UPPER NEUSE WATERSHED MANAGEMENT PLANNING PROJECT:

ISSUE BRIEF: *MANAGEMENT OF ON-SITE WASTEWATER DISPOSAL SYSTEMS*

(By Upper Neuse River Basin Association and Triangle J Council of Governments)

Purpose: The Draft Upper Neuse Watershed Management Plan (2002. p. 46) recommends that six County governments consider implementing comprehensive on-site and alternative wastewater disposal systems (septic systems) management programs to protect water quality within the 770-square mile Upper Neuse Watershed. The septic system recommendation is just one of several watershed management strategies recommended in the Draft Plan. However, the Draft Plan estimates that implementing this recommendation will cost more than the other recommended strategies combined, representing more than 95% of the Draft Plan's total costs for "new" programs.

The recommendation states:

> ***Requirements for Individual Septic Systems****: Inspect septic systems every five years to ensure that they are properly functioning. On average, this would mean inspecting 20% of all septic systems in the County annually. Require that homeowners repair or replace failing systems. (Local Health Code may need to be revised to require this inspections and maintenance program.)*
>
> ***Recommended Implementation:*** *Local*

The purpose of this draft Issue Brief is to provide interested parties with background information about the importance of this issue, potential components of an on-site systems management program, questions posed by some local governments, and possible alternative approaches for addressing this issue within the Upper Neuse Watershed.

This Issue Brief is currently under review by members of the Upper Neuse River Basin Association's Technical Advisory Committee (TAC). The comments and suggestions of TAC members and others will be incorporated into the final document.

Background: In the Upper Neuse Watershed, 30,000 to 35,000 households (about 40% of the total within the watershed) depend on on-site systems for the treatment and disposal of wastewater. Table 1 presents the number of people on septic systems within the watershed (Tetra Tech 2002). *

Figure 1 is a map showing the relative number of septic systems per subwatershed. Each subwatershed is labeled with it's hydrologic unit identification number shown in Table 1.

Table 1: Number of households on septic systems in the Upper Neuse, by subwatershed

Subwatershed (NRCS ID of Hydrologic Units--within basin 30202010)	Estimated Number of septic systems for the Year 2000
North Flat River (10010)	**2,740**
South Flat River (10020)	**2,385**
Flat River (10030)	**928**
Deep Creek (10040)	**1,697**
Lake Michie (10050A)	**1,250**
Flat River below Lake Michie (10050B)	**902**
North Fork Little (20010)	**2,241**
South Fork Little Forrest Creek (20020)	**3,325**
South Fork Little (20030)	**1,678**
Little River Res. (20040U)	**2,810**
Little River Res. (20040L)	**2,909**
West Fork Eno (30010A)	**540**
Lake Orange (30010B)	**524**
Lake Orange(30010C)	**471**
Sevenmile Creek (30020A)	**1,313**
Corporation Lake (30020C)	**1,541**
Eno River below Lake Ben Johnston(30020B)	**875**
Eno River Strouds Creek Stoney Creek (30030)	**7,495**
Eno River Crooked Creek (30040)	**9,738**
Eno River (30050)	**2,210**
Lake Holt (40010)	**1,071**
Knap of Reeds (40020)	**531**
Ellerbe Creek (50010)	**5,646**
Little Lick Cr. (50020)	**5,888**
Lick Creek (50030)	**3,674**
Lake Rogers (60010A)	
Ledge Creek below Lake Rogers (60010B)	**2,600**
Beaverdam Creek (60020)	**2,719**
New Light Creek (65010)	**1,999**
Horse Creek (65020)	**2,277**
Upper Barton Cr. (65030)	**11,857**
Cedar Creel (65040)	**6,584**
Total	**92,517**

* These data are from the *Technical Memorandum: Summary of the Modeling Tools Used in Assessing Management Measures in the Upper Neuse Watershed*, Tetra Tech, June 2002.

