# V. WASTE WATER ALTERNATIVES

This chapter will identify the range of wastewater alternatives technologically feasible for use in Upper Salford Township. Each of the considered alternatives has a track record of successful operation, as evidenced by the granting of permits from the Pennsylvania Department of Environmental Protection (DEP).

That range will then be reduced to those alternatives that are consistent with the Township's land use and natural resource protection policies. For that more narrow set of alternatives, a selection hierarchy will be presented; this prioritized ranking will then serve as the Township's statement of preference among the wastewater alternatives, putting any future providers of sewage facilities on notice as to the Township's expectations.

The preferred alternatives will be further evaluated in relation to the four study areas into which the Township has been divided for this plan. Finally, this chapter will address the wastewater management needs inherent in the preferred alternatives.

## A. Technology Options

Table V-1 presents, at the broad generic level, the components of various wastewater options, organized by the three major system components of collection, treatment, and disposal.

Table V-1
Technology Options by Wastewater System Component

| Collection | Treatment | Disposal |
|---|---|---|
| • Individual On-lot<br>• Gravity Sewers<br>-Conventional<br>-Small Diameter<br>• Pressure Sewers<br>-Grinder Pump<br>-STEP (Septic Tank Effluent Pump)<br>• Vacuum Sewers | Initial Treatment<br>• Septic Tank<br>• Package Treatment Plant<br>-Extended Aeration<br>-Aerobic Tanks<br>-SBR (Sequencing Batch Reactor)<br>-Biological Contactors<br>-Physical/Chemical<br>• Lagoon/Pond<br>• Marsh - Pond - Meadow<br>*Advanced Treatment*<br>• Sand Filtration<br>• Constructed Wetlands | • Subsurface Disposal<br>-Standard Trench<br>-Seepage Bed<br>-Elevated Sand Mound<br>-Drip Irrigation<br>• Land Application<br>• Discharge to Groundwater<br>• Stream Discharge<br>• Small Flow Spray Irrigation<br>• Evapotranspiration<br>• Holding Tank |

As described below, only a few of these components are considered appropriate and desirable to meet the wastewater needs of Upper Salford. To reach those determinations, however, it is important to understand and evaluate the implications of each of these components. The following is a general description of each of the components listed in Table V-1.

## 1. Collection and Conveyance

### a. Individual On-Lot Systems

With the exception of individual on-lot disposal systems (OLDS), the alternatives described here involve the collection and conveyance of sewage from two or more dwellings or other structures to a treatment site. The OLDS represents the "non-sewered" option, where each lot has its own self-contained sewage system. The only piping is that which connects the house or other structure being served to the treatment unit.

Collection systems serving two or more structures can be classified as gravity sewers, pressure sewers, or vacuum sewers.

### b. Gravity Sewers

*Conventional*

The conventional gravity sewer, today most commonly constructed of PVC pipe, has historically been the most popular method used for the collection and conveyance of wastewater. The pipe is installed on a slope to enable the wastewater to flow from the house site to the treatment facility. Pipes are usually 8" in diameter and must be installed below the frost line. Manholes are located a maximum of 400' apart or at changes of direction or significant changes in elevation. In areas of excessively hilly or flat terrain, sewage flow is assisted by pump stations.

*Small Diameter Effluent Sewers*

A small diameter effluent sewer (SDES) collects effluent from septic tanks at each service connection and transports it by gravity to a treatment plant or a conventional sewer. Synonyms include small diameter gravity sewers, septic tank effluent drains, and small bore sewers. The volume of septic tanks is often 1,000 gallons, but varies widely. Septic tanks

remove grit, settleable solids, and grease, and they attenuate peak flows. Both the horizontal and vertical alignments of the pipes can be curvilinear. The pipe network contains no closed loops. Uphill sections can be used, provided that there is enough elevation head upstream to maintain flow in the desired direction, and that there is no backflow into any service connection. Minimum diameters can be approximately two inches. Plastic pipe is typically used since it is economical in small sizes, and it resists corrosion by the septic wastewater. Cleanouts are used to provide access for flushing. Manholes are used infrequently, usually at major junctions of main lines. Air release risers are required at summits in the sewer profile. Because of the small diameters and flexible slope and alignment of the SDES, excavation depths and volumes are typically much smaller than with conventional sewers, sometimes requiring only a chain trencher.

Two varieties of SDES systems have been used: the variable grade effluent sewer (VGES) and the minimum grade effluent sewer (MGES). The VGES allows flexibility of horizontal and vertical alignment, provided that there is enough elevation head to maintain flow in the desired direction and that there is no backflow into any service connection at design flow. In the MGES, minimum downward slopes are imposed. In some cases, horizontal alignments have been required to be straight and larger minimum diameter constraints have been imposed. Therefore, the MGES is more conservative and more costly than VGES.

In both the MGES and the VGES, individual service connections can be equipped with a septic tank effluent pump unit, creating a hybrid with the septic tank effluent pump (STEP) pressure sewer. The use of STEP connections is advantageous when excavation costs can be reduced enough to offset pumping costs. Hybrid designs are common in current practice. Inline lift stations can also be used if required by the terrain or for cost-effectiveness.

Two-compartment septic tanks may be more efficient at retaining solids, but single-compartment tanks have performed well. Screens with outlet orifices have also shown reduced solids discharge.

Several dwelling units or other service locations can be clustered to a single septic tank, which should have an increased volume depending on the total population equivalent it serves.

SDES systems may not be as cost effective as pressure sewers if the treatment location is at a higher elevation than the service area or if there is topographic undulation between the service area and treatment location. Both instances would require lift stations.

c. Pressure Sewers

*Grinder Pump Pressure Sewers*

A grinder pump (GP) pressure sewer has a pump at each service connection. The pumps are one horsepower (0.75 kilowatt) or more, typically require 220 volts, and are equipped with a grinding mechanism that macerates the solids. The head and flow rate provided by the pumps is usually about 50 to 100 feet and 10 to 15 gallons per minute (gpm) but vary widely. The pumps discharge into a completely pressurized pipe system terminating at a treatment plant or conventional sewer.

Because the mains are pressurized, there will be no infiltration into them, but infiltration and inflow into the house sewers and the pump wells can occur. In areas where the GP sewer system has replaced septic tank and leaching field systems, the abandoned systems may be retained for emergency overflow, but they should be separated from the pump well by a valve that is opened only when emergency overflow is needed. Otherwise, the septic tank and leaching field system can become sources of large volumes of infiltration.

The discharge line from the pump is equipped with at least one check valve and one manual valve. Electrical service is required at each service connection. The sewer profile usually parallels the ground surface profile. Horizontal alignment can be curvilinear. Plastic pipe is typically used since it is economical in small sizes, and it resists corrosion. The minimum diameter is 1-1/4 inches for service connections and the smallest mains. Cleanouts are used to provide access for flushing. Automatic air release valves are required at summits in the sewer profile.

Because of the small diameters, curvilinear horizontal alignment, and profile paralleling the ground surface, excavation depths and volumes are typically much smaller for a GP pressure sewer than for conventional sewers. The pipes are installed slightly below the frost line.

Several dwelling units or other service locations have been clustered to a single pump well, which would have an increased working volume depending on the total population equivalent it services. However, clustered service connections have often led to disputes over billing and responsibility for nuisance conditions and service calls. Duplex pump wells are often used on clustered, commercial, institutional, or other larger services.

Because GP systems do not have the large excess capacity typical of conventional gravity sewers, they must be designed with an adequate allowance for desired future growth.

*Septic Tank Effluent Pump Pressure Sewer (STEP)*

A septic tank effluent pump (STEP) pressure sewer has a septic tank and a pump at each service connection. The pumps discharge septic tank effluent into a completely pressurized pipe system terminating at a treatment plant or a gravity sewer. Because the mains are pressurized, there will be no infiltration into them, but infiltration and inflow into the house sewers and the septic tanks can occur. The volume of the septic tanks is often 1,000 gallons but varies widely. Septic tanks remove grit, settleable solids and grease.

The pumps, which can be part of the septic tank or in a separate well, typically are smaller than GP's. They are designed to pump septic tank effluent and have larger clearances but will not pump raw sewage solids. The head and flow rate provided by the pumps are generally about 50 feet and 15 gallons per minute (gpm) but vary widely. The working volume of the pump well is usually about 40 gallons but this also can vary widely. The discharge line from the pump is equipped with at least one check valve and one manual valve. Electrical service is required at each service connection.

The pipe network can contain closed loops but usually does not. The sewer profile normally parallels the ground surface profile, and the horizontal alignment can be curvilinear. Plastic pipe is generally used since it is economical in small sizes, and it resists corrosion by the septic wastewater. The minimum diameter is typically 1-1/4 inch for service connections and the smallest mains; although 2 to 3 inches is generally recommended. Cleanouts are used to provide access for flushing, and automatic air release valves are required at or slightly downstream of summits in the sewer profile. Air release points should have odor control facilities.

Because of the small diameters, curvilinear horizontal alignment, and profile paralleling the ground surface, excavation depths and volumes are usually much smaller for a STEP pressure sewer than for conventional sewers, sometimes requiring only a chain trencher. The frost line normally determines the depth of the sewer.

Two-compartment septic tanks may be more efficient at retaining solids, but single-compartment tanks have performed well. Septic tanks with integral pump vaults are available and reduce excavation on-lot.

Several dwelling units or other service locations can be clustered through a small diameter effluent sewer to a single septic tank, which should have an increased volume depending on the total population equivalent it serves. Clustered service connections have led to disputes over billing and responsibility for nuisance conditions and service calls.

STEP systems do not have the large build-in excess capacity typical of conventional gravity sewers. Therefore, they must be designed with an adequate allowance for future growth if that is desired.

Where pressure sewers are indicated, the choice between STEP and GP (grinder pump) systems depends on two main factors. First, the costs of on-lot facilities will generally be over 75 percent - perhaps well over 90 percent - of the total system cost. Therefore, the system with the lower average on-lot cost will ordinarily have the lower total cost. In some cases, STEP systems have the advantage of allowing some service connections to be gravity connections, thus lowering on-lot costs. GP systems usually have the pumps (and

grinders) at all service connections. The second factor is the relevance of design velocities. GP systems require a higher velocity because they carry macerated sewage solids and grease. STEP systems will better tolerate the low-flow conditions that occur in locations with a highly fluctuating seasonal occupancy and in locations with slow buildout from a relatively small initial population to the ultimate design population. Finally, a collection system totally created by STEP'S decreases preliminary treatment needs at the wastewater facility, but the septic tanks at each dwelling must be pumped regularly.

d. Vacuum Sewers

A vacuum sewer system has three major subsystems: the central collection station, the collection network, and the on-site facilities. Vacuum is generated at the central collection station and is transmitted by the collection network throughout the area being served. Sewage from conventional plumbing fixtures flows by gravity to an on-site holding tank. When about 10 gallons of sewage has been collected, the "vacuum interface" valve, which operates automatically using pneumatic controls, opens for a few seconds allowing the sewage and a volume of air to be sucked through the service pipe and into the main. The difference between the atmospheric pressure behind the sewage and the vacuum ahead provides the primary propulsive force. The fact that both air and sewage flow simultaneously produces high velocities and prevents blockages. Following the valve closure, the system returns to equilibrium and the sewage comes to rest at the low points of the collection network. After several valve cycles, the sewage reaches the central collection tank, which is under vacuum. When the sewage in the central collection tanks reaches a certain level, a conventional non-clog sewage pump discharges it through a force main to a treatment plant or gravity interceptor.

## 2. Treatment Options

a. Septic Tank

Septic tanks are buried, water-tight containers designed to receive raw wastewater, to separate solids from the liquid, to provide limited digestion of organic matter, to store solids, and to allow the clarified liquid to discharge for disposal.

