

**Ohio EPA Home Sewage Treatment System (HSTS) Plan
Nimishillen Creek Watershed
Stark County**

I. Purpose of the Plan:

The Stark County Health Department (SCHD), along with assistance from the Northeast Ohio Four County Regional Planning and Development Organization (NEFCO), has developed a Home Sewage Treatment System (HSTS) Plan for the Nimishillen Creek (Figure 1) watershed to effectively coordinate the correction of failing HSTSs. The HSTS Plan:

1. Identifies target areas of impairment caused by failing HSTSs
2. Provides guidance for financially assisting homeowners with correcting failing systems
3. Outlines long-term inspection and monitoring goals
4. Offers comprehensive educational and outreach program

The Stark County Health Department covers essentially all unsewered areas of the watershed and county. The vast majority of the other health districts in the watershed primarily cover sewerred areas. Furthermore, if a land parcel within another health department's jurisdiction is proposed to be served by a home sewage treatment system, then the Stark County Health Department, having expertise in the program, does all the siting and installation inspections.

Within its jurisdiction, the Stark County Health Department requires a home sewage treatment system upgrade usually for one of the following reasons:

- A. Nuisance abatement program: inspects a HSTS upon submission of a written complaint.
- B. Evaluation for an addition to a home i.e. adding living space to home.
- C. Home sale inspection conducted by Health Department personnel or a private contractor. However, this program is highly subject to contractor interpretation, and relies on the buyer or seller to notify the department.
- D. Evaluation of a community with a high density of failing systems, which typically results in working with community for the expansion of sewers.

Currently, the SCHD investigates an average of 55 HSTS written nuisance complaints per year throughout Stark County. With additional funding, the Health Department would increase HSTS inspections and establish an Operation and Maintenance (O&M) Program in the Nimishillen Creek watershed. The three year goal will be to inspect between 3,000 to 5,000 HSTSs in the watershed to determine system location, type, and condition. Also, 100 percent of HSTSs inspected in the watershed would be enrolled in the O&M Program resulting in follow-up inquires and, if needed, enforcement actions following standard Health Department protocol for the repair or replacement of failing HSTSs.

The Stark County Health Department also proposes to initiate a cost-share program for homeowners in need of financial assistance to correct failing, non-discharging HSTSs. Furthermore, a comprehensive education and outreach program will be implemented to include

public meetings and consultation/education with individual homeowners during HSTS inspections. Lastly, the Health Department would like to offer incentives for the use of alternative HSTS technology, enabling the county to further develop non-discharging options for difficult repair situations.

The Stark County Health Department's HSTS Plan for the Nimishillen Creek watershed focuses on the reduction on non-point source (NPS) pollution arising from home systems; however, it will also serve as a model for development of a county-wide O&M Program. Thus, funding for this HSTS Plan will continue to benefit the watershed, as well as other watersheds within Stark County.

II. Key Features Affecting HSTSs in the Nimishillen Creek Watershed

A. Topography and Geology

The Nimishillen Creek watershed, like the rest of Stark County, lies in two subdivisions of the Appalachian Plateau province. The northern two-thirds of the watershed resides in the glaciated section of the Appalachian Plateau, and the southern one third in the unglaciated section. The headwaters in the northern and central portions of the county have moderate relief and gentle slopes due to glacial actions and depositions. However, in the unglaciated southern portion of the watershed, the Creek's mainstem has cut a narrow gorge through highlands resulting in steep sloping upland areas and broad flat expanses in the flood plains. As a result of glaciation, Nimishillen Creek currently flows southwardly and drains a major portion (32 percent) of Stark County.

