

Chapter 5

Management of Home Sewage and Regulated Sewage Treatment Systems

With a high concentration of existing on-site systems, it is important to understand the type of systems being authorized and how decentralized waste treatment infrastructure is governed and managed. Such an understanding enables decision makers and planners to address future wastewater needs. This chapter presents basic descriptions of the various on-site and Ohio EPA regulated systems found throughout the planning area as well as factors contributing to system failure and the impact system failure has on water quality. Identified in the chapter are current management structures and agency roles in regulating home sewage and state regulated systems. Recommendations were formed, aimed at enhancing the performance of these systems through better management and cooperative planning.

5.1 Introduction

While some suburban corridors are serviced by a centralized sewer treatment system, most unincorporated areas depend on some form of private, or decentralized on-site systems for wastewater treatment. Both Mahoning and Trumbull Counties are unified in recognizing failing on-site septic systems pose human health and public nuisance problems and adversely affect the water quality. According to an Ohio State University evaluation, less than five percent of Trumbull County soils can effectively support on-site leachfield sewage treatment systems. In Mahoning County, that figure is seven percent. Both local health departments are responding to regulatory needs for better management of existing on-site systems and adequate permitting standards of new on-site systems. Each department developed supplements/addendums to the new Ohio Department of Health (ODH) Sewage Treatment System Regulations, Ohio Administrative Code [\(OAC\) 3701-29](#). Each respective set of regulations was effective on January 1, 2015 and can be viewed on the following web sites:

- Mahoning County District Board of Health:
<http://www.mahoninghealth.org/fees-forms/well-septic-forms-links>
- Trumbull County Combined Health District:
http://www.tcbh.org/pdfs/12-17-14%20Bd%20Resolution_HSTS%20Addendums.pdf

5.2 On-Site Sewage or Decentralized Wastewater Treatment: An Overview

On-site sewage treatment describes the treatment and disposal of sewage within the property constraints of its point of origin. The concept of on-site sewage treatment is like a municipal wastewater treatment plant: provide adequate, cost-effective means of removing pollutants and pathogens from wastewater before sewage effluent enters the ground via an “on-lot” soil absorption system or surface water via a discharging “off-lot” system. On-site treatment must be performed in a manner avoiding odor and other nuisance conditions.

On-site sewage treatment systems service both residential and commercial needs within Eastgate’s Planning Area. In general, one-family, two-family, and three-family residential dwellings are served by Household Sewage Treatment Systems (HSTS), regulated by the local health department. Recent changes to state regulations provide health departments the option of assuming regulatory authority of other small on-lot sewage systems, referred to as “Small Flow On-site Sewage Treatment Systems (SFOSTS)”, from Ohio EPA (Ohio Revised Code (ORC) 3718.021). By OAC 3701.29-01 definition, a “small flow on-site sewage treatment system” or “SFOSTS” is a system, other than a household sewage treatment system, that treats not more than one thousand gallons of sewage per day and that does not require a national pollutant discharge elimination system permit issued under ORC section 6111.03 of the Revised Code or an injection well drilling or operating permit issued under section 6111.043 of the Revised Code. For the purposes of this chapter structures that are served by a small flow on-site sewage treatment system shall also include:

1. More than one dwelling or arrangements such as a dwelling and a detached garage with living space;
2. More than one vacation rental cabin;
3. A dwelling and related structure, such as a barn or personal garage, when the structure is used by persons other than, or in addition to the residents of the dwelling; and
4. A dwelling with a home business when the nature of the home business is such that it produces sewage, including but not limited to, home businesses that provide a public restroom for use by nonresidents”.

All other sewage systems are regulated by the Ohio EPA. All off-lot discharging systems, discharging to waters of the state¹, are required to be covered by a National Pollution Discharge Elimination System (NPDES) Permit.

In unsewered areas, the most common type of Ohio EPA regulated HSTS is the semi-public sewage disposal system (SPSDS). SPSDS's are defined in the ORC Section 3709.085 and OAC Section 3745-33 as "a disposal system that treats sanitary sewage discharged from publicly or privately owned buildings or places of assemblage, entertainment, recreation, education, correction, hospitalization, housing, or employment, but does not include a disposal system that treats sewage in amounts of more than twenty-five thousand gallons per day". The term "Ohio EPA HSTS" can be applied to both discharging and non-discharging systems. The Ohio EPA should be contacted for more site and system specific requirements.

5.3 Home Sewage Treatment Systems

According to the Ohio Department of Health, more than one million HSTS's exist in Ohio and over 25 percent of new homes being built incorporate an HSTS. It is estimated 49,000 – 50,000 HSTS exist in Eastgate's Planning Area; 32,000 in Trumbull County and 17,000 – 18,000 in Mahoning County.

An HSTS is designed to retain wastewater long enough on-site to allow solids to separate out through settling and flotation. However, methods of treatment and dispersal of treated effluent make every HSTS system different. A residential septic tank has varying capacities determined by the number of bedrooms in a house. Table 5-1 summarizes the required tank capacities according to the OAC 3709-29-12 (C), along with the recommendations by the Mahoning County District Board of Health and Trumbull County General Health District.

¹ Waters of the state, as defined by the Ohio EPA, are water bodies (i.e. rivers, lakes, creeks, wetlands, etc.) and systems such as ditches and storm sewers used to convey water.

