Chapter 3
Little Tennessee River Subbasin 04-04-03
Including the: Nantahala River Watershed

3.1 Subbasin Overview

Subbasin 04-04-03 at a Glance

Land and Water Area

Total area:	155 mi²
Land area:	152 mi²
Water area:	3 mi²

Population Statistics

2000 Est. Pop.:	8,750 people
Pop. Density:	5 persons/mi²

Land Cover (percent)

Forest/Wetland:	96.2%
Surface Water:	1.7%
Urban:	0.2%
Cultivated Crop:	0.1%
Pasture/ Managed Herbaceous:	1.8%

Counties

Cherokee, Clay, Macon and Swain

Monitored Streams Statistics

Aquatic Life

Total Streams:	32.0 mi/1,380.2 ac
Total Supporting:	32.0 mi
Total Not Rated:	1,380.2 ac

Recreation

Total Streams:	3.5 mi
Total Supporting:	3.5 mi

This subbasin contains most of the Nantahala River catchment. Headwaters of the Nantahala River are entirely within the Nantahala National Forest. The river, from its source to the confluence with Roaring Fork, is classified ORW. Much of the land adjacent to this reach is privately owned. The river and most tributaries are high gradient systems capable of supporting wild trout populations.

The Nantahala River was impounded in 1942, creating Nantahala Lake. Additional flow is diverted into the project from Whiteoak and Dicks Creek. Duke Energy acquired the development in 1988. Flow is diverted to downstream generators at Beechertown, bypassing a seven-mile reach of the river prior to discharging back into the original channel above the Nantahala Gorge. The regulated reach of the river below the powerhouse is very popular for rafting and canoeing. Development has increased along the gorge corridor as it relates to the recreational industry. Ninety six percent of the subbasin is forested.

There are two NPDES permitted dischargers in this subbasin: Macon County Schools-Nantahala WWTP and the Nantahala Outdoor Center. No significant compliance problems were noted during the most recent review period.

A map including the locations of the NPDES facilities and water quality monitoring stations is presented in Figure 8. Table 10 contains a summary of assessment unit numbers (AU#) and lengths, streams monitored, monitoring data types, locations and results, along with use support for waters in the subbasin. Refer to Appendix VIII for more information about use support methodology.

There were 5 benthic macroinvertebrate community samples collected during this assessment period. Data were also collected from one ambient monitoring station. Data collected from the ambient station has historically indicated good water quality. However, there were occasional periods when turbidity exceeded the state standard for Trout waters during this assessment cycle. These exceedences occurred in only four percent of the measurements, and therefore do not indicate impairment. Refer to the *2005 Little Tennessee River Basinwide Assessment Report* at http://h2o.enr.state.nc.us/esb/Basinwide/LTN2005.pdf and Appendix IV for more information on monitoring.

