2.1 DESCRIPTION OF THE PLANNING AREA

The base map data in the following sections has been provided by the Dauphin County Geographic Information Systems (GIS) and Environmental Systems Research Institute, Inc. (ESRI). Various sources were referenced to create mapping discussed in this report, which are noted on the individual exhibits.

2.1.1 Planning Area

The Planning Area for this Act 537 Sewage Facilities Plan consists of the entire Borough of Shinglehouse. Shinglehouse Borough encompasses 2.085 square miles (1,334 acres) and is bordered by Ceres Township (McKean County) to the west and by Sharon Township (Potter County) along all remaining borders. A general location map of the planning area is detailed on Map 1 in Appendix B.

2.2 PHYSICAL CHARACTERISTICS

2.2.1 Streams and Watersheds

Within the planning area, the two primary surface water streams are Oswayo Creek and Honeoye Creek (a tributary to the Oswayo Creek). As shown on Map 2 in Appendix B, all water within the Borough is drained by the Oswayo Creek and its tributaries. The Oswayo Creek Watershed extends beyond the Borough limits and drains to the Allegheny River, a principal tributary to the Ohio River in Pennsylvania.

According to Title 25, Chapter 93 of the Pennsylvania Code, the following protected water use watersheds have been identified within the Planning Area:

- **Janders Run** – *High Quality-Cold Water Fishes (HQ-CWF).*
- **Honeoye Creek** – *Cold Water Fishes (CWF).*
- **Oswayo Creek, upstream of Honeoye Creek** – *Cold Water Fishes (CWF).*
- **Oswayo Creek, downstream of Honeoye Creek** – *Warm Water Fishes (WWF).*
- **All unnamed tributaries to Honeoye Creek** – *Cold Water Fishes (CWF).*
- **All unnamed tributaries to Oswayo Creek** – *Cold Water Fishes (CWF).*

2.2.3 Floodplains

Floodplains are located along the Oswayo and Honeoye Creek, as well as some of their tributaries. 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 Oswayo and Honeoye Creek, as well as some of their tributaries (see Map 2 in Appendix B).

The majority of the properties in the Planning Area are located outside of the 100-year floodplains of the Borough; however there are some properties in the Planning Area within the 100-year floodplains of the Oswayo and Honeoye Creek. The 100-year floodplain is an area based on past experience and high statistical probability that a destructive flood event will occur.

2.2.4 Ponds

No ponds or reservoirs are located within the Planning Area.

2.3 SOILS

The characteristics of soils in the Planning Area were reviewed and analyzed to determine probable soil limitations for on-lot sewage disposal systems (OLDS) based on the Potter County Soil Survey Report prepared by the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS). The NRCS Web Soil Survey was also referenced, which offers information produced by the National Cooperative Soil Survey and operated by the NRCS (see Map 3 in Appendix B). On-lot systems are not being considered as an alternative for sewer disposal during the preparation of this Act 537 Plan. Developed properties with existing on-lot disposal systems outside of the Borough's current sewer service area are expected to continue use while permissible and non-failing.

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 were encountered in the Planning Area.

- Atherton silt loam (AhA)
- Basher silt loam (BdA)
- Castile gravelly silt loam (CbB)
- Ceres channery silt loam (CeB)
- Chenango gravelly loams (ChB, ChD, and ChF)
- Chippewa silt loam (CkB)
- Delaware fine sandy loam (DeA)
- Hartleton channery silt loam (HafD)
- Hazleton channery loam (HcfC)
- Kedron channery silt loam (KeD)
- Kinzua channery silt loam (KkF)
- Leck Kill channery loam (LeD)
- Lordstown channery silt loams (LoE and LoF)
- Lordstown channery loams (LosC and LosD)
- Lordstown-Cadosia complex (LrF)
- Mardin channery silt loams (MkB, MkC, MkD, and MkE)
- Middlebury silt loam (MoA and MpA)
- Morris and Volusia soils (MrsB and MrsD)
- Oquaga channery loam (OqsF)
- Scio silt loam (ScA)
- Tioga fine sandy loam (TaA)
- Tioga gravelly loam (TgA)
- Tunkhannock gravelly loam (TuB)
- Unadilla silt loam (UnA)
- Vly channery loam (VlD)
- Volusia channery silt loam (VoB, VoC, and VoD)
- Wayland soils complex (WaA)
- Wellsboro channery silt loam (WeD)
- Wyalusing silt loam (WyA)