Table 5-1: HSTS Tank Capacity Comparison

Ohio Department of Health Requirements (OAC 3701-29-12)	Mahoning County District Board of Health Recommendations	Trumbull County General Health District Recommendations
One or Two Bedrooms: 1,000 gallons in one or two tanks or compartments.	One to Four Bedrooms: 2,000 gallons in two tanks or compartments.	One to Four Bedrooms: 2,000 gallons in two tanks or compartments.
Three Bedrooms: 1,500 gallons in two tanks or compartments.	Five or More Bedrooms: 3,000 gallons in two tanks or compartments.	Five or More Bedrooms: 3,000 gallons in two tanks or compartments.
Four to Five Bedrooms: 2,000 gallons in two tanks or compartments.		
Six or More Bedrooms: 2,500 gallons plus an extra 250 gallons of tank capacity for each bedroom in two tanks or compartments.		
SFOSTS: 1,000 minimum in two tanks or compartments with at least 2 ½ times the daily design flow.		

*based on single family dwelling

All septic tank outlets, whether it is a single tank or the last tank in a series, must incorporate an effluent filter device to retain all solids greater than one sixteenth of an inch in size. All filters are required to have device specifications as stated in OAC 3701-29-12 (C)(3) and sized to meet the estimated daily design flow of the HSTS.

5.3.1 HSTS System Descriptions

In Mahoning and Trumbull Counties, septic tanks with leachfields, or soil absorption systems, are traditional and widely recognized systems and used unless site constraints indicate otherwise. In those cases, an aeration or mound system is issued for treatment of wastewater.

Illustrations 5-1 through 5-3, taken from the Ohio State University Extension Fact Sheet: AEX-743-93, provide an overview of a septic system. Incoming wastewater enters the septic tank via an inlet baffle forcing wastewater down into the tank, resulting in the settling of solids and the flotation of lightweight materials (i.e. grease, waxes, etc.). An outlet baffle prevents the scum

layer from entering the soil absorption system as clarified effluent traverses into the leachfield system. After receiving effluent, the leachfield filters and disperses it in the soil for treatment. In Ohio, leachfields are divided into two sections with a diversion device to alternate the flow of wastewater from one side of the system to the other. This alteration alleviates possible backup problems by allowing one side's pipes to clear out while the other side accepts waste.

Figure 5-1: HSTS overview Illustration

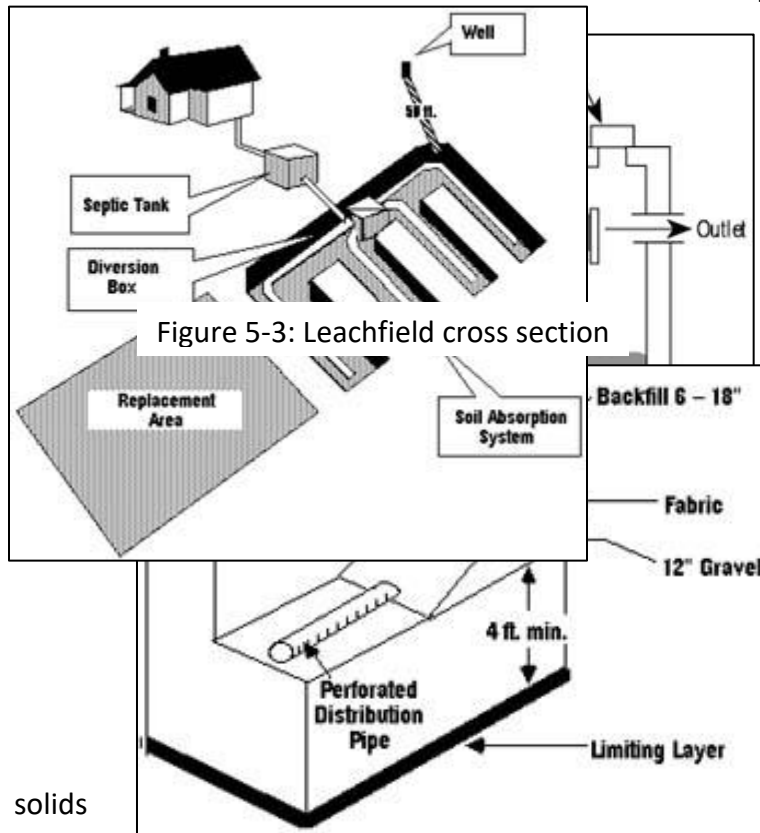
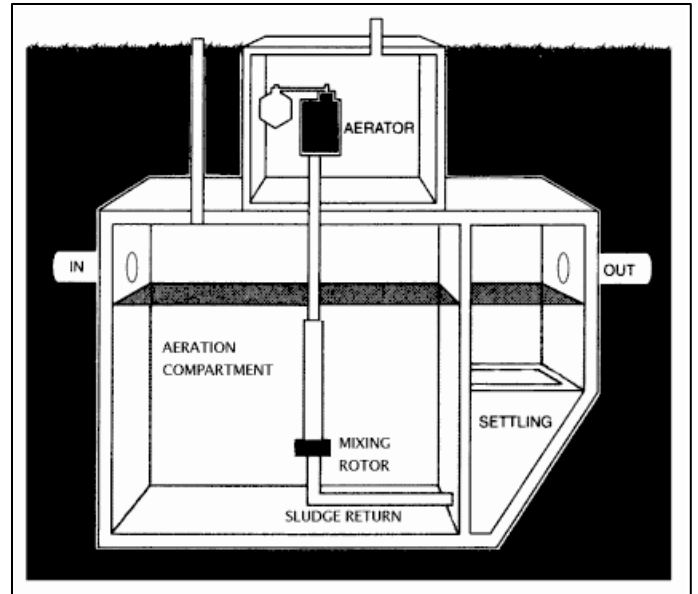


Figure 5-2: Septic tank cross section

Aerobic systems are like traditional septic systems by treating wastewater using natural processes. Some aeration systems include a pretreatment tank or compartment prior to an aeration chamber. Pretreatment for an aeration system is like a septic tank—solids separate out via settling and

flotation. Alternatively, aerobic systems require addition of oxygen to treat wastewater. After pretreatment, effluent flows into the aeration chamber where a mechanism injects and circulates air into the chamber via mixing device. Illustration 5-4 shows a cross section of a typical aeration chamber.