Figure 2 shows the areas in the watershed where slopes are greater than 6 percent, with the steepest slopes predominately occurring in the southern portion of the watershed. The townships of Canton, Osnaburg, and Pike in the southern unglaciated section of the watershed have the most area affected by steep slopes. Slopes greater than 12 percent are generally poor conditions for the installation of a properly functioning HSTS. However, this has not been a severe problem for two main reasons. First, to construct a home and driveway on steeply sloping ground has its own limitations, so many potential sites have not been developed. Second, sewage site evaluations have excluded development on steep slopes. These two factors have limited growth in these areas. In the Nimishillen Creek watershed, severe soil types have by far caused the greatest problem for HSTSs.

B. Soils

The principal natural feature limiting HSTS installation and/or function in the Nimishillen Creek watershed and all of Stark County is its soils. In unsewered portions of the watershed, there are 101 HSTS limiting soil types, as determined by the Stark County Health Department. Figure 3 shows all of the soils in the unsewered areas of Nimishillen Creek watershed which limit HSTS installation and function. The limiting soil types covering the largest areas (>2,000 acres) in the watershed are:

- ▶ Ravenna Silt Loam, 0 to 2% slopes (ReA) - 3,344 acres - Soils consists of somewhat poorly drained soils in broad areas in glaciated (northern) parts of the watershed. These

soils have a seasonally high water table for significant periods and are slow to dry out in the spring. These soils are categorized as having “severe” limitations in treating home sewage effluent.

- ▶ Sebring Silt Loam (Se) - 2,642 acres - This soil occurs in concave areas in shallow drainageways and in broad basin-like areas on the glacial till plain. Excessive wetness is the major limitation to the use of this soil for most non-farming uses. It is categorized as having “severe” limitations in treating home sewage effluent.
- ▶ Canfield Silt Loam, 6 to 12% slopes (CdC2) - 2,527 acres - Soils occur along drainageways and in the lower part of long slopes. Areas are irregular in size and shape. Moderately slow permeability and the slope are limitations to the treatment of home sewage effluent.
- ▶ Fitchville Silt Loam, 0 to 2% slopes (FcA) - 2,370 acres - This soil is in broad areas in valleys and in partly blocked drainageways on uplands in the glaciated part of the county. Ponding and seasonal wetness are the major limitation to the use of the soil for home sewage treatment systems.

C. Water Supply

Four cities or villages, Canton, North Canton, Louisville, and East Sparta, obtain their municipal water supply from wellfields located within the Nimishillen Creek watershed. East Canton and Hartville do not have a municipal water system and draw their drinking water from private wells. All of the above water supply areas are within areas serviced by sewers. The City of Canton also receives drinking water from wellfields outside of the Nimishillen Creek watershed in the Sandy Creek watershed.

Most of the remaining homes in the watershed rely on individual wells for their drinking water and are located in areas dependant on home sewage treatment systems. These areas include portions of Jackson, Lake, Marlboro, Plain, Nimishillen, Canton, Osnaburg, and Pike Townships.

To date, the Stark County Health Department has not recorded a drinking well being contaminated by a failing HSTSs.

D. Land Uses

A detailed description of land usage within the Nimishillen Creek watershed can be found in *Phase I of the Nimishillen Creek Comprehensive Watershed Management Plan (CWMP)* beginning on page six. In general, the watershed is dominated by three land use/land cover types: 1) agriculture and open areas occupy 52,716 acres or 44.7 percent of the watershed; 2) urban areas (34,852 acres, 29.3 percent); and 3) wooded lands (25,106 acres, 21.3 percent).

Residential areas (which fall under the urban areas category above) with high densities of homes in unsewered portions of the watershed are likely to have the highest concentrations of the failing HSTSs. The reasoning being that generally the higher the housing density the smaller the lot sizes, and therefore, less area to treat home sewage effluent. In addition, unsewered urban areas

with homes built before 1980 are also a concern because the average life of a full functioning HSTS is approximately 20 years.

E. Demographics, Socioeconomic, and the 2000 U.S. Census

Like land uses, the demographic characteristics vary greatly throughout the Nimishillen Creek watershed. Fortunately, most of the densely populated urban areas in and around the Cities of Canton, Louisville, and North Canton are serviced by sewers. However, there are still highly populated areas in the watershed that are dependent on HSTSs, and several of these populated areas have poor soils for HSTSs.

