RECOMMENDATIONS FOR EFFECTIVE SEPTIC SYSTEM MANAGEMENT IN THE UPPER ETOWAH WATERSHED

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INTRODUCTION

The upper Etowah River starts in north Georgia and flows southwest to Lake Allatoona, of which it is the principle tributary. Five counties lie within the upper Etowah watershed: Cherokee, Forsyth, Lumpkin, Dawson and Pickens. These five counties were historically rural with many small communities but few large cities. Due to their close proximity to Atlanta, however, population has increased dramatically. The population growth rate in the counties ranged between 24 to 72% during 1990 to 1997. Three of the counties within the watershed are among the top ten fastest growing in the entire country. Impacts on the watershed have increased with this growth, and concern for water quality and river health is high.

The U.S. Environmental Protection Agency (EPA) has stated that, "properly managed [and sited] decentralized wastewater systems can provide the treatment necessary to protect public health and the environment, including groundwater and surface waters, just as well as centralized systems (US EPA, 1997). Nevertheless, there is concern that – as a result of improper siting, installation, maintenance and sheer volume – that septic systems could be significantly contributing to the nutrient loads in the watershed. This report presents an analysis of the potential problems related to septic systems in the upper Etowah watershed, as well as specific recommendations to provide adequate public education and to ensure septic system maintenance and management.

SEPTIC SYSTEMS: STRUCTURE AND FUNCTION

On-site facilities come in many shapes and sizes but common to most are two main components:the tank and the absorption field. The tank's primary function is to separate solids from liquids and to provide partial decomposition of solids. Some of the separated solids settle out to the bottom (called sludge) while others, such as grease and fats, float to the top (called scum). The remainder of the wastewater forms the middle layer, called clarified sewage (or liquid effluent). Solids in the tank undergo anaerobic digestion and decomposition (breakdown and digestion by bacteria that function in the oxygen deprived tank environment). Not all solids are broken down, thus even in the best of systems, there will be sludge and scum accumulation. As sludge accumulates, the tank will require pumping to ensure that sludge and scum do not enter and clog the absorption field. Time required between pumpouts varies according to the size and style of the tank, and amount of entering wastewater. Intervals between pumpouts generally range between three to seven years (Smith, 1998), but some argue that the interval could be as long as ten years for well maintained systems. Georgia 's new septic regulations state that "the property owner shall be responsible for properly operating and maintaining the on-site sewage management system to increase the life expectancy and prevent failure" but include no specific requirements for mandatory pumpouts.

As new wastewater is flushed into the tank, the clarified effluent is pushed out. Clarity is largely a function of the length of time wastewater stays in the tank. To allow solids to separate out, wastewater needs to be retained in the tank for at least 24 to 72 hours. Georgia regulations require a minimum 24-hour retention time. Retention time is a function of the size of the tank and the level of use of the system (level of use refers to the quantity of wastewater being produced by the household and the ratio of amount of solids in that wastewater). At the time of

construction, the necessary size of the tank is calculated from the expected level of use, which is derived from the number of bed- rooms in the house. Georgia regulations require a tank liquid capacity of 1000 gallons for all one, two, three and four bedroom single family dwellings, with an additional 250 gallons for each additional bedroom. Tank capacity will be increased 50% if a garbage disposal is to be installed, as it adds biosolids to the tank.

The clarified sewage leaves the tank through the outlet pipe and moves into the absorption field. This effluent will still contain some suspended solids, various organic compounds, and active disease pathogens. The conventional absorption field is a series of underground-perforated pipes, set in a matrix of gravel filled trenches that allow the effluent to slowly drain into the ground. The length of the pipes (size of the absorption field)is a function of expected wastewater production levels, but is also highly dependent on the nature of the soil into which it is placed. The two functions of the absorption field are to transmit the effluent through the soil and to renovate the water. Renovation refers to the various biological and chemical processes that remove or immobilize the nitrogen, phosphorous, metals, bacteria, viruses, and sulfides from the effluent, before the effluent reaches ground or surface water. Beneficial aerobic (oxygen-requiring) bacteria multiply around the trench/soil interface forming what is called a biomat. The formation of this living biomat is critical to the renovation process. It is within this biomat that most of the retention and decomposition of organics, microbes, and pathogens takes place (Smith, 1998). Wastewater leaving the biomat seeps into the soil slowly enough to prevent saturation, thus increasing filtering capacity by allowing longer water retention time. .

There are many additional components or alternative construction technologies that can be added to these two basic structures. Dual compartment tanks, sequenced tanks, recirculating sand filters, and aerobic pretreatment units all modify the basic tank and can increase the amount of biosolids separated and provide some degree of pretreatment before the effluent enters the absorption field. Drip irrigation and mound construction are methodologies for absorption fields where the seasonal high water table makes the conventional trench absorption field unadvisable. Constructed wetlands can be used to increase the amount of nitrate removed from the effluent. Georgia regulations give design standards for some of these technologies, such as aerobic pretreatment, dosing tanks, drip irrigation, mound systems, and low pressure pipes. Newer technologies can also be utilized, with standards being set under the guidelines of “Section G: Experimental Onsite Sewage Management Systems ” of the regulations With these various additional components, , or alternative structures, on-site system performance can be increased.

Septic Tanks: Possible Failures

If functioning properly, on-site systems “can provide the treatment necessary to protect public health and meet water quality standards.” ((US EPA 832-R-97-001b) However, some studies estimate that as many as 40%of on-site systems may be failing (Canter and Knox 1985). Failures of septic systems fall into two main categories:visible failures and treatment failures. Visible fail- ures are when household fixtures backup or when effluent appears on the surface of the absorption field, or else where. Excessive odor is also considered a visible failure. These types of failures are highly apparent, and are the main form of reported failure (EPA 832-R-97-001b). Treatment failure, on the other hand, is not obvious. Treatment failure refers to the times when effluent is being insufficiently renovated before it reaches a well, stream, or any waterway

thus leading to environmental contamination, whether viral and bacterial (Scandura and Sobsey 1997)or nitrates (Hantzsche and Finnemore 1992).

Many factors can contribute to system failure. Structural problems such as clogged pipes, cracked tank, or broken pipes can all lead to visible failures. Older tanks made of metal can rust out. Pipes can be broken by tree roots, by construction activities, or by cars driven over absorption fields. However, a system need not be physically broken to fail. Sludge and scum will remain in a properly functioning tank. Periodic pumping of the tank is required. If a tank is not pumped, sludge accumulation can cause unclarified wastewater to be transmitted to the absorption field. Similarly, overuse of the system can lower retention time in the tank, and again unclarified sewage will leave the tank. Overflow of sludge and scum into the absorption field can directly clog the soils or can lead to the over stimulation of the biomat, leading to a reduction in transmisson of the effluent into the soils (Canter & Knox 1985). Many homeowners neglect the maintenance needs of their systems, thus perpetuating problems. However, even well-maintained systems eventually reach the end of their life spans and need replacement. Absorption fields can lose their capacity to immobilize phosporus and metals. Also, the beneficial biomat of bacteria over time will become too thick for effective transmission of the effluent. Most fields are calculated to have an expected life span of 15 to 30 years. With improper use, as mentioned above, fields have failed as early as seven years after construction.

Siting is an important factor in the proper functioning of septic systems. Appropriate soil associations are essential since soil types influence percolation rate, which should be 20-90 min. / inch (Kaplan 1987). Clays retain water, thus prolonging soil saturation. Saturation prevents the soil ’s adsorption of subsequent effluent, which causes rapid draining and prevents adequate filtration. Continual saturation also decreases the oxygen flow into the soils, and thus the aerobic (oxygen requiring)bacteria are unable to survive. The loss of the living biomat in these saturated soils decreases the renovation capabilities of the absorption field. Sandy soils also drain too quickly, because of their *low* water retaining capacity. Other factors that can make a site inadequate include steep slopes, shallow bedrock, high water tables, close proximity to surface water or wells, and frequent site flooding.

