

2.1 DESCRIPTION OF THE PLANNING AREA

The base map data in the following sections has been provided by the Lancaster County Geographic Information Systems (GIS) with supplemental information provided by PAMAP Program 2008, Natural Resources Conservation Service (NRCS), Federal Emergency Management Agency (FEMA), and Department of Conservation and Natural Resources (DCNR). The data provided was organized to show the appropriate information as shown for each particular map.

2.1.1 Planning Area

The Planning Area for this Act 537 Plan is the entire Township of Strasburg, Lancaster County, Pennsylvania. Strasburg Township encompasses approximately 20 square miles and is bordered by West Lampeter and East Lampeter Township to the north, Pequea and Providence Township to the west, Paradise Township to the east, and Eden Township to the south. The Township is serviced by the traffic corridors of U.S. Route 222, S.R. 741 and S.R. 896. A general location map is presented as Map 1 in Appendix H.

2.2 PHYSICAL CHARACTERISTICS

The Planning Area for this Act 537 Sewage Facilities Plan includes the entire Township. This chapter will evaluate important physical characteristics that relate either directly or indirectly to sewage facilities within the Planning Area.

2.2.1 Streams and Watersheds

Strasburg Township lies entirely within the Pequea Creek Drainage Basin, which covers 148 square miles and drains the central portion of Lancaster County, flowing from the Welsh Mountains in a southerly direction. There are other minor drainage areas in the Township that contribute flow to Pequea Creek, including the drainage basins of Big Beaver Creek, Little Beaver Creek, and Walnut Run. The limestone that underlies the areas drained by Pequea Creek, Big Beaver Creek, and Walnut Run provides for a meandering drainage pattern. Little Beaver Creek displays a pattern, which includes many small branches (see Map 2 in Appendix H).

As shown on Map 2 in Appendix H, all water in Strasburg Township drains to the Pequea Creek (primarily Warm Water Fishery as defined by Title 25, Chapter 93 of the Pennsylvania State Code).

2.2.2 Floodplains

In accordance with the policies and procedures of the National Flood Insurance Program, the Federal Emergency Management Agency (FEMA) has prepared mapping of the 100-year floodplains for the Pequea Creek in Strasburg Township (see Map 2 in Appendix H).

The majority of the properties in Strasburg Township are located outside of the 100-year floodplains of the Pequea Creek; however, several properties located in the S.R. 896 DGA and the Creekview Study Area of the Township are located within the 100-year floodplain of the Pequea Creek. The 100-year floodplain is an area based on past experience and high statistical probability that a destructive flood event will occur.

2.2.3 Ponds

Several small ponds are found in Strasburg Township. A majority of the ponds have been constructed as farm ponds or are abandoned farm ponds. These ponds are displayed on Map 3 in Appendix H.

2.3 SOILS

The characteristics of soils in Strasburg Township were reviewed and analyzed to determine probable soil limitations for on-lot sewage disposal systems (OLDS) based on the 1985 *Soil Survey of Lancaster County, Pennsylvania*, prepared by the United States Department of Agriculture, Soils Conservation Service (USDA-SCS), and the GIS mapping provided by Lancaster County and the United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). Additional soils information was provided by the NRCS's online Soil Data Mart and the Pennsylvania State University's SoilMap (see Maps 3 and 4 in Appendix H).

2.3.1 Soil Types

Soil types are mapped using abbreviations. The first two letters indicate the soil phase, i.e. the Ab for Albright in AbB. The third letter indicates the slope, i.e. the B in AbB. Slope categories are A, B, C, D, E or F:

A	0 to 3 percent slope
B	3 to 8 percent slope
C	8 to 15 percent slope
D	15 to 25 percent slope
E, F	greater than 25 percent slope, variations of slope

The following soils are present in the Township. They are further described in Table 2-2 and displayed on Map 3 in Appendix H.

