

SECTION 6

EXISTING WASTEWATER MANAGEMENT SYSTEMS

This section will describe the Town's existing wastewater management systems. This includes on-site disposal systems and private collection systems. The effectiveness of current wastewater management systems and the Town's Board of Health Regulations will be discussed. Evaluating the current condition of the Town's Wastewater Management systems is important in understanding needs and providing the basis for the needs analysis.

6.1 ON-SITE WASTEWATER DISPOSAL SYSTEMS

The Town of North Reading does not own or operate a public sewer system or wastewater treatment facility. Virtually all of the properties in North Reading use on-site treatment and sub-surface disposal systems. The one exception is a private facility located on Riverpark Drive, which has a privately owned connection. The facility discharges wastewater to the Reading wastewater collection system for ultimate transport, treatment and disposal by the MWRA.

The on-site treatment and disposal of wastewater is regulated by 310 CMR 15.000 otherwise known as "Title 5". The North Reading Board of Health represents the local enforcement of these regulations for compliance with on-site wastewater disposal facilities. "The purpose of Title 5, 310 CMR 15.000, of the State Environmental Code is to provide for the protection of public health, safety, welfare and the environment by requiring the proper siting, construction, upgrade, and maintenance of on-site sewage disposal systems and appropriate means for the transport and disposal of septage". The Board of Health approves the construction, upgrade, or expansion of an on-site sewage disposal system if it is designed to receive less than 10,000 gallons per day (gpd).

Board of Health on-site sewage disposal system records were available for 4,632 developed parcels in town. Pumping records, submitted to the Board of Health, have been identified with 2,690 of those parcels. These values represent approximately 99% and 57%, respectively of all the developed parcels in Town. Table 6-1 below provides a breakdown of the types of system in Town. Of those records information regarding the type of system is available for 2,957 systems or approximately 64%.

**TABLE 6-1
ON-SITE SEWAGE DISPOSAL SYSTEMS**

System Type	Number of Known systems	Percent of Known Systems
WWTF	6	0.20
Traditional Septic System	2612	88.33
Tight Tank	31	1.05
Cesspool	300	10.15
Bioclere	2	0.07
Bio filter	1	0.03
FAST	5	0.17
Total of Known	2957	
Unknown	1675	36.16
Total	4632	

6.1.1 Septic Systems

MassDEP defines a septic tank as “a watertight receptacle that receives sewage from a building and provides primary treatment (separation of solids and liquids and partial biodegradation).” Town data indicates that there about 2,643 known septic systems in North Reading. Some of these systems also include cesspools, tight tanks and grease traps.

Septic systems are the most common on-site wastewater treatment and disposal system used today. They are designed such that solids in the wastewater settle and digest at the bottom of the tank while the liquid flows to an effluent disposal system such as a leach field. Septic systems have limited treatment abilities and do not provide reliable reduction in many constituents such as phosphorus and nitrogen; however septic systems are often more cost effective than other systems when design flows are less than 10,000 gpd.

Most septic systems discharge to a Soil Absorption System (SAS) such as a leach field which is a series of trenches of sand and gravel buried a few feet below the ground surface where the liquid discharged from the septic tank percolates through the media and native soil before reaching water table. The leach field provides additional treatment by reducing solids, biological matter, nutrients, and bacteria in the wastewater.

6.1.2 Cesspools

MassDEP defines cesspools as a “pit acting as a settling chamber for solids and leaching for liquids” CMR 15.303. While cesspools were once common place, they are no longer a permissible treatment system for new construction. Unlike septic systems, cesspools serve as both the settling chamber and the SAS. This results in a higher concentration of wastewater being applied to a smaller cross section of soils. As a result, cesspools are prone to hydraulic

failure and reduce effectiveness in treatment of nutrients and bacteria. Board of Health records indicate there approximately 300 known cesspools still in use in North Reading.

