On-Site Wastewater Management Systems

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Why On-Site Systems?

Historically
- Simple wastewater management “system” in rural areas
- Simple sewer in cities
  - Pipes and ditches to streams
  - Limited treatment

Today
- Will the sewer come?
- Maybe, but probably not soon
  - Cost
  - Time to build
  - Potential environmental degradation
- On-site systems are a permanent solution for household wastewater
  - Relatively cheap
  - Environmentally benign if properly sited, installed, and maintained

On-site systems are equally effective as sewer
- Technology improvements
- Increased regulation
A Few Facts

- 25% of homes in the U.S. use on-site systems
  - 40+% in Georgia
  - 75% of new homes
  - 50,000+ systems installed annually

- Rockdale has approximately 20,000 systems installed

- Compare this to one of our neighbors, Gwinnett, they have approximately 100,000 systems installed
Function of On-Site System

- Distribute wastewater from the home into the soil
- Renovate the wastewater
  - Immobilize inorganic constituents
  - Dilute concentrations of mobile constituents
    - Dilution is the solution to pollution
  - Decompose organic components
  - Disinfect the wastewater
    - Immobilize, remove, or disable pathogens
Household Wastewater

• Waste generated in the home includes that from the toilet, bath, kitchen, and laundry.
• On-site systems designed for 150 gal/bedroom/day
• Water conservation is important to longevity and performance of a system
On-Site System Components

Diagram showing components of an on-site system, including:
- House
- Septic tank
- Dispersal system
- Percolation
- Evapotranspiration
- No restrictive horizon
- Ground water mound/parched water table
- Bedrock or impermeable soil layer
- Restrictive horizon
- Seep
- Runoff to lakes and streams
- To wells, springs, and base flow

Additional notation: Green箭头 indicates ground water flow.
Function of Components

- Septic tank
  - Removal of large solids
  - Limited organic decomposition
  - Protect absorption field from clogging

- Absorption field
  - Distribute wastewater into the soil

- Soil
  - Transmit wastewater from absorption field to ground or surface water
  - Renovate wastewater
Septic Tank

1,000 to 1,500 water tight tank (concrete, polyethylene, other)
Collect large solids
Limited decomposition of organic material (about 30% does not decompose)
Pictures of a concrete septic tank and a plastic septic tank
Advanced Treatment Systems

- Similar to secondary treatment at waste treatment plant
  - Aerobic treatment to lower BOD and suspended solids
- Used to overcome soil and site limitations
- Should extend life of system
  - Reduced solids to clog soil pores
- Additional maintenance requirements
  - Pumps, timers, and valves
  - Contract service
- Additional expense
Absorption Field

System to distribute wastewater from the septic tank into the soil
Pipe and gravel
Numerous other technologies
Pictures of absorption fields
Soil

The treatment media: Natural processes purify wastewater
Will an on-site system fail?

Yes!!!!

- But the waste treatment plant may also fail without proper design, installation, and maintenance
- Proper design, installation, and maintenance are the keys to long-term success of either system
On-Site System Failure

- Partially treated wastewater rising to the soil surface
  - Health hazard
  - Odor
  - Overland flow to surface water?
- Wastewater backs up into house
- Inadequate treatment before entering groundwater
  - Commonly not considered - “If toilet will flush, the system is working”
Common Causes of Early Failure

- Unsuitable soils
  - Slow perc rates
  - Seasonal water tables
  - Shallow rock
  - Water restrictive soil horizons

- Construction faults
  - System not at proper grade
  - Damaged components
  - System inspection should discover these

- Site water management
  - Gutter downspouts
  - Runoff from paved areas and/or upslope areas
Soil and Installation Problems are Being Addressed

- Soils at site must be evaluated by certified soil classifier, PE, or PG
- Contractor certification
- Installation inspections
- Homebuilder certification?
- Lists of certified on-site system contractors available from County Health Department (Environmental Section)
Common Causes of Longer-term Failure

- Under-designed system
  - Bedroom addition
  - Abnormally high water use
    - Leaky plumbing
- Lack of homeowner understanding and maintenance
- Nothing lasts forever
  - Properly sited, sized, and maintained system should last 20-30+ years
Extending Life of On-Site System

- Water Conservation
- Graywater Separation
- Reduce Contaminate Loads in Wastewater
Reduce Water Use
(or at least be aware of amount used)

- Dishwasher, 1%
- Leaks, 16%
- Faucets, 18%
- Shower, 19%
- Toilet, 21%
- Laundry, 25%
Water Conservation

- First step is to fix leaks
  - Leaking toilet can add 10-50 gpd to on-site system
- Use water saving fixtures
- Wash only full loads in the dishwasher and washing machine
- Don’t allow faucets to run while completing task
- Reduce water pressure
Graywater Separation

- Separation of wastewater from sinks, showers, and laundry (graywater; 65%) from toilet and kitchen waste (blackwater)
  - Separate management systems
- Surface discharge of graywater (sprinkler system) prohibited in GA
  - Contains appreciable concentrations of bacteria and potential pathogens
  - Regulations may change in the future
  - 2008 “hand watering” with graywater allowed
Reduce Contaminant Loads in Wastewater

- Do not dispose of household waste (cleaners, cosmetics, pesticides, preservatives, etc.) by flushing down the toilet or sink
  - May contaminate water and/or
  - Upset biological treatment processes

- Do not
  - Use “every flush” toilet bowl cleaners
  - Flush unwanted medicines down toilet
  - Drain chlorine-treated water into on-site systems

- Use recommended amounts of cleaners, bleach, detergents, drain cleaners, etc.

- Minimize use of garbage disposal
  - Increased amounts of fats and oils
  - Increased solids
Additives

- Have not been shown conclusively to enhance on-site system performance and are not generally recommended.
- Household waste contains large numbers and many types of microorganisms, enzymes, and other biological substances.
  - Amount added is minor.
- Enhanced decomposition may result in abnormal amounts of suspended solids added to drainfield.
  - Clog soil pores and cause hydraulic failure.
Untrained and often uninformed system owners assume responsibility for operation and maintenance

- “I have sewer at my house”

Two components of conventional on-site system maintenance

- Pump septic tank
  - Every 3-5 years
  - Wastewater residence time in tank
  - Minimizes addition of solids to drainfield and soil clogging

- Inspection
  - Wastewater on soil surface during the wet season and/or periods of high use

Do not ignore problems
How to Choose an On-Site Contractor

- Ask friends and co-workers for references
- Contact the Environmental Health Department to learn how to obtain a list of licensed contractors
- Consult the Better Business Bureau for complaints
- Investigate both independent contractors as well as large companies
- Gain working knowledge of an on-site system and your current on-site system
- Obtain an on-site permit
The Future?

- Increased use of advanced treatment systems
  - Enhanced nitrogen and phosphorus removal
  - Disinfection systems?

- Mandatory maintenance and periodic inspection
  - Used in many states and a few areas of GA
  - Government
  - Private
    - Warrantees?
Summary

On-site sewage management systems are an economical and environmentally benign alternative to centralized waste treatment if

- soils are favorable,
- the system is suitable for the site and properly installed, and
- the system is properly and regularly maintained

Maintenance is the key

- Simple, but it must be done

New technologies are becoming available to improve performance
Additional Information Sources

www.rockdalehealth.com

www.georgiaeh.us