

ON-SITE SEPTIC SYSTEM
EVALUATION
PEBBLE RIDGE COMMUNITY
DOYLESTOWN TOWNSHIP
February 2010



Responsibility of this Committee

The Doylestown Township Public Water & Sewer Advisory Committee is charged with ***“providing recommendations to the Board of Supervisors related to issues associated with providing public water and public sewer to Doylestown Township residents.”*** (ref. Resolution #130D dated January 17, 2006.

Background

- In 1998, Doylestown Township requested the Bucks County Water & Sewer Authority (BCWSA) to update the Township's Act 537 Sewage Facilities Plan to address Township growth and on-lot system failures.
- October 28, 1997 A revised draft 537 Plan was presented to the Board of Supervisors by the BCWSA. In response to residents' concerns raised during the meeting, the Board of Supervisors appointed a Sewer Study Committee. The Committee was comprised of Township residents charged to provide further review and comment on the draft plan and to provide input on how to best serve the Township's five and ten year sewer needs.

Background cont.

- One of the Sewer Committee's primary concerns in 1997 was to identify areas where private on-site septic system failures most often occur.
 - The Sewer Committee mailed a questionnaire to homeowners to identify critical areas where system failures were most often found.
 - The goal was to ensure septic systems in critical areas could be addressed within the five year period. Based upon results of the questionnaire and other background information, the Committee identified three areas which should be addressed within a five year period.
 - These areas were the **Pebble Ridge**, **Tedwill Road** and **Wilkshire Road** developments.

Background cont.

- A public meeting was held to discuss the recommendations of the Sewer Study Committee. Residents expressed additional information was needed by the Board of Supervisors prior to deciding which areas (neighborhoods) may need to be connected to public sewers within the next five years.
- The Board of Supervisors retained Boucher & James, Inc. in 1998 to conduct on-site observations of the areas located within the Pebble Ridge and Tedwill Road areas of the Township. This information was requested to assist the Supervisors in determining the relative number of system malfunctions within the study areas.
- The results of the study were presented to Doylestown Township in July of 1998.

Most Recent Surveys

- Ten years later in 2008 the Doylestown Township Board of Supervisors retained Boucher & James, Inc. to conduct an on-site observation of the single lot septic systems within the **Pebble Ridge** area of the Township.
 - * NOTE: Tedwill and Pebble Hill areas had sewers installed since 1998.
- The study was conducted in part to provide the Board of Supervisors with the relative number of private septic system malfunctions within the study area in addition to an update since the 1998 report. The 2008 report also provides a comparison of the 1998 findings to those of individual on lot disposal systems included in the 2008 report.

Most Recent Surveys cont.

- The comparative information is of primary interest in light of the septic system maintenance program mandated for the study area in response to the 1998 findings.
- Research work performed by Boucher & James, Inc. in 2008 involved two components.
 1. Research of the Bucks County Health Department Sewage files to search for system repairs and replacements since 1998.
 2. On-site observations of each lot for signs of system malfunction.

Most Recent Surveys cont.

- A *“malfunctioning septic system”* was defined by the observer, using the Pennsylvania Department of Environmental Protection’s (PA DEP) criteria of a malfunctioning system.
 - *Where sewage is present on the ground surface as well as where drain fields show indications of failure prior to the time of the survey; such as very soft ground and areas with dead or excessive growths of grass.*
- Boucher & James, Inc. added a second category termed a *“Suspected Malfunctioning Septic System”*. This included properties where conditions over the drain field did not reveal conditions worthy of being classified as a malfunctioning system but exhibited one of more of the following:

Most Recent Surveys cont.

- 1. Dead grass or dense growth of grass in septic area**
- 2. Soft soils and/or grey water within the drain field.**

- To make a valid comparison of the 2008 findings with the 1998 inspection findings, 1998 observations were reviewed and reclassified according to the 2008 Rating System. Research was undertaken to document system repairs and/or violations issued by the Bucks County Health Department since 1998.
- The on-site observation was a visual inspection performed between April 14 and 17, 2008.

Most Recent Surveys cont.

