

# Septic Systems and Wells

Chatham County Center

January, 2009

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## Homeowner Septic Information Workshop



**Tuesday, January 27, 2009**

**7:00 p.m.**

**Auditorium**

**County Agriculture Building  
Pittsboro, NC**

### PRESENTERS:

#### Al Cooke

Extension Agent, Chatham Co.  
Center  
NC Cooperative Extension Service

#### Carl Kivett

Environmental Health Specialist  
Chatham County Public Health  
Department

#### Andy Siegner

Environmental Health Director  
Chatham County Public Health  
Department

#### Jonathan Godfrey

Environmental Health Specialist  
Chatham County Public Health  
Department

#### Anne Lowry

On-Site Program Coordinator  
Chatham County Public Health  
Department

### TOPICS:

#### Lot Evaluation

Topography, type of soil, depth of soil, space available

#### Septic System Design Considerations

Water usage, house location, setbacks, types of systems

#### Maintenance

When to pump, cleaning filters, don't flush it/don't sink it, water use, additives, grey water

#### Signs of Failure

Backing up in house, surfacing, alarm, odors, health

and safety issues, cleanup

Chatham County On-Site Wastewater Monitoring Program

Landscaping Over Septic Fields

#### Repairs

Permits, contacting a contractor, inspections

New technologies

Drip, pretreatment, gravelless systems

Reports and Record-keeping

**\$5.00 registration per workshop paid at door.  
Please pre-register in advance by calling 919-542-8202.**

**NC** State University  
A&T State University  
**COOPERATIVE  
EXTENSION**

Empowering People • Providing Solutions

# Homeowner Well Information Workshop



**Tuesday, March 17, 2009, 7:00—8:30 p.m.**  
Auditorium, County Agriculture Building  
Pittsboro, NC

## Presenters:

Terri Ritter

Environmental Health Program  
Specialist

Nancy Leaver

Environmental Health Specialist

## Topics:

Well Permits, Water Testing, Groundwater and Geology, Well  
Abandonment, Well Protection and Repairs

**\$5.00 registration per workshop paid at door.**  
**Please pre-register in advance by calling 919-542-8202.**

Registration includes advertising, refreshments and workshop materials. Make check payable to Chatham County Cooperative Extension. For more details, call Glenn Woolard at 919-542-8202 or Terri Ritter at 919-545-8336.

*For accommodations for persons with disabilities, contact Glenn Woolard at 919-542-8202 no later than five business days before the event.*

## Well Information from the Chatham County Public Health Department

### Buying a Home with a Well

Most homebuyers would never consider purchasing a home without a thorough inspection of the structure and its operating systems. The same care must be taken to inspect the property's well system and the quality of its drinking water.

- Request a copy of the well log and any recent water quality tests
- Determine the type and age of the well, the depth of casing, and the condition of the pump and wellhead
- Identify pollution sources and their proximity to the well

### Hiring a Water Well Professional

Selecting the right water well professional is your best guarantee of a good supply of clean drinking water. To find a well professional, ask your neighbors, call your state water well association or local health department, or check in the yellow

pages of the telephone book. Once you have identified a few prospective companies, ask a lot of questions:

- Ask for two or three references
- Ask for proof of certification
- Ask about insurance and bonding
- Ask about maintenance and repair services
- An experienced driller should know the state and local regulations that govern well drilling as well as the geology of the area in which they drill

### Water Quality Sampling: Should I have my water tested?

If your water supply comes from a private well, you are responsible for assuring that it is safe. Routine testing for a few of the most common contaminants is recommended, even if your water appears clear and tastes good. Regular testing is valuable because it establishes a record of your well's water quality.

The Division of Environmental Health

offers water sampling services. Upon receiving an application and the applicable fee, a representative of the Division will make an appointment to collect your water sample(s). These samples are sent to the North Carolina Public Health Laboratory for analysis. Bacteria, inorganic, nitrate, sulfur bacteria and iron bacteria tests are \$33.00 each. Pesticide and petroleum samples are \$70.00 each. Application forms are available in the Environmental Health Section of the Chatham County website at [www.chathamnc.org](http://www.chathamnc.org).

