

## **3.0 Evaluation of Alternatives**

### **3.1 DESCRIPTION OF ALTERNATIVES**

#### **3.1.1 Sewer System Alternatives**

The sewer system alternatives have been developed to address specific wastewater needs in each of the Township's three major drainage basins. Table 3-1 cross-references each alternative with the areas to be serviced including the proposed sewer service area (PSA) and Needs Area shown in the Needs Survey. In addition, alternatives were developed to address only those wastewater needs within the existing sewer service areas. A no action alternative was also considered.

Alternatives for the South 7<sup>th</sup> Street Extension and Golf Circle areas were not presented as part of this analysis. The South 7<sup>th</sup> St Extension area will be addressed through a PADEP *Sewage Planning Module for a Minor Act 537 Plan Revision*. A private developer through a PADEP Planning Module will address the Golf Circle area. Both planning documents will be presented to PADEP at a later date.

##### **3.1.1.1 No Action Alternative**

Under this alternative, the existing sewer service area within the Township would not be modified to extend and provide sewer service to the Village of Vera Cruz and other areas with documented sewage needs. Those areas currently not serviced by sanitary sewers would continue to be serviced by individual on-lot treatment systems.

##### **3.1.1.2 Alternative #1 – Provide Sewer Service to the Leibert Creek Basin through Borough of Emmaus using a Gravity Interceptor**

Under this alternative, a gravity collection system would be constructed to service the various areas of the drainage basin. A gravity interceptor would be constructed starting at Main Road East and extending north and paralleling Leibert Creek. The interceptor would provide service to the entire Leibert Creek drainage basin. The interceptor would connect to the Borough of Emmaus collection system at existing MH #C-231 located adjacent to Leibert Creek within the Borough limits.

Table 3-1 pg 2

Table 3-1

A portion of the service area located along Shimerville Road between Mill Road and David Drive and Marion Place can be serviced by installation of a gravity sewer that discharges to the Borough's existing MH #C-2334C located on Shimerville Road. This portion of the alternative is dependent on the availability of limited capacity in the Borough's collection system located downstream of Borough MH #C-2334C.

A sanitary sewer collection system would be constructed to provide sewage service to the following proposed serve service areas:

- PSA-1
- PSA-2
- PSA-3
- PSA-4

It must be noted that certain properties within the above referenced proposed serve service areas will not be provided sewage service under the initial proposed project. These properties were eliminated from the initial project area due to lack of demonstrated need and cost to extend service at this time. These properties can be provided sewage service if needs develop in the future.

The remaining two proposed service areas in the Leibert Creek basin did not have a significant need for installation of sanitary sewers at this time. However, any plan developed should include a sewage capacity allocation for these areas in the future. This Alternative is illustrated on Figure 3-1.

The Borough of Emmaus has addressed available sewage capacity within the their collection system. The results of this analysis are included in Appendix J. Based on this analysis, the Borough cannot provide sewage service using their collection system for the entire drainage area. Therefore, this alternative is not feasible and will not be further evaluated.

### **3.1.1.3 Alternative #2 – Provide Sewer Service to the Leibert Creek Basin through Borough of Emmaus using pumping stations**

Under this alternative, a gravity collection system would be constructed to service the various areas of the drainage basin. A pumping station would be constructed to transfer sewage within the Township's collection system. A pumping station would be located in the area of Main Road East would transfer sewage to a gravity line located along Vera Cruz Road North. The sewer would connect to the Borough of Emmaus collection system at existing MH #C-231 located adjacent to Leibert Creek within the Borough limits.

Figure 3-1

A portion of the service area located along Shimerville Road between Mill Road and David Drive and Marion Place can be serviced by installation of a gravity sewer that discharges to the Borough's existing MH #C-2334C located on Shimerville Road. This portion of the alternative is dependent on the availability of limited capacity in the Borough's collection system located downstream of Borough MH #C-2334C.

A sanitary sewer collection system would be constructed to provide sewage service to the following proposed serve service areas:

- PSA-1
- PSA-2
- PSA-3
- PSA-4

It must be noted that certain properties within the above referenced proposed serve service areas will not be provided sewage service under the initial proposed project. These properties were eliminated from the initial project area due to lack of demonstrated need and cost to extend service at this time. These properties can be provided sewage service if needs develop in the future.

The remaining two proposed service areas in the Leibert Creek basin, PSA-5 and PSA-6 did not have a significant need for installation of sanitary sewers at this time. However, any plan developed should include a sewage capacity allocation for these areas in the future. This Alternative is illustrated on Figure 3-2.

The Borough of Emmaus has addressed available sewage capacity within the their collection system. The results of this analysis are included in Appendix J. Based on this analysis, the Borough cannot provide sewage service using their collection system for the entire drainage area. Therefore, this alternative is not feasible and will not be further evaluated.

#### **3.1.1.4 Alternative #3 – Provide Sewer Service to the Leibert Creek Basin through Lehigh County Authority Route 29 Facilities using a Pumping Station and Gravity Interceptor**

Under this alternative, a combination of gravity interceptors and pumping stations would be used to transport wastewater to LCA's Route 29 collection system. The proposed system would connect to the existing LCA collection system at MH # JS-1 located on Salem Drive.

Figure 3-2

The gravity interceptor would extend along Leibert Creek from Main Road East along the creek to the proposed pumping station. The proposed pumping station would be located near the intersection of Vera Cruz and Mill Roads. The force main would extend from the pumping station along Mill Road to Shimerville Road, to Salem Drive. The force main will terminate on Salem Drive at the LCA MH #JS-1. Capacity within the LCA collection and interceptor system was addressed in a letter dated August 28, 2002 from LCA that has been included in Appendix K.

A portion of the service area located along Shimerville Road between Mill Road and David Drive and Marion Place can be serviced by a low-pressure collection system. This low-pressure system will discharge to the proposed gravity manhole located at the intersection of Mill and Shimerville Roads.

A sanitary sewer collection system would be constructed to provide sewage service to the following proposed serve service areas:

- PSA-1
- PSA-2
- PSA-3
- PSA-4

It must be noted that certain properties within the above referenced proposed serve service areas will not be provided sewage service under the initial proposed project. These properties were eliminated from the initial project area due to lack of demonstrated need and cost to extend service at this time. These properties can be provided sewage service if needs develop in the future.

The remaining two proposed service areas in the Leibert Creek basin, PSA-5 and PSA-6 did not have a significant need for installation of sanitary sewers at this time. However, any plan developed should include a sewage capacity allocation for these areas in the future. This Alternative is illustrated on Figure 3-3.

#### **3.1.1.5 Alternative #4 – Provide Sewer Service to the Leibert Creek Basin through Lehigh County Authority Route 29 Facilities using Pumping Stations**

Under this alternative, a combination of pumping stations would be used to transport wastewater to the Lehigh County Authority Route 29 collection system. The proposed system would connect to the existing LCA collection system at MH # JS-1 located on Salem Drive.



Figure 3-3

The first pumping station, located in the area of Main Road East, would transfer sewage to a gravity line located along Vera Cruz Road North. The second proposed pumping station would be located near the intersection of Vera Cruz and Mill Roads. The force main would extend from the pumping station along Mill Road to Shimerville Road, to Salem Drive. The force main would terminate on Salem Drive at the LCA MH #JS-1. Capacity within the LCA collection and interceptor system was addressed in a letter dated August 28, 2002 from LCA that has been included in Appendix K.

A portion of the service area located along Shimerville Road between Mill Road and David Drive and Marion Place can be serviced by a low-pressure collection system. This low-pressure system will discharge to the proposed gravity manhole located at the intersection of Mill and Shimerville Roads.

A sanitary sewer collection system would be constructed to provide sewage service to the following proposed serve service areas:

- PSA-1
- PSA-2
- PSA-3
- PSA-4

It must be noted that certain properties within the above referenced proposed serve service areas will not be provided sewage service under the initial proposed project. These properties were eliminated from the initial project area due to lack of demonstrated need and cost to extend service at this time. These properties can be provided sewage service if needs develop in the future.

The remaining two proposed service areas in the Leibert Creek basin, PSA-5 and PSA-6 did not have a significant need for installation of sanitary sewers at this time. However, any plan developed should include a sewage capacity allocation for these areas in the future. This Alternative is illustrated on Figure 3-4.

