

3.1 EXISTING MUNICIPAL WASTEWATER TREATMENT SYSTEMS

The Borough of Shinglehouse's Wastewater Treatment Plant (WWTP) provides sanitary service to the residents and businesses in the Borough of Shinglehouse as well as both the Oswayo Valley Elementary School and Jr./Sr. High School. The Borough's sewer collection and conveyance system conveys wastewater to the WWTP that discharges to the Honeoye Creek (CWF). The sanitary sewer system is shown on Map 10 in Appendix B. There are two (2) pumping stations within the system (Low Street and Mill Street, respectively). None of the pump stations are at capacity. The Borough's WWTP is located north of Honeoye Street in Shinglehouse Borough at the terminus of Wolcott Avenue. A copy of the Shinglehouse Borough's 2017 Chapter 94 Wasteload Management Report is included as Appendix D of this Act 537 Plan.

3.1.1 Permitting

The Borough's WWTP discharges treated effluent to the Honeoye Creek in Potter County under the National Pollutant Discharge Elimination System (NPDES) permit number PA0036773. This permit has an expiration date of March 31, 2021.

The WWTP's current annual permitted discharge flow is 0.160 million gallons per day (MGD), with a peak wet weather flow or maximum monthly average flow (MMAF) of 0.160 MGD and a peak hourly flow of 0.250 MGD. The design capacity for organic loading is 447 pounds/day BOD₅ with a summer average monthly loading rate of 15 lbs/day CBOD₅ and a winter average monthly loading rate of 17 lbs/day CBOD₅. Table 3-1 presents the most recent NPDES discharge limits and the 2017 average discharge characteristics from the Borough's WWTP. The summer Fecal Coliform instantaneous maximum (IMAX) effluent limits were exceeded in May and July of 2017 which resulted in violations. Similar violations have occurred in recent years.

Table 3-1 NPDES Effluent Limits and Discharge Characteristics for the Borough's WWTP

Parameter	NPDES Effluent Limits ⁽¹⁾	Average Discharge Characteristics ⁽²⁾
Flow, mgd	0.160	0.071
pH (standard units)	6.0 (minimum) 9.0 (maximum)	7.0 7.67
CBOD, mg/L (summer) ⁽³⁾	25 (monthly) ⁽¹⁾ 40 (inst max)	15 23
CBOD, mg/L (winter) ⁽³⁾	40 (monthly) ⁽¹⁾ 60 (max week)	17 21
TSS, mg/L (summer) ⁽³⁾	30 (monthly) ⁽¹⁾ 45 (max week)	15 22
TSS, mg/L (winter) ⁽³⁾	45 (monthly) ⁽¹⁾ 65 (max week)	9 14
Fecal Coliform, #/100 ml (summer) ⁽⁴⁾	200 (geo mean) 1,000 (IMAX)	138 12,336
Fecal Coliform, #/100 ml (winter) ⁽⁴⁾	2,000 (geo mean) 10,000 (IMAX)	152 2,392
TRC, mg/L	1.0 (monthly) ⁽¹⁾ 2.6 (IMAX)	0.36 0.71

Notes:

- (1) NPDES Permit Discharge Limits, average monthly values.
- (2) 12-month average discharge characteristics from the period from January through December 2017.
- (3) Summer limits from Jun 1 to October 31. Winter limits from November 1 through May 31.
- (4) Summer limits from May 1 to September 30. Winter limits from October 1 through April 30.