Socioeconomic and demographic analysis was done using 2000 U.S. Census information at the census tract level. Figure 4 shows the U.S. Census Tract numbers in relation to sewer and unsewered areas in the watershed. A tract was included if a portion its area has unsewered areas. Table 1 shows the total number of structures built prior to 1980, median household income, population, and the population below the poverty level for each tract number. Please note that these are totals for the entire tract and not just unsewered areas. Therefore, the totals for unsewered areas will be less than those represented on the table. Despite this issue, the census information provides pertinent information for relatively small areas which helps prioritize future actions.

Figure 5 shows information for housing units per square mile for U.S. Census tract numbers with unsewered areas. In general, areas with high housing densities next to sewer areas would be candidates for sewer extensions if there were numerous failing HSTSs. Also, knowing which areas have lower household incomes or a higher population of people below the poverty level will aid in focusing any future cost-share assistance programs.

F. Water Quality

Ohio EPA Reports:

The most recent field data collected by the Ohio EPA in 1998 has limited usefulness in focusing HSTS inspections because the survey was primarily conducted in urban (sewered) areas. The 1998 study collected chemical and bacterial samples from Nimishillen Creek sties to evaluate water quality in close proximity to known point sources discharges. A detailed summary of Ohio EPA findings can be found in *Phase I of Nimishillen Creek Comprehensive Watershed Management Plan (CWMP)* beginning on page 67. Despite the surveys limits in dealing with NPS pollution, the comments sections in the Ohio EPA's 2000 Ohio Water Resource Inventory (305b Report) noted that nearly half the sites sampled had fecal coliform and/or nutrients at elevated levels from unknown sources. A likely source of some of these high values is failing HSTSs.

Table 1
2000 U.S. Census Information for Areas in the Nimishillen Creek
Containing Poor Soils in Unsewered Areas

U.S. Census Tract Number	Number of Structures Built before 1980	Median Household Income	Population	Population Below Poverty
7018	1,164	\$20,206	3,366	845
7021	1,641	\$24,028	4,282	1,254
7023	1,046	\$9,006	2,906	1,778
7109	1,088	\$53,351	4,227	187
7110	2,226	\$51,013	7,506	387
7111.02	1,814	\$62,875	9,324	193
7113.11	1,812	\$64,720	7,045	154
7120	1,593	\$42,180	4,372	160
7121.01	1,415	\$53,112	7,837	277
7121.02	1,626	\$51,653	6,940	195
7123	2,177	\$44,726	6,339	403
7124	1,533	\$39,471	6,351	723
7125	623	\$41,116	1,838	78
7126.01	1,687	\$39,070	2,286	81
7126.02	1,485	\$44,206	4,867	204
7127	1,419	\$47,236	5,010	172
7130	1,135	\$43,581	3,938	196
7131	2,170	\$38,607	6,270	656
7132.01	2,411	\$41,217	7,485	346
7132.02	718	\$44,268	2,223	24
7133	1,567	\$43,234	4,778	254
7134.01	2,120	\$40,376	5,239	311
7149.01	1,285	\$40,433	4,088	203
Totals*	35,755	N/A	118,517	9,091

* Only Tract Numbers 7109, 7127, 7128, and 7130 were 100 percent unsewered; therefore, totals for structures built prior to 1980, population, and poverty rates for unsewered areas will be lower than these totals.