The disposal method usually is subsurface. Septic tanks can be of various sizes with single-family on-lot tanks about 1,000 gallons (depending on house size) and communal tanks as large as needed.

b. Package Treatment Plant

The term “package treatment plant” refers to commercially available prefabricated treatment plants. Package treatment plants are often used to treat wastewater from individual properties and small communities. Common types of package treatment plants include: aerobic tanks, extended aeration, contact stabilization, sequencing batch reactors, rotating biological contactors, and physical/chemical treatment. When properly sized, operated and maintained, package treatment plants can provide satisfactory treatment for small flows.

c. Lagoon (Pond)

A lagoon (pond) is a body of wastewater contained in an earthen basin. Lagoons are popular in small communities because their low construction and operating costs offer significant financial advantages over other treatment methods. Lagoons can utilize anaerobic processes, aerobic processes or both (facultative lagoons). The aerobic ponds can be aerated with mechanical devices or aerated by natural processes such as wind turbulence and photosynthetic activity. DEP requires lagoons in series to make up a lagoon system. The type of lagoon system chosen as an alternative depends on land availability and flow characteristics.

d. Marsh - Pond - Meadow

A marsh/pond/meadow wastewater treatment system utilizes three natural ecological components to achieve a high level of treatment and, especially during the warmer months, a high degree of evapotranspiration. Some form of biological treatment, e.g., an aerated lagoon, precedes a man-made (usually clay-lined) marsh area which has been planted with appropriate species of vegetation (cattails, reeds, marsh grass, etc.) which provides further natural treatment. The marsh effluent then enters a pond (again, usually man-made and clay-lined) where the natural ecosystem of plants and animals further treat the effluent. Following the pond, water

is diverted through a meadow area which has been planted with species of grass which provide a high degree of nutrient uptake and evapotranspiration. Any effluent which leaves the meadow may be chlorinated and discharged to a stream or land applied.

e. Sand Filtration

There are several types of sand filtration: high rate, intermittent (ISF), and recirculating intermittent (RISF). The intermittent sand filter and recirculating intermittent sand filter are gravity filtration systems that are capable of producing a high quality effluent. They are both a biological and a physical wastewater treatment technology while the high rate filters are not. High rate filters are not discussed here because they usually are add-on's to package plants. ISF's and RISF's consist of an underdrained bed of granular material, usually sand. The filter surface is flooded intermittently with effluent from an aerobic unit, septic tank, package treatment unit or lagoon. The surface is allowed to drain between wastewater applications. Surface accumulations of solids are periodically removed from filters that are accessible and additional sand is added as necessary to ensure adequate filtration. Subsurface, nonaccessible types are bigger in surface area and require excavation of the filter for cleaning. RISF's return a portion of the drainage back onto the filter surface.

f. Constructed Wetlands

There are free surface (FSW) and subsurface wetlands (SSW). FSW show water at the surface amid the vegetation. SSW is created with water passing beneath the surface in a gravel bed. Wastewater enters a constructed wetland distributed evenly across the width. A waterproof liner is used on the sides and bottom of the cell to conserve water and provide more effective treatment. Cattails, bulrushes, or other plants are usually planted in the cells. The roots of these marsh plants form a dense mat among the gravel in SSF wetlands. Here chemical, biological and physical processes take place which purify the water. Water usually passes through several cells.

## 3. Disposal Options

### a. Subsurface Discharge

Septic tank or aerobic unit effluent usually flows to a distribution box. From this box, the liquid follows perforated distribution piping that has been laid in gravel-filled trenches (i.e., standard trench system). The gravel is covered with soil to the original ground level. From the piping, the liquid drains through the gravel and into the undisturbed soil beneath the trenches. Finally, the liquid reaches the groundwater. These systems are usually built on level ground or ground with moderate slopes.

Modifications of the standard trench system are implemented when particular soils and slopes cause constraints. These modified systems are seepage beds; subsurface sand filters; elevated sand mounds; and drip irrigation systems.

Seepage beds are similar to standard trenches, but the entire piped area is excavated. Seepage beds are a helpful alternative where space is somewhat limited. They require nearly level ground.

In an elevated sand mound system, effluent is pumped from a dosing tank (pressurized system required by DEP) to perforated pipe in a fabricated sand mound which covers plowed soil. Liquid flows through gravel, through sand and into the soil. The mound's vegetation enhances evapotranspiration. Although some natural soil permeability is required, an elevated sand mound may be placed in areas with a relatively shallow limiting zone, such as rocky or tight, clayey soils or soils with a high water table.

Drip irrigation systems have long been used for agricultural purposes but have only recently been adapted for wastewater treatment. Typically wastewater effluent from the septic tank flows into a chlorine dosing tank, then into a distribution unit, which consists of a pump, filters, valves, and meters. Finally, it flows into the drain field which consists of very small-diameter flexible drip irrigation tubing and emitters that are installed in narrow trenches within the root zone of vegetation either growing or proposed for the waste receiver site. The emitters discharge filtered wastewater to the soil. Although these are shallow systems

they have been used for year round residential disposal without problem.

Other modifications to the preceding four subsurface soil absorption systems include dosing systems, alternating absorption areas, serial distribution systems, evapotranspiration beds and oversized beds.

Dosing systems are trenches or beds which receive effluents from a pump or a siphon. This provides an even release of effluents from all points in the pipes. Distribution boxes are not needed in these systems.

Alternating absorption areas are actually two systems in one. One field is dosed and then rested, then the other is dosed and then rested. They require two distribution boxes and fields are usually switched every 6 to 12 months.

Serial distribution systems apply effluent by pump through absorption trenches which follow topographic contours. The trenches are in tiers-one above another. Drop boxes regulate liquid flow so the highest trench fills first, the second trench fills next, etc. These systems are conducive to severely sloped land.

Oversized beds are absorption beds that are sized larger than normal due to low soil percolation rates. Otherwise, the oversized bed is designed as an absorption bed.

b. Land Application

Treated, chlorinated wastewater effluent is applied by sprinkling to vegetated soils that are moderate in permeability (clay loams to sandy loams). It is treated as it travels through the soil matrix by filtration, absorption, ion exchange, precipitation, microbial action and also by plant uptake. Sprinklers can be categorized as hand moved, mechanically moved and permanent set, the selection of which includes the following considerations: field conditions (shape, slope, vegetation and soil type), climate, operating conditions, and economics. Vegetation is a vital part of the process and serves to extract nutrients, reduce erosion and maintain soil permeability.

c. Discharge to Groundwater

Where groundwater pollution would result from the use of traditional sub-surface disposal systems, the State allows for the use of a high level of treatment prior to sub-surface disposal. Thus, the system is more dependent upon the treatment plant than the soil matrix for groundwater protection.

d. Stream Discharge

The discharge of treated and chlorinated effluent to a surface stream is an alternative on-site disposal method that can be used when a conventional soil absorption system would be inadequate as a treatment and disposal medium. If appropriate receiving water is available, the level of treatment required may vary depending on local regulations, stream water quality requirements and other site-specific conditions.

In floodplain soils, areas of seasonal high water table, or areas where the soils will not support effluent disposal methods, stream discharge may be installed.

Since these systems discharge to surface waters, they require a National Pollution Discharge Elimination System (NPDES) permit and must provide improved effluent quality to meet the standards set for discharges to surface waters. These systems cannot discharge into a stream designated as Exceptional Value under Chapter 93 and may only discharge into a high quality stream when used to repair a malfunctioning system.

e. Small Flow Spray Irrigation System

Individual spray irrigation systems utilize a stationary sprinkler irrigation system, similar to those used on golf courses, to spray treated effluent over the surface of the land. These systems require a PA DEP, Bureau of Water Quality Management Permit (established under the PA Clean Streams Law). The same treatment processes that occur during land application described in Section C above also occur during small flow spray irrigation. In addition, a holding facility with a storage capacity for approximately three days' flow (minimum of one thousand gallons) must be

included to avoid spraying during adverse conditions such as heavy rainfall, extreme cold, high winds, or deep snow.

The sprinkler system is generally designed to spray for a short period of time (ten minutes) each day. This is usually done at night to avoid contact with people and domestic animals.

f. Evapotranspiration Beds

Evapotranspiration beds are mounds of sand that are lined with an impervious liner into which the effluent is pumped. There is no percolation to groundwater with this type of system. All of the effluent is evapotranspirated through the soil surface and cover vegetation.

g. Holding Tank

As defined by DEP regulations, a holding tank is a water-tight receptacle which receives and retains sewage and is designed and constructed to facilitate ultimate disposal of the sewage at another site. Holding tanks are used only on a temporary basis. The term "retaining tank," as defined by DEP, includes chemical toilets, privies, incinerating toilets, composting toilets, and recycling toilets; this term embodies treatment methodologies, as well.

## B. Wastewater System Selection Strategy

From the wastewater system alternatives deemed technologically appropriate in Table V-2, the Township has: 1) selected those systems that are consistent with its land use and natural resource policies; and 2) developed a prioritized ranking of those systems, based primarily on the degree of consistency with and support for those policies and, secondarily, on construction and maintenance costs and administrative needs.

On the basis of the 2005 Indian Valley Regional Comprehensive Plan and the current Zoning Ordinance for Upper Salford, the Township projects its future to be that of a relatively low-density residential community with pockets of existing moderate density (Village) areas. These existing Villages and Rural resource areas are to be served with individual on-lot disposal systems when possible. Flexible design alternatives, essentially through a conservation design option, will present the potential need for sewage disposal systems other than individual on-lot systems on a site-by-site basis.

Table V-2
General Applicability of Wastewater Alternatives
For Upper Salford Township

| ALTERNATIVE | Applicability YES/NO | COMMENTS |
|---|---|---|
| COLLECTION SYSTEM ALTERNATIVES | | |
| Individual | | |
| On-lot | Yes | Individual OLDS |
| Community | | |
| Conventional Gravity Sewer | Yes | **Where topography permits** |
| Small Diameter Gravity Sewers | Yes | Precede by on-site treatment (Septic Tanks) |
| Pressure Sewers | Yes | Adaptable to flat or rolling terrain |
| Vacuum Sewers | No | Less proven and more site specific than pressure sewers |
| TREATMENT ALTERNATIVES | | |
| Individual | | |
| Septic Tanks | Yes | Educate homeowners concerning need for OLDS maintenance |
| Aerobic Units | Yes | More expensive more maintenance than septic tank |
| Lagoons | Yes | With surface application of treated effluent |
| Physical-Chemical Systems | No | Basic cost prohibitive |
| Intermittent Sand Filter | Yes | |
| Constructed Wetlands | Yes | |
| Community | | |
| Septic Tanks | Yes | |
| Aerobic Units (Biological Treatment) | Yes | |
| Lagoons (Biological Treatment) | Yes | |
| Physical-Chemical Systems | Yes | |
| Intermittent Sand Filter | Yes | |
| Constructed Wetlands | Yes | |
| DISPOSAL ALTERNATIVES | | Usually very costly to maintain and generally not in conformance with DEP regulations as a permanent system |
| Individual | | **Allowed on a case by case basis when applicant demonstrates all other alternatives have been exhausted.** |
| Holding Tanks | No | |
| Land Disposal | | |
| Subsurface | | Preferred alternative |
| Conventional | Yes | |
| Alternate/**Experimental** | Yes | Depending on types allowed by DEP |
| Surface Application | Yes | Slow rate land application per DEP Guidelines |
| Stream Discharge | Yes | Depends on effluent criteria set by DEP |
| Community | | |
| Holding Tanks | Yes | When in conformance with DEP regulations |
| Land Disposal | | |
| Subsurface | | |
| Conventional | Yes | Dependent upon available soils |
| Alternate | Yes | Depending on types allowed by DEP |
| Surface Application | | |
| Discharge to Groundwater | Yes | Per DEP regulations |
| Small Flow Stream Discharge | Yes | Based on groundwater protection measures |
| Small Flow Spray Irrigation | Yes | Contingent upon stream designation |

This growth management approach provides the framework for the Township's sewage planning policies which are articulated in Chapter IV. These policies assign first priority to individual on-lot sewage systems (OLDS) to serve both existing and future development wherever feasible.