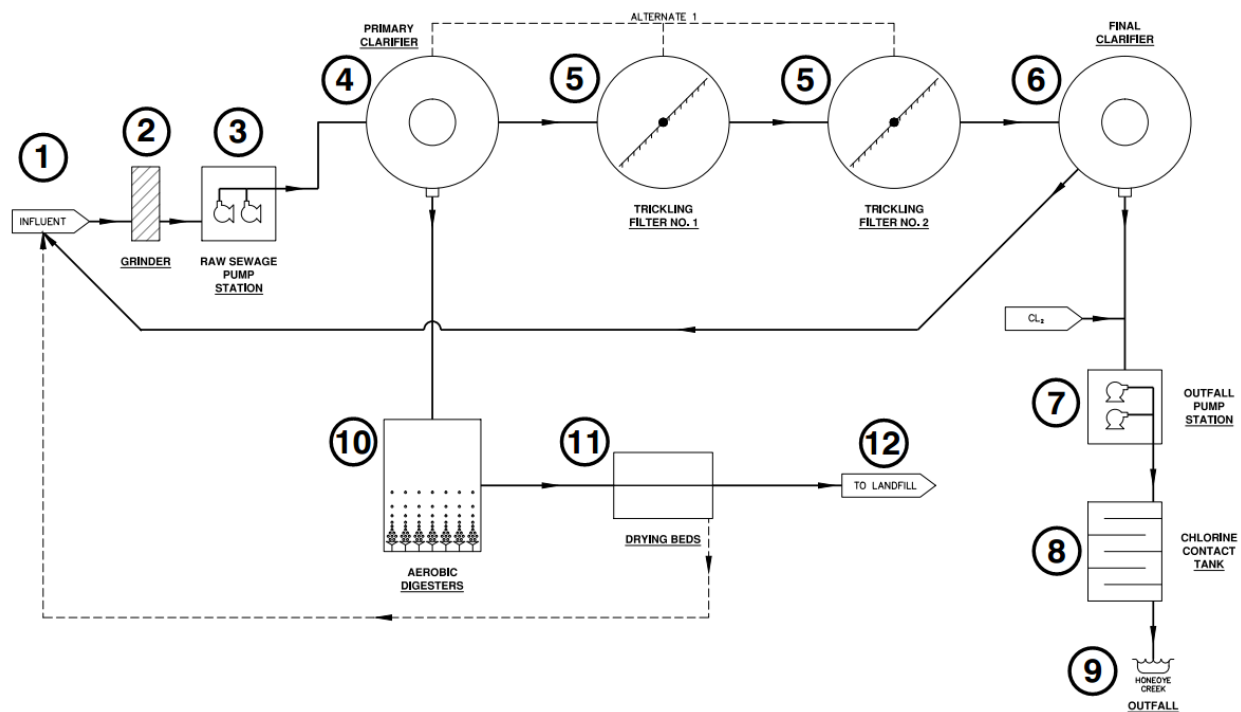
3.1.2 Basic Treatment Process

Flow through the WWTP is primarily by gravity. The plant utilizes primary clarification, fixed film bioreactors, and final clarification to achieve secondary treatment. Effluent is disinfected using sodium hypochlorite before being discharged to the Honeoye Creek.

Sludge is (wasted) from the primary clarifier into the aerobic digester. Sludge from the final clarifier is returned to the influent of the WWTP. Digested sludge is stored on-site until it can be dewatered using manually cleaned drying beds and disposed of via landfilling. Filtrate from the drying beds drains to the influent of the WWTP.

A schematic diagram of the existing WWTP process is shown below as Exhibit 3-1.

Exhibit 3-1 Existing WWTP Process Flow Schematic

Notes:

1. Influent raw wastewater from Borough.
2. Grinder shreds rags and other heavy debris
3. Raw wastewater pumps lift raw wastewater to Primary Clarifier.
4. Primary Clarifier settles solids out of raw wastewater. Solids go to the Aerobic Digester.
5. Trickling Filters distribute wastewater over rock and plastic media. The rock and plastic media are home to colonies of bacteria that use the wastewater as food.
6. Final Clarifier settles any remaining solids from the treated wastewater.

7. *Outfall Pump Station pushes treated effluent through the Chlorine Contact Tank and Outfall if the creek is high.*
8. *Chlorine Contact Tank provides an area where disinfection of final effluent occurs.*
9. *Final effluent is discharged to Honeoye Creek.*
10. *Primary Sludge from the Primary Clarifier is treated in the Aerobic Digester. Colonies of bacteria use air from blowers to reduce sludge content. The digesters also act as a sludge holding tank.*
11. *Drying beds are used to remove excess water from the sludge making it less expensive to landfill.*
12. *Once dried, the dewatered sludge is manually removed from the drying beds and placed into an on-site dumpster for disposal in a landfill.*

3.1.3 Collection and Conveyance Facilities

The original collection system was constructed in the 1960's and consists of approximately 10 miles of gravity sewer and force mains. An eight (8) inch diameter main conveys the wastewater to the WWTP. Map 10 in Appendix B shows the location of the existing Borough collection and conveyance mains, pump stations, and WWTP. The map was generated from GIS data.

There are two (2) pumping stations within the system. Neither of the pumping stations are at capacity. Table 3-2 presents the calculated 2017 average daily flows and facility capacities for the Borough pumping stations provided in the Shinglehouse Borough 2017 Chapter 94 Wasteload Management Report (included in Appendix D).

