APPENDIX G

ONSITE SYSTEM NEEDS SURVEY

FOR

UPPER MILFORD TOWNSHIP
ZIONSVILLE, PA

SEPTEMBER 2003

SEA PROJECT NO. 0050-001

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TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLES

FIGURES

1.0 BACKGROUND

1.1 General

The Pennsylvania Sewage Facilities Act, Act 537, requires that Upper Milford Township develop, revise, and implement an Official Sewage Facility Plan. A fundamental part of this planning process is the identification and documentation of the sewage disposal needs within the Township.

In 1996, the Township completed a needs survey within the Township. As part of this Act 537 Plan Revision, PADEP required the Township to update the 1996 survey using current needs criteria.

1.2 Purpose of Study

The purpose of this study is to provide documentation as to the current operational status of onsite wastewater treatment systems within Upper Milford Township. This study represents one of three phases of work associated with the Township's ongoing Act 537 Planning process. This phase of the planning process will be used to establish those areas of the Township to be serviced by sanitary sewers, with remaining areas to be serviced by on-site treatment systems as part of a septic management district.

The identification and documentation of sewage-associated problems involves the collection and tabulation of information, much of which currently exists in the form of reports, surveys and administrative actions, and then verifying the data with actual fieldwork.

There are three general needs categories relating to sewage disposal that must be considered:

(A) Public Health Needs
(B) Water Pollution Needs
(C) Community Development Needs

1.3 Previous Needs Assessment

1.3.1 Water Supply and Sewage Facilities Plan

The *Water Supply and Sewage Facilities Plan* (WSSFP) (Lehigh Valley Planning Commission, December 1995) references potential on-site sewage disposal problem areas within Upper Milford Township. These areas are summarized on Table 3-4 of the WSSFP document.

The four areas noted in the WSSFP are as follows:

Map No. 14 – Old Zionsville	Surrounding the intersections of Chestnut Street, Kings Highway, and Church View Road
Map No. 15 – Vera Cruz Area	Along Main Road and Vera Cruz Road
Map No. 16 – Zionsville	Along Kings Highway south, adjacent to Lower Milford Township
Map No. 17 – Knollwood Subdivision	East of 5th Street adjacent to Emmaus Borough
Map No. 18 – Robert Moyer Subdivision	Intersection of Main Road and Limeport Road

Therefore, the current needs survey has addressed all areas of concern outlined in the WSSFP.

1.3.2 1996 Act 537 Plan Revision

As part of the 1996 Act 537 Plan Revision, an onsite treatment system needs survey of the Township was completed. Based on the results of this survey, seven areas within the Township were identified for potential sewage service.

Based on the results of the needs survey, the following areas were identified for further evaluation:

- Vera Cruz Road from Emmaus to Quarry Drive
- The Village of Vera Cruz
- An extended portion of Vera Cruz along Spruce Road
- Moyer Subdivision
- Main Road East from Vera Cruz to Moyer Subdivision
- Village of Old Zionville
- Village of Powder Valley
- Mill Road west of Shimerville Road

The results of the on-site survey that was conducted as part of this study is summarized on Table 1-1.

The results of this survey demonstrated that the Village of Vera Cruz and Moyer Subdivision areas had documented wastewater needs. In these cases, total reported system failures (both major and minor problems) accounted for 30 – 40% of the total lots surveyed. In addition, the Main Road East area had in excess of 20% reported failures.

The Mill Road area percentages are misleading due to the low number of lots surveyed. Other areas surveyed all had less than 20 % failures. In all cases, the areas included tin these surveyed areas will be reexamined as part of this updated needs analysis.

This study also obtained a limited number of well water samples as summarized on Table 2-6. These samples included both samples obtained during the study period and results of samples obtained by homeowners in the area in the time period just prior to the 1996 study. Only 18% of the lots in the Study area were sampled. Of those sampled only 24% of the samples had contamination. The highest percentage of contaminated well water samples occurred in the Vera Cruz and Main Road areas. These results correspond to the results of the on-site system survey and indicate that failing on-site system may have some impact on contaminated well samples.