The Township currently has no other type of sewage facility. Where the conditions (i.e., density and soils) allow them to function, OLDS are most compatible with the residential, agricultural preservation, and water quality goals of the Township. The Township recognizes its responsibility to adopt a complete OLDS Management Ordinance and support plan to ensure adequate enforcement of the same.

The two factors that will necessitate alternatives to this preferred system are, in fact, density and soils. While there is no existing development in the Township that is served by a community system, the Regional Comprehensive Plan and Zoning Ordinance propose future development options that will require such systems. In such cases, the Township's policy will be to permit a community system with capacity geared to serving the needs of that particular development. Exceptions might be where adjacent developments are served jointly by a community system, and where existing on-lot system failures are best remedied through connection to such a system. In general, the Township's policy will be to avoid creation of excess, unallocated capacity in its community systems.

The Township does not wish to see the creation of large, centralized off-site treatment facilities with large amounts of reserve capacity created to serve the needs of future development. It also has a distinct preference against the construction of a wastewater collection system to transport effluent out of the Township for treatment and disposal in an adjacent community. These concepts were given significant consideration in earlier sewage facilities plans for Upper Salford.

In summary, Upper Salford supports two general types of wastewater facilities to meet its future growth needs: individual on-lot disposal systems (OLDS) and community systems. In broad terms, these systems can be defined as:

1. Individual OLDS: The utilization of on-site treatment and disposal alternatives on individual parcels independent of other parcels or systems. Supported by an OLDS management plan.

2. Community system: Wastewater collection within a designated service area, with treatment and disposal designed and sized to service the specific needs of a subdivision or land development.

Each of these system types can consist of various combinations of components and technologies. For example, disposal methods could include subsurface or land surface. Tables V-3 and V-4 list the available technologies for OLDS and community systems, respectively, in descending order of the Township's preference.

## C. Alternative Wastewater Facilities for Study Areas

For purposes of analysis and consideration of appropriate alternatives, Upper Salford's land area is divided into **Four** study areas, as shown in Map Figure 13. The basis for delineation of these study areas includes existing concentrations of development, existing on-site problem areas and the Rural Balance of the Township.

The study areas are:

1. Woxall Area
2. Salford Area
3. Salfordville Area
4. Rural Balance of the Township

Common to all of the study areas is the Township's desire to rely on individual OLDS whenever conditions allow. However, due to the small lot size and densities of the existing problem areas and the densities proposed under the Conservation Design Option of the Zoning Ordinance, the Township recognizes the potential need for community systems. For both existing and future individual systems, the Township will place emphasis on a program of on-lot system management, as described in this chapter. Within an overall program of education and monitoring, particular attention will be paid to sand mounds and to alternative individual systems using land application or stream discharge disposal technology. The ranking of preferred technology shall be as shown in Table V-3.

Table V-3

## INDIVIDUAL ON-LOT DISPOSAL SYSTEMS (OLDS) SELECTION

### POLICY

Encourage individual on-site treatment and disposal wherever feasible (depending on soil and site characteristics and density requirements). Repair existing OLDS where conditions require.

### METHODOLOGY

Evaluate the following wastewater technologies in sequence, beginning with Technology A. This technology evaluation sequence establishes a hierarchy of system preference. This hierarchy is intended to direct applicants proposing wastewater systems in the Township to utilize the technology most desired by the municipality.

The intent of this hierarchy is to place the responsibility of demonstrating the feasibility of a particular technology upon the applicant. If the applicant can prove, to the satisfaction of the Township, that a more preferred technology cannot be utilized then the next technology on the list is evaluated. The Township shall consider physical limitations, but not costs, in its evaluation of the feasibility of a preferred technology. This evaluation of technologies will be conducted under close scrutiny of the Township and its consultants and must fully comply with the DEP wastewater regulations.

### TECHNOLOGY EVALUATION

A. Septic tank/subsurface disposal system.
   1. Standard trench
   2. Seepage bed
   3. Elevated sand mound

B. Aerobic tank or septic tank/intermittent sand filter with subsurface disposal.

C. Aerobic tank/slow rate land application (i.e., spray irrigation).

D. Septic tank, aerobic or septic tank/sand filter treatment with alternative disposal area (e.g., oversized bed or evapotranspiration system).

E. Surface or subsurface alternative/experimental system.

F. Aerobic tank or septic tank and sand filter with stream or dry swale discharge.

G. Individual holding tank.

Table V-4

## COMMUNITY SYSTEM SELECTION

**POLICY**

Community systems will be used to serve new conservation subdivisions or specified problem areas and will have capacity limited to the needs of the conservations subdivision and/or specified problem area.

**METHODOLOGY**

Evaluate the following wastewater technologies in sequence, beginning with Technology A. This technology evaluation sequence establishes a hierarchy of system preference. This hierarchy is intended to direct applicants proposing wastewater systems in the Township to utilize the technology most desired by the municipality.

The intent of this hierarchy is to place the responsibility of demonstrating the feasibility of a particular technology upon the applicant. If the applicant can prove, to the satisfaction of the Township, that a more preferred technology cannot be utilized then the next technology on the list is evaluated. This evaluation of technologies will be conducted under close scrutiny of the Township and its consultants and must fully comply with the DEP wastewater regulations.

**TECHNOLOGY EVALUATION**

A. Community septic tank/intermittent sandfilter/sub-surface disposal.
B. Community aerobic unit/sand filter/sub-surface disposal.
C. Lagoon/pond system/slow rate land application (i.e., spray irrigation).
D. Community aerobic unit/slow rate land application.
E. Community septic tank/alternate system.
F. Community aerobic unit/alternate systems.
G. Community aerobic unit/stream discharge.
H. Central holding tank (temporary).

NOTES:

1. Sand filters shall be intermittent sand filters, recirculating intermittent sand filters, or rapid sand filters. Rapid sand filters shall have flow equalization and sufficient storage capacity for treatment upsets.

Each study area, or group of areas, also has particular wastewater facility needs related to natural characteristics and existing and proposed land use. The wastewater facility alternatives for the various study areas are as follows:

## Study Areas 1, 2 and 3 Woxall, Salford and Salfordville

These three study areas are experiencing the common problem of malfunctioning individual on-lot systems. Each village has similar conditions with respect to age of systems, lot size and soils. It is for these reasons that the alternative analysis will be performed collectively for the three areas.

The Township proposes to address the problems in the above-mentioned study areas with one or a combination of the following alternatives:

### 1. Replacement with Conventional OLDS

Under this alternative, the OLDS Selection Strategy in Table V-3 would be used to determine the type of system to be constructed. The selection strategy allows for alternative systems in the event that site conditions negate the use of conventional systems. The Township recognizes that this approach will necessitate an aggressive management role for the Township. Given the soil limitation with respect to effluent disposal, the small lot sizes and the percentage of malfunctioning on-lot disposal systems identified through well testing and septic survey within these three study areas; it does not appear practical to propose replacement of failing OLDS on an individual basis.

### 2. Community Systems

There are 162 dwellings within the **Woxall** study area. This area generates a daily design flow requirement of **42,525.0 gpd** (162 edu's x 262.5gpd/edu). There are 93 dwellings in the **Salford** study area. This area generates a daily design flow requirement of **24,412.5 gpd**. The **Salfordville** study area contains 62 dwellings and generates a daily design flow requirement of **16,275.0 gpd**. The total daily design flow requirement for the three study areas is **83,212.5 gpd**. Under this alternative we would typically look at a localized community sewage treatment /disposal strategy as outlined in Table V-4. However, due to the limitations of the soils in the proximity of the village areas and the significant flows associated with the villages, individual community options are limited. It is for this reason that centralized treatment and disposal options shall be explored first when analyzing alternatives for these

existing needs areas. Decentralized treatment alternatives are also explored in the analysis. Based upon the field survey data collected and the records maintained by the Montgomery County Health Department, it appears that all of these areas require prompt remedial action on a community scale. The following alternatives have been reviewed:

**a. Community Treatment with Stream Discharge**

Upon map survey of the available soils, historic record of malfunctions with soil based OLDS and soil test results from properties in close proximity to the study areas; it was determined that the soils would not support year round subsurface disposal of treated effluent. This implies that either an alternate disposal site or seasonal storage areas (Lagoons) would have to be established. The lagoon storage would use a significant amount of the land available for disposal therefore centralized treatment with stream discharge was evaluated first. Land disposal options are thoroughly explored in later alternative analysis.

**(Option 1) – Combined community treatment with stream discharge**

This option is to collect the sewage flows generated by Woxall and Salford and convey them to Waste Water Treatment Plant (WWTP) located on municipal property located along the Perkiomen Creek. The sewage flows generated by Salfordville would be directed to the existing WWTP at Shelly Square Shopping Center with disposal to the East Branch of the Perkiomen Creek. Both streams have water quality designations and discharge limits that would allow for this proposal. Map Figure 15 – Option 1 graphically represents this proposed alternative. The option would necessitate the creation of an additional wastewater treatment plant but minimize the length of collection lines outside of service areas. It also lends itself to a phased implementation plan. No land acquisition or lease agreements would be necessary under this option. The municipality would own and operate both WWTP's under this option.

**(Option 2) – Combined community treatment with stream discharge**

This option would propose the sewage flows collected from Woxall and Salfordville be directed to the existing WWTP at Shelly Square for treatment with disposal to the East Branch of the Perkiomen Creek. Sewage flows generated by Salford would be directed to a WWTP established on municipal property with discharge to the Perkiomen Creek. Both streams have water quality designations and discharge limits that would allow for this proposal. Map Figure 15 – Option 2 graphically represents this proposed alternative. This option allows the needs area of Salford to be remedied with a community specific treatment facility, but extends conveyance lines through more land outside of the service areas. This option also lends itself to a phased implementation plan. This option requires no acquisition of land to implement. The municipality would own and operate both WWTP's under this option.

(**Option 3) – Centralized treatment with stream discharge**

This option proposes the sewage flows generated from Salford, Salfordville and Woxall **(83,212.5 gpd)** to be collected and conveyed to the existing Shelly Square WWTP for treatment with disposal to the East Branch of the Perkiomen Creek. Map Figure 15 – Option 3 graphically represents this proposed alternative. The existing WWTP facility can be upgraded to accommodate these increased flows. The East Branch of the Perkiomen Creek has a water quality designation and discharge limits that would allow for this level of disposal. This option would eliminate the need for a second WWTP at the Salford location. Length of conveyance lines outside the service areas would be increased. Utilization of low pressure force mains would physically limit the potential for properties outside the service area to connect. This plan also lends itself to phased implementation, but not with respect to the treatment facility. This option requires no acquisition of land to implement. The municipality would own and operate the Shelly Square WWTP's under this option.

