

SOURCE WATER PROTECTION PLAN UPDATE

**Town of North Brookfield Water Department
Horse/North Pond Reservoir**

March 2014

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Research and Writing:
Bruce Young, Water Resource Planner
Mass Rural Water Association

(See Resources Section to connect to information on Mass Rural Water Association, USDA Farm Service Agency and the Massachusetts Department of Environmental Protection)



INTRODUCTION

Despite our best efforts to protect the environment, accidental spills of hazardous chemicals are common occurrences and bacterial outbreaks still happen unexpectedly, sometimes with dangerous consequences. These water contamination events may result in costly treatment, remediation and/or litigation, could permanently destroy a water source, and in worst-case scenarios could injure water customers. Public water suppliers around the Commonwealth of Massachusetts and across the nation are finding that proactive planning for water systems is essential to both the long-term integrity of their water supplies and is essential for reducing their overall costs and liabilities.

Proactive protection planning for drinking water sources can provide numerous benefits including: increased consumer confidence; reduced likelihood of contamination incidents with costly and/or potentially harmful results; solidified relationships between regulatory agencies, employees and the public; and increased support for requests for federal, state and local financial assistance.

To help protect Public Water Systems, such as the Town of North Brookfield Public Water System, the Federal Safe Drinking Water Act Amendments of 1996 (SDWA) require proactive planning through a Source Water Assessment Program (SWAP) conducted by each state. The SWAP emphasizes the importance of source water protection as a pollution prevention tool that can be used as part of a comprehensive approach to source water protection. Source water assessments help characterize the susceptibility of public drinking water sources to contamination by summarizing information about the activities and land uses within recharge areas. (See Resources Section to connect to information on the Federal Safe Drinking Water Act Amendments of 1996 (SDWA) and the Source Water Assessment Program (SWAP))

As part of the SWAP program, the Massachusetts Department of Environmental Protection (DEP) delineated Surface Water Supply Protection Areas (areas important for protecting surface water and surface water recharge areas) for Public Water Systems in Massachusetts, and identified land uses and activities that may be Potential Sources of Contamination (PSOC) within those areas.

Surface Water Supply Protection Areas were delineated into three protection areas; Zone A, Zone B and Zone C:

Zone A-(maps page 27 and 29)

- (a) the land area between the surface water source and the upper boundary of the bank;
- (b) the land area within a 400 foot lateral distance from the upper boundary of the bank of a Class A surface water source, as defined in 314 CMR 4.05(3)(a); and
- (c) the land area within a 200 foot lateral distance from the upper boundary of the bank of a tributary or associated surface water body.

Zone B-(map page 30)

The land area within one-half mile of the upper boundary of the bank of a Class A surface water source, as defined in 314 CMR 4.05(3)(a), or edge of watershed, whichever is less. However, Zone B shall always include the land area within a 400 foot lateral distance from the upper boundary of the bank of the Class A surface water source.

Zone C-(map page 31)

The land area not designated as Zone A or B within the watershed of a Class A surface water source as defined at 314 CMR 4.05(3)(a). (See Resources Section to connect to information on the Surface Water Supply Protection Area delineation)

Upon completion of the delineation of Surface Water Supply Protection Areas and the initial identification of Potential Sources of Contamination in the SWAP report, all Public Water Systems are encouraged to develop a Source Water Protection Plan.

A Source Water Protection Plan is formulated to help identify any additional water system vulnerabilities and enumerates specific techniques and actions to manage land uses and Potential Sources of Contamination at or near the drinking water source. Management techniques and source water protection actions taken by water system managers, landowners, and the community eventually become the key to achieving long-term comprehensive source water protection.

The purpose of this Source Water Protection Plan is to identify any additional Potential Sources of Contamination that may be a threat to the Surface Water Supply Protection Areas of the North Brookfield Public Water System, and to provide specific recommendations to the community of North Brookfield in order to reduce and manage Potential Sources of Contamination to protect and maintain quality drinking water.

This Source Water Protection Plan builds on the information provided in the DEP SWAP reports, other DEP directives, and other available land use and source water protection information pertaining to the North Brookfield Public Water System. The Plan provides detailed descriptions, maps, Potential Sources of Contamination, and management strategies to reduce immediate and long-term threats to the Surface Water Supply Protection Areas in the North Brookfield Public Water System. This plan also provides strategies for future protection through land use initiatives, education and outreach strategies to ensure a long-term community commitment toward drinking water source protection and sustainability.

This plan is a working document that is intended to be reviewed annually and updated every three years to remain current, active, and viable.

SYSTEM DESCRIPTION

Source

The Town of North Brookfield lies within the Chicopee River Basin Watershed. The undersurface composition is igneous crystalline and meta-sedimentary geology created in the Paleozoic and Precambrian eras. The watershed of the Chicopee River Basin is generally composed of glacial till or bedrock with sand and gravel lined streambeds characterized by rolling hills and alluvial plains with numerous natural and artificial lakes.

The Town of North Brookfield obtains its water supply from one of the numerous water bodies within the Chicopee River Basin, Horse Pond, also known as North Pond. Horse Pond is classified as an Outstanding Resource Water under the Massachusetts Surface Water Quality Standards of 1995 (310 CMR 4.00). The water quality of Outstanding Resource Waters is designated for protection due to their outstanding socioeconomic, recreational, ecological and/or aesthetic values.

Horse Pond is North Brookfield's primary municipal drinking water supply (source ID 2212000-02S) located north of the town center and east of Rufus Putnam Road. Horse pond is a terminal reservoir and has a total water surface area of 35 acres, a storage capacity of approximately 380 million gallons and a safe yield of approximately 0.47 million gallons per day. The water supply provides drinking water to approximately 3,896 residents, around 85% of the population, and provides water for the Town of North Brookfield fire protection system. Horse Pond is located adjacent to Doane Pond, a potential emergency water source for the Town of North Brookfield.

Doane Pond (source ID 2212000-01S) located south of Horse Pond, off Oakham Road, is a potential emergency source of potable water for the Town of North Brookfield Water Department. The pond is a terminal reservoir and has a total water surface area of 8 acres, and has a storage capacity of approximately 42.6 million gallons and a safe yield of approximately 0.2 million gallons per day. Doane Pond cannot be utilized without prior written approval from DEP.

Watershed (*maps page 26, 27 and 28*)

The Horse Pond watershed, including the Zone A, B, and C, is comprised of 884 acres of forests, water bodies and wetlands, open land, rural roadways and a mix of low density residential and agricultural land uses that extends northward into the community of New Braintree. Of the 884 acres, 594 acres are located in North Brookfield and 289 acres are located in New Braintree. Also, of the 884 acres, 60% (523 acres) is forested, 18% (162 acres) is cropland, 12% (136 acres) is wetland/forested wetland, 7% (65 acres) is water, 2% (18 acres) is pasture, and the remaining 1-1.5% (approximately 9 acres) is a mix of residential and very low density residential land use.

The Zone A of the Horse Pond reservoir and its tributaries are 332 acres in size. The streams that supply Horse Pond are North Brook, the East and West Branches of Stoddard Brook, Hunter Brook and Swamp, and a small unnamed streamlet just to the north of East Stoddard Brook.

There are several roads that cross Horse Pond's Zone A, including Stoddard Road, Rufus Putnam Road, Barnes Road in North Brookfield and Moore Road in New Braintree. The roads located in the Zone A are rural residential roads.

In-lake Issues

Each year there is a water taste and odor potential in Horse Pond due to the excess of algae that occurs in the spring from the nutrients that are washed into the reservoir from spring rains. The North Brookfield Water Department treats this annual outbreak with copper sulfate and flushes main lines to remove potential contaminants within the system.

The North Brookfield Water Department samples monthly for coliform bacteria and occasionally does experience elevated levels in the summer. The raw water is chlorinated with sodium hypochlorite to treat elevated bacteria levels.

Heightened bacteria levels in the reservoir can also occur due to beaver and goose activity. Proper trapping measures are followed each year to mitigate any beaver problems. The Water Department also encourages landowners to report heightened beaver activity and have had much success with this community approach. Goose populations are reduced by brush clearing activities and the Water Department's participation in the MSPCA Geesepeace egg addling program. (See Potential Sources of Contamination Section for more information on wildlife in the Surface Water Supply Protection Areas)

Watershed Sampling Plan

Raw water pH, turbidity, conductivity and color are monitored daily. Iron, manganese, and total dissolved solids are checked weekly. Coliform bacteria and alkalinity are checked monthly. All samples are taken from a tap on the influent line at the Raw Water Pump Station at 74 Oakham Road. The North Brookfield Water Department is satisfied with this sampling location and has successfully addressed changes in water quality due to in-lake issues.

Distribution and Treatment

The North Brookfield Water Department operates a Community public water system with 1,260 service connections that serves a population of approximately 3,896 residents in the town. The service area consists of 1,136 residential connections, 31 municipal/institutional connections and approximately 51 commercial/industrial connections. The North Brookfield Water Department is classified as a grade 2 distribution system; the treatment facilities are classified as a class 2-treatment system. The water from the source (Horse Pond) flows by gravity through a 12-inch transmission main to the Oakham Road Pump Station. The water intake from Horse Pond is movable and can be set at depths between 9 and 13 feet. The water is treated, pumped to the storage tank and then flows to the distribution system. The water system has one pressure zone. System pressure ranges from 20-180 PSI. The water flow is metered at the source and at every service connection.