- Professional observers of Boucher & James, Inc. used a “checklist” and available information obtained from the Bucks County Health department, to look for the following *signs of a system malfunction or suspected malfunction*:
 - 1. Effluent on lawn surface**
 - 2. Presence of by-pass pipes discharging to storm water swales or adjacent streams**
 - 3. Dead grass or Excessive grass growth**
 - 4. Soft soils**
 - 5. Sewage odors.**

Most Recent Surveys cont.

- The checklist also provided a category for the observer to comment on unusual situations or conditions encountered and any information volunteered by the home owner if present at the time of observation. The ***observation did not involve any of the following:***
 - 1. Entry into the residence.**
 - 2. Dye testing**
 - 3. Inspection of septic tanks or distribution boxes**
 - 4. Excavation of drain fields, or any other intensive evaluation method.**

Most Recent Surveys cont.

- If signs of malfunction were found, photographs were taken and site specific notes taken describing the malfunction. The study area consisted of:
 - 203 single lot residential properties
 - 199 lots occupied by residential structures.
 - One resident did not allow observers to inspect their property; resulting in:
 - 198 total inspections.
 - 50 lots contained **malfunctioning** septic systems:
 - 23 malfunctions in '98 also malfunctioned in '08
 - 1 holding tank property in '98 also had a malfunctioning system in '08
 - 18 non-malfunctions in '98 now malfunctioned in '08

Most Recent Surveys cont.

- 6 '08 Malfunctions were denied access in '98
- 2 additional Holding Tanks Present in '08 (only 1 in '98)
- 23 lots with malfunctions in '98 showed no malfunction in '08.
- Comparing the results of the 1998 to 2008 field surveys revealed:
 - 104 properties did not have malfunctioning or indications of malfunction during either the 1998 or 2008 inspections.

Most Recent Surveys cont.

- Three properties observed in 2008 which contained holding tanks were classified as malfunctions. This is because the tanks were installed because of serious problems with their on-lot septic drain fields. Also, holding tanks are not considered a permanent sewage disposal method (source; PA DEP).
- Five properties installed new septic systems from 1998 to 2008. Three of the five systems replaced existing on-lot septic systems that were malfunctioning. The remaining two systems were installed for new home construction.

Factors Affecting the Results of an OLDS Study/Report:

OLDS have a limited life span (See data from Daniel Friedman), however, that life span may be extended based on conditions of the property and conditions of use. Some factors that may influence the longevity of some OLDS include the following:

1. Water usage by the residents.
2. Number of people living in the house.
3. Household appliances/faucets-low vs. high volume
4. Sale of house – Number in household prior to and after sale of the house.
5. Soil and Geological conditions.
6. Storm run-off.
7. Effect of neighboring public sewer systems.
8. Upkeep & Maintenance of the on-lot system.
9. Age of the OLDS.
10. Ground conditions caused by the weather—(See data from Willow Grove Air Station and AccuWeather.com).

WEATHER DATA COMPARISON for the 1998 & 2008 ON-LOT STUDIES

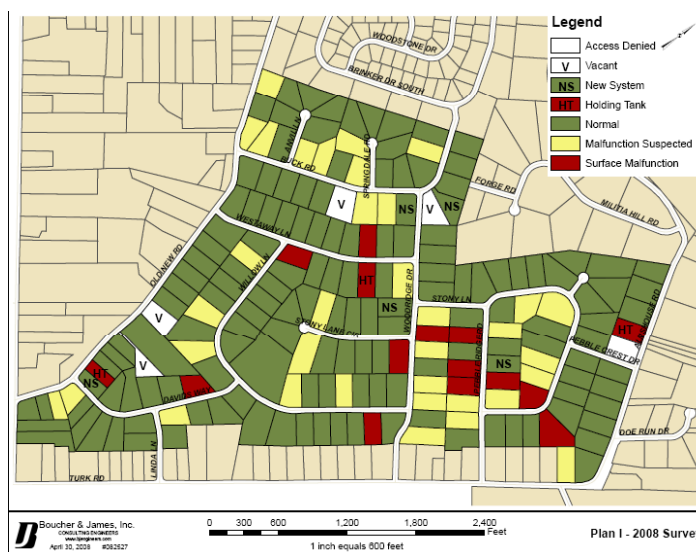
Graphic Display

Topic – During Study Period	1998 Data (1)	2008 Date (2)
Number of Days to complete Survey	33	4
Average High Temp-F	81.6-F	60.25-F
Number of Rain Days	6	0
Average Precipitation/day	0.18"	0
Topic – One (1) Week Prior to Studies	1998 Data	2008 Data
Avg. High Temp -F	74.3-F	66.7-F
Number of Rain Days	6	2
Average Precipitation/day	0.34"	0.06"