Detailed Results Of Septic System Failure

Fecal coliform/disease vectors

Fecal coliform contamination is perhaps the most prominent concern relating to septic system failures. Fecal coliform is a bacteria that can cause many types of diseases, including diarrhea, hepatitis A, dysentery, and typhoid fever (A. L. Burruss Inst., 1998). Groundwater contamination from sewage overflows has also caused cholera and salmonella (Canter and Knox, 1985). Successful filtration of pathogens is dependent on many factors, including those affecting transmission rate or longevity of the organism.

Nitrates

Conventional septic systems are not highly effective at removing nitrogen from wastewater. The only method for nitrate removal is through plant uptake. A study by Nizeyimana et al (1996) cites several sources that have found nitrate groundwater contamination to be strongly correlated with population and septic system densities. The nitrogen in wastewater effluent is composed primarily of ammonia, which is oxidized to nitrate, a soluble anion that is carried along with percolating effluent. A study done by Wilhelm *et al*. (1994) cited findings of 100 m plumes of nitrate from residential households. Accumulation of nitrates in water supplies can lead to blue baby disease when concentrations are very high (>1. 0 mg/l), and nitrites can produce a serious condition called "brown blood disease " in warm water fishes ((Kentucky web page, 1998).

Phosphorus

Phosphorus is also found at relatively high concentrations in sewage. Phosphate is usually converted in the soil to dicalcium phosphate or octacalcium, and eventually forms hydroxyapatite, a stable calcium precipitate (Canter and Knox, 1985). Thus, relatively new septic systems are generally effective in phosphorus removal. However, as systems age the phosphate-adsorption capacity can be depleted, resulting in long plumes of phosphate. Wilhelm et al (1994) reported phosphate plumes 75 meters long. Phosphorus levels can also be problematic in certain soils or in locations close to surface waters. Increased phosphorus in surface water can lead to eutrophic conditions.

pH and Metals

Many septic plumes have low pH, especially in carbonate-poor terrain. Oxidation of the septic effluent increases its acidity, resulting in a low-pH plume. Low pH decreases the soil 's potential for metal adsorption, which leads to increased mobility of metals and a higher likelihood of dissolved wastewater metals leaching into groundwater (Robertson and Blowes, 1995). Metal contamination can be particularly harmful to aquatic organisms and can impair drinking water.

SEPTIC SYSTEMS IN THE UPPER ETOWAH

Pollution Concerns in the Upper Etowah

In a study conducted from 1992 to 1996, water quality in Lake Allatoona and its tributaries (including the Etowah River)was evaluated, and an outline of objectives to help maintain water quality was created (A.L. Burruss Inst., 1998) This study indicated that the lake, which is designated for recreation, only exceeded federal coliform standards once during the summer, but exceeded limits eleven times during the winter months. However, it should be noted that the winter sampling cannot be directly compared to the federal standards, because it did not follow the methodology specified by the federal guidelines.

Sampling was also done in the tributaries, where numerous sites exhibited elevated coliform throughout the year. The upper Etowah River (designated by the state for a fishing use classification)exceeded standards, often considerably, for all but four months of the year. Again,

winter measurements did not follow sampling guidelines, but the consistently high levels do indicate cause for concern. Coliform was particularly high during months with many storm events, and increased coliform corresponded to high levels of turbidity. Though the study suggested that the source of some of the coliform was runoff from poultry and livestock operations, septic systems were also implicated. The presence of compounds which most likely originate from household wastewater, and the fact that coliform concentrations were highest on the most urbanized rivers, implicates septic systems. A similar water quality study done on the Washington River found the same seasonal variation and also concluded that failing septic system were a source of the pollution (Dewalle and Schaff 1980).

Both nitrogen and phosphorus lead to eutrophication (nutrient enrichment), which increases chances of algal blooms, fish kills, and depletion of macrophyte populations. Lake Allatoona, traditionally a mesotrophic reservoir, is becoming increasingly eutrophied and is beginning to experience algae problems. The lake is a phosphorus-limited system, and 75%of the phosphorus entering the lake comes from the Etowah River inflow (A.L. Burruss Inst., 1998). The report suggests that this may be due to high percentages of septic systems in the headwater counties. Phosphorus concentrations in the Etowah increase up to 200-fold during storm events.

Status of Septic Systems in the Upper Etowah

1) Number of Systems in Use.

One might be tempted to conclude that individual septic systems do not contribute a significant portion of nutrient contamination due to their relatively small size. Though a failure at an individual site does not compare with possible nutrient contamination released from a small package plant, one needs to consider that there are a large number of septic systems operating in the upper Etowah watershed, and that more and more systems are installed each year. Contamination from septic systems is most likely to occur in areas where these systems are densely clustered. High densities result in an increased saturation of the soil, which depletes the soil's capacity to filter the septic effluent (Canter and Knox, 1985). The counties in the upper Etowah watershed have experienced rapid growth during the 1990 's, and it is predicted that population growth will continue in the future. The five counties had population growth rates from 24 to 72 % between 1990 and 1997. Estimates for the year 2002 indicates that this growth will slow some; however, the cumulative growth between 1990 and 2002 will produce a population doubling for some of these counties (GA County Guide, 1998). Between the late 1970 's and 1998, well over 40, 000 septic systems were installed in the upper Etowah watershed. Between 75 and 94% of the households in the watershed use onsite treatment systems. In comparison, the average for the state of Georgia is 37 %of house- holds, and the United States average is 25 %of households (US Census of Housing, 1990).

2) North Georgia Soils

Many of the soils within the upper Etowah watershed are unsuitable for conventional septic systems. One reason for this is the relatively high clay composition of the soils in this region. Soils with a high clay content will retain water, which will prevent adsorption of the effluent, which in turn prevents adequate filtration in the drainage field. In general, the watershed is also

characterized by shallow bedrock and steep slopes, which affect adequate drainage field functioning by increasing the flow rate of water through the soil.

3) Old Systems

Because of the large number of septic systems installed, and the generally poor soils in the region, there should be concerns with the older septic systems in the watershed. The previous method for septic system approval required only a hydraulic conductivity rate test (perc test). Georgia 's recently passed septic system regulations, and the accompanying manual, now require the completion of multiple perc tests in conjunction with analysis of soil classification maps by trained soil scientists. This will prevent future septic systems from being sited improperly, but there are still tens of thousands of older systems in operation that were installed with less rigorous requirements. An additional concern regarding older septic systems involves the level of usage they were designed to support. In the upper Etowah watershed, and especially around Lake Allatoona, homes that were built for part-time residents are increasingly being occupied for longer periods of time than initially intended. Yet the septic systems were designed with part-time residency in mind. Therefore the size of the tank and field may be inadequate for year-round occupation.

4) Lack of Homeowner Understanding

Knowledge of septic system functioning is necessary to ensure proper system functioning and to protect against system failure. This includes understanding on the part of homeowners. The National Small Flows Clearinghouse has suggested that homeowner awareness is necessary for proper septic system functioning. The US EPA (1997) suggests that educational materials for homeowners should explain proper system use and maintenance, as well as the consequences of septic system failures. Educated and responsible homeowners can help ensure that their systems are operated and maintained properly, thereby reducing the number of failing systems and the adverse impacts on surface and ground waters (US EPA, 1997). It is not currently known whether or not homeowners in the upper Etowah watershed understand how their septic systems work, and what they should and should not do to keep their systems operating properly. It is likely that homeowner understanding reflects the generally poor understanding throughout the United States.

5) Lack of Pro-active Management

The septic tank regulations enacted by the state of Georgia require minimal inspection and no regulated maintenance after a system is installed. It is likely that maintenance is not performed by most homeowners, as the majority of failure reports include only obvious system failures. A lack of proper maintenance and management of septic systems before they reach the point of an obvious failure increases the risks that smaller, less noticeable failures will occur, and that pollutants will enter the ground and surface waters. Due to the large percentage of households using septic systems, the large number of older systems, the generally poor soils of the upper Etowah watershed, and a lack of homeowner under- standing and management of proper system functioning and maintenance, pollution from failing septic systems may very well threaten the

Etowah River. It is important to note that no studies have been conducted which enumerate the contribution of septic systems to nutrient loading of the Etowah River.