**b. Centralized Treatment with a Combination of Land Based Disposal and Stream Discharge**

Upper Salford Township has evaluated eighteen potential sites that the township either currently owns or believes that they can purchase/lease in order to dispose of treated effluent from a proposed mechanical wastewater treatment plant. These properties are graphical delineated on Map Figure 17. The eighteen sites were evaluated based upon the size of the tract as well as the constrained areas on each tract. The constrained areas are comprised of floodplain, hydric soil, wetlands and/or steep slopes. Steep slopes were defined as slopes greater than twenty five percent. The following is a summary of the properties that were evaluated:

**LAND BASED DISPOSAL SITE EVALUATION**

| Tax Parcel Number | Address | Gross Area (Acres) | Constrained Area (Acres) | Net Area (Acres) |
|---|---|---|---|---|
| 620000037009 | 2469 BERGEY RD | 44.08 | 9.01 | 35.07 |
| 620001963009 | 493 OLD SKIPPACK RD | 84.04 | 15.29 | 68.75 |
| 620001984006 | 141 OLD SKIPPACK RD | 106.00 | 41.98 | 64.02 |
| 62000163108 | SHELLY ROAD | 105.41 | 48.48 | 56.93 |
| 620000856036 | THOMPSON RD | 4.38 | 1.54 | 2.84 |
| 620001091008 | 2540 PERKIOMENVILLE R | 21.18 | 2.29 | 18.89 |
| 620001387009 | 1729 SALFORD STATION | 19.88 | 17.53 | 2.35 |
| 620001390006 | 1591 SALFORD STATION | 0.48 | 0.36 | 0.12 |
| 620001408006 | 43 SALFORD STATION RD | 22.95 | 20.02 | 2.93 |
| 620001423504 | 0 SALFORD STATION RD | 11.16 | 6.62 | 4.54 |
| 620001530001 | SCHWENKSVILLE RD | 2.68 | 0.38 | 2.30 |
| 620001531009 | 331 SCHWENKSVILLE RD | 37.05 | 23.10 | 13.95 |
| 620001582003 | 1243 SCHWENKSVILLE RD | 1.91 | 0.89 | 1.02 |
| 620001582012 | SCHWENKSVILLE RD | 14.19 | 2.75 | 11.44 |
| 620001583002 | SCHWENKSVILLE RD | 24.12 | 13.65 | 10.47 |
| 620001739017 | OLD SKIPPACK RD | 7.52 | 0.25 | 7.27 |
| 620002037007 | SPRING MOUNT RD | 93.84 | 60.23 | 33.61 |
| 620002042002 | SUMNEYTOWN PIKE | 0.58 | 0.00 | 0.58 |

The remaining net areas of each property were then evaluated based upon the existing soils mapping to determine the suitability for land based disposal of treated effluent. The soil mapping revealed that the soils on the

properties were either somewhat limited or very limited for land based disposal of treated effluent. Since the soils were limited in their ability to dispose of treated effluent for the purposes of the Act 537 Plan evaluation, the soils were assumed to be somewhat poorly drained soils that could be irrigated only during the growing season. This will result in an application rate of 0.5 inches per acre per week or 1,940 gpd per acre during the growing season. This is an annual loading application rate of 957 gpd per acre. The growing season is from April 1 to September 30 of each year. Since the soils are only generally suitable for growing season land based disposal of treated effluent, spray irrigation is the most practical and cost effective means of disposing of the treated effluent to the land. The treated effluent will have to be either stored in a lagoon or discharged to stream during the remainder of the year. The mechanical wastewater treatment plants that have been proposed by this plan will provide denitrification of the wastewater therefore a nitrogen balance will not be a limiting factor in the land based disposal of the treated effluent.

The following buffer requirements were used in evaluating each site for the use of spray irrigation as the means of land based disposal of the treated effluent.

| | | |
|---|---|---|
| Occupied Dwelling Unit | = | 100 feet |
| Other Buildings | = | 50 feet |
| Property Lines | = | 50 feet |
| Township or State Roads | = | 50 feet |
| Stormwater Facilities | = | 50 feet |
| Wetlands | = | 25 feet |

The use of drip irrigation was also considered but was not selected in the initial evaluation due to the fact of the primary advantage of drip irrigation is the ability to use the soil as a means of disposal all year round which reduces the storage requirements. Since the soils will most likely not support year round disposal of treated effluent this is no longer an advantage. The other major issue is the additional required infrastructure for drip irrigation. Drip irrigation will require twice as many force mains to be installed on site for the dose and return or flush force mains. The other major issue is that a portion of the flush water and the backwash from the filters will need to be returned to the WWTP. This will require additional conveyance lines back to the proposed collection system. This volume must also be retreated by

the mechanical WWTP. Drip irrigation also requires the use of a covered concrete storage tank with a minimum of three days of storage. Drip irrigation also requires the use of electronically actuated valves that require numerous control wires out into the fields that need to be maintained. This also requires additional capital expense of having to install additional vaults in the drip fields to house the valves.

It was assumed that approximately sixty five percent of the net area may be able to be used on each property. This is an assumption based upon past design experience. This factor will take into account the reduction of areas due to buffer requirements or portions of the useable soils that are too small to allow for the use of standard spray irrigation sprinklers. This assumption will have to be confirmed based upon a detailed layout of each property after a certified soil scientist has confirmed that the soil is suitable for spray irrigation and the PA DEP has witnessed and approved the soil classification.

For the purposes of this evaluation it has been determined that a net useable area, including the reduction factor of 0.65, of at least five useable acres is required in order for a property to be considered for land based disposal of treated effluent. This will result in a minimum seasonal application rate of 9,700 gpd (5 acres x 1,940 gpd/acre) or an annual application rate of 4,785 gpd (5 acres x 957 gpd/acre). The use of properties with a disposal capacity less than the above is not recommended unless it is adjacent to another property that will be utilized for land based disposal. This recommendation is based upon the on going operation and maintenance costs of operating a land based disposal field. Based upon these criteria the following seven properties were eliminated from additional consideration:

| Tax Parcel Number | Address | Gross Area (Acres) | Constrained Area (Acres) | Net Area (Acres) |
|---|---|---|---|---|
| 620000856036 | THOMPSON RD | 4.38 | 1.54 | 2.84 |
| 620001387009 | 1729 SALFORD STATION | 19.88 | 17.53 | 2.35 |
| 620001390006 | 1591 SALFORD STATION | 0.48 | 0.36 | 0.12 |
| 620001408006 | 43 SALFORD STATION RD | 22.95 | 20.02 | 2.93 |
| 620001530001 | SCHWENKSVILLE RD | 2.68 | 0.38 | 2.30 |
| 620001582003 | 1243 SCHWENKSVILLE RD | 1.91 | 0.89 | 1.02 |
| 620002042002 | SUMNEYTOWN PIKE | 0.58 | 0.00 | 0.58 |

The following eleven properties were evaluated in order to determine their potential for being utilized for a land based disposal of treated effluent.

| Tax Parcel Number | Address | Gross Area (Acres) | Constrained Area (Acres) | Net Useable Area (Acres) |
|---|---|---|---|---|
| 620000037009 | 2469 BERGEY RD | 44.08 | 9.01 | 35.07 |
| 620001091008 | 2540 PERKIOMENVILLE RD | 21.18 | 2.29 | 18.89 |
| 620001531009 | 331 SCHWENKSVILLE RD | 37.05 | 23.10 | 13.95 |
| 620001582012 | SCHWENKSVILLE RD | 14.19 | 2.75 | 11.44 |
| 620001583002 | SCHWENKSVILLE RD | 24.12 | 13.65 | 10.47 |
| 620002037007 | SPRING MOUNT RD | 93.84 | 60.23 | 33.61 |
| 620001739017 | OLD SKIPPACK RD | 7.52 | 0.25 | 7.27 |
| 620001423504 | 0 SALFORD STATION RD | 11.16 | 6.62 | 4.54 |
| 620001963009 | 493 OLD SKIPPACK RD | 84.04 | 15.29 | 68.75 |
| 620001984006 | 141 OLD SKIPPACK RD | 106.00 | 41.98 | 64.02 |
| 620001631008 | SHELLY ROAD | 105.41 | 48.48 | 56.93 |

The following is summary of each property and the potential useable capacity of the property for land based disposal of treated effluent. The actual capacity of the property cannot be determined until a certified soil scientist classifies and delineates the soils on each site. This delineation and classification has to be witnessed and approved by the PA DEP. Once the soil classification and boundaries have been determined then a detailed layout of individual sprinklers must be performed in order to determine the wetted area of the useable soils. Once the wetted area is determined then a detailed hydrogeologic report including a mounding analysis must be performed by a licensed hydro-geologist in order to verify that, including the impact of the proposed application of treated effluent, a four-foot separation will exist between the seasonal high ground water table and the finished grade and to ensure that no breakout of ground water will occur.

**Tax Parcel No. 620000037009 – 2469 Bergey Road and 620001739017 Old Skippack Rd**

These two parcels are adjoining and have a combined net area of 42.34 acres out of the combined total area of 51.6 acres. In order to estimate the potential useable area of this combined tract the net area must be multiplied by the use factor of 0.65 to determine the net usable area. This results in a net useable area of 27.5 acres. This area has the

potential disposal capacity of 53,350 gpd (27.5 acres x 1,940 gpd/acre) during the growing season. In order to utilize this capacity the treated effluent would have to be discharged to the stream from October to the end of March. Since spray irrigation is normally only applied to the land once a week and given the fact the this area occasionally receives prolonged rain events during the growing season, a effluent storage lagoon with at least fourteen days storage capacity would be required. This is a storage capacity of approximately 746,900 gallons. If property were to be used for spray irrigation disposal with out having a seasonal stream discharge, the disposal capacity of this property would be 26,318 gpd (27.5 acres x 957 gpd/acre). This would require a storage lagoon with a capacity to store the treated effluent during the approximate 182 days of the non-growing season. This will require lagoon with a volume of approximately 4,789,876 gallons.

This property is located close to one of the proposed wastewater treatment plant locations (Shelly Square WWTP) so the infrastructure to convey the treated effluent from the WWTP to the disposal site would require approximately 5,000 linear feet of four inch force main. Given the large amount of storage required for a year round disposal of the treated effluent it may be more practical to utilize a seasonal stream discharge in conjunction with a seasonal land based disposal option. The area required for storage lagoon(s) of almost five million gallons would greatly reduce the available land that could be utilized for disposal of the treated effluent. If this option were utilized then a storage lagoon and irrigation pump station would be required to be installed on the property since the Shelly Square WWTP property does not have sufficient land to for the construction of a storage lagoon.

The estimated construction costs to utilize this area as a spray irrigation field is approximately $1,570,000.00. The construction costs were estimated based upon a force main cost of $240,000.00 (4,000 lf x $60.00/lf), pumps and wet well at the WWTP to convey the treated effluent from the WWTP to the spray field $105,000.00, storage lagoon $275,000.00, irrigation pump station at site $400,000.00 and the cost of the spray fields of $550,000.00 (27.5 acres x $20,000.00).

It should be noted that Upper Salford Township currently owns both tax parcel number 620001739017 and 620000037009.

**Tax Parcel No. 620001963009-(493 Old Skippack Rd.), 620001984006-(141 Old Skippack Rd) and 620001631008-(0 Shelly Road)**

These three parcels are adjoining and have a combined net area of 189.7 acres out of the combined total area of 295.4 acres. In order to estimate the potential useable area of this combined tract the net area must be multiplied by the use factor of 0.65 to determine the net usable area. This results in a net useable area of 123.3 acres. This area has the potential disposal capacity of 239,211gpd (123.3 acres x 1,940 gpd/acre) during the growing season. In order to utilize this capacity the treated effluent would have to be discharged to the stream from October to the end of March. This disposal capacity exceeds the needs of the three study areas. The disposal capacity required for the three areas would be 83,212.5 gpd. Since spray irrigation is normally only applied to the land once a week and given the fact the this area occasionally receives prolonged rain events during the growing season, a effluent storage lagoon with at least fourteen days storage capacity would be required. This is a storage capacity of approximately 1,164,975 gallons. If property were to be used for spray irrigation disposal with out having a seasonal stream discharge, the disposal capacity of this property would be 117,998 gpd (123.3 acres x 957 gpd/acre). This would require a storage lagoon with a capacity to store the treated effluent during the approximate 182 days of the non-growing season. This will require lagoon with a volume of approximately 15,144,675 gallons.