6.1.3 Tight Tanks and Grease Traps

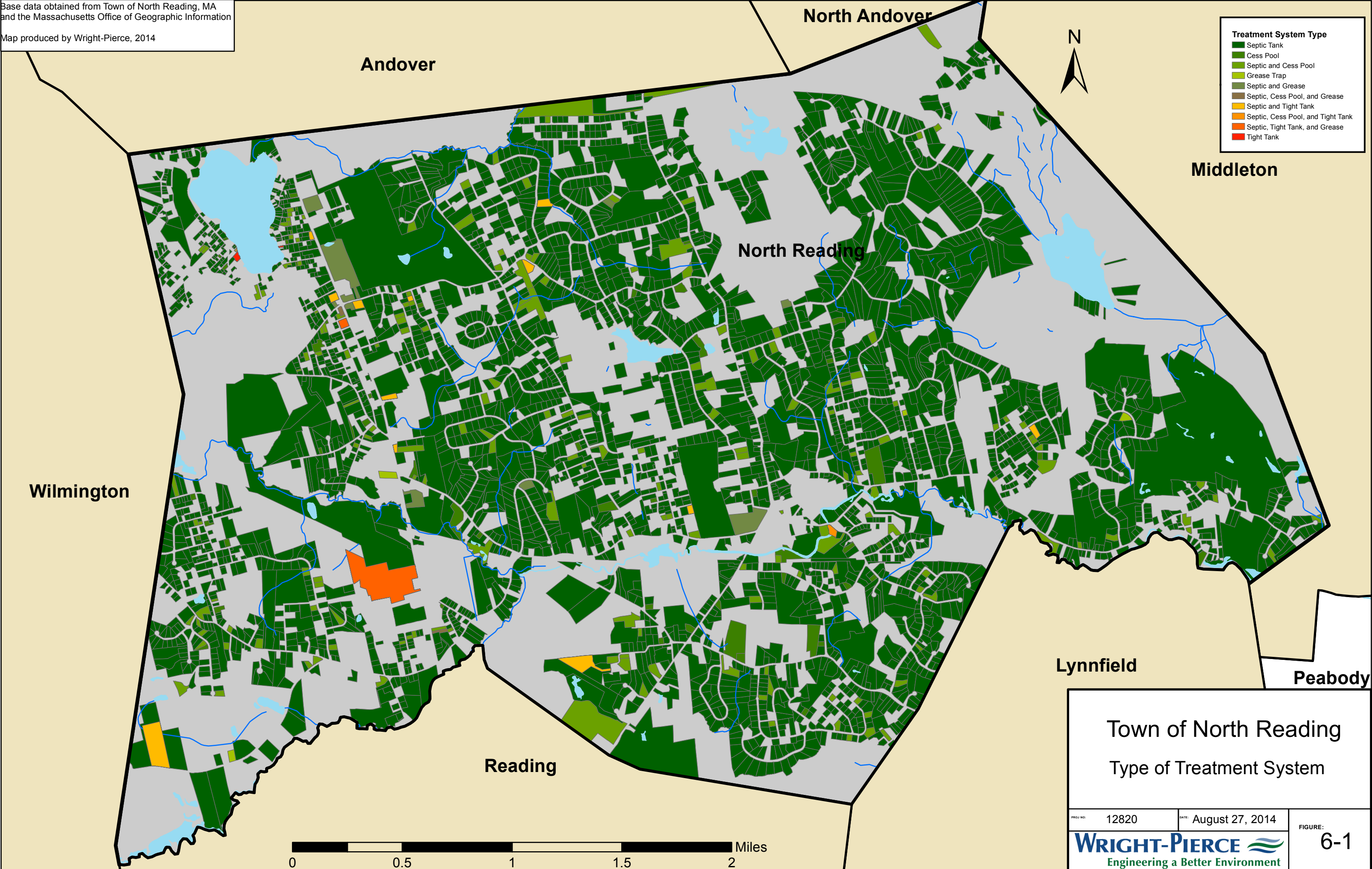
MassDEP defines a tight tank as “a watertight vessel that has an inlet to receive raw sewage but no outlet. A tight tank is designed and used to collect and store sewage until it is removed for disposal”. Tight tanks are used where the property cannot sustain a treatment system. Properties with tight tanks must have the contents regularly pumped and transported to a wastewater treatment facility. Title 5 strongly discourages the use of tight tanks, but they are allowed in situations where an existing system has failed and there is no other feasible alternative. Board of Health records indicate there are 31 known tight tanks in North Reading.