### What Tests are Available from the Chatham County Public Health Department?

**Bacteria:** This test provides a general assessment of the bacterial safety of your water. It is recommended that your well be tested for bacteria every year.

**Inorganic:** The parameters tested for include: alkalinity, arsenic, calcium, chloride, copper, fluoride, iron, hardness, magnesium, manganese, lead, pH, and zinc.

*(Continued on page 3)*

## Well Information from the Chatham County Public Health Department

(Continued from page 2)

**Nitrates/Nitrites:** Nitrates or Nitrites in the water can be very dangerous. Excessive levels can cause methemoglobinemia, or "blue baby syndrome". Boiling the water can increase the concentration of the nitrates or nitrites. Sources of nitrate are fertilizer, animal waste and sewage.

**Sulfur Bacteria:** This test may be needed if your water has a "rotten egg odor," bitter taste or you notice corrosion on pipes with black or yellow staining on fixtures.

**Iron Bacteria:** This test may be needed if your water has a reddish-brown tinge, an oily sheen or a cucumber odor. A slimy build up in the toilet tank is also an indicator of iron bacteria.

**Pesticide:** You should request this test if your well is in an area of intensive agriculture or the well is located within 50 feet of a termite treated building foundation.

**Petroleum:** Petroleum products contain volatile and semi-volatile organic compounds. You should request this test if your well is located near an underground storage tank (UST) or the well is near a landfill.

For more information on water quality testing, please contact the Environmental Health Division of the Chatham County Public Health Department at 919-542-8208.

## Protecting Well Water Supply

### What shape is your well in?

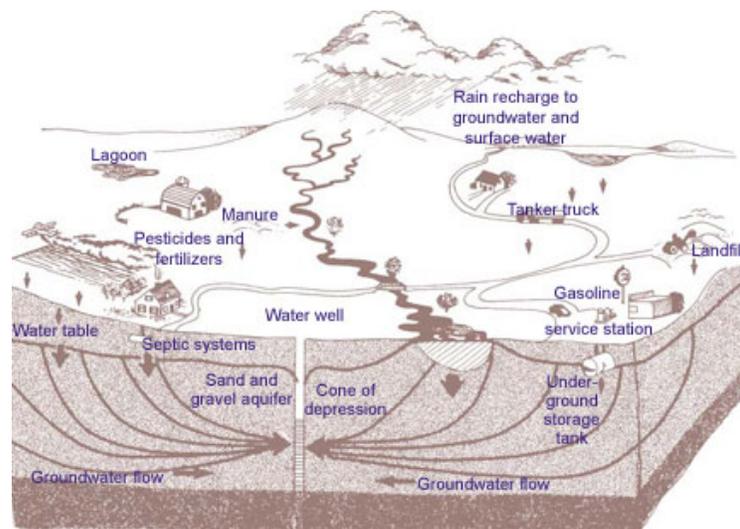
Keeping your well water free of harmful contaminants is top priority for your health and for the environment. In North Carolina, more than 800,000 citizens draw water from a well. Many areas in North Carolina are experiencing rapid population growth which can deplete groundwater supplies. If the water in a well is pumped too quickly and the groundwater cannot replenish it, the well can go dry.

One of the easiest ways to protect well water from pollution is to make sure that the well is in good shape and placed in the right location. A poorly built or maintained well can allow pollutants to enter water directly. The closer the well is to sources of pollution, the more likely the well will become polluted. For instance, if the well casing is cracked and pesticides that are being mixed near the well are spilled, the pesticides can easily leak into the well and pollute your drinking water. These pollutants can easily spread to a neighbors well and seep into other water sources such as creeks, rivers, and lakes around the home.

### How safe is your drinking water?

If you drink water, it comes from a well or spring (groundwater sources) or a river or lake (surface water sources). Drinking water in North Carolina is generally safe, but it can become polluted if we are not careful. Many of the things we do at home can pollute our water and the environment. Poorly maintained or designed septic and animal waste systems can pollute surface and groundwater. Pesticides, fertilizers, fuels, and cleaning products can contaminate our water when they are not stored and handled properly.