Pump Station

The Oakham Road Pump Station (2212000-03T), located on Oakham Road, has the ability to treat the water with potassium permanganate (seasonal use) for color control, powdered activated

carbon (PAC) (seasonal use) for taste and odor control, sodium hypochlorite for disinfection and polyaluminium chloride (polymer) for coagulation. In 2012, a spring loaded HOA switch for the coagulant injection pump at the Oakham Pump Station was installed to prevent the potential of chemical overfeed. The Oakham Road Pump Station pumps conditioned water to the Bell Hill Water Filtration Plant. The conditioned water is pumped by two 200 horsepower pumps (1,500 gallon per minute pumping capacity).

Water Storage Facilities

North Brookfield Water Department has one active water storage facility. The Bell Hill Storage Tank, located off Bell Road, is a 1.5 million gallon ground level concrete tank. The tank was constructed in 2000. The tank is equipped with level transmitters and high/low level alarms, connected to a SCADA system. The water level in the tank regulates the operation of the clearwell pumps in the Bell Hill Treatment Plant. The tank can be isolated from the distribution system without interruption of water service.

Treatment Facilities

The Bell Hill Treatment Plant (2212000-02T), located off Bell Road, receives conditioned water from the Oakham Road Pump Station. The facility has a design capacity of two million gallons per day and provides treatment for compliance with the Surface Water Treatment Rule by filtration (Trident package units) followed by disinfection, pH adjustment, and corrosion control, all by chemical injection. The facility is equipped with backup power generator. The Bell Hill Water Filtration Plant consists of 2 Trident Package Filter Units in parallel. Each filter unit consists of an up flow clarifier/contactor followed by a down flow mixed media filter bed. The treatment process proceeds as follows. The conditioned water enters the treatment plant via a 12-inch main. After entering the treatment facility, polyaluminum chloride (PAC) and a nonionic polymer are injected into the water. An inline static mixer follows the injection point. The static mixer promotes flocculation development during the coagulation process. The conditioned water flows through the clarifier portion of the filter unit for the removal of flocculent. The water then overflows into the filter portion of the unit where the fines and particulates are removed. The filter effluent is injected with sodium hypochlorite for disinfection prior to the clearwell. The clearwell is baffled in order to provide chlorine contact time. Two 75 horsepower high-lift pumps move the filtered water into the Bell Hill Storage Tank located adjacent to the treatment plant. Prior to leaving the plant, the water passes through a venturi water meter and passes the injection points for sodium hydroxide for pH adjustment, and zinc orthophosphate, a corrosion inhibitor. The high lift pumps are controlled by the water level in the Bell Hill Water Storage Tank. The filter backwash effluent is discharged to a recycle wet well where it is recycled to the beginning of the treatment plant. The clarifier backwash effluent is discharged to a wet well then pumped to the town sewer. Spring loaded HOA switches for chemical pumps were installed in 2012.

Potential Sources of Contamination PSOC's

The Environmental Protection Agency (EPA) states that drinking water may reasonably be expected to contain at least small amounts of some contaminants and sets standards for approximately ninety contaminants in drinking water. The EPA promulgates a Contaminant Candidate List, which is a list of federally regulated drinking water contaminants, their Maximum Contaminant Levels (legal threshold limit on the amount of substance that is allowed in Public Water Systems), their likely sources in drinking water, and their potential health effects from acute or long-term exposure. (See Resources Section to connect to information on the EPA Contaminant Candidate List)

The Massachusetts Department of Environmental Protection (DEP), as a condition of primacy, is allowed to create stricter Maximum Contaminant Levels, and is allowed to add contaminants to the Contaminant Candidate List for Public Water Systems in Massachusetts. (See Resources Section to connect to information on the Massachusetts Department of Environmental Protection Contaminant Candidate List)

Contaminants regulated by the EPA and DEP include microbes, radionuclides, inorganic compounds, volatile organic compounds (VOC), synthetic organic compounds (SOC), disinfectants and disinfection byproducts.

A few of the common types of these Potential Sources of Contamination (PSOC) are Household Hazardous Waste, stormwater, road deicing agents, leaking or malfunctioning septic systems, wildlife, agricultural runoff, leaking fuel tanks and/or spills from fluid transfers, pesticides, fungicides and herbicides.

Individually, these Potential Sources of Contamination can appear to be insignificant and harmless, but cumulatively, over time contaminants from these sources can pose a serious risk to the long-term quality of our drinking water sources.

Many of the Potential Sources of Contamination are present in homes and businesses and, the contaminants are often odorless, tasteless, and colorless. Often, the only way to identify their presence is through water quality testing. And, while owners and operators of Public Water Systems in Massachusetts are subject to stringent reporting and water testing requirements regulated by the EPA and DEP, not all contaminants are included in the required tests. Additionally, many contaminants, once detected, can be extremely difficult and expensive to remediate and the water source may never again be suitable as a drinking water source.

The following are Potential Sources of Contamination identified during the planning process and their respective management strategies for reducing potential drinking water contamination in

the North Brookfield Public Water System:

PSOC #1 LAND DEVELOPMENT

Residential and commercial development, with all of the associated land uses (septic systems, lawn care, stormwater, etc.), is one of the biggest threats to a drinking water supply. Contamination from land uses associated with development can be slow and insidious and are often overlooked until a crisis is thrust upon the community. Residents of North Brookfield value the rural character of the town and the Horse Pond Surface Water Supply Protection Areas for many reasons, including wildlife diversity and habitat areas, water resource areas, agricultural landscapes and the natural forest and wetland ecosystems. It is critically important that the community discusses alternatives to development with landowners and develops regulatory land protection strategies to protect and preserve land within the Horse Pond Surface Water Supply Protection Areas in North Brookfield.

According to the North Brookfield Master Plan and Open Space and Recreation Plan, land protection is a top priority in North Brookfield due to an increased rate of residential development, especially large homes on large lots, an aging population of residents with land in Chapter 61 temporary protection status, and outdated or insufficient zoning, subdivision and site plan review regulations. (See Resources Section to connect to information on the Town of North Brookfield Master Plan and Open Space and Recreation Plan on the Town of North Brookfield website)

MANAGEMENT STRATEGIES PSOC #1 LAND DEVELOPMENT

Water Supply Protection District (WSPD) Bylaw (*Land Use map page 32*)

It is recommended that the Town of North Brookfield adopt a Water Supply Protection District (WSPD) Bylaw that would create an overlay district to protect the Horse Pond Surface Water Supply Protection Areas. The passage of a WSPD is the most important management strategy to protect the drinking water supply. Once the WSPD bylaw is in place, North Brookfield's public drinking water supply will benefit from greater regulatory protection from the most insidious drinking water contamination threats. There are several WSPD bylaws in towns and cities in Massachusetts that are pertinent to the North Brookfield Surface Water Supply Protection Areas and are worth emulating.

Ten-Year Land Acquisition Plan (*Protected Open Space map page 33*)

It is recommended that the Town of North Brookfield Water Department partner with town boards and committees, land use protection organizations, land trusts and the DEP to create a detailed ten-year land acquisition plan for the Horse Pond Surface Water Supply Protection Areas. The land acquisition plan should be a multi-faceted approach to protecting key parcels within the watershed and, at a minimum, should include the following:

- Decision tree to identify and prioritize key parcels;

- Methods for education and outreach to landowners;
- Regular interval follow up procedures;
- Management program for each key parcel to include regular, logged inspections;
- Funding options-Commonwealth Capital Funding, land trust partnerships, etc.;
- Protection options and models-Agricultural Preservation Restrictions, Conservation Restrictions, easements, Chapter 61, donations, land swaps, etc.; and
- Partnership options with New Braintree boards and committees for acquisition of land and utilizing the transfer of “Right of First Refusal” option under M.G.L Chapter 61.

Development Proposal Review

It is recommended that the North Brookfield Water Department continue to review and comment on proposed new or expanded land uses or activities within the watershed. The Water Superintendent should continue to appoint a staff member or request that a Water Commissioner continue the following:

- Contact local and regional boards and commissions annually to ensure that the North Brookfield Water Department staff and board remain on their lists of people to be notified when new or expanding projects are proposed within the watershed;
- Assign a staff person to monitor public hearing notices of boards posted in Town Hall or published in local newspapers and to report findings to the Board of Water Commissioners;
- Request to work with municipal/regional planners and to be included in the site plan review process for any new and expanded developments in the watershed;
- Recommend that, at a minimum, all development projects within the Surface Water Supply Protection Areas:
 - keep undisturbed buffers
 - plant vegetated filter strips
 - cover sand, salt, manure, fertilizers
 - install stormwater controls
 - Install erosion controls
 - phase project construction
 - not allow livestock or domestic animals within 100 ft. of reservoir or tributaries
 - meet compliance with local water supply protection control measures
 - require secondary containment for chemicals
 - reduce impervious surfaces to < 15%
 - maintain catch basins regularly
 - manage animal wastes

PSOC #2 RESIDENTIAL ACTIVITIES

Typical residential activities generally do not pose a major immediate threat to drinking water supplies; however, contamination from residential activities can stem from numerous sources, can be cumulative, and often pose threats to drinking water resources over an extended period of time. Sources of residential pollutants in North Brookfield's Surface Water Supply Protection Areas for Horse Pond include, but are not limited to, Household Hazardous Waste, landscape care products, and home heating fuel oil storage tanks.