MassDEP defines a grease trap as a “watertight structure located on a building sewer and before a septic tank, in which grease and oils are separated from sewage”. Grease traps are important to protect wastewater infrastructure from fats, oils and grease (FOG). Forty-four properties in town have grease traps installed according to the Board of Health records.

Figure 6-1 presents the Board of Health records based upon the type of system.

Base data obtained from Town of North Reading, MA
and the Massachusetts Office of Geographic Information

Map produced by Wright-Pierce, 2014



6.1.4 Innovative/Alternative Technologies

Several sites in town utilize alternative technologies to treat and dispose of wastewater on-site. These systems include Bioclere treatment, Biofilters, and FAST systems. Currently these systems are being used to manage the wastewater for commercial properties. While they can provide improved water quality they are more expensive to construct, operate and maintain than Title 5 septic systems.

Innovative/Alternative (I/A) technologies are typically considered only when a septic system is insufficient to treat the anticipated loadings or specific constraints on the disposal of the treated wastewater are applicable to the property. For example, I/A systems are often installed in nitrogen sensitive watersheds where additional treatment is needed.

There are a number of I/A technologies approved by MassDEP which are considered to be equivalent to conventional Title 5 systems. Some of these systems allow for a reduction in the SAS size. One of the most common I/A technology utilized for residential properties is leaching chambers. For some soil types, the use of chambers in lieu of traditional pipe trenches allows for a reduction in the SAS size of up to 25% according to the North Reading Board of Health regulations. In some cases MassDEP has allowed size reductions up to 40%.

Some other examples of I/A systems being used in town include:

- Bioclere systems: Small package wastewater treatment systems consisting of a modified trickling filter over a clarifier.
- FAST systems: These systems are installed within septic tanks to provide secondary treatment of wastewater. The systems utilize aeration and media to promote microbial growth for improved effluent quality.
- Ruck Systems: System which adds supplementary components to traditional SAS for improved nitrogen removal. The system uses multiple tanks, filtration and a carbon source to promote nitrification and denitrification.

6.1.5 Treatment Facilities (MassDEP Groundwater Discharge Permit)

Table 6-2 lists locations of wastewater treatment facilities in North Reading. These sites have a design flow of over 10,000 gpd requiring their own wastewater treatment facility on-site and associated groundwater discharge permit issued by the MassDEP. These systems provide a higher level of treatment than can be achieved with a septic system and usually require nutrient removal to reduce the nitrogen loadings from the wastewater. They typically provide a 75% reduction in loading of nitrogen. The flow data reported represents the maximum value reported during the reporting period. The data was provided by the MassDEP Northeast Region Wastewater Management Chief.

**TABLE 6-2
GROUNDWATER DISCHARGE PERMITS**

DEP Permit #	Facility Name	Address	Design / Permitted Q (gpd)	2014 Max Daily Flow* (gpd)	2015 Max Daily Flow** (gpd)
642	Meadowview Care & Rehab Center	134 North Street	17,000	3,244-8,844	3,761-9,657
832	Edgewood Luxury Apartments (Berry Site)	100 Lowell Road	63,240	28,163-34,950	30,592-44,012
45-4	Greenbriar Condominiums	5 Greenbriar Drive	40,000	9,866-18,601	12,240-19,520
142-3	Park Colony Condominiums	36 Main Street	26,000	14,700 - 25,730	14,700 - 25,600
931-0	NR High & Middle School	191 Park Street	17,500	10,600-11,190***	3,500-12,300
662	U.S. Postal Service	74-76 Main Street	16,000	1,800-13,200	2,680-9,748

*Flow data collected from December 2013 to November 2014

**Flow data collected from October 2014 to September 2015

6.1.6 Residuals Management

Residual solids are removed by septage haulers contracted by the individual property owners. The solids are usually taken to facilities at the Greater Lawrence Sanitary District WWTF. The Board of Health maintains records of pump outs based upon reporting completed by the septage haulers.