- Chester silt loams (CbA, CbB, and CbC)
- Clarksburg silt loam (CkA)
- Comus silt loam (Cm)
- Conestoga silt loams (CnA, CnB, and CnC)
- Elk silt loams (EcA and EcB)
- Glenelg silt loams (GbB and GbC)
- Glenville silt loam (GdB)
- Hagerstown silt loam (HaB)
- Hagerstown urban land complex (Hc)
- Hollinger silt loams (HfB, HfC, and HfD)
- Lehigh silt loams (LbB and LbC)
- Letort silt loams (LdA, LdB, and LdC)
- Linside silt loam (Ln)
- Manor silt loams (MaB, MaC, and MaD)
- Manor very stony silt loams (MbD and MbF)
- Newark silt loams (Nc and Nd)
- Nolin silt loam (Ne)
- Penlaw silt loam (Pa)
- Pequea silt loams (PeC, PeD, and PeE)
- Water (W)

2.3.2 Prime Agricultural Soils

Prime farmland, as defined by the United States Department of Agriculture's Soil Conservation Service (USDA-SCS), is the land that is best suited for producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and water supply needed to economically produce a sustained high yield of crops when it is treated and managed using acceptable farming methods. According to the SCS, prime farmlands generally include Class I and II soils, which produce the highest yields with minimal inputs of energy and economic resources. Qualities that characterize prime agricultural soils include high permeability to water and air, few or no rocks, optimum levels of acidity and alkalinity, 0 to 8 percent slopes, and the absence of flooding during the growing season. These soils may currently be utilized for crops, pasture, woodland, or land covers other than urban land or water areas.

Prime agricultural soils within Strasburg Township are depicted Map 4 in Appendix H. The following soils are considered to be prime agricultural soils in the Township:

- Chester silt loams (CbA and CbB)
- Clarksburg silt loam (CkA)
- Comus silt loam (Cm)
- Conestoga silt loams (CnA and CnB)
- Elk silt loams (EcA and EcB)
- Glenelg silt loam (GbB)
- Hagerstown silt loam (HaB)
- Hollinger silt loam (HfB)
- Lehigh silt loam (LbB)
- Letort silt loams (LdA and LdB)
- Lindside silt loam (Ln)
- Manor silt loam (MaB)

2.3.3 Hydric Soils

Hydric soils are poorly drained soils that develop an anaerobic (limited oxygen) surface layer because of long periods of saturation or inundation by water. These soils display slow permeability. A seasonal high water table is often commonplace in areas where hydric soils are dominant. Hydric soils are typically an indication of wetland areas. The following Township soils have major hydric components:

- Chester silt loams (CbA and CbB)
- Clarksburg silt loam (CkA)
- Comus silt loam (Cm)
- Lehigh silt loams (LbB and LbC)
- Lindside silt loam (Ln)
- Newark silt loams (Nc and Nd)
- Nolin silt loam (Ne)

The areas in the Township with soils having major hydric components are shown on Map 4 in Appendix H.

2.3.4 Soil Suitability for On-Lot Sewage Disposal

Chapter 73 of Title 25 of the Pennsylvania Code presents design criteria and limitations for on-lot disposal systems. They are summarized in Table 2-1.

Table 2-1 On-Lot Sewage Disposal System Suitability Criteria

System	Hydric Soils	Depth To Bedrock	Depth to Seasonal High Water Table	Slope
Unsuitable for Any System	Yes	< 16 Inches	< 10 Inches	> 25%
Suitable for Elevated Sand Mound	No	20 Inches or Greater	20 Inches or Greater	<12%
Suitable for Conventional In-Ground	No	60 Inches or Greater	60 Inches or Greater	<25% for Standard Trenches <8% for Seepage Beds

Note: 1. In addition to limitations relating to soils, subsurface conditions, and slopes, absorption areas can not be located within 100-year floodways.