Summary of 2008 Survey Findings

- Plan I provides a visual summary of the 2008 field observation findings for the entire study area.
 - 15 properties revealed confirmed malfunctioning septic systems.
 - 35 properties had systems that were suspected of malfunctioning
 - 148 properties appeared to not have a malfunction or did not show signs of a malfunction.

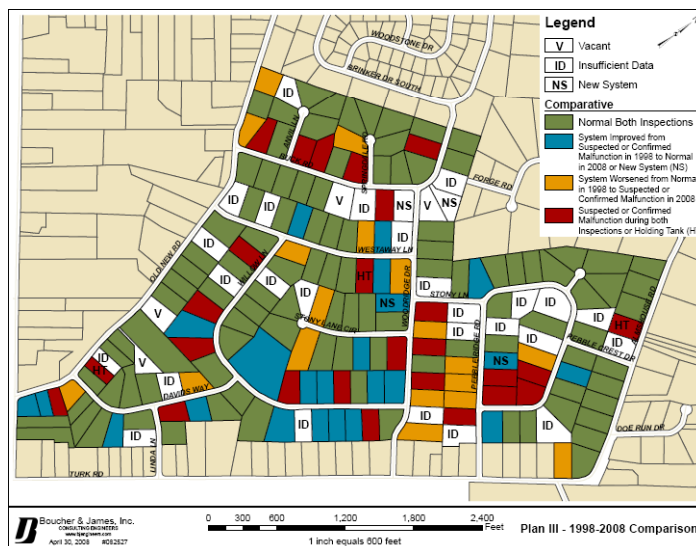
Plan I Survey – 2008



Summary of 2008 Survey Findings

- Plan III provides a visual comparison of the 1998 findings to the 2008 inspection results.
- Comparing the 1998 results to 2008 reveals:
 - 104 properties did not reveal a malfunction or indication of a malfunction during either 1998 or 2008 inspections.
 - 23 properties revealing a malfunction or suspected malfunction in 1998 still experienced a malfunction or suspected malfunction in 2008.
 - 23 properties revealing a malfunction or suspected malfunction in 1998 did not reveal any indication of a malfunction or suspected malfunction in 2008.
 - 20 properties that did not reveal a malfunction or suspected malfunction in 1998 were found to be malfunctioning or revealed signs of a suspected malfunction during 2008.

Plan III Survey – '98 vs. '08



Why the Problem with Septic Systems in the Pebble Ridge Area? – Soil!!



COUNTY OF BUCKS

DEPARTMENT OF HEALTH
Neshaminy Manor Center, 1282 Almshouse Road, Doylestown, PA 18901 - 215-345-3318
FIELD OFFICES
Bucks County Government Services Center, 7321 New Falls Road, Levittown, PA 19055 - 215-949-5805
Bucks County Government Services Center, 261 California Road, Quakertown, PA 18951 - 215-529-7000

County Commissioners
CHARLES H. MARTIN, Chairman,
JAMES F. CAWLEY, ESQ., Vice-Chairman
DIANE M. ELLIS-MARSEGLIA, LCSW

Director
DAVID C. DAMSKER, M.D., M.P.H.

Jan 13 2008

Stephanie Mason
Zoning Officer
Doylestown Township

Re: Pebble Ridge Area
On-Site Septic Study

Dear Ms. Mason

I put together some information about the soils in the Pebble Ridge area. Please let me know if you would like me to go over any of this information with you. This type of information on soils is used in determining the feasibility of on site septic as per DEP standards. The map and descriptions give you a general idea of what type of soil you would find in the area. On-site testing is always used for final determination. For the most part the soils in this area are poorly drained and would not qualify by today's standards. There are some small areas where some better drained soils could be found but field testing would have to be performed to verify this.

Let me know if I can be of any help.