6.2 ON-SITE WASTEWATER DISPOSAL SYSTEMS EFFECTIVENESS

The effectiveness of treatment of wastewater using on-site systems is highly variable and is dependent on a wide variety of factors. These factors include:

- In-situ soils
- Type – Septic; I/A; Wastewater treatment
- Depth to groundwater
- Age
- Size (tank and leach field)
- System loading

- Maintenance

All of these factors relating to a specific system are as unique as the persons using the systems. While in general the use of septic systems has been shown to provide adequate levels of treatment, there are indications that their use has been linked to poor surface water quality and impacts to water supplies. This is particularly evident in denser communities and those with small parcel sizes.

6.2.1 Septic System Failures and Rehabiliations

Weston & Sampson Engineers, Inc completed a draft Comprehensive Wastewater Management Plan for the Town of North Reading in 2008. This report cites North Reading's Board of Health estimates on septic system failures. The board estimated 100 septic system repairs per year, with 66 to 75 percent of the repairs requiring an entire system replacement.

A more recent review of septic system rehabilitations and failures was conducted as part of the wastewater needs analysis completed for this report. Figure 6-2 depicts the replacement/rehabilitation of the septic systems on a town-wide basis. The figure depicts that the problems are town-wide and not localized to a single area of Town. While it shows that they can be replaced it does not represent the specific challenges that will arise on smaller lots when land area for replacement is unavailable under future conditions. Water quality impairments in many of the surface waters in North Reading indicate poorly operating and failing septic systems.

6.2.2 DEP Violations

MassDEP publishes a listing of Enforcement Actions. MassDEP's enforcement authority helps to promote compliance with environmental regulations. A review of Enforcement Action's between 2004 and 2015 revealed two violations for North Reading's Groundwater Discharge permit sites.

In 2004, DEP executed a Consent Order against the United States Postal Service (USPS) facility in North Reading because Discharge Monitoring Reports from that year indicated violations of groundwater standards for nitrate nitrogen, total suspended solids, BOD and total nitrogen.

In 2009, MassDEP issued a Notice of Noncompliance against Park Colony Condominium Associates for their failure to comply with their groundwater discharge permit, specifically the requirement to submit an annual financial report.

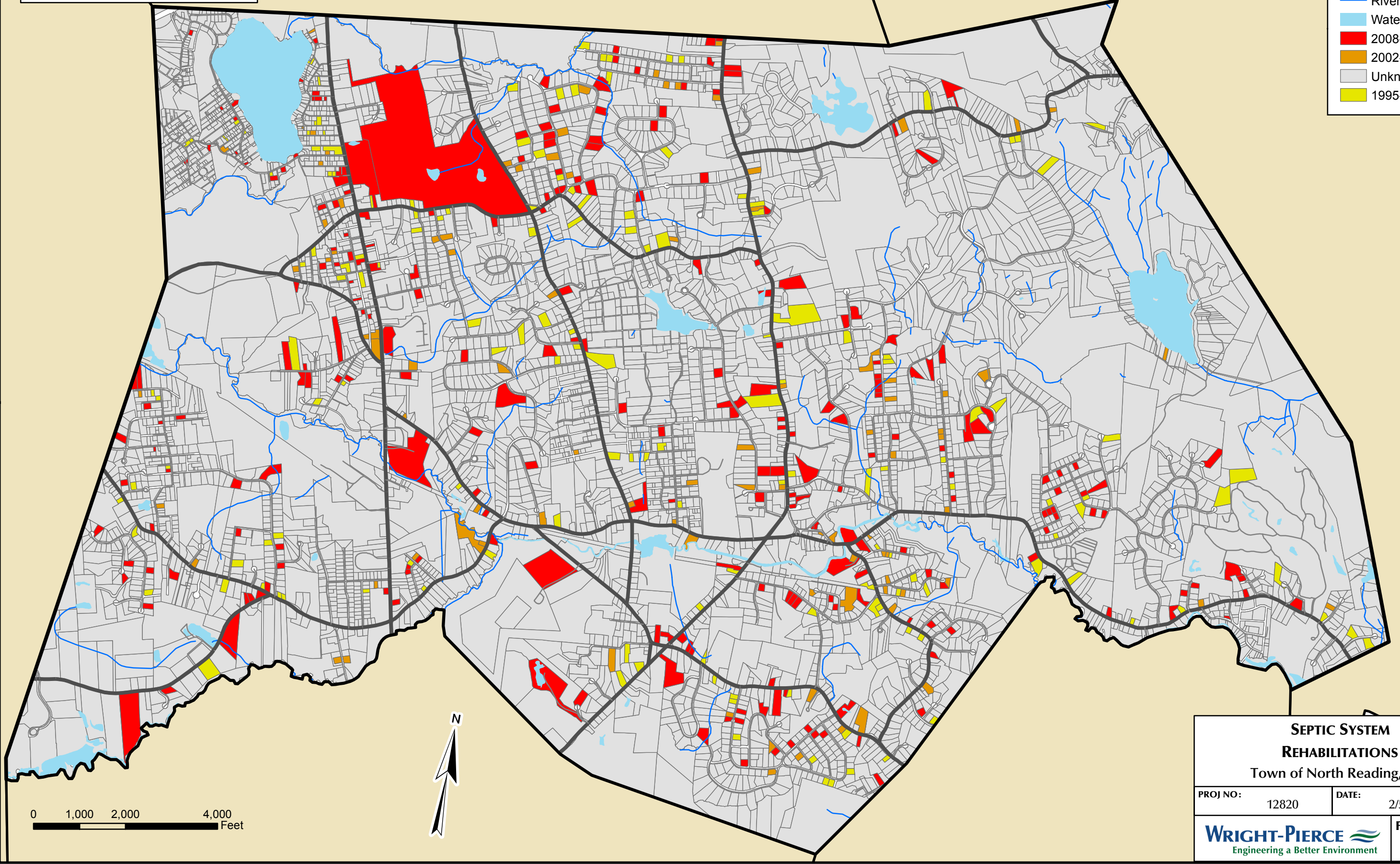
Additionally a review of the data indicates that almost all private wastewater have experienced inconsistent compliance with their groundwater discharge permit. It is common with privately owned facilities that compliance can be problematic for a variety of reasons. The operation can be challenging given the limited oversight and high variability of flows. Additionally as equipment ages, the capability and reliability of equipment becomes significantly reduced. Changes in the MassDEP groundwater regulations have required additional requirements and oversight of the facilities to increase compliance with the discharge permits.