1.3.3 Private Requests

The Township has not received any private requests for connection to a sanitary sewer system. Furthermore, two systems within the Township require individual treatment facilities to meet the needs of individual residences:

- 4926 Main St.
- 6558 St. Peters Rd.

Table 1-1

The following residents have requested the Township to provide sewage service:

- 3235 S. 6th St.
- 3201 S. 7th St. Extension
- 3320 S. 7th St. Extension
- 3001 N. 2nd St.

In addition, the residents in the area of Golf Circle have requested sewer service in the past. Therefore, this area will be included as a potential sewer service area within the Township.

1.4 Assessment Approach

The approach used in assessing the onsite systems consisted of the following:

- Delineation of Study Areas
- Review of Exiting Conditions
- Review of Historical Records and Previous Studies
- Onsite System Survey

2.0 DELINEATION OF STUDY AREAS

The first phase of the needs assessment outlined the areas of the Township to be included in the study. This phase of the study was required to determine those areas of the Township that may require installation of sanitary sewers in the future to meet wastewater needs resulting from failing onsite treatment systems.

The following factors were used in delineation of these areas to be studied:

Township Zoning – Currently, a portion of the Township is zoned for rural type development. Under these current zoning regulations, minimum lot size is one acre. In some designated areas such as the South Mountain Conservation District, the minimum lot size is five acres. In addition, these areas of the Township are located in the more rural sections of the township away from the more densely populated areas currently serviced by sanitary sewers. Based on these constraints, it was determined that the need for sanitary sewers would not be required in the near future. Unless other factors such as known onsite system operational problems were known, these areas were eliminated from the study.

Housing Densities – Due to the rural/ suburban rural nature of the Township, there are several areas that currently have very low housing densities. These areas consist of existing farms, vacant open land, and previously approved subdivisions with lot sizes in excess of one acre. Unless other factors such as known onsite system operational problems were known, these areas were eliminated from the study.

Location of Existing Sanitary Sewer System – Another factor used in the delineation of study areas was the location of the existing sanitary sewer system. Any future service areas would be required to utilize the existing system to transport wastewater to the Township wastewater treatment plant. In the rural areas of the Township, connection to the existing system would not be practical at this time due to the cost of installation of collection and interceptor sewers. Therefore, these outlying areas were eliminated from any further study unless other factors such as high density or known onsite treatment system problems were also applicable to the area.

As part of the scope of work submission and subsequent correspondence to PADEP, the Township delineated thirteen (13) areas for study as part of the needs analysis. These areas have been illustrated on Figure 2-1. The areas to be evaluated as part of this analysis have been delineated by drainage basins and include the following:

Figure 2-1

Saucon Creek Drainage Basin

Area #SC-1 This area is located on the eastern end of Township and is bounded by Brunner and Limeport Roads.

Leibert Creek Drainage Basin

Area #LC-1 This area is located adjacent to the Borough of Emmaus along Shimerville and Mill Roads.

Area #LC-2 This area includes the Village of Vera Cruz and is bounded by the Northeast Extension of the Pennsylvania Turnpike and the former Reading Railroad.

Area #LC-3 This area is located adjacent to Main Road East between the former Reading Railroad right of way and Limeport Road. This area includes the Moyer subdivision.

Area #LC-4 This area is located adjacent to Jasper Road between Main Road East and Shimerville Road.

Area #LC-5 This area is located adjacent to Main Road East and Shimerville Roads between Chestnut St. (PA Route 29) and Milford and Beck Roads.

Indian Creek Drainage Basin

Area #IC-1 This area is located adjacent to St. Peters Road west of Chestnut Street (PA Route 29).

Hosensack Creek Drainage Basin

Area #HC-1 This area is located adjacent to the Church View Road and includes Sun Valley Run, Deer Drive, Wendi Drive (East and West), and Gwen Circle.

Area #HC-2 This area consists of the overall Village of Old Zionsville.

Area #HC-3 This area consists of the overall Village of Zionsville.