In the 1996 Ohio Water Resource Inventory (305b Report), organic enrichment and nutrients were two of the most often cited causes for water quality impairment in Nimishillen Creek. Below is a summary of this 1996 Inventory:

- ▶ Total Length of Creek and Tributaries = 94 miles
- ▶ Drainage Area = 413.8 sq. miles

- ▶ Attainment of Aquatic Life Use Designation:
 - Full Attainment = 4.7 miles
 - Threatened = 0.0 miles
 - Partial Attainment = 15.1 miles
 - Non Attainment = 48.3 miles
 - Not Assessed = 25.6 miles

- ▶ Causes of Impairments (most often cited):
 1. Organic Enrichment
 2. Metals
 3. Habitat Alterations
 4. Siltation
 5. Dissolved Oxygen
 6. Ammonia
 7. Flow Alteration
 8. Oil and Grease
 9. Unknown Toxicity
 10. pH
 11. Thermal Modification
 12. Salinity/Total Dissolved Solids/chlorides
 13. Nutrients

- ▶ Sources of Impairments (most often cited):
 1. Industrial Point Sources
 2. Channelization
 3. Municipal Point Sources
 4. Urban Runoff
 5. Storm Sewers
 6. Contaminated Sediments
 7. Non-irrigated Crop Production
 8. Spills
 9. Agriculture
 10. Removal of Riparian Vegetation
 11. Stream Bank Modification
 12. Other

Nimishillen Creek Macroinvertebrate Surveys:

The City of Canton and NEFCO completed two Macroinvertebrate Surveys in 2000 and 2002 for Nimishillen Creek. The studies were carried out to obtain baseline data and characterize Nimishillen Creek's water quality in the Canton area. Another benefit of the surveys was monitoring dramatic changes to the Creek's features (macroinvertebrate scores, litter, riparian habitat, etc.) over time. Sixteen sites were selected based on the presence of nearly ideal in-stream habitat. The biological evaluation consisted of survey of the benthic macroinvertebrates. The physical characteristics of each site were also documented and included the measurement of the streams dimensions, habitat, riparian corridor, land uses, and possible adverse impacts to the Creek.

Utilizing the Ohio Department of Natural Resources' (ODNR) Scenic Rivers Stream Quality Monitoring Program, Nimishillen Creek averaged a "fair" score both years it was monitored, but is most likely still not meeting State of Ohio water quality standards at most monitoring sites. The results also suggest that the riparian habitat, riffle activity, and in-stream habitat were not limiting factors in stream monitoring for macroinvertebrate community quality. In general, conditions in and around the stream did not seem to influence the macroinvertebrate communities. This suggests that other factors are affecting the water quality and macroinvertebrate communities at these sites.

III. Home Sewage Treatment System Problem Definition**A. Sewered and Unsewered Areas**

Figure 4 shows the extent of sewered areas in the Nimishillen Creek watershed. Generally, sewered areas are limited to the Cities of Canton, North Canton, and Louisville, and the Villages of Hartville, East Canton, and East Sparta. Well over half of the watershed area remains dependent on some type of home sewage treatment system. Where practicable, the Stark County Health Department will promote the extension of sewers to areas with a large percentage of failing HSTSs. Typically, sewer expansion is practicable only if an existing sewer line is in close proximity.

B. Characterization of Existing Home Sewage Systems

In 1994 the Stark County Residential Sewage Regulation revisions prohibited off-lot discharge and leach wells for new construction. Since that time, the majority of systems installed for new construction has consisted of a leaching tile field or some modification, based upon soil severity. Additional components such as Class 1, NSF approved aeration units or lift stations may be added to the system based upon need. For repairs, again on-lot treatment and disposal is highly preferred. However, when soils, lot size, or topography dictate, an off-lot discharging sewage treatment system may be used. Currently, that would consist of either: a) a Class 1 NSF approved aeration system with 100 sq. ft. filter and failsafe, or b) a subsurface sand filter (with 24" of Ohio EPA approved filter sand). This may also be followed by chlorination or french drain, depending upon site characteristics.

The Stark County Health Department records do not predate the 1960s. Between the 1960s and early 1990s, leach fields were again the most common system used. In sand and gravel areas,

leach wells may have also been used. Less frequently, an off-lot discharging system was used if soils were severe or lot size was small. Prior to the 1960s systems vary between leach fields, leach wells, cesspools, or some type of off-lot discharging systems. Variation was great due to the lack of oversight at that time.