2.3.2 Prime Agricultural Soils

Prime farmland, as defined by the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS), 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 NRCS, 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 Shinglehouse Borough are depicted in Map 4 in Appendix B. The following soils are considered to be prime agricultural soils in the Borough:

- Basher silt loam (BdA)
- Castile gravelly silt loam (CbB)
- Chenango gravelly loam (ChB)
- Delaware fine sandy loam (DeA)
- Mardin channery silt loam (MkB)
- Middlebury silt loam (MpA)
- Scio silt loam (ScA)
- Tioga fine sandy loam (TaA)
- Tioga gravelly loam (TgA)
- Tunkhannock gravelly loam (TuB)
- Unadilla silt loam (UnA)
- **Atherton silt loam (AhA), if drained*

The following soils are considered to be farmlands of statewide importance in the Borough:

- Mardin channery silt loam (MkC)
- Volusia channery silt loam (VoB, VoC)
- Wildin channery silt loam (WmC)

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 Borough soils have major hydric components:

- Atherton silt loam (AhA)
- Chippewa silt loam (CkB)
- Wayland soils complex (WaA)
- Wyalusing silt loam (WyA)

The following Borough soils have inclusions of hydric components:

- Basher silt loam (BdA)
- Middlebury silt loam (MoA, MpA)
- Morris and Volusia soils (MrsB, MrsD)
- Scio silt loam (ScA)
- Tioga fine sandy loam (TaA)
- Tioga gravelly loam (TgA)
- Volusia channery silt loam (VoB, Voc, VoD)

The areas in the Borough with soils having major hydric components or inclusions of hydric components are shown on Map 2 in Appendix B.

2.3.4 Soil Suitability for On-Lot Sewage Disposal

Criteria and limitations for suitability for OLDS are presented in Chapter 73 of Title 25 of the Pennsylvania Code and summarized in Table 2-1.

Table 2-1 Suitability Criteria for On-Lot Sewage Disposal Systems

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 System	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 shall not be located within 100-year floodways.

The characteristics of the soils in the Borough were reviewed and analyzed to determine the probable limitations for OLDS based upon the Potter County Soil Survey Report as prepared by the USDA-NRCS. Additional soils information was provided by the NRCS's Web Soil Survey. Each soil was assigned a suitability based on the presence of hydric soils, depth to bedrock and seasonally high water table, and slope.

The results of this analysis are presented in Table 2-3 and Map 5 in Appendix B. In order to compare the Chapter 73 and Soil Survey information to determine the suitability 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 criteria.

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 criteria.

C. *Soil Rating Criteria for IRSIS*

In June of 1996 the DEP created another on-lot disposal alternative for areas deemed unsuitable for 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. Soils with inclusions of hydric components are rated at a grade lower than determined using the above criteria.

Based on the criteria outlined above, the majority of the soils in the developed portions of the Borough are rated suitable and marginally suitable for conventional subsurface systems. Where conventional subsurface systems are unsuitable, only select properties may be rated suitable and marginally suitable for sound mound systems and still be located outside of 100-year

floodways. IRSIS systems could be used in some instances; however, their operation and maintenance are complex and their applications can be limited. Therefore, they were not further investigated in this Plan. They should, however, be considered as an alternative when other methods are not suitable.

As previously identified, Soil Suitability for OLDS (not including IRSIS) for the Borough is presented in Table 2-3 and on Map 5 in Appendix B in three (3) general categories:

- Soils Suitable and Marginally Suitable for In-Ground Systems.
- Soils Suitable and Marginally Suitable for Elevated Sand Mounds but Unsuitable for In-Ground Systems.
- Soils Generally Unsuitable for Conventional Systems.

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

Currently, there are 28 OLDS within the Borough of Shinglehouse. These OLDS are shown on Map 11 in Appendix B.