Figure 8 Little Tennessee Subbasin 04-04-03

Planning Section
Basinwide Planning Unit
May 22, 2006

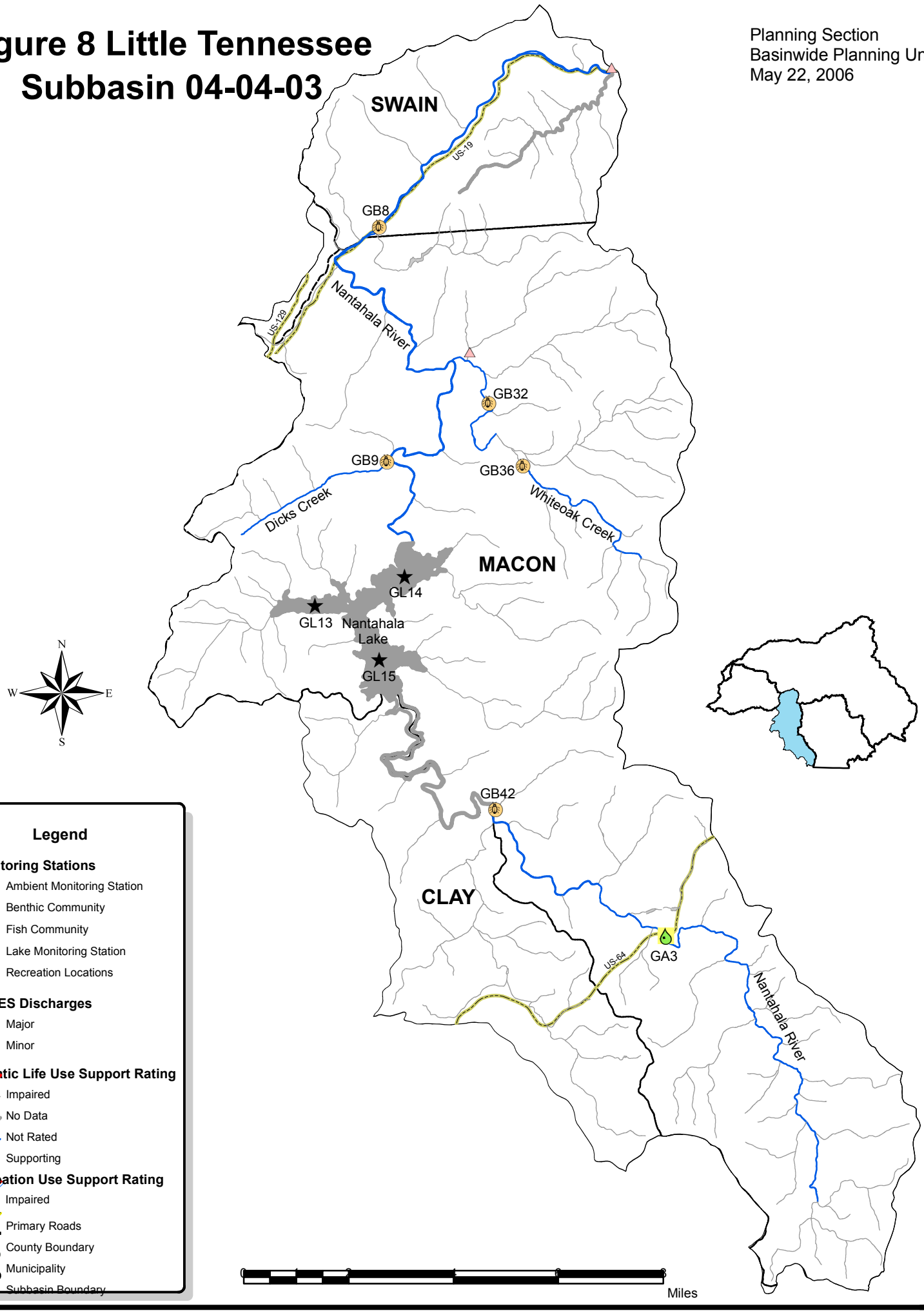

Table 10 Little Tennessee Subbasin 04-04-03

AU Number / Description	Classification	Length/Area		Aquatic Life Assessment: AL Rating	Station	Result	Year/ Parameter	% Exc	Recreation Assessment: REC Rating	Station	Result	Stressors	Sources
Dicks Creek													
2-57-42	C;Tr	3.3	FW Miles	**S**					ND			Habitat Degradation	Impoundment
From source to Nantahala River					GB9	GF	2004						
Nantahala River													
2-57-(0.5)	B;Tr,ORW	3.5	FW Miles	**S**	GA3	NCE			**S**	GA3	NCE		
From source to Roaring Fork					GB42	E	2004						
2-57-(22.5)b	B;Tr	18.2	FW Miles	**S**					ND				
From Nanthahala Lake Dam to Nantahala River Arm of Fontana Lake, Little Tennessee R.					GB8	G	2004						
Nantahala River [Nantahala Lake (Aquone Lake)]													
2-57-(22.5)a	B;Tr	1,380.2	FW Acres	**NR**	GL14	ID			ND				
					GL15	ID							
					GL13	ID							
From Roaring Fork to Nantahala Lake Dam													
Silvermine Creek													
2-57-55	C	4.8	FW Miles	ND					ND				
From source to Nantahala River													
Whiteoak Creek													
2-57-45a	C;Tr	3.5	FW Miles	**S**					ND			Nutrient Impacts	Unknown
From source to SR 1397					GB36	GF	2004						
2-57-45c	C;Tr	3.6	FW Miles	**S**					ND				
From SR 1423 to Nantahala River					GB32	E	2004						