The addition of oxygen supports the growth of bacteria to digest solids. A third, optional settling or filtering chamber may exist to promote settling of excess solids before entering a final disinfecting stage. Effluent treatment for an aerobic system can consist of several methods and includes using a leachfield, sand filter, or disinfection. Sand filters may be used to treat effluent before entering the ground environment. Wastewater pumped out to a sand filter is pumped evenly over numerous layers of sand and gravel, located above or below ground.



Purification of effluent is assisted by the natural bacteria existing within the sand. Disinfection, via chlorination or ultraviolet (UV) light is a common effective method to treat effluent before it enters the environment. After disinfection, treated effluent either percolates into the ground or is discharged on-lot to a lake or pond or off-lot to a ditch, stream, pond, or lake.

In many areas of Ohio, soils with shallow depth to limiting substrate layers and a high percolation rate are not compatible with traditional septic systems. For these sites, the local health departments can issue a permit for an ODH approved alternate treatment system such as the mound and drip distribution system. Mound systems are utilized in the planning area, but the pretreatment stage differs by county and can include a septic tank, a trash trap, aerobic aeration system, and/or an effluent filter. After the initial stage(s) the effluent travels into a dosing chamber where a pump delivers the effluent to the mound for distribution in the soil. The mound system uses sand placed on top of natural soil to treat and dispose of septic tank effluent. The depth of sand is determined by the depth of the natural soil layer above the limiting layer and varies by county regulation due to soil constraints. The distribution pipes are placed on top of the sand layer and a layer of gravel is placed around the pipes. The pipes are then covered with a construction fabric and a layer of soil is placed over the entire mound to allow grass and non-woody plants to grow and prevent erosion.

The drip distribution system is another alternative treatment system used in the region. Drip irrigation systems apply treated wastewater slowly and uniformly through a network of narrow tubes. Wastewater flows through a primary treatment stage to settle out solids and floatable materials via a traditional or aerobic septic system. Primary treatment is followed by a filtration to filter out fine particles to protect the tubing from clogging. Wastewater is then stored until a predetermined volume is reached and is then pumped, under pressure, through the network of narrow tubes that are either at ground surface level or below the ground at a predetermined depth. The wastewater drips slowly out from the tubes through evenly spaced holes. The minimum standards for a drip distribution system are outlined in OAC 3701-29-15 Appendix C.

Grey Water Recycling Systems

Grey Water Recycling Systems (GWRS) are used in addition to an HSTS and are defined by OAC 3701-29-17 as “systems that treat and reuse or recycle back into the environment wastewater discharged from lavatories, bathtubs, showers, clothes, washers and laundry sinks that does not contain food or bodily wastes”. New to the local health departments, both the Trumbull County General Health District and Mahoning County District Board of Health can issue permits for a type 1 GWRS and require an operation and maintenance permit. A GWRS must meet the same requirements of OAC 3701-29-09 (installation and operation) and 3701-29-10 (designers and site designs) as an HSTS. Should a GWRS malfunction, the owner must immediately divert the water to an HSTS or sanitary sewer when applicable (OAC 3701-29-17 (D7)).

OAC 3701-29-17 (E) limits the total amount of grey water discharging from a system to sixty gallons per day. Reuse of grey water is only permitted for subsurface irrigation during the normal Ohio growing season. Irrigation may include watering of gardens, lawns, landscape plants, and food crops (except root crops) and edible portions exposed to grey water. In addition to an HSTS, installation of a GWRS would reduce loadings and wear and tear on an HSTS.

5.4 Home Sewage Treatment System Failure

Regardless of age, numerous problems and failures with individual HSTS systems have been documented across Ohio. In Eastgate's Planning Area soil suitability, the age of the system, and the establishment of subdivision and environmental regulations are leading causes of system failure.

Soil suitability has become a prevalent failure factor in the region. If effluent cannot percolate efficiently, then it remains in the leachfield and can cause a system backup or improper discharge. Effluent percolates faster in soil composed of sand and gravel than in clay-like soil. Numerous systems in the planning area are old and predate subdivision and environmental regulations. The elevation of a site's water table will also have a direct effect on the percolation of effluent. Other factors that can prohibit the proper HSTS function include:

- Shallow depth to bedrock;
- Slope exceeding 15 percent;
- Frequency in flooding – both counties state that an HSTS shall not be placed in a 100-year floodplain (delineated using FEMA maps);
- Improper installation and lack of maintenance (i.e. switching leachfield distribution baffle);
- Excessive water use in the home;
- Change in property drainage (i.e. position of downspouts or rain gutters, or the installation of paved areas that drain excess water to the yard area of the septic system; and
- Failure to pump the septic tank.

Failing septic systems are a nuisance in Mahoning and Trumbull Counties. Inspections of septic systems occur in both counties either prior to the sale of a house, land re-plats, home additions, owner repair request, or if a nuisance report has been filed. According to county health departments, systems with minor problems can continue functioning under the condition the problem is fixed through maintenance, servicing, or alternative system permit. Systems brought back into compliance require proper documentation of compliance to be submitted to the appropriate board of health.

The Trumbull County General Health District created and approved a “Temporary Home Sewage Nuisance Abatement Policy” on January 17, 2007 for residents currently serviced by HSTs and receiving sanitary sewers within a ten-year time frame. Sanitary sewer projects slated beyond ten years are not applicable. This policy allows residents to forgo complete septic system upgrades and to continue utilizing existing systems. In Mahoning County, failing septic systems in areas designated to be sewerred within 12 months may be considered for a Board of Health approved holding tank variance and other interim controls. However, once sanitary sewer is accessible, the system must be properly abandoned, and a sanitary sewer tie-in is required.