Figure 3-4

### 3.1.1.6 Alternative #5 – Provide Sewer Service to the Leibert Creek Basin through new WWTP with Stream Discharge to Leibert Creek

Under this alternative, a 0.110 mgd treatment plant would be constructed along Quarry Drive. The treatment plant would discharge to Leibert Creek in the vicinity of the WWTP. Since Leibert Creek is classified as a HQ-CWF stream, water quality standards for any treatment facility would be very strict. Typical monthly effluent standards for this facility would be as follows:

Biochemical Oxygen Demand (5 day)	15 mg/l
Total Suspended Solids	30 mg/l
Ammonia Nitrogen	
Winter	4.5 mg/l as N
Summer	1.5 mg/l as N
Total Nitrogen	10 mg/l as N
Phosphorus	2.0 mg/l as P
pH	7 - 9
Dissolved Oxygen	Not less than 6.0
Total Chlorine Residual	Not detectable

In order to achieve these effluent stands, the proposed treatment plant would include the following unit processes:

- Influent bar screen
- Grit removal system
- Packaged type activated sludge system
- Ultra-violet disinfection system
- Post aeration
- Aerobic digestion
- Belt filter press

The majority of the collection system would be serviced through a pumping station located on East Main Road. A small pumping station would also be required to service potential users that are located in the lower portion of the Leibert Creek drainage basin. The pumping station would be located near the Township municipal boundary with the Borough of Emmaus.

A portion of the service area located along Shimerville Road between Mill Road and David Drive and Marion Place can be serviced by a low-pressure collection system. This low-pressure system will discharge to the proposed gravity manhole located at the intersection of Mill and Shimerville Roads.

This Alternative is illustrated on Figure 3-5.

Figure 3-5

### **3.1.1.7 Alternative #6 – Provide Sewer Service to the Leibert Creek Basin through New WWTP with Land Application Discharge**

Under this alternative, land application would be used to dispose of the treated effluent from a WWTP located in the area outlined in Alternatives #1-5.

The land application alternatives are similar to those for stream discharge. The major difference is that the treated effluent is disposed of via a spray irrigation system instead of by direct discharge to a receiving water body. Based on the current PADEP regulations, all Act 537 Plans must include land application as one of the wastewater management alternatives.

There are four types of land treatment which are widely used:

- Rapid infiltration
- Spray irrigation
- Drip Irrigation

The PADEP has issued regulations governing the design of spray irrigation facilities, *Manual for Land Application of Treated Sewage and Industrial Wastewater*, (October 15, 1997). The USEPA has published recommended design standards for all three types of systems in the *Process Design Manual, Land Treatment of Municipal Wastewater* (1981). The PADEP standards will be used in the pre preliminary design phase for the cost-effectiveness analysis.

Based on preliminary analysis, rapid infiltration was not considered as a viable method for land application in this area. The soils in the area do not meet minimum percolation requirements necessary for rapid infiltration systems.

There are several advantages associated with land application of municipal effluents:

- Recharge of groundwater supplies
- Reduction of organic loading in surface waters
- Irrigation of vegetation that is not used in the human food chain

Of these advantages, the recharge of existing groundwater supplies is of primary importance. During years of drought, the water table of an area may become depleted by normal water consumption. Proper management of a land application operation could minimize this impact.

The land application treatment process entails three major components:

- Conventional secondary treatment plant
- Spray field or disposal area
- Effluent storage lagoon

Conventional secondary treatment is required prior to land application. The treatment processes usually included are:

- Preliminary treatment consisting of screening and grit removal
- Secondary treatment
- Disinfection with chlorine

Normal treatment levels for this application are 85 percent removal of both BOD<sub>5</sub> and total suspended solids. A chlorine residual of 1.5 mg/l is also required for disinfection and to control odor in the effluent storage lagoons.

The land application portion of the system consists of a large spray field or disposal area and storage lagoon. Normal biological activity of the cover vegetation and chemical and microbial activity in the soil mantle are used for final treatment. Based on the site limitations dictated by the cover crop and soils, the effluent is sprayed onto the field and allowed to percolate through the soil.

Soil limitations for preliminary screening of soils for use with land application were as follows:

Permeability Rate	>0.06 in/hr
High Ground water Table	>4.0 ft
Depth to Bedrock	>4.0 ft
Slope	<12.0%

Based on a compatibility review of the soils found within Upper Milford Township, several soils are potentially usable for spray irrigation:

- Gladstone (Gfb, GfC)
- Udorthents (Ua)
- Washington (WaB, Wac)

In addition, Edgemont, Gladstone (GeA-C), Laidag, Murrill, Neshaminy, and Penn are somewhat limited for use. In most cases, depth to high groundwater table is the limiting factor regarding these soils.

A review of the geology of the area indicates that carbonate rocks underlie a majority of the area. These areas include both Allentown and Rickenbach dolomite. Furthermore, those areas on the fringe of the carbonate rock area may also have layers of carbonate rock interspaced with the other rock formations. Studies conducted in adjacent areas indicated that limestone formations were found in areas mapped for rock formations other than limestone.

Based on the presence of limestone bedrock in the Upper Milford area, land application of treated wastewater would not be feasible as outlined in Title 25 PaCode Chapter 73.12.

**3.1.1.8 Alternative #7 – Provide Sewer Service to the Leibert Creek Basin through Lehigh County Authority Route 29 Facilities using a Low Pressure System**

Under this alternative, a low-pressure collection system would be used to transport wastewater to LCA’s Route 29 collection system. The proposed system would connect to the existing LCA collection system at MH # JS-1 located on Salem Drive.

A sanitary sewer collection system would be constructed to provide sewage service to the following proposed serve service areas:

- PSA-1
- PSA-2
- PSA-3
- PSA-4

It must be noted that certain properties within the above referenced proposed serve service areas will not be provided sewage service under the initial proposed project. These properties were eliminated from the initial project area due to lack of demonstrated need and cost to extend service at this time. These properties can be provided sewage service if needs develop in the future.

The remaining two proposed service areas in the Leibert Creek basin, PSA-5 and PSA-6 did not have a significant need for installation of sanitary sewers at this time. However, any plan developed should include a sewage capacity allocation for these areas in the future. This Alternative is illustrated on Figure 3-6.



Figure 3-6

### **3.1.1.9 Alternative #8 – Extending Sewer Service to the South Fifth St. Area**

This alternative would provide sewer service to PSA-12. Under this alternative, gravity sewers would be extended along South 5th Street. Sewers would also be extended to provide sewer service to and provide sewer service to Plain View Rd, Columbus Drive, Knoll Wood Drive and Hillary Drive. The sewers would connect to the Borough of Emmaus collection system at Borough MH #C-1 located on South 5<sup>th</sup> St.

This Alternative is illustrated on Figure 3-7.

### **3.1.1.10 Alternative #9 – Extending Sewer Service to Indian Creek Drainage Basin**

Under this alternative, this area would be serviced by a gravity collection system and a community septic disposal system. The community disposal system designed to process sewage from the St. Peters Road and the Schantz Road areas (PSA-7) would have a capacity of 36,000 gpd. The collection system would require approximately 18,300 linear feet of gravity sewer. Two central pumping stations, one located on St Peters Road and the second located on Schantz Road, would transfer the sewage to the community system. A mechanical bar screen would be included with the pumping station to remove rags and other large debris. The treatment system would consist of two sequencing batch reactor tanks followed by an absorption bed with an effective minimum absorption bed area of 36,000 square feet. The proposed site for the absorption bed would be located adjacent to St. Peters Road in a vacant field. A detailed analysis of this system is contained in Appendix L.

This Alternative is illustrated on Figure 3-8.

### **3.1.1.11 Alternative #10 – Extending Sewer Service to the Hosensack Creek Drainage Basin**

Under this alternative, each sub-drainage basin within this area would be serviced by a gravity collection system, central pumping station, and a community septic disposal system. This Alternative is illustrated on Figure 3-9.

**Churchview Road Area (PSA-8)** - The community disposal system designed to process sewage from the Church View Road Area (PSA-8) would have a capacity of 17,000 gpd. The collection system would require approximately 8,000 linear feet of gravity sewer. A central pumping station located Church View Road would transfer the sewage to the community system. A mechanical bar screen would be included with the pumping station to remove rags and other large debris. The treatment system would consist of a sequencing batch reactor treatment plant followed by an absorption bed with an effective minimum absorption bed area of 17,000 square feet. The proposed site for the absorption bed would be located adjacent to Church View in a vacant field. A detailed analysis of this system is contained in Appendix L.