Table 10 Little Tennessee Subbasin 04-04-03

AU Number	Classification	Length/Area	Description	Aquatic Life Assessment					Recreation Assessment				
				AL Rating	Station	Result	Year/ Parameter	% Exc	REC Rating	Station	Result	Stressors	Sources

Use Categories:
AL - Aquatic Life
REC - Recreation

Monitoring data type:
GF - Fish Community Survey
GB - Benthic Community Survey
GA - Ambient Monitoring Site
GL- Lake Monitoring

Results:
E - Excellent
G - Good
GF - Good-Fair
F - Fair
P - Poor
NI - Not Impaired

Use Support Ratings 2006:
S - Supporting, I - Impaired
NR - Not Rated
NR*- Not Rated for Recreation (screening criteria exceeded)
ND-No Data Collected to make assessment

Miles/Acres
FW- Fresh Water

m- Monitored
e- Evaluated

Results
CE-Criteria Exceeded > 10% and more than 10 samples
NCE-No Criteria Exceeded
ID- Insufficeint Data Available

Aquatic Life Rating Summary

S	m	32.0	FW Miles
NR	m	1,380.2	FW Acres
ND		214.8	FW Miles

Recreation Rating Summary

S	m	3.5	FW Miles
ND		243.3	FW Miles
ND		1,380.2	FW Acres

Fish Consumption Rating Summary

I	e	246.8	FW Miles
I	e	1,380.2	FW Acres

Waters in the following sections and in Table 10 are identified by an assessment unit number (AU#). This number is used to track defined segments in the water quality assessment database, list 303(d) Impaired waters, and is used to identify waters throughout the basin plan. The AU# is a subset of the DWQ index number (classification identification number). A letter attached to the end of the AU# indicates that the assessment is smaller than the DWQ index segment. No letter indicates that the AU# and the DWQ index segment are the same. For example, index number 11-3-(14) might be split into two assessment units 11-3-(14)a and 11-3-(14)b.

3.2 Use Support Assessment Summary

Table 11 Summary of Use Support Ratings by Category in Subbasin 04-04-03

Use Support Rating	Aquatic Life	Recreation
Monitored Waters		
Supporting	32.0 mi	3.5 mi
Impaired*	0.0	0.0
Not Rated	1,380.2 ac	0.0
Total	**32.0 mi 1,380.2 ac**	**3.5 mi 0.0 ac**
Unmonitored Waters		
No Data	214.8 mi 0.0 ac	243.3 mi 1,380.2 ac
Total	**214.8 mi 0.0 ac**	**243.3 mi 1,380.2 ac**
Totals		
All Waters**	**246.8 mi 1,380.2 ac**	**246.8 mi 1,380.2 ac**

* The noted percent Impaired is the percent of monitored miles/acres only.
** Total Monitored + Total Unmonitored = Total All Waters.

All surface waters in the state are assigned a classification appropriate to the best-intended use of that water. Waters are regularly assessed by DWQ to determine how well they are meeting their best-intended use. For aquatic life, an Excellent, Good, Good-Fair, Fair, or Poor bioclassification are assigned to a stream based on the biological data collected by DWQ. For more information about bioclassification and use support assessment, refer to Appendices IV and VIII, respectively. Appendix IX provides definitions of the terms used throughout this basin plan.

In subbasin 04-04-03, use support was assigned for the aquatic life, recreation, fish consumption and water supply categories. Waters are Supporting, Impaired, Not Rated, and No Data in the aquatic life and recreation categories on a monitored or evaluated basis. Waters are Impaired in the fish consumption category on an evaluated basis based on fish consumption advice issued by the Department of Health and Human Services (DHHS). All waters are Supporting in the water supply category on an evaluated basis based on reports from Division of Environmental Health (DEH) regional water treatment plant consultants. Refer to Table 11 for a summary of use support for waters in subbasin 04-04-03.