Household Hazardous Waste

Many hazardous products and chemicals are used in the home every day. When discarded, these products are called Household Hazardous Waste (HHW). HHW are discarded materials and products that are ignitable, corrosive, reactive, toxic or otherwise listed as hazardous by the U.S. Environmental Protection Agency (EPA). The EPA estimates the average American household generates approximately twenty pounds of HHW each year, and products used and disposed of by a typical residence may contain more than one hundred hazardous substances. These chemicals can contaminate soil and drinking water sources. A few of the common HHW products are:

- Batteries
- Cleaners
- Cosmetics
- Fluorescent light bulbs
- Glues
- Ink
- Medicines
- Motor oil and automotive supplies
- Paints, thinners, stains and varnishes
- Swimming pool chemicals
- Smoke detectors
- Thermometers
- Fuel

Landscape Care Products

Homeowners often use fertilizers, pesticides and herbicides on their lawns and landscaping components. These potentially hazardous chemicals get washed into storm drains or percolate into the groundwater with lawn irrigation water, rainwater or snowmelt.

Fuel Oil Storage Tanks

Storage tanks for vehicle fuel and heating oil are common on farms and rural residences nationwide. These above-ground and underground tanks historically have been constructed of

steel, and over the years tens of thousands of the tanks have corroded and leaked petroleum products into soil and groundwater across the United States. Even small leaks can add up to big problems. A tank leaking one drop every 10 seconds could release 60 gallons per year. Leaking tanks can be a source of drinking water contamination. Petroleum-based fuels contain toxic compounds including benzene, toluene, xylene and ethylene dibromide. These compounds are thought to cause cancer, and pose a number of other health risks including nervous system damage, reproductive problems and immune system depression. Very small amounts of these compounds in drinking water may not produce noticeable tastes or smells, but can have serious health effects if ingested over many years.

MANGEMENT STRATEGIES PSOC #2 RESIDENTIAL ACTIVITIES

Household Hazardous Waste

It is recommended that the North Brookfield Water Department conduct education and outreach efforts to residents in the Horse Pond Surface Water Supply Protection Areas about Household Hazardous Waste, and remind residents about the Household Hazardous Waste Collection Day at the end of summer in North Brookfield.

It is recommended that the Water Department appoint a liaison to partner with the teachers and staff at the local schools to create academic curriculum plans on Household Hazardous Waste and the dangers of Household Hazardous Waste disposal in septic systems.

It is also recommended that the North Brookfield Water Department work with the Board of Health to update their website to include information on where to discard of Household Hazardous Waste items that are not accepted on the annual Household Hazardous Waste Collection Day. (See Resources Section to connect to information on Household Hazardous Waste and the Town of North Brookfield Household Hazardous Waste Day)

Landscape Care Products

It is recommended that the North Brookfield Water Department conduct education and outreach efforts to residents in the Horse Pond Surface Water Supply Protection Areas about appropriate landscaping practices and products to prevent contamination to Horse Pond and the Surface Water Supply Protection Areas. (See Resources Section to connect to information on landscape care products)

Fuel Oil Storage Tanks

It is recommended that the North Brookfield Water Department conduct education and outreach efforts to residents in the Horse Pond Surface Water Supply Protection Areas about upgrading fuel oil systems to include proper containment and safety measures (under Chapter 453 of the Acts of 2008), inspecting fuel lines, spill containment and general groundwater contamination in the Horse Pond Surface Water Supply Protection Areas. (See Resources Section to connect to information on Chapter 453 of the Acts of 2008 and information on fuel oil storage tanks)

PSOC #3 ONSITE SEWAGE DISPOSAL SYSTEMS

A nationwide survey by the EPA and Cornell University found that the most common water-quality problem in rural water supplies is bacterial contamination from septic-tank effluent. The contamination of drinking water by septic effluent is one of the foremost water quality issues in the United States. Improperly functioning or failing septic systems can also contribute viruses, nitrates, and numerous chemical compounds to a water supply.

On-site sewage disposal systems (septic systems) can fail over time and are often unable to treat many modern day cleaners and chemicals which, when flushed down the drain or toilet, often impair or kill the bacteria needed to make the system work. The end results are improper treatment of wastewater-if not outright failure of the system. Proper maintenance and education are the easiest and least expensive methods to prevent costly problems in the future and prevent contamination of drinking water supplies as well as other water resources such as rivers, streams and wetlands.

Many communities have implemented septic system inspection and outreach programs through their water department or board of health to reduce the threat an improperly functioning septic system poses to drinking water sources. Such programs involve voluntary participation by the landowner. To encourage participation, it is important to establish at the outset that the goal of the program is not to penalize or fine property owners, but to work cooperatively to ensure the protection of the water supply.

MANAGEMENT STRATEGIES PSOC #3 ONSITE SEWAGE DISPOSAL SYSTEMS

Septic System Inspection Program

It is recommended that the North Brookfield Water Department or Board of Health contact all landowners within the Surface Water Supply Protection Areas that have septic systems to request their voluntary participation in a quarterly (or some other regular interval) inspection program. The Board of Health should waive regular inspection fees and, upon the first inspection, the inspector should meet with the property owner to map the location of the septic system for future inspections. A visual inspection for odor, seepage or lush green growth should be performed. If any of the symptoms of an improperly functioning septic system are present, the inspector should recommend that the homeowner consult with a licensed wastewater disposal engineer for a more in depth evaluation of the problem.

Because the program is purely voluntary, some property owners may opt not to participate fearing financial repercussions. It is recommended that town officials contact local septic system pumping contractors to request that they notify the Board of Health if any of the above described symptoms are observed so that the town may assist the homeowners in expediting the repair process. (See Resources Section to connect to information on septic system inspection programs)

Homeowners Assistance in Procuring Financial Aid for Septic System Repair

It is recommended that the Board of Health provide assistance to property owners in contacting appropriate sources of financial assistance for septic system repair. The Commonwealth of

Massachusetts has developed programs to assist homeowners with wastewater management problems. (See Resources Section to connect to information on financial aid for septic system repair)

Partnership with Town Boards, Committees and Schools to Conduct Public Education and Outreach on Septic Systems

It is recommended that the North Brookfield Water Department continue to work with the Board of Health, Board of Selectmen and other boards and committees to inform septic system owners of how a septic system works, how to care for it, what not to put in it, and the connection between septic systems and drinking water.

It is also recommended that public education and outreach about septic systems continue to be conducted at regular intervals throughout the year. A mailing containing information about the Town's voluntary septic system program should be included with the current educational flier sent to homeowners with the water bills. Information should also be made available at public buildings and storefronts around town. The National Small Flows Clearinghouse produces a video called *Your Septic System: A Reference Guide for Homeowners* that can be shown on North Brookfield's local cable access television. The video can also be made available at the public library. Literature should also be provided to homeowners during inspections. (See Resources Section to connect to information on The National Small Flows Clearinghouse)

It is recommended that the Water Department appoint a liaison to partner with the teachers and staff at the local schools to create academic curriculum plans on septic systems and the dangers of Household Hazardous Waste disposal in septic systems.

PSOC #4 AGRICULTURE

Potential threats to the quality of water associated with agriculture include animal manure, pesticides, fertilizers, herbicides, abandoned vehicles and waste oil/fluids used by farm equipment. The effects of agricultural pollutants on specific waters vary and may not always be fully assessed. However, we know that these pollutants can have harmful effects on drinking water supplies, fisheries, and wildlife.

According to the EPA, the most prevalent agricultural problem is high levels of nitrate from manure and fertilizer. Ammonium, a major component of fertilizer and manure, is very soluble in water and increased concentrations of nitrate that result from the nitrification of ammonium are commonly present in both ground water and surface water associated with agricultural lands. Nitrate is a colorless, odorless and tasteless compound that has been associated with methemoglobinemia, also known as blue baby syndrome, a condition found in infants under six months that can result in brain damage and death. (See Resources Section to connect to information on fertilizers and drinking water sources)

MANAGEMENT STRATEGIES PSOC #4 AGRICULTURE

It is recommended that the North Brookfield Water Department continue to foster relationships with owners of agricultural land located within the Surface Water Supply Protection Areas to help reduce potential source water contamination. The goal is to create long-lasting relationships with owners of agricultural land to be able to work as partners to alleviate potentially harmful agricultural practices. Over the past few years, the North Brookfield Water Department was successful at working with the owner of an agricultural operation in relocating horse grazing areas that were moved to be within one-hundred feet of the Horse Pond Reservoir, and cow grazing areas that were moved to within one-hundred feet of a major tributary of the Horse Pond Reservoir.