C. Known Impacts on Specific Stream Segments

The only evidence of water quality impacts from failing HSTSs is contained in the Water Quality section above. Despite strong indications that failing home sewage treatment systems are a factor in degraded water quality, neither the Ohio EPA information or NEFCO's macroinvertebrate information directly identifies this as a cause. A water survey focusing generally on nonpoint source pollution or specifically on the effects of failing home sewage systems on the Nimishillen Creek would greatly assist the Health Department in focusing future corrective actions.

D. Critical Areas

HSTS Inspections:

Identifying critical areas for home sewage treatment systems inspections and enrollment into an Operations & Maintenance Program is primarily based on the combination of three factors: 1) housing units per square mile; 2) HSTS limiting soils; and 3) proximity to already sewered areas. Higher priority will be given to unsewered areas dense with housing units located on poor soils adjacent to or near areas with installed sewer lines. Figure 5 shows the priority areas within the watershed based on the above criteria.

The Health Department personnel's goal is to eventually inspect every HSTS in the watershed, but they realize that some sections of the watershed are worse than others due to the factors outlined above. Therefore, the SCHD will start inspections in all Priority 1 Areas, then move to Priority 2 Areas, and so on. For each Area, Health Department personnel will inspect every HSTS and enroll the homeowner in the Operations & Maintenance Program. If a system is found not to be functioning properly, then corrective action(s) will be ordered following standard Health Department protocol. Also, if the Stark County Health Department determines there is a significant public health risk as a result of multiple failing HSTSs in a small area, then a likely option would be the extension of an existing sewer system to service the area, if practical.

Priority Area 1 - Unsewered areas with greater than 500 housing units per square mile with substantial sections of HSTS limiting soils. These areas are primarily located on the fringe of cities and villages with existing sewers, and include U.S. Census tract numbers 7018, 7021, 7023, 7121.01, 7120, 7123, 7126.01, 7126.02. These regions will be the first to be inspected by the Stark County Health Department and the first to be enrolled in the Operation and Maintenance Program. Because of the high housing densities, likely small lot sizes, and the fairly close proximity to existing sewers, the Health Department's preferred option would be the expansion of an existing sewer system into these priority areas if a significant number of failing systems are discovered during inspections.

Priority Area 2 - Unsewered areas with 301 to 500 housing units per square mile with substantial sections of HSTS limiting soils. Like Priority 1 Areas, these Areas are principally located adjacent to cities and villages with existing sewers. Priority 2 Areas

include U.S. Census tract numbers 7133, 7124, 7121.02, and 7111.02. These regions will be inspected after all Priority 1 Areas have been inspected. Do to the close proximity to existing sewer lines in most Priority 2 Areas, sewer extension will be a possible option for the Health Department to alleviate concentrated pockets of failing systems.

Priority Area 3 - Unsewered areas with 151 to 300 housing units per square mile with substantial sections of HSTS limiting soils. These areas are primarily located to the southeast of the City of Canton and north of North Canton in Lake Township. Priority 3 Areas include U.S. Census tract numbers 7146, 7110, 7113.11, 7125, 7131, 7132.02, 7132.01, and 7146. These regions will be inspected after the inspection of all Priority 2 Areas. The Stark County Health Department will consider the extension of an existing sewer system only if feasible.

Priority Area 4 - Unsewered areas with 1 to 150 housing units per square mile with substantial sections of HSTS limiting soils. These sections are primarily located in the agricultural areas located in the northeastern section of the watershed. The unglaciated southern portion of the watershed is also a Priority 4 Area due to steep slopes limiting development. U.S. Census tract numbers falling into this category include 7109, 7127, 7128, 7130, and 7149.01. These regions will be the last to be inspected due to the low housing densities. In most cases, extension of sewers into these areas is not practicable option.