3.3 Status and Recommendations of Previously and Newly Impaired Waters

The following waters were either identified as Impaired in the previous basin plan (2002) or are newly Impaired based on recent data. If previously identified as Impaired, the water will either remain on the state's 303(d) list or will be delisted based on recent data showing water quality improvements. If the water is newly Impaired, it will likely be placed on the 2008 303(d) list. The current status and recommendations for addressing these waters are presented below, and each is identified by an AU#. Information regarding 303(d) listing and reporting methodology is presented in Appendix VI.

3.3.1 White Oak Creek [AU# 2-57-45a]

Current Status
White Oak Creek from SR1397 to SR1423 (1.0 miles) was Impaired in 1996 due to nutrient enrichment and a Fair benthic community below a trout farm. DWQ sampled the benthic community in two locations (GB32 and GB36) in 2004. At site GB36, just below the trout farm, the bioclassification improved to Good-Fair indicating water quality is improving. However, a large population of snails indicates nutrient inputs from the trout farm are still impacting the stream. A 3.6 mile segment downstream is rated Excellent (GB32), indicating a full recovery from the upstream impacts.

2007 Recommendations
Because of the improvement to Good-Fair at site GB36, DWQ recommends White Oak Creek be removed from the 303(d) list of Impaired waters. The trout farm should continue to improve nutrient management at its facility.

3.4 Status and Recommendations for Waters with Noted Impacts

The surface waters discussed in this section are not Impaired. However, notable water quality problems and concerns were documented for these waters during this assessment. Attention and resources should be focused on these waters to prevent additional degradation and facilitate water quality improvements. DWQ will notify local agencies of these water quality concerns and work with them to conduct further assessments and to locate sources of water quality protection funding. Additionally, education on local water quality issues and voluntary actions are useful tools to prevent water quality problems and to promote restoration efforts. The current status and recommendations for addressing these waters are presented below, and each is identified by an AU#. Nonpoint source program agency contacts are listed in Appendix VII.

3.4.1 Dicks Creek [AU# 2-57-42]

Current Status
Water in Dicks Creek was historically impounded at Dicks Creek Pond and diverted into Duke Energy's Nantahala Hydroelectric Project. As part of the1999 agreement between Duke Energy, NCDENR, USDA, and USFWS, this diversion ceased and flows in Dicks Creek were allowed to pass through Dicks Creek dam, into the Nantahala River. In 2003, Duke Energy agreed to restore additional flow in Dicks Creek as part of its mitigation for impacts caused by the Nantahala Hydroelectric Project. More information on this agreement can be found in Section 2.5.4.

DWQ sampled the benthic community in Dicks Creek at site GB9 to determine the condition of the stream prior to the introduction of new, stable flows. This site received a Good-Fair bioclassification in 2004.

2007 Recommendations
DWQ will sample Dicks Creek to evaluate the stream response to restored flows.

3.5 Additional Water Quality Issues within Subbasin 04-04-03

The following section discusses general issues that may threaten water quality in the subbasin that are not specific to particular streams, lakes or reservoirs. The issues discussed may be related to waters near certain land use activities or within proximity to different pollution sources.

Those surface waters given an Excellent bioclassification may be eligible for reclassification to a High Quality Water (HQW) and/or Outstanding Resource Water (ORW). These streams are shown in Table 10. For more information about water quality standards and reclassification, see Chapter 5.