It is recommended that the Town of North Brookfield enforce its abandoned vehicle bylaw within the Surface Water Supply Protection District and require owners of unlicensed and unused vehicles to dispose of them properly. This is imperative to ensure that hazardous fluids such as oil, gas, and hydraulics are not leaching into the groundwater. Landowners should also be informed of local waste oil and automotive fluid collection centers. (See Resources Section to connect to information on the Town of North Brookfield's Zoning Bylaws)

It is also recommended, to the extent possible, that the North Brookfield Water Department work with boards, committees and agricultural landowners to ensure that all new manure pits and new animal feed lots be designed to restrict infiltration and run-off to groundwater or surface water.

It is recommended that the North Brookfield Water Department send educational material to all agricultural landowners on proper pesticide and fertilizer application, storage and storage design.

The USDA has various funding sources for government agencies, non-government organizations and agricultural facilities to assist in meeting environmental regulations. One program in particular, the Environmental Quality Incentives Program (EQIP), is a voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years in length. These contracts provide financial assistance to help plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland. In addition, a purpose of EQIP is to help producers meet Federal, State, Tribal and local environmental regulations. (See Resources Section to connect to information on the USDA Environmental Quality Incentives Program)

PSOC #5 WILDLIFE

Beavers and muskrats are often associated with concerns about the quality of drinking water. Water exiting a beaver/muskrat pond can be high in natural organic matter (NOM) and other particulates that require additional water treatment, which results in higher treatment costs and higher health risks. Beavers or muskrats near public water supply sources also pose a threat to the protection of public health because both animals have commonly been identified as carriers of *Giardia Lamblia* and *Cryptosporidium*, pathogens that pose an unacceptable risk to drinking water. (See Resources Section to connect to information on beavers and muskrats)

Canadian geese are another wildlife concern in reservoir management. Geese return to the same nest site year after year and are tolerant of human disturbance. Goose fecal matter is a potential source of bacteria in the Horse Pond Surface Water Supply Protection Areas. Furthermore, goose droppings can become a source of phosphorus and nitrogen, which can stimulate algal blooms and cause ecological imbalance in the reservoir ecosystem.

MANAGEMENT STRATEGIES PSOC #5 WILDLIFE

Beaver Management

The North Brookfield Water Department, Board of Health and residents living along Horse Pond tributaries continue to work jointly in ensuring that any beaver activity is halted as soon as it is noticed. The Water Department inspects all potential beaver locations once a month and is highly satisfied with the chain of action where a resident or employee of the Water Department notices activity, the Board of Health is notified and a trapping permit is issued. The Water Department notes that beaver activity in the watershed greatly affects the quality of the raw water coming into the treatment plant and considers any beaver activity a high priority in its weekly survey of the watershed. It is recommended that the Water Department continue these highly effective beaver management strategies.

Goose Management

The North Brookfield Water Department has adopted and plans to continue using the strategies and techniques developed by GeesePeace to reduce the hazards caused by wild goose populations. GeesePeace is a non-profit organization dedicated to building better communities through innovative, effective and humane solutions to wildlife conflicts. The specific strategy used by GeesePeace is to locate the goose nests, monitor activity to correctly time the site visit, go to the nest, check for transpiration, and if there is none, use corn oil to cover the egg so a chick cannot hatch. This process, called egg addling, is used to reduce the wild goose population is endorsed by the Massachusetts Society for the Prevention of Cruelty to Animals. Federal and state permits are obtained prior to all addling activities. (See Resources Section to connect to information on GeesePeace)

In addition to egg addling, the North Brookfield Water Department has reduced cutting near the banks of the Reservoir as a goose control measure. The Water Department began this technique after researching a study showing that geese prefer nesting in water bodies with at least 50 feet of cleared area so that they are able to assess and monitor predator activity. It is recommended that the Water Department continue these highly effective goose management strategies

PSOC #6 TRANSPORTATION CORRIDORS

Municipal Activities (*Impervious Surfaces map page 34*)

There are a few residential roadways within the Surface Water Supply Protection Areas of Horse Pond. During storm events, impervious roadway surfaces quickly transport stormwater laden with de-icing materials, petroleum based chemicals and other contaminants from roads and lawns to catch basins or directly to wetlands, streams, rivers and other water bodies. Common contaminants in stormwater can originate from automotive leaks, automobile maintenance and washing, or accidental spills, but the most prevalent contaminate in New England stormwater is de-icing material.

The amount of snowfall in Massachusetts and the necessity of overland travel require the use of plows and de-icing materials to keep roadways safe in the winter. Salt, or sodium chloride, is the most commonly used de-icing material. In general, the purpose of salt is to: reduce adherence of snow to the pavement; keep the snow in a "mealy" condition and thereby permit nearly full removal by plowing; and prevent the formation of ice or snow ice (hard pack).

According to the National Research Council (NRC), Massachusetts, New Hampshire, and New York report the highest annual road-salt and deicing material loadings. High levels of salt and deicing materials deposited in the Horse Pond Surface Water Supply Protection Areas could impact drinking water and create significant adverse health, environmental, and infrastructure problems. (See Resources Section to connect to information on the National Research Council)

Utilities

Transformers are essential for high voltage power transmission, which makes long distance transmission economically practical. Transformer oil or insulating oil is usually a highly-refined mineral oil dielectric fluid (MODF) that is stable at high temperatures and has excellent electrical insulating properties. MODF can be toxic to drinking water and may also contain polychlorinated biphenyls (PCBs). (See Resources Section to connect to information on the MODF and PCBs)

PCBs are highly persistent, bioaccumulative and toxic chemicals, which were once commonly used as dielectric fluids in electrical equipment. A federal ban on the manufacturing of PCBs was passed in 1979. The Toxic Substances Control Act allows the continuing use of certain PCB bearing equipment, but the disposal of the oils from this equipment is strictly regulated. When transformer manufacturers switched from PCB to non-PCB fluids, the new transformers were often filled using the same equipment that had been used for PCBs. The result was that some newer transformers were contaminated with various levels of PCBs.

Utility Right-of-Way maintenance, if not properly conducted can also be a source of contamination. Sensitive areas should be mapped and no-spray and limited-spray areas recognized by both the utility and the Town of North Brookfield.

MANAGEMENT STRATEGIES PSOC #6 TRANSPORTATION CORRIDORS

Municipal Activities

It is recommended that the North Brookfield Water Department continue to work with the Highway Department to ensure catch basins and stormwater controls are inspected, maintained, and cleaned on a regular schedule. Also, the North Brookfield Water Department should continue to work with the Highway Department to ensure that regular street sweeping occurs to reduce the amount of potential contaminants in stormwater runoff in the Surface Water Supply Protection Areas.

It is also recommended that the North Brookfield Water Department partner with the Highway Department to use Global Positioning Satellite equipment to map stormwater controls and catch basins so they may submit detailed information to the Town for continued investments in catch basin cleaning equipment, Geographical Information System (GIS) and Global Positioning System (GPS) equipment, and stormwater management manpower to enable them to continually improve the management of impervious surfaces and stormwater systems.

It is recommended that the North Brookfield Water Department continue to work with the Highway Department to implement Best Management Practices, personnel training and advanced technologies, such as plow truck GIS system spreaders, pre-wetting, and pavement temperature monitoring to reduce salt and deicing applications to roadways in the Town of North Brookfield Surface Water Supply Protection Areas. (See Resources Section to connect to information on salt and snow removal Best Management Practices)

Utilities

It is recommended that the North Brookfield Water Department contact the electric utility provider to determine if any of the transformers contain Polychlorinated biphenyls (PCBs) or other potential water source contaminants. And, if necessary, meet with the utility provider to identify transformers with potential water source contaminants located in the Surface Water Supply Protection Areas and replace transformer oil with eco-friendly bio-based transformer oil.

It is also recommended that the North Brookfield Water Department partner with the electric utility supplier, Highway Department and the North Brookfield Emergency Management Agency to use Global Positioning Satellite equipment to map and then create an electrical transformer monitoring program for potential leaks and management of trees, limbs and other transformer hazards. The team should identify a central location for a storing a transformer spill kit.

It is recommended that the North Brookfield Water Department supply the electric utility supplier updated and accurate maps of the Surface Water Supply Protection Areas.

PSOC #7 PUBLIC ACCESS/RECREATION

There are no existing official recreational trails around the Horse Pond Reservoir, though the local residents do sometimes ride horses and hike near the reservoir. Fishing is allowed. Boating, swimming and camping are not allowed. Dog walking is allowed around the reservoir.

Litter tossed from vehicles passing on Rufus Putnam Road is a minor problem in the watershed.