The characteristics of the soils in Strasburg Township were reviewed and analyzed to determine the probable soil limitations for on-lot sewage disposal systems (OLDS) based upon the 1985 *Soil Survey of Lancaster County, Pennsylvania*, prepared by the United States Department of Agriculture, Soil Conservation Service (USDA-SCS), and the GIS mapping provided by Lancaster County and the United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). Additional soils information was provided by the NRCS's online Soil Data Mart and the Pennsylvania State University's SoilMap. Table 2-2 and Map 5 in Appendix H present the general classification of soils within the Township based on the suitability for on-lot systems based on the Chapter 73 requirements and the information presented in the Soil Survey and online resources. In order to compare the Chapter 73 and Soil Survey information to determine the general classification, the following criteria were used:

A. Soil Rating Criteria for Conventional Subsurface Systems

The following ratings for subsurface systems apply only to deep soils with limiting zones greater than sixty inches (60"). In such areas, the following criteria were used to determine slight limitations, marginal limitations, and generally unsuitable conditions:

- Soils with limiting zones (groundwater or bedrock) at a depth less than sixty inches (60") are rated unsuitable for subsurface systems.
- Soils that exhibit slopes between eight percent (8%) and twenty-five percent (25%) are rated marginal for subsurface systems.
- Soils that exhibit slopes greater than twenty-five percent (25%) are rated unsuitable for subsurface systems.
- Soils with major hydric components are unsuitable for subsurface systems. Soils with inclusions of hydric components are rated at a grade lower than determined using the above.

B. *Soil Rating Criteria for Elevated Sand Mounds*

Soils with a depth of limiting zone between twenty inches (20") and sixty inches (60") typically require elevated sand mounds. In such areas, the following criteria were used to determine marginal or generally unsuitable conditions:

- Soils with limiting zones (groundwater or bedrock) at a depth less than twenty inches (20") are rated unsuitable for elevated sand mounds.
- Soils considered marginal for elevated sand mounds exhibit slopes greater than eight percent (8%) and less than fifteen percent (15%).
- Soils that exhibit slopes greater than fifteen percent (15%) are rated unsuitable for elevated sand mounds.
- Soils with major hydric components are unsuitable for elevated sand mounds. Soils with inclusions of hydric components are rated at a grade lower than determined using the above.

C. *Soil Rating Criteria for IRSIS*

In June of 1996 the Pennsylvania Department of Environmental Protection created another on-lot disposal alternative for areas that are unable to support subsurface systems or elevated sand mounds. This system, known as Individual Residential Spray Irrigation System (IRSIS), utilizes spray irrigation for ultimate disposal of treated domestic wastewater. In areas that are unsuitable for standard systems, the following criteria were used to determine marginal limitations and unsuitable conditions:

- Soils revealing a limiting zone of less than 10 inches (seasonal high water table) or 16 inches (coarse fragments/bedrock) are unsuitable.
- Soils that exhibit greater than 4% slope on agricultural land are unsuitable.
- Soils that exhibit greater than 12% slope on grass are unsuitable.
- Soils that exhibit greater than 25% slope on woodlands are unsuitable.
- Soils with major hydric components are unsuitable for IRSIS systems. Soils with inclusions of hydric components are rated at a grade lower than determined using the above.

Based on the criteria outlined above, approximately less than half of the soils in Strasburg Township are rated unsuitable for conventional subsurface systems primarily due to steep slopes and the retention of water by the soil and more than half of the soils are rated suitable and marginally suitable for elevated sand mounds. IRSIS systems could be used in some instances; however their operation and maintenance are complex and their applications limited. Therefore, they were not further investigated in this Plan. They should, however, be considered as an alternative when other methods are not suitable.

Soil Suitability for on-lot systems (not including IRSIS) for the Township is presented on Map 5 in Appendix H in three general categories:

1. Soils Suitable and Marginally Suitable for In-Ground Systems
2. Soils Suitable and Marginally Suitable for Sand Mounds but Unsuitable for In-Ground Systems
3. Soils Generally Unsited for Conventional Systems

It should be understood that soil testing was not performed in conjunction with the preparation of this Act 537 Plan. Site-specific investigations are required to determine soil characteristics and OLDS suitability at a given location within the Township on a case-by-case basis.