3.5.1 Management Strategies for Water Quality Protection

Municipalities and smaller outlying communities are being pressured to expand and this involves construction and/or development in areas of pristine waters along the Little Tennessee River and its tributaries. High Quality Water (HQW) and Outstanding Resource Water (ORW) are supplemental classifications to the primary freshwater classification(s) placed on a waterbody. Management strategies are associated with the supplemental HQW and ORW classifications and are intended to protect the current use of the waterbody. Below is a brief summary of these strategies and the administrative code under which the strategies are found. More detailed information can be found in the document entitled *Classifications and Water Quality Standards Applicable to Surface Waters and Wetlands of North Carolina* (NCDENR-DWQ, 2004). This document is available on-line at http://h2o.enr.state.nc.us/admin/rules/. Definitions of the primary and supplemental classifications can be found in Chapter 5.

HQW is intended to protect waters with water quality higher than the state's water quality standards. In the Little Tennessee River basin, waters classified as ORW and waters designated by the NC Wildlife Resources Commission (WRC) as native (wild) trout waters are subject to HQW rules.

New discharges and expansions of existing discharges may, in general, be permitted in waters classified as HQW provided that the effluent limits are met for dissolved oxygen (DO), ammonia/nitrogen levels (NH_3-N), and the biochemical oxygen demand (BOD_5). More stringent limitations may be necessary to ensure that the cumulative effects from more than one discharge of oxygen-consuming wastes will not cause the dissolved oxygen concentration in the receiving water to drop more than 0.5 milligrams per liter (mg/l) below background levels. Discharges from single-family residential structures into surface waters are prohibited. When a discharge from an existing single-family home fails, a septic tank, dual or recirculation sand filters, disinfection, and step aeration should be installed (Administrative Code 15A NCAC 2B .0224)

In addition to the above, development activities which require an Erosion and Sedimentation Control Plan under the NC Sedimentation Control Commission or an approved local erosion and sedimentation control program are required to follow stormwater management rules as specified in Administrative Code 15A NCAC 2H .1000 (NCDENR-DWQ, 1995). Under these rules, stormwater management strategies must be implemented if development activities are within one mile of and draining to waters designated as HQW. The low-density option requires a 30-foot wide vegetative buffer between development activities and the stream. This option can be used when the built upon area is less than 12 percent of the total land area or the proposed development is for a single-family residential home on one acre or greater. Vegetated areas may

be used to transport stormwater in the low-density option, but it must not lead to a discrete stormwater collection system (e.g., constructed). The high-density option is for all land disturbing activities on greater than one acre. For high-density projects, structural stormwater controls must be constructed (e.g., wet detention ponds, stormwater infiltration systems, innovative systems) and must be designed to control runoff from all surfaces affected by one inch or more of rainfall. More stringent stormwater management measures may be required on a case-by-case basis where it is determined additional measures are needed to protect and maintain existing and anticipated uses of the water (Administrative Code 15A NCAC 2H .1006).

ORWs are unique and special surface waters that have some outstanding resource value (e.g., outstanding fish habitat and fisheries, unusually high levels of water-based recreation, special ecological or scientific significance). No new discharge or expansions on existing discharges are permitted. Rules related to the development activities are similar to those for HQW, and stormwater controls for all new development activities requiring an Erosion and Sedimentation Control Plan under the NC Sedimentation Control Commission or an approved local erosion and sedimentation control program are required to follow stormwater management rules as specified in Administrative Code 15A NCAC 2H .1000 (NCDENR-DWQ, 1995). In addition, site-specific stormwater management strategies may be developed to protect the resource values of these waters.

Many of the streams in this subbasin are also classified as trout (Tr) waters, and therefore, are protected for natural trout propagation and maintenance of stocked trout. There are no watershed development restrictions associated with the trout classification; however, the NC Division of Land Resources (DLR), under the NC Sedimentation and Pollution Control Act (SPCA), has requirements to protect trout streams from land disturbing activities. Under G.S. 113A-57(1), "waters that have been classified as trout waters by the Environmental Management Commission (EMC) shall have an undisturbed buffer zone 25 feet wide or of sufficient width to confine visible siltation within the twenty-five percent of the buffer zone nearest the land-disturbing activity, whichever is greater." The Sedimentation Control Commission, however, can approve land-disturbing activities along trout waters when the duration of the disturbance is temporary and the extent of the disturbance is minimal. This rule applies to unnamed tributaries flowing to the affected trout water stream. Further clarification on classifications of unnamed tributaries can be found under Administration Code 15A NCAC 02B .0301(i)(1). For more information regarding land-disturbing activities along designated trout streams, see the DLR website at http://www.dlr.enr.state.nc.us/.