Figure 3-7

Figure 3-8

Figure 3-9

**Old Zionsville Area (PSA-9)** - The community disposal system designed to process sewage from Old Zionsville (PSA-9) would have a capacity of 32,000 gpd. The collection system would require approximately 13,100 linear feet of gravity sewer. A central pumping station located adjacent to Kings Highway would transfer the sewage to the community system. A mechanical bar screen would be included with the pumping station to remove rags and other large debris. The treatment system would consist of sequencing batch reactor tanks followed by an absorption bed with an effective minimum absorption bed area of 32,000 square feet. The proposed site for the absorption bed would be located adjacent to Kings Highway in a vacant field. A detailed analysis of this system is contained in Appendix L.

**Zionsville Area (PSA-10)** - The community disposal system designed to process sewage from Zionsville (PSA-10) would have a capacity of 7,000 gpd. The collection system would require approximately 2000 linear feet of gravity sewer. A central pumping station located on Kings Highway south of the former Reading Railroad right of way would transfer the sewage to the community on-site septic system. A mechanical bar screen would be included with the pumping station to remove rags and other large debris. The treatment system would consist of two 6,000-gallon septic tanks followed by an absorption bed with an estimated effective absorption bed area of 8,800 - 12,800 square feet. The proposed site for the absorption bed would be located adjacent to Kings Highway in a vacant field.

### **3.1.1.12 Alternative #11 – Extending Sewer Service in the Swabia Creek Drainage Basin**

Under this alternative, the gravity collection system servicing ESA-8 would be extended to provide sewer service to this area.

The majority of the area would be serviced by gravity sanitary sewers that connect to existing LCA MH #B-8. The gravity sewer would be extended from MH #B-8 along the unnamed tributary to Swabia Creek to Mill Road. Sewers would then extend along Mill Road and provide sewer service to Homestead Circle and Flora Drive.

Gravity sanitary sewers that also provide service to the Ford Drive area would service the area along Tank Farm Road north of Mill Road. A small portion of Tank farm Road would be serviced through existing MH #B-12.

The sanitary sewers servicing the Chestnut Street area would extend along both sides of the highway and connect to existing LCA MH #R-20.

This Alternative is illustrated on Figure 3-10.

Figure 3-10

### **3.1.2 Onsite System Treatment Alternatives**

#### **3.1.2.1 No Action Alternative**

Under this Alternative, the Township would continue to operate its on-site management program without any modifications. Currently, the Township has a part time Sewage Enforcement Officer (SEO) who is responsible for management of all on-site systems in the Township. As part of his duties, the SEO issues permits for construction of new on-site treatment systems, issues repair permits for failing on-site systems, witnesses soil probes and percolation tests associated with new system construction or repair of old systems, and is responsible for enforcement actions associated with failing existing on-site treatment systems.

#### **3.1.2.2 Formation of Sewage Management District**

Under this Alternative, Upper Milford Township would form a sewage management district within the Township to manage all on-site treatment systems. The management district would encompass the entire Township and include all homes or other facilities serviced by on-site treatment systems.

#### **Using Existing Township Resources to Establish Management Agencies**

As outlined in the no action Alternative, Upper Milford Township is currently involved in a limited on-site system management program. This program, based on state regulations, requires that the Township issue permits for on-site treatment systems. These activities involve site testing, design review and final inspection of on-site sewage systems and require that procedures and fees be established to carry out the program. Some of the activities of the Township extend to resolving system malfunctions as required by local ordinances or state laws. A sewage management program is a natural extension of the existing permitting program. While the existing on-site permitting program stops at the final inspection of the system installation, the sewage management program would extend the Township oversight of these on-site systems through required maintenance or inspection. This assures that the special precautions taken to make sure these systems are designed and installed properly are not wasted because of the lack of owner maintenance. It also assures that all new land developments proposed within the Township will become part of the management program and will have maintained systems. Malfunctions of existing systems will be reduced due to more frequent maintenance.



## **Function of an On-Site Treatment System Management Agency**

The management program will be designed to:

- Actively identify malfunctions;
- Take enforcement action to abate nuisances;
- Provide technical assistance to help correct malfunctions;
- Update old systems to present disposal technology (as applicable);
- Require property owners to pump septage from septic tanks on a predetermined schedule;
- Conduct operation and maintenance inspections.

## **Planning Elements Required Establishing an On-site Treatment System Management Agency**

As part of this Act 537 Plan Revision, the following planning elements were included in order to properly assess a sewage management program:

- Identification of the areas of the municipality in which sewage management activities will be established;
- An evaluation of the types of periodic inspections, operation or maintenance activities needed to assure long term use of onlot systems;
- An identification of the legal authority the municipality intends to use to carry out these activities, including enforcement and restraint of violations of the program;
- Standards for operation, maintenance, repair and replacement of sewage facilities consistent with any state standards;
- Establishment of a fee schedule for the services provided by the municipality or management agency;
- An ordinance that implements the program.

## **Sewage Management Program Requirements**

The basic options available to the Township in establishing their sewage management program are controlled by the minimum maintenance standards contained in Chapter 71 of PADEP's regulations. These standards were established to make sure that each management program established carries out at least the minimum activities necessary to maintain on-site treatment systems. These minimum standards require that the sewage management plan include:

- Removal of septage or other solids from the treatment tanks once every three years or whenever a tank inspection reveals that the tank is filled in excess of 1/3 the liquid depth of the tank with scum or solids;

Maintenance of surface contouring around the system to divert stormwater away from the system and protect the system from all forms of material damage;

Water conservation requirements;

Requirements for maintenance of electrical, mechanical and chemical components of the sewage facility including collection/ conveyance piping, pressure lines, septic or holding tanks, alarm and flow recorders (if necessary), pumps, disinfection equipment and related safety equipment;

Provisions for septage pumping and disposal; and

Requirements for holding tank maintenance.

### **Implementation of the Sewage Management Program**

The key to implementation of the sewage management program is establishment of a successful sewage management program is as follows:

Assure that all systems are constructed in accordance with requirements set forth by PADEP and other regulatory agencies.

Assure that all systems are pumped on a regularly scheduled basis.

Assure that all systems are inspected on a regularly scheduled basis to assure that they are operating properly.

Assure that septage generated in the Township is properly disposed at permitted wastewater treatment facilities.

**System Permitting** – Under this program, permitting of all on-site treatment systems would be processed through the Township’s existing Sewage Enforcement Officer (SEO). The permitting process would follow current PADEP permit requirements.

**System Pumping** – The program would establish a mandatory minimum pumping schedule for all on-site treatment systems in the Township. The Township would issue a notice to each system prior to the date that the system pumping is required. The system owner would then contact an approved contractor to pump the contents of the on-site treatment system including the septic tank and other auxiliary tanks such as a pump tank. The contractor would be responsible for notifying the Township that the system was pumped and the resulting septage was disposed of in an approved manner. Based on current PADEP requirements, each system would be pumped once every three years.

**System Inspection** – As part of the pumping activity, the pumping contractor would be responsible to perform a preliminary inspection of the on-site treatment system. Prior to pumping the system, the access lid of the septic tank would be exposed to allow for inspection of the internal components of the septic tank. These would include items such as the inlet and outlet baffles and inlet and outlet piping. As part of the reporting to the Township, the pumping contractor would be responsible to assess the condition of the system and report any potential deficiencies as part of the septage disposal manifesting system.

If the contractor discovers any deficiencies with a system, the Township SEO will complete a follow-up inspection to determine the severity of the problem and possible corrective actions.

**Permitting of all Contractors** – All approved contractors pumping on-site treatment systems in the Township would be permitted by the Township. The Township ordinance would establish the duration of any permit. As part of the permitting process, the contractors must demonstrate the following:

- Equipment used in the pumping activities must be in serviceable condition and well maintained.
- The Contractor must have proper insurances to include environmental damage, automotive, and liability.
- The Contractor must demonstrate his/ her abilities to properly inspect on-site treatment systems.
- The Contractor must demonstrate an approved method for disposal of all septage.

Contractors would be required to obtain operating permits on an annual basis. All fees and fee schedules would be established in the Township Ordinance.

### **Legal Authority for Implementing Program**

A sample ordinance for implementing the sewage management program is contained in Appendix H. In addition, the Township has a current ordinance for use of holding tanks. This ordinance is contained in Appendix I.