It is very expensive, and in some cases, nearly impossible to get pollutants out of water once they get there. Expensive treatments or new wells would be required to get safe



Potential groundwater pollutants

## 2. How close is the well to sources of pollution?

North Carolina law does not allow wells to be built near sources of pollution. The state sets minimum allowable distances, which are called "separation distances." These minimum distances are set in order to make use of the natural protection soil provides. However, state well codes do not mention every home activity and structure. Also be aware that some counties have well ordinances that may vary from the state regulations. Some variances permit as little as 50 feet separation. It is important to check with your local health department or your Cooperative Extension office for this information.

When no distances are mentioned for the specific activity or structure you have in mind, provide as much separation as possible between your well and any potential source of pollution. If your home is located on soils that soak up water very quickly (such as sandy soils) or on thin soil that lies over bedrock, maximum separation is needed. If the source or activity presents a high risk of pollution, keep it as far away from your well as possible. The law requires that existing wells meet only the distance requirements in effect at the time the well was built. For your own sake, you should meet current regulations and exceed them if you can.

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# Protecting Well Water Supply

(Continued from page 3)

<b>Minimum Separation Distances Between Well and Potential Homestead Sources of Contamination</b>	
Sanitary landfills	500 ft.
Any source of sewage, such as septic tank and drainfield, cesspools and privies, sewer lines which are not watertight, and any sludge-spreading or wastewater irrigation operations	100 ft.
Any source of animal waste, such as animal feedlots or manure piles, animal barns, or lagoons, pet kennels	100 ft.
Any source of chemical contamination, including fertilizer, pesticide, herbicide (insect and weed killers), or other chemical storage areas; buried gasoline and oil tanks	100 ft.
All other potential sources of groundwater contamination not specifically listed	100 ft.
Building foundations	50 ft.
Streams, lakes, ponds, etc.	50 ft.
For a well serving a single-family dwelling, minimum separation distances can be reduced where lot size or other fixed conditions make this necessary. In this case, the distance should be as large as possible, but at least 50 feet from sources of sewage listed above, and 25 feet from building foundations and watertight sewage lines.	

### 3. How well does the soil filter out pollutants?

Soil can filter pollutants carried up by stormwater runoff as it travels down to groundwater. The ability of soil to filter your water depends on the type of soil around the well. Water passes quickly through sand, so sandy soil cannot filter out pollutants. Water and pollutants move more slowly through clay, so clay soils have more time to filter out pollutants. Soils high in organic matter also filter pollutants.

### 4. How quickly does water reach your well?

Another factor that influences groundwater pollution is the depth from the soil surface to the water table or to fractured bedrock. The water table is the top of the groundwater. Groundwater can be stored in soil or rock. Groundwater reaching fractured bedrock can move quickly down to wells. The farther water and pollutants have to move through the soil to reach the top of the water table, the longer the soil will have to filter the groundwater. Water table depth varies in North Carolina.

### 5. What is the condition of your well casing and cap?

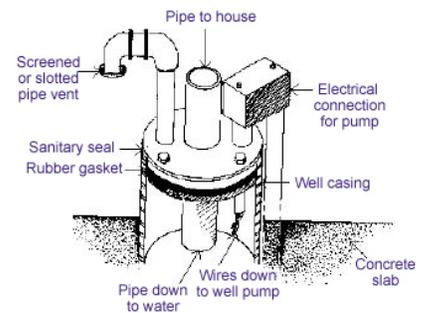
When wells are drilled, the driller installs a steel or plastic lining pipe called a "casing" to keep the borehole from collapsing. Wells cased below the water table offer greater protection from pollution since they help ensure that surface water is filtered through soil, sand, or rock before entering the well.

You can inspect your well casing for holes or cracks at the surface and, using a light, check the inside of the casing. If the well casing moves when you push on it, the casing might not keep out pollutants. In areas of shallow groundwater (less than 20 feet from the surface), or fractured bedrock, listen for water running down the well when the pump is not on. If you hear water running, there could be a crack or hole in the casing, or the well is not cased down into the water table. Both conditions are bad for your water quality because a poor casing may not keep out contaminants.