Table 3-2 Average Daily Flows and Rated Capacities of Shinglehouse Borough Pumping Stations

Pumping Station	Location	Rated Capacity (gpd)	2017 Conditions	
			Average Daily Flow (gpd) ⁽¹⁾	Remaining Facility Capacity (gpd)
1	Mill Street Pump Station	54,000	165	53,835
2	Low Street Pump Station	21,600	253	21,347

Notes:

- ⁽¹⁾ *Average Daily Flows are calculated based on the monthly pump run-times and the rated capacity of the pumps as supplied by the pump manufacturers. Peaking Factor of 4.0 was assumed.*

3.1.4 Existing Operating Conditions

A. Condition of Wastewater Facilities

Preventative maintenance activities are routinely performed by the WWTP staff to optimize the operation of the system and to minimize the occurrence of blockages. The pumping stations are visited regularly to monitor the operation of these facilities and to maintain the equipment in good condition.

The Borough has continued with development of an inflow and infiltration program. The Borough continues to investigate sources of inflow and infiltration and takes corrective action to reduce these sources of extraneous flow within their collection system. Manholes are inspected regularly and any defects repaired as required. During 2017 the Borough inspected 2,121 lineal feet of 8-inch diameter Vitrified Clay Pipe (VCP) sewer lines. Repairs identified will be completed in 2018.

B. Projected Overload

Based on the 2017 Chapter 94 Wasteload Management Report, the Borough is not projecting a hydraulic overload or an organic overload for the five-year planning period (2018 through 2022). The projected average flow for 2022 is 0.071 MGD. The projected average for the peak flows over three months in 2022 is 0.093 MGD. Both flows are under the facilities hydraulic capacity of 0.160 MGD (AAF) and 0.25 MGD (PHF). The projected average organic loading for 2022 is 68 pounds per day and projected maximum monthly peak organic loading for 2022 is 113 pounds per day. Both organic projections mentioned above are under the facility's organic capacity of 447 pounds per day.

Currently, the Borough is approximately 90 percent "built out". The 2017 Shinglehouse Borough Chapter 94 Report projects an additional 12 EDU's that have either been reserved, committed, or planned for over the course of this Act 537 20 year planning period and one sewer service disconnection. Due to a steady Borough population decline since 1970, it is anticipated that this trend will continue throughout the remainder of the Act 537 planning period. The Shinglehouse Borough WWTP has adequate capacity to handle the anticipated EDU's.

C. Industrial Waste

There are no significant industrial waste discharges to the Borough system. Any new industrial waste applications would be reviewed on a case-by-case basis and pretreatment standards set accordingly.

D. Permit Violations

EPA's ECHO website was searched to determine any permit violations incurred by the Borough. Fecal coliform effluent limit violations occurred during the second and third quarters of 2017.

3.1.5 Scheduled or In-Process Upgrading of Treatment and Collection Facilities

No scheduled upgrades to the existing collection and conveyance facilities are being considered as they are currently adequately sized and operating effectively. A WWTP Evaluation was completed in October 2016 to provide a structural evaluation, headworks analysis, treatment analysis, and disinfection analysis for long term upgrades and improvements to the existing WWTP. Structural alternatives were identified in the study to replace the aged equipment and technology with more efficient advanced technology, enhance treatment during the harsh winter months of northern Pennsylvania, and provide strategic process capabilities. These alternatives are reviewed in detail in Chapter 5. Projects may occur as a result of recommendations or suggestions made in this Act 537 Plan.

3.1.6 Operation and Maintenance Requirements

The Borough is responsible for the operation and maintenance of the municipal sewage collection and treatment system. The Borough employs one (1) plant operator and one (1) full time employee who are responsible for the operation, inspection, and maintenance of the treatment plant, collection system and pumping stations. These personnel are on occasion assisted by additional part-time Borough personnel or outside contractors as necessary.

3.1.7 Disposal Areas

The effluent from the Borough's WWTP is discharged into the Honeoye Creek. Digested sludge from the facility is pumped to sludge drying beds where it is manually removed. The dewatered sludge is typically hauled to the McKean County Landfill located at 19 Ness Lane, Kane, Pennsylvania.

3.2 EXISTING PACKAGE WASTEWATER TREATMENT FACILITIES

No Package Wastewater Treatment Facilities are located in the planning area.