Both Mahoning and Trumbull Counties continue to address infrastructure needs of communities with areas of concentrated failing septic systems. Along with state and federal governing agencies, the counties continue to secure funds from various sources to provide sanitary sewer service to these areas.

5.4.1 Blueprint Trumbull County

The Blueprint Trumbull County Committee was formed in the summer of 2006 to address failing home sewage treatment systems within Trumbull County and the cost associated with system replacement. The committee included representation from Eastgate, state and local government officials (state congressmen representation and county commissioners, planning commission, and health department), wastewater treatment plant operators, and the county realtor association. The goal of the committee was to address the failing septic areas stated in the county’s consent order with the State of Ohio (#2006-CV-2248). Under the order, Trumbull County agreed to construct sanitary sewers in 11 defined areas by 2025. Subcommittees

identified funding avenues to help alleviate some if not all the septic grade costs, create homeowner education pamphlets regarding septic system maintenance and the sanitary sewer petition process, identify regulatory and legislative measures regarding septic systems and funding sources, and map out existing and future needs for sanitary sewers and areas with failing septic systems. Many of the defined areas were split up into phases to acquire funding. As of October 2015, Trumbull County is on track to finish by 2025, with a little more than 53% of the consent decree fulfilled.

5.5 Ohio EPA Regulated Sewage Treatment Systems (RSTs)

There are approximately 1,402 RSTs in the Eastgate planning area: 514 in Mahoning County and 888 in Trumbull County. Of the 514 RSTs in Mahoning County, 18 are Ohio EPA regulated package plants and in Trumbull County 97 of the 888 are Ohio EPA permitted package plants. Table 5-2 offers an RSTs summary of both Mahoning and Trumbull Counties.

Table 5-2: Summary of Regulated Sewage Treatment Systems

Ohio EPA Regulated Sewage Treatment Systems			
Area	Total # Systems	Semi-public	Package Plants
Mahoning County	514	496	18 (0 county owned)
Trumbull County	888	791	97 (7 county owned)
Totals	1402	1287	115

5.5.1 Semi Public Disposal System (SPDS)

An SPDS is “a disposal system that treats the sanitary sewage discharged from publicly or privately owned buildings or places of assemblage, entertainment, recreation, education, correction, hospitalization, housing, or employment, but does not include a disposal system that treats sewage in amounts of more than twenty five thousand gallons per day; a disposal system for the treatment of sewage that is exempt from the requirements of ORC section 6111.04 pursuant to division (F) (6) of that section; or a disposal system for the treatment of industrial

waste”². A non-discharging SPDS generally includes two septic tanks followed by either a leaching tile field or a mounded subsurface sand filter followed by an evapotranspiration tile field. A discharging SPDS generally includes a package aeration plant followed by surface sand filters, chlorination and dechlorination facilities. However, older models constructed prior to the early 1970's or systems that have malfunctioned may discharge effluent quality that does not meet water quality standards. The regulation of these systems falls upon the Ohio EPA although most of these systems currently lack an NPDES permit. The local health department, through contract with the Ohio EPA, inspects these systems and record and maintain inspection results. Through this cooperation, the Ohio EPA is able to gather more state-wide information about Ohio’s SPDSs and identify those systems functioning without the owner of the system having to acquire an NPDES permit.

On May 31, 1984 House Bill (HB) 110 amended sections 3709.085 and 6111.01 of the ORC. HB110 allows local boards of health the authority to perform, via a contractual agreement with the Ohio EPA, operation and maintenance, education, inspections and informal enforcement on SPDSs treating sanitary only flows of 0-25,000 gpd throughout their respective jurisdiction. Local health departments annually inspect SPDS and RHSTS facilities for compliance with Ohio’s water pollution control laws and regulations. In the event an SPDS is found in violation of Ohio’s water pollution laws, a notice of violation is generally sent to the Ohio EPA for enforcement as done by the Mahoning County District Board of Health. Taking enforcement a step further, the Trumbull County General Health Department adopted a county-wide program in which enforcement is resolved through the health department. Applicable inspection fees are paid by the facility to the respective local health department, but include one exception, “recreational vehicle park, recreation camp, or combined park-camp that is licensed under ORC Section 3729.05 or at any manufactured home park that is licensed under ORC Section 3733.03”³.

² OAC 3745-33

³ ORC Section 3709.085

5.5.2 Package Plants

A package plant is a prefabricated, discharging treatment facility typically treating wastewater volumes less than 100,000 gpd. An extended aeration system is a typical system utilized in Mahoning and Trumbull County. With this system, incoming wastewater is initially screened to remove large suspended solids. Solids not caught in this process are ground to reduce the particle size. Wastewater continues flowing into an aeration chamber where, like the home aeration system, oxygen is added to the microorganisms. If the flow is required to be regulated, wastewater will pass through equalization tanks to regulate peak wastewater flows before proceeding to the aeration chamber. After leaving the aeration chamber, the mixed liquor (the combination of wastewater and microorganisms) flows into a clarifier where microorganisms settle to the bottom and a portion of them are pumped back into the wastewater at the beginning of the process. This returned material is called return activated sludge, while the material that is not removed is called waste activated sludge. The waste activated sludge is removed from the treatment process and is disposed of. The clarified water is sent over a weir and into a collection channel prior to entering the dosing chamber and sand filters. Prior to discharge, disinfection of wastewater is carried out by either chlorination/dechlorination or UV technology.

