

Comprehensive Environmental Inc.

Study of Urban Non-Point Source Pollution Witches Brook North Subwatershed



PENNICHUCK WATER WORKS SUMMER 2002



**Comprehensive
Environmental Inc.**
21 Depot Street
Merrimack, NH 03054
(603) 424-8444

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1.0 PROJECT DESCRIPTION

As part of a follow-on project to a comprehensive watershed management plan for the Pennichuck chain pond system, Comprehensive Environmental Inc. (CEI) assisted Pennichuck Water Works in a detailed evaluation of potential threats to water quality in one of the subwatersheds. Pennichuck Water Works and the New Hampshire Department of Environmental Services (NHDES) jointly funded this project. Also included in this project were evaluations of measures to minimize water quality threats. Recommendations have been presented in the report in a manner such that logical cost-effective implementation can occur.

From September to December 2001, CEI conducted a detailed review of an area of the Pennichuck watershed. This area is a 1,400-acre subwatershed known as the Witches Brook North (WBN) Subwatershed as identified in a 1998 *Watershed Management Report* (Comprehensive Environmental Inc., 1998). Field information was gathered during the fall.

The WBN subwatershed includes the towns of Milford, Amherst and a small portion of Hollis. The Western portion of the subwatershed consists of a low development density and large tracts of undeveloped land throughout Amherst and Milford. The Eastern portion of the subwatershed represents a slightly higher density of development with more commercial and industrial lands, located primarily in Amherst at the most downgradient end of the subwatershed.

The general character of land development throughout the WBN subwatershed does not appear to pose major threats to water quality currently. Previous studies of water quality throughout the Pennichuck watershed have found a greater degree of water quality concerns that correspond with a greater density of development and resulting imperviousness. As such, a blend of structural and non-structural remedial measures have been recommended for those subwatersheds to handle these existing water quality concerns. Water quality concerns throughout the WBN subwatershed are present, but they have not yet developed into problems due to its more recent development incorporating some stormwater management measures, and moreover due to the overall low density of land development found in the WBN subwatershed. Therefore, the WBN subwatershed presents a unique opportunity for communities to focus on the prevention of future water quality impacts while still being able to address minor water quality concerns through public education and sound land management practices.



2.0 DRAINAGE DESCRIPTIONS

The Witches Brook North Subwatershed contains some relatively steep terrain with many hills and valleys forming several small catchments. Runoff from these catchments forms a number of tributaries that combine and form one central tributary to Witches Brook. These smaller tributaries originate from two general areas, designated as areas A and B in this report (Figure 2-1). These two areas combine at different points along the subwatershed and travel through the easternmost portion of subwatershed. This downgradient area is designated as area C for purposes of this report. Area A refers to drainage consisting of the land around Stable Road and Area B refers to all drainage from the land around and downgradient of Ponemah Hill Road. Area C refers to drainage associated with land east of Route 122.

Generally, the western half of the subwatershed has low-density residential development throughout, with large tracts of undeveloped land. The eastern half of the subwatershed also has low-density residential development with some agricultural, livestock, and commercial lands along Route 122. Below is a more detailed description of each drainage area.

2.1 Area A –Stable Road Drainage Area

The general drainage direction for Area A (Figure 2-2) is from the northwest to the southeast, beginning with the land to the north of Stable Road in Milford. At the western portion of the drainage area, a small pond along Stable Road near Crestwood Lane (Figure 2-3) collects runoff from Crestwood Lane and the surrounding area. This pond marks the beginning of a perennial brook (referred to hereafter as “Stable Road Brook”) that travels southeast through forested lands and combines with Federal Hill Brook in Area B. Land north of and along the eastern portion of Stable Road (also named as Town Farm Road in Amherst) forms Peacock Brook (name provided by a local resident) that flows southeast through forested lands and enters Golden Pond (Figure 2-4) adjacent to Golden Pond Lane. Peacock Brook then drains Golden Pond under Golden Pond Lane and continues southeast through some forested and agricultural lands (Figure 2-5) to a small detention pond adjacent to Route 122 (Figure 2-6). Peacock Brook flows southeast under Rt. 122 to Area C.

Another smaller tributary, from the land between the Stable Road Brook and Peacock Brook catchment areas, flows southeast through predominantly forested lands (Figure 2-1) and combines with the



downstream portion of Federal Hill Brook near the intersection of Ponemah Hill Road and Route 122 in Area B.

Field investigation of drainage area A revealed the following areas of concern.

2.1.1 A-1 Potential Nutrient Input at Pond along Stable Road

The pond at the beginning of the Stable Road Brook in Milford receives runoff from Crestwood Lane, surrounding residential properties, and Stable Road. The pond appears to be in good condition and it functions as a good detention area for stormwater. However, the residential property abutting the pond has a well-manicured lawn (Figure 2-7) that may be a potential source of nutrients and pesticides in the event of over-fertilization or excess pesticide application. Although it does not appear to be an issue at the present time, its potential influence from these sources is high since the lawn constitutes a significant portion of the pond's edge.

Recommendations to address these concerns can be found in Section 3.1.1.

2.1.2 A-2 Potential Nutrient Input at Golden Pond

The location where Peacock Brook enters Golden Pond in Amherst appears to have been diverted under the driveway for the adjacent residential property. The brook enters Golden Pond at the southwest portion of the pond, which drains south under Golden Pond Lane. Golden Pond appears to be in good condition and serves as a detention area for runoff from the eastern portion of Stable Road and Town Farm Road. However, activities at the abutting residential property may pose a potential hazard to water quality since the yard extends to the edge of the pond. Currently, there is minimal risk other than that of erosion due to the undeveloped state of the yard (Figure 2-8). Due to the size and style of the home, there is a potential that this residential property will have a well-manicured lawn and elaborate landscaping in the future that may pose a potential risk to water quality in the form of over fertilization or pesticide application.

Recommendations to address these concerns can be found in Section 3.1.1.



2.1.3 A-3 Hoofed Animals and Land Degradation Along Peacock Brook

The outlet from Golden Pond is a continuation of Peacock Brook that travels through some forested and agricultural lands for approximately 1,500 feet before passing under Route 122 in Amherst. The majority of the land immediately adjacent to this portion of the brook is grassy with a forested area just before the brook's intersection with Route 122. Portions of the grassy area surrounding the brook serve as brook crossings (Figure 2-9) where hoofed animals have trampled vegetation and created barren patches of land. It is likely that these areas are also frequented by such animals for drinking. The activities of these animals contribute to erosion and sedimentation of the brook and are likely to serve as a direct source of bacteria.

These sites can be addressed through Pennichuck Agriculture Outreach and Visitation Program.

2.2 Area B –Ponemah Hill Road Drainage Area

The general drainage pattern for Area B flows from west to east (see Figure 2-10), beginning on top of Federal Hill in Milford. Runoff from Federal Hill creates a well-defined drainage channel downgradient of the access road to the Lookout Tower. Runoff from the steep surrounding slopes (Figure 2-11) contributes to this perennial brook as it crosses beneath Ponemah Hill Road. The perennial brook (referred to hereafter as "Federal Hill Brook") follows the local topography and receives additional runoff from the southeastern portion of Ponemah Hill Road between Federal Hill and Route 122. Federal Hill Brook combines with Stable Road Brook at the Milford/ Amherst line (Figure 2-1) northwest of Farmington Road. The resulting brook continues east, along which two small tributaries connect. Drainage from the steep section of Ponemah Hill Road west of Farmington Road in Amherst forms one small tributary. The unnamed tributary mentioned in Section 2.1 forms the other tributary located further to the east. Downstream of this junction and adjacent to Ponemah Hill Road is a small wetland detention area (Figure 2-12). The wetland detention area flows south under Ponemah Hill Road to a man-made pond (Figure 2-13) just before Route 122 and into Area C.

Field investigation of drainage area B revealed the following areas of concern.



2.2.1 B-1 Steep Grade along Ponemah Hill Road

Runoff from Ponemah Hill Road upgradient of Farmington Road in Amherst follows a steep grade and becomes concentrated in the paved and riprap swales alongside the roadway. These swales discharge to a common outlet via 2 catch basins to a forested area north of Ponemah Hill Road. The forested area is laden with sediment up to 1.5 feet in some areas, with numerous sediment deltas (Figure 2-14) spawning from the central flow path. At the time of this observation, the Town of Amherst Public Works was upgrading the drainage system to handle the heavy flows. According to workers on site, the roadway washed away last spring due to heavy runoff from the area that was measurable in inches of sheet flow.

Immediate improvements occurring at the time of observation included increasing the size of pipes connecting catch basins, repairing the roadway and riprap swale, and installing hay bales alongside the road and riprap swale. Apparently, pipe size within and between drainage structures limited the flow of water, forcing runoff to back up within and travel past catch basins. This led to the undermining of the road and the observed sediment deposits throughout the forested area downgradient. Public Works employees indicated that this section of Ponemah Hill Road has a history of runoff control problems due to the steep grade.

Recommendations to address these concerns can be found in Section 3.2.2.

2.2.2 B-2 Erosion around Rocky Hill Road and Route 122

Downgradient of the roundabout along Rocky Hill Road at the Amherst/Hollis line is a paved swale along the eastern side of Rocky Hill Road (Figure 2-15) that collects runoff from the roundabout roadway and surrounding land. Runoff travels through the paved swale, enters a 15" reinforced concrete pipe (RCP) beneath the road, and discharges to the steep forested area west of Rocky Hill Road. The outlet is nearly buried in the hillside due to sedimentation below and around the outlet (Figure 2-16). A sediment delta extends into the forested area; however, minimal impact was observed further downgradient at a small detention pond (Figure 2-17) adjacent to Rocky Hill Road. This pond drains to a meandering swale parallel to Rocky Hill Road and then beneath Route 122 near its intersection with Rocky Hill Road. A large sediment delta was observed just before the 18" culvert beneath Route 122 (Figure 2-18). The sedimentation is mainly due to erosion alongside the roadway, caused by runoff from Route 122 and the end of Rocky Hill Road. There is a small sediment delta at the outlet of this culvert to the east of Route



122 in drainage Area C. The drainage for this area follows a lowland area between a residential property and a forested area (Figure 2-19) to the wetlands adjacent to Rainbow Brook (described in Section 2.3). At the present time, there appeared to be no significant downstream impacts from the small culvert under Route 122. Left unchecked, these sediments have the potential to reach Rainbow Brook.

