

A Watershed Perspective

Introduction

This section of the report provides an overview of surface and ground water resources within the Town of Cornwall (Cornwall) and is based upon Connecticut Department of Environmental Protection (CT DEP) data and knowledge of the region. Recommendations are also offered with regard to measures the Town may wish to pursue in terms of protection, management and/or restoration of these resources.

These comments are given from the perspective of improving and maintaining water quality and supporting designated uses of the State's waters per the State of Connecticut "Water Quality Standards"¹. This information also reflects CT DEP's growing commitment to address water resource concerns from a watershed perspective, taking into account the cumulative impact that various land use policies and activities within a given watershed may have upon water resources.

Please note that some of these comments may overlap with those of other Environmental Review Team (ERT) members who are dealing with more specialized aspects of the review (i.e. – fisheries, wetlands, etc.). In such cases, these comments are meant to support or supplement these specialized reviews, not supplant them.

Watershed Context

As a way of describing Connecticut's water resources in terms of the landscape, CT DEP has divided the state along natural drainage boundaries into eight "major basins" or watersheds. These, in turn, are divided into increasingly smaller, nested watersheds which are described as "regional", "subregional" and "local" drainage basins. At each level, these watersheds are generally named after the brook, river or waterbody into which all of the water within that topographically-defined area ultimately flows. Each drainage area has also been assigned a number which reflects how it is connected to the rest of the watershed. Every water feature, no matter how small, has its own distinct watershed.

Cornwall lies entirely within the Housatonic Major Drainage Basin (No. 6), meaning that all of the surface and ground water within the town's geographic area ultimately flows into the Housatonic River by one route or another.² (see **Drainage Basins Map**) Three Regional Drainage Basins comprise the Housatonic Major Drainage Basin in Cornwall: the

¹ CT DEP Bureau of Water Management – Planning and Standards Division. Effective 2002 & 1996. Water Quality Standards. CT DEP. Hartford, CT.

² Connecticut Geological and Natural History Survey. (Compiled by Marianne McElroy). 1981. Natural Drainage Basins in Connecticut (Map). CT DEP Natural Resources Center in cooperation with the USGS. Hartford, CT

Housatonic Mainstem Regional Drainage Basin (No. 60), the Hollenbeck Regional Drainage Basin (No. 62) and the Shepaug Regional Drainage Basin (No. 67), meaning that water either flows directly to the Housatonic River, or to the Housatonic via the Hollenbeck or Shepaug Rivers. Each of these Regional Drainage Basins is, in turn, divided into Subregional Drainage Basins.

The Housatonic Mainstem Regional Drainage Basin (No. 6) in Cornwall is comprised of three Subregional Drainage Basins:

- Housatonic River Subregional Drainage Basin (No. 6000)
- Mill Brook Subregional Drainage Basin (No. 6008)
- Furnace Brook Subregional Drainage Basin (No. 6010)

The Hollenbeck Regional Drainage Basin (No. 62) in Cornwall is comprised of just one Subregional Drainage Basin:

- Hollenbeck River Subregional Drainage Basin (No. 6200)

The Shepaug Regional Drainage Basin (No. 67) in Cornwall is comprised of two Subregional Drainage Basins:

- Shepaug River Subregional Drainage Basin (No. 6700)
- West Branch of Shepaug River Subregional Drainage Basin (No. 6702)

These Subregional Drainage Basins can be further subdivided into Local Drainage Basins. However, for the purposes of this review, water resources will be examined at the Regional and Subregional Drainage Basin level.

Water Quality Standards, Classifications and Criteria

Per federal Clean Water Act requirements as well as Connecticut's own Clean Water Act, the State has adopted "Water Quality Standards" (WQS) that establish water quality management goals and policies for the State's surface and ground waters. There are three basic elements associated with the WQS:

- 1) Standards³ – The Standards describe general goals and policies for maintaining or improving water quality. They also establish the allowable discharges, principles of waste assimilation, and anti-degradation policy;
- 2) Classifications and Criteria – The Classifications establish water quality classes (i.e. – AA, A, B, etc.) and describe their designated uses (i.e. – potential drinking water supply, fish and wildlife habitat, recreational use, etc.). The Criteria specify

³ Connecticut's Water Quality Standards, inclusive of classifications and criteria, can be viewed on CT DEP's website at: http://www.ct.gov/dep/lib/dep/water/water_quality_standards/wqs.pdf.

narrative and numerical factors (i.e. – chemical, physical, bacterial criteria) to be met for each Classification.

- 3) Classification Maps⁴ – The Classification Maps are a companion piece to the WQS and show the classification(s) assigned to specific surface and ground water resources throughout the state. These assignments are based on both the use or potential use of such waters as well as on their known or presumed quality. In cases where actual water quality does not meet desired water quality, the Classification Maps reflect this fact by means of assigning a split designation - such as B/A. In this example, the first letter (B) represents the current water quality, and the second letter (A) represents the water quality goal for that surface water resource.

At the State level, CT DEP uses these classifications to make decisions as to how these water resources will be managed and what sorts of water-related withdrawals or discharges will be allowed or not allowed with regard to regulatory programs that CT DEP administers. The Town of Cornwall should also be aware of the implications of these Classifications with regard to local land use planning and decision making.

Specific water quality classifications for surface and ground waters in Cornwall will be discussed in the sections that follow. It should be noted that the Classification Map for the Housatonic Major Basin was last updated in 1999. Since that time, additional waters have been identified as not meeting water quality standards under a related but separate program within CT DEP that also deals with water quality. At least one waterbody in Cornwall falls in this category. This discrepancy will be discussed in a subsequent section. CT DEP is working to better integrate the information produced by each of these water quality programs. However, because reclassification of waters must go through a formal hearing process which can be a long and complicated proceeding, the Classification Maps have typically not been updated frequently.

Surface Water Resources

In this section, information about Cornwall's surface water resources from several CT DEP programs and sources is presented and discussed.

⁴ For those with Geographic Information System (GIS) capabilities, Classification Maps can be downloaded directly from CT DEP's website at:

http://www.ct.gov/dep/cwp/view.asp?a=2698&q=323342&depNav_GID=1707&depNav_

Environmental GIS Data for Connecticut can also be purchased in CD form through the CT DEP Store. For more information, see the CT DEP website at:

http://www.ct.gov/dep/cwp/view.asp?a=2698&q=322886&depNav_GID=1708&depNav_

Paper print-outs of the Classification Maps can also be purchased directly from the CT DEP through "Maps on Demand". For more information, see the CT DEP website at:

<http://www.ct.gov/dep/cwp/view.asp?a=2688&q=322398>

Surface Water Quality Classifications

The Surface Water Quality Classifications for Cornwall are most easily examined at the Regional Drainage Basin level.⁵ (See **Water Quality Classifications Map**)

- Shepaug Regional Drainage Basin – This entire drainage basin within Cornwall is classified as Class AA⁶. This is because it is part of a public water supply watershed area that drains to reservoirs that serve the City of Waterbury.

As host community to a portion of a public drinking water supply watershed, the Town of Cornwall should be acquainted with the Source Water Protection Program administered by the CT Department of Public Health (CT DPH). This program is geared toward protecting not only the withdrawal point for surface and ground water public drinking water supplies but also the area of land over and through which water flows to these reservoirs and wells. For more information on the Source Water Protection Program, see the CT DPH website at:

<http://www.ct.gov/dph/cwp/view.asp?a=3139&q=387338> .

- Hollenbeck Regional Drainage Basin – This entire drainage basin within Cornwall is classified as Class A⁷.
- Housatonic Mainstem Regional Drainage Basin – Most of the surface waters in this drainage basin are classified as Class A with a couple of exceptions. These exceptions are Furnace Brook which is classified as Class B/A⁸; and the Housatonic River which is classified as Class D/B⁹.

Furnace Brook is classified as B/A due to the presence of an inactive Town mixed waste landfill site near the stream. Water resources near landfill sites are typically assigned an existing Class B condition or lower because it is assumed that leachate

⁵ CT DEP Environmental and Geographic Information Center. 1997. Water Quality Classifications - Housatonic River, Hudson River, and Southwest Coastal Basins (Map). CT DEP. Hartford, CT

⁶ **Class AA surface waters** have overall excellent water quality and the following designated uses: existing or potential drinking water supply; fish and wildlife habitat; recreational use (may be restricted); agricultural and industrial supply.

⁷ **Class A surface waters** have overall excellent water quality and the following designated uses: potential drinking water supply; fish and wildlife habitat; recreational use; agricultural and industrial supply, and other legitimate uses including navigation.