To prevent pollutants from flowing into the well, the driller should install a tight-fitting cap. This cap prevents insects or surface water from entering the well. A screened vent in the cap allows air to enter the well. The well must be sealed with a watertight cap compatible with the casing and installed so that it cannot be easily removed. Electrical

wiring should be enclosed in the conduit to protect you from being shocked. If the well has a vent, make sure it faces the ground, is tightly connected to the well cap or seal, and is properly screened. The well code requires that all wells have a watertight seal and the top of the casing ends at least 12 inches above the soil surface.

Not all wells have caps. Some wells may have pumping equipment attached at the surface.



Typical well cap

### 6. Are casing and grout deep enough?

The space between the casing and the sides of the well hole provides a direct channel for stormwater runoff to reach the groundwater. To seal off that channel, the driller fills the space with grout, such as cement, concrete, or a special type of clay called bentonite. Both the grout and the casing prevent pollution from getting into the well. In addition, grout must extend deep enough to seal off any layers of poorer quality water that make contact with the well casing. Chatham County has a grout depth requirement of 20 feet and casing depth requirement of 40 feet.

### 7. Is the well protected at the ground surface?

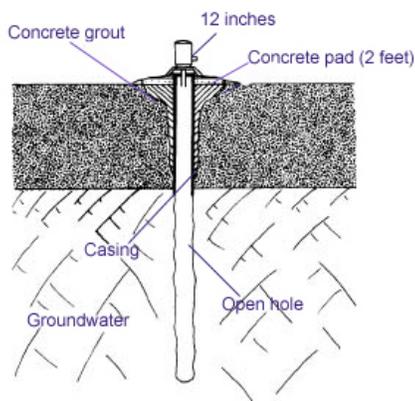
The well casing extends above the ground to prevent stormwater runoff from entering the well directly. The well code requires that at least 12 inches of casing pipe extend above the ground after the final grading of the surrounding land. The wellhead should be surrounded 2 feet in all directions by a concrete pad, which should slope away from the well. This may vary from county to county. The concrete pad stabilizes the

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## Protecting Well Water Supply

(continued from page 4)

casing and the soil around it, and the slope of the pad keeps stormwater runoff from entering the well.



Typical drilled well

### 8. How old is your well?

The age of your well is an important factor in predicting whether your water might be polluted. A well constructed more than 60 years ago is likely to be located at the center of the homestead, which means it is probably surrounded by many activities that can cause pollution. It may also be more shallow than a newer well and may have a thinner casing that can corrode more easily. (Even wells with modern casings that are 30 to 40 years old can be corroded.) Older well pumps are more likely to leak lubricating oils into the well. All of these characteristics of older wells can contribute to the pollution of your well water. If you have an older well, you might wish to have it examined by a county health department representative, Division of Water Quality (DWQ) regional groundwater specialist, or a qualified well driller.

### 9. Is your well drilled or dug?

Wells that have been dug rather than drilled pose the highest risk of pollution because they are shallow and often poorly protected from stormwater runoff. A dug well is a large-diameter hole (usually more than 2 feet wide), which often has been constructed by hand.

Shallow driven wells, also known as sand point wells, pose a moderate to high risk of being polluted. They can only be installed in areas of relatively loose soils, such as sand, because they are constructed by driving a small-diameter pipe into the ground.

Other types of wells include jetted wells, in which water under high pressure washes away the soil, and bored wells, in which an earth auger removes the soil. Drilled wells are made either by rotary drilling or by percussion drilling. (Some people refer to drilled wells as "punched.") Drilled wells for home use are commonly 2 to 4 inches in diameter. Bored wells are commonly 18-24 inches in diameter. Drilled or jetted wells are the safest types.

### 10. Are you preventing backflow?

Backflow occurs when water (and possibly pollution) flows backwards through the pipes from the house to the well. There should be anti-backflow devices, known as check valves, on all faucets with hose connections, or there should always be air gaps between hoses or faucets and the water level. Without anti-backflow devices, you risk having polluted water in laundry tubs, sinks, washing machines, pressure washers, outside hydrants, or swimming pools flow back through the plumbing into your well water.