Recommendations to address these concerns can be found in Section 3.2.3

2.2.3 B-3 Potential Nutrient Input from Farmington Road

Farmington Road is a short, dead-end road off Ponemah Hill Road in Amherst, servicing a few residential properties. Runoff from this area contributes to the small tributary formed by the drainage mentioned in Section 2.2.1. Residential properties in this area have well-manicured lawns (Figure 2-20) and as such represent the typical hazard of nutrient and pesticide input to local runoff. The potential for contamination exists, although the level of risk associated with this area is relatively low due to the travel time of runoff to major tributaries and the well-vegetated conveyances that runoff must travel through.

Recommendations to address these concerns can be found in Section 3.1.1.

2.2.4 B-4 Agricultural Lands along Ponemah Hill Road

There are agricultural areas along Ponemah Hill Road where horses and cattle were observed. One is located adjacent to the hairpin turn in Ponemah Hill Road at the Amherst/ Milford line and the other two areas are located north and south of Ponemah Hill Road in Amherst near its intersection with Route 122. These areas represent the typical threat of bacteria associated with large animals located in close proximity to waterways. The likelihood of potential input varies from very low to very high according to location. However, the potential threat should be addressed to all such agricultural lands since similar land use practices exist throughout.

Recommendations to address these concerns can be found in Section 3.2.1.

2.2.5 B-5 Man-Made Pond Near Intersection of Ponemah Hill Road and Route 122

There is a man-made pond associated with the aforementioned agricultural lands southwest of the intersection of Ponemah Hill Road and



Route 122 in Amherst (Figure 2-21). Although the pond serves as a detention area for the brook receiving Federal Hill and Stable Road Brooks, the lawn surrounding the pond poses a potential threat to water quality due to the potential for direct input of nutrients and pesticides. Just downstream of the pond's outlet is a fenced dog pen area within ten feet of the brook. This barren land (Figure 2-22) is an exposure point of bacteria to the brook from the dog area.

Recommendations to address these concerns can be found in Section 3.1.1.

2.2.6 B-6 Potential Nutrient Input at Beginning of Federal Hill Brook

Federal Hill Brook begins along the centralized valley perpendicular to the Federal Hill Lookout Tower access road in Milford. The perennial brook crosses beneath Ponemah Hill Road just north of the Lookout Tower access road. The brook flows east through a residential property (Figure 2-23) adjacent to Ponemah Hill Road. At this point, the brook has been routed through a narrow stone channel approximately 4 to 5 feet below the surrounding lawn elevation. The surrounding lawn appears to be well manicured and as such represents a potential source for nutrients and pesticides to directly enter the brook.

Recommendations to address these concerns can be found in Section 3.1.1.

2.2.7 B-7 Future Development along Ponemah Hill Road

The landscape surrounding the low-density residential development and vacant land along Ponemah Hill Road in Milford consists of steep hills and valleys (Figure 2-24) that create a great deal of runoff. The fragile channel stability of the drainage paths in this area, coupled with the area's high potential for future development, highlight the important role zoning will play in this area's future.

Recommendations to address these concerns can be found in Section 3.1.3.

2.2.8 B-8 Flea Market and Antique Sales

The flea market and antique sales areas (Figure 2-25) along Route 122 in Hollis drain east to Rainbow Brook. Vehicles from vendors and customers frequent the market and sales areas and park on the surrounding dirt and grassy areas. Runoff from this area is moderate since there is no pavement throughout these commercial areas. However,



compaction of earthen surfaces can still generate runoff in some instances that approximate that of pavement. Although these areas do not appear to be a serious problem now, should these areas become paved, runoff to Rainbow Brook may increase significantly and pose a potential water quality threat to the brook.

2.3 Area C –Drainage Area East of Route 122

The drainage for Area C (Figure 2-26) flows in an easterly direction. The brook formed by Stable Road Brook and Federal Hill Brook enters a small detention pond (Figure 2-27) east of Route 122 and then continues east. Approximately 1,000 feet from the intersection of Ponemah Hill Road and Route 122, the brook combines with Peacock Brook (Figure 2-28) to form the major tributary to Witches Brook known as Rainbow Brook (name provided by a local resident). Rainbow Brook continues southeast through wetlands (Figure 2-29), along which a small tributary (mentioned in Section 2.2.2) from the Rocky Hill Road area enters approximately 600 feet northeast of the intersection of Rocky Hill Road and Route 122. Rainbow Brook continues east and combines with Witches Brook at the easternmost point of the watershed along the southern boundary of Amherst. Field investigation of drainage area C revealed the following areas of concern.

2.3.1 C-1 Potential Nutrient Input from Residential Development along Patricia Lane

There is a residential development nearing completion along Patricia Lane. The majority of drainage from this development is handled on-site with BMPs and structures that utilize the sandy soils. There is one discharge to the wetland and forested area that drains to Peacock Brook. However, stormwater has a great deal of travel time through the wetland and forested area before it reaches the brook. There does not appear to be any issues associated with the discharge now, except for some sediment related to construction activities. However, this area's discharge, in its downgradient locale (relative to the subwatershed), may be overtaxed if upgradient properties do not infiltrate stormwater onsite and instead tie into the BMPs and form a common discharge.

Recommendations to address these concerns can be found in Section 3.1.1.

2.3.2 C-2 Drainage from Church along Patricia Lane

The church along Patricia Lane has one central parking area that drains east via sheet flow and one 12" outlet from two catch basins in the



parking area. This outlet discharges into the same wetland area (Figure 2-30) mentioned in Section 2.3.1. A small sediment delta was observed below the outlet. Minimal impact to the surrounding wetlands was observed. However, the outlet represents a discharge through which others might connect when surrounding areas become more developed.

Recommendations to address these concerns can be found in Section 3.1.2, which encourages town-wide stormwater infiltration. This would lessen the burden on existing structures to handle upstream drainage.

2.3.3 C-3 Aboveground Storage Tanks (ASTs) at Church along Patricia Lane

The church off Patricia Lane in Amherst has two 500-gallon Aboveground Storage Tanks (ASTs) (Figure 2-31) located at the southern portion of the property. Runoff from this area flows south to Peacock Brook. The close proximity of the ASTs to Peacock Brook (<200 feet) warrants an evaluation of the petroleum storage at the property. Currently, there is not adequate spill containment for the two tanks or proper stormwater control. The tanks are not adequately protected against damage from vehicular traffic. At the time of inspection, there was very faint petroleum sheen on the standing water within the containment walls. The petroleum sheen appears to be from the feed lines, on which an oily residue was also visible.

Recommendations to address these concerns can be found in Section 3.2.3.

2.3.4 C-4 Agricultural Lands Adjacent to Peacock Brook

Immediately east of Route 122 and along Peacock Brook is agricultural land. A grassy field that is primarily used for haying purposes borders the brook. The same property is also home to approximately 35 cows that occupy a portion of land along Route 122. The grazing area (Figure 2-32) for the cows does not extend to the brook; however, the cows represent the typical threat of bacteria to the brook due to their proximity.

Recommendations to address these concerns can be found in Section 3.2.1.

2.3.5 C-5 Sawmill Operations Near Junction of Peacock and Rainbow Brooks

There is a sawmill operation along Ponemah Hill Road east of Route 122 near the junction of Peacock and Rainbow Brooks. A local tree service company runs the sawmill area that serves as storage for vehicles and



lumber as well as log-cutting operations (Figure 2-33). The machinery used in such operations can represent a water quality threat due to the risk of petroleum releases. However, runoff from this area cannot reach either brook since the entire area is a depression that has no outlet. During rain events, local runoff ponds at the eastern portion of the site and slowly infiltrates the soils. Consequently, water quality threats from this site relate to the potential for groundwater contamination. Due to the close proximity to Peacock and Rainbow Brooks, there is a potential for site operations to pose a threat to the water quality of the brooks via groundwater.