The Horse Pond Reservoir Dam Rehabilitation Project was completed in the spring of 2012. Funding was acquired through a USDA Rural Development loan and grant program. Construction began in the summer of 2011. The downstream banking of the dam was buttressed using large cement blocks to strengthen the dam and prevent movement of the soil. Drainage was installed along the toe of the dam collect the inevitable leakage that occurs in earthen dams. The low level gate valve was replaced. The spillway was removed and rebuilt in the spring of 2012 with a new walkway and weir board. A 97 page PowerPoint presentation of the process is available on the North Brookfield Water Department Website. Other pictures are available on the North Brookfield Water Department Facebook page. (See Resources Section to connect to information the Horse Pond Reservoir Dam Rehabilitation Project)

MANAGEMENT STRATEGIES PSOC #7 PUBLIC ACCESS/RECREATION

The North Brookfield Water Department has erected gates at both ends of the reservoir to prevent motor vehicles traffic at the reservoir. The banks of the Zone A streams and the Reservoir are inspected seasonally for evidence of recreational vehicle damage. No evidence has been discovered of damage, though the Water Department would investigate the trespass and continue to conduct educational outreach to landowners in the event that such damage was discovered.

Weekly inspections are conducted at the reservoir and surrounding Surface Water Supply Protection Areas. Litter and debris is quickly removed from the transportation corridors along the reservoir and Surface Water Supply Protection Areas. Land use violations (illegal tree/brush cutting, soil removal, etc.) are immediately reported to the pertinent town department.

Large Drinking Water Supply Area protection signs have been installed along the edges of the watershed in both North Brookfield and New Braintree. Signage is inspected during weekly Surface Water Supply Protection Areas site visits.

Horse Pond Reservoir fishing permits, obtainable at the North Brookfield Water Department, are available to residents of North Brookfield and non-residents. The permit system allows the Water Department the opportunity to maintain control of the number of fishermen on the reservoir and the right to invalidate a permit if a violation of the rules were to occur.

It is recommended that the Water Department continue these highly effective public access and recreation management strategies and add a dog pickup bag dispenser at the reservoir main entrance area.

ACTION PLAN

Land Development

ACTION	WHO	WHEN
Develop a Water Supply Protection District Bylaw	Water Department, Planning Board, Board of Health, Conservation Commission, Board of Selectmen	2104
Develop a Ten-Year Land Acquisition Plan	Water Department, Planning Board, Board of Health, Conservation Commission, Board of Selectmen	2014-2015
Development Proposal Review	Water Department	Ongoing

Residential Activities

ACTION	WHO	WHEN
Household Hazardous Waste Programs	Water Department, Board of Health School Department	2104
Landscape Care Product Education and Outreach	Water Department	2014
Fuel Oil Storage Tank Education and Outreach	Water Department	2014

Onsite Sewage Disposal Systems

ACTION	WHO	WHEN
Septic System Inspection Program	Board of Health	2104-2015
Homeowner Financial Aid for Septic System Repair	Water Department, Board of Health	2014
Partnership for Education and Outreach	Water Department, Board of Health School Department, Local Cable	2014-2015

Agriculture

ACTION	WHO	WHEN
Continue to Foster Relationships with Farmers	Water Department	Ongoing
Enforce Abandoned Vehicle Bylaw	Building Department	2014
Outreach and Educational Programs	Water Department	2014-2015

Wildlife

ACTION	WHO	WHEN
Beaver Management Program	Water Department	Ongoing
Goose Management Program	Water Department	Ongoing

Transportation Corridors

ACTION	WHO	WHEN
Stormwater and Deicing Programs	Water Department, Highway Department	2015
Utility Transformer and Map Program	Water Department, Highway, NBEMA	2015

Public Access/Recreation

ACTION	WHO	WHEN
Watershed Weekly Inspections	Water Department	Ongoing
Fishing Permit System	Water Department	Ongoing
Dog Pickup Bag Station	Water Department	2014

EDUCATION AND OUTREACH

Public education and outreach are extremely important actions a community must take to protect their water supply. Source water protection information needs to be passed on to the public so they can engage in the process and apply best management practices for protecting North Brookfield's drinking water supply.

The North Brookfield Water Department continues to conduct education and outreach to the Horse Pond Reservoir and Surface Water Supply Protection Area consumers and abutters through individual site visits, weekly inspections, signage, letters, phone contact, electronic media and the annual Consumer Confidence Report (CCR).

In addition to the numerous education and outreach efforts that North Brookfield Water Department personnel have utilized in the past, the department has recently:

- Established a relationship with boards and committees in the Town of New Braintree;
- Sent a letter to New Braintree residents in the Surface Water Supply Protection Areas;
- Updated the Water Department website to include new projects, documents, agendas; minutes, billing information, links and pictures; (See Resources Section to connect to information on the North Brookfield Water Department website)
- Created a Facebook page; (See Resources Section to connect to information on the North Brookfield Water Department Facebook page)
- Spent numerous hours in the field conducting leak detection efforts for water conservation and infrastructure improvement;
- Received permission and posted signage in the Town of New Braintree;
- Utilized Global Positioning Satellite (GPS) equipment to identify and map key features within the Surface Water Supply Protection Areas; and
- Began the process of developing of a Geographic Information System (GIS) to be able to visualize, question, analyze, interpret, and understand data to reveal important relationships, patterns, and trends within the Surface Water Supply Protection Areas.

It is recommended that the North Brookfield Water Department continue to build these important community relationships and also appoint a liaison to work with staff at the library and administrators of the approximately 350 students at the elementary school and approximately 225 students at the North Brookfield High School to help create curriculum plans focused on water conservation and watershed protection efforts.

EMERGENCY CONTACT/ EMERGENCY RESPONSE

Stephen Jones, *Water Superintendent*

Andrew Lalashius, *Plant Operator*

Shiela LeBlanc, *Administrative Assistant*

In case of an emergency, call the office phone number. If there is no answer, a recording will provide emergency numbers to call to receive a response from the North Brookfield Water Department.

Water Department Phone: (508) 867-0207

Water Department Fax: (508) 867-0224

Water Department Email: nbwd@verizon.net

Board of Selectmen: (508) 867-0200

Board of Health: (508) 867-0201

Police Department (non-emergency): (508) 867-0206

Police Department (emergency): 911

Water Supply Emergency

In the event of a water supply emergency, alternative supplies need to be established in order to provide the community with adequate water. The alternative supply sources that were evaluated include emergency interconnections, bottled water and civil defense water provisions.

The Town has 1.5 million gallon water storage tank and in the case of an emergency could supply customers for approximately three days under current delivery conditions. In the event of an emergency the Water Department will use media contacts to notify the public that water conservation is a priority and notify the water users that the Water Restriction Bylaw is in full effect.

The North Brookfield Water Department has an agreement and interconnection with the Town of East Brookfield to supply water in the case of an emergency. The Water Department tests the water connections between North Brookfield and East Brookfield bi-annually. However, if the emergency were extended, additional measures would be required to meet system demands. These measures include either purchasing bottled water and distributing to consumers accordingly or contacting the civil defense for the utilization of water wagons. Poland Springs, a local water supplier will be contacted for additional resources if needed.

The North Brookfield Water Department could also petition DEP for an Emergency Declaration allowing the use of Doane Pond as a drinking water supply.

Massachusetts Water/Wastewater Agency Response Network (WARN)

The North Brookfield Water Department is a member of the Massachusetts Water/Wastewater Agency Response Network (WARN), which allows public water and wastewater systems in Massachusetts to receive rapid mutual aid and assistance from other public systems in Massachusetts to restore services damaged by natural or man-made incidents. Public utilities sign the MAWARN standard agreement, which then allows them to share resources with any other public system in Massachusetts that has also signed the standard agreement. (See Resources Section to connect to information on the Massachusetts WARN)

Municipal

The North Brookfield Water Superintendent and Plant Operator take part in education and training in emergency response annually and have frequent contact with the North Brookfield Highway Department, Police and Fire Departments in the case of an emergency spill on Rufus Putnam Road or anywhere within the Surface Water Supply Protection Areas.

The North Brookfield Water Department has access to the North Brookfield Emergency Management Agency (NBEMA) to assist in any emergency in the Town of North Brookfield. (See Resources Section to connect to information on the Town of North Brookfield NBEMA)