⁸ **Class B surface waters** have good to excellent water quality and the following designated uses: recreational use, fish and wildlife habitat, agricultural and industrial supply, and other legitimate uses including navigation.

⁹ **Class D surface waters** have unacceptable water quality and the goal is Class B or Class A. Designated uses: same as for B. One or more of the designated uses for class B is not fully supported due to an intractable or very difficult pollution problem.

may be affecting water quality. In order for Furnace Brook to achieve the goals of Class A surface waters, outstanding issues regarding the landfill would need to be addressed. Furnace Brook is discussed further in the Water Quality Assessments section.

The Housatonic River is classified Class D/B due to the presence of polychlorinated biphenyls (PCBs) which are primarily associated with releases from the General Electric Company (GE) facility in Pittsfield, MA. A remediation project led by the U.S. Environmental Protection Agency (U.S. EPA) is currently underway. CT DEP expects the outcome of this process to eventually allow the Housatonic River to be reclassified as Class B. This complicated, inter-State issue is discussed further in the Impaired Waters section.

Leachate and Wastewater Discharge Sources

A companion piece to the Water Quality Classifications is the Leachate and Wastewater Discharge Sources inventory and maps. A major determinant of existing water quality conditions is the known or suspected presence of waste materials, discharges of wastewater, and other sources of known pollution. The Leachate and Wastewater Discharge Sources inventory is a list of these sources and the accompanying maps locate and generally categorize the type of waste source¹⁰. The inventory is comprised of surface and ground water discharge information including: wastewater discharges which have received a state permit; historic and now defunct waste disposal sites; accidental spills or leaks; and other discharges or releases of liquid or solid wastes which are known or suspected of affecting water quality. It does not necessarily represent all known or potential sources of pollution that may exist. The inventory is used by CT DEP to assess water quality conditions and establish goals.

In Cornwall, 10 Leachate and Wastewater Discharge Sources have been listed in the inventory and are identified on the corresponding map.¹¹ (See **Leachate and Wastewater**

¹⁰ CT DEP Bureau of Water Management. 1999. Leachate and Wastewater Discharge Sources Inventory. Hartford, CT

¹¹ CT DEP Environmental and Geographic Information Center. Revised 1997. Leachate and Wastewater Discharges – Housatonic River, Hudson River, and Southwest Coastal Basins (Map). CT DEP. Hartford, CT

For those with Geographic Information System (GIS) capabilities, Leachate and Wastewater Discharge Sources Maps can be downloaded directly from CT DEP's website at:

http://www.ct.gov/dep/cwp/view.asp?a_2698&q_323342&depNav_GID_1707&depNav_

Environmental GIS Data for Connecticut can also be purchased in CD form through the CT DEP Store. For more information, see the CT DEP website at:

http://www.ct.gov/dep/cwp/view.asp?a_2698&q_322886&depNav_GID_1708&depNav_

Paper print-outs of the Leachate and Wastewater Discharge Sources Maps can also be purchased directly from the CT DEP through "Maps on Demand". For more information, see the CT DEP website at:

http://www.ct.gov/dep/cwp/view.asp?a_2688&q_322398

Discharge Sources Map) In some cases, the Leachate and Wastewater Discharge Sources displayed on the map have been used to determine the Water Quality Classification of a particular surface or ground water resource. For example, in the instance of Furnace Brook which was described previously, an inactive mixed waste landfill site has been identified as a Leachate and Wastewater Discharge Source and has been taken into consideration with regard to the Water Quality Classification of that stream. However, in other cases, Leachate and Wastewater Discharge Sources have been identified that have not influenced the Water Quality Classification of the adjacent surface or ground water resources. This may be because the Leachate and Wastewater Discharge Source has been remediated, or - as in many cases - the real or potential impact on the surface and/or ground water resources has not been determined. In any event, CT DEP believes that it is important to record this information, especially if it is uncertain that the site has been completely remediated.

Water Quality Assessments

To determine whether the State's surface water resources are meeting the designated use goals assigned to them per the Water Quality Classifications, CT DEP periodically assesses selected water bodies throughout the state. Generally, three basic designated uses are assessed for each surface water resource: fish consumption; recreation; and habitat for fish, other aquatic life and wildlife. Through the assessment process, each of these designated uses is classified as being either "fully supporting"; "impaired" or "unassessed". In some cases, there is "insufficient information" to make an assessment. The ideal situation, of course, is when all three designated uses are determined to be "fully supporting" for a particular water resource. However, there are many instances where one designated use is found to be "fully supporting" while the other two uses may be "impaired" or "unassessed". These results (as well as a description of Connecticut's water quality management program and assessment process) are reported biennially to the federal government in the "Integrated Water Quality Report to Congress"¹²

In Cornwall, eight surface water resources (or portions of those water resources) have been assessed recently or historically. (See **Assessed Waterbodies Map**) Included in this assessment are two lakes/ponds:

- Cream Hill Lake (No. CT6008-00-1-L1_01)
- Mohawk Pond (No. CT6700-03-1-L2_01)

In addition, six rivers/streams - or segments of these watercourses - have been assessed:

- Housatonic River (No. CT6000-00_06)

¹² For more information, see the most recent report: CT DEP Bureau of Water Management. December 2006. Integrated Water Quality Report to Congress - prepared pursuant to Federal Clean Water Act Sections 305(b) and 303(d). Hartford, CT. This document can be viewed on CT DEP's website at: [http://www.ct.gov/dep/lib/dep/water/water_quality_management/305b/2006_305\(b\)fullplusapps.pdf](http://www.ct.gov/dep/lib/dep/water/water_quality_management/305b/2006_305(b)fullplusapps.pdf)

- Gunn Brook (No. CT6000-14_01)
- Mill Brook (No. CT6008-00_01 & CT6008-00_02)
- Furnace Brook (No. CT6010-00_01)
- Hollenbeck River (No. CT6200-00_01)
- Bradford Brook (No. CT6200-01_01)

The beginning and end points of each stream or river segment are described in Appendix A of the “Integrated Water Quality Report to Congress”.

With regard to Cream Hill Lake and Mohawk Pond, both waterbodies are reported as being fully supporting with regard to fish consumption; recreation; and habitat for fish, other aquatic life and wildlife. However, it is important to note that some of the information used in these assessments is dated. Some of the information for Cream Hill Lake goes back to a 1978 study. Likewise, some of the information for Mohawk Pond dates from around 1995. Lakes are primarily assessed in terms of their trophic condition which is discussed further in the section of this report entitled: Lake Trophic Categories. Seasonal water quality testing for “indicator bacteria” is also required of State and local agencies that maintain public bathing beaches. Contact the local or regional health district for the Town of Cornwall for more information with regard to this matter.

With regard to the river and stream assessments –

- **Housatonic River** (18.23 mile segment) – This segment was determined to be fully supporting for habitat for fish, other aquatic life and wildlife. Insufficient information was available to assess it for recreation. It is impaired for fish consumption.
- **Gunn Brook** (3.58 mile segment) – This segment was determined to be fully supporting for fish consumption; and habitat for fish, other aquatic life and wildlife. It was not assessed for recreation.
- **Mill Brook** (two segments totaling 3.85 miles) – The first 1.63 mile segment which begins at the mouth of the brook was determined to be fully supporting for fish consumption. It was not assessed for habitat for fish, other aquatic life and wildlife; or for recreation. The second 2.22 mile segment which begins around the Route 128 crossing, was determined to be fully supporting for fish consumption. It was not assessed for recreation. It is impaired for habitat for fish, other aquatic life and wildlife.
- **Furnace Brook** (3.98 mile segment) – This segment was determined to be fully supporting for fish consumption; and habitat for fish, other aquatic life and wildlife. It was not assessed for recreation.
- **Hollenbeck River** (18.32 mile segment) – This segment was determined to be fully supporting for fish consumption. It was not assessed for habitat for fish, other aquatic life and wildlife; and insufficient information was available to assess it for recreation.
- **Bradford Brook** (1.98 mile segment) – This segment was determined to be fully supporting for fish consumption; and habitat for fish, other aquatic life and wildlife. It was not assessed for recreation.

As mentioned in the foregoing sections on Water Quality Classifications and Leachate and Wastewater Discharge Sources, Furnace Brook has been classified as B/A because of the historic landfill located near it which may be affecting this stream's ability to meet all Class A water quality criteria. This assessment shows, however, that this stream is meeting Class A and B uses associated with fish and wildlife habitat.