Problems with extended aeration plants can generally be traced to improper operation, maintenance, or management of the system. The following is a list of some advantages and disadvantages:

Advantages:

- Package plants are staffed on limited time scale;
- Package plants are easy to install as they usually come preassembled and are mounted on a concrete pad or above or below grade; and
- With proper maintenance, systems are generally odor free and perform well and meet effluent quality standards.

Disadvantages:

- Extended aeration plants do not achieve denitrification or phosphorous removal without additional processes;

- There is limited flexibility in the systems adapting to effluent criteria due to regulatory changes;
- The extended aeration process increases energy demand; and
- Require a year-round flowing stream which allows water quality standards to be maintained with the treated discharge.

Both on-site non-discharging and discharging RHSTs are regulated by the Ohio EPA and may be considered for approval provided a detailed plan of the system is certified by a professional engineer (P.E.), a Permit-To-Install is approved by the Director of the Ohio EPA, the plans have been through an anti-degradation review, and a NPDES permit has been issued to a proposed discharge to Waters of the State. **All applications must conform to the AWTMP.**

5.5.3 National Pollution Discharge Elimination System (NPDES)

Under the jurisdiction of local health departments, HSTs are approved and installed based upon site conditions. In cases where leachfield systems are not applicable, off-lot discharging systems may be acceptable allowing the discharge of wastewater treatment system effluent into a nearby waterway. Under the Clean Water Act, a receiving stream is protected by an NPDES permit which is required of all point sources. The NPDES permit creates a means of operating, monitoring, reporting, and sets numerical limitations on the amount of specified pollutants authorized for discharge. The Ohio EPA issues two types of NPDES permits: individual and general. An individual NPDES permit is unique to each facility. The individual permit sets limitations on pollutants based on the applicant's operations, type and amount of discharge, receiving stream and other factors⁴.

Ohio EPA has issued two general National Pollutant Discharge Elimination System (NPDES) permits for select new and replacement discharging household sewage treatment systems. Though effluent limitations, monitoring, record keeping and siting criteria for the two permits are identical, implementation or the determination of coverage under the applicable general NPDES permit is different.

⁴ Of Ohio EPA Division of Surface Water, "Types of NPDES Permits"

General NPDES permit OHK000002 allows the local board of health where the household sewage treatment system is being located to determine eligibility or coverage under the permit. Under the conditions and criteria of general NPDES permit OHL000002, Ohio EPA will be responsible for making this determination. Under Ohio Revised Code 3718 (Amended Substitute House Bill No. 119), Ohio EPA was required to develop a general NPDES permit (Permit OHL000002) process that did not require the local board of health to enter into an MOU to determine coverage under a general NPDES permit. Under the provisions of this general NPDES permit, Ohio EPA will evaluate projects to determine eligibility after a Notice of Intent (NOI) is submitted for a project.

In either case, coverage under the general NPDES permits cannot be granted if the residence can be served by an onsite soil absorption system or connected to sanitary sewers and only the local board of health can make this determination. Therefore, any residence or property owner should first contact the local board of health to determine the proper course of action.

5.6 Impacts to Water Quality

Inadequate sewage treatment impacts surface water as well as ground water quality. The three primary pollutants in raw sewage are nitrates, phosphates, and parasitic organisms. Total coliform is used as an indication that other, potentially harmful bacteria may be present within the water. Fecal coliform is a standard measure of microbial pollution and is an indicator of disease potential of a water source. When water tests positive for total coliform, a second test is performed to determine whether Fecal coliform or E. coli is present. These two bacteria may be the result of human or animal waste.

Due to the nature of nonpoint sources, the source of E. coli is hard to determine. All the regions' watersheds are impaired due to bacteria from sources such as failing septic systems. Watersheds such as the Grand River, Little Beaver Creek, Mill Creek, and Yellow Creek have endorsed watershed action plans identifying bacteria as a cause of water quality impairment. Each plan identifies probable sources (i.e. failing septic systems) and provides best management practices for watershed communities and governing officials to implement. These practices were developed with input from the respective county health departments.

5.7 Domestic Septage Disposal

HSTS's failure can be attributed to many factors, one of which is lack of homeowner education regarding their system and the maintenance required to keep the system functioning properly. The 2015 rules, specifically OAC 3701-29-19, established an O&M program for every HSTS and GWRS system in the county and mandates system owner education in compliance with ORC 3718.02 (A)(7). Under the program, both health departments are required to develop a record system to retain: any O&M monitoring, service contract, sampling, inspections, pumping, required permit reporting. All HSTSs installed after January 1, 2007 are to be included in the program, while the local health departments are to establish an O&M time line and process to phase in prior installed systems.

The cost of repairing and/or replacing a failing septic system is costly. However, maintenance such pumping the septic tank when the tank is 1/3 full of scum/grease, liquid, and sludge, or eliminating a garbage disposal can help alleviate waste loads on a system and prolong its useful life. The Ohio State University Extension has produced Fact Sheet AEX-740-98, "Septic Tank Maintenance", recommending the frequency at which a septic tank should be pumped based on the tank size and number of people within a household.

The disposal or treatment of septage from HSTS's is regulated under the U.S. EPA's Part 503 provision, "Standards for the Use or Disposal of Sewage Sludge". This provision establishes a list of acceptable options for state and local health departments to consider. Disposal methods include:

- Discharge to an accepting licensed Wastewater Treatment Plant;
- Land Application;
- Discharge to an approved waste lagoon or drying bed;
- Discharge to a permitted incinerator; and
- Discharge to a permitted sanitary landfill that has a Permit-To-Install authorization to accept such waste.

