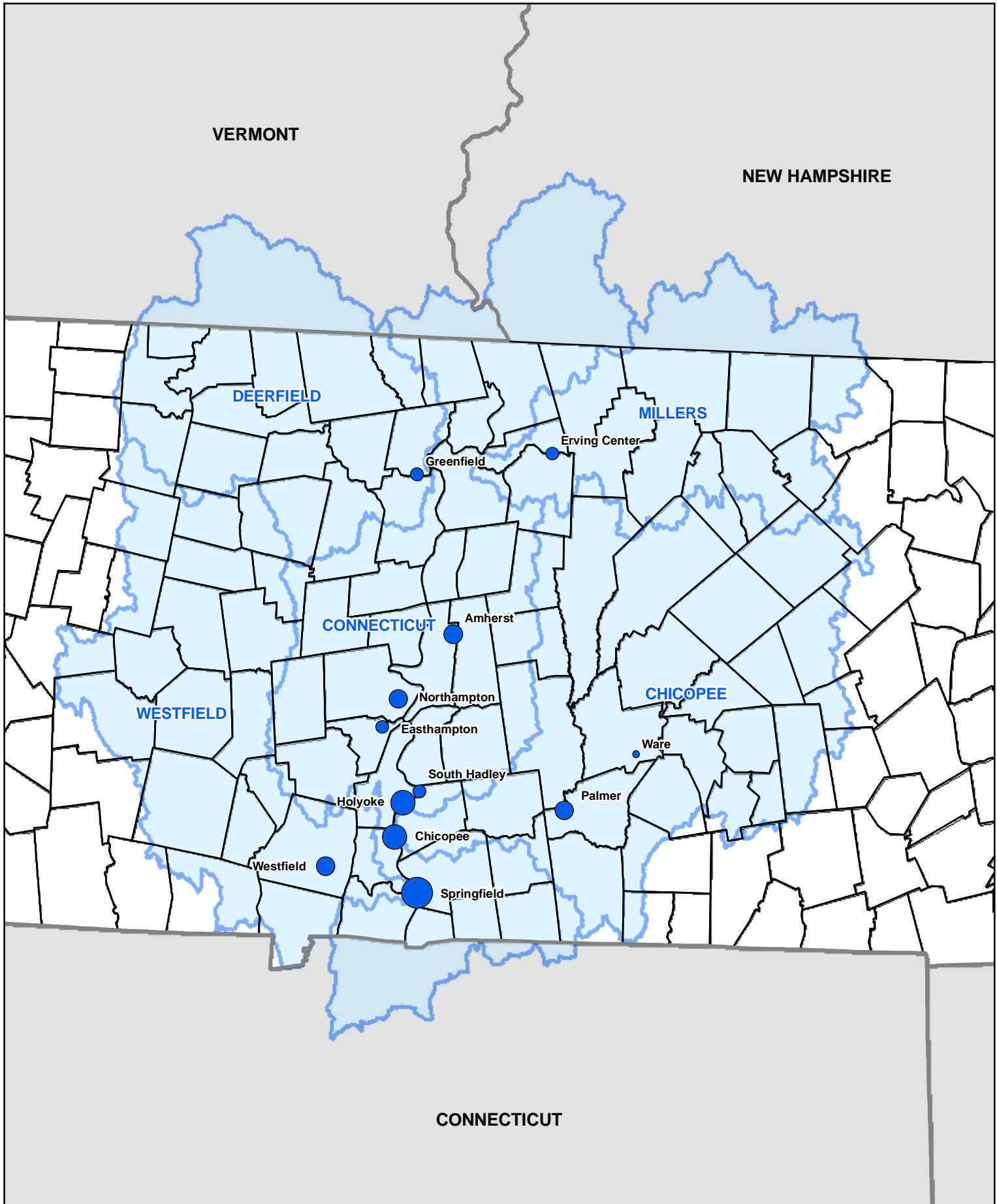


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Permitted Flows for POTWS
 in Blackstone Watershed
 Figure 1-1-1