Swabia Creek Drainage Basin

Area #SWC-1 This area is in the northern section of the Township and adjacent to Chestnut St., Mill Road, Tank Farm Road, and Rose Drive.

Little Lehigh Creek Drainage Basin

Area #LL-1 This area is located adjacent the Borough of Emmaus along South 5th St., Columbus Drive.

Area #LL-2 This area is located adjacent the Borough of Emmaus along South 7th St.

Each of these areas were examined further to assess the conditions of the onsite systems in each area.

3.0 REVIEW OF EXISTING CONDITIONS

3.1 General

As part of the needs analysis, three areas of background information must be examined to assess the ability of onsite treatment systems to operate properly and prevent groundwater pollution and other public health concerns. These areas include:

- Soil Characteristics
- Geological Characteristics
- Existing Densities
- Floodplain
- Limiting Isolation Distances

Each of this areas will provide background information in the assessment of the operation of existing onsite treatment systems.

3.2 Soil Characteristics

Soil characteristics are very important in the assessment of the operation of onsite treatment systems. All onsite treatment systems (except for single wastewater treatment plants with stream discharge) rely on the ability of the soil to accept the effluent from a septic tank other individual type treatment system and properly transfer it to the upper groundwater table. Biological and physical/ chemical reactions in the soil must also treat this effluent to prevent contamination of the groundwater table. The inability of the soils to properly percolate the effluent to the groundwater table could result in surface failures of the onsite treatment systems and thus present potential health risks. Therefore, soil characteristics are a very important factor in the assessment of the operation of onsite treatment systems.

The updated soils map in digitized format for Lehigh County was obtained from the NRCS Map Compilation and Digitizing Center Internet Site (http://mcdc.cas.psu.edu/). The soils information was obtained from the USDA-NRCS NASIS Pangaea Reports Internet site (http://www.statlab.iastate.edu/soils/reportest/). Since the final published version of the updated soils survey was not available at the time of this report preparation, there was no descriptions available regarding soil associations in Lehigh County. This soils information supersedes the data that was presented in the previous soils survey *Lehigh County Soil Survey Series 1959, No. 31*. The updated soils information is summarized on Table 3-1.

Table 3-1

3.3 Geology Characteristics

Upper Milford Township is underlain by the following four geologic formations that are shown on Figure 3-1: Leithsville Formation (Limestone), Hardyston Formation (Quartzite and quartz-pebble conglomerate), Granite Gneiss and Granite Hornblende Gneiss.

The main concern regarding on-site systems includes those areas with carbonate bedrock. As shown on Figure 3-1, there are several areas with this type of bedrock to include:

- Allentown Dolomite
- Leithsville Formation
- Reikenbach Dolomite

These areas would pose a high risk to onsite systems due to the potential for groundwater contamination via to sinkholes in carbonate rock. The areas impacted by this geology include the Leibert's Creek areas (Needs Areas LC-1 through 4), Saucon Creek area (Needs Area SC-1), and the Swabia Creek area (Needs Area (SWC-1).

It should be noted that other areas of the Township may have limestone strata within the bedrock and would be considered to have a moderate risk with regard to operation of on-site systems.

3.4 Needs Area Density

Density of existing residential housing and other commercial activity is an important factor in any needs assessment. Density is important for the following reasons:

3.4.1 High Density Areas

Higher density areas normally have small lot sizes associated with each home or commercial activity. Once an onsite system must be replaced, the physical constraints of the lot size preclude use of conventional onsite treatment systems. If a suitable area can be found, other regulatory constraints such as distance to wells or existing structures must be addressed. In some cases, a location for a replacement system cannot be found on these lots and other alternatives must be pursued.

These types of problems normally occur most frequently in areas with existing lot sizes of 0.75 acres or less. In these cases, it is usually more cost effective to install central collection sanitary sewers to meet the area's wastewater needs. The cost for installation of sewers in these areas is normally cost effective since the houses are in close proximity to one another. This distance reduces the length of sanitary sewers required to service each house or commercial facility.