With regard to Mill Brook, this assessment shows that the upper section of this stream is not meeting designated uses for Class A waters with regard to fish and wildlife habitat. Unless this impairment is corrected in the near future, the water quality classification for this stream may eventually be modified to reflect the current situation. In conjunction with this, the presumed source(s) of impairment would be added to Leachate and Wastewater Discharge Sources inventory and map.

The two impaired surface water resources in Cornwall – Mill Brook as well as the Housatonic River – are discussed further in the Impaired Waters section that follows.

Impaired Waters

Through the water quality assessment process, a subset of waterbodies have been identified as not meeting Connecticut's "Water Quality Standards". These waterbodies are called "impaired waters" and are identified in a separate section of the "Integrated Water Quality Report to Congress" (Appendix C), generally referred to as the "Impaired Waters List"¹³.

As described in the preceding section, two surface water resources in Cornwall have been identified as impaired through water quality assessments conducted by CT DEP – the upper section of Mill Brook, and the Housatonic River. Each of these impairments will be discussed in more detail in this section.

- **Mill Brook** (CT6008-00_02) – A 2.2 mile section of this stream, starting at the confluence of Heffers Brook (just upstream of the Route 128 crossing) and ending at the Cream Hill Lake outlet dam, has been determined to be impaired for habitat for fish, other aquatic life and wildlife. The exact cause of the impairment is unknown but suspected sources include nonpoint runoff from agricultural activities. This segment ranks high on CT DEP's Total Maximum Daily Load (TMDL)¹⁴ priority list for developing a TMDL for this stream segment. A TMDL is a "tool" used by CT DEP to address water quality problems. TMDLs provide the framework for restoring impaired waters by establishing the maximum amount of a pollutant that a waterbody can receive without adverse impact to fish, wildlife, recreation, or other uses. Under

¹³ For further information on the Impaired Waters List, see the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325614&depNav_GID=1654

¹⁴ For further information on TMDLs, see the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325604&depNav_GID=1654

the federal Clean Water Act, States are required to develop TMDLs for waters that have been identified as being impaired by pollutants, or find another appropriate mechanism for addressing the impairment. As an initial step toward addressing the Mill Brook impairment, CT DEP is providing a grant through its Nonpoint Source Program to the Northwest Conservation District (NCD) to do a survey of the watershed to help identify possible source(s) of pollution. NCD will also provide CT DEP with recommendations for addressing the problem(s). As this process moves forward, NCD and/or CT DEP may be looking to the Town for assistance in addressing this situation so that Mill Brook can eventually be removed from the Impaired Waters List.

- **Housatonic River** (No. CT6000-00_06) – Almost the entire Housatonic River, from the Derby Dam in Shelton and Derby, up to the Massachusetts border, has been determined to be impaired for fish consumption. This includes the segment of the Housatonic River that forms the western boundary of the Town of Cornwall. As mentioned previously, the cause of this impairment is polychlorinated biphenyls (PCBs) and the source is primarily the General Electric Company (GE) facility in Pittsfield, MA and contaminated sediments that have migrated downstream into Connecticut. PCBs generally attach to sediments and other small particles which, as they are transported through the river system, get ingested by aquatic life, incorporated into the food chain, and concentrated in predatory species toward the top of the feeding hierarchy. As a result of PCBs levels in certain fish species in the Housatonic River, the Connecticut Department of Public Health (CT DPH) has issued a fish consumption advisory.¹⁵

In October 2000, a Consent Decree was issued by the U.S. District Court in Springfield, MA regarding remediation and restoration of the GE-Pittsfield/Housatonic River Site. Parties to the Consent Decree include: the U.S. Environmental Protection Agency; the U.S. Department of Justice; the Commonwealth of Massachusetts' Attorney General's Office, Executive Office of Environmental Affairs, and Department of Environmental Protection; the State of Connecticut Attorney General's Office and Department of Environmental Protection; the U.S. Department of Interior, the National Oceanic and Atmospheric Administration, the City of Pittsfield, the Pittsfield Economic Development Authority, and the General Electric Company. Because another process has been established to address PCB contamination that, if successful, will result in attainment of "Water Quality Standards" and goals for the Housatonic River in Connecticut, CT DEP has chosen to pursue this process rather than the TMDL- approach.

The Consent Decree specifies a very detailed process for addressing clean-up of PCBs at the GE facility, a number of other properties and sites in the Pittsfield area,

¹⁵ For more information on the Housatonic River PCB fish consumption advisory, see the CT DPH website at: http://www.ct.gov/dph/ewp/view.asp?a=3140&q=387460&dphNav_GID=1828&dphPNavCtr_#47464

and in the Housatonic River. The U.S. Environmental Protection Agency (EPA) is responsible for overseeing the remediation effort which includes performing, directing and/or approving work associated with this project. The riverine portion of the clean-up is being addressed in stages and for this purpose, the Housatonic River has been divided into three distinct parts, referred to as the ½ mile, the 1 ½ mile, and Rest of River. The ½ mile and 1 ½ mile comprise the 2 mile section of the East Branch of the Housatonic, immediately adjacent to and downstream of the GE facility to the confluence of the West Branch of the Housatonic. Remediation of these two river sections was completed in 2002 and 2006, respectively. Although a very complicated undertaking, in basic terms, the river clean-up involved removing sediments that exceeded certain predetermined contamination levels and replacing them with clean sediment.

The Rest of River portion is comprised of the 135 mile mainstem of the Housatonic River, which starts at the confluence of the East and West Branches and continues downstream through the rest of Massachusetts and Connecticut to Long Island Sound. According to studies done by U.S. EPA and GE, the greatest mass of PCBs in Rest of River is concentrated within the first 10.5 miles of river and floodplain between the confluence of the East and West Branches and Woods Pond Dam in Lee, MA. As outlined in the Consent Decree, there are many steps associated with Rest of River with regard to determining the extent and degree of PCB contamination throughout the riverine system, and what, if any, additional remediation will take place. This complicated process is expected to take many years and the final outcome has not yet been determined. To date, U.S. EPA has completed ecological and human health risk assessments, and PCB transport and fate modeling studies. These, in turn, have triggered requirements for GE to provide Interim Media Protection Goals which have been completed and a Corrective Measures Study which is currently underway. All of these steps are ultimately leading to a Final Cleanup Decision for Rest of River. Additional and more detailed information about the 2000 Consent Decree and GE/Housatonic River Site can be found on the U.S. EPA website¹⁶.

As a party to the Consent Decree, CT DEP has been participating in remediation process decisions by providing comments on key documents produced that affect the State of Connecticut's interests. The Town of Cornwall has also been involved in the remediation process through its representative on the Housatonic River Commission who participates in the Citizen Coordinating Council hosted by U.S. EPA. CT DEP is particularly concerned that the on-going source of PCBs in Massachusetts be addressed. Sometime after completion of this project, it is expected that the Housatonic River will subsequently meet "Water Quality Standards" for fish consumption in Connecticut so that the fish consumption advisory can be lifted and the waterbody removed from the "Impaired Waters List".

¹⁶ U.S. EPA website for GE/Housatonic River Site: <http://epa.gov/region01/ge/>

Monitoring of fish and aquatic macroinvertebrates in the Connecticut portion of the Housatonic River has been occurring through an independent, voluntary agreement between CT DEP and GE, and is expected to continue during and following any additional remediation activities that may take place. A portion of this monitoring is conducted in the West Cornwall section of the Housatonic River.

Lake Trophic Categories

In addition to being classified according to water quality, lakes (and large ponds) in Connecticut are also categorized according to “trophic” condition. “Trophic” basically refers to the amount of nutrients in a lake which, in turn, affects algae and other aquatic plant growth. As a lake “matures”, it becomes shallower as a result of accumulated sediment and decaying vegetation, which allows more opportunity for rooted aquatic plants and wetland vegetation to become established. This natural aging process is referred to as “eutrophication” and it occurs at different rates, depending on many factors influencing a particular waterbody. However, eutrophication can also be influenced by human activities which cause the rate of eutrophication to increase beyond the normal pace. This is referred to as “cultural eutrophication”. Agricultural runoff, excess application of lawn fertilizers, and malfunctioning septic systems are examples of activities which may contribute excess nutrients to a lake and cause cultural eutrophication to occur.