### **3.1.2.3 Incorporation Into County System**

Under this Alternative, the Township would turn over all responsibility for management of on-site systems to a county level health department. Although Lehigh County does not currently have a health department, some local officials are potentially planning to form such an agency in the future. Until this agency would be formed and operational, the Township would be required to continue to implement its own management program.

## **3.2 EVALUATION OF ALTERNATIVES**

### **3.2.1 Facility Capacity Analysis**

This analysis will be used to determine if existing facilities have sufficient capacity to meet the future wastewater needs of their respective sewer service areas. These facilities will include both the existing Lehigh County Authority Interceptor and the existing sewage collection system located in Emmaus Borough.

#### **3.2.1.1 Wastewater Treatment Plant**

The City of Allentown wastewater treatment plant will ultimately service the Township's sewage needs. The treatment plant capacity is allocated through LCA. Therefore, all wastewater needs will be addressed by available capacity from LCA. Based on correspondence from LCA dated August 28, 2003 and July, 27 2005, there is sufficient treatment capacity available to meet all of the Township's projected requirements. A copy of this letter is found in Appendix B.

#### **3.2.1.2 Interceptor Analysis**

##### **Lehigh County Authority Interceptor**

The LCA completed an analysis in July 1999 for acceptance of 259,200 gpd (180 gpm) from a proposed Township pumping station discharging to LCA MH #JS-1. Based on this analysis, the LCA collection/ interceptor required to provide service to the proposed Township pumping station located in the vicinity of Mill and Vera Cruz Roads had sufficient capacity to transport the projected flows. Based on current flow projections for the Leibert Creek drainage basin, the projected peak flows are less than the 259,200 gpd used for this analysis.

In addition, the analysis indicates that the collection system will have sufficient capacity to address all wastewater needs within PSA-13 (South 7<sup>th</sup> St. Extension area), PSA-11 (Swabia Creek Basin), and PSA-14 (Golf Circle Area). The estimated wastewater flow from this area is estimated to be 0.029 mgd daily average flow with an estimated peak flow rate 0.116 mgd.

## **Borough of Emmaus Collection System**

As part of the Act 537 Plan, the Township was requested to evaluate the potential for using the Borough of Emmaus collection system to convey sewage to the LCA interceptors. Based on an analysis completed by the Borough Engineer in a letter dated June 12, 2003, Hanover Engineering, it was determined that the Borough did not have sufficient reserve capacity in their collection system to provide service to Upper Milford Township' proposed collection and interceptor system servicing the entire Leibert Creek drainage basin. This analysis is provided in Appendix J.

### **3.2.2 Financial Analysis**

#### **3.2.2.1 Sewer System Alternatives**

##### **Capital Costs**

**Sewer System Construction Costs** – The construction costs associated installation of sanitary sewers has been summarized on Tables 3-2 and 3-3. Where possible, gravity sanitary sewers were used to provide sewage service. However, in some cases, this was not practical due to topographic constraints. In these cases, the use of low-pressure sewer systems was used to provide sewage service.

For purposes of estimating costs for each alternative, the following types of gravity sewers were used:

- 8 in. diameter gravity sewer located in open terrain (off road areas)
- 8 in. diameter gravity sewer located in Township roads
- 8 in. diameter gravity sewer located in PennDOT roads
- 12 in diameter interceptor sewers
- Low-Pressure Mains

The estimated construction costs for the gravity sewers in each alternative have been summarized on Table 3-2.

In addition, several alternatives included use of a pumping station and force main. In these cases, the pumping station design was assumed to consist of a submersible type pumping system. The associated force mains were assumed to be 6-inch diameter ductile iron pipe.

The low pressure sewers were estimated using single unit grinder pump systems and common low pressure force mains that are 2-5 inches in diameter depending on the number of customers serviced by the low pressure system.

Table 3-2

The estimated construction costs for the low-pressure sewers, pumping stations, and force mains associated with each alternative are summarized on Table 3-3.

**Wastewater Treatment Plant Construction Costs** - The costs associated with construction of a WWTP associated with Alternatives #6, #9, and #10 are summarized on Table 3-4. The treatment plant costs associated with Alternative #6 include a treatment facility including a sequence batch reactor type activated sludge system. The treatment system systems associated with Alternatives #9 and #10 are for community on-lot systems including treatment tanks and absorption beds and necessary appurtenances at the treatment site.

**LCA Non-project Capacity Tapping Fees** – The cost of the tapping fee has been included in alternatives # 3, #4, #7 and #8. In each of these alternatives, the sewer system users will be ultimately serviced by LCA facilities and will be required to pay the minimum connection fee of \$1,606 per equivalent dwelling unit (EDU). These costs have been summarized on Table 3-5.

**Total Capital Costs** - The total estimated capital costs for construction of sewers in each alternative are summarized on Table 3-6. In addition, the costs for engineering, legal assistance, and administrative costs have been included in the analysis. Also, any costs associated with acquisition of right of ways have been included in the analysis.

### **Operation and Maintenance Costs**

**Collection System Operating Costs** – The operating costs associated with each alternative will be most associated with operation of pumping station equipment. These costs would include labor associated with maintaining the station and electrical power to operate the pumping equipment. The operating costs associated with the gravity sewers would be minimal. For purposes of this analysis, 12 - 50 man-hours of maintenance activity were used. The cost for each man-hour of labor is \$150/hr including vehicles and other sewer equipment such as video inspection and vactor equipment. Therefore, the estimated gravity collection system O&M cost varied from \$600 to \$7500 for each of the various alternatives.

The cost for operating a low-pressure collection system was estimated to be \$15, 000 per year. This would include such maintenance tasks as flushing of lines.

The costs associated with operation of grinder pump units would also be minimal. Once constructed, these units would be operated and maintained by the individual homeowner. The homeowner would be required obtain an annual maintenance contract to assure that their pump unit would be maintained. This would also provide an efficient means to repair any potential pump failure in the future.

The estimated operations and maintenance costs associated with the collection system alternatives are summarized on Table 3-7.

Table 3-3



Table 3-4

Table 3-5

Table 3-6

Table 3-7

**Wastewater Treatment Plant Costs** - The costs for operation and maintenance of a wastewater treatment plant are summarized on Table 3-8.

**LCA Annual UMiT Common Rate User Charges** – For purposes of this analysis, an annual unit charge of \$451/EDU was used to account for the base annual user fees paid to LCA for use of their system. These annual costs are summarized on Table 3-9.

### **Present Worth Analysis**

The present worth for each of the alternatives is summarized on Table 3-10. The present worth analysis was calculated for a 20-year period and included:

- Capital cost of the sanitary sewer collection system
- Capital cost of interceptor sewers (if necessary)
- Present worth of collection system operation and maintenance costs
- Present worth of WWTP capital costs
- Present worth of WWTP operation and maintenance costs

The present worth of the operations and maintenance costs was calculated using current WSJ prime interest rate of 4.00%.

### **User Charges**

It is estimated that properties within the Vera Project Area that connect to the sewer system will pay an annual user charge of \$1,378 per Edu. The charge will be composed of two parts, the then current Upper Milford Common Rate charge, currently \$451 plus a Vera Cruz Project charge estimated to be \$ 927.

This user charge does not include any additional costs associated with a capital recovery fee where required to fund the construction of sewer facilities.

### **Septic Management District Costs**

#### **Township Costs**

The Township will be able to implement the septic management district alternative using existing Township staff. The Township currently employs the services of a qualified full time Sewage Enforcement Officer (SEO). The Township also uses the services of a part-time backup SEO when necessary.

The cost for implementation of the septic management district is not anticipated to significantly increase Township's costs.

Table 3-8

Table 3-9

Table 3-10



## **User Costs**

The homeowner will continue to be responsible for all costs associated with operation and maintenance of the on-site treatment systems. These costs would include periodic pumping of the septic tanks and system repairs.

In addition, individual homeowners will continue to be responsible for costs associated with permitting of new on-site systems and repairs to existing onsite systems. Costs include percolation testing costs, engineering fees if applicable, Township permit fees and system installation costs.

### **3.2.3 Environmental Impact Analysis**

#### **3.2.3.1 Sewer System Alternatives**

##### **No Action Alternative**

Under this alternative, limited existing and no future wastewater needs within the Township would be addressed. As a result, both surface and ground water resources could be impacted throughout the planning period.