These properties are all close to one of the proposed wastewater treatment plant locations (Shelly Square WWTP) so the infrastructure to convey the treated effluent from the WWTP to the disposal site would require approximately 2,700 linear feet of four inch force main. Given the large amount of storage required for a year round disposal of the treated effluent it may be more practical to utilize a seasonal stream discharge in conjunction with a seasonal land based disposal option. The area required for storage lagoon(s) of approximately 15 million gallons of treated effluent would greatly reduce the available land that could be utilized for disposal of the treated effluent. If this option were utilized

then a storage lagoon and irrigation pump station would be required to be installed on the property since the Shelly Square WWTP property does not have sufficient land to for the construction of a storage lagoon.

The estimated construction costs to utilize this area as a spray irrigation field for the full disposal requirements of the Township study areas (83,212.5 gpd) is approximately $10,787,315.00. The construction costs were estimated based upon a force main cost of $162,000.00 (2,700 lf x $60.00/lf), pumps and wet well at the WWTP to convey the treated effluent from the WWTP to the spray field $105,000.00, storage lagoon $8,331,287.00, irrigation pump station at site $450,000.00 and the cost of the spray fields of $1,739,000.00 (86.95 acres x $20,000.00).

It is also noted that Upper Salford Township would have to either purchase all parcels or obtain an easement to utilize these parcels for land based disposal of treated effluent.

**Tax Parcel No. 620001091008 – 2540 Perkiomenville Road**

This parcel has a net area of 18.89 acres out of the total area of 21.18 acres. In order to estimate the potential useable area of this tract the net area must be multiplied by the use factor of 0.65 to determine the net usable area. This results in a net useable area of 12.28 acres. This area has the potential disposal capacity of 23,823 gpd (12.28 acres x 1,940 gpd/acre) during the growing season. In order to utilize this capacity the treated effluent would have to be discharged to the stream from October to the end of March. Since spray irrigation is normally only applied to the land once a week and given the fact the this area occasionally receives prolonged rain events during the growing season, a effluent storage tank with at least fourteen days storage capacity would be required. This is a storage capacity of approximately 333,522 gallons. If property were to be used for spray irrigation disposal with out having a seasonal stream discharge, the disposal capacity of this property would be 11,751 gpd (12.28 acres x 957 gpd/acre). This would require a storage lagoon with a capacity to store the treated effluent during the approximate 182 days of the non-growing season. This will require lagoon with a volume of approximately 2,138,682 gallons.

This property is not located close to either of the proposed treatment plant locations so the infrastructure to convey the treated effluent from either WWTP to the disposal site would require approximately 22,000 linear feet of four inch force main from the Shelly Square WWTP or 10,000 linear feet from the Salford WWTP. While portions of the treated effluent force main could be installed in a common trench with the raw wastewater force main it is still a long distance to transport the effluent. Given the large amount of storage required for land only disposal of the treated effluent it may be more practical to utilize a seasonal stream discharge in conjunction with a seasonal land based disposal option. If this option were utilized then a storage lagoon and irrigation pump station would be required to be installed on the property since the Shelly Square WWTP property does not have sufficient land to for the construction of a storage lagoon.

The estimated construction costs to utilize this area as a spray irrigation field is approximately $2,377,800.00. The construction costs were estimated based upon a force main cost of $1,320,000.00 (22,000 lf x $60.00/lf), pumps and wet well at the WWTP to convey the treated effluent from the WWTP to the spray field $105,000.00, storage lagoon $175,000.00, irrigation pump station at site $400,000.00 and the cost of the spray fields of $377,800.00 (18.89 acres x $20,000.00).

It is also noted that Upper Salford Township currently owns tax parcel number 620001091008.

**Tax Parcel No. 620001531009 – 331 Schwenksville Road and 620002037007 Spring Mount Rd**

These two parcels are adjoining and have a combined net area of 47.56 acres out of the combined total area of 130.89 acres. In order to estimate the potential useable area of this combined tract the net area must be multiplied by the use factor of 0.65 to determine the net usable area. This results in a net useable area of 30.9 acres. This area has the potential disposal capacity of 59,946 gpd (30.9 acres x 1,940 gpd/acre) during the growing season. In order to utilize this capacity the treated effluent would have to be discharged to the stream from October to the end of March. Since spray irrigation is normally only applied to the land once a week and given the fact the this area occasionally receives

prolonged rain events during the growing season, a effluent storage tank with at least fourteen days storage capacity would be required. This is a storage capacity of approximately 839,244 gallons. If property were to be used for spray irrigation disposal without having a seasonal stream discharge, the disposal capacity of this property would be 29,571 gpd (30.9 acres x 957 gpd/acre). This would require a storage lagoon with a capacity to store the treated effluent during the approximate 182 days of the non-growing season. This will require lagoon with a volume of approximately 5,381,922 gallons.

This property is located approximately equidistant from either of the two proposed wastewater treatment plant locations (Shelly Square WWTP or Salford WWTP) so the infrastructure to convey the treated effluent from the WWTP to the disposal site would require approximately 12,900 linear feet of four inch force main from either WWTP. This is a long distance to transport the effluent. Given the large amount of storage required for year round land only disposal of the treated effluent it may be more practical to utilize a seasonal stream discharge in conjunction with a seasonal land based disposal option. If this option were utilized then a storage tank and irrigation pump station would be required to be installed on the property since neither of the proposed WWTP site would have sufficient room for storage lagoons.

The area required for storage lagoon(s) of almost five and a half million gallons needed for land only disposal would greatly reduce the available land that could be utilized for disposal of the treated effluent. If this option were utilized then a storage lagoon and irrigation pump station would be required to be installed on the property since neither WWTP property has sufficient land for the construction of a storage lagoon.

The estimated construction costs to utilize this area as a spray irrigation field is approximately $2,505,200.00. The construction costs were estimated based upon a force main cost of $774,000.00 (12,900 lf x $60.00/lf), pumps and wet well at the WWTP to convey the treated effluent from the WWTP to the spray field $105,000.00, storage lagoon $275,000.00, irrigation pump station at site $400,000.00 and the cost of the spray fields of $951,200.00 (47.56 acres x $20,000.00).

It is also noted that Upper Salford Township currently owns both tax parcel numbers 620001531009 and 620002037007.

**Tax Parcel No. 6200001582012 – Schwenksville Road, 620001423504 and 620001583002 - Schwenksville Road**

These three parcels are adjoining and have a combined net area of 26.45 acres out of the combined total area of 49.47 acres. In order to estimate the potential useable area of this combined tract the net area must be multiplied by the use factor of 0.65 to determine the net usable area. This results in a net useable area of 17.2 acres. This area has the potential disposal capacity of 33,353 gpd (17.2 acres x 1,940 gpd/acre) during the growing season. In order to utilize this capacity the treated effluent would have to be discharged to the stream from October to the end of March. Since spray irrigation is normally only applied to the land once a week and given the fact the this area occasionally receives prolonged rain events during the growing season, a effluent storage tank with at least fourteen days storage capacity would be required. This is a storage capacity of approximately 466,948 gallons. If property were to be used for spray irrigation disposal with out having a seasonal stream discharge, the disposal capacity of this property would be 16,460 gpd (17.2 acres x 957 gpd/acre). This would require a storage lagoon with a capacity to store the treated effluent during the approximate 182 days of the non-growing season. This will require lagoon with a volume of approximately 2,995,720 gallons.

This property is located approximately equidistant from either of the two proposed wastewater treatment plant locations (Shelly Square WWTP or Salford WWTP) so the infrastructure to convey the treated effluent from the WWTP to the disposal site would require approximately 8,600 linear feet of four inch force main from Shelly Square WWTP and 8,300 linear feet from the Salford WWTP. This is a relatively long distance to transport the effluent; however these sites could be supplied by the same effluent force main as 331 Schwenksville Road and the Spring Mount Road property. Given the large amount of storage required for year round land only disposal of the treated effluent it may be more practical to utilize a seasonal stream discharge in conjunction with a seasonal land based disposal option. If this option were utilized then a storage tank and irrigation pump station would be required to be installed on the

property since neither of the proposed WWTP sites would have sufficient room for storage lagoons.

The area required for storage lagoon(s) of almost two and a half million gallons needed for land only disposal would greatly reduce the available land that could be utilized for disposal of the treated effluent. If this option were utilized then a storage lagoon and irrigation pump station would be required to be installed on the property since neither WWTP property has sufficient land for the construction of a storage lagoon.

The estimated construction costs to utilize this area as a spray irrigation field is approximately $1,760,000.00. The construction costs were estimated based upon a force main cost of $516,000.00 (8,600 lf x $60.00/lf), pumps and wet well at the WWTP to convey the treated effluent from the WWTP to the spray field $105,000.00, storage lagoon $210,000.00, irrigation pump station at site $529,000.00 and the cost of the spray fields of $529,000.00 (26.45 acres x $20,000.00).

It is also noted that Upper Salford Township currently owns both tax parcel numbers 620001582012 and 620001583002.

**(Option 4) - Centralized treatment with a combination of stream discharge and seasonal land based disposal (this option limits disposal to municipally owned lands)**

This option proposes the sewage flows generated from Salford, Salfordville and Woxall **(83,212.5 gpd)** to be collected and conveyed to the Shelly Square WWTP for treatment with disposal to the East Branch of the Perkiomen Creek. Map Figure 15 – Option 4 graphically represents this proposed alternative. The existing WWTP facility can be upgraded to accommodate these increased flows. The East Branch of the Perkiomen Creek has a water quality designation and discharge limits that would allow for this level of disposal. The lands chosen for disposal under this option are the parcels owned by the municipality at the intersection of Salford Station Road and Schwenksville Road. These parcels are commonly known as the Upper Salford Park. The park property consists of three parcels with a gross acreage of 49.47 acres with a net usable area of 17.2 acres. In aggregate they have a disposal capacity of 33,353 gpd. These parcels were selected under this option

due to their proximity to the Shelly WWTP and the potential disposal capacity. Total estimated costs of construction of the spray irrigation disposal system would be $1,889,000. Physical constraints of the treatment site would preclude any significant expansions beyond 100,000 gpd. This option would eliminate the need for a second WWTP at the Salford location. Length of conveyance lines outside the service areas would be increased. Utilization of low pressure force mains would physically limit the potential for properties outside the service area to connect. This plan also lends itself to phased implementation, but not with respect to the treatment facility. This option requires no acquisition of land to implement. The municipality would own and operate the Shelly Square WWTP under this option.

**(Option 5) - Centralized treatment with a combination stream discharge and seasonal land based disposal (this option limits disposal to a combination of municipally owned and privately owned lands)**

This option proposes the sewage flows generated from Salford, Salfordville and Woxall **(83,212.5 gpd)** to be collected and conveyed to the Shelly Square WWTP for treatment with disposal to the East Branch of the Perkiomen Creek. Map Figure 15 – Option 5 graphically represents this proposed alternative. The existing WWTP facility can be upgraded to accommodate these increased flows. The East Branch of the Perkiomen Creek has a water quality designation and discharge limits that would allow for this level of disposal. The lands chosen for disposal under this option are a combination of a parcel owned by the municipality that is contiguous to a parcel owned privately. Both parcels have little frontage and are situated between Bergey Road and Shelly Road. The privately owned parcel is currently owned by Faringer. Map Figure 17 graphically represents the two parcels. The Faringer property and the Township property contain 51.6 gross acres with a net usable area of 27.5 acres. In aggregate they have a disposal capacity of 53,350 gpd. These parcels were selected under this option due to their close proximity to the Shelly WWTP and the potential disposal capacity. Total estimated costs of construction of the spray irrigation disposal system would be $1,570,000.00. Physical constraints of the treatment site would preclude any significant expansions beyond 100,000 gpd. This option would eliminate the need for a second WWTP at the Salford

location. Length of conveyance lines outside the service areas would be increased. Utilization of low pressure force mains would physically limit the potential for properties outside the service area to connect. This plan also lends itself to phased implementation, but not with respect to the treatment facility. This option requires the acquisition or lease of land to implement. If the land must be purchased, the estimated cost of the Faringer tract would be $1,322,400.00. Assuming land must be purchased this option would result in a total disposal cost of $2,892,400. The municipality would own and operate the Shelly Square WWTP and the spray irrigation fields under this option.