As per Connecticut’s Water Quality Standards, lakes are primarily assessed with regard to how their current condition compares to what their natural trophic condition would be, absent any significant cultural impacts. Parameters used to assess lakes pertain primarily to levels of nutrients (ie. – phosphorus and nitrogen), water clarity, and degree of plant productivity (ie. - algae and rooted aquatic vegetation). Using these parameters, lakes are identified as falling into one of the following four trophic categories: oligotrophic, mesotrophic, eutrophic and highly eutrophic.¹⁷ Since eutrophication is a natural process, this categorization system recognizes that there is nothing wrong with a eutrophic lake that has naturally matured to that condition. It is a problem, however, if a lake is categorized as naturally mesotrophic but has become eutrophic as a result of human activities.

¹⁷ **Oligotrophic Lakes** may be Class AA, Class A, or Class B water. Low in plant nutrients. Low in biological productivity characterized by the absence of macrophyte beds. High potential for water contact recreation.

Mesotrophic Lakes may be Class AA, Class A, or Class B water. Moderately enriched with plant nutrients. Moderate biological productivity characterized by intermittent blooms of algae and/or small areas of macrophyte beds. Good potential for water contact recreation.

Eutrophic Lakes may be Class AA, Class A, or Class B water. Highly enriched with plant nutrients. High biological productivity characterized by frequent blooms of algae and/or extensive areas of dense macrophyte beds. Water contact opportunities may be limited.

Highly Eutrophic Lakes may be Class AA, Class A, or Class B water. Excessive enrichment with plant nutrients. High biological productivity, characterized by severe blooms of algae and/or extensive areas of dense macrophyte beds. Water contact may be extremely limited.

As described earlier, two lakes in Cornwall have been assessed: Mohawk Pond and Cream Hill Lake. Both were found to be fully supporting with regard to fish consumption; recreation; and habitat for fish, other aquatic life and wildlife. However, as noted previously, some of the information used in these assessments is dated. Following are the trophic categorizations for each of these lakes as well as some pertinent watershed considerations:

- **Mohawk Pond** – Early Mesotrophic; 16.2 acre pond with 122 acre watershed; Mean depth = 15 ft.; Maximum depth = 26 ft.¹⁸

A relatively small, mostly forested watershed surrounds this deep kettle pond which is located in both Cornwall and Goshen. This means that under undisturbed, natural conditions, a relatively small amount of nutrients are making their way into this pond, as compared to what would be contributed if the watershed were much larger. Because a large volume of water is receiving a small amount of nutrients, the concentration of nutrients in the pond is relatively dilute. As a result, the natural eutrophication rate of this pond is comparatively low. However, if there were to be a lot of human disturbance within this watershed, the impact on the waterbody would also be greater. Much of Mohawk Pond's watershed is comprised of State forest lands which serve to protect this waterbody. There is a YMCA camp on the northwestern shore of the pond and there is a State boat launch on the southwestern shore. Development activities within the private lands that drain to the lake could potentially affect lake water quality. Mohawk Pond is fed by runoff and bottom springs and drains through a marsh to the East Branch of the Shepaug River.

- **Cream Hill Lake** – Early Mesotrophic; 73 acre lake with 403.2 acre watershed; Mean depth = 15.7 ft.; Maximum depth = 43 ft.¹⁹

¹⁸ CT DEP Bureau of Water Management. Revised 1996. Caring for Our Lakes – Watershed and In-Lake Management for Connecticut Lakes. Hartford, CT (This document can be viewed on CT DEP's website at: http://www.ct.gov/dep/cwp/view.asp?a_2719&q_325528&depNav_GID_1654)

Jacobs, Robert P., Eileen B. O'Donnell. 2002. A Fisheries Guide to Lakes and Ponds of Connecticut. CT DEP Bulletin 35. Hartford, CT

Note – Several earlier references provide slightly different measurements with regard to watershed size, pond acreage and depth of Mohawk Pond. For example, also see: CT DEP Bureau of Water Management. 1991. Trophic Classifications of Forty-Nine Connecticut Lakes. Hartford, CT. This lists watershed area = 99.8 acres; surface area = 15.2 acres; mean depth = 16.2 ft.; maximum depth = 27 ft.

¹⁹ Frink, C.R. and W.A. Norvell. 1984. Chemical and Physical Properties of Connecticut Lakes. The Connecticut Agricultural Experiment Station. Bulletin No. 817. New Haven, CT

State Board of Fisheries and Game – Lake and Pond Survey Unit. 1959. A Fishery Survey of the Lakes and Ponds of Connecticut. Report No. 1. Hartford, CT

As with Mohawk Pond, the size of the watershed area contributing to Cream Hill Lake is relatively small compared to the lake's surface area and depth. Hence, the natural eutrophication rate of this pond is also relatively low. The watershed area contributing to this lake is mostly forested, with some agriculture and development. There is a small amount of development along the lake – mostly along the eastern shoreline. In addition, the Cream Hill Lake Association, a private club, is located on the northwestern shoreline of the lake. According to CT DEP data, all of the watershed lands are privately owned. The future use and/or protection of these lands is an important consideration with regard to maintaining the water quality of Cream Hill Lake. This waterbody is fed by bottom springs and a small brook, and the water level is slightly elevated due to the presence of a low dam. The outlet stream from the lake drains to Mill Brook.

As part of its natural resource inventory, the Town of Cornwall may wish to collect and evaluate the existing, historical data for these two bodies of water. This information can be used to determine whether it might be appropriate to have updated studies done for these lakes. In addition to consulting with the CT DEP Lakes Management Program²⁰, Cornwall may wish to make use of resources that can be found on the Connecticut Federation of Lakes (CLF) website at: <http://www.ctlakes.org/>. As suggested by its name, CLF is a consortium of lakes groups, working together to address common issues and share information. In addition, the Town may wish to consider requesting a no-cost vegetation survey from the Connecticut Agricultural Experiment Station (CAES) which is amidst a multi-year aquatic invasive species project. For more information, consult the CAES website at: <http://www.ct.gov/caes/site/default.asp> and click on the link for “invasive aquatic plants”. Finally, consult “Caring for Our Lakes” on the CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325528&depNav_GID=1654 for basic information on developing lake management plans.

Ground Water Resources

In this section, information about Cornwall's ground water resources from several CT DEP and Connecticut Department of Public Health (CT DPH) programs and sources is presented and discussed.

Ground Water Quality Classifications

As can be seen on the Water Quality Classifications map (**See Water Quality Classification Map**), most of the ground water in the Housatonic Regional Drainage Basin and Hollenbeck

²⁰ Contact CT DEP Lakes Management Program by phone at: (860)424-3716

Regional Drainage Basin sections of Cornwall are classified as Class GA.²¹ There are several problematic areas, however, where the water is listed as being GA or GAA²² with the special notation that ground water in these areas “may not meet current standards”. This means CT DEP knows or suspects that the ground water may be degraded in some way. In some but not necessarily all of these instances, the questionable status of the ground water may be linked to one of the Leachate and Wastewater Discharge Sources described earlier, for example, a past spill or an area of failing septic systems.

All of the ground water in the Shepaug Regional Drainage Basin is classified as Class GAA. As mentioned earlier, this area is part of the public water supply watershed for the City of Waterbury.

Aquifers

The term “aquifer” applies to any geologic formation capable of yielding usable quantities of water to wells.²³ A “usable quantity” can vary depending on whether one needs to supply an individual residence or an entire town. This definition of aquifers encompasses not only coarse stratified drift (glacial deposits of sand and gravel) but also the finer glacial materials and fractured bedrock. Most people, however, are specifically thinking of glacial deposits of coarse stratified drift when they refer to aquifers as these materials tend to yield greater quantities of ground water, particularly for public water supply systems.

Cornwall basically relies on its underlying bedrock aquifer to supply both public and private drinking water wells. However, as seen on the accompanying map, there are a number of areas of stratified drift scattered throughout the Town, along the river and stream valleys. (See **Aquifers Map**) Many of these stratified drift deposits are limited in extent and it is assumed that the amount of water they might yield would also be limited. However, there are three areas of stratified drift in Cornwall that have been identified as having the potential to serve as high and/or moderate yield aquifers for public water supply. Further hydrogeologic investigation would be needed to develop a more accurate prediction as to how much water these aquifers might potentially yield. With regard to the high and moderate yield aquifers along the Housatonic River, it is important to recognize that the aquifer areas on either side of the river are hydraulically connected (i.e. – extend into

²¹ **Class GA ground waters** have overall excellent water quality and the following designated uses: existing private and potential public or private supplies of water suitable for drinking without treatment; baseflow for hydraulically connected surface water bodies.