These impacts would include possible contamination of groundwater resources by failing on-site treatment systems. In some cases, homeowners may be unable to properly repair a failing on-site system. In order to prevent a public health hazard, the homeowner may be forced to use a holding tank. Under some extreme conditions, the homeowner may lose the occupancy permit for the premises and the house would be forced to remain vacant until adequate sewage facilities are provided.

In addition, others problems could be fostered by this alternative:

Inability of homeowners to sell properties due to inability to obtain septic system certification for the mortgage company

The area surrounding failing on-site treatment systems could be subject to odor problems

Based on the negative impacts associated with the no action alternative, some form of action to address wastewater needs must be taken by the Township.

### **Alternative #1 – Provide Sewer Service to the Leibert Creek Basin through Borough of Emmaus using a Gravity Interceptor**

Since the Borough of Emmaus cannot provide sufficient capacity in their collection system to provide service to the Township, this alternative was determined to be unfeasible and was not evaluated for environmental impacts.

### **Alternative #2 – Provide Sewer Service to the Leibert Creek Basin through Borough of Emmaus using pumping stations**

Since the Borough of Emmaus cannot provide sufficient capacity in their collection system to provide service to the Township, this alternative was determined to be unfeasible and was not evaluated for environmental impacts.

### **Alternative #3 – Provide Sewer Service to the Leibert Creek Basin through Lehigh County Authority Route 29 Facilities using a Central Pumping Station and Gravity Interceptor**

**General Environmental Impacts** - Construction of new wastewater conveyance facilities in the Village of Vera Cruz and Moyer subdivision areas of the Township will have a positive impact both surface and ground water quality in the area. This portion of the Township will have a positive environmental impact on the overall area by improving both surface and groundwater quality. These improved conditions will also have a positive impact on the quality of living conditions in this area. The various environmental impacts have been illustrated on Figure 3-11.

The construction of new facilities to service existing homes and other facilities in the Village of Vera Cruz and Moyer subdivision areas of the Township will have a positive impact both surface and ground water quality in the area. The new collection system will service properties with known or suspected problematic existing on-site treatment systems. By removing these on-site systems from service, corresponding waste loadings of BOD<sub>5</sub>, ammonia nitrogen, and phosphorus will be removed from entering both groundwater and surface waters in the area. Since this area is located in the Environmentally Sensitive Zone of the Township, these factors are extremely important to maintain the high quality of the groundwater.

Construction of the sewer facilities will have minimal adverse short-term impacts in this area, such as noise, dirt, and minor traffic disruptions during the construction period. Some of these impacts can be minimized through the use of approved soil erosion control techniques and posted traffic detours. These impacts will be eliminated upon the completion of the construction of the facilities.

Figure 3-11

In addition, several of the collection sanitary sewers will be located adjacent to PennDOT highways. PennDOT construction restrictions may require that sewers be located in the shoulder of the highway wherever possible. Necessary PennDOT permits will be obtained for all sewers located within PennDOT right of ways.

This alternative will require a pumping station to transfer sewage to LCA facilities. Therefore, this alternative will require continual electrical resources to operate the system.

**Wetland Impacts** –This alternative will have minimal long-term impact on wetland areas. As shown on Figure 3-11, most of the mapped wetland areas associated with the area directly adjacent to Leibert Creek in the Vera Cruz area. The gravity interceptor will have to cross these wetland areas. However, the areas can be restored to near existing conditions upon completion of the construction. In addition, the interceptor will pass through wetlands located adjacent to Leibert Creek. Necessary PADEP and US Army Corps of Engineers (ACOE) permits will be obtained for all wetland crossings as part of the design process. These permit applications are anticipated to be for PADEP GP-5 permits and ACOE permits associated with wetlands.

**Stream Crossings** – The interceptor and collection system sewers will have several stream crossing associated with Leibert Creek as illustrated on Figure 3-11. These crossing include two stream crossing along Main Road East and one crossing along Vera Cruz Road North in the Village of Vera Cruz. Also, the sewers will cross several smaller unnamed tributaries of the Leibert Creek. During the design phase of the project, these areas will be mapped and necessary PADEP permits (PADEP GP-5 Permit) will be obtained where necessary for the sewer pipes crossing the wetland areas. Upon completion of construction, these wetland areas should revert back to conditions present prior to construction.

**Floodplain Impacts** - This alternative will have minor long-term impacts on flood plains in the area. The proposed interceptor will be located outside the designated floodway wherever possible. In those areas where the interceptor is located within the designated 100-year floodplain, all manholes will be equipped with waterproof manhole covers. Where practical, the top of the manhole structure will be above the estimated 100-year flood elevation. The areas that will be impacted by the floodplain are adjacent to the Leibert Creek. This alternative will not involve any permanent structures that will impact flood plain and change floodplain characteristics. The design phase will include obtaining necessary PADEP permits associated with occupancy of any floodplain areas.

**Impact on Prime Agricultural Soils** – As shown on Figure 3-11, this alternative will could have an impact on prime agricultural soils. However, several of the larger land tracts have been placed into the Township’s Agricultural Preservation Program. Therefore, these properties will not be subject to future development as a result of implementation of this alternative.

**Secondary Impacts** – Secondary impacts such as controlling growth in this area should not be a significant problem. Current Township Ordinances will control growth based on the physical topography of the area and the inability to construct new houses.

**Historical Site Impacts** - Based on the results of the needs survey, several older homes were identified. Construction of any sewers required to service these homes or associated structures will not impact the buildings in anyway. In most cases, extension of sewer service to areas with these older structures will enhance the value of the building by replacing older outdated sewage systems.

In addition, a historic Jasper quarry was located along Vera Cruz Road North adjacent to the Village of Vera Cruz. Based on discussions with the PHMC, no additional survey work will be required if the proposed sanitary sewers remain in existing road rights of way that have been previously disturbed.

**Future Development Impacts** - Developers within this area of the Township would be responsible to extend all other sewers to provide sewer service to new developments or other subdivisions. Impacts associated with this construction activity would be addressed as part of the Township's subdivision review process.

#### **Alternative #4 – Provide Sewer Service to the Leibert Creek Basin through Lehigh County Authority Route 29 Facilities using Pumping Stations**

**General Environmental Impacts** - Construction of new wastewater conveyance facilities in the Village of Vera Cruz and Moyer subdivision areas of the Township will have a positive impact both surface and ground water quality in the area. This portion of the Township will have a positive environmental impact on the overall area by improving both surface and groundwater quality. These improved conditions will also have a positive impact on the quality of living conditions in this area. The various environmental impacts have been illustrated on Figure 3-12.

The construction of new facilities to service existing homes and other facilities in the Village of Vera Cruz and Moyer subdivision areas of the Township will have a positive impact both surface and ground water quality in the area. The new collection system will service properties with known or suspected operating problems associated with the existing on-site treatment systems. By removing these onsite systems from service, corresponding waste loadings of BOD<sub>5</sub>, ammonia nitrogen, and phosphorus will be removed from entering both groundwater and surface waters in the area.

Construction of the sewer facilities will also have minimal adverse short-term impacts in this area, such as noise, dirt, and minor traffic disruptions during the construction period. These impacts can be minimized through the use of approved soil erosion control techniques and posted traffic detours. These impacts will be eliminated upon the completion of the construction of the facilities.

Figure 3-12

In addition, several of the collection sanitary sewers will be located adjacent to PennDOT highways. PennDOT construction restrictions may require that sewers be located in the shoulder of the highway wherever possible. Necessary PennDOT permits will be obtained for all sewers that will be located within PennDOT right of ways.

This alternative will require two pumping stations to transfer sewage to LCA facilities. Therefore, this alternative will require continual electrical resources to operate the system.

**Wetland Impacts** - This alternative will have minimal long-term impact on wetland areas. As shown on Figure 3-12, the mapped wetland areas associated with the area directly adjacent to Leibert Creek in the Vera Cruz area and will not be directly impacted by this alternative. The collection sewers will have to cross other unmapped wetland areas. Any wetland areas would be mapped during design phase of the project. Necessary PADEP and US Army Corps of Engineers (ACOE) permits will be obtained for all wetland crossings as part of the design process. These permit applications are anticipated to be for PADEP GP-5 permits and ACOE permits associated with wetlands.