3.3 EXISTING INDIVIDUAL ON-LOT SYSTEMS

Currently, there are 28 existing on-lot systems are located in the Planning Area (see Map 11 in Appendix B). The remainder of the Borough is serviced by the Borough's WWTP. Due to their location and non-failing statuses, the existing on-lots systems will continue to be used while permissible.

The types of on-lot system implemented varies, but is classified as one of the following:

- **In-Ground** – Systems consisting of absorption areas, trenches and other disposal systems that rely solely on the surrounding soil for treatment.

Types of systems found in the area include:

- Standard in-ground systems (septic tank with below-grade seepage bed).

Current regulations regarding on-lot disposal systems began in 1966, and most systems that were created before 1972 did not use best available technologies or methods that would be acceptable today.

3.3.1 Residential Complaints and Requests for Service

No pasty complaints have been received by the Borough. Some residents in the Park Avenue area of the Borough have requested public sewage service in order to avoid future malfunction of their OLDS systems.

There were no records available of malfunctions and/or repairs of Borough OLDS systems available for review.

3.3.2 Sanitary Survey

As part of the planning work for this Act 537 Plan, sanitary surveys were conducted throughout Shinglehouse Borough. The Act 537 Sewage Disposal Needs Identification Guidance (SDNIG) document published by the DEP (latest edition) was utilized as the basis for performing the Sanitary Surveys.

A. Public Health Needs

The DEP has designated "public health needs" as a general needs category relating to sewage disposal that must be considered. The definitions and requirements stated in this section are taken from the DEP's SDNIG document. Public health needs are considered to be those health hazards and water pollution problems that involve discharging untreated or inadequately treated sewage to the surface of the ground or waters of the Commonwealth, including groundwater. Most commonly, these needs are found to be malfunctioning OLDS and malfunctioning community on-lot disposal systems (COLDS). On-lot disposal system malfunctions are classified into three categories: confirmed, suspected, and potential. When determining the public health needs of an area using OLDS/COLDS, all systems inventoried, mapped, and analyzed must be placed into one of four categories:

1. Confirmed Malfunctions are malfunctions documented by dye testing, laboratory test results, observation by a Sewage Enforcement Officer (SEO) or a professional with experience in OLDS, "Best Technical Guidance" repair permits, and seasonally wet absorption areas. Also included are piped discharges from a single structure with direct evidence of sewage (i.e. direct observation of soap suds, food residue, solids, odors, etc.), reported system backups, malfunctions with photographic documentation, or other similar evidence.
2. Suspected Malfunctions are systems exhibiting some malfunction characteristics such as abnormally green grass in the vicinity of an absorption area, piped discharges from a dwelling without direct evidence of sewage (i.e. no observation of soap suds, food residue, solids, odors, etc.), absorption areas located in known unsuitable soils (observed wetlands, rock outcropping, etc.), cesspools in high-density development areas, and pit privies.
3. Potential Malfunctions are systems that appear to be operating satisfactorily but were constructed prior to system permitting requirements, systems located in areas extremely unlikely to receive permitting by current standards, systems constructed in areas having soils mapped as unsuitable or with severe limitations for OLDS and systems located on exceptionally steep slopes greater than 25 percent. Included as potential malfunctions are permits issued for OLDS repairs that meet Chapter 73 standards. While this needs category does not represent "stand alone" existing needs, the information may be utilized in a needs analysis to locate areas affected by poorly defined adverse circumstances. For example, clusters of legitimate repairs will often indicate areas requiring closer scrutiny.
4. No Malfunction are those systems that appear to be operating satisfactorily, were constructed since the implementation of system permitting requirements, and appear to have been constructed in accordance with the permitting requirements in effect at the time of construction. For the purpose of needs identification, OLDS permitting under Act 537 became effective on May 15, 1972.

Several other situations exist that must be inventoried, mapped, and analyzed when identifying public health needs for an Act 537 Official Plan or Plan Update Revision. These include wildcat sewers, borehole disposal, holding tanks, public complaints, and sanitation-related illnesses.