²² **Class GAA ground waters** have overall excellent water quality and the following designated uses: existing or potential public supply of water suitable for drinking without treatment; baseflow for hydraulically-connected surface water bodies.

²³ For general information on ground water and aquifers, please see CT DEP’s website at: http://www.ct.gov/dep/cwp/view.asp?a=2685&q=322260&depNav_GID=1625&depNav=

neighboring townships). In addition, any evaluation of these aquifers as potential water supplies would need to also take into account other important factors such as the amount of "base flow" that these aquifer areas provide to the river, and overlying land uses that may affect the quality of the ground water beneath.

Ground Water Protection Programs

There are two different programs at the State level that were created to specifically help protect public drinking water supplies and/or ground water drinking supplies, in particular. One is the Aquifer Protection Program which is administered by CT DEP and augments existing CT DEP water quality programs; the other is the Source Water Protection Program which is administered by the CT Department of Public Health (CT DPH).

The CT DEP Aquifer Protection Program is specifically focused on protecting public water supply wells in sand and gravel aquifers that serve more than 1000 people. None of the public water supply wells in Cornwall serve more than 1000 people, and all of these wells are located in bedrock. Therefore, none of Cornwall's public water supply wells fall under the umbrella of this program. However, it might be helpful for the Town of Cornwall to review the Aquifer Protection Program for components that might be useful in protecting the public water supply wells throughout town. More information on the Aquifer Protection Program can be found on the CT DEP website at:

http://www.ct.gov/dep/cwp/view.asp?a=2685&q=322252&depNav_GID=1654.

The CT DPH Source Water Protection Program is geared towards protecting both surface and ground water public drinking supplies.²⁴ This program was mentioned previously in the "Surface Water Quality Classification" section since a portion of Cornwall lies in the Shepaug Regional Drainage Basin, a public water supply watershed which contributes to downstream surface water reservoirs. Cornwall residents do not receive any of their drinking water from surface water supplies. While most residents rely on private wells, a portion of the population depends on community wells. In addition, there are a number of non-community wells which serve schools and businesses. Altogether, there are approximately a dozen community and non-community public water supply wells throughout Cornwall.

One component of the Source Water Protection Program is the federal Source Water Assessment Program (SWAP) which was established to assess all public drinking water supply sources in terms of their susceptibility to potential sources of contamination. In accordance with this program, CT DPH, in cooperation with CT DEP, conducted a statewide assessment of all public drinking water supply sources. Reports and maps were produced for all public water supply systems, along with recommendations for protection. Copies of all of these reports were provided to the chief elected official (or designee) for each municipality.

²⁴ Information on the CT DPH Source Water Protection Program can be found on the CT DPH website at: http://www.ct.gov/dph/cwp/view.asp?a_3139&q_387338

However, because the location of these public water supplies is considered sensitive due to national security threats, maps of these well sites can no longer be made publicly available. This is a double-edged sword, of course, because these circumstances also make it difficult to educate citizenry and raise public awareness about local land use policy and practices that are needed to protect the source areas which supply these wells with water. For further information on SWAP, see CT DPH's website at:

<http://www.ct.gov/dph/cwp/view.asp?a=3139&q=387342> . For guidance on how to protect community and non-community wells and how to incorporate this type of sensitive information into a municipal natural resource inventory, contact the CT DPH Drinking Water Section at: (860)509-7333.

General Recommendations for Water Resource Protection

In addition to the foregoing information and recommendations with regard to Cornwall's surface and ground water resources, the Town should be familiar with the following documents which are specifically geared towards protecting water resources impacted by non-point source pollution and stormwater run-off from land use development activities:

- "2002 Connecticut Erosion & Sedimentation Guidelines"²⁵
- "Connecticut Stormwater Quality Manual"²⁶

The Town of Cornwall should consider incorporating these documents into its local land use plans and regulations if it has not done so already. Additional information on state-of-the-art stormwater management practices, low impact development (LID) techniques and watershed protection can be obtained through:

- The University of Connecticut - Cooperative Extension System – Nonpoint Education for Municipal Officials program (NEMO). See their website at: <http://nemo.uconn.edu/>
- The Center for Watershed Protection. See their website at: <http://www.cwp.org/index.html>

In addition, information on creating greenways along Connecticut's rivers and streams for protection of water quality and other purposes can be found on the CT DEP website at:

http://www.ct.gov/dep/cwp/view.asp?a=2707&q=323858&depNav_GID=1704&depNav=

²⁵ The Connecticut Council on Soil and Water Conservation in cooperation with the Connecticut Department of Environmental Protection. 2001. 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (DEP Bulletin 34). Hartford, CT.

²⁶ Connecticut Department of Environmental Protection. 2004. 2004 Connecticut Stormwater Quality Manual. Hartford, CT. This document can be viewed on CT DEP's website at:

http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325704&depNav_GID=1654)

Related Initiatives and Programs

Additional information on Cornwall's water resources and recommendations for management and protection may be gained from the following regional programs and initiatives that include all or portions of Cornwall:

- Housatonic River Management Plan²⁷ (Housatonic River Commission)

For more information, contact the Northwestern Connecticut Council of Governments by telephone at: (860)868-7341

- Housatonic Riverbelt Greenway

In 2001, the Housatonic Main Stem was officially designated by the Governor of Connecticut as the "Housatonic Riverbelt Greenway". It is hoped that this planning designation will encourage towns and other groups to work together and create a contiguous greenway along the river corridor. The Housatonic Valley Association (HVA) has been working with communities and other organizations up and down the river corridor to make this vision a reality.

For more information, see the HVA website at:

<http://www.hvatoday.org/show.cfm?page=land/riverbelt.htm&folder=land>

- Litchfield Hills Greenprint Project (Housatonic Valley Association/Trust for Public Land)

For more information, see the HVA website at:

<http://www.hvatoday.org/show.cfm?page=land/greenprint.htm&folder=land>

and the TPL website at:

http://www.tpl.org/tier3_cd.cfm?content_item_id=19095&folder_id=261

- Northwest Highlands Program (The Nature Conservancy – CT Chapter)

For more information, see the TNC-CT website at:

<http://www.nature.org/wherewework/northamerica/states/connecticut/preserves/arc121228.html> (Note – TNC-CT has also conducted a special study focusing

specifically on the Hollenbeck watershed which included identifying important natural resources, threats to natural resources, etc.)

²⁷ Housatonic River Commission. September 2006. Housatonic River Management Plan. (Prepared for Housatonic River Commission by Dodson Associates, Ltd.) Warren, CT

- Upper Housatonic Valley National Heritage Area

For more information, see UHVNHA website at:
<http://www.upperhousatonicheritage.org/>

- Highlands Study (U.S. Forest Service)

For more information, see the USFS website at:
<http://www.na.fs.fed.us/highlands/> (Note – Phase 2 of the Connecticut study is currently underway. As part of this, the U.S. Geological Survey is conducting a water resources study which includes the Cornwall area.)

Housatonic River Hydroelectric Project (FERC No. 2576)

The Housatonic has been extensively harnessed for hydroelectric power generation. In Connecticut, FirstLight Hydro Generating Company operates five hydroelectric facilities on the Housatonic River: Falls Village, Bulls Bridge, Rocky River (associated with Candlewood Lake), Shepaug (dam forms Lake Lillinonah) and Stevenson (dam forms Lake Zoar). A new license covering all of these facilities was issued by the Federal Energy Regulatory Commission (FERC) in June 2004. The entire operation is referred to as the Housatonic River Hydroelectric Project (FERC No. 2576).