In both Mahoning and Trumbull Counties, HSTS service providers are required to hold valid registrations issued by the respective local health department and are required to be renewed on an annual basis. The registration can be suspended or revoked by the health

commissioner if the provider is found to be in violation of the respective county's Septage Disposal Rules. In addition, providers are required to keep records of each septic tank pumped and the volumes removed and submit the records to the appropriate local health department.

The methods of disposal vary by County. Trumbull County only allows disposal via an Ohio EPA NPDES Permitted Publicly Owned Wastewater Treatment Plant (WWTP). Currently, only the City of Warren WWTP is an approved septage receiving facility. Mahoning County has three septage receiving facilities: Campbell, Struthers, and Boardman WWTPs.

Land Application

Land application of treated sewage is a process that reuses treated sewage in a manner that reduces or eliminates the discharge of pollutants into the waters of the state. Generally, land application is done by spray irrigation and is applied to farmland. However, other application areas can include golf courses and recreational fields.

Land application follow the laws outlined in OAC section 3701-29-20 and OAC section 3745-29-20. The Ohio EPA requires that the PTI for a land application system and to land apply septage needs a land application management plan.

A site cannot be utilized for land application without prior approval from the health commissioner. Prior to approval, the political subdivision in which the site is located is notified, a site inspection is conducted by the health commissioner, and a fee established by the board of health. The land applier must state that he/she is applying only domestic septage to the proposed land. Adopted from "Part 503", the land applier must notify the land owner of the following harvesting restrictions⁵:

- Food crops with harvested parts that touch the surface and are totally above the ground (i.e. melons, tomatoes, cucumbers, etc.) shall not be harvested for 14 months after application of domestic septage;
- Food crops with harvested parts below the surface (i.e. potatoes, onions, etc.) shall not be harvested for 20 months after application of domestic septage when the domestic septage remains on the land surface for four months or longer prior to incorporation into the soil;

⁵ Mahoning County District Board of Health, "Regulation of Servicing and Disposal of Septage", Section 4.3

- Food crops with harvested parts below the surface (i.e. potatoes, onions, etc.) shall not be harvested for 38 months after application of domestic septage when the domestic septage remains on the land surface for less than four months prior to incorporation into the soil;
- Animal feed, fiber, and those food crops that do not touch the soil surface (i.e. corn, apples, peaches, wheat, oats, etc.) shall not be harvested for 30 days after application of domestic septage; and
- Turf grown on land where domestic septage is applied shall not be harvested for one year after application of domestic septage when the harvested turf is placed on either lawn or land with a high potential for public exposure, unless otherwise specified by the board of health.

Due to the fact land application has a tendency of forming a nuisance to the surrounding environment, a series of isolated distances have been established⁶:

- Field drainage swale, wet weather streams, intermittent streams, open field drain tile - 33 ft;
- Lakes, ponds, rivers, creeks - 500 feet, unless specified otherwise;
- Occupied dwellings - 500 feet;
- Potable water supplies (i.e. wells, cisterns) - 500 feet; and
- Property lines, roads, and streets- 50 feet.

Lagoons or holding ponds are used as an alternative storage method if the capacity of spreading or saturation has been affected by heavy rainfall, snow, or other weather conditions. According to county regulations, the facilities are to be built to prevent surface water runoff, ground water contamination, and nuisance conditions while the septage is being stored or retrieved for land application.

As per Trumbull County's addendum to OAC 3701-29-20(A), the Trumbull County Board of Health prohibits land application of septage. All sewage, removed by sewage haulers, is to be

⁶ Mahoning County District Board of Health, "Regulation of Servicing and Disposal of Septage", Section 4.14

disposed of at a licensed sewage treatment facility. Mahoning County permits land application and has several active sites.

5.8 Regulation and Management of On-Site or Decentralized Wastewater Treatment Systems

A majority of the responsibility of regulating residential on-site sewage treatment systems rests with the Ohio Department of Health (ODH), ODH's Public Health Council, and the local health department. The local health department can further refine rules to engage stricter standards and is responsible for enforcement and the development of maintenance programs. The Ohio EPA provides initial review of plans for certain development types. The following paragraphs briefly explain the roles of the agencies in their regulating and management of on-site sewage treatment systems.

Ohio Environmental Protection Agency (Ohio EPA)

The Ohio EPA initially reviews wastewater treatment options in the unsewered areas of the planning area that do not involve one, two, or three-family dwellings as authorized under the ORC, Sections 6111.44 and 6111.45. The Ohio EPA reviews the wastewater design plans of new commercial, industrial, and institutional facilities in addition to and any expansion plans of existing structures.

Ohio Department of Health (ODH)

Regulation of HSTSs and SFOSTS's are two programs the state department oversees. Under ORC 3718 and OAC Section 3701-29, ODH has the authority to regulate one, two, or three-family dwellings. However, the department's role in managing and regulating household sewage treatment systems is best described by taking a closer look at its rule making bodies, the Public Health Council and Technical Advisory Committee.

Technical Advisory Committee

Members of ODH's TAC are appointed by the director and consist of representatives from educational institutions, public health professionals, and members of the wastewater industry, soil scientists, engineers, and a designee from the ODH. The Technical Advisory Committee (TAC) aids in developing standards and guidelines to assist the Director in approving or disapproving systems or related components differing in design and function from those mentioned in the sewage regulations. The committee makes recommendations to the Director for the approval or disapproval of such systems or components and functions under authority provided by ORC Sections 3718.03 and 3718.04.

Public Health Council

A seven-member council comprises the rule-making arm of ODH. The Council adopts, amends, or rescinds rules applicable to public health and forms them into laws. According to ORC Chapter 3701.34, the Council "...prescribes by rule the number and functions of divisions and bureaus and the qualifications of chiefs or divisions and bureaus within the department" and "considers any matter relating to the preservation and improvement of the public health and advises the director thereon with such recommendations as it considers wise". However, the Council does not have executive or administrative duties.