If a vacuum forms in a water supply pipe, the backflow that can result is called backsiphoning. Backsiphoning from pesticide mixing tanks or pressure washers allows chemicals to flow back into the well through the hose. An anti-backflow device should be used when filling pesticide sprayer tanks, to prevent the chemical mixture from flowing back into the well and polluting groundwater. If you don't have an anti-backflow device, the hose must be kept out of the tank when filling the pesticide sprayer. Another option to use if you don't have an anti-backflow device is to use an inexpensive plastic container. The container is filled with water at the well and then used to fill the sprayer away from the homestead and the well.

- Water supplies that have cross connections between them (connections

tween two otherwise separate pipe systems) also put your drinking water at risk because the water in one pipe system can become polluted by the other system.

### 11. Do you have any unused wells?

Many homes have old, unused wells on the property. No one knows how many of these unused wells there are in North Carolina, but estimates range in the hundreds of thousands.

If unused wells are not properly filled and sealed, they can provide a direct route into the groundwater for stormwater runoff carrying pollutants. These wells can also allow pollutants to move from one groundwater system to another. Wells should also be filled so that children and animals cannot fall into them.

You cannot always see unused wells. A depression in the ground may indicate an old well. Pipes sticking out of the ground around existing or past homes are the most obvious signs of an unused well. Other places to check for unused wells include in basements of houses, under front steps of houses, or near old cisterns.

A well that has been permanently closed by approved methods is considered an abandoned well. Unused wells must be properly abandoned. As a well owner, you can abandon your own well without a license but you must meet the minimum well code requirements for abandonment. Use of unacceptable materials and methods can lead to well settling, well collapse, and groundwater pollution.

North Carolina regulations include the following requirements for well abandonment:

- If the well owner contracts someone else to abandon the well, it must be done by a certified well driller.
- The pump, piping, and any other obstructions must be removed from the well. Casings and screens should be removed if doing so will not cause or contribute to groundwater pollution.

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## Protecting Well Water Supply

Any casing that is not properly grouted must either be removed or properly grouted.

- The well must be chlorinated to disinfect it before it is sealed.

**The entire depth of the well must be filled with cement, grout or clay. Specific requirements vary according to well type and local geological characteristics.**

### 12. Has your well been tested recently?

Well water should be tested once a year. You can have your water tested by either a public or a private laboratory. A [list of certified labs](#) is available from the North Carolina Cooperative Extension Service. In some cases the North Carolina Department of Agriculture will test your water for a small fee. Although it would be expensive and difficult to test your water for every possible pollutant, some basic tests should be conducted. If you take the samples yourself, you must carefully follow the instructions that come with the collection bottle.

Water should be tested once a year for bacteria and nitrate, which can cause health problems. Yearly testing is necessary because groundwater travels and may pick up pollutants elsewhere. So even if you are doing everything you can to prevent your well from being contaminated, it may become polluted from other people's activities. If your water has high bacteria or nitrate levels, talk to a county health specialist. There may be problems with the location or construction of your well.

If your well draws from sandy soil or granite bedrock, testing once for corrosivity is also important. The tests to check for corrosivity include hardness, alkalinity, pH, conductivity, and chloride. Test once to find out how corrosive the water may be to your plumbing system.

**Test for pollutants that are most likely at your home.**

- Test for lead if you have lead pipes or soldered copper joints or brass fixtures.

- Test for volatile organic chemicals (VOCs) if you have an underground fuel storage tank, or if there has been a nearby use or spill of oil, petroleum, or solvent.
- Testing for pesticides can be expensive but it is important if the potential for pesticide pollution is high, such as after a spill or if your well is downhill from fields where pesticides have been applied. Testing for pesticides may also be justified if your well has high nitrate levels or if your well is shallow or not properly cased and grouted.

It is important to record test results and to note changes in water quality over time. In addition to water analysis results, you should keep records of your well construction and of maintenance done on the well and pump.