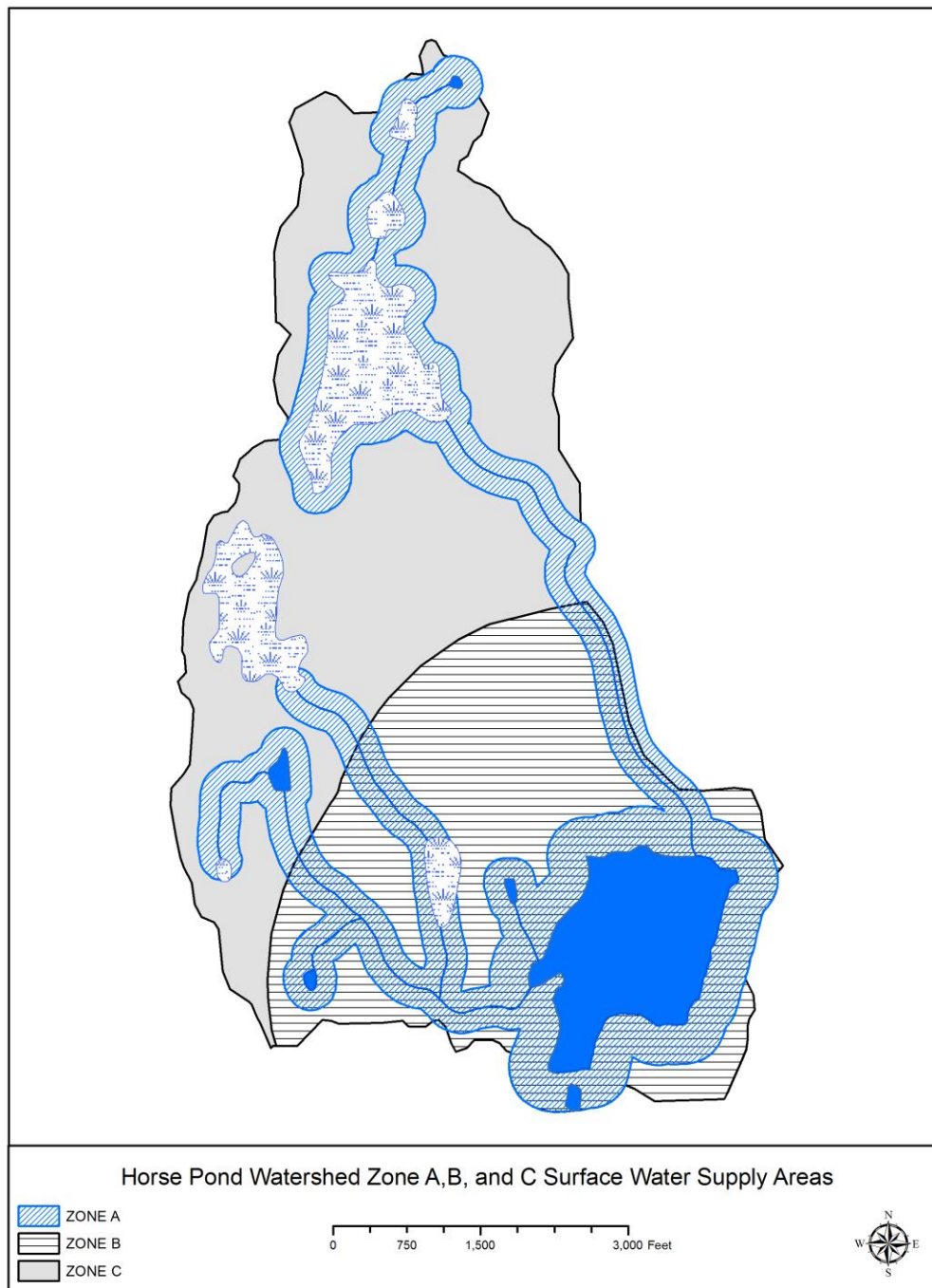
A letter was sent to the New Braintree Board of Selectmen, Conservation Commission and Board of Health requesting that the North Brookfield Water Department be contacted in the case of a hazardous spill or potential contamination event. It is recommended that the North Brookfield Water Department continues building relationships with New Braintree boards and committees for emergency and non-emergency protection efforts.

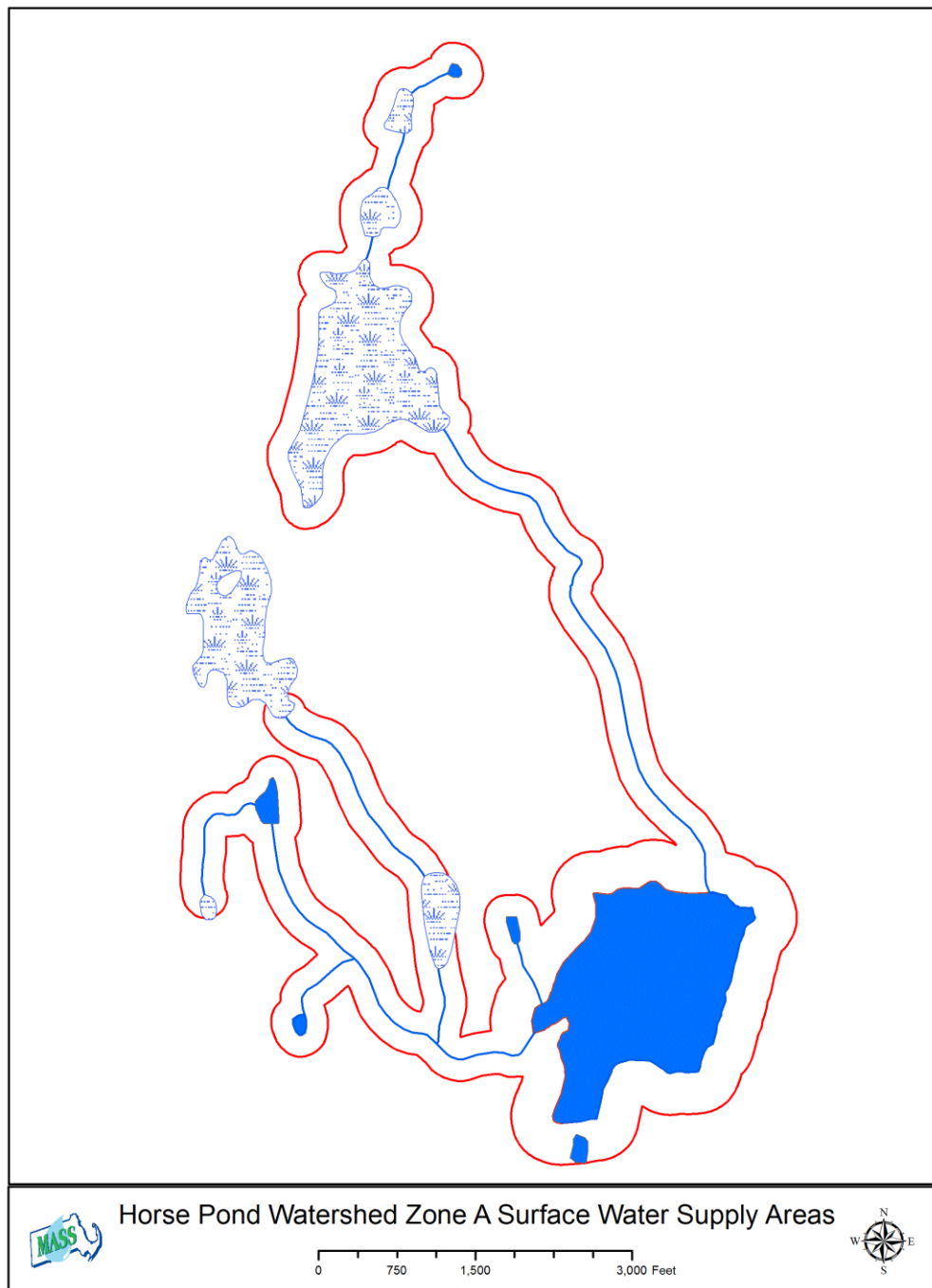
Emergency Response Plan

Public Water Systems are required to prepare and keep in an easily accessible place an Emergency Response Plan (ERP) prepared in accordance with Massachusetts Drinking Water Regulations 310 CMR 22.04 and the Massachusetts Drinking Water Guidelines and Policies for Public Water Supplies, Chapter 12-Emergency Response Planning Requirements Guidance including Appendix O-Handbook for Water Supply Emergencies.

The North Brookfield Water Department Emergency Response Plan was created in 2009, has been updated annually and is located on the 4th shelf from the floor in the lunchroom of the Town of North Brookfield Water Treatment Plant.

(See Resources Section for information on the North Brookfield Water Department Emergency Response Plan)