5. Wildcat Sewers are collection systems (community sewers) serving more than one equivalent dwelling unit (EDU) and discharging untreated or partially treated sewage to the surface of the ground, storm sewers, or other waters of the Commonwealth.
6. Borehole Disposal is an individual or community system that discharges to a borehole, abandoned water well, dry well, ventilation shaft, or other subterranean structure.
7. Holding Tanks are watertight receptacles designed to retain sewage for disposal at another location. All holding tanks installed as repairs are counted as "needs." Specifically excluded are holding tanks installed to serve new land development or low flow commercial facilities. While not actually discharging sewage into the environment, properly maintained holding tanks, when used in OLDS repair situations, are included in the confirmed malfunction category.
8. Public Complaints are legitimate complaints received by the PA DEP or the municipality concerning improper sewage disposal. The number, nature, and location of public complaints concerning improper sewage disposal are important, yet often overlooked indicators of sewage disposal problem areas.

9. Sanitation Related Illness is any reported illness, either resulting from or suspected to be resulting from improper sewage disposal. Records and incidents in which polluted water supplies have been suspected or confirmed as the cause of disease is documentation establishing a community's wastewater treatment needs. Confirmed or suspected vectorborne disease that may be attributed to surface ponding of sewage should also be considered.

B. Sanitary Sewage Survey

In order to determine the extent of the conditions as stated above in Shinglehouse Borough that could endanger public health, a sanitary sewage survey was completed in the areas utilizing OLDS systems. There are approximately 28 homes in Shinglehouse Borough served by OLDS. A total of 15 surveys were collected from random property owners throughout the Borough. The survey inquired about the age, type and condition of the OLDS and water systems on the property. A summary of the surveys is included in Appendix F.

Follow-up field verifications ("door-to-door surveys") were performed for a percentage of the properties based on guidelines set forth in the SDNIG document. According to the SDNIG document, a recommended minimum number of properties with OLDS within each Sewage Management Area (SMA) should be surveyed in order to conduct a "representative", or "valid" door-to-door sanitary sewage survey of the SMA. The minimum percentage of the properties that should be surveyed varies with the total number of properties in the SMA in accordance with the requirements published in the SDNIG (Table 3-2).

Table 3.3 Minimum OLDS Requirements for Door-To-Door Sanitary Survey – Tier 2

OLDS in the SMA	Minimum Percentage of OLDS to Survey
Up to 50	50%
51 to 100	35%
101 to 500	25%
501 to 1,000	20%
Greater than 1,000	15%

In accordance with the SDNID, a Tier 1 survey was conducted for the entire Borough and more than 50% of the OLDS were surveyed. At each home where the sewage survey was completed, the field inspectors made general observations of the properties and performed closer investigations of sites that demonstrated evidence of sewage malfunctions including direct observation of sewage, soapsuds, food residues, solids, or odors. Other environmental conditions including abnormally green grass, piped discharges and swampy or wet areas in the vicinity of the on-lot systems were also noted.

During the survey, a total of 15 properties were surveyed. Based on the Tier 1 Survey, the number and percentage of the properties in Shinglehouse Borough that were determined to have confirmed, suspected, potential, and no malfunctions are summarized in Table 3-3. Complete results are presented in Appendix F.

Table 3-4 Summary of Tier 1 Survey Malfunction Categories

OLDS Surveyed	Malfunction (% of OLDS Surveyed)							
	Confirmed		Suspected		Potential		None	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
15	2	13%	0	0%	5	33%	8	53%

Based on the number of surveys completed and the lack of malfunctions found, no further surveys were completed.

C. Soil Suitability for On-Lot Sewage Disposal

The characteristics of the soils located in the Borough were compiled using information presented in GIS mapping provided by Potter County and the United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS), and the NRCS's online Soil Data Mart and the Pennsylvania State University's Soil Map. These characteristics were used to determine the areas of the Borough suitable for the use of OLDS. Factors taken into consideration for OLDS suitability include the following:

- Depth to limiting zone (bedrock or water table).
- Percent slope.
- Hydric soils (soils with hydric components or inclusions of hydric components).

The criteria used to determine areas suitable for the use of either elevated sand mound OLDS or in-ground OLDS, are presented in Table 2-1. Using these criteria, in combination with the soil characteristics presented in the USDA's Soil Survey and Section 2.3, a determination was made regarding the suitability of areas of the Borough for the use of elevated sand mound OLDS, or in-ground OLDS. (See Table 2-1 and Map 5 in Appendix B).

3.3.3 Well Water Survey

Currently there are approximately 12 properties in Shinglehouse Borough that are not provided with public water. Of these properties, there are approximately 8 properties that do not have public water or public sanitary sewer service. During the door-to-door sanitary sewage survey, well water samples were collected from the surveyed properties where private wells are used.