2.3.6 C-6 Sand Pits Bordering Rainbow Brook

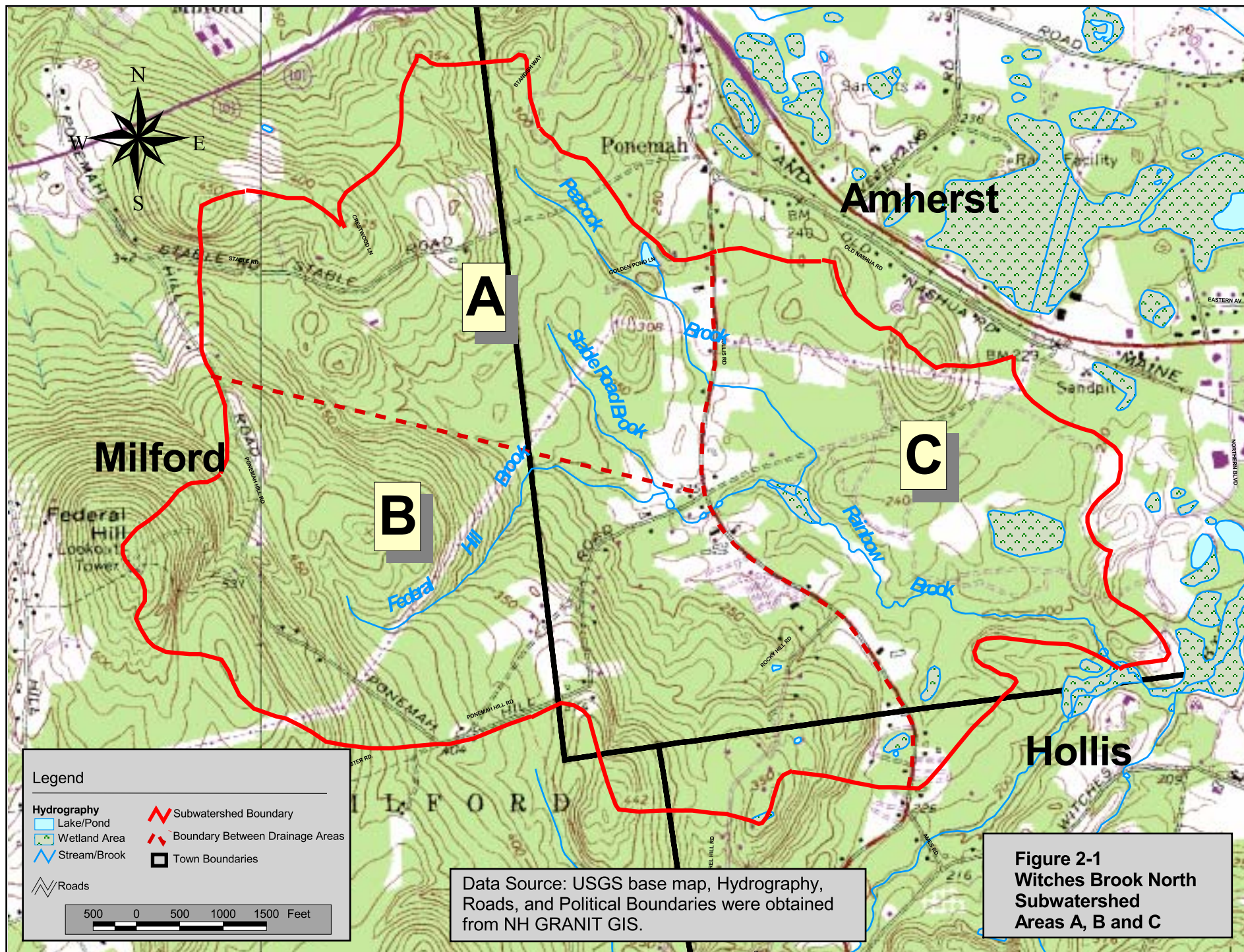
Rainbow Brook is bordered primarily by sand pits to the north. Runoff from this area is minimal; therefore, water quality threats come in the form of groundwater contamination. Although considered to be trespassing, activities in the sand pits typically include the use of motorized vehicles such as four-wheelers, dirt bikes, and 4x4 trucks. The nature of these activities create the potential for a release of hazardous materials to the sandy soils and groundwater, creating an indirect pathway for contaminants to Rainbow Brook.

2.3.7 C-7 Fuel Tanks near Rainbow Brook

Irving Oil Company is located at the end of Northern Boulevard near the junction of Rainbow Brook and Witches Brook. The facility has two petroleum fuel Aboveground Storage Tanks (ASTs) (one 1,500-gallon and one 2,000 gallon) located within 150 feet of the wetland area adjacent to Rainbow Brook. The area surrounding the ASTs drains directly to the wetland area adjacent to Rainbow Brook via a catch basin and sandy swale.

Fuel ASTs located within close proximity to receiving waters (Figure 2-34) are normally considered to be a high potential water quality threat. However, the ASTs are double-walled, protecting against leaks, and are used primarily for the fueling of Irving service vehicles. At the time of inspection, there was no petroleum staining observed on or around the ASTs.

Recommendations to address these concerns can be found in Section 3.2.4.



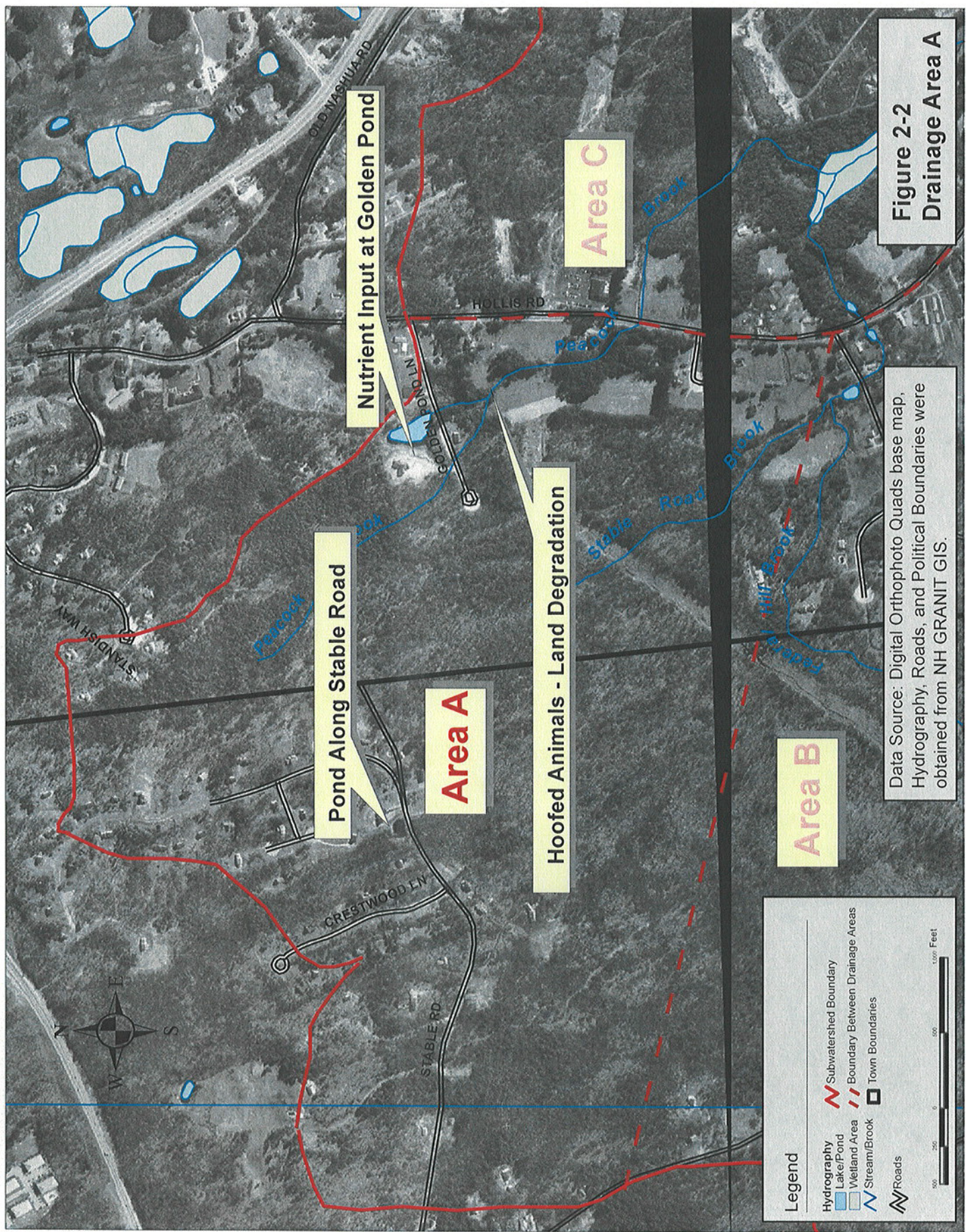


Figure 2-2
Drainage Area A

Data Source: Digital Orthophoto Quads base map, Hydrography, Roads, and Political Boundaries were obtained from NH GRANIT GIS.

Area A Stable Road Drainage Area



Figure 2.3 A small pond adjacent to Crestwood Lane collects runoff from the surrounding lane.

Area A Stable Road Drainage Area



Figure 2.4. Golden Pond inlet adjacent to Golden Pond.
Picture taken from residential driveway.

Area A Stable Road Drainage Area



Figure 2.5. Forested and agricultural lands through which Peacock Brook flows before entering a detention pond adjacent to Route 122.



Figure 2-6. Detention pond adjacent to Route 122.

Areas of Concern:

A-1 Potential Nutrient Input at Pond along Stable Road



Figure 2-7. Pond along Stable road. Although the pond is presently in good condition, the residential lawn abutting the pond is a potential source of nutrients and pesticides.

Areas of Concern:

A-2 Potential Nutrient Input at Golden Pond



Figure 2-8. Golden Pond. Although the pond is currently in good condition, there is a potential risk to water quality from fertilization or pesticide application in the future if a lawn is developed.

Areas of Concern

A-3 Hoofed Animals and Land Degradation Along Peacock Brook



Figure 2-9. Degradation - erosion and sedimentation of the land along Peacock Brook. Animal activities are also likely to serve as a direct source of bacteria.