Financial Assistance:

Pending funding, financial assistance will be concentrated in areas (based on 2000 U.S. Census tract numbers) where the average household annual income is below \$35,000 and/or areas with high poverty population rates (greater than 500). U.S. Census tract units in the Nimishillen Creek watershed that fit these criteria include tracts 7018, 7021, 7023, 7124, and 7131 (Table 2). It is anticipated that significant financial assistance will be needed in order to correct all failing HSTSs and eliminate the resulting water pollution. Although the focus of any cost-share assistance program will be in the areas above, all homeowners in the watershed needing financial assistance to correct failing HSTSs will be eligible for financial assistance, if available.

IV. Proposed Corrective Action Plan

Current Actions:

Currently, the Stark County Health Department, in its 1994 revisions to its county home sewage regulations, established no off-lot discharge for new construction. When doing a repair, all reasonable on-lot possibilities are reviewed before off-lot discharge is considered. Typically, off-lot discharge is only used when dictated by small lot-size or poor soil types. The Stark County Health Department criteria for upgrading HSTSs can be found above in section I.

The Health Department does not currently have a financial assistance program for the repair or replacement of failing HSTSs. However, financial assistance for HSTS repairs and replacements can be attained through the Stark County Regional Planning Commission (RPC). Through the RPC's Stark County Rehabilitation Emergency Assistance Program, eligible homeowners can

receive up to \$3,500 in grants to repair or replace failing HSTs. Anything over \$3,500 can be covered by a deferred loan. Eligibility for this program is based on household income.

Proposed Actions:

When funding becomes available, the Stark County Health Department will work in critical areas to aid in either correcting HSTs or promoting the extension of sanitary sewers to eliminate water quality degradation from failing systems. In addition, between 3,000 and 5,000 HSTs will be inspected to determine system location, type, and condition over a three year period. Health Department personnel will begin by inspecting all systems in the first priority areas designated in section III above, then move inspection efforts to the next priority areas in the watershed. For example, Health Department personnel will inspect all HSTs and order corrections for failing systems in all of the Priority 1 Areas before moving to Priority 2 Areas.

All (100 percent) of the HSTs inspected will be enrolled in the Stark County operation and maintenance program that will be established. Follow-up and necessary enforcement will be conducted under normal Health Department protocol, outlined in section I, for the repair and replacement of failing HSTs, where extension of sanitary sewer is unlikely within three years.

The Stark County Health Department also proposes to initiate a cost-share program for homeowners in need of financial assistance to correct an HSTs problem. It is envisioned that the establishment in an Operation and Maintenance Program within the Nimishillen Creek watershed will result in a substantial increase in number of homeowners needing financial assistance. Once funding is secured, the SCHD will work with the Stark County RPC to establish an assistance program that is complementary, and not in “competition” with, their assistance programs. The Health Department also understands that it will have to work under the conditions (if any) imposed by the funding agency when establishing a cost-share assistance program.

Furthermore, a comprehensive education and outreach program will be implemented to include several public meetings and consultation/education with individual homeowners during HSTs inspection. Informational pamphlets will be distributed detailing proper system maintenance and operation unique to each type of HSTs. The Health Department estimates that between 3,000 to 5,000 watershed residents will be contacted through their education and outreach program over a three year period. Lastly, the SCHD will offer incentives, pending funding, for use of alternative HSTs technology, enabling the county to further develop non-discharging options for difficult repair situations.

The efforts outlined above will focus on the reduction of NPS pollution arising from HSTs within the Nimishillen Creek watershed; however, it will also serve as a model for the development of a county-wide Operation and Maintenance Program. Thus, the funding of this plan will continue to benefit the watershed, as well as other watersheds within Stark County, long after the initial funding is utilized.

V. Tracking and Documenting Success

In 2000, the Stark County Health Department acquired environmental health software that

enables the entry of sewage records. Currently all new systems are recorded in the database. Additional funding will allow existing records to be entered into this same database. Once entered, the database can be used to track inspections, document problems, and provide statistical information.