Figure 3-1

3.4.2 Moderate Density Areas

Moderate density areas are normally defined as areas with lot sizes between 0.75 and 2.0 acres. Once an onsite system must be replaced, the physical constraints of the lot size are not as restrictive as in the higher density areas. In most cases, on-site system replacement areas can be located on the existing property.

Installation of sanitary sewers in these areas will be more expensive than in the higher density areas. Since the houses are located further apart, the length of sanitary sewers required to service each house is much larger thus increasing the overall project costs. Therefore, installation of sanitary sewers is normally required if use of onsite treatment systems is no longer feasible due to documented system malfunctions.

3.4.3 Low Density Areas

Low density areas are normally defined as areas with lot sizes greater than 2.0 acres. If an onsite system must be replaced, the physical constraints of the lot size are not as restrictive as in the higher density areas. In all but a few cases, system replacement areas can be located on the existing property.

Installation of sanitary sewers in these areas will be more expensive than in the higher density areas. Since the houses are located further apart, sanitary sewers required to service each house is much longer thus increasing the overall project costs. Therefore, installation of sanitary sewers is not required in these areas unless other mitigating circumstances require them.

3.4.4 Summary

The estimated housing density for each delineated needs study area is summarized on Table 3-2. In most cases, the housing densities of the needs areas are within the moderate density category. In several of the needs areas, there are small pockets of high-density housing. However, their location and proximity to the existing sewer service areas will make it very expensive to provide sewer service to these high density areas.

Table 3-2

3.5 Floodplain Restrictions

There are several areas within the needs areas that are located within the 100-year floodplain. Repair of properties with failing septic systems would be very difficult in these areas. Properties located within the designated floodplain zone normally experience high seasonal ground water tables. As a result, these soils have limiting zones that are close to the ground surface and therefore are not suitable for the repair of on-sites systems.

A summary of the number of properties located within the 100-year floodplain is shown on Table 3-3. Based on a review of this data, a significant number of properties within the Village of Vera Cruz area (Needs Area LL-2) are located within the 100-year floodplain. The other areas are not significantly impacted by this restriction.

3.6 Limiting Isolation Distances

As outlined in PaCode Chapter 73.13, there are minimum isolation distance for various features located on the properties such as well, rock outcrops, property lines, etc. One of the primary concerns in areas with high densities is isolation distances associated with onsite systems, streams/ waterways, and potable water wells.

Under current regulations, the isolation distance between an absorption bed and an individual water supply should be a minimum of 100 feet. This is of major concern since shorter isolation distances between the potable water well and absorption bed could impact the quality of drinking water available to the given property. Therefore, lack of available property size will limit any future approved repairs for a failing on-site system.

A summary of properties where this isolation distance cannot be maintained for future repairs is summarized on Table 3-4. Based on a review of this data, a significant number of properties within the Leibert's Creek basin including the Village of Vera Cruz (Needs Areas LC-1 through 3), Old Zionsville area (Needs Area HC-2), Zionsville area (Needs Area HC-3), and South 7th Street Extension area (Needs Area LL-2) have the highest percentage of properties that are impacted by this type of restriction. The areas least impacted by this future restriction are the Indian Creek Basin (Needs Area IC-1) and Church View Road area (Needs Area HC-1).

Table 3-3

Table 3-4

4.0 REVIEW OF HISTORICAL RECORDS

A review of the Township records from 1992 through 2002 was completed to assess the past performance of the on site treatment systems within the delineated study areas. This analysis represents a 10-year operating period.

The total number of repair permits issued each year from 1992 to present is presented on Table 4-1. The location of these repair permits has been illustrated on Figure 4-1. A total of 221 permits were issued by the Township's SEO for repair of existing on-site systems. 213 of these permits were for systems located within one of the fourteen delineated study areas.