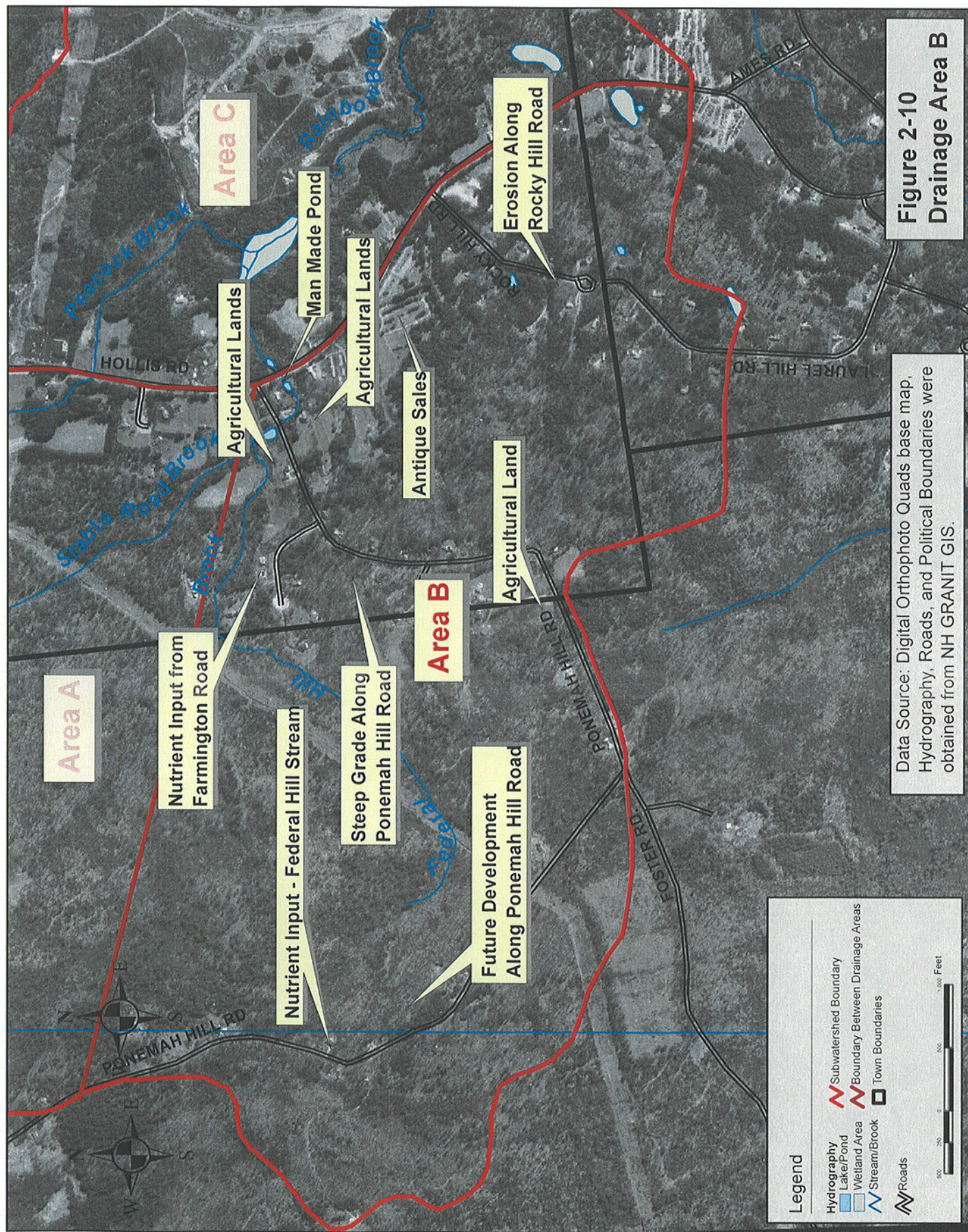


Figure 2-10
Drainage Area B

Data Source: Digital Orthophoto Quads base map, Hydrography, Roads, and Political Boundaries were obtained from NH GRANIT GIS.

Area B – Ponemah Hill Road Drainage Area



Figure 2-11. View of the steep slopes contributing to the Federal Hill Brook.

Area B – Ponemah Hill Road Drainage Area



Figure 2-12. Wetland detention area located adjacent to Ponemah Hill Road.



Figure 2-13. A man-made pond before Route 122.

Areas of Concern

B-1 Steep Grade along Ponemah Hill Road



Figure 2.14. Forested area laden with sediment.

Areas of Concern

B-2 Erosion around Rocky Hill Road and Route 122



Figure 2-15. A paved swale along the eastern side of Rocky Hill Road.

Areas of Concern

B-2 Erosion around Rocky Hill Road and Route 122



Outlet

Figure 2-16. The outlet is nearly buried in the hillside due to sedimentation.

Areas of Concern

B-2 Erosion around Rocky Hill Road and Route 122



Direction of Inlet Flow

Figure 2-17. A small detention pond adjacent to Rocky Hill Road. Minimal impact due to sedimentation is observed in this area. Road is at the upper right hand side of picture.

Areas of Concern

B-2 Erosion around Rocky Hill Road and Route 122



Figure 2-18. A large sediment delta observed before the 18'' culvert beneath Route 122.

Areas of Concern

B-2 Erosion around Rocky Hill Road and Route 122



Figure 2-19. Lowland area between residential property and forested area receiving discharge.

Areas of Concern

B-3 Potential Nutrient Input from Farmington Road



Figure 2-20. A residential property with a well-manicured lawn, which poses a risk of nutrient and pesticide input to local runoff.

Areas of Concern

B-5 Man-Made Pond Near Intersection of Ponemah Hill Road and Route 122



Figure 2-21. A man-made pond associated with the agricultural lands southwest of the intersection of Ponemah Hill Road and Route 122 in Amherst.

Areas of Concern

B-5 Man-Made Pond Near Intersection of Ponemah Hill Road and Route 122



Figure 2-22. The unvegetated dog pen which is located downstream of the pond's outlet and within ten feet of the brook is an exposure point of bacteria to the brook.

Areas of Concern

B-6 Potential Nutrient Input at Beginning of Federal Hill Brook



Figure 2-23. A residential property adjacent to Ponemah Hill Road. The surrounding lawn is a potential source for nutrients and pesticides.

Areas of Concern

B-7 Future Development along Ponemah Hill Road



Figure 2-24. Steep hills and valleys creating a great deal of runoff surround the low-density residential areas and vacant lands along Ponemah Hill Road.

Areas of Concern

B-8 Flea Market and Antique Sales



Figure 2-25. The flea market and antique sales areas. In the future these areas may pose a potential water quality threat to the brook if paved.

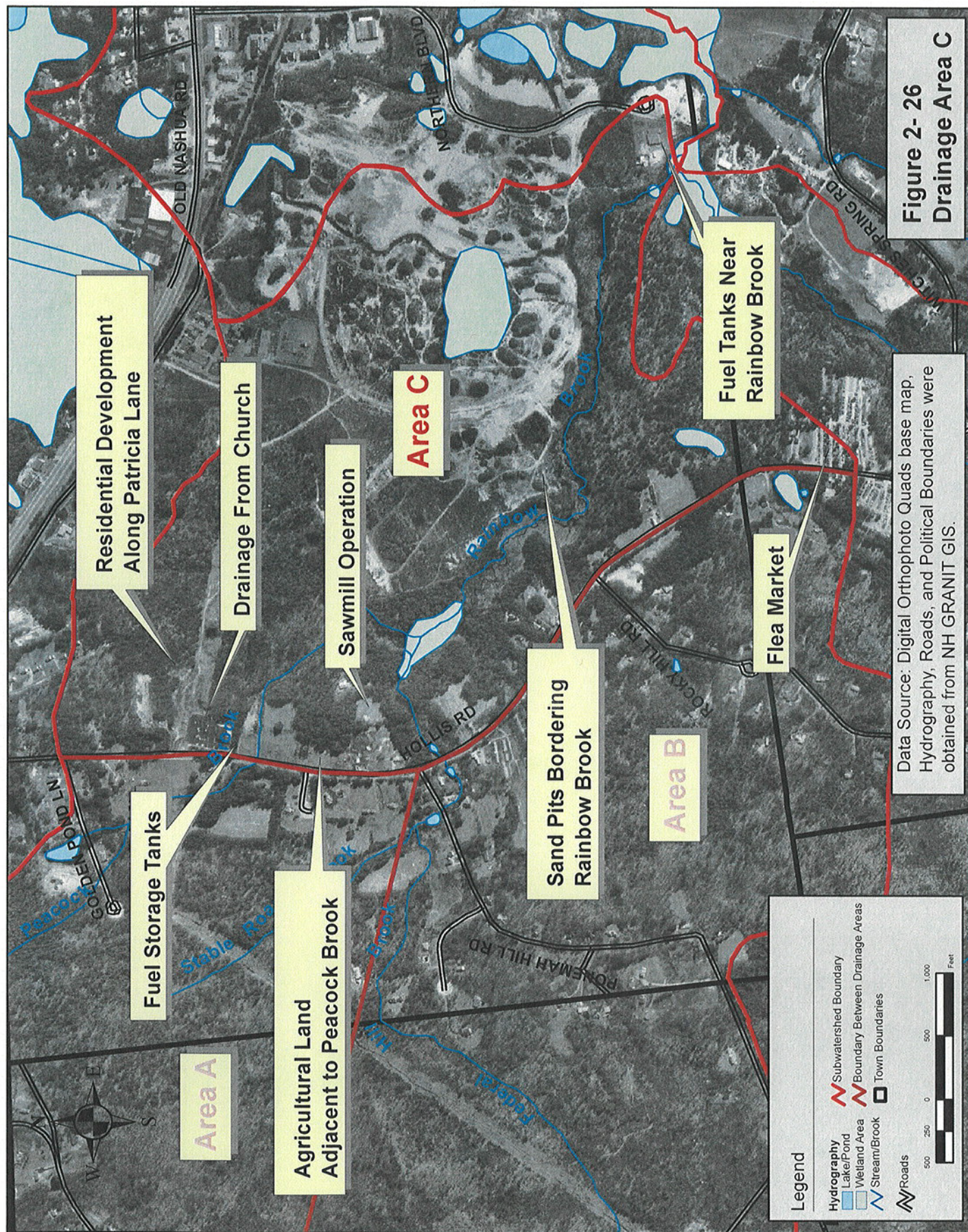


Figure 2-26
Drainage Area C

Data Source: Digital Orthophoto Quads base map, Hydrography, Roads, and Political Boundaries were obtained from NH GRANIT GIS.

Area C – Drainage Area East of Route 122



Figure 2-27. A small detention pond. The brook formed by Stable Road Brook and Federal Hill Brook enters the pond east of Route 122 and then continues east.

Area C – Drainage Area East of Route 122



Figure 2-28. View of Peacock Brook from Ponemah Hill Road.

Area C



Figure 2-29. Rainbow Brook continues southeast through wetlands.

Areas of Concern

C-2 Drainage from Church along Patricia Lane



Figure 2-30. The outlet discharges into the wetland area.

Areas of Concern

C-3 Aboveground Storage Tanks (ASTs) at Church along Patricia Lane



Figure 2-31. Two 500-gallon ASTs located at the southern portion of the property.