Sincerely

Brendan O'Boyle

Soil Horizons

Soil horizons are approximately horizontal layers that result from the interaction of soil-forming factors. Soils are identified on the basis of the morphology of their horizon sequences, and their suitability for wastewater treatment is assessed on the basis of horizon characteristics.

Soil scientists call the major horizon forms "master horizons" and classify them with alphanumeric symbols. The major horizons are:

- A horizons—generally considered to correspond with "topsoil", where biological activity is often greatest and plant roots most concentrated
- E horizons—lighter colored horizons from which some constituents such as clay have been removed
- B horizons—generally considered to be "subsoil", where constituents including clay may accumulate
- C horizons—material below the developed soil affected by weathering or other geological processes
- R horizons—unweathered or indurated bedrock
- O horizons—horizons predominantly composed of organic matter

Survey Area	PA017 - Bucks County, Pennsylvania
Soil	DdA Doylestown silt loam, 0 to 3 percent slopes
Farm Class	Not prime farmland
Drainage Class	Poorly drained *
Slope Range	0-3
Land Capability Class	4w
Hydrologic Group	D
Bedrock Depth	deep
Seasonal Water Table	0-6 in
Flooding Potential	none
Bulk Density	1.50 gm/cm ³
Profile Permeability	slow
Whole Soil kw factor	0.43
Rock Free kf factor	0.43
T factor	4
Leaching Potential	Low
Major Hydric	yes

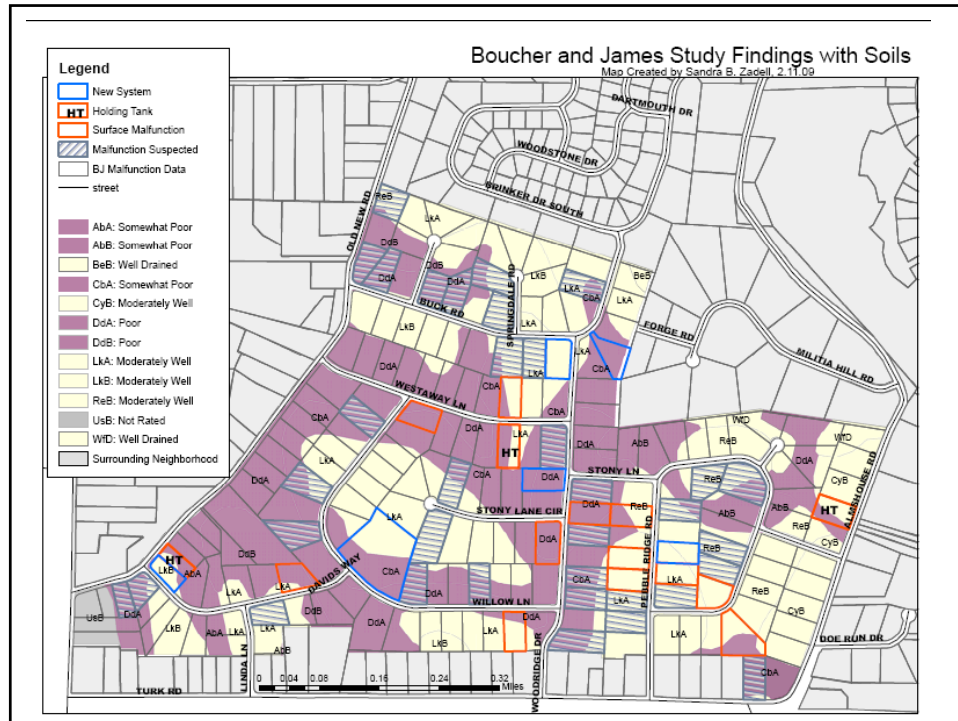
Selected Soil Interpretations

Bucks County, Pennsylvania

[The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

*This soil interpretation was designed as a "limitation" as opposed to a "suitability". The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation.

Map symbol and soil name	Pct. of map unit	Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Bed (conventional) (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DdA: Doylestown	85	Very limited Seasonal high water table Slope	1.00 0.18	Very limited Seasonal high water table Bedrock, above 72" Slow percolation * 12-36"; can not use system Slow percolation * 36-60" Slope	1.00 1.00 1.00 1.00 0.13	Very limited Seasonal high water table Bedrock, above 72" Slow percolation * 12-36"; can not use system Slow percolation * 36-60" Slope	1.00 1.00 1.00 1.00 0.01



How Long do Septic Systems Last?