A further delineation by respective study area of repair permits is presented in Table 4-2. It should be noted that the repair permits were for all types of system modifications to include:

- Replacement of septic tank baffles
- Replacement of diversion bull valves
- Replacement of distribution boxes
- Replacing piping from the house to the septic tank
- Replacement of septic tanks
- Replacement of entire septic systems including septic tank, lift pump if required, distribution boxes if required, and absorption area

As shown on Table 4-2, the Saucon Creek Basin area (Needs Area SC-1) had the highest percentage of system repairs during the past 10-year period. During the past 10 years, 50% of the onsite systems required some sort of repair. All other areas examined except for the Shimerville/ Mill Road area (Needs Area LC-1), Village of Vera Cruz (Needs Area LC-2), and South 7th St area (Needs Area LL-2) had repair rates that exceeded 20% during this period.

It should be noted that repair rates for the Village of Vera Cruz might be artificially low and not reflect true conditions. Due to the small lot size in this area (<0.50 edu per acre), there are limited options available for repair of failing systems. As a result, discussions with the residents in these areas while conducting this needs survey indicated that they have adjusted to using significantly less water to minimize problems with septic failures thus lowering the documented failure rates and need for system repairs.

Table 4-1

Figure 4-1

Table 4-2

A tabulation of systems repaired using "Best Technical Guidance " (BTG) has been presented on Table 4-3. In each of these cases, the site restricts prevented on-site system repairs from fully meeting criteria required under Title 25 PaCode Chapter 73. Restrictions may have included isolation distances from potable water supplies, existing housing units or other isolation distance requirements. Based on this data, the Village of Vera Cruz (Needs Area LC-2) has a significant number of repairs using this guidance. Of the 24 repairs completed since 1992, 77 were made using "BTG". Based on a review of this data, a significant number of properties within the Leibert's Creek basin including the Village of Vera Cruz (Needs Areas LC-1 through 2), Old Zionsville area (Needs Area HC-2), and Zionsville area (Needs Area HC-3) have the highest percentage of properties that are impacted by this type of restriction. This higher percentage of this type of repair can be attributed to the high density of housing in this area.

Table 4-3

5.0 FIELD SURVEY OF ON-SITE SYSTEMS

5.1 General

The Township SEO conducted a field survey of all onsite systems in areas with the needs areas outlined on Figure 2-1. These areas included the older, denser subdivisions within the Township that are not serviced by sanitary sewers. Currently, there are approximately 2800-2900 properties within the Township serviced by onsite sewage systems. As part of this survey, the Township SEO inspected 961 onsite treatment systems within the delineated needs areas. Since the remaining properties are located in outer areas of the Township with low housing densities, it was assumed that these areas would be part of any newly formed Sewage Management District and sanitary sewers would not be built to service these areas in the near future.

This survey was used to identify suspected and potential malfunctions in the designated study areas. This survey only included visual observations of surface conditions. These surface conditions may have included the presence of lush green grass, marshy areas in the yard at drain fields, evidence of system surfacing, and subsequent runoff. This survey was only able to identify potential surface failures. Where possible, individual homeowners were interviewed to obtain any other information regarding the functioning of the respective onsite system.

It should be further noted that the weather conditions during the time of the survey were extremely dry. The area was subject to an extreme drought and the area was subject to mandated water conservation measures as required by the State of Pennsylvania. As a result, the water use was significantly reduced. Furthermore, groundwater levels were also extremely low. These conditions impacted the ability of the SEO to identify potentially malfunctioning on-site systems.

5.2 Survey Results

The results of the onsite survey results were tabulated for the following categories:

> **Unknown Disposal Method** – During the site visit, the SEO was unable to determine the type and location of the existing onsite system. In all cases, there was no evidence of any system malfunction.

Suspected System with Operational Problems – During the site visit, these systems were identified as having either potential or periodic operating problems. In some cases, homeowners provided information regarding periodic operating problems. However, the system did not shown evidence of malfunction conditions during the actual site visit.