**(Option 6) - Centralized treatment with a combination of stream discharge and seasonal land based disposal (this option proposes disposal to privately owned lands)**

This option proposes the sewage flows generated from Salford, Salfordville and Woxall **(83,212.5 gpd)** to be collected and conveyed to a WWTP located on the existing Township administration property with disposal to the Perkiomen Creek. Map Figure 15 – Option 6 graphically represents this proposed alternative. The Perkiomen Creek has a water quality designation and discharge limits that would allow for this level of disposal. The land chosen for disposal under this option is the Philadelphia Folk Festival Property located immediately adjacent to the Township Administration property along Salford Station Road. The privately owned parcel is currently owned by Godshall. Map Figure 17 graphically represents the parcel. The property contains 69.7 acres with a net usable area of 42.15 acres. The tract has a disposal capacity of 81,771 gpd. during the growing season This assumes crop uptake only for land application rates which may be conservative given the site contains pockets of well drained and moderately well drained soils. The true land application rates would ultimately be determined by soil investigation. This parcel was selected under this option due to its close proximity to the proposed WWTP and the potential disposal capacity. Total estimated costs of construction of the spray irrigation disposal system would be $3,560.077. This cost assumes infrastructure capable of spraying the daily flow of 81,771 gpd. The co-location of the treatment site with the Township public works department would allow closer supervision and control of the facility and ease of maintenance. This option would eliminate the need for the municipal ownership and

expansion of the existing WWTP at the Shelly Commercial property, eliminate all pump stations and reduce the length of conveyance lines through undeveloped portions of the Township location. The Township Administration property has enough unconstrained land to establish lagoon storage at the treatment site. This will eliminate the need for an additional wet well and transfer pump, making land disposal more cost effective. Utilization of low pressure force mains would physically limit the potential for properties outside the service area to connect. This plan also lends itself to phased implementation, but not with respect to the treatment facility. This option requires the acquisition or lease of land to implement. If the land must be purchased, the estimated cost of the Godshall tract would be $2,091,000. The current use of the land could be easily be continued with simple coordination. Assuming land must be purchased this option would result in a total disposal cost of $5,651,077. The municipality would own and operate the WWTP and either lease or own the spray irrigation disposal area under this option.

**c. <u>Centralized Treatment with Land Based Disposal</u>**

This option relies upon land based disposal of treated effluent as its sole means of disposal.

**(Option 7) - Centralized treatment with land based disposal system (this option proposes disposal to privately owned lands)**

This option proposes the sewage flows generated from Salford, Salfordville and Woxall **(83,212.5 gpd)** to be collected and conveyed to the Shelly Square WWTP for treatment with land application being the sole means of disposal. Map Figure 15 – Option 7 graphically represents this proposed alternative. The existing WWTP facility can be upgraded to accommodate these increased flows. The lands chosen for disposal under this option are a combination of three parcels owned privately by TH Properties. Map Figure 17 graphically represents the three parcels. The three parcels, in aggregate, contain 295.4 acres with a net usable area of 123.3 acres. They have a combined disposal capacity of 117,998 gpd. This potential disposal capacity exceeds the immediate land disposal needs of the Township's service areas. It is therefore reasonable to assume that possibly two of the

three parcels, or only portions of the three parcels, would be required to be purchased or leased from the owner. This can only be determined by further analysis by a hydrogeologist and preliminary design of a spray irrigation disposal system. However, the three parcels combined clearly support the needs of the Township. These parcels were selected under this option due to their close proximity to the Shelly WWTP and the potential disposal capacity. Total estimated costs of construction of the spray irrigation disposal system would be $10,028,292.00. Approximately 75% of this cost can be attributed to the construction of the storage lagoons. Eliminating the option of seasonal stream discharge significantly increases the storage requirements due to the inability to spray during the times outside of the growing season. Physical constraints of the treatment site would preclude co-location of the storage lagoon(s) and any significant expansions beyond 110,000 gpd. This option would eliminate the need for a second WWTP at the Salford location. Length of conveyance lines outside the service areas would be increased compared to options that entertain multiple WWTPs. Utilization of low pressure force mains would physically limit the potential for properties outside the service areas to connect. This plan also lends itself to phased implementation, but not with respect to the treatment facility. This option requires the acquisition or lease of land to implement. The net usable acreage needed by the Township is approximately 86.95 acres (83,212 gpd/ 957 gpd/acre). Therefore, the estimated gross acreage needed to be either leased or purchased would be estimated at 178.0 acres assuming 75% of the land is free of environmental constraint and that 65% of the unconstrained land can be used for spray irrigation land application. If only the land needed by the Township (178 acres) could be purchased, the estimated cost of acquisition would be $5,350,769.00. Assuming land must be purchased, this option would result in a total disposal cost of $21,955,111.00. The municipality would own and operate the Shelly Square WWTP and lease/own the spray irrigation fields under this option.

### d. Decentralized Community Treatment and Disposal Systems

Upper Salford Township has three study areas (Woxall, Salford and Salfordville) whose wastewater needs can be addressed by decentralized community systems that

address each study area individually. There are four options for providing community treatment and disposal for the three study areas. The four options are as follows:

- **Community Treatment with Stream Discharge**

  This option involves one WWTP to service the wastewater needs of the study area with the treated effluent being discharge into a stream on a year round basis. This option only requires that land have to be obtained to in order to build the WWTP. The location of the WWTP has to have the ability to discharge the treated effluent into a perennial stream. The receiving stream has to be able be permitted to receive treated effluent. This means that the stream cannot be designated as a "High Quality" or "Exceptional Value" watershed. The WWTP will most likely have to be a mechanical WWTP in order to meet the discharge standards of the PA DEP for discharging the treated effluent into the stream.

- **Community Treatment with Seasonal Stream Discharge and Seasonal Land Based Disposal**

  This option involves a WWTP to service the wastewater needs area with the treated effluent being stored in a lagoon or tank and land applied during the growing season (April – September) and the treated effluent being discharged to stream during the non growing periods of the year (October – March). This option will significantly reduce the storage requirements for the land-based disposal of the treated effluent. The required storage will still be based upon the soils on the disposal sites but since the treated effluent will be discharged to stream from October to March the effluent does not have to be stored during the non-growing season. This will reduce the storage volumes down to approximately 14 to 28 days depending on the classification of the soils on the disposal site(s). In order to implement this option, land will need to be obtained for the WWTP site and for the storage and disposal of the treated effluent on the land. The WWTP must have access to a perennial stream for the discharge of the treated effluent during the non-growing months.

The soils on the land that will be utilized for the land based disposal of the treated effluent must meet the PA DEP requirements for disposal of treated effluent. The PA DEP may allow the use of marginal soils for the land-based disposal since the WWTP has the capability of discharging the treated effluent to stream during extremely wet years. The PA DEP classifies the soils that are used for land based upon the drainage classification of the soils and the seasonal high ground water table. This option would require that sufficient soils be available to dispose of all of the treated effluent via a land based disposal option during the growing season. While this can be done with either drip or spray irrigation, the most cost effective means is by spray irrigation if all year round disposal is not required. The treated effluent will be conveyed from the WWTP to a storage lagoon. The treated effluent will then be land applied one day a week in accordance with the application rates that are approved by the PA DEP based upon the type of soils available at the disposal site. If the soils are of such a low quality that that majority of the treated effluent is being disposed of by crop uptake (i.e. irrigation of the grass) then the treated effluent can be applied more frequently at a lower application rate. This is similar to how golf courses are irrigated.

The level of treatment has to meet the PA DEP requirements for stream discharge. The advantage of treating the effluent to a high level is that the treated effluent that will be applied to the land will only rely on the soil for disposal and not treatment. This means that the soil or crop will not have to remove the excess nitrogen from the treated effluent. The concern is that if the treatment process does not include denitrification of the treated effluent that the treated effluent that is land applied could raise the background nitrogen level in the ground water and adversely affect the quality of the water in nearby wells.

- **Community Treatment with a Combination of Land Based Disposal and Stream Discharge**

  This option allows for the effluent from the WWTP to be disposed of by a combination of stream discharge

and land based disposal. The advantage of this option is that it allows for some land based disposal in areas with poor soils or where sufficient land can not be obtained for the purposes of one hundred percent disposal of the treated effluent even during the growing season. The difference between this and option two is that option two requires that sufficient land be permitted for the disposal of the one hundred percent of the treated effluent during the growing season. This option will allow for a percentage of the treated effluent that is generated each day to be disposed of via a land based disposal method with the remainder of the treated effluent being discharged to the stream. This will allow for the Upper Salford Township to still have a partially land based disposal even if sufficient lands can not be obtained at this time for one hundred percent land based disposal even during the growing season. This option can be modified in the future to increase the percentage of treated effluent that is disposed via land application as additional lands are purchased. This will allow Upper Salford Township to purchase additional lands over a period of time as they become available or additional money is available via grants. The percentage of the treated effluent that is discharge to the stream will vary according to the seasonal capability of the soils to dispose of the treated effluent. This option also allows for the storage lagoon size to be reduced since the operator will only have to store the treated effluent that he believes that he can dispose of via land application during the following week. This allows for the storage lagoon size to be reduced to seven to fourteen days. This also gives the operator the ability to rest a disposal field if there is an excessively wet season. The level of treatment will be the same as option two.

- **Community Treatment with Land Based Disposal**

  This option requires that the wastewater from the study area be collected and treated by a community treatment system and disposed of via land application. This option requires that sufficient land be acquired to dispose of all of the treated effluent generated by each study area. With this option the required storage of the treated effluent will be based

upon the disposal capacity of the soils on the disposal sites. The PA DEP requires approximately ninety days for deep well drained and deep moderately well drained soils. The storage requirements for deep, somewhat poorly drained soils are 185 days. The design of the storage lagoons needs to be based upon a hydrograph such that the lagoon will be totally empty each year and all effluent generated by the need area is applied to the disposal fields. The calculations need to be based upon the wettest year in ten years. The PA DEP published application rates are as follows:

| | |
|---|---|
| Forested Well Drained Soils | =6,571 gpd/acre |
| Forested Moderately Drained Soils | =3,567 gpd/acre |
| Deep Well Drained Soils | =6,018 gpd/acre |
| Moderately Deep Well Drained Soils | =4,551 gpd/acre |
| Deep Moderately Well Drained Soils | =3,168 gpd/acre |
| Moderately Deep, Moderately Well Drained | =1,781 gpd/acre |
| Growing Season Only Deep Somewhat Poorly Drained Soils | =957 gpd/acre |

The application rates given above are the annual average application rates. The actual rates vary by month from a high of 9,702 gpd/acre to a low of 0 gpd/acre.

The option of using a one hundred percent land based disposal system will allow for the use of either treatment lagoons or a mechanical WWTP to provide the required treatment of the wastewater generated by the study area. The issue with utilizing lagoon treatment is that it does not provide denitrification of the treated effluent. This is the biological process in which nitrogen is removed from the treated effluent. If the nitrogen is not removed from the wastewater by a biological process then it has to be removed by crop uptake or dilution on the disposal sites. The concern is that the total nitrogen level must be less than 10 mg/l when it leaves the disposal site. The generally accepted total nitrogen that is discharged from a WWTP that utilizes the lagoon style process is 22 mg/l. This means that the soils and crops on the disposal sites have to have the ability to remove at least 12 mg/l of nitrogen. This requirement will further limit the application rate at which the treated effluent

can be applied to the soils and may even eliminate potential sites from being used to dispose of treated effluent. The use of a mechanical WWTP that provides denitrification will eliminate this issue and will only rely on the soils to dispose of the treated effluent and not require the soils to also provide additional treatment of the effluent.