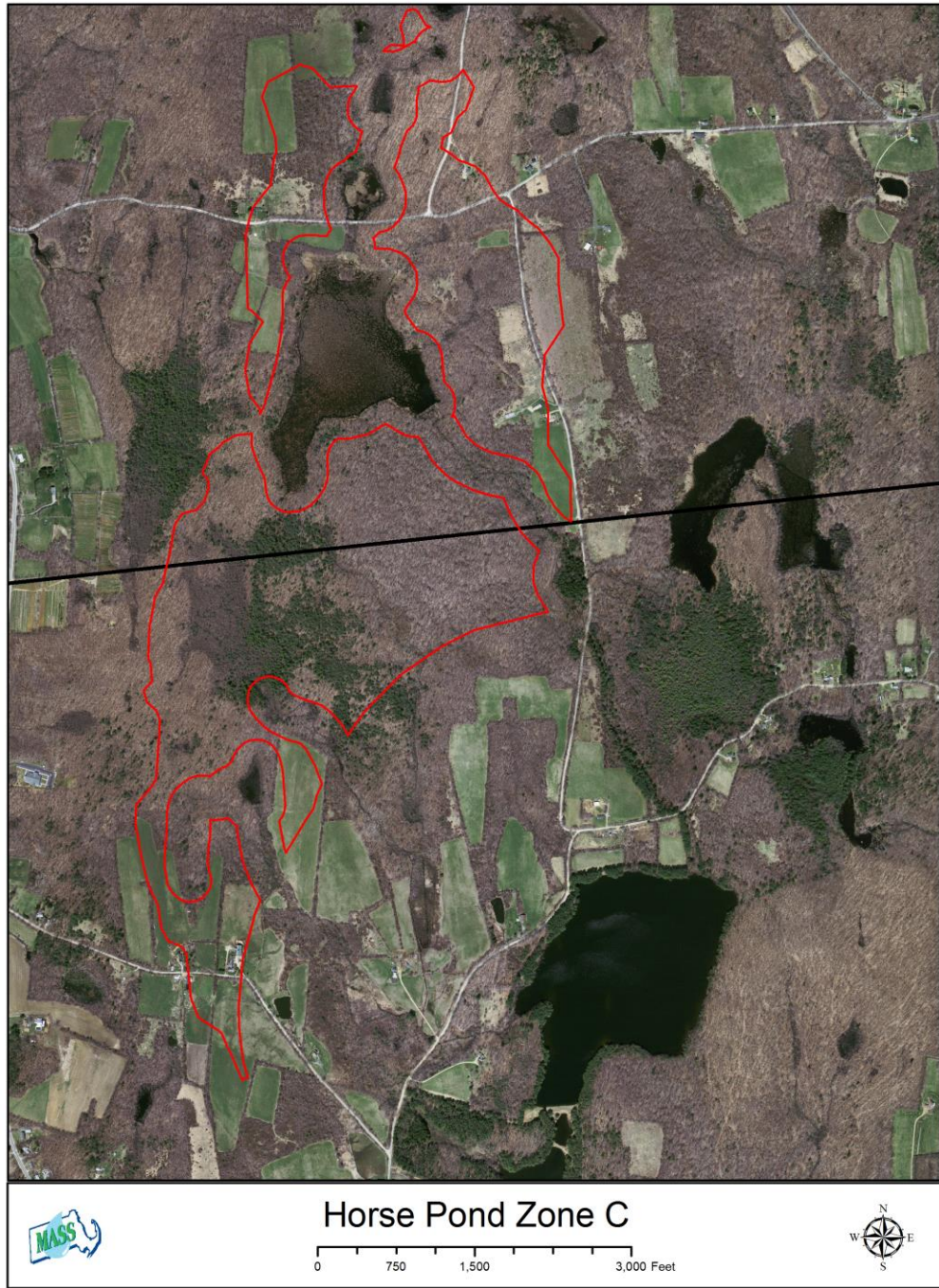


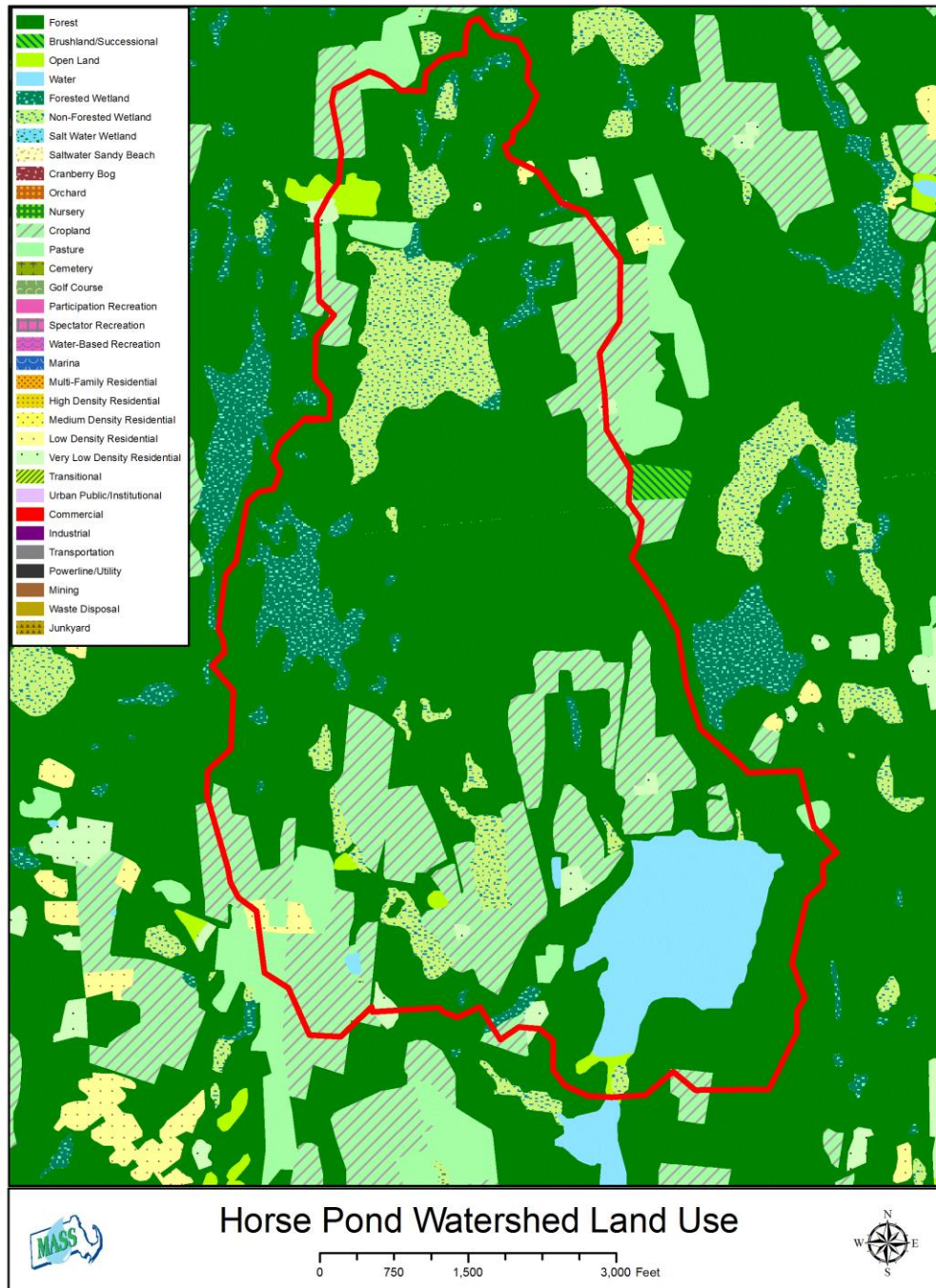


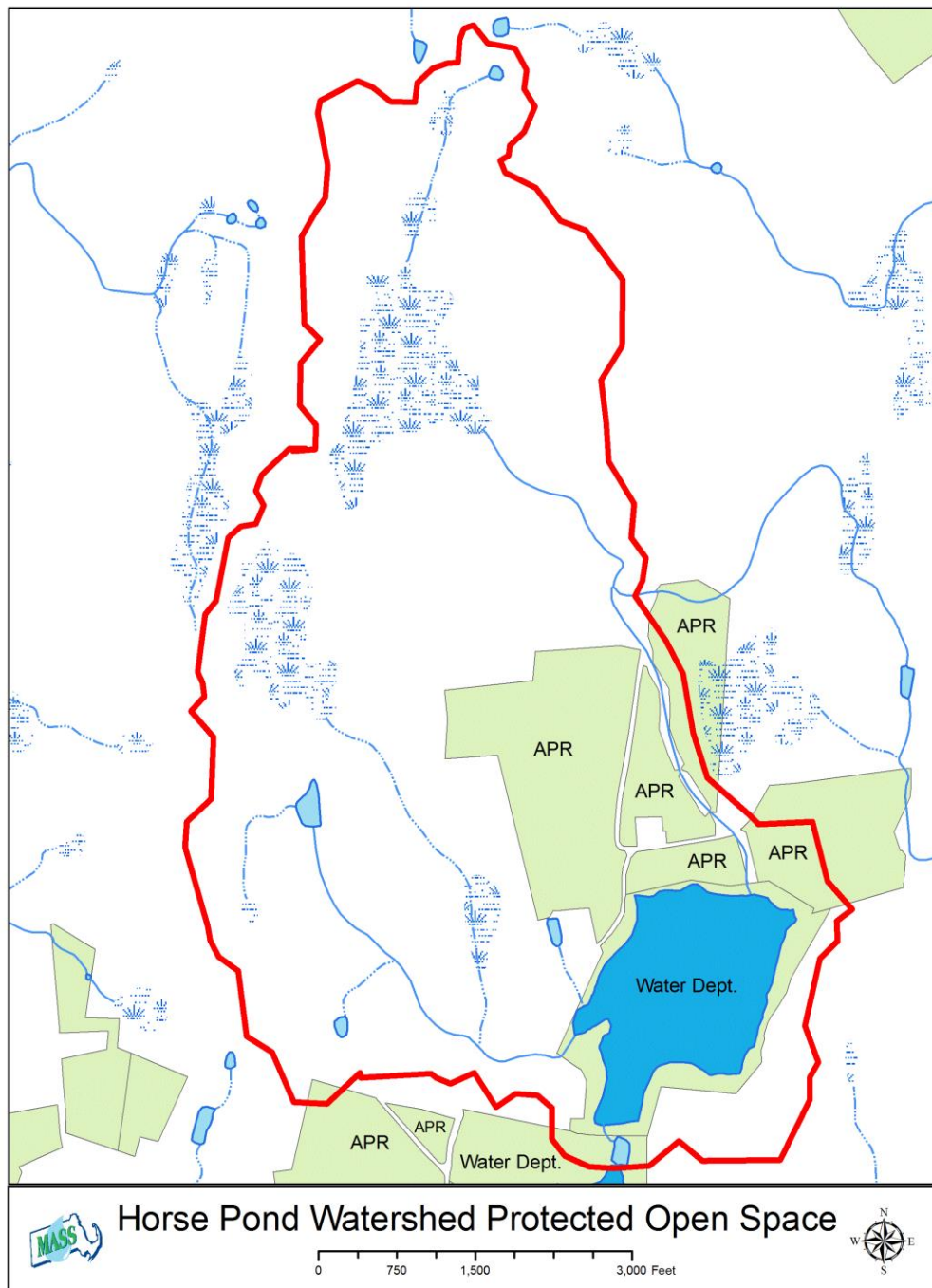


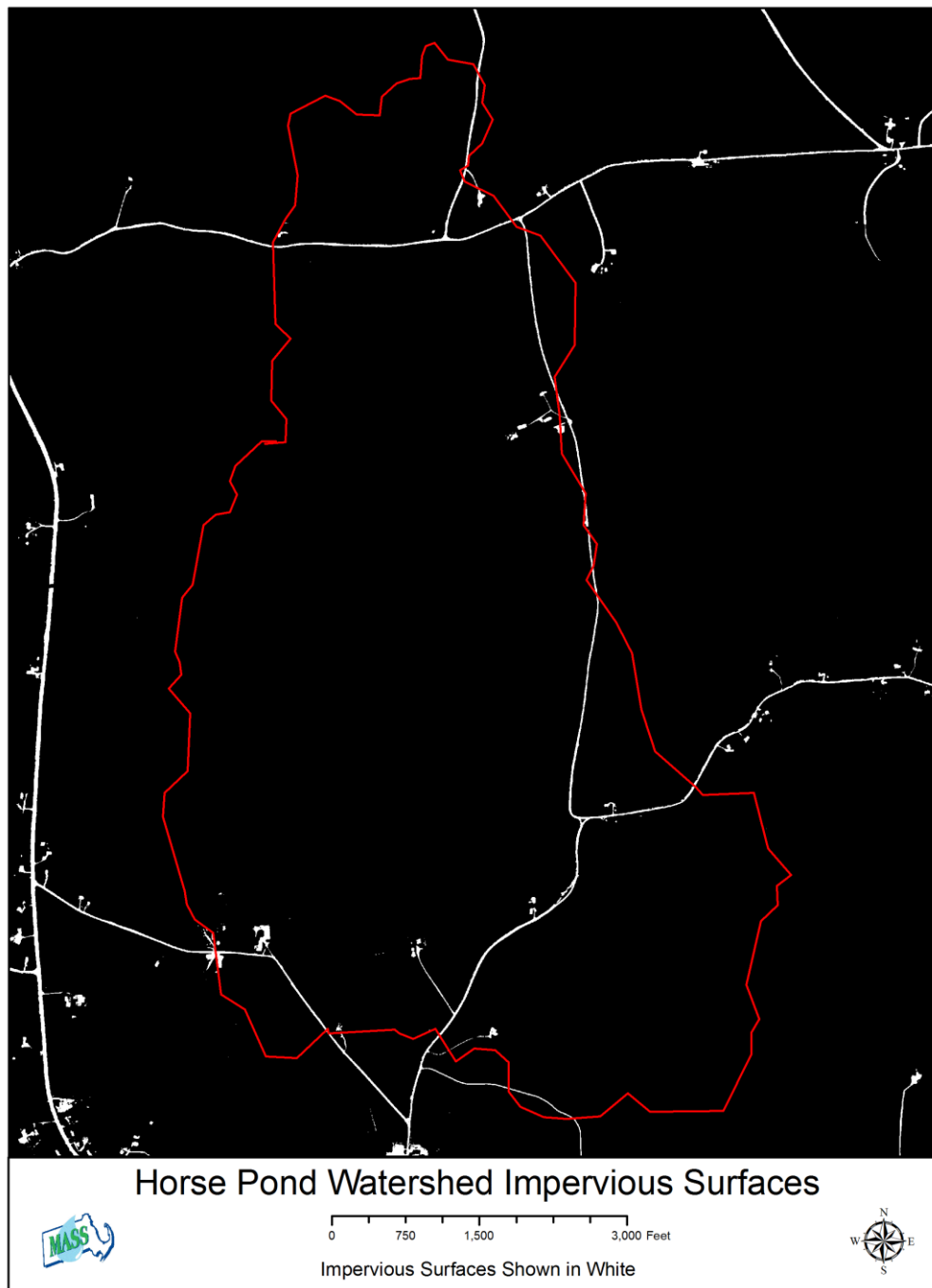












RESOURCES

The Mass Rural Water Association Website <http://www.massrwa.org/>

The United States Department of Agriculture Farm Service Agency Source Water Protection Program <http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=swp>

The Official Website of the Massachusetts Department of Environmental Protection <http://www.mass.gov/dep/>

The United States Environmental Protection Agency Ground Water and Drinking Water Website <http://water.epa.gov/drink/index.cfm>

The United States Environmental Protection Agency Safe Drinking Water Act (SDWA) Website <http://water.epa.gov/lawsregs/rulesregs/sdwa/>

Source Water Assessment Program (SWAP) Report for North Brookfield Water Department, July 26, 2002, Prepared by the Massachusetts Department of Environmental Protection Bureau of Resource Protection, Drinking Water Program
<http://www.mass.gov/eea/docs/dep/water/drinking/swap/cero/2212000.pdf>

Sanitary Survey Report for North Brookfield Water Department, May 29, 2012, Prepared by the Massachusetts Department of Environmental Protection Bureau of Resource Protection, Drinking Water Program

The Massachusetts Department of Environmental Protection Water, Wastewater and Wetlands Regulations and Standards <http://www.mass.gov/dep/water/laws/regulati.htm>

The Environmental Protection Agency Contaminate Candidate List
<http://water.epa.gov/scitech/drinkingwater/dws/ccl/index.cfm>

310 CMR 22.00 Massachusetts Drinking Water Regulations
<http://www.mass.gov/eea/agencies/massdep/water/regulations/310-cmr-22-00-massachusetts-drinking-water-regulations.html>

Town of North Brookfield, Massachusetts official website <http://www.northbrookfield.net/>

The United States Environmental Protection Agency Household Hazardous Waste Website
<http://www.epa.gov/epawaste/conservation/materials/hhw.htm>

The United States Environmental Protection Agency At Home and in the Garden Website
<http://www.epa.gov/epahome/home.htm>

The United States Environmental Protection Agency Tanks and Containment Website
<http://www.epa.gov/agriculture/ttan.html>

A Homeowners Guide to Septic Systems
http://wri.eas.cornell.edu/EPA_HomeownersGuide_SepticSmart.pdf