Table 2-2 On-Lot Disposal Systems Soil Suitability Assessment

(* Indicates Prime Farmland)

(** Indicates Farmland of Statewide Importance)

Soil Symbol	Soil Name	Description	Slope (%)	Depth to Seasonal High Water Table (inches)	Depth to Bedrock (inches)	Hydric Soil (H) or Inclusions (I)	General Limitations					
							Conventional Inground Systems			Elevated Sand Mounds		
							Suitable	Marginal	Unsuitable	Suitable	Marginal	Unsuitable
CbA	Chester	silt loam	0-3	>72	>60	H	X			X		
CbB	Chester	silt loam	3-8	>72	>60	H	X			X		
CbC	Chester	silt loam	8-15	>72	>60			X			X	
CkA	Clarksburg	silt loam	0-5	18-36	>60	H			X			X
Cm	Comus	silt loam	0-3	>72	>60	H	X			X		
CnA	Conestoga	silt loam	0-3	>72	>60		X			X		
CnB	Conestoga	silt loam	3-8	>72	>60		X			X		
CnC	Conestoga	silt loam	8-15	>72	>60			X			X	
EcA	Elk	silt loam	0-3	>72	>60		X			X		
EcB	Elk	silt loam	3-8	>72	>60		X			X		
GbB	Glenelg	silt loam	3-8	>72	>48				X	X		
GbC	Glenelg	silt loam	8-15	>72	>48				X		X	
GdB	Glenville	silt loam	3-8	6-36	>60				X			X
HaB	Hagerstown	silt loam	3-8	>72	>40				X	X		
Hc	Hagerstown	urban land complex	0-15	>72	>60			X			X	
HfB	Hollinger	silt loam	3-8	>72	>60		X			X		
HfC	Hollinger	silt loam	8-15	>72	>60			X			X	

Table 2-2 (cont.) On-Lot Disposal Systems Soil Suitability Assessment

(* Indicates Prime Farmland)

(** Indicates Farmland of Statewide Importance)

Soil Symbol	Soil Name	Description	Slope (%)	Depth to Seasonal High Water Table (inches)	Depth to Bedrock (inches)	Hydric Soil (H) or Inclusions (I)	General Limitations					
							Conventional Inground Systems			Elevated Sand Mounds		
							Suitable	Marginal	Unsuitable	Suitable	Marginal	Unsuitable
HfD	Hollinger	silt loam	15-25	>72	>60		X				X	
LbB	Lehigh	silt loam	3-8	6-18	40-60	H			X		X	
LbC	Lehigh	silt loam	8-15	6-18	40-60	H			X	X		
LdA	Letort	silt loam	0-3	>72	>60		X			X		
LdB	Letort	silt loam	3-8	>72	>60		X			X		
LdC	Letort	silt loam	8-15	>72	>60			X		X		
Ln	Lindside	silt loam		18-36	>60	H			X		X	
MaB	Manor	silt loam	3-8	>72	>60		X			X		
MaC	Manor	silt loam	8-15	>72	>60			X		X		
MaD	Manor	silt loam	15-25	>72	>60			X			X	
MbD	Manor	very stony silt loam	8-25	>72	>60			X			X	
MbF	Manor	very stony silt loam	25-60	>72	>60				X		X	
Nc	Newark	silt loam	0-3	6-18	>60	H			X		X	
Nd	Newark	silt loam	0-3	6-18	>60	H			X		X	
Ne	Nolin	silt loam	0-3	36-72	>60	H			X	X		
Pa	Penlaw	silt loam	0-5	6-18	>60				X		X	
PeC	Pequea	silt loam	8-15	>72	40-60				X	X		

Table 2-2 (cont.) On-Lot Disposal Systems Soil Suitability Assessment

(* Indicates Prime Farmland)