Rules created by the Council are filed with the Secretary of State Legislative Services Commission Joint Committee on Agency Rule Review (JCARR) and the office of Small Business. Following JCARR's procedures, subject to ORC 119, a public review and hearing on the proposed rule must be carried out. Once the public review period has expired the rule is heard by JCARR and is sent to those on the Council's mailing list and to local health departments if passed.

In October of 2006, the council adopted new sewage treatment system rules in January 2007 to update the 30-year-old regulations. The new rules created stricter requirements for installers, service providers and pumpers, system approval and installation, and included rules for small flow on-site sewage treatment systems compatible with the Ohio EPA's rules. However, Substitute HB 119, passed in July of 2007, suspended the new rules so "*further work and research will be done to assess the available technologies, consider the current types of systems and rates of failure across Ohio and determine the best ways to ensure that future systems achieve*

*treatment of sewage to protect the public health, the environment, and homeowners' investment in their property in a cost effective manner"*⁷. The previous, 1977 rules became effective again and local health departments were encouraged to develop more stringent or detailed rules during the interim period that followed. From 2010 until 2014, the regulations underwent revisions, until finally reaching the current language.

Local Health Departments

On a county-wide level, Household Sewage Treatment Systems for single, two, and three-family dwellings are regulated under OAC Section 3701-29, through the management of the local health department via the ODH. Local health departments are required to enforce the code, investigate nuisance complaints, and perform mandated inspections. Further demonstrating their authority is ORC Section 3709-21, which states:

"the board of health of a general health district may make such orders and regulations as are necessary for its own government, for the public health, the prevention or restriction of disease, and the prevention, abatement, or suppression of nuisances. Such board may require that no human, animal, or household wastes from sanitary installations within the district be discharged into a storm sewer, open ditch, or watercourse without a permit therefore having been secured from the board under such terms as the board requires....all orders and regulations not for the government of the board, but intended for the general public, shall be adopted, recorded, and certified..."

Backed by OAC 3701-29, local health departments have the duty of approving HSTS systems for individual dwellings and subdivisions, and registering installers and septage haulers. In unsewered areas, should sewer become accessible, local health departments mandate homeowners to tie into the system in accordance with their regulations⁸.

Local health departments have authority over proposed subdivisions within their respective counties. Under OAC Section 3701-29-08, plans for a proposed subdivision must pass through the local health department. Under Section 3701-29-08 (A), an HSTS cannot be installed unless it has been deemed impracticable or inadvisable by the department and the Ohio EPA to

⁷ Ohio Department of Health's Home Sewage Treatment Website, www.odh.ohio.gov/odhPrograms/eh/sewage/sewage1.aspx

⁸ OAC 3701-29-02

install a central sewage system. In the event HSTSs are proposed, the plans must also show information including:

- Total land size;
- Location and size of all lots;
- Properties and characteristics of soils in subdivision;
- Depth to normal ground water table and rock strata; and
- Location of all bodies of water, streams, ditches, sewers, drain tile, and proposed potable water supply sources and lines on this or adjacent lots within one hundred feet of the proposed subdivision, or any other information which may affect the installation or operation of household sewage disposal systems or the enforcement of OAC 3701-29.

The Mahoning County District Board of Health expanded on the OAC's subdivision regulations. The Mahoning County District Board of Health defines a major subdivision as a parcel of land divided into 10 or more lots (regardless of size). However, if the 10 lots are divided up into lots larger than 5 acres in size and do not require review of the Planning Commission, the lots are now considered acreage and will not require District Board of Health involvement until the lot owner requires a septic system approval prior to creation of the lot. Additionally, all property splits involving the creation of a parcel less than 5 acres is evaluated to determine septic suitability prior to the lot being recorded. The Trumbull County General Health District defines a major subdivision as any parcel of land shown as a unit or continuous unit that is divided up into two or more parcels of less than five acres. Under their definition, an HSTS system will only be considered if a letter is received by the Trumbull County General Health District from the Ohio EPA and Trumbull County Sanitary Engineer stating that sewer or a centralized system (i.e. package plant) is not feasible for the proposed new subdivision. If such letter is received, a review of riparian setbacks and hydric soils review is performed by the Trumbull County Soil and Water Conservation District (TCSWCD). With TCSWCD's help, the General Health District can design and approve an HSTS suitable for the subdivision.

In their respective regulations, both require soil evaluations prepared by a professional soil scientist certified by the American Registry of Certified Professional in Agronomy, Crops, and

Soils or by the Association of Ohio Pedologists. Within each soil evaluation, soil permeability, soil-gravel interface area, and slope must be documented. If the subdivision plans include service by a sanitary sewer system, then the plans are forwarded to the Ohio EPA as per Section 6111.44 of the Ohio Revised Code (ORC).

5.9 Financial Assistance

There are financial assistance programs at the federal, state, and local levels of government that provide communities with the financial and technical aid needed to provide sanitary sewer service to areas experiencing the effects of failing septic systems or off-lot systems and to assist low income families with tap-in fees.

U.S. Army Corps of Engineers' Section 594 Ohio Infrastructure Program

Section 594 of the Federal Water Resource Development Act (WRDA) established a financial assistance program, under the direction of the U.S. Army Corps of Engineers, specifically for Ohio communities who may be seeking assistance for water related environmental infrastructure projects. Projects may include: wastewater treatment; combined sewer overflows; water supply, storage, and treatment; environmental restoration; surface water resource protection; and acid mine drainage.