Areas of Concern

C-4 Agricultural Land Adjacent to Peacock Brook



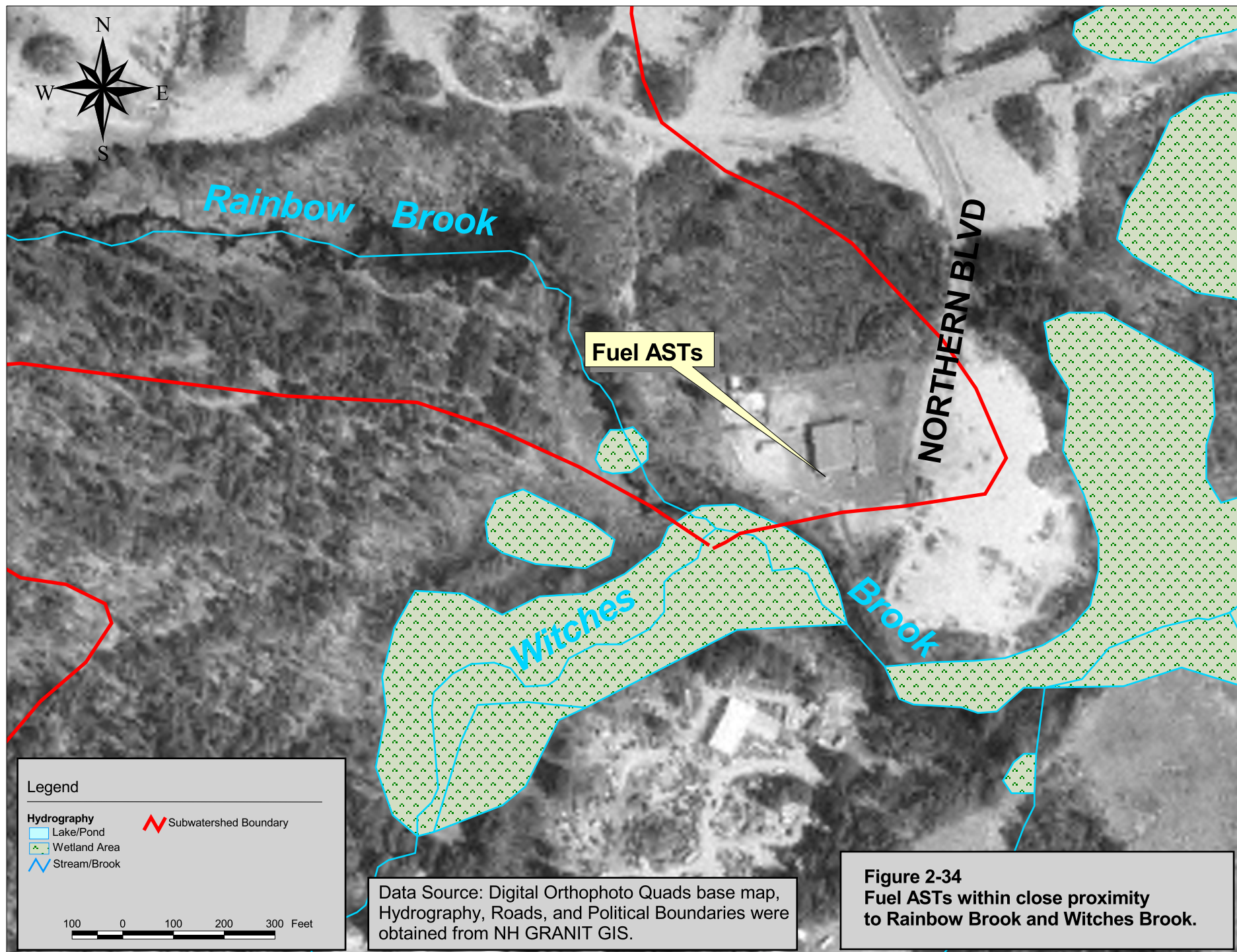
Figure 2-32. A grazing area. The cows represent a threat of bacteria to the brook due to their proximity.

Areas of Concern

C-5 Sawmill Operations Near Junction of Peacock and Rainbow Brooks



Figure 2-33. Log-cutting operations in the sawmill area. The machinery can pose a water quality threat due to the risk of petroleum releases.



3.0 RECOMMENDATIONS

Based upon a thorough review of the subwatershed and evaluation of potential problem areas, two broad categories of recommendations were developed; General Recommendations and Site Specific Recommendations. General Recommendations are meant to prevent or address problems that were consistently found throughout the subwatershed. These are described in Section 3.1. Site Specific Recommendations (described in Section 3.2) are intended to provide information to Pennichuck Water Works and the appropriate community personnel about a concern on an individual site. In many cases these concerns can be addressed with a letter and a site visit.

3.1 General Recommendations

3.1.1 Address Homeowner Impacts

1. *Develop and distribute informational brochures*
2. *Encourage Master Gardener Program*
3. *Host topic-specific seminars*

The Pennichuck Watershed has seen substantial development in the past ten years, and while efforts to lessen commercial impacts on water resources are starting to take shape, influencing the actions of residents may prove a bit more challenging. Unlike businesses that are regulated at the time of site plan development and then (through local, state, and federal regulations) in their ongoing operations, residential impacts can really only be controlled at the time of subdivision approval. With more and more residents moving to areas like the WBN subwatershed it becomes increasingly important to find effective ways to reach these landowners. Based on extensive field reviews, CEI found that the following residential activities are occurring in the subwatershed and need to be addressed:

- ❑ “Taming” the forest that serves as a natural buffer to Non-Point Source Pollution;
- ❑ Growing large lawns with ornate landscaping that require intensive management.

Since these conditions usually develop over an extended period of time, the incremental changes typically goes unnoticed even when there are legal instruments in place prohibiting buffer disturbance. The upside of this is that there is often time to educate the landowner about other alternatives to buffer disturbance and labor and chemical intensive landscaping practices.



The success of citizen outreach efforts can be greatly increased by understanding one guiding principal: *people learn in different ways*. Some need to see an example, some need to understand the science, and some need to physically work on an example to learn. With this principle in mind, three approaches are detailed below to address residential impacts by conveying the same message in a number of different ways:

1. Brochures

Amherst has developed a buffer brochure and also provides some good information through their Conservation Commissions web site about landscaping. This information should be shared amongst the other Pennichuck Communities and receive broad distribution. One enhancement to these might be more pictures to show examples of good buffers and those that are poor. The examples should be local and perhaps some form of recognition to the owners of the good buffers could be made. Creative recognitions such as the awarding of a native shrub or two to the owner also may draw the attention of local papers furthering the media exposure of the brochure program.

2. Master Gardener Program

The Master Gardener Program is an opportunity for selected individuals to get training and attend seminars related to horticulture. Then a person gives back to the community by providing 45 hours of volunteer work. The program has been quite successful and there are already some Master Gardeners in all of the Pennichuck Watershed Communities. Having a Master Gardener in one's neighborhood would be a welcome resource to many, and since the program is geared towards low impact gardening and landscaping it will help protect water resources.

Because the participants in the program are given very good training, the application process to become a Master Gardener has become quite competitive (only one in four are selected) and costs \$150. Perhaps some of the Pennichuck Communities could sponsor a Master Gardener applicant each year. The individual could then host a workshop or be a speaker in a series of workshops (as described below).

3. Workshops

Topic specific workshops can be a very good way to reach a broad audience and instill some environmental stewardship in the attendees if done properly. Broad topic workshops such as "Gardening" often present information so superficially that it leaves many participants wondering if they learned anything. Topic specific workshops such as "Roses", "How to Build a Water Garden", "Environmentally Friendly Lawn Care", "Composting", and "Drought-proofing Your Landscaping" may draw a smaller crowd per workshop, but participants will be more enthusiastic about attending another workshop later because they know it won't waste



their time. A hands-on component or field trip should be a part of the workshops as well.

To get sufficient attendance it is imperative to get the word out long before the workshop and charge a nominal fee to cover the cost of hiring good qualified guest speakers. All speakers should be able to work environmentally friendly hints into their presentations. Holding workshops in the Spring seems to attract the most people as they are anticipating outside improvements at that time. A local gardening club or a conservation commission could coordinate workshops.

3.1.2 Town-wide Recharge Requirements

Institute town-wide recharge requirements on impervious surfaces that exceed 2,500 s.f. or 10% of the lot.

Many communities have recognized the need to protect the quality of the groundwater resources upon which they depend. They have passed local ordinances restricting activities such as salt application over aquifers and storage of hazardous materials. Ironically, many communities were so averse to exposing their aquifers to the risk of contamination that they overlooked a problem they were exacerbating; the lack of groundwater recharge.

Many towns have required developers to mitigate the impacts of the stormwater they were creating. This meant preventing floods and treating the water before it was releasing into a nearby waterbody. The fact that these pipe and lined-pond drainage systems were starving the aquifers was generally overlooked or considered an insignificant trade off of development.

Now that we can document declining groundwater levels, some communities are starting to recognize the importance of having a sufficient quantity of groundwater for their citizens and those of adjacent towns. Additionally, these communities are learning that infiltrating stormwater provides vastly superior treatment in comparison to other methods and is perhaps one of the only feasible ways to eliminate the bacteria contained in stormwater. Unfortunately, the value of infiltrating stormwater into the ground has come to the public's attention last. In hindsight if stormwater infiltration had been required first, these designs would probably address not only the recharge needs, but may have precluded the need to adopt separate treatment requirements. At least a portion of the flood control requirement could also be met through stormwater infiltration.

In addition to recharging aquifers, there are a number of reasons why the communities of Amherst, Hollis, and Milford should require stormwater infiltration town-wide:



- ❑ The sandy soils of the area are well suited for employing stormwater infiltration devices
- ❑ The 30% open space requirement in Amherst, Milford and large lot sizes in Hollis allow for greater flexibility in siting an infiltration structure.
- ❑ One of the few remaining wild trout population known to exist in Southern New Hampshire resides in Witches Brook and relies on the sustained inputs of cold, clean groundwater.