RECOMMENDATIONS

Education

Lack of proper operation and maintenance is often cited as an important component in the failure of septic systems. (NSFC WWWBRP 18, 20, 21, NSFC Onsite Demonstration Project, Morse 1998)In a survey of on-site systems in North Carolina, it was determined that the lack of a maintenance program was the major cause of poor system performance (Hoover and Amoozegar 1989). There are many actions homeowners should take, and many they should avoid (See Appendix A). However, this information may not be known by the homeowner, or homeowners may not even be aware they have a septic system. A pamphlet designed by the San Bernardino California Department of Environmental Health Services starts with "Unless you are already paying monthly sewer bills, you may be using a septic system " ((Kaplan 1987). Georgia regulations state, in Rule 290-5-26-. 18, "The property owner shall be responsible for properly operating and maintaining the on-site sewage management system to increase the life expectancy and prevent failure." Homeowner education programs can facilitate this end.

An education campaign by the Upper Etowah River Alliance, in conjunction with the health departments of the five counties in the watershed, would go a long way toward addressing the issue of septic systems and their possible impacts on ground and surface water. Information could be shared with the public in a variety of ways:

1) Media Releases

Articles printed in community newspapers and magazines, as at least one county health official has recognized, could reach many homeowners. Similarly, public service radio messages, or short TV news clips could provide quick tips and suggestion on necessary actions.

2) Pamphlets

There are many informative pamphlets available from many sources. National Small Flows Clearinghouse has a series of homeowner information publications, and even a Homeowner Onsite Record Keeping Folder. The District 2 Public Health Department of the State of Georgia has pre- pared a pamphlet as have local health departments. Distribution of these pamphlets should be targeted at all homeowners with on-site systems. Though some information about septic systems may be provided to new homeowners when they purchase their house, follow up information is highly recommended. A mass mailing could be effective. A less expensive method would be to distribute such pamphlets at the various public meetings sponsored by the Alliance or at other public awareness functions.

3) Seminars-Presentations and Videos

The Upper Etowah River Alliance could sponsor homeowner seminars regarding septic maintenance featuring presentations by county extension agents, health department employees, or professional septic system speakers. Web searches can facilitate in the selection of such speakers. In addition, video presentations could convey what can be confusing information in an easily accessible manner. The National Small Flows Clearinghouse, for example, has developed an excellent video as has the State of Florida.

Regulation

Introduction

In a recent report to Congress, [1] the United States Environmental Protection Agency (EPA) stated that while "[d]ecentralized wastewater systems are primarily governed by state and local jurisdictions [,]…existing laws and regulations can be barriers to implementing [and managing] decentralized waste treatment systems."[2] Specifically, the US EPA reported that "[i]n many cases states and/or localities: lack adequate enabling legislation to support proper management of decentralized systems [,] divide the legislative authority for public health and water protection between two or more branches of government, resulting in inequitable consideration of centralized and decentralized wastewater options and in inadequate management of decentralized systems [, and] enact prescriptive regulatory codes that narrowly define the types of wastewater systems allowed, regardless of the fact that other types of systems can meet performance and regulatory standards."[3]

State enabling statutes are inadequate if they "[do]not refer to decentralized wastewater systems or [if they are]vague or uncertain regarding legal powers to perform important management functions, "including the right to access private property to inspect systems and correct system mal- functions."[4] Division of legal authority for management of wastewater systems between state departments of health and departments of environment has led to "large, urban centralized wastewater facilities being effectively managed, while small, rural decentralized wastewater systems are frequently unmanaged."[5] Finally, regulatory codes at state and local levels can create barriers to effective decentralized wastewater management if they "prohibit or restrict the use of alternative onsite systems "rather than allow for "assess [ment] and select [ion of alternative systems] according to their ability to meet regional and local performance standards and their suitability for site-specific conditions."[6]

To remedy these problems, the EPA recommends that "[a]gencies responsible for decentralized wastewater systems be vested with the powers necessary to effectively manage them, such as the right to access private property to inspect systems and correct system malfunctions,"[7] that state and local codes be enacted "for regular inspection and pumping [to]significantly reduce onsite system failures in an area."[8] Solutions implemented by various communities include:(1) development of "adopted model ordinances or legal agreements...includ[ing]entering into service agreements with homeowners for system maintenance "; and (2) "obtaining property easements for inspections of decentralized sys- tems."[9] The US EPA also strongly suggests that states consider consolidation of centralized and decentralized wastewater system management.[10]

Consolidation would not only "allow for a comprehensive analysis and equitable appraisal of wastewater needs and [the best way to meet] water quality goals, "it would also "foster [] accountability and management program coordination."[11] Moreover, funds traditionally allocated only to environmental protection division programs could be allocated to septic system replacement projects where serious threats to groundwater and human health are found to exist. To preserve the advantages of local management, "[a]uthority for specific management functions could then be delegated as appropriate to regional and local agencies."[12]

Many communities have found that "to protect ground and surface water, decentralized systems, whether for individual or multiple dwellings, must be managed from site evaluation and design, *through the life of the system*."[13] Typically, homeowners are expected to manage their individual systems. [14] While some homeowners diligently assume this responsibility, many more have failed to routinely maintain their systems, thereby causing needless system failures. [15] Thus communities are encouraged to adopt a "proactive "wastewater management program "to ensure that [existing decentralized] systems perform satisfactorily over their service lives."[16] The EPA cites a number of advantages to such programs: "better onsite system performance and environmental protection, extended life of [existing] system [s], significant cost savings, planning flexibility, assistance for individual homeowners and developers in meeting requirements, and economic benefits accruing from use of local contractors."[17]

Current Georgia Statutes And Regulations

Although the EPA report to Congress stated that Georgia was one of only three states which "do not have specific regulations governing decentralized systems, "[18] this is no longer the case. On April 14, 1997, "Act 280 "became state law. [19] Under this Act, the Georgia Department of Human Resources (DHR) was directed in part to "adopt state-wide regulations relating to on-site sewage management systems [,] to provide an exemption for prior approved systems [,]to provide that local county boards of health shall have certain duties relating to such systems [, and] to provide that county boards of health shall have the authority to adopt standards and requirements relating to such systems."[20]

Section 1 of the Act created definitions of the following:(1) Chamber system;[21] (2)Conventional system;[22] (3) On-site sewage management system;[23] (4) Prior Approved System;[24] and (5) Unsatisfactory service.[25] Section 1 also provided the Department of Human Resources (DHR) with the authority to promulgate "state-wide regulations for on-site sewage management systems, including but not limited to experimental and alternative systems."[26] The DHR was authorized to require inspection and approval before use of a particular wastewater system, with the exception that if a "prior approved "system was contemplated, it must be approved "pursuant to the manufacturer 's recommendations."[27]

Section 2 of the Act authorized county boards of health authority, within certain limits, to (1) "determine the health needs and resources of its jurisdiction by research and by collection, analysis, and evaluation of all data pertinent to the health of the community;"[28] (2) "develop, in cooperation with the Department, programs, activities, and facilities responsive to the needs of its area ";[29] (3) "secure compliance with the rules and regulations of the Department that have

local application;"[30] and (4) "enforce, or cause enforcement of, all laws pertaining to health unless the responsibility for the enforcement of such laws is that of another agency." [31] Section 2 also provided that "[e]ach county board of health shall have the power and the duty to adopt regulations providing standards and requirements governing the installation of on-site sewage management systems within the incorporated and unincorporated area of the county, within the limits of Code Section 31-2-7 and any rules and regulations promulgated under [that] Code section."[32] In other words, county boards of health can either adopt the regulations as approved by the DHR, or add to them in one of six ways: (1) they can specify "the locations...where on-site sewage management systems may be installed ";[33] (2) they can specify "the minimum lot size or land area which may be served by an on site sewage management system *based on scientific data regarding on-site sewage management systems* ";[34] (3) they can specify "the types of residences, buildings, or facilities which may be served by on-site sewage management systems ";[35] (4) they can issue "permits for the installation of on-site sewage management systems prior to such installation ";[36] (5) they can inspect "on-site sewage management system installations prior to the completion of the installation;"[37] and (6) provide for "ongoing maintenance of such systems."[38]

Finally, Section 3 of the Act mandated that building permits may not be issued for septic systems that do not comply with the state-wide standards and Code Section 31-2-7.39 This section also provided that "[e]ach county governing authority shall provide by ordinance or resolution for the enforcement provisions of this Code section."[40] Pursuant to the directives of Act 280, the Georgia Department of Human Resources promulgated "On-Site Sewage Management Systems "Regulations which were passed as Rule 290-5-26 in February of 1998. [41] Many of the specifics of these regulations are found in the *Manual for On-Site Sewage System Management*, which is undergoing final revision.