**Stream Crossings** – The interceptor and collection system sewers will have several stream crossing associated with Leibert Creek. These crossing include one stream crossing along Main Road East and one crossing along Vera Cruz Road North. Also, the sewers will cross several smaller unnamed tributaries of the Leibert Creek. During the design phase of the project, these areas will be mapped and necessary PADEP permits (PADEP GP-5 Permit) will be obtained where necessary for the sewer pipes crossing the wetland areas.

**Flood Plain Impacts** - This alternative will have minor impact on flood plains in the area. The proposed interceptor will be located outside the designated floodplain wherever possible. The areas that will be impact the floodplain are associated with the Leibert creek. This alternative will not involve any permanent structures that will impact flood plain and change floodplain characteristics. The design phase will include obtaining necessary PADEP permits associated with occupancy of any floodplain areas.

**Impact on Prime Agricultural Soils** – As shown on Figure 3-12, this alternative will could have an impact on prime agricultural soils. However, several of the larger land tracts have been placed into the Township's Agricultural Preservation Program. Therefore, these properties will not be subject to future development as a result of implementation of this alternative.

**Secondary Impacts** – Secondary impacts such as controlling growth in this area should not be a significant problem. Current Township Ordinances will control growth based on the physical topography of the area and the inability to construct new houses.

**Historical Site Impacts** - Based on the results of the needs survey, several older homes were identified within this area. Construction of any sewers required to service these homes or associated structures will not impact the buildings in anyway. In most cases, extension of sewer service to areas with these older structures will enhance the value of the building by replacing older outdated sewage systems.

In addition, a historic Jasper quarry was located along Vera Cruz Road North adjacent to the Village of Vera Cruz. Based on discussions with the PHMC, no additional survey work will be required if the proposed sanitary sewers remain in existing road rights of way that have been previously disturbed.

**Future Development Impacts** - Developers within this area of the Township will be responsible to extend all other sewers to provide sewer service the new developments or other subdivisions. Impacts associated with this construction activity will be addressed as part of the Township's subdivision review process.

**Alternative #5 – Provide Sewer Service to the Leibert Creek Basin through new WWTP with stream discharge to Leibert Creek**

**General Environmental Impacts** - Construction of new wastewater conveyance and treatment facilities in the Village of Vera Cruz and Moyer subdivision areas of the Township will have a positive impact both surface and ground water quality in the area. This portion of the Township will have a positive environmental impact on the overall area by improving both surface and groundwater quality. These improved conditions will also have a positive impact on the quality of living conditions in this area. The various environmental impacts have been illustrated on Figure 3-13.

The construction of new facilities to service existing homes and other facilities in the Village of Vera Cruz and Moyer subdivision areas of the Township will have a positive impact both surface and ground water quality in the area. The new collection system will service properties with known or suspected operating problems associated with the existing on-site treatment systems. By removing these onsite systems from service, corresponding waste loadings of BOD<sub>5</sub>, ammonia nitrogen, and phosphorus will be removed from entering both groundwater and surface waters in the area. Since this area is located in the Environmentally Sensitive Zone of the Township, these factors are extremely important to maintain the high quality of the groundwater.

Construction of the sewer facilities will also have minimal adverse short-term impacts in this area, such as noise, dirt, and minor traffic disruptions during the construction period. These impacts can be minimized through the use of approved soil erosion control techniques and posted traffic detours. These impacts will be eliminated upon the completion of the construction of the facilities.



Figure 3-13

In addition, several of the collection sanitary sewers will be located adjacent to PennDOT highways. PennDOT construction restrictions may require that sewers be located in the shoulder of the highway wherever possible. Necessary PennDOT permits will be obtained for all sewers that will be located within PennDOT right of ways.

This alternative will require construction of a new WWTP in the Vera Cruz area. This plant would have minimal impact on the area. Aesthetic impacts such as odor could be minimized through proper operation and maintenance of the facility. Noise could be minimized through use of acoustical enclosures for the various piece of mechanical equipment. The WWTP effluent would be of sufficient quality to meet current water quality standards in the Leibert Creek.

**Wetland Impacts** - This alternative will have minimal long-term impact on wetland areas. As shown on Figure 3-13, the mapped wetland areas associated with the area directly adjacent to Leibert Creek in the Vera Cruz area and will not be directly impacted by this alternative. The collection sewers will have to cross other unmapped wetland areas. Any wetland areas would be mapped during design phase of the project. Necessary PADEP permits would be obtained for all wetland crossings as part of the design process. These permit applications are anticipated to be for PADEP GP-5 permits. These wetland areas can be fully restored to existing conditions upon completion of the construction.

**Stream Crossings** – The interceptor and collection system sewers will have several stream crossing associated with Leibert Creek. These crossing include one stream crossing along Main Road East and one crossing along Vera Cruz Road North. Also, the sewers will cross several smaller unnamed tributaries of the Leibert Creek. During the design phase of the project, these areas will be mapped and necessary PADEP permits (PADEP GP-5 Permit) will be obtained where necessary for the sewer pipes crossing the wetland areas.

**Impact on Prime Agricultural Soils** – As illustrated on Figure 3-13, this alternative will have minimal impact on prime agricultural soils. There are no major active farming sites within the service area associated with this alternative. Areas designated for future sewer service will be addressed either through further planning at the time of the proposed sewer construction or through the Planning Module approval process.

**Historical Site Impacts** - Based on the results of the needs survey, several older homes constructed in the earlier 1800's were identified. Construction of any sewers required to service these homes or associated structures will not impact the buildings in anyway. In most cases, extension of sewer service to areas with these older structures will enhance the value of the building by replacing older outdated sewage systems.

In addition, a historic Jasper quarry was located along Vera Cruz Road North adjacent to the Village of Vera Cruz. Based on discussions with the PHMC, no additional survey

work will be required if the proposed sanitary sewers remain in existing road rights of way that have been previously disturbed.

**Secondary Impacts** – Secondary impacts associated with the implementation of this alternative will be controlled using existing Township Ordinances and oversight by Township advisory organizations such as the Township Planning Commission.

**Future Development Impacts** - Developers within this area of the Township will be responsible to extend all other sewers to provide sewer service new developments or other subdivisions. Impacts associated with this construction activity will be addressed as part of the Township's subdivision review process.

### **Alternative #6 – Provide Sewer Service to the Leibert Creek Basin through new WWTP with Land Application Discharge**

Construction of new wastewater treatment facilities in this portion of the Township will have a positive environmental impact on the overall area by improving both surface and groundwater quality. These improved conditions will also have a positive impact on the quality of living conditions in this area.

However, the area has significant amounts of carbonate bedrock. As a result, use of land application methods for disposal of treated effluent could have a negative impact on groundwater quality due to the potential of sinkholes and underground streams and other caverns.

### **Alternative #7 – Provide Sewer Service to the Leibert Creek Basin through Lehigh County Authority Route 29 Facilities using a Low Pressure Collection System**

**General Environmental Impacts** - Construction of new wastewater conveyance facilities in the Village of Vera Cruz and Moyer subdivision areas of the Township will have a positive impact both surface and ground water quality in the area. This portion of the Township will have a positive environmental impact on the overall area by improving both surface and groundwater quality. These improved conditions will also have a positive impact on the quality of living conditions in this area. The various environmental impacts have been illustrated on Figure 3-14.

The construction of new facilities to service existing homes and other facilities in the Village of Vera Cruz and Moyer subdivision areas of the Township will have a positive impact both surface and ground water quality in the area. The new collection system will service properties with known or suspected operating problems associated with the existing on-site treatment systems. By removing these onsite systems from service, corresponding waste loadings of BOD<sub>5</sub>, ammonia nitrogen, and phosphorus will be removed from entering both groundwater and surface waters in the area.

Figure 3-14

Construction of the sewer facilities will also have minimal adverse short-term impacts in this area, such as noise, dirt, and minor traffic disruptions during the construction period. These impacts can be minimized through the use of approved soil erosion control techniques and posted traffic detours. These impacts will be eliminated upon the completion of the construction of the facilities.

In addition, several of the collection sanitary sewers will be located adjacent to PennDOT highways. PennDOT construction restrictions may require that sewers be located in the shoulder of the highway wherever possible. Necessary PennDOT permits will be obtained for all sewers that will be located within PennDOT right of ways.