2.4 GEOLOGIC FEATURES

The geology of an area dictates important groundwater characteristics, such as median well yields and the susceptibility of formations to transfer or accumulate contaminants, including bacteria from OLDS and nitrate-nitrogen from agricultural activities. Nitrate pollution of groundwater has not been significant in Shinglehouse Borough. According to *Hydrogeology and Groundwater Quality of the Glaciated Valleys of Bradford, Tioga, and Potter Counties, Pennsylvania* prepared by the Pennsylvania Department of Conservation and Natural Resources (PA-DCNR) and the U.S. Geological Survey (USGS), the geologic formations underlying Shinglehouse Borough contain groundwater with nitrate-nitrogen (NO_3-N) concentrations well below 5 mg/L.

Potter County Spatial Data and data from the United States Geological Survey and the Pennsylvania Department of Conservation and Natural Resources were used to prepare Map 6 in Appendix B, which shows the geologic formations of the bedrock surface underlying the Borough. Descriptions of the geologic formation found in the Borough are provided below.

Chadakoin Formation (Dch)
The Chadakoin Formation consists of light-gray to brownish siltstone, fine-grained sandstone, medium-gray shale, and conglomerate, and it commonly contains marine fossils. The Chadakoin Formation is often a poor aquifer, but is adequate for domestic supplies; salt water and natural gas in wells is common. The formation is found throughout the Borough except in select northern and southwestern portions.

Catskill Formation (Dck)
The Catskill Formation consists of a succession of grayish-red sandstone, siltstone, shale, and some conglomerate and mudstone, generally in fining-upward cycles. The Catskill Formation is often a fair to good aquifer with good to excellent water quality. The formation is primarily found in the select northern and southwestern portions of the Borough.

Median yields of wells are described in the following table.

Table 2-2 Median Well Yields

Bedrock Formations	Median Groundwater Yields (GPM)
Chadakoin	4
Catskill	300

Yields from the Chadakoin Formation are generally suitable for single family detached dwellings. The Catskill Formation has large median yields generally suitable for municipal supplies.

2.5 TOPOGRAPHY

Shinglehouse Borough is situated in the northwestern part of Potter County, about two miles from the New York State line. The Borough is bordered by Ceres Township (McKean County) to the west and by Sharon Township (Potter County) along all remaining borders. Elevations in the Borough average about 1,500 feet above see level (see Map 7 in Appendix B).

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

The Borough owns a water supply system consisting of one active groundwater well (Well #3), one reserve groundwater well (Well #2), and one abandoned groundwater well below the Oswayo Creek (Well #1). Well #3 has a safe yield of 288,000 gallons per day (gpd) and currently serves as the primary water source. Liquid chlorine is used for disinfection. Caustic soda is also added to control pH for corrosion control. Well #2 has a safe yield of 216,000 gpd and is treated with an electromedia filter for iron and manganese and chlorine for disinfection. The system has a 140,000 gallon finished water storage tank. Per the Borough's Wellhead Protection Program (WHPP) dated December 2003, the average daily demand is 178,000 gallons per day with a peak use of 220,000 gallons per day. The Borough's water service area is depicted in Map 9 in Appendix B.

The Borough's Wellhead Protection Plan (WHPP) located in Appendix C clearly identifies actual and potential sources of contamination to the source and allows the Borough to effectively educate the public on the importance of their drinking water source. The WHPP also serves as the first step for long-term sustainable planning for the future of the Borough and provides a comprehensive action plan in case of an emergency. Three tiers of protective zones are delineating within the WHPP.

No significant growth is anticipated within the Planning Area and therefore no expansions of the Borough's water distribution system are planned.

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 dependant 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. Map 2 in Appendix B includes the available NWI information for the Planning Area.

The following wetland types (NWI mapping codes) are found in the Planning Area:

- PEM1A – Palustrine, Emergent, Persistent, Temporarily Flooded
- PEM1C – Palustrine, Emergent, Persistent, Seasonally Flooded
- PFO1/SS1A – Palustrine, Forested, Broad-Leaved Deciduous, Temporary Flooded
- PFO1/SS1C – Palustrine, Forested, Broad-Leaved Deciduous, Scrub-Shrub, Broad-Leaved Deciduous, Seasonally Flooded
- PFO1A – Palustrine, Forested, Broad-Leaved Deciduous, Temporary Flooded
- PFO1C – Palustrine, Forested, Broad-Leaved Deciduous, Seasonally Flooded
- PSS1/EM1C – Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Emergent, Persistent, Seasonally Flooded
- PSS1A – Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Temporary Flooded
- PSS1C – Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Seasonally Flooded