The license includes a Water Quality Certificate (WQC) issued by CT DEP. Among other things, the WQC requires that the Falls Village hydropower facility operate in “run-of-river” mode rather than in the former “pond-and-release” mode. This basically means that all the water coming down the river must continue to pass down the river, through the hydropower plant and/or the natural bypass channel below the dam. In other words, the water can no longer be impounded, held for a period of time and then released at the Falls Village dam as was previously done. CT DEP required this change of operation to improve water quality and aquatic habitat in the stretch of river below the dam. The Falls Village hydropower operation is the only Housatonic River Project facility above Cornwall and this change to a more natural flow regime affects the segment of river that forms the Town’s western border. A copy of the FERC License and other documents related to the Housatonic River Hydroelectric Project can be found on the FERC website at: <http://www.ferc.gov/>.²⁸

²⁸ When searching the FERC eLibrary for documents related to the FirstLight Hydro Generating Company – Housatonic River Hydroelectric Project (FERC No. 2576), be sure to enter “P-“ in front of the license docket number. (For example, enter: P-2576)

References

- Connecticut Council on Soil and Water Conservation in cooperation with the Connecticut Department of Environmental Protection. 2001. 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (DEP Bulletin 34). Hartford, CT.
- CT DEP. 2004. Connecticut Stormwater Quality Manual. Hartford, CT. (This document can be found on the CT DEP website at:
http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325704&depNav_GID=1654)
- CT DEP. 2006. List of Connecticut Waterbodies Not Meeting Water Quality Standards. (aka: Impaired Waters List). Appendix C in 2006 Integrated Water Quality Report to Congress - prepared pursuant to Federal Clean Water Act Sections 305(b) and 303(d). Hartford, CT. (This document available on CT DEP website at:
http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325614&depNav_GID=1654)
- CT DEP Bureau of Water Management. Revised 1996. Caring for Our Lakes – Watershed and In-Lake Management. Hartford, CT (This document available on CT DEP’s website at:
http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325528&depNav_GID=1654)
- CT DEP Bureau of Water Management. December 2006. Integrated Water Quality Report to Congress - prepared pursuant to Federal Clean Water Act Sections 305(b) and 303(d). Hartford, CT. (This document available on CT DEP’s website at:
[http://www.ct.gov/dep/lib/dep/water/water_quality_management/305b/2006_305\(b\)fullplusa.pps.pdf](http://www.ct.gov/dep/lib/dep/water/water_quality_management/305b/2006_305(b)fullplusa.pps.pdf))
- CT DEP Bureau of Water Management. 1999. Leachate and Wastewater Discharge Sources Inventory. Hartford, CT
- CT DEP Bureau of Water Management – Planning and Standards Division. Effective 2002 & 1996. Water Quality Standards. CT DEP. Hartford, CT (This document available on CT DEP’s website at: http://www.ct.gov/dep/lib/dep/water/water_quality_standards/wqs.pdf)
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- Connecticut Geological and Natural History Survey. (Compiled by Marianne McElroy). 1981. Natural Drainage Basins in Connecticut (Map). CT DEP Natural Resources Center in cooperation with the USGS. Hartford, CT

Frink, C.R. and W.A. Norvell. 1984. Chemical and Physical Properties of Connecticut Lakes. The Connecticut Agricultural Experiment Station. Bulletin No. 817. New Haven, CT

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Jacobs, Robert P., Eileen B. O'Donnell. 2002. A Fisheries Guide to Lakes and Ponds of Connecticut. CT DEP Bulletin 35. Hartford, CT

State Board of Fisheries and Game – Lake and Pond Survey Unit. 1959. A Fishery Survey of the Lakes and Ponds of Connecticut. Report No. 1. Hartford, CT

Website References

Center for Watershed Protection website: <http://www.cwp.org/index.html>

Connecticut Agricultural Experiment Station – Invasive Aquatic Plant Survey – Information available on CAES website at: <http://www.ct.gov/caes/site/default.asp>

CT DEP - Ground Water and Aquifers - Information available on CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2685&q=322260&depNav_GID=1625&depNav=

CT DEP - Total Maximum Daily Load (TMDL) - Information available on CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325604&depNav_GID=1654)

CT DPH – 2006 Connecticut Fish Consumption Advisory - Information available on CT DPH website at: http://www.ct.gov/dph/cwp/view.asp?a=3140&q=387460&dphNav_GID=1828&dphPNavCtr=#47464

CT DPH Source Water Assessment Program - Information available on CT DPH website at: <http://www.ct.gov/dph/cwp/view.asp?a=3139&q=387342>

CT DPH Source Water Protection Program - Information available on CT DPH website at: <http://www.ct.gov/dph/cwp/view.asp?a=3139&q=387338>

Connecticut Federation of Lakes (CLF) website: <http://www.ctlakes.org/>

Connecticut Greenways - Information available on CT DEP website at: http://www.ct.gov/dep/cwp/view.asp?a=2707&q=323858&depNav_GID=1704&depNav=

Housatonic River Hydroelectric Project (FERC No. 2576) – For documents related to this project, see the Federal Energy Regulatory Commission website at: <http://www.ferc.gov/>

Housatonic Riverbelt Greenway – Information available on HVA website at:
<http://www.hvatoday.org/show.cfm?page=land/riverbelt.htm&folder=land>

Litchfield Hills Greenprint Project - For more information, see the HVA website at:
<http://www.hvatoday.org/show.cfm?page=land/greenprint.htm&folder=land>
and the TPL website at:
http://www.tpl.org/tier3_cd.cfm?content_item_id=19095&folder_id=261

Northwest Highlands Program (and Hollenbeck Watershed) - For more information, see the TNC-CT website at:
<http://www.nature.org/wherewework/northamerica/states/connecticut/preserves/art21228.htm>
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U.S. EPA - GE/Housatonic River Site website: <http://epa.gov/region01/ge/>

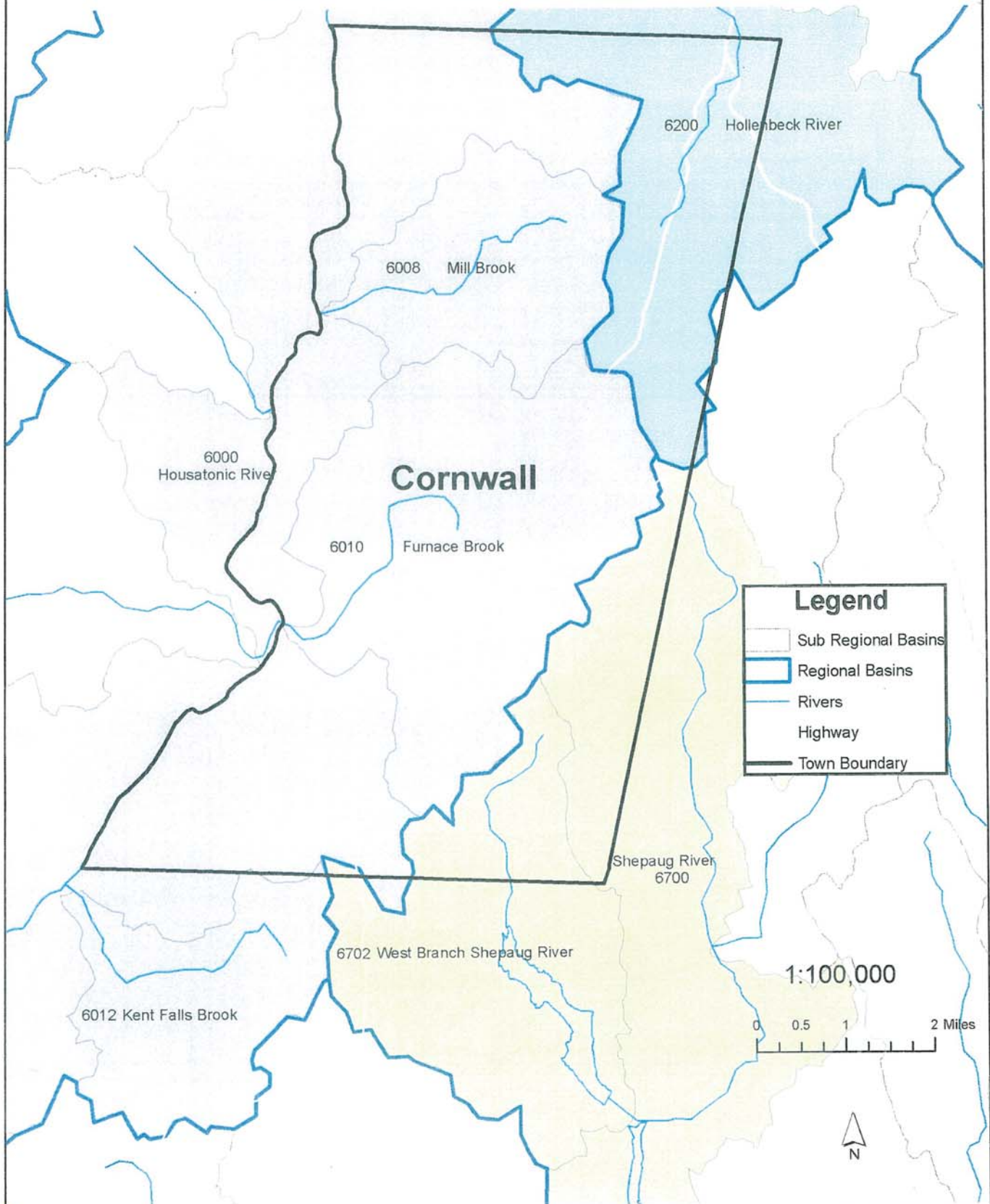
U.S. Forest Service - Highlands Study - For more information, see the USFS website at:
<http://www.na.fs.fed.us/highlands/>