U.S. Department of Agriculture Rural Development

The USDA Rural Development's Home Repair Loan and Grant Programs or Section 504, offers low interest loans to very low-income households in rural America to install new septic systems. To qualify, the applicants' income must fall below 50 percent of the area's median household income. Grants up to \$7,500 are available for residents over 62 who may be unable to afford a loan. The USDA's Rural Utilities Service's Water and Waste Disposal Program provides long-term/ low interest loans for "clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and stormwater drainage to households and businesses in eligible rural areas". For additional information the USDA programs can be found at the following links:

Home Repair Loan and Grant Program- <http://www.rd.usda.gov/programs-services/single-family-housing-repair-loans-grants>

Water and Waste Disposal Program- <http://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program>

Ohio Department of Development's (ODOD's) Office of Housing and Community Partnership

Community Development Block Grant's Water and Sanitary Sewer and Formula Allocation programs provides grants to communities that need to address infrastructure needs of low to moderate income neighborhoods. The Water and Sanitary Sewer Program provides grants to communities faced with mandates relating to the correction of unsanitary conditions due to septic system failures. The goal of the Water and Sanitary Sewer Program is to fashion a safe and sanitary living environment for all Ohio communities.

Ohio Water Pollution Control Loan Fund (WPCLF)

The WPCLF is a state revolving loan fund administered jointly by the Ohio Water Development Authority and the Ohio EPA. The program provides funds to communities for sewage treatment facilities, interceptor sewers, and collection systems. Applications to this fund are made to the Ohio EPA's Division of Environmental and Financial Assistance. Visit their website for details (http://www.epa.state.oh.us/defa/wpclf_new.html).

Reduced interest rates are available to communities that qualify based on economic need. Interest rate reductions can also be realized through an innovative program offered by the Ohio EPA and linked to the WPCLF. A community applying for financial assistance through the WPCLF can choose to sponsor a restoration or preservation project. The sponsoring community must officially nominate such a project through the Water Resource Restoration Sponsor Program (WRRSP). The WRRSP is a statewide competitive program that is allocated \$15,000,000 annually. If the sponsored project ranks within funding capabilities, the sponsoring community will be given a reduction in their interest rates on the WPCLF project resulting in a net savings with two water quality enhancing projects moving forward rather than just the WPCLF project.

The linked deposit program is an alternative funding solution for financing certain WPCLFs. Rather than borrowing from the WPCLF, an eligible applicant receives loan funds through a participating private lender at below market interest rates. The loan is guaranteed by the WPCLF through a certificate of deposit. Both county health departments provide a low interest loan option to homeowners which are administered by local banking institutions.

U.S. Department of Housing and Urban Development Community Development Block Grant (CDBG)

The CDBG funding, via the Community Housing Improvement Program (CHIP), can be used to assist low to moderate income (LMI) homeowners perform sewage system upgrades and/or sewer tap ins as a home improvement. Local jurisdictions apply for the grant and administer the funds to residents. County governments are typically the applicant for their unincorporated areas, where HSTSs are prevalent.

State Capital Improvement Program (SCIP)

The State Capital Improvement Program (SCIP) is administered at the state by the Ohio Public Works Commission. Applications are submitted to the District 6 Public Works Integrating Committee (Mahoning/Trumbull) who then discuss and recommend qualifying projects for funding. The SCIP receives monies from bond issuance. Eligible projects include wastewater treatment and water supply systems, solid waste disposal facilities, storm water and sanitary collection, storage and treatment systems and facilities. The SCIP requires a local match equaling a minimum of 10% for repair or replacement projects, 50% for new or expansion projects, and 0% for loans. To apply for SCIP, subdivisions within Mahoning and Trumbull counties must apply to the District 6 Public Works Integrating Committee (D6PWIC). D6PWIC evaluates and scores pre-applications using a locally developed methodology based on criteria listed in Chapter 164 of the Ohio Revised Code. These evaluation criteria focus on the financial need of the subdivision, the project's strategic importance to the district and subdivision, and emphasize the repair and replacement of infrastructure rather than new or expansion of infrastructure.

5.10 Recommendations

This chapter's recommendations encourage all appropriate, governing entities to coordinate and support efforts to create a solid and effective HSTS program for not only the State, but for Mahoning and Trumbull Counties. Overall, this Plan supports the cooperative efforts by the local and regional entities that are working and have worked to create strategies and plans addressing and fixing the nuisance and failing HSTS areas in Mahoning and Trumbull Counties.

Implementation Recommendations:

Funding

1. Encourage the counties and their respective governmental entities to prioritize and update areas in need of sanitary sewer service.
2. Encourage governing entities to seek and/or create funding sources to address areas of failing septic systems and/or assist homeowners with system upgrades.
3. State and federal level, the Ohio EPA, U.S. EPA and USDA are encouraged to further expand their funding requirements to include financial assistance to households outside the LMI income range.

Education

1. Develop and implement information and education programs with local boards of health, Eastgate, and local watershed groups. Any materials or programs developed are encouraged to take advantage of various grants such as the Ohio Environmental Education Fund (OEEF).
2. Homeowners are encouraged to learn about water conserving devices to extend the life span of their system.
3. Discourage the use of garbage disposals in homes served by an HSTS. Using a garbage disposal increases the amount of organic waste entering a system, and in turn increases the frequency of HSTS pumping and maintenance.

Illicit Discharge Elimination Strategies

1. Collaboration between county health departments, county soil and water conservation districts, Ohio EPA, and county engineers to address illicit discharges.
2. Identify “hot spots” where areas failing or nuisance septic systems are concentrated based on field observation and/or water quality data as presented by the Ohio EPA and local watershed action plans.
3. Utilize the area’s watershed action plans to assist in developing measures to eliminate illicit discharges when possible.