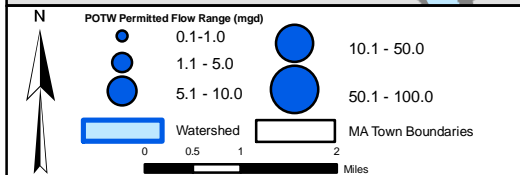
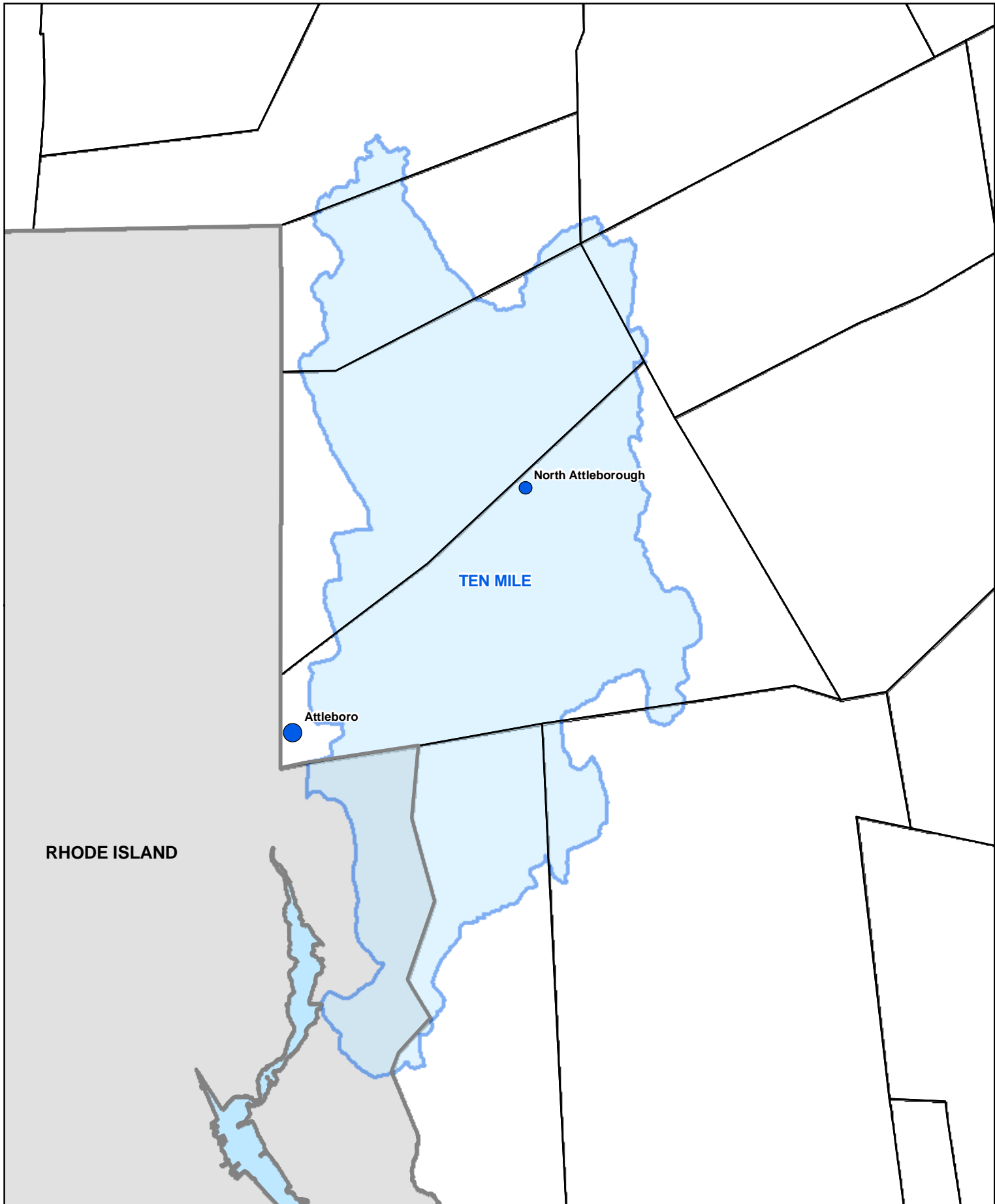
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Permitted Flows for POTWs in Connecticut Watershed and the Chicopee, Millers, Deerfield and Westfield Subwatersheds
 Figure 1-1-2