There are a number of ways to implement this recharge requirement, however it is recommended that towns add a general prohibition in their Zoning Ordinance that applies in all districts. For instance, towns could place a prohibition on impervious lot coverage that exceeds 2,500 square feet or 10% of the lot without a Special Exception. A requirement of the Special Exception could be that stormwater runoff is infiltrated such that the post-development runoff volume does not exceed the predevelopment runoff volume. Traditionally towns have placed these stormwater infiltration requirements in their Subdivision and Site Plan Review controls and/or their Aquifer and Wetland Overlay Districts. The important distinction between a requirement implemented as proposed and that of the traditional methods is that this will be applied town-wide. This will allow the community to replenish all its groundwater resources, rather than just protect those close to wetlands or over a major aquifer.

The 2,500 s.f. and 10% imperviousness thresholds were chosen because studies have shown a significant impact on brooks in watersheds with impervious surfaces of 15% or greater. A 2,500 s.f. threshold applied town-wide is a reasonable alternative to the single-family home exemption that many towns write into their stormwater controls.

3.1.3 B-7 Address Development on Steep Slopes

Reduce lot coverage and protect steep slopes

The steep slopes found in Milford along Ponemah Hill Road will be subject to substantial erosion unless the town takes steps to protect this fragile area. Milford allows 70% of residential lots to be covered with impervious surfaces (minimum 30% open space). While it is unlikely that a residence would approach this massive an area, accessory structures such as large storage building or barn could generate a lot of runoff from the site. Adjusting the lot coverage downward (or required open space upwards) would be an effective way to address single family homes as most will not be held to stormwater standards if they are not part of a subdivision (see Section 3.1.2.) A more reasonable number would be to prohibit impervious surfaces in excess of 2,500 s.f. or 10% unless recharge is provided.



Hollis does not allow buildings and other associated structures on slopes in excess of 25%. With a few additions that keep drainage discharges off these slopes, Milford's Planning Board could adopt a similar steep slopes prohibition that will protect stream channels and land values. Again, this should be in the dimensional or general requirement such that it applies to all structures whether they are in subdivisions or not.

3.2 Site Specific Recommendations

3.2.1 B-1 Steep Grade Along Ponemah Hill Road

Stabilize roadside with riprap

The Town of Amherst has completed some stabilization work in the steep drainage ditches along Ponemah Hill Road. Where riprap has been placed in the ditch that runs along the western side of the road it appears to have done a reasonable job of stabilizing the channel. The ditch on the eastern side is not afforded the protection of the riprap and still appears to be unstable.

It is recommended that where riprap exists it should be left in place. The remaining portions of the ditch on the west and the entire ditch on the east should be recontoured and cover with a non-woven filter fabric. Then riprap should then be hand placed over the filter fabric.

Parcel: Amherst right of way

Owner: Town of Amherst

Estimated installation cost: \$25,000

Operation & Maintenance:

Annual repairs \$500

3.2.2 B-2 Rocky Hill Road Sedimentation and Route 122 Erosion

Leaching catchbasin and stabilization

1. Leaching Catchbasin

Drainage structures near the roundabout on Rocky Hill Road appear to have been done incrementally as the needs arose. The paved swale/apron (refer to Figure 2-15) that collects water and sediments downgradient of the roundabout transmit both onto a forested hillside upgradient of a pond. Installing a leaching catchbasin with a sump will assist in infiltrating stormwater from small storms and provide a more convenient place to remove accumulated sediments.

Parcel: Town of Amherst right of way (portions of Amherst 2-03-9)

Owner: Town of Amherst



and
 Edward Deiongh
 9 Rocky Hill Rd
 Amherst, NH 03031

Estimated installation cost: \$2,500

Operation & Maintenance:

Annual catchbasin cleaning: \$50

2. Stabilization

The erosion problem that occurs along Route 122 in the same steep area of Amherst cannot continue indefinitely without transporting sediment to Rainbow Brook. The state Department of Transportation (DOT) should be approached and asked to provide a better gravel shoulder along Route 122 in the vicinity of Rocky Hill Road (see description in Section 2.2.2) upgradient of the 18" culvert that passes under Route 122. The improved shoulder could transition into various methods of drainage stabilization from riprap to turf reinforcing fabric. Unless the NHDOT plans on cleaning the drainage channel yearly, riprap is the best choice.

Parcel: State right of way

Owner: State of NH

Estimated installation cost: Done by NHDOT

Operation & Maintenance: Annual repairs

3.2.3 C-3 Aboveground Storage Tanks (ASTs) at Church along Patricia Lane

Recommend additional safeguards for oil tanks

The ASTs at the church are exempt from state and federal regulations (see Appendix A) however their close proximity to surface water suggest that they could still voluntarily implement some of the more important features found in those requirements.

Additionally, DES and the State Fire Marshall have adopted National Fire Protection Act 31 (NFPA), as appropriate for the installation of *all* ASTs. However, the provisions of NFPA Chapter 31 may not be required for the ASTs at the church since the requirement is for AST installations; therefore, the ASTs might be exempt from the requirement, under a grandfather clause. The local fire department should be consulted to determine if the church is required to upgrade their ASTs to comply with NFPA 31.



At a minimum, Pennichuck should provide DES Environmental Fact Sheets *WMD-OIL-24 BMPs for the Installation and Upgrading of On-Premise-Use Heating Oil Tank Facilities* and *WMD-OIL-10 Recommended Installation Practices for Outdoor Heating Oil Tanks*, to inform the church about the hazards of heating oil tanks and to encourage the facility to upgrade their ASTs. The DES fact sheets are provided in Appendix B.

Parcel: Amherst 2-12-3

Owner: Living Safe Ministries
134 Hollis Rd
Amherst, NH 03031

Estimated installation cost: Containment (block wall);
roof; and
extending vent lines
\$1,500-\$2,000

Operation & Maintenance: Visual inspection by owners
No costs anticipated

3.2.4 C-7 Fuel Tanks near Rainbow Brook

Provide Input on Irving Oil's SPCC Plan and Update and SWPPP

The facility manager at the Irving site verified that the ASTs are registered with the New Hampshire Department of Environmental Services (NHDES) and that the facility has a Spill Prevention Control and Countermeasure (SPCC) Plan for petroleum storage. This Plan will need to be updated in December 2002, as required by 40 CFR 112.5 and therefore provides an opportunity to evaluate and comment on the SPCC Plan update.

The Irving facility is also subject to EPA's Phase I storm water regulations due to the industrial activities (refueling and trucking) at the site. As such, 40 CFR 122 requires that the facility file for a NPDES industrial storm water permit, which includes developing a Storm Water Pollution Prevention Plan (SWPPP). The facility manager was not sure if a SWPP had been completed for the facility.

Pennichuck should send a letter to NHDES and EPA who review and renew the SPCC Plan and SWPPP, respectively. The letter should remind them of the close proximity of the tanks to surface waters that contribute to the water supply reservoirs and that minimum compliance is not acceptable. Pennichuck could also provide Irving with signage that could be placed at the refueling area to remind personnel that they are close to Pennichuck's surface water supplies.



Parcel: Amherst 2-28-24

Owner: Minnow Realty Investment
26 South River Rd
Bedford, NH 03110

Facility Owner: Irving Oil
29 Northern Blvd.
Amherst, 03031

Cost: N/A- Letter to NHDES

Operation & Maintenance: N/A



Appendix A

**APPLICABILITY OF REGULATIONS TO CHURCH ABOVE GROUND
STORAGE TANKS**

**APPLICABILITY OF REGULATIONS TO IRVING ABOVE GROUND
STORAGE TANKS**

Church

The ASTs at the church on Patricia Lane in Amherst are most likely used to provide heat for the building, and as such, are not regulated by the New Hampshire Department of Environmental Services Env-Wm 1402.02 (b)(1) Control of Aboveground Petroleum Storage Facilities. The U.S. Environmental Protection Agency requires a Spill Prevention Control and Countermeasure (SPCC) Plan for facilities with aboveground storage tanks greater than 660 gallons individual capacity or greater than 1,320 gallons aggregate on-site storage. The church does not meet these criteria; therefore, it is not required to have a SPCC Plan.

RSA 146-E:4 requires that On-Premise Use Facilities (OPUFs), such as the church, comply with the provisions of the National Fire Protection Association (NFPA) Chapter 31 Standard for the Installation of Oil-Burning Equipment. Additionally, DES and the State Fire Marshall have adopted NFPA 31, as appropriate for the installation of *all* ASTs. However, the provisions of NFPA Chapter 31 may not be required for the ASTs at the church since the requirement is for AST installations; therefore, the ASTs might be exempt from the requirement, under a grand father clause. The local fire department should be consulted to determine if the church is required to upgrade their ASTs to comply with NFPA 31.

Aside from requirements, NH DES and the State Fire Marshall strongly encourage OPUFs to comply with the provisions of NFPA 31 and to implement Best Management Practices (BMPs) for the installation and upgrading of ASTs. Although DES does not require such compliance, failure to achieve compliance could preclude future eligibility and access to the NH Petroleum Reimbursement Cleanup Funds should a release occur.

Irving

The Irving facility is subject to EPA's Phase I storm water regulations due to the industrial activities (refueling and trucking) at the site. As such, 40 CFR 122 requires that the facility file for a NPDES industrial storm water permit, which includes developing a Storm Water Pollution Prevention Plan (SWPPP). It is unclear at this time if the Irving facility has a SWPPP. They should fulfill the Phase I regulatory requirements immediately, unless the facility has done so already.