The statutes and regulations discussed above are clearly intended to prevent inappropriate siting and installation of new on-site sewage treatment systems. They also contemplate the siting and approval of alternative and experimental systems, where appropriate. Furthermore, they are intended to provide consistent, minimum standards for such systems state-wide. Several of the statutes and regulations can be read to authorize system inspection, and testing only after problems are reported to the county environmental health department or at the request of the homeowner.[42] Yet others seem to be broad enough to authorize county environmental health personnel to develop a "lifetime "management program for on-site sewage treatment systems.[43]

The next section discusses statutes and organizational suggestions developed by a number of states to allow for effective "lifetime "on-site sewage system management. Adoption of these measures would be of benefit to the upper Etowah as well as other regions of the state. Proposals for possible future regulation are divided into two groups: (1) regulations which would strengthen post-failure management and (2) regulations which would facilitate pre-failure management." Post-failure "management as used in this report means actions that are taken after a homeowner, a neighbor or a county health department becomes aware that a system has failed. Currently septic systems are managed through an initial permitting and inspection process, after which the home- owner is responsible for unmonitored septic system management unless the health department is notified, by the homeowner or neighbors, of problems or possible system

failure. At this point, a visual inspection is completed, and tests are ordered if the source of the septic failure is unclear.

"Pre-failure "management refers to septic systems management that occurs before a home-owner calls the environmental health department to report that they are having problems with their system. Pre-Failure Management could include imposing mandatory pumping requirements, or organizing regular inspections by health department officials for systems past a certain age. These proposals for amendments to existing laws and regulations may prove useful to the upper Etowah counties and stakeholders as they consider ways in which to manage aging septic systems.

Proposals To Strengthen Post-Failure Management

Mandatory Information Disclosure Upon Sale

There are several informal mechanisms in place for communication of on-site septic system information when homes are sold in Georgia. First, inspections are almost always required by banks and other lending institutions before sale of a home or before refinancing a mortgage. Second, real estate brokers, home buyers, or sellers will request a Department of Health letter confirming a particular system appears to be functioning properly. Department of Health personnel will complete a visual inspection at that time, and will ask to see a receipt to show that the tank has been pumped. If the system is more than three years old, the inspector may condition issuance of the requested letter on having the holding tank pumped.

Third, real estate brokers, on homeowner disclosure forms, will often ask the seller to indicate whether the home uses a septic system or sewer, the date of the last inspection, and any known problems the seller has had with the system. This information is likely requested so that the real estate broker will not be found liable for misrepresentations about the seller 's septic system. [44] Yet there are no guarantees that the information will be given and no assurance that if the information is given that a seller will feel compelled to reveal all pertinent information, especially about an older septic system. There are no formal requirements for issuing to the buyer a pamphlet detailing proper use and maintenance of a septic system. Therefore, a pamphlet is only transferred if the original septic permittee passes the pamphlet along, or if the home buyer requests a copy from the county environmental health department.

It is therefore suggested that a section be added to the current Mandatory Disclosure statutes requiring that the seller provide certain information that a new homeowner needs in order to properly maintain the system in place. A number of states currently require that such information be included on a real estate seller disclosure form.[45] Some are quite general, while others require that sellers provide detailed information. Those statutes which require disclosure of the following information seem best: (1) the kind of septic system installed, [46] (2) the age of the septic system, (3) the date of the last inspection of the system, [47] (4) the date the septic system holding tank was last pumped,[48] (5) the management history of the system;[49] (6) known problems of the system, [50] (6) number of bedrooms the tank was permitted for and whether any additions have been made to the home since the permit was issued.[51].

To further facilitate homeowner education, the Upper Etowah River Watershed counties and stakeholders may want to require that a pamphlet detailing proper septic system use and maintenance be distributed at the closing of the sale of a home with an on-site sewage system. Copies of the brochure developed or distributed by the county health department could be provided to real estate firms and real estate attorneys who handle such closings. Copies could be sent directly to these offices or attached to a Department of Health Letter.

Misdemeanor Fines Schedule For Magistrate And Superior Court Judges

When county environmental health officials receive a call that a homeowner is having a problem with their septic system or that their system has failed, the official or a county inspector will inspect the system and order tests if the reason for the system failure is not apparent. The homeowner will then be instructed on the proper steps to take to correct the system failure. At times, a homeowner will not comply with these requests. At this point, environmental health officials can go to the local magistrate court to obtain a citation. That citation is then served by the marshal.

Taking the homeowner to Magistrate Court does not result in compliance and, at times, that individual must be taken to Superior Court before he or she will remedy a septic failure. One of the explanations offered for this problem is that although local ordinances might state that a fine of up to $500 can be imposed on an individual found guilty of a misdemeanor, magistrate judges, perhaps unaware that the homeowner has been given a sufficient amount of time to comply with the county health department 's requests, will only impose a fine of $50 and grant the homeowner additional time to comply.

To assist local environmental health officials dealing with homeowners who are reluctant to correct problems that have caused their septic systems to fail, a fine schedule could be added to the current enforcement statute, loosely based upon the state 's other environmental statutes.[52] These fines would be imposed if the health official is forced to take the homeowner to court to ensure cooperation and could vary depending on the number of times the system has failed, or based on a "per day the homeowner remains in violation of the county directive."[53] A provision could also be added allowing an injunction to be issued for violation or threatened violation of Rule 290-5-26-18 which prohibits the maintenance of a septic system in such a manner that causes it to fail, "without the necessity of showing the lack of an adequate remedy at law."[54]

Tax Credit For Septic System Replacement And Septic System Upgrade

On-site sewage systems are more prone to failure as they age, especially if they have not been properly maintained throughout their lifetime. Systems permitted under the old testing methodologies are also candidates for system failure. Yet replacement can be very costly. Realizing that a number of homeowners will soon be facing the prospect of being asked to replace their system, the counties in the upper Etowah watershed may want to look into the possibility of a state income tax credit. The State of Massachusetts recently adopted just such a credit in response to a homeowner outcry against such replacement.[55] This outcry is understandable when one considers that replacement of a septic system is expensive and inconvenient.[56] Creating a tax credit to recoup forty percent of the cost will help to create an

incentive for homeowners to comply with a request that reduces the homeowner's long term liabilities as well as benefits the public health. Under the Massachusetts statute, the credit is applied to the homeowner's state income tax return.[57] Upon a showing of necessity and proof of actual expenses, the taxpayer is entitled to deduct up to $1,500 per tax year over a six year period or until they reach the 40% figure or $6, 000.[58]

Proposals To Facilitate Pre-Failure Management

The State of North Carolina has recognized that the combined problems of rapid growth, improper septic system installation, and insufficient on-site sewage system management have "a detrimental effect on the public health and environment through contamination of land, groundwater and surface waters."[59] As a result, they have looked for innovative ways to develop comprehensive management of wastewater systems and have enacted a number of progressive provisions that to date have not been challenged. The adoption of these provisions in Georgia would benefit the counties and stakeholders in the upper Etowah watershed.