Table 2-3 On-Lot Disposal Systems Soil Suitability Assessment

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
AhA	Atherton*	silt loam	0-3	0-6	>80	H			✓			✓
BdA	Basher*	silt loam	0-3	18-24	>80	I			✓			✓
CbB	Castile*	gravelly silt loam	0-5	18-24	>80	-			✓			✓
CeB	Ceres	channery silt loam	3-8	>80	40-60	-			✓	✓		
ChB	Chenango*	gravelly loam	0-8	>80	>80	-	✓			✓		
ChD	Chenango	gravelly loam	15-25	>80	>80	-		✓				✓
ChF	Chenango	gravelly loam	25-50	>80	>80	-			✓			✓
CkB	Chippewa	silt loam	0-8	0-6	8-20	H			✓			✓
DeA	Delaware*	fine sandy loam	0-3	>80	72-99	-	✓			✓		
HafD	Hartleton	chanery silt loam	15-25	>80	40-60	-			✓			✓
HcfC	Hazleton	channery loam	3-15	>80	40-60	-			✓		✓	
KeD	Kedron	channery silt loam	15-25	6-36	18-32	-			✓			✓
KkF	Kinzua	channery silt loam	25-65	48-72	>80	-			✓			✓
LeD	Leck Kill	channery loam	15-25	>80	40-60	-			✓			✓
LoE	Lordstown	channery silt loam	25-35	>80	20-40	-			✓			✓
LoF	Lordstown	channery silt loam	35-60	>80	20-40	-			✓			✓
LosC	Lordstown	channery loam	3-15	>80	20-40	-			✓			✓
LosD	Lordstown	channery loam	15-25	>80	20-40	-			✓			✓
LrF	Lordstown-Cadosia	complex	25-60	>80	20-40, or >80	-			✓			✓
MkB	Mardin*	channery silt loam	0-8	13-24	14-26	-			✓			✓
MkC	Mardin**	channery silt loam	8-15	13-24	14-26	-			✓			✓
MkD	Mardin	channery silt loam	15-25	13-24	14-26	-			✓			✓
MkE	Mardin	channery silt loam	25-35	13-24	14-26	-			✓			✓
MoA	Middlebury	silt loam	0-3	6-24	>80	I			✓			✓
MpA	Middlebury*	silt loam	0-3	6-24	>80	I			✓			✓
MrsB	Morris and Volusia	soils	0-8	6-18	10-22	I			✓			✓

Table 2-3 (cont.) On-Lot Disposal Systems Soil Suitability Assessment

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			Conventional Inground Systems		
							Suitable	Marginal	Unsuitable	Suitable	Marginal	Unsuitable
MrsD	Morris and Volusia	soils	8-25	6-18	10-22	I			✓			✓
OqsF	Oquaga	channery loam	25-60	>80	20-40	-			✓			✓
ScA	Scio*	silt loam	0-3	18-24	>80	I			✓			✓
TaA	Tioga*	fine sandy loam	0-3	36-72	>80	I			✓		✓	
TgA	Tioga*	gravelly loam	0-3	36-72	>80	I			✓		✓	
TuB	Tunkhannock*	gravelly loam	0-8	>80	>80	-	✓			✓		
UnA	Unadilla*	silt loam	0-3	>80	>80	-	✓			✓		
VlD	Vly	channery loam	15-25	>80	20-40	-			✓			✓
VoB	Volusia**	channery silt loam	3-8	6-18	10-22	I			✓			✓
VoC	Volusia**	channery silt loam	8-15	6-18	10-22	I			✓			✓
VoD	Volusia	channery silt loam	15-25	6-18	10-22	I			✓			✓
WaA	Wayland	soils complex	0-3	0-6	>80	H			✓			✓
WeD	Wellsboro	channery silt loam	15-25	13-24	14-30	-			✓			✓
WyA	Wyalusing	silt loam	0-5	0-6	>80	H			✓			✓

* Prime Farmland Soils

** Farmland of Statewide Importance