According to the guidelines for well water surveys published in the SDNIG document, well water surveys may be completed in two tiers (or steps). In tier one, a minimum of 15 percent of the wells in the study area must be sampled. For the second tier, representative sampling must be completed with percentages the same as for the Door-to-Door Survey (see Table 3-2). Each well water sample was analyzed for total coliform bacteria, fecal coliform bacteria and nitrate-nitrogen concentration.

The Sewage Disposal Needs Identification Guidance requires representative sampling, or second tier sampling in any SMA, if:

1. The total coliform bacteria contamination rate is 10 percent or greater in the first tier well water samples; and
2. The fecal coliform bacteria contamination rate is 20 percent or greater in the first tier well water samples that had total coliform bacteria contamination.

A total of two (2) water samples were collected during the Tier 1 analysis of Shinglehouse Borough. These samples were analyzed by Fairway Laboratories. The results of the Tier 1 water sampling are displayed in Table 3-5.

Table 3-5 Tier 1 Well Water Survey Results - Bacteria and Nitrate Contamination

Wells Surveyed	Total Coliform Present (% of Surveyed)		Fecal Coliform Present (% of Total Coliform)		Nitrate > 5mg/L, but <10 mg/L (% of Surveyed)		Nitrate >10 mg/L MCL (% of Surveyed)	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
2	0	0%	0	0%	0	0%	0	0%

* Water samples were not taken where residents are provided with a public water supply.

** Environmental Protection Agency: Safe Drinking Water Act set the limit for nitrate (as nitrogen) to 10 mg per liter.

As illustrated in Table 3-5, the results of the Tier 1 well water testing indicated that there was no need to complete Tier 2 sampling. The laboratory results for each sample collected by the Borough's Licensed Water Operator and general information on water quality was presented to each homeowner who participated in the well water sampling.

3.3.4 Summary and Conclusions

Tables 3-3 displays the results of the sanitary surveys completed for Shinglehouse Borough as part of this Act 537 Plan. Map 13 in Appendix B "OLDS Malfunction Exhibit" displays the locations where the sanitary surveys were completed and the corresponding malfunction category. The Tier 1 survey indicated a 13% confirmed malfunction rate based on field observations.

Tables 3-5 and 3-6 display the results of the water samples collected. The Tier 1 water sampling revealed that the few private water wells in the Borough are not adversely impacted by OLDS, identifying that the few OLDS are properly functioning.

It is recommended that an On-lot Sewage Management Program be implemented by the Borough to assist homeowners in developing a regular maintenance schedule to help maintain the functionality of the existing OLDS. Because of the few number of OLDS in the Borough, the construction of public sanitary sewers for areas need to be considered as discussed further in this Plan. The implementation of a Sewage Management Program for the Borough and construction of public sanitary sewer to areas of the Borough currently served by OLDS is further discussed and evaluated in Chapter 5.

3.4 WASTEWATER SLUDGE AND SEPTAGE GENERATION

Upon treatment of domestic and industrial wastewater, the entrained solids are removed and often require special consideration for ultimate disposal. Solids from wastewater are created in two forms, sewage sludge and septage. Sludge is generated at wastewater treatment facilities and is generally disposed by landfilling or land application. The remaining homes not served by public sewers generate septage. Septage is the decomposed remains of the separated solids from domestic wastewater. As this sludge ages within a septic tank or similar treatment system, partial treatment is provided. Septage is a concentrated form of sludge.

3.4.1 Sources of Sludge or Septage in the Planning Area

The Borough's WWTP generates wastewater sludge within the planning area. Septage is generated by the on-lot systems described in Section 3.3.

3.4.2 Quantities of Sludge and Septage Generated

The Borough's WWTP did not dispose of any dewatered or liquid sludge in 2017. Septage from on-lot systems are the responsibility of the property owner. Assuming 25 percent of all septic tanks are pumped out annually (1,000 gallons each), approximately 7,000 gallons of septage is generated annually from on-lot systems within the Borough.

3.4.3 Present Methods of Disposal

Sludge generated by the WWTP is generally hauled off site in the form of liquid sludge or dewatered sludge. In 2017, no dewatered or liquid sludge was hauled off-site. In years prior, dewatered sludge was hauled to the McKean County Landfill in Kane, PA.