Confirmed Malfunction – These onsite systems showed evidence of malfunction conditions during the site visit. These systems had visual evidence of surface failures such as lush green grass, wetness areas around the absorption bed, septic tank overflow, or signs of surface discharge of partially treated wastewater. In addition, systems repaired using "BTG" have been included as confirmed malfunctions as defined in "*Act 537 Sewage Disposal Needs Identification*" (PADEP, Rev April 2002)

Elevated Sand Mounds – This type of system were identified to provide evidence of the need for non- conventional onsite treatment systems. Although there are other non- conventional type onsite treatment systems in use in the Township, these systems are easily identifiable and have been in allowed for use by PADEP for the longest period of time.

Confirmed/ Suspected Cesspools – These systems either consists of cesspools or systems employing septic tanks followed by cesspools. Although these systems are currently not classified as malfunctions, these type of systems could require replacement upon sale of the residence due to the possible inability of the seller to obtain system certification. As a result, these types of systems represent a possible future need in the area.

The results for each of the delineated needs areas are summarized on Table 5-1. The average confirmed malfunction rate for the onsite systems located within the delineated study area was 3.99 percent. Only 8.82 percent of the systems surveyed were utilizing elevated sand mounds as their means of sewage disposal. Also, only 3.26 percent of the systems utilized cesspools or systems with septic tanks and cesspools.

The survey found that the area with the highest percentage of system problems was the South 7th St. area (Needs Area LL-2). In this area, all of the systems evaluated were either confirmed or suspected malfunctions, cesspools, or unknown disposal systems.

Table 5-1

Several areas within the Liebert's Creek basin also had significant documented failures. The Shimersville Rd/ Mill Road area (Needs Area LC-1) and the Village of Vera Cruz (Needs Area LC-2) experienced a septic malfunction rate (both suspected and confirmed) in excess of 30%. Furthermore, discussions with the residents in these areas during the survey indicated that they use significantly less water to minimize problems with septic failures thus lowering the documented failure rates. The Main Road East area (Needs Area LC-3) experienced a septic malfunction rate (both suspected and confirmed) in excess of 25%.

The only other area with a significant septic failure rate was the Saucon Creek basin (Needs Area SC-1) that experienced a septic malfunction rate (both suspected and confirmed) in excess of 20%.

The remaining needs areas did not demonstrate any significant problems with their respective onsite systems. These areas experienced a septic malfunction rate (both suspected and confirmed) of less than 20%.

6.0 SEWAGE NEEDS EVALUATION

Based on the data compiled in this study, each delineated study area was evaluated to determine if the extension of central collection sewers should be considered. To assist in this evaluation, a matrix was developed for each of the

- Soils
- Geology
- Density
- Historical Repair Records
- Confirmed Malfunctions
- Suspected/ Confirmed Malfunctions
- Use of Elevated Sand Mounds
- Suspected/ Confirmed Cesspools
- Limiting System Factors

Each category was rated as follows:

- High Risk – These factors were evaluated to have a significant impact on the wastewater needs in the area

- Moderate Risk - These factors were evaluated to have some impact on the wastewater needs in the area.

- Slight risk - These factors were evaluated to have little to no impact on the wastewater needs in the area.

Averaging the risk factors from each category for each needs survey made the overall risk factor. The following numeric weight was given to each risk factor:

- Slight Risk 1
- Moderate Risk 2
- Severe Risk 3

The results of this analysis are presented on Table 6-1. Based on this assessment, The Main St. East Area (Needs Area #LC-3) and the 7th St. (Needs Area #LL-2) had a "High Risk" rating regarding wastewater needs. This was a direct result of high-risk ratings for soils, geology, system repairs, confirmed malfunctions, and cesspools. As a result of this rating, these areas should be considered for sanitary sewer service in the near future.

Table 6-1

Both the Shimersville/Mill Road Area (Needs Area #LC-1) and the Vera Cruz Area ((Needs Area #LC-2) had "Moderate Risk" ratings. Due to the problems with existing on-site systems in these areas and the current resident's necessity to adapt to using available systems, it is recommended that these areas also be sewered in the near future.

The remaining areas exhibited "Moderate – Low "Risk ratings. As a result, sewering of these areas is not required in the near futre. However, it is recommended that the Township incorporate these areas into proposed sewer service areas that can be sewered if a higher need is documented in the future.