Those streams noted as having Excellent bioclassifications in Table 10 may qualify for HQW or ORW classification. There may also be many more streams in the basin that qualify for such designation that DWQ has not monitored. DWQ relies on citizen requests to initiate the stream reclassification process (See Section 5.1.4) and encourages requests for reclassification to HQW or ORW when it is warranted. Appropriate stream classification will help to protect water quality in the long-term.

Native Southern Appalachian Brook Trout occupy many high elevation streams in the Little Tennessee River Basin. They are the only trout native to the southern Appalachian Mountains and require clear, cold streams to survive. They are very sensitive to excess sediment. Efforts to restore and expand their populations across the basin will benefit from designation as HQW or ORW. Those streams that can support Native Appalachian Brook Trout should be identified and evaluated for qualification as HQW or ORW.

3.5.2 Septic System Concerns

Development of rural land in areas not served by sewer systems is occurring rapidly in the Little Tennessee River basin. Hundreds of permit applications for onsite septic systems are approved every year. Septic systems generally provide a safe and reliable method of disposing of residential wastewater when they are sited (positioned on a lot), installed, operated, and maintained properly. Rules and guidelines are in place in North Carolina to protect human health and the environment. Water quality is protected by locating the systems at least 50 feet away from streams and wetlands, limiting buildable lot sizes to a ¾-acre minimum, and installing drain fields in areas that contain suitable soil type and depth for adequate filtration; drinking water wells are further protected by septic system setbacks.

Septic systems typically are very efficient at removing many pollutants found in wastewater including suspended solids, metals, bacteria, phosphorus, and some viruses. However, they are not designed to handle other pollutants that they often receive such as solvents, automotive and lubricating oil, drain cleaners, and many other household chemicals. Additionally, some byproducts of organic decomposition are not treated. Nitrates are one such byproduct and are the most widespread contaminant of groundwater in the United States (Smith, et al., 2004).

One septic system generates about 30 to 40 pounds of nitrate nitrogen per year (NJDEP, 2002). Nitrates and many household chemicals are easily dissolved in water and therefore move through the soil too rapidly to be removed. Nitrates are known to cause water quality problems and can also be harmful to human health (Smith, et al., 2004).

Proper location, design, construction, operation, and maintenance of septic systems are critical to the protection of water quality in a watershed. If septic systems are located in unsuitable areas, are improperly installed, or if the systems have not been operated and/or maintained properly, they can be significant sources of pollution. Additionally if building lots and their corresponding septic systems are too densely developed, the natural ability of soils to receive and purify wastewater before it reaches groundwater or adjacent surface water can be exceeded (Smith, et al., 2004). Nutrients and some other types of pollution are often very slow to leave a lake system. Therefore, malfunctioning septic systems can have a significant long-term impact on water quality and ecological health (PACD, 2003).

Local governments, in coordination with local health departments, should evaluate the potential for water quality problems associated with the number and density of septic systems being installed throughout their jurisdiction. Long-term county-wide planning for future wastewater treatment should be undertaken. There are water quality concerns associated with both continued permitting of septic systems for development in outlying areas and with extending sewer lines and expanding wastewater treatment plant discharges. Pros and cons of various wastewater treatment options should be weighed for different parts of the county (based on soil type, depth, proximity to existing sewer lines, etc.) and a plan developed that minimizes the risk of water quality degradation from all methods employed.

In addition, local governments, again in coordination with local health departments, should consider programs to periodically inform citizens about the proper operation of septic systems and the need for routine maintenance and replacement. Owners of systems within 100 feet of streams or lakes should be specifically targeted and encouraged to routinely check for the

warning signs of improperly functioning systems and to contact the health department immediately for assistance in getting problems corrected.