The following is an analysis of the above four options as they relate to the three study areas. The three previously described study areas that could utilize a decentralized community based treatment and disposal option are the Woxall area, the Salford area and the Salfordville area.

(1) Woxall Study Area

The Woxall study area contains 162 dwellings. This study area will generate 42,525 gpd (162 edus x 262.5 gpd/edu) of wastewater. This study area is located in two watersheds. The western half of this study area is located in the Unami Creek watershed. This is an exceptional value watershed. The eastern half is located in the East Branch of the Perkiomen Creek Watershed.

(a) Option One – Stream Discharge

In order to implement this option the wastewater generated by the study area would have to be conveyed to a mechanical WWTP that would discharge into Vaughn Run, which is a tributary to the East Branch of the Perkiomen Creek. The most logical location for the WWTP would be adjacent to Vaughn Run near Old Sumneytown Pike. The section of Vaughn Run that the WWTP discharge into would have to be verified to ensure that it was a perennial stream. The discharge parameters would be very similar to those issued for the Shelly Square WWTP since it is discharging into the same watershed.

(b) Option Two – Seasonal Stream Discharge and Land Based Disposal

This option would require that a mechanical WWTP be constructed at the same approximate location as

suggested in option one. The existing soils in this area are subject to seasonal high ground water tables due the confluence of streams in this area. The primary soils on the undeveloped lands in this area that could be utilized for disposal of treated effluent are Lehigh Channery Silt Loams (Lh). These are somewhat poorly drained soils. The PA DEP recommends that these soils only be utilized during the growing season. The PA DEP defines the annual application rate of 957 gpd/acre. The actual application rate during the growing season is 1,940 gpd. The difference between the annual application rate and actual application rate is the fact that since the treated effluent can only be dispose of from April through September the treated effluent will need to be stored during the remaining portions of the year. The stored effluent then needs to be applied during the growing season. Since this option will utilize a stream discharge during the non-growing season, the actual application rate of 1,940 gpd/acre can be used to estimate the size of the disposal fields required. This analysis will only define the net useable area required since detailed field-testing and site restrictions will be performed to determine the actual gross area that would be needed. The required net useable area would be 21.92 acres (42,525 gpd/1,940 gpd/acre). The majority of the soils that would meet this requirement in the study that are not currently developed are located along Perkiomenville Road between Sumneytown Road and Old Skippack Pike. This option would also require a storage lagoon with a volume between 595,350 gallons to 1,190,700 gallons to provide the 14 to 28 days of storage.

(c) Option Three – Combination of Seasonal Land Based Disposal with Stream Discharge

This option is basically the same as option two with the exception that the land-based disposal would not have to dispose of all of the effluent generated during the growing season. A portion of the wastewater treated by the WWTP would be discharged to the stream everyday during the growing season and a portion of it would be stored in a lagoon and then disposed of via a land based disposal method once a

week. This option will allow Upper Salford Township to increase the amount of effluent that is disposed of on the land over time as they purchase additional lands. This will allow for the acquisition costs to be spread out over a longer period of time. The storage requirements can also be reduced to seven days since any excess effluent that is generated during the week can be discharged to the stream. This will also allow for the effluent to be discharged to the stream if the disposal fields become saturated from an extreme or prolonged rain event. This is a serious consideration considering that most of the available soils are somewhat poorly drained and will take time to recover from extreme or prolonged rain events.

(d) Option Four – Land Based Disposal

This option is like option two except that all of the effluent generated by the WWTP will need to be stored and then disposed of by land application. The WWTP in this option may be located closer to the disposal sites since it does not have to be near the stream since it will not utilize a stream discharge option.

The existing soils in this area are subject to seasonal high ground water tables due the confluence of streams in this area. The primary soils on the undeveloped lands in this area that could be utilized for disposal of treated effluent are Lehigh Channery Silt Loams (Lh). These are somewhat poorly drained soils. The PA DEP recommends that these soils only be utilized during the growing season. The PADEP defines the annual application rate of 957 gpd/acre. The stored effluent then needs to be applied during the growing season. This analysis will only define the net useable area required since detailed field-testing and site restrictions will be performed to determine the actual gross area that would be needed. The required net useable area would be 44.43 acres (42,525 gpd/957 gpd/acre). The majority of the soils that would meet this requirement in the study that are not currently developed are located along Perkiomenville Road between Sumneytown Road and Old Skippack Pike. This option would also require a storage lagoon with a volume of 7,867,125 gallons to

provide the approximately 185 days of storage. This option would most likely require multiple properties to be able to have a net useable area of 44.43 acres. The PA DEP would also look very closely at the existing soils to ensure that the entire volume could be disposed due to the poor quality of soils. The PA DEP may require additional area be provided to ensure that the effluent can be entirely disposed of during the growing season or may require a stream discharge permit as a back up due to the quality of the soils in the area.

(2) Salford Study Area

The Salford study area contains 93 dwellings. This study area will generate 24,412.5 gpd (93 edus x 262.5 gpd/edu) of wastewater. This study area is located in Perkiomen Creek watershed.

(a) Option One – Stream Discharge

In order to implement this option the wastewater generated by the study area would have to be conveyed to a mechanical WWTP that would discharge into Perkiomen Creek. The most logical location for the WWTP would be adjacent to municipal property. The discharge parameters would be very similar to those issued for the Shelly Square WWTP since it is discharging into a similiar watershed.

(b) Option Two – Seasonal Stream Discharge and Land Based Disposal

This option would require that a mechanical WWTP be constructed at the same approximate location as suggested in option one. The existing soils in this area are subject to season high ground water tables due the confluence of streams in this area. The primary soils on the undeveloped lands in this area that could be utilized for disposal of treated effluent are the Penn Silt Loams (Pe) and Readington Silt Loams (Re). These are well drained or moderately well drained soils. The PA DEP allows for a longer disposal period on this type of soils. The PA DEP defines the annual application rate of 3,000 to 6,000 gpd/acre. The actual application rate during the

growing season is 6,000 to 9,000 gpd. The difference between the annual application rate and actual application rate is the fact that since the treated effluent can be disposed of at a greater rate from April through September. Since this option will utilize a stream discharge during the non-growing season, the actual application rate of 6,000 to 9,000 gpd/acre can be used to estimate the size of the disposal fields required. It will be assumed that the disposal rate will be 6,000 gpd/acre for this analysis. This analysis will only define the net useable area required since detailed field-testing and site restrictions will be performed to determine the actual gross area that would be needed. The required net useable area would be 4.06 acres (24,412.5 gpd/6,000 gpd/acre). The majority of the soils that would meet this requirement in the study that are not currently developed are located along Salford Street between Harmon Road and Skippack Pike. This option would also require a storage lagoon with a volume between 341,775 gallons to 683,550 gallons to provide the 14 to 28 days of storage.

(c) Option Three – Combination of Seasonal Land Based Disposal with Stream Discharge

This option is basically the same as option two with the exception that the land-based disposal would not have to dispose of all of the effluent generated during the irrigation season. A portion of the wastewater treated by the WWTP would be discharged to the stream everyday during the irrigation season and a portion of it would be stored in a lagoon and then disposed of via a land based disposal method once a week. This option will allow Upper Salford Township to increase the amount of effluent that is disposed of on the land over time as they purchase additional lands. This will allow for the acquisition costs to be spread out over a longer period of time. The storage requirements can also be reduced to seven days since any excess effluent that is generated during the week can be discharged to the stream. This will also allow for the effluent to be discharged to the stream if the disposal fields become saturated from an extreme or prolonged rain event.

(d) Option Four – Land Based Disposal

This option is like option two except that all of the effluent generated by the WWTP will need to be stored and then disposed of by land application. The WWTP in this option may be located closer to the disposal sites since it does not have to be near the stream since it will not utilize a stream discharge option. The primary soils on the undeveloped lands in this area that could be utilized for disposal of treated effluent are the Penn Silt Loams (Pe) and Readington Silt Loams (Re). These are well drained or moderately well drained soils. The PA DEP allows for a longer disposal period on this type of soils. The PA DEP defines the annual application rate of 3,000 to 6,000 gpd/acre. It will be assumed that the disposal rate will be 4,500 gpd/acre for this analysis. This analysis will only define the net useable area required since detailed field-testing and site restrictions will be performed to determine the actual gross area that would be needed. The required net useable area would be 5.42 acres (24,412.5 gpd/4,500 gpd/acre). The majority of the soils that would meet this requirement in the study that are not currently developed are located along Salford Street between Harmon Road and Skippack Pike. This option would also require a storage lagoon with a volume between 2,197,125 gallons to provide the 90 days of storage required for these types of soils. It is noted that this type of soil is spread out in long strips that cover multiple properties so in order to obtain the required disposal land multiple properties may need to be purchased in order to take advantage of the best soils in the area.

(3) Salfordville Study Area

The Salfordville study area contains 62 dwellings. This study area will generate 16,275 gpd (62 edus x 262.5 gpd/edu) of wastewater. This study area is located in the East Branch of the Perkiomen Creek Watershed.

(a) Option One – Stream Discharge

In order to implement this option the wastewater generated by the study area would have to be conveyed to a mechanical WWTP that would discharge into the East Branch of the Perkiomen Creek. The most logical location for the WWTP would be to expand the existing Shelly Square WWTP. The discharge parameters would be very similar to those issued for the Shelly Square WWTP since it is discharging into the same watershed.

(b) Option Two – Seasonal Stream Discharge and Land Based Disposal

This option would require that a mechanical WWTP be constructed at the same approximate location as suggested in option one. The existing soils in this area north of Woessner Road are subject to season high ground water tables due the confluence of streams in this area. While there are some good soils located along Bergey Road below Woessner Road the seasonal high ground water table will most likely prevent the treated effluent from being applied at the maximum application rate. Due to the seasonal high water tables in this area the soils that can be utilized for land application of treated effluent will be located closer to the ridge along Old Skippack Road. The primary soils on the undeveloped lands in this area that could be utilized for disposal of treated effluent are Lehigh Channery Silt Loams (Lh). These are somewhat poorly drained soils. The PA DEP recommends that these soils only be utilized during the growing season. The PA DEP defines the annual application rate of 957 gpd/acre. The actual application rate during the growing season is 1,940 gpd. The difference between the annual application rate and actual application rate is the fact that since the treated effluent can only be disposed of from April through September the treated effluent will need to be stored during the remaining portions of the year. The stored effluent then needs to be applied during the growing season. Since this option will utilize a stream discharge during the non-growing season, the actual application rate of 1,940 gpd/acre can be used to estimate the size of the disposal fields

required. This analysis will only define the net useable area required since detailed field-testing and site restrictions will be performed to determine the actual gross area that would be needed. The required net useable area would be 8.39 acres (16,275 gpd/1,940 gpd/acre). The majority of the soils that would meet this requirement in the study that are not currently developed are located along Old Skippack Road between Schwenksville Road and Salford Street. This option would also require a storage lagoon with a volume between 227,850 gallons to 455,700 gallons to provide the 14 to 28 days of storage.

(c) Option Three – Combination of Seasonal Land Based Disposal with Stream Discharge

This option is basically the same as option two with the exception that the land-based disposal would not have to dispose of all of the effluent generated during the growing season. A portion of the wastewater treated by the WWTP would be discharged to the stream everyday during the growing season and a portion of it would be stored in a lagoon and then disposed of via a land based disposal method once a week. This option will allow Upper Salford Township to increase the amount of effluent that is disposed of on the land over time as they purchase additional lands. This will allow for the acquisition costs to be spread out over a longer period of time. The storage requirements can also be reduced to seven days since any excess effluent that is generated during the week can be discharged to the stream. This will also allow for the effluent to be discharged to the stream if the disposal fields become saturated from an extreme or prolonged rain event. This is a serious consideration considering that most of the available soils are somewhat poorly drained and will take time to recover from extreme or prolonged rain events.