**Wetland Impacts** - This alternative will have minimal long-term impact on wetland areas. As shown on Figure 3-14, the mapped wetland areas associated with the area directly adjacent to Leibert Creek in the Vera Cruz area and will not be directly impacted by this alternative. The collection sewers will have to cross other unmapped wetland areas. Any wetland areas would be mapped during design phase of the project. Necessary PADEP and US Army Corps of Engineers (ACOE) permits will be obtained for all wetland crossings as part of the design process. These permit applications are anticipated to be for PADEP GP-5 permits and ACOE permits associated with wetlands.

**Stream Crossings** – The interceptor and collection system sewers will have several stream crossing associated with Leibert Creek. These crossing include one stream crossing along Main Road East and one crossing along Vera Cruz Road North. Also, the sewers will cross several smaller unnamed tributaries of the Leibert Creek. During the design phase of the project, these areas will be mapped and necessary PADEP permits (PADEP GP-5 Permit) will be obtained where necessary for the sewer pipes crossing the wetland areas.

**Flood Plain Impacts** - This alternative will have minor impact on flood plains in the area. The proposed interceptor will be located outside the designated floodplain wherever possible. The areas that will be impact the floodplain are associated with the Leibert creek. This alternative will not involve any permanent structures that will impact flood plain and change floodplain characteristics. The design phase will include obtaining necessary PADEP permits associated with occupancy of any floodplain areas.

**Impact on Prime Agricultural Soils** – As shown on Figure 3-14, this alternative will could have an impact on prime agricultural soils. However, several of the larger land tracts have been placed into the Township's Agricultural Preservation Program. Therefore, these properties will not be subject to future development as a result of implementation of this alternative.

**Secondary Impacts** – Secondary impacts such as controlling growth in this area should not be a significant problem. Current Township Ordinances will control growth based on the physical topography of the area and the inability to construct new houses.

**Historical Site Impacts** - Based on the results of the needs survey, several older homes were identified within this area. Construction of any sewers required to service these homes or associated structures will not impact the buildings in anyway. In most cases, extension of sewer service to areas with these older structures will enhance the value of the building by replacing older outdated sewage systems.

In addition, a historic Jasper quarry was located along Vera Cruz Road North adjacent to the Village of Vera Cruz. Based on discussions with the PHMC, no additional survey work will be required if the proposed sanitary sewers remain in existing road rights of way that have been previously disturbed.

**Future Development Impacts** - Developers within this area of the Township will be responsible to extend all other sewers to provide sewer service the new developments or other subdivisions. Impacts associated with this construction activity will be addressed as part of the Township's subdivision review process.

#### **Alternative #8 – Extending Sewer Service to the South Fifth St. Area**

**General Environmental Impacts** - Construction of new wastewater conveyance facilities in this portion of the Township will have a positive environmental impact on the overall area by improving both surface and groundwater quality. These improved conditions will also have a positive impact on the quality of living conditions in this area. The various environmental impacts are illustrated on Figure 3-15.

The construction of new facilities to service existing homes in this area will have a positive impact both surface and ground water quality in the area. The new collection system will service properties with known operating problems associated with the existing on-site treatment systems. By removing these onsite systems from service, corresponding waste loadings of BOD<sub>5</sub>, ammonia nitrogen, and phosphorus will be removed from entering both groundwater and surface waters in the area.

Construction of the sewer facilities will also have minimal adverse short-term impacts in this area, such as noise, dirt, and minor traffic disruptions during the construction period. These impacts can be minimized through the use of approved soil erosion control techniques and posted traffic detours. These impacts will be eliminated upon the completion of the construction of the facilities.

**Wetland Impacts** – As shown on Figure 3-15, there are no known designated wetlands areas that will be impacted by any sewers associated with this alternative. During the design phase of the project, any wetland areas will be identified and necessary PADEP permits will be obtained for the sewer pipes crossing any wetland areas. Upon completion of construction, any wetland areas should revert back to conditions present prior to construction.

Figure 3-15

**Floodplain Impacts** - This alternative will have no impact on any designated floodplains.

**Impact on Prime Agricultural Soils** – As illustrated on Figure 3-15, this alternative will have minimal impact on prime agricultural soils. There are no active farming sites within the service area associated with this alternative.

**Secondary Impacts** – Secondary impacts associated with the implementation of this alternative will be controlled using existing Township Ordinances and oversight by Township advisory organizations such as the Township Planning Commission.

**Historical Site Impacts** - Based on the results of the needs survey, a few older homes were identified within this area. Construction of any sewers required to service these homes or associated structures will not impact the buildings in anyway. In most cases, extension of sewer service to areas with these older structures will enhance the value of the building by replacing older outdated on-site sewage treatment systems.

**Future Development Impacts** - Developers within this area of the Township will be responsible to extend all other sewers to provide sewer service the new developments or other subdivisions. Impacts associated with this construction activity will be addressed as part of the Township's subdivision review process.

### **Alternative #9 – Extending Sewer Service to Indian Creek Drainage Basin**

**General Environmental Impacts** - Construction of new wastewater conveyance and treatment facilities in this portion of the Township will have a positive environmental impact on the overall area by improving both surface and groundwater quality. These improved conditions will also have a positive impact on the quality of living conditions in this area. The various environmental impacts are illustrated on Figure 3-16.

Construction of the sewer facilities will also have minimal adverse short-term impacts in this area, such as noise, dirt, and minor traffic disruptions during the construction period. These impacts can be minimized through the use of approved soil erosion control techniques and posted traffic detours. These impacts will be eliminated upon the completion of the construction of the facilities.

**Wetland Impacts** - This impact is illustrated on Figure 3-16. This alternative should have no direct impact on any identified wetland areas. Necessary PADEP permits would be obtained for all wetland crossings identified as part of the design process. These permit applications are anticipated to be for PADEP GP-5 permits. These wetland areas can be fully restored to existing conditions upon completion of the construction.



Figure 3-16

**Floodplain Impacts** - This alternative will have no impact on any designated floodplains. The design phase will include obtaining necessary PADEP permits associated with occupancy of any floodplain area if necessary. Necessary PADEP permits would be obtained for all floodplain crossings identified as part of the design process. These permit applications are anticipated to be for PADEP GP-5 permits.

**Impact on Prime Agricultural Soils** – As shown on Figure 3-16, this alternative will have minimal impact on prime agricultural soils. There are no major active farming sites within the service area associated with this alternative. It is anticipated that the proposed sewer extension would only service existing homes in the area.

**Historical Site Impacts** - Based on the results of the needs survey, there were a few older structures identified in this area. Construction of any sewers required to service these homes or associated structures will not impact the buildings in anyway. In most cases, extension of sewer service to areas with these older structures will enhance the value of the building by replacing older outdated on-site sewage treatment systems. Also, there are no impacts regarding archeological resources associated with this alternative.

**Secondary Impacts** – Secondary impacts associated with the implementation of this alternative will be controlled using existing Township Ordinances and oversight by Township advisory organizations such as the Township Planning Commission.

**Future Development Impacts** - Developers within this area of the Township will be responsible to extend all other sewers to provide sewer service the new developments or other subdivisions. Impacts associated with this construction activity will be addressed as part of the Township's subdivision review process.

### **Alternative #10 – Extending Sewer Service to the Hosensack Creek Drainage Basin**

**General Environmental Impacts** - Construction of new wastewater conveyance and treatment facilities in this portion of the Township will have a positive environmental impact on the overall area by improving both surface and groundwater quality. These improved conditions will also have a positive impact on the quality of living conditions in this area. The various environmental impacts are illustrated on Figure 3-17.

Construction of the sewer facilities will also have minimal adverse short-term impacts in this area, such as noise, dirt, and minor traffic disruptions during the construction period. These impacts can be minimized through the use of approved soil erosion control techniques and posted traffic detours. These impacts will be eliminated upon the completion of the construction of the facilities.

**Figure 3-17**

**Wetland Impacts** - This impact is illustrated on Figure 3-17. This alternative should have no direct impact on any identified wetland areas. Necessary PADEP permits would be obtained for all wetland crossings identified as part of the design process. These permit applications are anticipated to be for PADEP GP-5 permits. These wetland areas can be fully restored to existing conditions upon completion of the construction.

**Floodplain Impacts** - This alternative will have no impact on any designated floodplains. The design phase will include obtaining necessary PADEP permits associated with occupancy of any floodplain area if necessary. Necessary PADEP permits would be obtained for all floodplain crossings identified as part of the design process. These permit applications are anticipated to be for PADEP GP-5 permits.

**Impact on Prime Agricultural Soils** – As shown on Figure 3-17, this alternative will have minimal impact on prime agricultural soils. There are no major active farming sites within the service area associated with this alternative. It is anticipated that the proposed sewer extension would only service existing homes in the area.