Statement Of Purpose & Problems Regarding Septic

The North Carolina General Assembly passed a "Purpose"statement as part of their waste- water systems statute.[60] This statute has made it possible to aggressively address watershed degradation problems in the Neuse and Tar Pamlico Watersheds. The specific findings of the General Assembly were that (1) if *improperly* managed, on-site septic systems become a serious potential source of groundwater pollution, threatening environmental health and human health, and (2) if *properly* sited and regulated, on-site septic can be a safe and effective wastewater management option.[61]

The North Carolina Assembly also passed a "Declaration of Public Policy "in which they officially recognized that "conservation of its air and water resources " was a top priority. [62] It also recognized that these resources belong to the citizens of North Carolina and "affirm[ed] the State's ultimate responsibility for the preservation and development of these resources in the best interest of all of its citizens."[63] Furthermore, the statute announced that "[i]t is the public policy of the State to maintain, protect, and enhance water quality within North Carolina."[64] In its "Basinwide Water Quality Management Plans" section, the Assembly noted that effects of septic systems on basin water quality are to be considered, [65] and that "[t]he public should be informed of the complexity of the problems regarding water quality so that the public can appreciate the effectiveness of a systemwide approach...Public involvement should be encouraged, and public education should be enhanced."[66]

Amending Georgia's Title 31 to include a statement of purpose, similar to those above, would create a powerful tool that could assist state and local health officials to legitimately regulate on-site waste systems before they fail in order to protect and enhance the health and welfare of their communities. Legal challenges to pre-failure system monitoring may also be reduced or avoided. [67]

Enhanced Inspection Provision

The State of Pennsylvania includes in its "General Provisions and Public Policy" article of its Water and Sewage statute a provision (as part of the clean streams law) that allows "such inspections of public or private property as are necessary *to determine compliance* with the provisions of this act, and the rules, regulations, orders *or permits issued hereunder*."[68] The validity of this provision was challenged and the Pennsylvania Commonwealth Court held that "warrantless inspections of commercial property " under laws that do not "define the frequency of inspections, provide for follow up inspections in cases where violations have been discovered, specifically set forth the purpose of each inspection, nor prohibit forcible entries so as to provide a mechanism for accommodating any special privacy concerns which might arise " violate the constitutional protection against unreasonable searches.[69] The Pennsylvania Supreme Court reversed and remanded this decision, but on the grounds that hazardous wastes were involved.[70] In addition, challenges to regulations under this section were upheld as "within the scope of the police power."[71]

Georgia statutes and regulations could be amended to include a statement which explicitly authorizes local health officials to inspect a homeowner's septic system before a system fails. Efforts must be made, however, to specify the inspection frequency, to provide a follow up inspection if a violation is discovered, to clearly state the purpose of periodic inspections, and forcible entry without a warrant to avoid the "open question" in the Pennsylvania challenge case (whether the lack of such specifications violates the constitutional guarantee against unreasonable searches where hazardous wastes are *not* involved). States like Oregon and Michigan which inspect on-site sewage systems regularly, inspect them once every two or three years, depending on the age of the system. Allowing for regular inspections has the added advantage of removing a disincentive for reporting problems; the homeowner knows that the problem will eventually come to light and, through education, that catching problems early can save significant amounts of money.[72]

Funding And Personnel Issues

Undoubtedly, increased monitoring and management of on-site septic systems will require additional inspectors. North Carolina has passed several statutes to create funding for pre-failure management. They include a statute that directs the managing authority (a sanitary district) to "apply service charges and rates based upon the exact benefits derived, "[73] a statute which enables the district to "make special assessments for constructing, reconstructing, extending, or *otherwise building or improving* sewage collection and disposal systems of all types, *including septic tank systems***,** "[74] and a statute that enables sanitary districts to collect a tax itself or to allow the tax to be collected, earmarked, and distributed to the district. [75] Additionally , language was inserted into the "Clean Water Management Trust Fund "explicitly stating that such funds could be used to "repair or eliminate failing septic. tank systems, to eliminate illegal drainage connections, ...[w]ith priority [being]given to economi- cally distressed units of local government."[76] Title 31 of the Official Code of Georgia and Rule 290-5-26 could be similarly amended to include provisions that allow each county to (1) hire a qualified inspector to assist with database development and periodic inspections; (2) charge an annual fee to homeowners for this and other services, analogous to a "sewer charge" but not nearly as expensive;77 (3) provide

a mechanism for collecting the annual fee through the water utility or, if the homeowners are not charged a water fee, through a tax levied by the county, earmarked and allocated to the health department; and (4) apply for and obtain money from the State's "Water Pollution Control Revolving Fund." [78]

Re-Permitting Statute

Finally, once a database of septic system information is complete, the stakeholders and counties of the upper Etowah watershed may want to institute a system of re-permitting which coincides with an established schedule of proper pumping intervals. Re-permitting could be limited to a "Two Year Provisional Permit "for new septic owners and a "Two Year Old System "permit for systems that are from fifteen to twenty years old, or it could have an intermediate permit level that coincides with the "three to five year " pumping recommendations of the EPA.

National Small Flows Clearinghouse recommends that new owners of septic systems [79] have the system inspected two years after an initial permit is issued.[80] This enables them to get sense of the demands they are putting on the system. Based on this information, a more appropriate pumping schedule can be developed. Following the two-year inspection and establishment of an appropriate pumping schedule, a homeowner would receive a permit that expires at the end of the recommended pumping interval (from three to five years with an exception for seasonal use septic). To receive a new permit, a homeowner would simply need to submit proof that the system had been pumped at the expiration of the permit. An "Older Tank "permit would be issued as the system age exceeds twenty years. Homeowners might not be required to pump more often than three to five years; inspections would simply be more frequent given the age of the system.

Organizational Issues

Before the last four suggestions can be implemented, three things will have to happen. First, a study will need to be conducted to establish the effects of failing on-site sewage system failure on the Upper Etowah River. Such a study is necessary to justify the imposition of more restrictive regulations on homeowners who use such systems.[81] Genoa, Michigan is a city that faced diminished water quality problems as septic systems began to fail.[82] Homeowners in the area, like homeowners in Massachusetts, objected strenuously to the prospect of replacing their individual systems.[83] Before implementing a septic replacement program, therefore, a questionnaire identifying homeowner concerns as well as information regarding the proper use and maintenance of septic systems was distributed.[84] A similar survey and information dissemination project could be developed for the five Upper Etowah River Watershed counties to facilitate information gathering regarding homeowner practices and regulatory concerns while databases are being developed.

Second, states such as Michigan and Oregon which inspect individual septic systems on a regular basis find that a computer database is indispensable. They have developed databases which enable them to efficiently and easily access and update information regarding individual permits and systems, keep track of upcoming inspections; and generate reminder notices for homeowners when it is time to pump. Computers have been purchased for each county in Georgia and

database software has been developed for the express purpose of automated on-site septic system management, but some counties have not yet received their systems. It is therefore suggested that every effort be made by regional managers to ensure that the computers and database software are sent to those counties and that comprehensive county databases be completed within the next five years.

Finally, it is recommended that the Upper Etowah River Alliance and counties within the watershed explore with others at the state, regional and local level, the advantages and disadvantages of merging the Georgia Department of Human Resources and the Georgia Environmental Protection Division, as recommended by the United States Environmental Protection Agency.[85]

Funding Opportunities

Pre-failure regulation of septic systems is important to ensure proper functioning, but the cost of such measures can be high. This section describes potential sources of funding for the measures suggested in this report.

Clean Water State Revolving Fund (CWSRF)

Each state administers a Clean Water State Revolving Fund (CWSRF), which acts similarly to a lending institution by providing low and no-interest loans for important water quality projects. Nationally the CWSRF has assets in excess of $27 billion, and funds an average of $3 billion worth of water quality projects annually. Funding from the CWSRF can be used for projects which include: 1) the installation of new systems; 2) the replacement, upgrade, or modification of failing or insufficient systems; and 3) centralized management programs, including entities which design, site, inspect, operate, and/or maintain a septic systems (US EPA, 1999). The state of Ohio has used CWSRF monies to establish a program where low-interest loans are available to homeowners for upgrading or replacing their septic systems. In Mahoning County, Ohio, $1,425,000 has been allocated for these loans, and Cuyahoga County, Ohio has designated $1,950,000 for homeowner loans. A similar program has been established in Maine which provides low interest loans to finance septic systems, and has made $1,277,152 in loans through the end of 1998.