(d) Option Four – Land Based Disposal

This option is like option two except that all of the effluent generated by the WWTP will need to be stored and then disposed of by land application. The WWTP in this option may be located closer to the

disposal sites since it does not have to be near the stream since it will not utilize a stream discharge option.

The primary soils on the undeveloped lands in this area that could be utilized for disposal of treated effluent are Lehigh Channery Silt Loams (Lh). These are somewhat poorly drained soils. The PA DEP recommends that these soils only be utilized during the growing season. The PADEP defines the annual application rate of 957 gpd/acre. The stored effluent then needs to be applied during the growing season. This analysis will only define the net useable area required since detailed field-testing and site restrictions will be performed to determine the actual gross area that would be needed. The required net useable area would be 17.06 acres (16,275 gpd/957 gpd/acre). The majority of the soils that would meet this requirement in the study that are not currently developed are located along Old Skippack Road between Schwenksville Road and Salford Street. This option would also require a storage lagoon with a volume of 3,010,875 gallons to provide the approximately 185 days of storage. This option would most likely require multiple properties to be able to have a net useable area of 17.06 acres. The PA DEP would also look very closely at the existing soils to ensure that the entire volume could be disposed due to the poor quality of soils. The PA DEP may require additional area be provided to ensure that the effluent can be entirely disposed of during the growing season or may require a stream discharge permit as a back up due to the quality of the soils in the area.

### 3. Retaining Tanks

Sewage retaining tanks may be used on an interim basis until an appropriate permanent sewage disposal method can be implemented. Services of a licensed sewage hauler must be arranged to empty a retaining tank.

### Study Area 4 (Rural balance of the Township)

#### 1. Individual OLDS

The limited development now existing in this area is at low density, and the current and proposed zoning would essentially continue that pattern. Most wastewater facility needs, therefore, should concern existing on-lot systems that are malfunctioning or prone to failure, along with new development of low-density, single-family dwellings. Reliance on individual OLDS should suffice in most cases. Under this alternative, new development in these areas would rely on the OLDS Selection Strategy found in Table V-3.

#### 2. Community Systems

Community systems may be needed in Study Area 4 for two reasons. Soil limitations may make individual systems unfeasible in some locations, particularly for any significant number of new lots. Also, under the proposed current zoning terms ordinance, "conservation subdivisions" alternative can be created with a density bonus if such new development is served by utilizing other than individual on-lot systems. Under this alternative, the COLDS Selection Strategy found in Table V-4 would be used to determine the type of system to be constructed.

#### 3. Retaining Tanks

Sewage retaining tanks may be used on an interim basis until an appropriate permanent sewage disposal method can be implemented. Services of a licensed sewage hauler must be arranged to empty a retaining tank.

## D. Management of Wastewater Systems

In establishing policies for the systems deemed most appropriate to meet its current and future wastewater needs, Upper Salford is placing heavy reliance on individual OLDS and community systems. While these systems are potentially the most compatible with the Township's existing conditions and land use objectives, they will require proper construction and a consistent level of quality in operation and maintenance. This is particularly true in light of the limitations posed by the soil characteristics in much of the Township.

Currently, ownership of wastewater facilities in the Township is almost exclusively in the hands of the individual property owners served by them.

This is not expected to change markedly in the future in relation to individual systems; the exception may occur where the effluent from one or more individual system is conveyed to a community treatment and disposal system. With regard to the community systems themselves, it is the Township's intent to own and operate them.

## E. Management System for Individual OLDS

In the management of individual on-lot systems, the Township proposes to become a more involved party than it has been to this point. Primary responsibility for the continued functioning of these systems will remain with the individual property owner. The Township anticipates a supplemental role. Its focus will be education and monitoring to assure the necessary maintenance of individual systems; direct action by the Township, e.g., pumping out a system, would be limited to relatively last-resort cases.

Table V-5 outlines five options for Township involvement in the management of individual wastewater systems. In each option, the Township administers a public education program for property owners, advising them of the need for system maintenance and water conservation. Beyond that, the options move from #1 to #5 in the direction of increasingly active participation by the municipality in system ownership and maintenance.

For Upper Salford, Option #2 is selected. This calls for continued ownership and operation of individual OLDS by the property owner. This status quo situation would be enhanced, however, by a Township requirement (to be implemented by ordinance) that the septic tank be pumped out once every three years and that proof of the pumping be provided to the Township. (See Appendix E for the draft Sewage Management Ordinance) This minimal expansion of the Township's involvement in wastewater facilities, well within its administrative capabilities, should contribute significantly to the performance and longevity of individual OLDS.

Table V-5

Individual OLDS Management Program Options

| | |
|---|---|
| **1.** | **PRIVATE OWNERSHIP/PRIVATE OPERATION AND MAINTENANCE**<br><br>A. OLDS ownership by property owner;<br>B. Property owner has sole responsibility for OLDS operation and maintenance; and<br>C. Township administers Public Education Program to inform residents of need for OLDS maintenance and water conservation. |
| **2.** | **PRIVATE OWNERSHIP/PRIVATE OPERATION AND MAINTENANCE WITH PROOF-OF.**<br><br>A. OLDS ownership by property owner;<br>B. Property owner responsible for OLDS operation and maintenance;<br>C. Township requires proof-of-pump out of septage once every three years (or other specified period); and<br>D. Township administers Public Education Program (as in 1C above) |
| **3.** | **PRIVATE OWNERSHIP/PRIVATE OPERATION AND MAINTENANCE WITH PUBLIC ASSURANCE PROGRAM**<br><br>A. OLDS ownership by property owner;<br>B. Property owner responsible for OLDS operations and maintenance;<br>C. Township monitors OLDS operation and inspects system annually (or other specified period);<br>D. Township requires proof-of-pump out of septage at least once every three years or at the direction of the inspector; and<br>E. Township administers Public Education Program (as in 1C above). |
| **4.** | **PRIVATE OWNERSHIP/PUBLIC OPERATION AND MAINTENANCE**<br><br>A. OLDS ownership by property owner;<br>B. Township responsible for OLDS operation and maintenance through structured program;<br>C. Property owner becomes a customer and pays a user fee; and<br>D. Township administers Public Education Program (as in 1C above). |
| **5.** | **PUBLIC OWNERSHIP/PUBLIC OPERATION AND MAINTENANCE**<br><br>A. Township owns all OLDS;<br>B. Township responsible for OLDS operation and maintenance as in #4 above.<br>C. Property owner becomes a customer and pays a user fee; and<br>D. Township administers Public Education Program (as in 1C above). |

The intent of an expanded Township role, including the public education program, in relation to individual OLDS is to prevent system failures caused by a lack of adequate maintenance. Several factors contribute to this lack, including:

**Uninformed property owner**. This can occur when residents accustomed to public sewers relocate to a more rural area, such as Upper Salford, that relies on individual OLDS. Frequently, they lack information on the necessity of regular maintenance of their system.

**Poor record-keeping**. The property owner may realize the system should be serviced regularly, but fails to keep a record of maintenance. Also, when a homeowner buys a used home, he may not be aware of when the last maintenance was performed.

**Negligence**. Some property owners simply neglect their systems and fail to live up to their responsibilities of proper OLDS maintenance.

The Township's policies toward individual wastewater system maintenance can be categorized according to three types of systems: (1) functioning individual OLDS; (2) malfunctioning individual OLDS; and (3) alternative individual systems, including land application and stream discharge disposal methods.

**1. <u>Functioning Individual OLDS</u>**

Consistent with Option #2 in Table V-5, the Township's policies toward currently functioning and all future individual OLDS are proposed to be:

a. Require regular (once every three years) maintenance, consistent with standards established by the Township, and proof that this maintenance was performed;

b. Develop and disseminate a public education program for property owners, stressing the need and means of OLDS maintenance. The program would include:

1. Direct contact with individuals experiencing problems.

2. Provision of literature to all Township residents, describing all types of on-lot systems.

3. Encouragement for the installation of water conservation devices.

4. Demonstration projects to show effective ways to correct typical on-site failures.

c. Create and administer a special program for sand mounds, including a more directed public education message and required pumping /proof of pumping on a two-year frequency.

## 2. Malfunctioning Individual Systems

It is the intent of the following discussion to address those malfunctioning systems outside of the proposed Study Areas of Woxall, Salford and Salfordville. All lots within those service areas will be served with the selected alternatives. The following management policies will apply to those malfunctioning systems outside the above-mentioned service areas.

Any community that relies heavily on individual OLDS will experience some number of malfunctioning systems; in Upper Salford, the situation is heightened by the unfavorable soil characteristics. Where such failures occur or are imminent, the choices may include repair, connection to a community system, or replacement with an alternative individual system. In dealing with failed or malfunctioning systems, the Township's policies will include:

a. Providing owners of malfunctioning on-lot systems with educational material to assist them in devising the best solution for their system (this may be an extension of the material described in #1-b, above).

b. Working with the Montgomery County Health Dept. to evaluate clusters of individual systems to determine if a community system may be a feasible solution.

c. Enacting an ordinance (see Appendix E) to empower the Township to repair malfunctioning systems, at the property owner's expense, where the owner fails to do so.

## 3. Alternative Individual Systems

For new or replacement individual systems using land application or stream discharge technology, the Township's policies will be the same as those it applies to conventional systems, i.e., required routine maintenance and a public education program. Because

such systems tend to require more maintenance than conventional individual OLDS, the Township will implement additional policies enabling it to:

a. Review the system design and inspect construction activities.

b. Require financial assurances satisfactory to the Township to be held for 18 months after the date of initial operation, for all new or repaired systems that require a DEP permit.

c. Require a maintenance agreement with the property owner that provides for regular Township inspection of the system and the payment of a fee by the property owner to cover inspection costs.

These management policies are consistent with those enacted for the six (6) small flow stream discharge systems currently in operation.

## F. Management of Community Systems

The Township intends to own and operate any privately-constructed community systems, either by requiring a continuing offer of dedication or stipulating the transfer of ownership at a prescribed level of build-out or occupancy of the development being served. On this basis, the Township will be the responsible party for the management of community systems. The roles of the Montgomery County Health Dept. and the Pa. Dept. of Environmental Protection will be in the areas of design approval, permitting, monitoring, and enforcement.

The Township will demand a high level of quality in the design and construction of the community systems built in Upper Salford, perhaps exceeding those of DEP. For example, intermittent sand filtration may be required for all systems. Land application will be the preferred disposal method for community systems.

Specific Township policies concerning the management of community systems will include:

1. The Township shall review and approve the system design and shall review construction of all community systems.

2. There shall be financial assurances satisfactory to the Township to be held in perpetuity following the date of occupancy of the last house.

3. Prior to the transfer of ownership, routine maintenance shall be required and the Township will perform routine inspections of the community system on a regular basis.

4. All new community systems will be covered by the management program.

## G. Management Program Summary

Through the Act 537 Plan and its attendant policies, the Township has made a commitment to prevent pollution and protect public health by planning for and regulating wastewater treatment and disposal. Cooperation, assistance, and regulatory support on the part of the PA DEP, the Montgomery County Health Department, individual property owners, and developers is essential to the success of that effort. Therefore, to minimize or eliminate potential health and/or environmental hazards, the Township shall institute a Wastewater Systems Management Program.

The intent of the Wastewater Systems Management Program is to provide for improved design, installation, operation, and maintenance of wastewater systems through municipal administration and ordinances. To make such a program effective, it is imperative that the Township take on the following functional responsibilities:

- Review of plans and system designs by the Township Engineer for conformance with the official wastewater facilities plan and applicable ordinances.

- Enact and implement ordinances to assure the long-term viability of the following: community subsurface disposal; land disposal through spray irrigation (individual and community); stream discharge (individual and community) and connection to centralized sewerage systems.

- Develop and implement an inspection program for the construction, operation and maintenance of all community wastewater systems in conjunction with the MCHD and the PA DEP.

- Develop and implement a public education program.