University of Connecticut - Cooperative Extension System – Nonpoint Education for Municipal Officials website: <http://nemo.uconn.edu/>

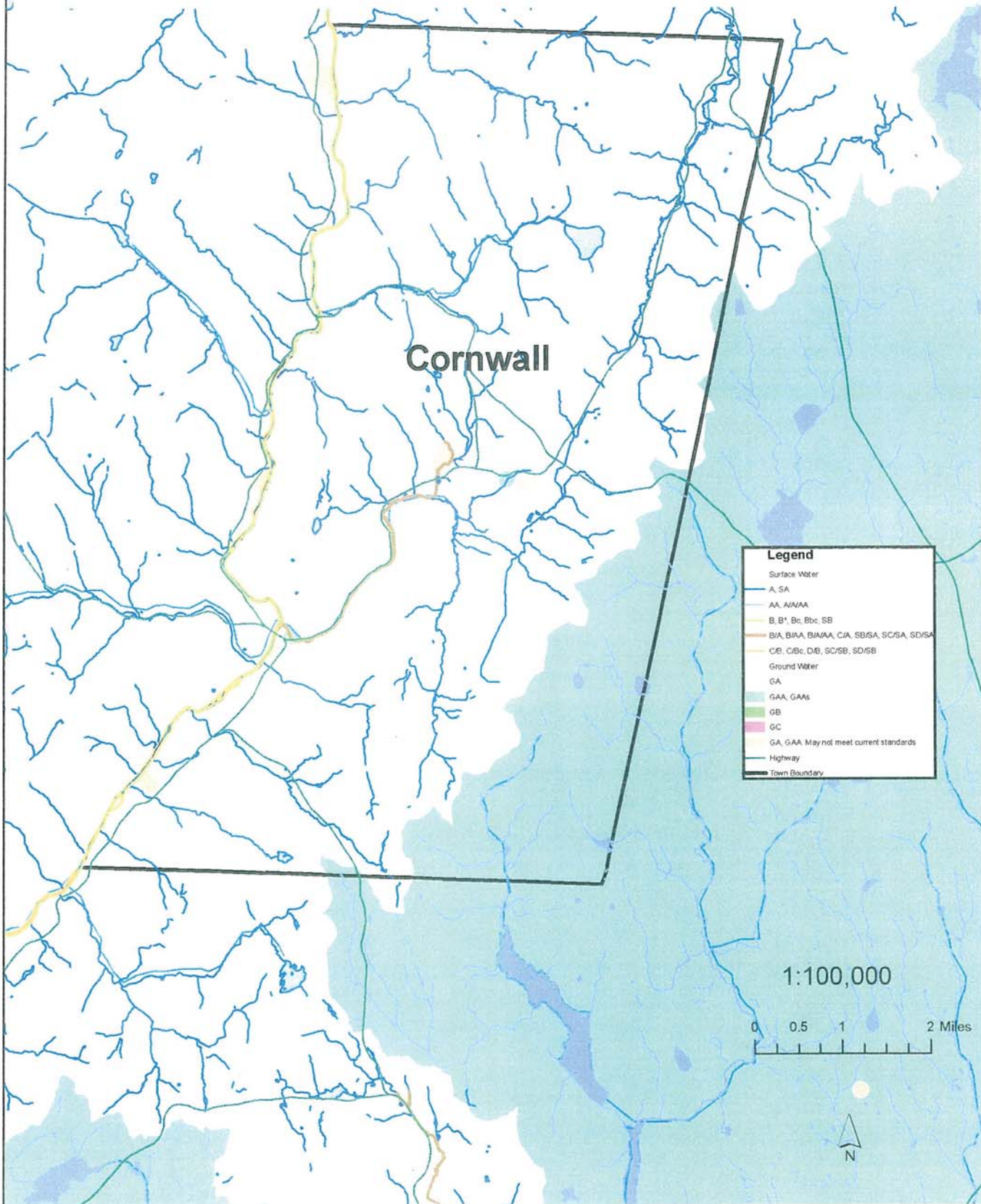
Upper Housatonic Valley National Heritage Area - For more information, see UHVNHA website at: <http://www.upperhousatonicheritage.org/>