#### **Related publications available from Cooperative Extension:**

- Health Effects of Drinking Water Contaminants. HE-393
- Home Drinking Water Treatment Systems. HE-419/WQWM-136
- Nitrate in Drinking Water. AG-473-1/WQWM-5
- Protecting Water Supply Springs. AG-473-15/WQWM-73
- Questions to Ask When Purchasing Water Treatment Equipment. AG-473-3/WQWM-7
- Should You Have Your Water Tested? AG-473-2/WQWM-3
- Your Water Supply: Well Construction and Protection. AG-469/WQWM-10
- Diseases Carried by Drinking Water. WQWM-145
- Groundwater in the Piedmont at Blue Ridge Provinces of North Carolina. AG-473-6/WQWM-6
- Groundwater in the Coastal Plain of North Carolina. AG-450
- Radon in Water. HE-396/WQWM-13
- Metals in Drinking Water. AG-473-1/WQWM-6
- Lead in Drinking Water. HE-395/WQWM-8
- Volatile Organic Chemicals (VOCs) in Drinking Water. AG-473-5/WQWM-16
- About Wells: What You Need to Know. Iron and Manganese. FCS-394
- Removing Deposits from Surfaces. WQWM-12/FCS 397

Call Chatham Co. Center of NCCooperative Extension at 919-542-8202 or email to [glenn\\_woolard@ncsu.edu](mailto:glenn_woolard@ncsu.edu)

Source: Home\*A\*Syst -- Environmental Stewardship for Homeowners -- 1 -- Protecting Well Water Supply ---- WQWM-172 (Call for copy of this publication including questions to access your well water protection.) The online publication can be viewed at <http://www.soil.ncsu.edu/assist/homeassist/water/>

## Septic Systems and Their Maintenance

### Tips for Maintaining Your Septic System

- ◇ Do not put too much water into the septic system; typical water use is about 50 gallons per day for each person in the family.
- ◇ Do not add materials (chemicals, sanitary napkins, applicators, and so on) other than domestic wastewater.
- ◇ Restrict the use of your garbage disposal.
- ◇ Do not pour grease or cooking oils down the sink drain.
- ◇ Install a watertight concrete riser over the septic tank to simplify access.
- ◇ Periodically have the solids pumped out of the septic tank.
- ◇ Maintain adequate vegetative cover over the drainfield.
- ◇ Keep surface waters away from the tank and drainfield.
- ◇ Keep automobiles and heavy equipment off the system.
- ◇ Do not plan any building additions, pools, driveways, or other construction work near the septic system or the repair area.

### Is Special Care Needed for the Drainfield?

Yes. The drainfield does not have an unlimited capacity. The more water your family uses, the greater the likelihood of problems with the septic system.

Water conservation practices can help reduce the amount of wastewater generated in the home.

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## Septic Systems and Their Maintenance

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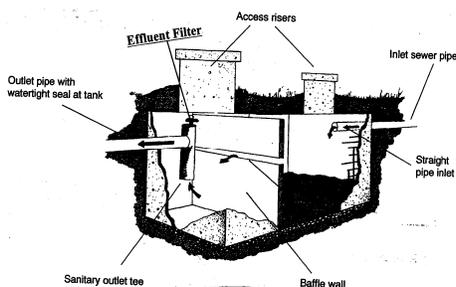
Periodically check your plumbing for leaky faucets and toilets. Uncorrected leaks can more than double the amount of water you use. Many soils that can absorb the 200 to 250 gallons of sewage usually produced each day by a family of four would become waterlogged if an extra 250 gallons were added.

For more information on this subject see North Carolina Agricultural Extension Service publications HE-250, Focus on Residential Water Conservation and HE-213, Water Management Checklist for the Home.

Be sure that foundation drains, roof waters, gutter waters, and surface waters from driveways and other paved areas do not flow over the septic tank or the drainfield. Careful landscaping can help direct excess surface waters away from the system.