(** Indicates Farmland of Statewide Importance)

Soil Symbol	Soil Name	Description	Slope (%)	Depth to Seasonal High Water Table (inches)	Depth to Bedrock (inches)	Hydric Soil (H) or Inclusions (I)	General Limitations					
							Conventional Inground Systems			Elevated Sand Mounds		
							Suitable	Marginal	Unsuitable	Suitable	Marginal	Unsuitable
PeD	Pequea	silt loam	15-25	>72	40-60			X			X	
PeE	Pequea	silt loam	25-50	>72	40-60			X			X	
W	Water							X			X	

2.4 GEOLOGICAL FEATURES

The geology of an area dictates the groundwater characteristics, such as well yields and the susceptibility of formations to transfer or accumulate contaminants, including bacteria from OLDS and nitrate-nitrogen from agricultural activities. According to *Groundwater Resources of the Lower Susquehanna River Basin, Pennsylvania* prepared by the Pennsylvania Geological Survey, the geologic formations underlying Strasburg Township produce groundwater with nitrate-nitrogen concentrations above 5 mg/L as well as nitrate-nitrogen concentrations in groundwater exceeding maximum contaminant level of 10 mg/L in agricultural areas within the Township underlain by carbonate bedrock (see Map 6 in Appendix H for geologic formations).

Strasburg Township is located within the Conestoga Valley Section of the Piedmont physiographic province in the Susquehanna River Basin. The majority of the Conestoga Valley Section is underlain by carbonate rocks, with thin shale interbeds and formations of schist, quartzite, and phyllite. The section, frequently having faults or folds, is described as gently rolling hills at a considerably lower elevation than the surrounding non-carbonate area. Carbonate bedrock produces a good aquifer; however, it is also an area for potential groundwater contamination since groundwater easily passes through solution cavities in the subsurface without being cleansed by the soil.

The following formations underlie Strasburg Township: Conestoga Formation, the Vintage Formation, the Antietam-Harpers Formation, and the Chickies Formation. The Conestoga Formation covers the northern half, the southwestern corner, and portions of the central part of the Township. Bands of the Vintage Formation are located in the central part of the Township. The Antietam-Harpers Formation is found in smaller bands across the center of the Township, as well as in the southeast corner. The Chickies Formation is found in the southeast corner of the Township. Lancaster County Spatial Data and data from the Pennsylvania Department of Conservation and Natural Resources (DCNR) were used to prepare Map 6 in Appendix H, which shows the geologic formations of the bedrock surface underlying the Township. The descriptions of the characteristics for the geologic formations are provided below.

Conestoga Formation (OCc)

The Conestoga Formation is comprised of medium-gray, impure limestone and because of its highly erosive nature, it presents itself as a rather flat and open landscape with little topographical variation. In addition, this area is conducive to crop production as the limestone results in highly fertile soils.

Vintage Formation (Cv)

The Vintage Formation is comprised of gray, thick bedded to massive, finely crystalline dolomite. The rocks are much more resistant to erosive forces, resulting in steeper topography and more rugged landscapes.

Antietam-Harpers Formation (Cah)

The Antietam-Harpers Formation is comprised of dark-greenish gray phyllite, albite mica schist, quartz schist, light-gray buff weathering quartzite, and some ferruginous quartzite. The rocks are much more resistant to erosive forces, resulting in steeper topography and more rugged landscapes.

Chickies Formation (Cch)

The Chickies Formation is comprised of light-gray to white, hard, massive quartzite and quartz schist with thin inter-bedded dark slate at top.

2.5 TOPOGRAPHY

Strasburg Township is located within the Piedmont Lowlands sections of the Valley and Ridge Piedmont Physiographic Province. The topography of Strasburg Township can be described as generally hilly with gently rolling terrain and a lower flat area in the center of the Township. The Township is bordered on the north and west by the Pequea Creek and on the south by the Big Beaver Creek. Elevations in the Township range from approximately 300 feet to 920 feet (see Map 7 in Appendix H).