**Historical Site Impacts** - Based on the results of the needs survey, there were a few older structures identified in this area. Construction of any sewers required to service these homes or associated structures will not impact the buildings in anyway. In most cases, extension of sewer service to areas with these older structures will enhance the value of the building by replacing older outdated on-site sewage treatment systems. Also, there are no impacts regarding archeological resources associated with this alternative.

**Secondary Impacts** – Secondary impacts associated with the implementation of this alternative will be controlled using existing Township Ordinances and oversight by Township advisory organizations such as the Township Planning Commission.

**Future Development Impacts** - Developers within this area of the Township will be responsible to extend all other sewers to provide sewer service new developments or other subdivisions. Impacts associated with this construction activity will be addressed as part of the Township's subdivision review process.

### **Alternative #11 – Extending Sewer Service in the Swabia Creek Drainage Basin**

**General Environmental Impacts** - Construction of new wastewater conveyance facilities in this portion of the Township will have a positive environmental impact on the overall area by improving both surface and groundwater quality. These improved conditions will also have a positive impact on the quality of living conditions in this area. The various environmental impacts are illustrated on Figure 3-18.

Figure 3-18

Construction of the sewer facilities will also have minimal adverse short-term impacts in this area, such as noise, dirt, and minor traffic disruptions during the construction period. These impacts can be minimized through the use of approved soil erosion control techniques and posted traffic detours. These impacts will be eliminated upon the completion of the construction of the facilities.

**Wetland Impacts** - This impact is illustrated on Figure 3-18. This alternative should have minimal direct impact on any identified wetland areas. Necessary PADEP permits would be obtained for all wetland crossings identified as part of the design process. These permit applications are anticipated to be for PADEP GP-5 permits. These wetland areas can be fully restored to existing conditions upon completion of the construction.

**Floodplain Impacts** - This alternative will have minimal impact on any designated floodplains. As shown on Figure 3-18, the collector sewers may occupy the flood plain in the vicinity of the existing LCA sewer connection point along the unnamed tributary to Swabia Creek. The design phase will include obtaining necessary PADEP permits associated with occupancy of any floodplain area if necessary. Necessary PADEP permits would be obtained for all floodplain crossings identified as part of the design process. These permit applications are anticipated to be for PADEP GP-5 permits.

**Stream Crossings** – The interceptor and collection system sewers will have several stream crossing associated with the unnamed tributary to Swabia Creek. These crossing include one stream crossing along Mill Road. Also, the sewers will occupy the stream bank adjacent to the unnamed tributary of Swabia Creek north of Mill Road. During the design phase of the project, these areas will be mapped and necessary PADEP permits (PADEP GP-5 Permit) will be obtained where necessary for the sewer pipes crossing the wetland areas.

**Impact on Prime Agricultural Soils** – As shown on Figure 3-18, this alternative will have minimal impact on prime agricultural soils. There are no major active farming sites within the service area associated with this alternative. It is anticipated that the proposed sewer extension would only service existing homes in the area.

**Historical Site Impacts** - Based on the results of the needs survey, there were no older structures identified in this area. Also, there are no impacts regarding archeological resources associated with this alternative.

**Secondary Impacts** – Secondary impacts associated with the implementation of this alternative will be controlled using existing Township Ordinances and oversight by Township advisory organizations such as the Township Planning Commission.

**Future Development Impacts** - Developers within this area of the Township will be responsible to extend all other sewers to provide sewer service the new developments or other subdivisions. Impacts associated with this construction activity will be addressed as part of the Township's subdivision review process.

## Summary of Sewer Alternative Analysis

**No Action Alternative** - Based on the results of the alternative analysis, implementation the No Action Alternative will not meet the future needs of the Township. Existing wastewater needs in the unsewered areas of the Township will continue to exist and the Township will not have the necessary resource to address them.

**Leibert Creek Basin Alternatives** – Based on the results of this analysis, both alternatives #3, #4 and #7 were found to be feasible alternatives. Based on the cost analysis, Alternative #7, (Low-pressure sewer collection system) appeared to be the least cost alternative presented. The second least costly alternative was Alternative #4 (Gravity Collection System with pumping stations).

A further comparison of these alternatives was made to evaluate the Alternatives:

The advantages of Alternative #7 versus Alternative #4 are as follows:

- Low-pressure sewer systems have been used extensively throughout the USA and Europe for about 30 years and have provided significant capital cost savings in areas where there is widely varying topography, the need for conventional pumping stations, bedrock close to the surface, high water tables, low density housing, and a variety environmental issues. The capital construction cost of a low-pressure sanitary sewer system (Alternative #7) is estimated to be approximately 1.3 million dollars less when compared to the installation of a gravity sanitary sewer collection system with regional pump stations (Alternative #4).
- Alternative #7 will consist of small diameter force mains (2”-5”) and, because of its shallow installation depth can be installed with fewer disturbances to existing lawns, sidewalks, pavement, and utilities when compared to Alternative #4 that consists of larger pipe diameters and deeper excavations.
- Alternative #7 will consist of low-pressure force mains and therefore, the overall regular maintenance of the low-pressure sanitary sewer system will be less when compared to Alternative #4, which will includes regional pump stations that require daily maintenance.
- Typically in areas that are served exclusively by low-pressure sewers infiltration/inflow is significantly reduced.

The disadvantages of Alternative #7 Versus Alternative #4 are as follows:

The design of a low-pressure sanitary sewer system (Alternative #7) must consider all potential future sanitary sewer connections, since the low-pressure sanitary sewer system consists mainly of force mains, which have limiting velocities that can

preclude future sanitary sewer connections. The gravity sanitary sewer system that is proposed under Alternative #4 will be capable of accepting a larger quantity of future sanitary sewer connections that may have not been anticipated during the initial planning phases. Additionally, the regional pump stations that are proposed under Alternative #4 can also be upgraded, if needed, to accommodate unanticipated future sanitary sewer connections.

Grease in smaller diameter force mains, which are proposed under Alternative #7, may become a problem, which without proper maintenance could result in blockages.

Public education is necessary so the user knows how to deal with emergencies or other maintenance problems.

Property owners typically do not support the ownership, operation, and maintenance responsibilities associated with the individual pump stations that will be installed for the low pressure sanitary sewer system (Alternative #7). However, by township ordinance the owner's will be required to enter in to an annual Maintenance Agreement with a private company that has been given special training by the manufacture of the grinder pump.

Power outages can result in overflows or the inability to discharge wastewater from the home, assuming there is an operating water supply during the the power outage

The main advantages of Alternative #7 are lower capital and potentially lower operating costs. However, the major disadvantage with Alternative #7 is its limited capacity compared to that of a gravity system to accept a larger quantity of long-term future sanitary sewer connections that may have not been anticipated during the initial planning phases.

Therefore, it is recommended that Alternative #4 be selected. However, during the design phase of the project, the use of a low-pressure sewer system for the Project Area in it's entirety or in part will be examined in greater detail.

**Remaining Areas of Township** - The remaining Alternatives should be implemented once a wastewater need in a given area is determined as part of the proposed septic management program. The Township should reserve capacity in the regional LCA interceptors and Allentown WWTP to address any needs in these areas once the systems begin showing signs of failure. The Township will be able to monitor system operational activity and need repairs and/ or replacement through the proposed sewage management district.



### **3.2.3.2 On Site System Treatment Alternatives**

**No Action Alternative** – Under this alternative, the Township would continue to implement a limited management role over on-site treatment systems in the Township.

**Formation of Sewage Management District** – Under this alternative, the Township would have a more active role in the operation and maintenance of on-site treatment systems in the Township. This would improve the overall operation of on-site wastewater treatment systems in the Township and assist the Township in protecting both groundwater and surface water resources.

**Incorporation Into County System** – Since Lehigh County does not have a Department of Health established at this time, this alternative can not be implemented. Based on current reports from the County, such a Department is only in the early planning stages and would not be formed in the near future. Therefore, this alternative cannot be considered.

**Summary of Alternative Analysis** – Based on this analysis, the Township should form its own septic management district to manage on-site treatment systems located within the Township. This will allow the Township to better protect the area from potential environmental impacts associated with failing on-site treatment systems. By managing the existing treatment systems, existing users of the on-site treatment systems can optimize their performance and extend their effective service life.