APPENDIX B

NHDES WMD-REM- 4 (Formerly OIL-10)
RECOMMENDED INSTALLATION PRACTICES FOR
OUTDOOR HEATING OIL TANKS

NHDES WMD-REM-16 (Formerly OIL-24)
BEST MANAGEMENT PRACTICES FOR THE INSTALLATION
AND UPGRADING OF ON-PREMISE-USE HEATING OIL TANK
FACILITIES

Site Remediation

Environmental Fact Sheet



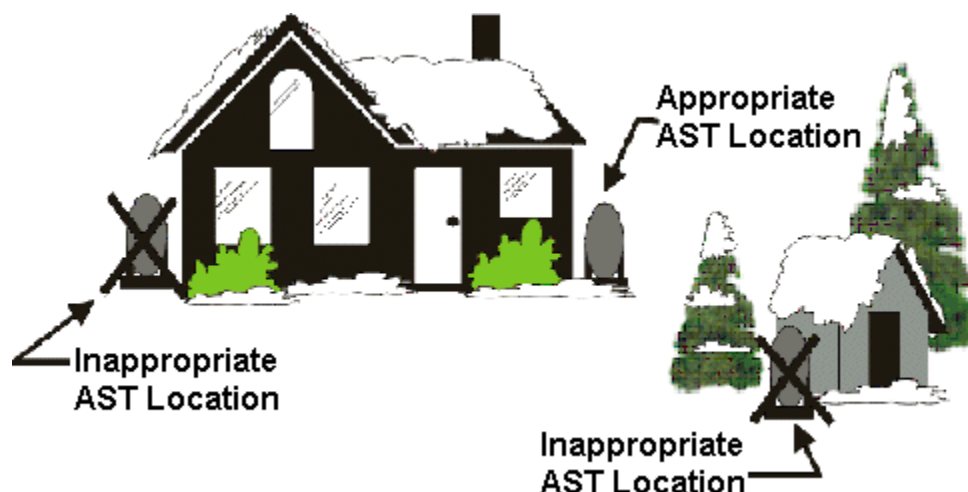
WMD-REM-4

2004

RECOMMENDED INSTALLATION PRACTICES FOR OUTDOOR HEATING OIL TANKS

Background

Every year, releases of heating oil to the environment occur from on-premise-use tanks in New Hampshire, costing homeowners, insurers, suppliers, and taxpayers millions of dollars to clean up. Frequently, releases occur when the tank topples over or shifts, breaking the suction line. Such occurrences are frequently caused when the tank is struck by snow or ice falling from roofs, or by tanks settling into soft water-saturated soil. Many of these releases are preventable if a little planning is taken in locating these tanks. This fact sheet provides tank owners with guidance on how to improve installation of these facilities and diminish the potential for environmental and financial disasters, which can be caused by tank or fuel line ruptures.



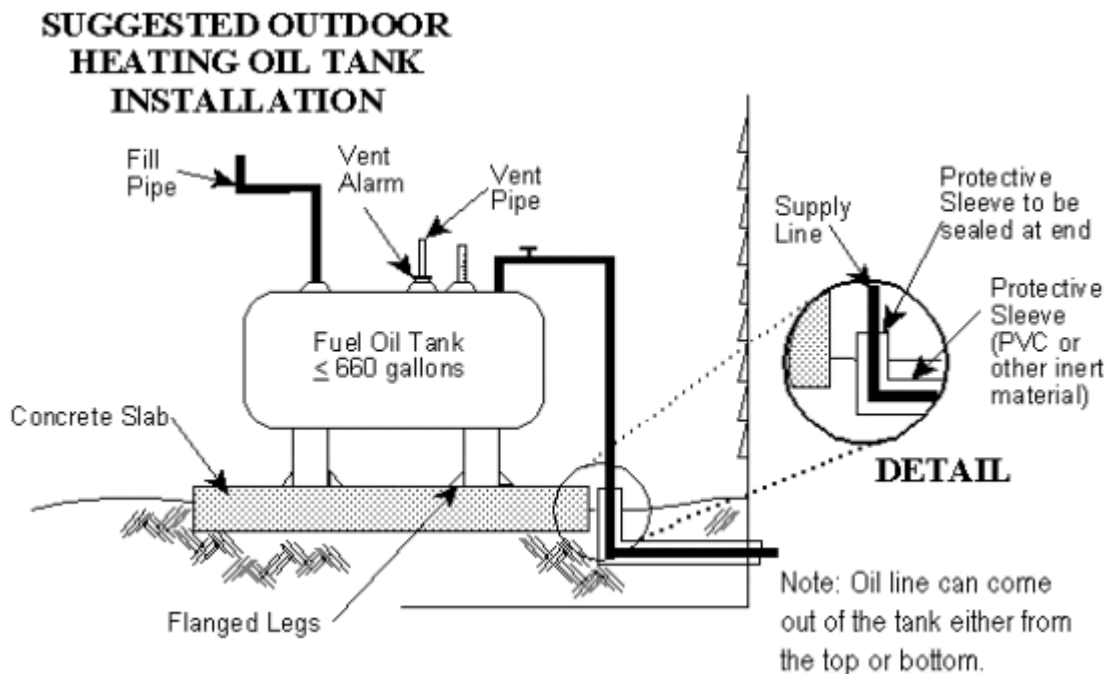
Recommended Installation Practices

The practices described below are only a portion of the requirements of the National Fire Protection Association's (NFPA) Code for the Installation of Oil Burning Equipment (NFPA 31) and New Hampshire Department of Environmental Services' (DES) best management practices (BMPs). Your heating oil dealer or installation contractor should be completely familiar with all the requirements of NFPA 31 and the BMPs. When installing or modifying any heating oil system, please consult your local fire department concerning specific local requirements and permits. DES refers to a heating oil "system" as all of the components from the fill pipe to the point of the supply line where it connects to the burner.

Should an oil release occur, the State may provide funds to cover the cost of cleaning up the contamination. However, be advised that upgrading an applicable heating oil system to the standards of NFPA 31 and DES BMPs will be a future condition of eligibility to be able to access the N.H. Petroleum Reimbursement Cleanup Fund. Those owners who demonstrate financial need may apply for reimbursement of costs up to \$1,000 in order to meet the compliance requirements. Please refer to DES "SAFETANK" fact sheet for more information on this program. Installation or modification of small

(660 gallons or less) aboveground storage tanks located outside must include the following features:

- Placement at least 10 feet from the property line (5 feet for tanks less than 276 gallons).
- Protection from weather and physical damage. For example, NFPA 31 and DES BMPs require that outside tanks be protected from the weather and from physical damage. This includes locating a tank so that it is not placed beneath the eaves of a sloping roof of a building or beneath large trees where they may be prone to being struck by falling snow or ice.
- Construction of the tank must meet the applicable standards of the Underwriters Laboratory (UL) or the American Society of Mechanical Engineers' (ASME) Boiler and Pressure Vessel Code. Any tank installed after 1992 should have a vent line with an inside diameter no smaller than 1 1/4 inches, with a vent whistle to prevent overflow.
- Tanks shall be securely supported by rigid, non-combustible supports to prevent sliding, settling, or lifting of the tank. Tanks and cradles containing tanks shall be placed on a concrete pad and not on the bare ground. Experience has shown that placing each leg of a tank on an individual concrete block may cause the tank to settle unevenly over time, even to the point where the tank has slid off a block during periods where the ground is soft.



- The tank shall be provided with a means to determine the liquid level. For example, DES recommends the tank be outfitted with a gauge visible or an alarm audible to the delivery person indicating when the tank is nearly full. According to RSA 146-E:4, II, all heating oil tanks must be equipped with a vent alarm system on or before July 1, 1995.
- The fill opening should be of a size and so located as to permit ready filling in a manner that will avoid spillage. This means the fill pipe opening should be on a horizontal plane with the opening pointing upward.
- Piping should be substantially supported and protected against physical damage and corrosion. Corrosion protection must be provided to buried piping by utilizing copper piping having a bonded outer coating of ductile plastic. This includes all portions of piping which pass through and/or under a building foundation or floor.
- A suitable oil filter shall be provided in the fuel supply line to an oil burner using heating oil or kerosene. The oil filter shall be located as close as possible to the furnace, where it will be

protected from the weather and traffic. May spills occur when a filter located outside has been shifted by an ice or snow pack , or exposed to foot traffic, and broken off.

Vertical tanks or horizontal tanks are permitted in New Hampshire, however, horizontal tanks are preferred for outdoor use because they are less prone to tipping over.

The requirements described above are only a portion of NFPA 31 and BMPs, emphasized to prevent releases of heating oil. When installing a heating oil system, the local fire department and all of NFPA 31 and BMPs should be consulted.

Cleanup Assistance

Should a petroleum release occur, cleanup assistance may be available to owners of commercial or residential on-premise-use heating oil tanks through the Fuel Oil Discharge Cleanup Fund. To be eligible for cleanup assistance, all heating oil tanks installed after August 28, 1993, must comply with NFPA 31.

For More Information

For more information, please contact the N.H. Department of Environmental Services at (603) 271-3644.

DISCLAIMER: Information contained in this Fact Sheet is current as of January 1, 2004, and statutory or regulatory changes that may occur after this date may cause part or all of the information to become invalid. If there are any questions concerning the current status of this information, please contact DES at (603) 271-3644.

Site Remediation

Environmental Fact Sheet



WMD-REM-16

2004

Best Management Practices for the Installation and Upgrading of On-Premise-Use Heating Oil Tank Facilities

All owners of on-premise-use facilities (OPUFs) should take measures to bring their facilities into compliance with the requirements of RSA 146-E:4 and the New Hampshire Department of Environmental Services (DES) best management practices (BMPs). Failure to achieve compliance could preclude future eligibility and access to the New Hampshire Petroleum Reimbursement Cleanup Funds should a release occur. Be advised that DES refers to an OPUF as only that portion of a heating oil system from the fill pipe to the point where the supply line connects to the burner. This includes the fill and vent pipes, the tank with its supports and foundation, appurtenances connected to the tank, and any and all supply and return piping.