Topography is an important factor in determining the suitability of an area for on-lot sewage disposal. See Section 2.3.4 for further discussion.

2.6 POTABLE WATER SUPPLIES

Strasburg Township residents rely upon individual wells for their water supply. Approximately 86 properties within the Township are served by public water provided by Strasburg Borough Authority from the two source water springs to the Strasburg Borough Authority Water Treatment Plant, and from the transmission main leading from the Water Treatment Plant to the Borough. The Borough has a policy of not providing service beyond the Borough limits; however, the existing service is a longstanding agreement between the Borough and the property owners, in exchange for the right of way for the transmission main through the property owner's land (see Map 9 in Appendix H).

2.7 WETLANDS

Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support a prevalence of vegetation typically adapted for life in saturated soils. Wetlands generally include swamps, marshes, bogs, and other areas that exhibit the three criteria for defining a wetland area: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology.

As more information has become available about the beneficial aspects of wetland habitats, scientists, engineers, environmental interest groups, and governmental agencies have worked to protect and maintain the unique environments. Along with the traditional uses of wetlands as fish and wildlife habitat, wetlands are now being used for stormwater management and wastewater treatment.

Wetlands are a critical component in many ecological processes and are consequently protected by the federal government. Wetlands provide the following benefits or functions:

- Fish and Wildlife Habitat
- Water Quality Maintenance
- Pollution Filter
- Oxygen Production

- Nutrient Recycling
- Chemical and Nutrient Absorption
- Aquatic Productivity
- Flood Control
- Recreational Land Preservation
- Educational Opportunities
- Microclimate Regulation
- World Climate Regulation
- Sediment Removal
- Energy Source (Peat)
- Open Space Preservation

The National Wetlands Inventory (NWI) mapping, as compiled by the U.S. Fish and Wildlife Service, is useful as a background source of information regarding wetland locations. The maps are prepared through the use of color infrared aerial photographs, and the quality of the maps varies dependent upon the time of year that the photos were taken and other factors. Field investigation, conducted by a trained scientist or engineer, is necessary to determine the actual presence or absence of wetland areas. Known wetlands within Strasburg Township, based on NWI information, are displayed on Map 2 in Appendix H.

The following wetland types (as designated by NWI mapping codes) are found in Strasburg Township:

- PEM5/2A – Palustrine, Emergent, *Phragmites australis*/Nonpersistent, Temporarily Flooded
- PFO1A – Palustrine, Forested, Broad-Leaved Deciduous, Temporarily Flooded
- L1UBHh – Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded, Diked/Impounded
- R2UBH – Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded
- PUBFh – Palustrine, Unconsolidated Bottom, Semipermanently Flooded, Diked/Impounded
- PUBHh – Palustrine, Unconsolidated Bottom, Permanently Flooded, Diked/Impounded
- R2USA – Riverine, Lower Perennial, Unconsolidated Shore, Temporarily Flooded
- PEM5B – Palustrine, Emergent, *Phragmites australis*, Saturated
- PEM5C – Palustrine, Emergent, *Phragmites australis*, Seasonally Flooded
- PEM5Ah – Palustrine, Emergent, *Phragmites australis*, Temporarily Flooded, Diked/Impounded
- PUBHx – Palustrine, Unconsolidated Bottom, Permanently Flooded, Excavated
- PUBFx – Palustrine, Unconsolidated Bottom, Semipermanently Flooded, Excavated
- R2USC – Riverine, Lower Perennial, Unconsolidated Shore, Seasonally Flooded
- R2EM2A – Riverine, Lower Perennial, Emergent, Nonpersistent, Temporarily Flooded
- PEM5E – Palustrine, Emergent, *Phragmites australis*, Seasonally Flooded/Saturated
- PUSCh – Palustrine, Unconsolidated Shore, Seasonally Flooded, Diked/Impounded