PA 319 Grants

Section 319 of the Clean Water Act provides funds for states to restore waters adversely affected by nonpoint source pollution, as well as to protect waters which are endangered by nonpoint source pollution. Most states have plans which allow the use of section 319 funds for the installation. and repair of onsite wastewater systems. The Upper Etowah River Alliance has recently received section 319 funding, and additional funds could be applied for to support septic education programs in the Etowah watershed.

USDA Rural Utilities Service

The USDA Rural Utilities Service (RUS) provides loans and grants to develop water and waste disposal systems in rural areas and towns with populations less than 10, 000. Grants under the

program are intended to make the costs of waste disposal reasonable for rural users, and the program will also guarantee the loans made by other lenders intended for water and waste disposal.

Point-Nonpoint Source Trading Programs

The EPA is currently advocating the use of watershed-based trading programs to achieve water quality objectives, recognizing that trading is an innovative way to develop common-sense, cost-effective solutions for water quality problems. Trading is an efficient, market-driven approach to meet the goals of the Clean Water Act (CWA). Within a point-nonpoint source trading program, point sources (such as a package plant or treatment plant) can earn discharge credits in exchange for financing better management practices of nonpoint sources. This can include financing of septic system upgrades and management.

The EPA recognizes several economic, environmental and social benefits from effluent trading programs. Economic benefits include the reduction in costs for individual pollution sources and the reduction of the overall cost of addressing water quality problems in the watershed. Environmental benefits include an equal or greater reduction of pollution for the same or less cost, the incentive for polluters to go beyond minimum pollution reduction, and the working toward broader environmental goals (such as, ecological restoration, improved wildlife habitat, and endangered species protection). Social benefits include the encouragement of dialogue among stakeholders and the fostering of holistic solutions for watersheds with multiple sources of water pollution.

Of the several point-nonpoint source trading programs recently initiated in the United States, two are of particular note. The trading program for North Carolina ’s Tar-Pamlico River basin has been highly successful. Selected publicly owned treatment works (POTWs) in the basin pay into a state fund that supports implementation of best management practices (BMPs) on farms. The plants achieve water quality goals less expensively than if each plant upgraded its facility independently (US EPA, 1999; Hall and Howett, 1999). The trading program for Lake Dillon, CO is of interest because it includes septic systems within the nonpoint sources that it is designed to mitigate. The Upper Etowah River Alliance is currently in a partnership to examine a point-nonpoint trading program for the river. Septic systems should definitely be included within this analysis.

NOTES

1 Office of Water, U.S. EPA, Pub. No. 832-R-97-001b, Response to Congress on Use of Decentralized Wastewater Treatment Systems (1997).

2 *ibid.* at 18.

3 *ibid.*

4 *ibid.*

5 *ibid.* at 21. The EPA ascribes this division of authority to the fact that "[r]egulatory officials responsible for water quality programs historically have not considered decentralized wastewater systems as an acceptable option, and certainly not an option of equal statute with centralized facilities for protection of water quality." *ibid.* . at 19.

6 *ibid.* at 20.

7 12 . *ibid.* at 18.

8 *ibid.* at 19.

9 *ibid.* (reporting that services are "conducted by either a local agency or private contractor).

10 *ibid.* at 20.

11 *ibid.*

12 *ibid.*

13 *ibid.* at 21 (emphasis added).

14 *ibid.* at 22.

15 *ibid.* (reporting that the result of this "inadequate operation and ...lack of routine maintenance " have led to a perception that "decentralized systems are less reliable than centralized facilities ").

16 *ibid.*

17 *ibid.* (citing F. SHEPHARD, AD HOC TASK FORCE FOR DECENTRALIZED WASTEWATER MANAGEMENT, MANAGING WASTEWATER: PROSPECTS IN MASSACHUSETTS FOR A DECENTRALIZED APPROACH (1996)).

18 *ibid.* (noting that California, Georgia, and Michigan regulate decentralized systems ...at the local level).

19 1997 Ga. Laws 280 (codified as amended at *O.C.G.A.*§§ 31--2-7, 31-3-5, 31-3-5. 1).

20 *ibid.*

21... *O.C.G.A.*§ 31--2-7 (a)(1)(1996).

22 *ibid.* § 31--2-7 (a)(2).

23 *ibid.* § 31--2-7 (a)(3).

24 *ibid.* § 31--2-7 (a)(4).

25 *ibid.* § 31--2-7 (a)(5).

26 *ibid.* § 31--2-7 (b).

27 *ibid.* If such systems were found to provide "unsatisfactory service, " however, , " [u]pon written request of one-half or more of the health districts in the state, the Department is authorized to require reexamination of the system or any component thereof." *ibid.*

28 *O.C.G.A.*§ 31--3-5 (a)(1)(1996).

29 *ibid.* § 31--3-5 (a)(2).

30 *ibid.* § 31--3-5 (a)(3).

31 *ibid.* § 31--3-5 (a)(4).

32 *ibid.* § 31--3-5 (b).

33 *ibid.* § 31--3-5 (b)(1).

34 *ibid.* § 31--3-5 (b)(2)(emphasis added). It should be noted that the zoning powers of a county or municipal governing authority are not limited by this section, and a county or municipality may "establish minimum lot sizes larger than the minimum lot sizes specified [by the county board of health]." *ibid.* § 31--3-5 (c).

35 *ibid.* § 31--3-5 (b)(3).

36 *ibid.* § 31--3-5 (b)(4).

37 *ibid.* § 31--3-5 (b)(5).

38 *ibid.* § 31--3-5 (b)(6). All other more restrictive regulations would have to be passed by county and municipal governments.

39... 12 . *ibid.* § 31--3-5. 1.

40 *ibid.*

41 GA. COMP. R. & REGS. r. 290-5-26-01, *et seq.* (1997).

42 See 1997 Ga. Laws 280 ¶ 1;;*O.C.G.A.*§ 31--3-5 (b)(3)-(5);GA. COMP. R. & REGS. r. 290-5-26-03 (3);r. 290-5- 26-03 (1)-(3).

43 See *O.C.G.A.*§ 31--3-5 (a)(2)-(4), § 31--3-5 (b)(5); GA. COMP. R. &REGS. r. 290-5-26-03 (2)(b), r. 290-5-26-18 (4).

44 Cf. Clarance E. Hagglund & Britton D. Weimer, "Caveat Realtor: The Broker 's Liability for Negligent and Innocent Misrepresentations," 20 *Real Est. L. J.* 149 (1992). But cf. Clarance E. Hagglund & Britton D. Weimer, "Caveat Emptor: Realty Purchaser 's Duty to Investigate," 20 *Real Est. L. J.* 373 (1992).

45 The states of Ohio, Pennsylvania, Rhode Island and Washington mandate disclosure regarding on-site septic systems. A proposed disclosure form for the state of Connecticut can be found in Katherine A. Pancak *et al.*, "Residential Disclosure Laws: The Further Demise of Caveat Emptor," 24 *Real Est. L. J.* 291, 322 app. A (1996).

46 See R.I. GEN LAWS § 5--20. 8-2 (1996). The size and location of the drain field, since that is a part of the permit record could also be added.

47 See OHIO REV. CODE ANN. §5320. 30 (Anderson 1996); 68 PA. CONS. STAT. ANN. §1025 (West 1996); WASH. REV. CODE ANN. § 64.06.020 ((West 1996).

48 See 68 PA. CONS. STAT. ANN. §1025 (West 1996); R.I. GEN LAWS § 5-20.8-2 (1996); WASH. REV. CODE ANN. § 64.06.020 (West 1996).

49 See R. I. GEN LAWS § 5-20.8-2 (1996); WASH. REV. CODE ANN. §64.06.020 (West 1996).

50 See OHIO REV. CODE ANN. §5320. 30 (Anderson 1996); 68 PA. CONS. STAT. ANN. §1025 (West 1996); R.I. GEN LAWS § 5-20.8-2 (1996); WASH. REV. CODE ANN. §64.06.020 (West 1996).