Base data obtained from Town of North Reading, MA
and the Massachusetts Office of Geographic Information

Map produced by Wright-Pierce, 2015

- Minor Road
- Major Road
- River/Stream
- Water Body
- 2008-2013
- 2002-2007
- Unknown/None
- 1995-2001

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**SEPTIC SYSTEM
REHABILITATIONS**
Town of North Reading, MA

PROJ NO: 12820 DATE: 2/5/2016

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE:
6-2

6.3 NORTH READING BOARD OF HEALTH SEPTIC SYSTEM REGULATIONS

The Board of Health is North Reading's local regulatory authority for on-site wastewater systems that are not regulated specifically by a permit issued by the MassDEP. The Board of Health's Health Agent addresses items such as design reviews, system installation inspections and town regulation enforcement.

The Board of Health regulations include requirements for residential septic systems including 1,500 gallons of capacity in the septic tank and a minimum leachfield area of 800 square feet. These requirements are more stringent in accordance with Title 5 for all houses larger than 3 bedroom, and areas with poor soils. The Board of Health has many other requirements such as property setbacks and construction limitation which are outlined in the Town's Bylaws.

The Board of Health also requires private WWTF for any property with flows greater than 15,000 gpd.

6.4 COLLECTION SYSTEMS

The Town of North Reading currently does not own any public collection systems or means of transporting wastewater to wastewater treatment facilities.

However in 1988, an emergency condition was issued to allow the facility at Riverpark 93 Office Park to connect to the Massachusetts Water Resources Authority through a private connection. This connection allows for the discharge of up to 67,040 gpd of sanitary waste through use of a pump station, 3000 linear feet of force main and 250 feet of gravity sewer connecting to the Reading. This connection enters the MWRA system through the Town of Reading's sewer system on Grove Street. The connection was made in accordance with Chapter 57 of the Acts of 1987, An Act Relative to Protecting the Drinking Water Wells and Aquifers of the Ipswich River Watershed. The facility is currently using about 1/3 of the overall capacity allocated to it through the approved agreements.