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Permitted Flows for POTWs in Ten Mile Watershed
 Figure 1-1-3

Table 1.1-1
LIST OF POTWs

NAME OF FACILITY	PERMITTED CAPACITY (MGD)
Blackstone River Watershed	
Upper Blackstone Water Pollution Abatement District	56.0
Grafton	2.4
Northbridge	1.8
Douglas	0.6
Upton	0.4
Uxbridge	2.5
Hopedale	0.6
Connecticut River Watershed	
Springfield	67.0
Amherst	7.1
Northampton	8.6
Holyoke	17.5
Chicopee	15.5
Easthampton	3.8
S. Hadley	4.2
Chicopee River Watershed	
Palmer	5.6
Ware	2.0
Ten Mile River Watershed	
North Attleborough	4.6
Attleboro	8.6
Millers River Watershed	
Erving Center	2.7
Deerfield River Watershed	
Greenfield	3.2
Westfield River Watershed	
Westfield	6.1

1.2 OBJECTIVES

The purpose of this report is to develop planning level costs for upgrading all major POTWs in the Connecticut, Blackstone, and Ten Mile River watersheds. The usefulness of this study lies not in the individual facility evaluations, but more in the estimated total dollars established for upgrades in the individual watersheds or for the entire project.

For the purposes of this study, all facilities were evaluated in the same manner. As such, this study is not intended to be a substitute for a thorough evaluation that would be required if a facility were to embark on any major improvements.

Evaluations of the twenty-one POTWs include the use of the BioWin simulation package to aid in determining:

- the maximum nitrogen reduction, either seasonal or year round, resulting from operational and minor modifications/retrofits to the existing facility under existing flows;
- upgrades and associated costs required to meet an effluent concentration of 8 mg/L total nitrogen seasonally (May –October) and annually at permitted flows; and,
- upgrades and associated costs required to meet an effluent concentration of 5 mg/L total nitrogen seasonally (May – October) and annually at permitted flows.

This study will provide the Commonwealth of Massachusetts with preliminary information necessary to assess technical and financial impacts associated with potential nitrogen reduction alternatives to the POTWs in Massachusetts that contribute nitrogen to Narragansett Bay and Long Island Sound. This report will help communities to begin identifying possible nitrogen reduction alternatives and associated costs. It will also assist the commonwealth in effectively assessing the financial impacts of future total nitrogen limits within each watershed required to meet the water quality goals of Narragansett Bay and Long Island Sound.

The cost estimates contained herein are “order of magnitude” projections for nitrogen removal only based on the best available data and the noted limitations of this study. As such, they should be used for broad planning purposes in determining where more specific evaluations are warranted in the context of meeting the interstate nutrient loading goals.

1.3 ORGANIZATION

Section 2 describes the Quality Assurance (QA) procedures that were implemented to standardize the approach used in evaluating each facility in the project.

Sections 3 through 9 provide the results of the plant evaluations, sections being grouped by the river into which each plant discharges. Each section provides some background information about the plant; a summary of the existing treatment processes and data; a description of special conditions; a nitrogen removal evaluation; and estimated costs for the nitrogen removal alternatives that are presented.

Section 10 provides a summary of this study including a watershed by watershed discussion of the results. It also includes key recommendations and the intended use of the results of this study.