Town of Cornwall

Regional and Subregional Drainage Basins

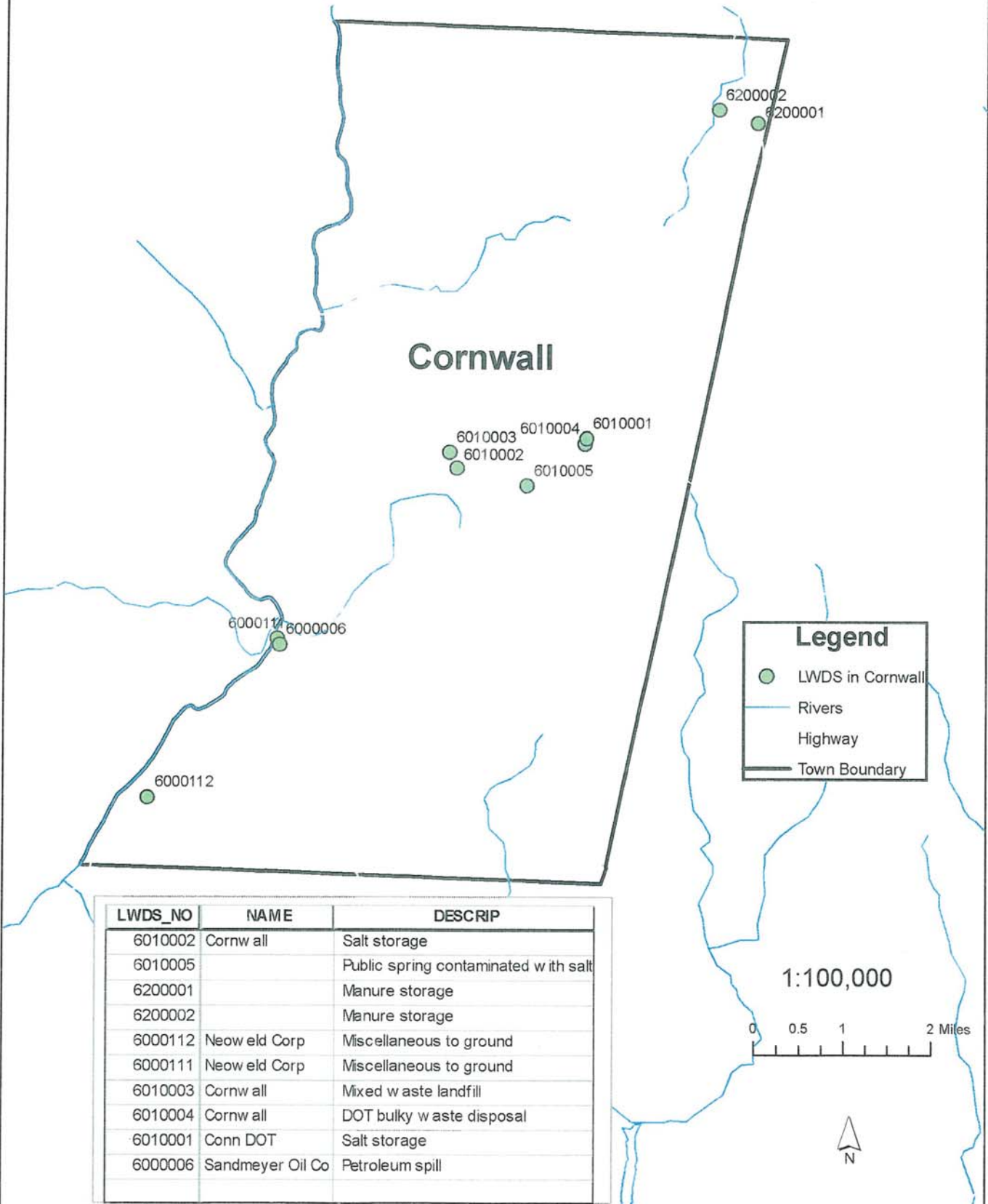


Town of Cornwall Water Quality Classifications



Town of Cornwall

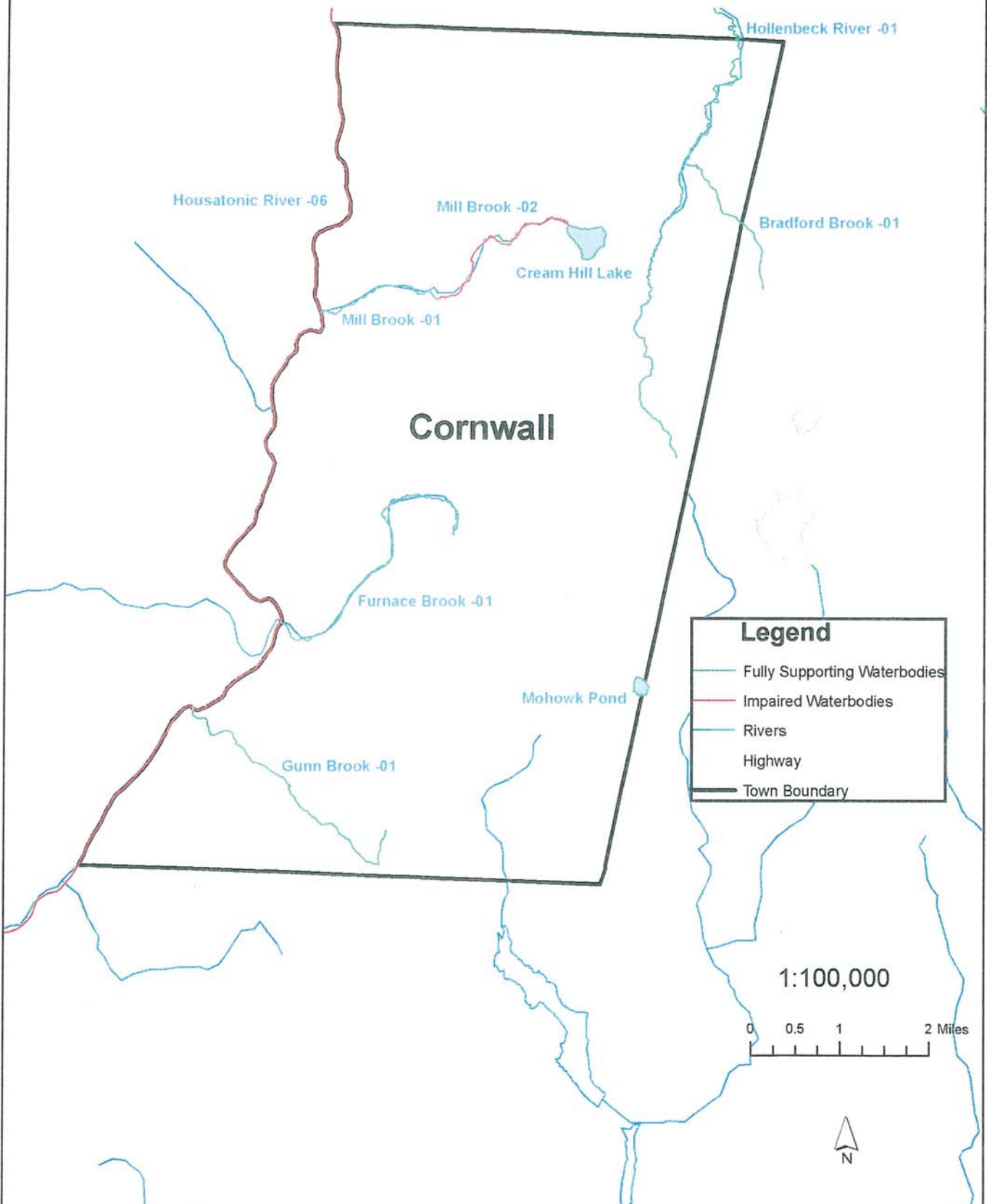
Leachate and Wastewater Discharge Sources (LWDS)



LWDS_NO	NAME	DESCRIP
6010002	Cornw all	Salt storage
6010005		Public spring contaminated w ith salt
6200001		Manure storage
6200002		Manure storage
6000112	Neow eld Corp	Miscellaneous to ground
6000111	Neow eld Corp	Miscellaneous to ground
6010003	Cornw all	Mixed waste landfill
6010004	Cornw all	DOT bulky w aste disposal
6010001	Conn DOT	Salt storage
6000006	Sandmeyer Oil Co	Petroleum spill

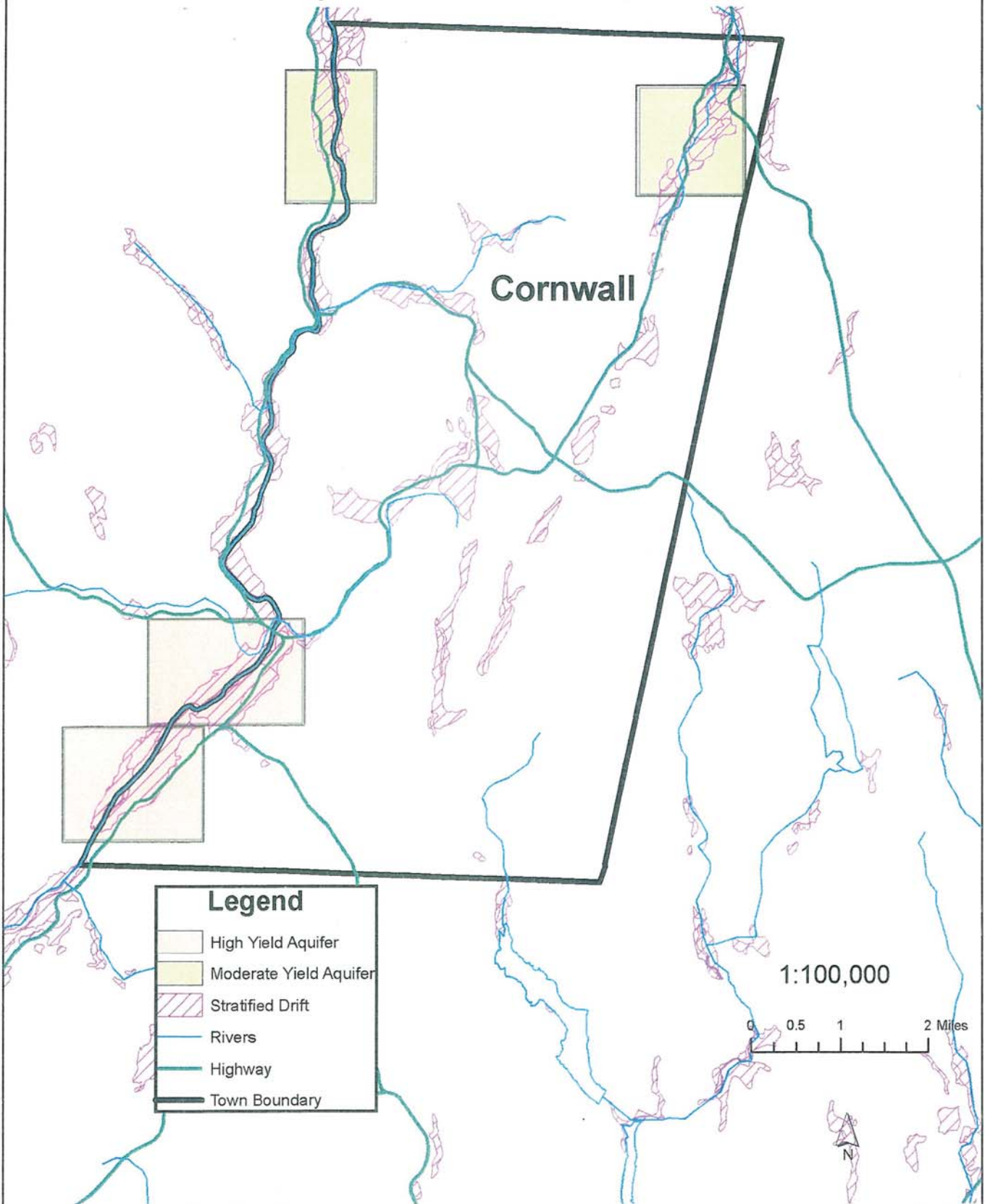
Town of Cornwall

Assessed Waterbodies



Town of Cornwall

High and Moderate Yield Aquifers



Legend

- High Yield Aquifer
- Moderate Yield Aquifer
- Stratified Drift
- Rivers
- Highway
- Town Boundary

1:100,000