RSA 146-E:4 requires that these facilities comply with the provisions of the National Fire Protection Association standard NFPA 31 *"Installation of Oil-Burning Equipment."* The primary guidance document for such facilities remains NFPA 31. These BMPs augment that standard by further detailing specific requirements such as tank foundations, protective sleeves for supply lines, and outdoor tank locations. Other requirements listed in this document are simply a reiteration of the NFPA 31 standards which DES believes are important in preventing oil releases to the environment.

APPLICABILITY

Facilities that are subject to these requirements are those heating oil storage tank systems that are **used solely for heating the building on the property where the tank is located**. They include both aboveground and underground tanks that are **not** regulated by either Administrative Rule Env-Wm 1402 *"Control of Aboveground Petroleum Storage Facilities"* **or** Administrative Rule Env-Wm 1401 *"Underground Storage Facilities."* The majority of these tanks are the familiar 275-gallon tank that often serve residential heating needs but may also include smaller tanks which supply oil to kerosene heaters as well as non-residential applications that are not covered by either of the administrative rules listed above. If there is any question on the applicability of a particular system, please contact DES at 271-3644.

TANK FABRICATION & STANDARDS

Heating oil storage tanks that are covered by these BMPs shall follow the minimum design and fabrication standards of NFPA 31, which requires tanks be built in accordance with the following:

(a) Underwriters Laboratories, Inc. UL 142, *Standards for Steel Aboveground tanks for Flammable and Combustible Liquids*; UL 58, *Standard for Steel Underground Tanks for Flammable and Combustible Liquids*; UL 80, *Standard for Steel Inside Tanks for Oil Burner Fuel*; UL 1316, *Standard for Glass-Fiber Reinforced Plastic Underground Storage Tanks for Petroleum Products*.

(b) American Petroleum Institute, Standard API 650, *Specifications for Welded Steel Tanks for Oil*

Storage.

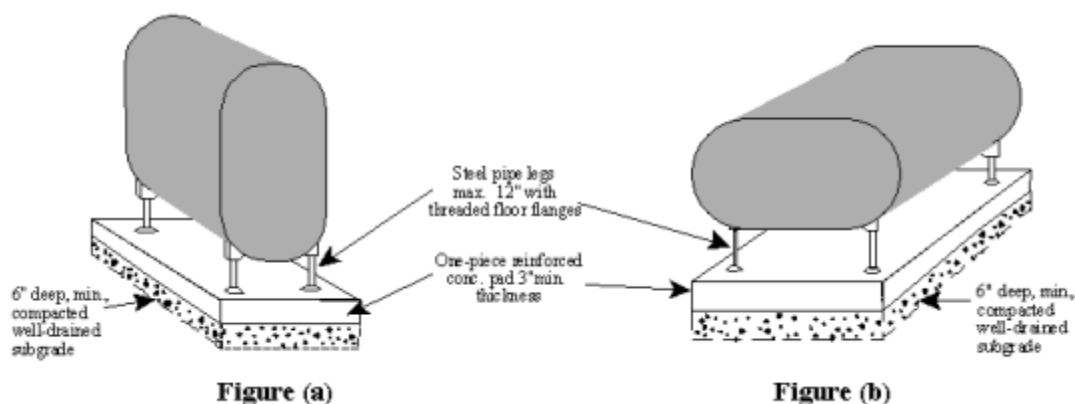
(c) American Society for Testing and Materials, ASTM D 4021, *Standard Specification for Glass-Fiber Reinforced Polyester Underground Petroleum Storage Tanks*.

OUTSIDE TANKS - 660 GALLONS or Less

Tanks located outdoors, such as those at manufactured housing parks, account for a large portion of OPUFs in New Hampshire. Because of constant exposure to weather and the elements, special considerations are required to prevent system failure and subsequent releases. Because of the annual freezing and thawing of the soil in New Hampshire, an adequate foundation and support system is critical.

LEGS AND FOUNDATIONS: Tanks of either upright (vertical) or horizontal configuration shall be mounted on steel pipe legs not exceeding 12 inches in height and fitted with threaded floor flanges at the base of each leg. The legs shall rest on a minimum 3-inch thick reinforced concrete pad. The length and width of the pad shall be equal to or larger than the dimensions of the tank. The pad shall rest on a bed (6" minimum) of compacted well-drained gravel, crushed stone, coarse sand or other acceptable subgrade. See figures (a) and (b) below.

With either vertical or horizontal tanks, the leg brackets that are welded to the bottom of a tank shall not be used as a leg and shall not rest directly on the concrete pad. Some tanks, such as UL 142 tanks, are designed and manufactured to be supported by cradles, saddles or other similar supports. These supports shall be placed on concrete pads as described above. In all cases, there shall be a minimum of 4 inches of clearance from the bottom of the tank to any other surface.



OUTDOOR TANK LOCATION: Physical damage to tanks and lines from snow or ice falling from overhead roofs results in many sizable releases of oil each year. Outside tanks and piping shall be located such that their exposure to damage from falling snow or ice is minimized. To meet this requirement, the facility shall be:

- Located at the gable end of a building.
- Fully covered by a sturdy, well constructed roof.
- Located so that the tank and any unsupported piping is not located within 18 inches of the drip line of the eaves.

- d. Filters located outside and unprotected from the elements are not permitted.

Other considerations to minimize the risk of physical damage to the tank and associated components shall be taken into account when locating an outdoor tank. These may include overhanging tree limbs, high foot traffic areas, and snow storage areas from plowing. See fact sheet WMD-OIL-10 for more information on proper outdoor tank location.

INSIDE TANKS - 660 GALLONS or LESS

Although tanks and piping located within a building are not subject to the exposure that outdoor tanks are; provisions must be made in order to minimize the risk of an oil release.

LEGS AND FOUNDATIONS: Whenever possible, a tank (either vertical or horizontal) shall be located on a concrete floor. Tank legs shall not exceed 12 inches in height and shall be equipped with threaded floor flanges. Saddles, cradles or other supports designed specifically for a tank can be used. Tanks located inside a building **without** a finished concrete floor shall be supported on legs not exceeding 12 inches and fitted with threaded floor flanges. The legs shall rest on a minimum 3-inch thick reinforced concrete pad. The length and width of the pad shall be equal to or larger than the dimensions of the tank. The pad shall rest on a bed (6" minimum) of compacted well-drained gravel, crushed stone, coarse sand or other acceptable subgrade. (See figures (a) and (b) - Page 2).

OIL SUPPLY and RETURN PIPING

Many oil releases from OPUFs originate from supply and/or return lines. This is especially true for those unprotected lines that are located within or under a concrete floor, buried underground or otherwise located in a corrosive environment. State of New Hampshire fire code Saf-C 6012.02(b) states: "Whenever an oil supply or return line is installed under concrete, sub-floors, or earth surfaces, the line shall be continuous from the burner to the tank and not contain any splices." Additionally, NFPA 31 states: "all buried piping shall be protected against corrosion."

All oil supply and return lines installed under or within concrete floors, under sub-flooring or buried by any description of soil shall be fully encased in a non-metallic, liquid tight conduit such as PVC, ABS or other similar material. Supply and return lines which are above grade but which are covered with mortar shall be considered buried and are also required to be encased in such a sleeve or conduit.

Lines that penetrate a foundation wall shall be encased in a non-metallic, liquid-tight conduit such as PVC, ABS or other acceptable material. The opening of the conduit should be sealed at the wall to prevent the entry of water, insects, rodents, etc. The use of plastic or vinyl coated copper supply (and return) lines are required for all outdoor applications and strongly encouraged for all installations.

VENT LINES AND VENT ALARMS

VENTS: All tanks must be equipped with proper atmospheric venting. Indoor tanks shall be equipped with vent pipes that terminate outside the building. Inside and outside tanks with a capacity of 660-gallons or less shall have a vent with a minimum inside diameter of 1 1/4 inches. Underground tanks with a capacity of 66-gallons or less also require a vent with a minimum inside diameter of 1 1/4 inches. (Note: NFPA requires that when underground tanks are filled by the use of a pump through tight connections, a vent pipe not smaller in size than the discharge to the pump should be used.)

VENT ALARMS and GAUGES: All tanks shall be equipped with a method of determining the oil

level in the tank. As a minimum, an audible vent whistle alarm shall be present on all tanks (above ground and underground). Such a device is used to signify that the predetermined safe fill volume of a tank has been reached during a delivery. Aboveground tanks shall also be equipped with a sight gauge to indicate the liquid level in the tank at any given time. Underground tanks shall be accessible such that a gauge stick can be used to determine the liquid level. The use of electronic liquid level gauges and overfill prevention alarms is also acceptable and encouraged where possible.

ABANDONMENT OF TANKS AND RELATED EQUIPMENT

NFPA 31, section 2-8 states, and these BMPs reiterate: "If a tank and its related piping is abandoned for whatever reason, the tank and all piping connected to it, including the outside fill and vent piping and any piping connected to the appliance, shall be emptied of all contents, cleaned, removed from the premises or property, and disposed of in accordance with all applicable local, state, and federal rules and regulations." The DES Waste Management Division can be contacted to obtain the requirements and available options for the proper disposal of tanks and associated piping.

ADDITIONAL INFORMATION

Keep in mind that DES refers to an OPUF system as those portions of a fuel oil heating system from the fill pipe to the point where the supply line connects to the burner. There are many additional aspects and components of heating systems that are not covered in these BMPs. NFPA 31 remains the document of standard for the installation of oil-burning equipment in New Hampshire and should be used in conjunction with these BMPs for all new installations and system upgrades.

In order to meet the upgrade requirements, financial assistance is available to those owners who demonstrate financial need. Refer to fact sheet WMD-REM-17 for information on the SAFETANK program.

Please contact the OPUF Release Prevention Coordinator in DES's Waste Management Division at (603) 271-3644 for additional information.

Disclaimer: Information contained in this Fact Sheet is current as of January 1, 2004. Statutory or regulatory changes that may occur after that date may cause part or all of the information to become invalid. If there are any questions concerning the current status of information, please contact DES at (603) 271-3644.