- The life expectancy of a septic tank depends largely on its materials, while the life of septic system piping depends largely on the risk of damage from vehicle traffic, clogging by roots, or flooding by groundwater.
- *The life expectancy of a drain field varies widely by installation type (conventional soil absorption system versus a sand bed filter, for example), by soil conditions (clay or rock or sand), and importantly, by the frequency of maintenance and cleaning which has been performed on the septic system.*
- Understanding the proper procedures for septic tank care, septic tank cleaning frequency, and other septic tank maintenance chores, will permit the owner of a home with an onsite septic system to maximize the life of the system and to assure that it is working properly.

How Quickly Does a Septic System Fail?

The life of a septic system depends on the following factors:

1. **Septic Tank Pumping Frequency:** providing you are starting with a functional and reasonably-designed septic system, the **most significant step you can take to extend the septic system life is to have the septic tank cleaned or "pumped" on schedule.**
2. **How the Septic System is Used:** Conserving water reduces the load on the absorption field. Avoiding flushing chemicals or items that don't biodegrade reduces the solid build-up rate in the septic tank.
3. **Soil Conditions such as the soil percolation rate and the amount and level of ground water or surface water that affect the soil absorption area or drain field.**
4. **Septic Tank Materials:** a steel septic tank rusts away, first losing its baffles (which lead to drain field clogging) and eventually rusting at its bottom or sides. The rate of rust depends on the soil conditions and soil acidity and other factors. A concrete septic tank can have a very long life, in excess of 40 years, except for cases of poorly-mixed concrete or possibly acidic soils which may reduce that span. Plastic or fiberglass septic tanks can expect to have a similar life unless they are mechanically damaged.
5. **Life of Special Components** such as effluent pumps or septic grinder pumps, septic filters, septic media, and sand bed filter systems often determines the need for repair of alternate-design septic systems that use these components.
6. **Nearby trees or plants** whose roots invade system components.

How Quickly Does a Septic System Fail?

7. **A steel septic tank** will rust out on a schedule affected by soil acidity and tank steel quality and coating integrity. ***A steel septic tank more than 15 or 20 years old is likely to have already rusted to the point of having lost its baffles and perhaps having a rusted-out bottom.***
8. **A concrete septic tank** can last 40 years to nearly indefinitely, though poor quality concrete or acidic ground water may result in deteriorated baffles or tank components.
9. **A conventional septic drain field** has a varying life as a function of the soil percolation rate, drain field size, and usage level. ***One in good soil with a well maintained septic tank, can last for more than 50 years. In general, if there is a conventional septic drain field or a raised bed system and it's 20 years old, its forward life is not predictable and owners should budget for its replacement at any time.***
10. **The septic tank is only one part of an on-site wastewater system.** It is designed to remove solids prior to the effluent entering the soil absorption field, provide for the filtration, digestion of a portion of those solids, and storage of the remaining solids. Taking care of the septic tank will, however, extend the life of the costly second half of the onsite wastewater treatment system - the absorption system, leach field, or drain field.

Conclusion of this Committee

- Comparing data collected during a 10 year period to expert reports on soils found within the study area and on life expectancies of septic systems; this committee has determined a need in the Pebble Ridge community for sewage management solutions beyond on-lot systems being used today because of:
 - Average age of the homes and corresponding septic systems are approaching their life expectancy.
 - Springdale (Anvil Lane, Springdale Lane, Buck Rd)- April 1972
 - Woodridge (Westaway Lane, Wood Ridge, Willow Lane)- October 1968
 - Twin Woods Estates (Linda Lane, Davids Way, Old New Rd)- February 1966
 - Pebble Ridge Farms (Pebble Ridge, Pebble Crest, Stony Lane Circle, Shady Brook) –Sept 1966
 - Soil content not suitable in most areas of the community for percolation needed for installation of a septic system.
 - Lot size and location of wells do not allow proper available land on many lots to install a new septic system and/or drain field.



Conclusion Cont.

Due to the need established by this committee, it is our opinion the Doylestown Township Board of Supervisors has a fiduciary duty to move forward with a feasibility study to determine the practicality of installing public sewers in the Pebble Ridge Community.