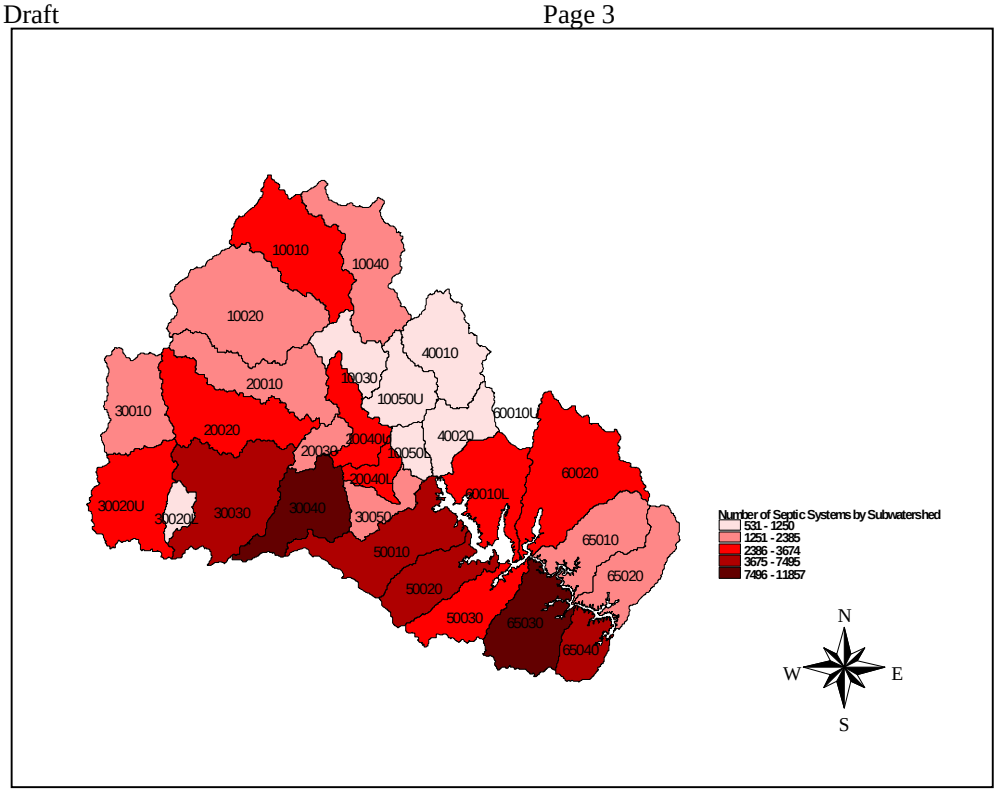

Figure 1: Septic systems per subwatershed in the Upper Neuse

Figure 2 shows the relative density of septic systems per acre for each subwatershed in the Upper Neuse Watershed. The density map shows where the greatest concentrations of systems exist in the watershed.

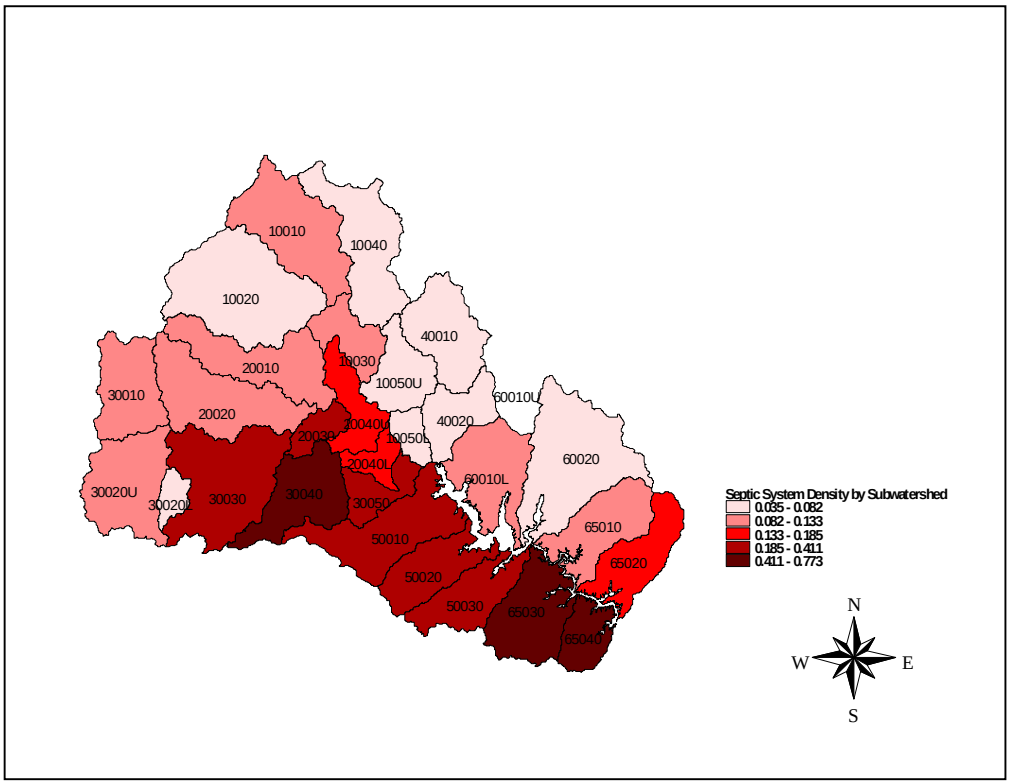

Figure 2: Septic system density by subwatershed in the Upper Neuse (density per acre)

Most of the septic systems are conventional; however, low-pressure pipe systems, sand filter systems, spray and drip irrigation systems, and other technologies are also in use. Conventional septic systems have a useful life ranging typically from 20 to 40 years, assuming proper operation and maintenance. Actual experience will depend on site conditions, quality of design and construction, wastewater volume and characteristics, maintenance practices, and other factors.