51 See WASH. REV. CODE ANN. § 64.06.020 ((West 1996). Note that a statement of annual or assessment fees can also be inserted if they are instituted by amendment. See R.I. GEN LAWS § 5--20.8-2 (1996).

52... We say loosely because the existing Title 12 statute that enumerates a fine program imposes steep penalties. See O. C. G. A. § 12--13-19 (1996). Yet under O. C. G. A. § 17--10-3 (a)(1), a fine for a misdemeanor may not exceed $1,000. And, although a fine can be issued for each

offense, the total fine may not exceed $1,000. See *Rucker v. State*, 133 Ga. App. 180,210 S. E. 2d 365 (1974)(holding that so long as separate penalties for separate occurrences of the same violation do not exceed maximum fine they are not excessive).

53 See *ibid.* § 12--13-19 (c).

54 *O.C.G.A.*§ 12--13-15 (1996).

55 Homeowners were upset by rumors circulating that "septic system repairs [would] approach [] or exceed [] the value of residences under inspection." M. Allison Hamm, "The Massachusetts Experience With Non-Point Sources: Regulators Beware," 10 WTR *NAT. RESOURCES &ENV 'T*, Winter 1996, at 47, 49.

56 Additionally, the homeowner will be "stuck " with his or her house because getting a "clean " inspection or a Department of Health Letter will be difficult at best and impossible at worst.

57 MASS. GEN. LAWS ANN. 62 § 6 ((h)(i)(1996).

58 *ibid.*

59 N.C. GEN. STAT. §130A-333 (1996).

60 *ibid.*

61 *ibid.* North Carolina also chose to create a comprehensive waste treatment management system, combining environmental protection and public health departments, see N.C. GEN. STAT. § 143--211 (1996), and creating sanitary water districts. See *ibid.* § 130A--55, *et seq.* (1996). An additional statement of findings can be found in N.C. GEN. STAT. § 143-- 215.8B (1996), specifically discussing water quality management plans for the 17 major river basins in the state. *ibid.*

62 *ibid.* § 143--211 (a)(1996).

63 *ibid.*

64 *ibid.* § 143--211 (b)(1996).

65 N.C. GEN. STAT. §143-215. 8B (a)(1996).

66 1997 N.C. Laws 458 § 8.1((7)(1996).

67 But note that to be upheld any such regulations would need to be "reasonable to achieve [this] valid public purpose. See Douglas A. Yanggen &Leslie A. Amrhein, "Groundwater Quality Regulation: Existing Governmental Authority and Recommended Roles," 14 *COLUM. J. ENVTL. L.* 1, 62 (1989)(noting that "[w]hile groundwater protection may be considered a

valid public purpose, [laws] designed for this purpose may nonetheless be invalidated if a court finds that zoning authority has employed unreasonable means to accomplish this goal ”).

68 35 PA. CONS. STAT. ANN. §691. 5 (West 1996).

69 *Commissioner, Dept. of Envtl. Resources v. Fiore,* 491 A. 2d 284, 88 Pa. Cmwlth. 418 (Comwlth 1984), *rev ’ d* 516 A. 2d 704 512 Pa. 327 (1985)(emphasis added).

70 *Dept. of Envtl . Resources v. Fiore,* 516 A. 2d 704 512 Pa. 327 (1985).

71 *Commissioner v. Harmar Coal Co*., 306 A. 2d 308, 452 Pa. 77 (Sup. 1973), *appeal dismissed* 415 U. S. 903 (197_) (holding that regulations “maintaining water resources are within police power ” and that a state may, , when exercising police power “not only suppress what is offensive, disorderly or unsanitary, but also enact regulations to promote the health, morals or safety and the general well-being of the community ”).

72 The homeowner may only need to have the holding tank pumped, but if the problem is avoided, the entire system might need to be replaced.

73 N.C. GEN. STAT. §130A-64 (1996).

74 N.C. GEN. STAT. §153A-185 (1996).

75 N.C. GEN. STAT. §130A-62 (1996).

76 N.C. GEN. STAT. §113-145.3 (1996).

77 The average charge is around $53 per year, either payable all at once or in two payments. Homeowners pay an extra lab fee if tests must be ordered.

78 See O. C. G. A. § 12--5-38. 1 (1996).

79 “New ” refers to the original permittee or a person buying a home with a septic system.

80 Videotape: *Your Septic System: A Guide for Homeowners* (National Small Flows Clearinghouse 1990).

81 See Douglas A. Yanggen & Leslie A. Amrhein, “Groundwater Quality Regulation: Existing Governmental Authority and Recommended Roles,” 14 *COLUM. J. ENVTL. L.* 1, 89 (1989)(noting that “[t]o help ensure that regulatory provisions contained within an ordinance constitute a reasonable means of achieving an enumerated public purpose objectives of the ordinance, local governments must take care to relate the severity of the regulation chosen to the harm which is sough to be prevented ”).

82 “Building Sustainable Communities,” in WATER QUALITY 205.

83 *ibid.*

84 *ibid.*

85... Office of Water, U.S. EPA, Pub. No. 832-R-97-001b, *Response to Congress on Use of Decentralized Wastewater Treatment Systems* 20 (1997).

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APPENDIX A: BASIC OPERATION AND MAINTENANCE GUIDELINES FOR ON-SITE SYSTEM OWNERS

-DO PUMPOUT - The basic maintenance element that is often overlooked by septic owners is the periodic pumpout. Solids only undergo partial decomposition in the tank. The sludge and scum that accumulates over time needs to be pumped out in order to avoid solids leaving the tank and clogging the absorption field. A regular schedule of inspection and pumpout should be part of the homeowner's routine. Inspections every 1-2 years, and pumpouts every 3-5 years are recommended.

-DO CONSERVE WATER - By decreasing the amount of water used in the household, one can improve system functioning and possibly longevity. Installing water saving devices, such as low flow showerheads, fixing leaky faucets and toilets are all methods of reducing household water use.

-LEARN the location of your tank and field

-AVOID driving over the absorption field-as this could crush pipes and compact soils.

-PLANT only grass over the absorption field. Woody roots of trees and shrubs can clog the absorption field, or damage the pipes.

-DIRECT roof drains, basement sump pump drains and other water drainage systems away from absorption field as this can interfere with the renovation process of your field.

-DO NOT USE caustic drain openers. These chemicals can break down the sludge and scum layers in your tank causing more solids to exit the tank. Such solids in your absorption field will decrease the viability and longevity of your system.

-BE SPARING in your use of bathroom and kitchen cleaners, as well as amounts of laundry detergents used. These chemicals can interfere with the proper function of your system. Remember that both the tank and field have living bacterial components that are vital to the system. Many household cleaners can impair or kill these beneficial bacteria.

-AVOID running multiple loads of laundry on one day. Large influxes of water into the tank can reduce the separation capacity of the tank and increase amounts of solids leaving the tank.

-AVOID using septic tank additives, septic tank cleaners, yeast, and sugar. All these can increase the amount and activity of the bacteria in the tank. This heighten activity can prohibit sludge and scum from separating out of the wastewater and actually will increase the amounts of bio solids leaving the tank.

-A SEPTIC SYSTEM is not a TRASH CAN - Do not pour grease, oil, paint, pesticides, or other hazardous chemicals into drains. Do not flush cat litter, diapers, sanitary napkins, tampons, condoms, paper towels, or other plastic items. Eliminate or reduce the use of food grinders.

(from NSFC pamphlets WWWBRP 18, 20, &21)

APPENDIX B: RESOURCES

National Small Flows Clearinghouse
West Virginia University
P.O. Box 6064
Morgantown, WV 26506-6064
(800)624-8301, (304)293-4191
fax:(304)293-3161
Web site: www.nsfc.wvu.edu

The Water Resources Research Institute
Office Suite 1131
Jordan Hall, Box 7912
North Carolina State University
Raleigh, NC 27895-7912
(919)515-2815
fax:(919)515-7802
Web site: http://www2.ncsu.edu/ncsu/CIL/WRRI/index.html

Web sites:

National Onsite Wastewater Recycling Association, Inc (NOWRA)
www.nowra.org

NCSU Water Quality Group
http://www.bae.ncsu.edu/bae/programs/extension/wqg/index.html

NCDENR On-site Wastewater Section
http://www.deh.enr.state.nc.us/oww/index.htm.