Massachusetts Department of Energy and Environmental Affairs Septic System Inspection Program
<http://www.mass.gov/eea/agencies/massdep/water/wastewater/septic-system-inspections.html>

The United States Environmental Protection Agency Septic System Funding Website
<http://water.epa.gov/infrastructure/septic/funding.cfm>

Massachusetts Department of Energy and Environmental Affairs Title 5 and Septic System Financing Website
<http://www.mass.gov/eea/agencies/massdep/water/wastewater/title-5-and-septic-system-faqs-financing.html>

National Small Flows Clearinghouse Website <http://www.nesc.wvu.edu/wastewater.cfm>

Town of North Brookfield, Massachusetts Town Bylaws
<http://www.northbrookfield.net/bylaws.htm>

United States Department of Agriculture Environmental Quality Incentives Program Website
<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/>

The Massachusetts Department of Environmental Protection Standard Operating Procedure (SOP) - Drinking Water Program Determining a Threat to Public Water Supplies Related to the Presence of Beaver or Muskrat
<http://www.mass.gov/eea/docs/dep/water/beaverws.pdf>

The official GeesePeace Website <http://www.geesepeace.com/>

National Research Council Website <http://www.nationalacademies.org/nrc/>

The United States Environmental Protection Agency PCB Website
<http://www.epa.gov/epawaste/hazard/tsd/pcbs/index.htm>

University of New Hampshire Green SnowPro Training and Certification Website
<http://t2.unh.edu/green-snowpro-training-and-certification>

The Horse Pond Reservoir Dam Rehabilitation Project PowerPoint Presentation
<http://www.northbrookfield.net/documents/WaterDept/HORSE%20POND%20DAM%20REPAIR%20PROJECT%20FINAL.pdf>

The Official Facebook Page of the Town of North Brookfield Water Department
<https://www.facebook.com/NBWater>

The Official Website of the Massachusetts Office of Geographical Information (MassGIS)
<http://www.mass.gov/mgis/massgis.htm>

The Massachusetts Water/Wastewater Agency Response Network (WARN) Website
<http://www.mawarn.org/>

The Town of North Brookfield Emergency Management Agency Website
<http://www.northbrookfield.net/nbema.htm>

The North Brookfield Water Department Emergency Response Plan, PWS ID: 2212000,
Developed in 2009 and updated annually. Located on the 4th shelf in the lunchroom of the Town
of North Brookfield Water Treatment Plant