Conventional septic systems rely on basic physical and biological processes for treatment and disposal of effluent. They rarely include provisions for disinfection. Treated wastewater is disposed of under or on the ground. If it is assumed that each household system generates an average of 120 gallons of wastewater a day (USEPA, 1992), then 30,000 septic systems within the Upper Neuse watershed would have a combined discharge volume of about 3.6 million gallons per day. That is comparable to combined discharge for the Towns of Hillsborough and Butner.

Historically, once a conventional on-site system has been installed there is limited monitoring, inspection, and preventive maintenance. In a study conducted by Orange County in the early 1980s, it was estimated that 8% to 10% of the septic systems in the County were malfunctioning or failing at that time. Malfunctioning and failing septic systems (as well as large-scale centralized systems) can contribute to elevated levels of nutrients, bacteria, and other contaminants in surface waters and ground waters within the watershed.

Septic system management programs should be reviewed and where necessary strengthened to assure that such systems remain viable over the long-term.

Management Program Components: To determine the components to be included in a potential septic system management program, several questions must be considered, including, but not limited to, the following:

1. What will be the geographical scope of the program?
   -- Jurisdiction-wide?
   -- Watershed-wide?
   -- Risk-based approach, such as by priority sub-watersheds?
2. What types of systems will the program address?
   -- New systems only?
   -- New and repaired systems?
   -- Or all new and existing systems?
3. What level of management services will be provided?
   -- Monitoring and inspection of systems? (system components, parameters, frequency, usage and flow)
   -- Septage hauling and/or disposal?
   -- Ecosystem monitoring? (locations, water quality parameters, frequency)
   -- Design, construction and maintenance of systems?
4. Will the program mandate system repair and replacement? Will the local governments conduct or contract for system repair and replacement, and bill the owner with a lien placed on the property for unpaid charges?

5. Will recorded easements or access agreements be required to assure access to privately-owned systems?
6. Will the program include any penalty provisions? If so, which provisions?
7. How will program costs be recovered?
    -- Design review and approval costs/charges?
    -- Construction inspection costs/charges?
    -- Permit renewal costs/charges?
    -- Resource impact costs/charges?
    -- Monitoring and enforcement costs?
8. Will the program include any provisions for financial assistance?
    -- Interest-free or low-interest loans?
    -- Grants for replacement/repair of systems?
    -- Risk-based funding assistance?
9. What public education and outreach measures will be included?
    -- Requirements for plat/deed notifications?
    -- Time-of-sale information?
    -- Periodic information about preventive maintenance and proper operation?
    -- Technical education and training?
10. How will information be managed?
    -- Geographic information systems (GIS)
    -- Program specific software

Proposals relating to the establishment of a septic system management program within the Upper Neuse Watershed would probably encounter considerable public concern. Some probable questions, and general responses, are:

- Would such a program be a governmental invasion of property rights and privacy?
- What has been the actual experience with system failures and malfunctions throughout the watershed? Durham would like more data linking documented stream degradation to onsite sewage treatment, and Wake County is about to undertake a study to answer this question. Many feel that we are understating the problem of aging systems and their potential for water contamination.
- What would be the costs versus the expected benefits to public health and water quality? Until we have better data, this is difficult to answer.
- How would local governments afford the extra staff needed to carry out blanket inspections? Wake County believes that they would need to double the number of inspection staff in order to implement the recommendation.
- Won't this proposed new program increase cost to property owners? The draft Watershed Management Plan reports that program costs per dwelling unit typically range from $20 to $150 per year, depending on the level of service included. Costs are usually recovered through an annual or monthly fee. For comparison, septic system repair costs usually range from $2000 to $5000, although more exotic repairs can cost as much as $25,000.
- Aren't there public education and outreach efforts now in place?
- Are local health departments authorized to require inspection and maintenance programs for existing systems?
- Is public management an option? Durham supports public management of on-site wastewater treatment, citing EPA recommendations that would qualify the Upper

Neuse as sensitive to excess nutrients and in need of rigorous public management models.