Oregon On-Site Sewage Treatment and Disposal Program
http://waterquality.deq.state.or.us/wq/OnSite/OnSite.htm

Purdue On-site Wastewater Disposal
http://danpatch.ecn.purdue.edu/~epados/septics/septic.htm

Texas Waternet: A service of the Texas Water Resources Institute at Texas A&M University
http://twri.tamu.edu/

Texas On-site wastewater treatment research council
http://towtrc.tamu.edu/

United States Environmental Protection Agency
http://www.epa.gov/

Virginia Department of Health Division of Onsite Sewage and Water Services
http://www.vdh.state.va.us/onsite/index.htm

Virginia Polytechnic Institute and State University On-site Wastewater Treatment and Disposal Systems
http://fbox.vt.edu:10021/cals/cses/reneau/index.html

Water Resources Research Institute of the University of North Carolina

APPENDIX C: MODEL FORMS AND PROPOSED AMENDMENTS

Real Estate Sales Disclosure Form Mandatory Septic Disclosure Clause

Proposed State Income Tax Credit Provision

Proposed Amendment To Title 31, Chapter 3

Statement Of Purpose

Declaration Of Public Policy

Proposed Amendment To The Current Inspection Provisions Of Title 31 & Rule 290-5-26

Proposed Amendment To Allow For On-Site Management System Allocations From "Water Pollution Control Revolving Fund" O.C.G.A. § 12-5-38.1 (A)

REAL ESTATE SALES DISCLOSURE FORM
MANDATORY SEPTIC DISCLOSURE CLAUSE

OPTIONS GROUP #1[1]

A. The property is served by:
___ Public Sewer Main ___ Septic System
___ Other Disposal System (describe) _____

If the property is connected to a sewer system:

B. What kind of septic system is it?[2]
___ Chamber System ___ Conventional System
___ Prior Approved System
___ Alternative System (describe)_____
_____
_____
_____

[ ] Don't Know Model Number:[3]

[ ] Yes [ ] No [ ] Don't Know C. Was a permit issued for its construction?

[ ] Yes [ ] No [ ] Don't Know D. Was the system approved by the city or the county after construction?

[ ] Don't Know E. How many bedrooms was the system approved for?____

[Month and Year] F. When was the system last inspected? _____

[Month and Year] G. When was the system last pumped? _____

[ ] Yes [ ] No [ ] Don't Know H. Do all plumbing fixtures including the laundry drain go to the sewage system? If no, explain: _____
_____

[ ] Yes [ ] No [ ] Don't Know I. Are you aware of any changes or repairs to the septic system? If yes, explain: _____
_____

[ ] Yes [ ] No [ ] Don't Know J. Are there any defects in the operation of the system? If yes, explain: _____

[1] Modeled on WASH. REV. CODE ANN. § 64.06.02 (West 1996).

[2] Systems identified to conform with O.C.G.A. § 31-2-7 (1996).

[3] Homeowners should consult their permit issued when septic system was approved.

OPTIONS PROVISION #2[4]

Are you aware of any leaks, backups, or other problems relating to any of the plumbing, water and sewage related items? ___ Yes ___ No

OPTIONS PROVISION #3[5]

SANITARY SYSTEM: The nature of the sanitary system servicing the property is (check appropriate boxes):

[ ] Public Sewer [ ] Private Sewer [ ] Septic Tank [ ] Leach Field

[ ] Aeration Tank [ ] Futration Bed [ ] Unknown

[ ] Other: _____

If not a public sewer, date of last inspection: _____
If owner knows of any current leaks, backups or other material problems with the sanitary system servicing the property, please describe: _____
_____

[4] From 68 PA. CONS. STAT. ANN. § 1025 (west 1996).

[5] Modeled on OHIO REV. CODE ANN. § 5320.30 (Anderson 1996).

PROPOSED STATE INCOME TAX CREDIT PROVISION[6]

The following credits shall be allowed against the tax imposed by this chapter:

***

Any owner of residential property located in the [State of Georgia] who is not a dependent of another taxpayer and who occupies said property as his principal residence shall be allowed a credit equal to 40 per cent of the expenditures for design and construction expenses for the repair or replacement of a failed cesspool or septic system pursuant to the provisions of Title [31] as promulgated by the [Department of Human Resources] in [February of 1998]. Said expenditures shall be the actual cost to the taxpayer or $15,000, whichever is less; provided, however, that said credit shall not exceed $1,500 in any tax year and any excess credit may be applied over the following five subsequent tax years up to an aggregate maximum of %6,000. The amount of any such credit shall be reduced by an amount equal to the total interest subsidy or grant received from the [state], whether directly or indirectly toward the cost of said expenditures. The department shall promulgate such rules and regulations as are necessary to administer the credit afforded by this subsection, including, but not limited to, a notification system by the [state] to recipients of said interest subsidy or grant of the amount of the total provided by the [state].

[6] From MASS. GEN. LAWS ANN. 62 § 6 (h) (i) (1996)

PROPOSED AMENDMENT TO TITLE 31, CHAPTER 3
STATEMENT OF PURPOSE[7]

The General Assembly finds and declares that continued installation, at a rapidly and constantly accelerating rate, of septic tank systems and other types of wastewater systems in a faulty or improper manner and in areas where unsuitable soil and population density adversely affect the efficiency and functioning of these systems, has a detrimental effect on the public health and environment through contamination of land, groundwater and surface waters. Recognizing, however, that wastewater can be rendered ecologically safe and the public health protected if methods of wastewater collection, treatment and disposal are properly regulated and recognizing that wastewater collection, treatment and disposal will continue to be necessary to meet the needs of an expanding population, the General Assembly intends to ensure the regulation of wastewater collection, treatment and disposal systems so that these systems may continue to be used, where appropriate, without jeopardizing the public health.

[7] N.C. GEN. STAT. § 130A-333 (1996).

PROPOSED AMENDMENT TO TITLE 31, CHAPTER 3
DECLARATION OF PUBLIC POLICY[8]

It is the public policy of the State to maintain, protect, and enhance water quality within [Georgia]. Further, it is the public policy of the State that the cumulative impact of transfers from a source river basin shall not result in a violation of the antidegradation policy set out in 40 Code of Federal Regulations § 131.12 (1 July 1997 Edition) and the statewide antidegradation policy adopted pursuant thereto.

[8] N.C. GEN. STAT. § 143-211(b).

PROPOSED AMENDMENTS TO THE CURRENT INSPECTION PROVISIONS OF TITLE 31 & RULE 290-5-26[9]

The department [and local county officials] shall have the power and its duty shall be to:

***

(#) Make such inspections of public or private property as are necessary *to determine compliance with the provisions of this act,* and the rules, regulations, orders or permits issued hereunder.

[9] 35 PA. CONS. STAT. ANN. § 691.5 (b)(8) (West 1996).

PROPOSED AMENDMENT TO ALLOW FOR ON-SITE SEWAGE MANAGEMENT SYSTEM ALLOCATIONS FROM "WATER POLLUTION CONTROL REVOLVING FUND" O.C.G.A. § 12-5-38.1 (a)[10]

The director is authorized to administer funds granted to the state by the administrator of the federal Environmental Protection Agency pursuant to Title VI of the Federal Water Pollution Control Act, as now or hereafter amended, for the purpose of providing assistance to municipalities or counties or any combination thereof or to any public authority, agency, commission, or institution for construction of treatment works as that term is defined in Section 212 of the federal Clean Water Act, *or to repair or eliminate failing septic tank systems, and to facilitate improvement of on-site sewage maintenance programs, with priority given to economically distressed units of local government and areas of serious ground water or watershed degradation.*

[10] Based on N.C. GEN. STAT. ANN. § 113-145.3 (1996).