(taken from AG-439-13, *SoilFacts, Septic Systems and Their Maintenance*)

## Septic System Effluent Filters



If your septic system was installed or repaired after January 1, 1999, you probably have an effluent filter installed in the outlet end of your septic tank. These filters are designed to prevent solids from entering the drainfield and should greatly increase the life of your system.

Routine cleaning of the filters is required to keep septage from clogging your drains and to prevent the toilets from backing up. A dirty filter could also cause septage to surface around the tank.

The manufacturers recommend that the filters be removed and cleaned every two to three years. To clean the filter, simply remove the riser lid from the outlet end of the septic tank and lift the filter by the handle. (It's recommended that you wear gloves to prevent septage from coming in contact with your skin.) While holding the filter over the open riser, use a water hose to rinse the filter clean allowing the rinse water to fall back into the septic tank. After cleaning the filter, reinsert it into the tank and replace the riser lid.

If you have any other questions about filters contact the Chatham County Environmental Health Office at 919-542-8208.

## Septic System Repair Permits

Unfortunately, if house fixtures drain well, many people are not concerned about whether their septic system is working properly. They don't realize that untreated sewage can be a health hazard. Damage from heavy vehicle traffic, tree roots or insufficient diversion of runoff water can cause premature failure of a system. Using too much water (more than 120 gallons a day per bedroom) or disposing of too many solids (grease, cat box litter, paper towels, etc.) in the system can also have damaging effects. If you notice signs of failure, call your local Health Department immediately to apply for a free repair permit. An Environmental Health Specialist will visit the site, diagnose the problem and suggest possible solutions. State law requires that a repair permit be issued before repairing a failing septic system. It is important that the system be repaired as soon as possible to minimize health risks to the community. (*Terri Ritter, R.S., Division of Environmental Health, Chatham Co. Public Health Department*)

## Environmental Health

The Chatham County Public Health Department, Division of Environmental Health, governed by **North Carolina Department of Environment and Natural Resources: Laws and Rules for Sewage treatment, and Disposal Systems, 15A NCAC 18A .1900**, is responsible for the issuance of subsurface sewage disposal systems (septic system) permits.

It is important for homeowners to retain copies of all septic and well permits. Copies of these permits are available per request at the Environmental Health office. The Environmental Health office is located in the Dunlap Building, 80 East Street in Pittsboro. Office hours are Monday through Friday 8:00am-5:00pm. Feel free to contact the Environmental Health office with any concerns or questions at (919) 542-8208.

**North Carolina** Cooperative Extension Service  
 NC State University  
**Chatham County Center**  
 PO Box 279  
 Pittsboro, NC 27312-0279

### Estimated Septic Tank Inspection and Pumping Frequency in Years

Tank Size (gallons)	Number of People Using the System				
	1	2	4	6	8
900	11	5	2	1	<1
1,000	12	6	3	2	1
1,250	16	8	3	2	1
1,500	19	9	4	3	2

If the septic system is not used very often (as in an infrequently used vacation home with a correctly sized tank), it will probably not need to be pumped as frequently as indicated in the table. If you use a garbage disposal, the tank may need to be pumped more frequently. After a few inspections, you should be able to adjust the schedule according to the rate at which solids accumulate.

### Septic and Well Publications

- ◇ Cooperative Extension Septic and Well publications  
*<http://chatham.ces.ncsu.edu/Publications/environment.php>*
- ◇ Cooperative Extension Water publications  
*<http://www.bae.ncsu.edu/programs/extension/publicat/wqwm/water.html>*
- ◇ Protecting Well Water Supply  
*<http://www.soil.ncsu.edu/assist/homeassist/water/>*
- ◇ Your Water Supply – Well Construction and Protection  
*<http://www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag469.html>*
- ◇ Septic Systems and Their Maintenance  
*<http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-13/>*
- ◇ Septic System Owner’s Guide  
*<http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-22/>*
- ◇ North Carolina Home \*A\* Syst  
*<http://www.soil.ncsu.edu/assist/homeindx.html>*
- ◇ EPA Groundwater and Drinking Water  
*<http://www.epa.gov/safewater/>*

**Community and Rural Development**  
<http://www.ces.ncsu.edu/chatham/crd/crdindex.html>