Recommendation from the UNRBA Task Group on Septic System:

During the Summer and Fall of 2002, the Upper Neuse River Basin Association (UNRBA) met with local government staff to review the Draft Plan and its recommendations. In response to issues raised concerning the current septic system recommendation, the UNRBA convened a task group from County Health Departments, the UNRBA Board of Directors, NCDENR, and NCSU Cooperative Extension. This task group met in December of 2002 with the objectives of discussing the Draft Plan's recommendation for septic systems, discussing alternatives to the current recommendation, and offering guidance to the UNRBA Technical Advisory Committee and Executive Committee for approval. The group offered the following general recommendations for review.

1. *Conduct Targeted Monitoring in Specific Watersheds*
   In waters where concentrations of septic systems may be of concern, monitor surface waters for fecal coliform and nutrients. Make this effort a part of the basin-wide surface water quality monitoring program recommended in the Draft Upper Neuse Plan.

2. *Conduct Conditions Assessment(s)*
   There is limited information available to undertake systematic and detailed assessments of the locations, age, condition, maintenance history, and related information for the septic systems in the Upper Neuse Watershed. Local health departments could share such data for use in a systematic assessment to estimate the number of systems in place, provide a general idea of where these systems are, and conduct correlation studies to determine possible cause and effect relationships. Wake County is currently beginning a county-wide study that could provide important information for other jurisdictions in the Upper Neuse. The UNRBA should use the Wake County assessment results to support subsequent efforts for developing alternative management strategies.

3. *Implement a GIS-Based Information Management System*
   Improved management and analysis of information is needed to support watershed management planning efforts. GIS technology can be used to efficiently manage, analyze, and display information relating to septic system locations, types, maintenance history, site characteristics, uses, and nearby land uses and water bodies.

4. *Strengthen Public Education and Outreach and Efforts*
   Several local health departments already provide educational materials and reminders regarding septic system operation and maintenance. The following should be considered: (a) providing an information package to all purchasers of properties that have septic systems; (b) mailing operation permits to homeowners (many stay in the hands of the builders under current approach); and (c) updating existing brochures and related information.

Currently, there is no certification requirement for septic system inspectors and installers. Testing and certification programs for inspectors, permitters, installers of septic systems (ie the National Sanitation Foundation and the State Certified Operator Program) can educate installers about proper practices that, currently, are often overlooked.

5. *Adopt a "Phased" Approach*

It may be extremely difficult or infeasible to implement a management program that is initially applicable to all new and existing systems. Existing homeowners will be reluctant to support such requirements. As an alternative, consideration could be given to making the new requirements applicable for:

a) All new systems (requiring delayed inspections within 6-9 months of a new home sale, while the home still under warranty, could save the homeowner money); and
b) All existing systems at the time of resale of the property (this is also a consumer protection issue for the home buyer).

Currently, inspections of septic systems are required only by major lending agencies. For both a and b, an important question is, "Who is responsible for the inspection and oversight?"

Finally, counties should consider the following option:
c) In areas where feasible, require homeowners to hook up to available municipal sewer systems at the time of repair or property resale.

6. *Adopt a Risk-Based Management Strategy*

The failure of a single septic system in a remote area may have very limited adverse effects on public health or the natural environment. However, that same failure, if located in close proximity to a community ground-water well or public recreational water, could have the potential to adversely affect public health. Failures of multiple systems within a sensitive watershed area could lead to excessive nutrient loading to surface waters.

In addition, some systems pose more risk than do others. Sand filtration systems, for example, are notorious for failures and threat to receiving waters. Monitoring all sand filters is a potential recommendation (Orange County monitors these on a 3-year basis--they bill for the service but admit to difficulties with collection of the charge). Aging mobile home parks are another example of high-risk areas where system densities are high, systems receive little maintenance, and systems are often undersized and located in poor soil.

A risk-based management approach would target requirements, resources and efforts in proportion to the level of risk to public health and environmental quality. The more valuable the resource and the more vulnerable it is to the effects of septic system failure, the higher the level of management required within the affected area.

7. *Establish Supplemental Funding Support as a Way to Balance Benefits and Burdens*
   Consideration should be given to the potential merits of using water utility revenues or other funding sources for septic system repair and replacement, particularly within sensitive areas such as protected water supply watersheds. The state might be another potential funding source (ie, revolving loan funds or, in specific cases, the NC Clean Water Management Trust Fund).

For questions, information and assistance regarding this Issue Brief or the Upper Neuse Watershed Management Plan, please contact:

Chris Dreps
UNRBA Program Coordinator
UNRBA
P.O. Box 12276
Research Triangle Park, NC 27709
Tel: 919-558-2702
Email: dreps@tjcog.org

Patrick Davis, former Water Resources Program Manager for TJCOG, assisted in developing this issue brief.