OFFICIAL SEWAGE FACILITIES PLAN

WEST BRADFORD TOWNSHIP

CHESTER COUNTY, PENNSYLVANIA

Prepared for

West Bradford Township
1385 Campus Drive
Downingtown, PA 19335

Date: March 2011

Project No.: 20600401.00001

URS
Iron Hill Corporate Center
4051 Ogletown Road, Suite 300
Newark, DE 19713

Table of Contents

Table of Contents (cont'd)

Table of Contents (cont'd)

Tables

Table of Contents (cont'd)

EXECUTIVE SUMMARY

West Bradford Township, located in central Chester County between Coatesville and West Chester, is essentially a bedroom community predominated by detached dwellings on medium to large size lots. Sewer service to the Township is generally divided equally between on-lot systems and public wastewater treatment plants (WWTPs). There are three wastewater treatment plants in the Township – two of the WWTPs, the DuPont WWTP and the Strasburg Corridor WWTP, are owned by the Township; and the third WWTP, Broad Run WWTP, is owned by Utilities Incorporated of Pennsylvania (UIP) and is regulated by the Pennsylvania Public Service Commission (PUC). The Embreeville Center is served by a WWTP located in Newlin Township.

This current Act 537 Plan represents a "Base Plan" for the Township. Previous base planning efforts were postponed so that the Township could respond to the wastewater needs of the Village of Marshallton (Route 162 Corridor Sewage Study, 1998) and the northwestern portion of the Township (West Bradford Township Act 537 Sewage Facilities Plan Update, 2002).

The Township has been divided into seven study areas to facilitate the analysis of various wastewater alternatives as may be applicable to each. These study areas are smaller portions of the Township that have similar characteristics such as existing land use, zoning, physiographic features, and future growth potential. The study areas are:

- UIP Study Area – This area comprises the UIP Franchise Area as currently approved by the PUC including those areas currently served by the Broad Run WWTP.
- DuPont Wastewater Treatment Facility Study Area - This study area encompasses the northwest portion of the Township, and is equivalent to the current service area for the DuPont lagoon treatment and spray irrigation disposal wastewater facility.
- Romansville Study Area - The Romansville Study Area is generally centered on the intersection of Strasburg and Shadyside Road, and includes the Village of Romansville, contiguous residential development, and proposed development lands identified as the Stargazers property.
- Strasburg Corridor Study Area - This area spans parcels on the north and south sides of Strasburg Road in the Village of Marshallton and the Tattersall development, as well as the Broad Run Estates development on the northeast and north sides of Broad Run Road and Leids Road, respectively. These lands comprise the current service area for the Strasburg Corridor lagoon treatment and spray irrigation disposal wastewater facility.
- Embreeville Center Study Area - The Embreeville Center Study Area consists of an approximately 226 acre parcel of land located at the southernmost end of West Bradford Township, bordered by Strasburg Road to the north and Embreeville Road to the south. The Embreeville Center consists of approximately 18 separate buildings located on a 226 acre (+/-) parcel. The property is under the ownership of the Pennsylvania Department of Public Welfare, was formerly operated as a State Hospital, and is currently served by a WWTP located in Newlin Township.
- Appleville Mobile Home Park Study Area - The Appleville Mobile Home Park is located on the east and west side of Marshalltown-Thorndale Road, south of its intersection with Hall Road. Currently, the Appleville Mobile Home Park consists of approximately 230

individual mobile home units plus a farm market. Additionally, the majority of the land is under cultivation as an active orchard.

- Residential Study Area - This area represents the balance of the Township not encompassed by the other Study Areas. Single family residential uses on parcels of at least one acre in size comprise nearly all of this study area.

For the Romansville Study Area, a door-to-door survey was conducted of the existing on-lot systems to determine the existence of suspected or confirmed malfunctions. Within the UIP Study Area, a similar door-to-door survey was conducted of the Glenside Road Area. These surveys were conducted under the supervision of Certified Sewage Enforcement Officers (SEOs) in accordance with the guidelines of the DEP publication entitled *Sewage Disposal Needs Identification*.

Numerous alternatives were identified for each Study Area, as detailed in Chapter V. The selected alternatives for each Study Area are as follows:

- UIP Study Area – New development will be served by individual on-lot sewage systems in accordance with the Individual On-Lot Disposal Selection Strategy described in Table V-3, except in situations where a developer requests service by the Broad Run WWTP. Where service is requested at the WWTP, a development may be served only if UIP demonstrates to the satisfaction of the Township and DEP that adequate capacity to serve the project exists within the current 400,000 gpd WWTP capacity.
- DuPont Wastewater Treatment Facility Study Area – Identified sewage needs within this Study Area can be adequately served by the existing DuPont WWTP. Future development within this Study Area may be served by the DuPont WWTP provided adequate capacity is deemed to exist in consideration of Romansville Study Area needs, as discussed in Chapter VIII.
- Romansville Study Area – The selected alternative for the existing residences in the Romansville Study Area is continued use of on-lot systems subject to the On-Lot Management Ordinance to be adopted by the Township. The selected alternative for the Stargazers Development portion of the Romansville Study Area is the use of the DuPont WWTP for the five year needs of the development which corresponds to Phase 1 of the development, or 43 lots.
- Strasburg Corridor Study Area – Very limited new development potential exists within the Study Area. What new development potential does exist can be served by the Strasburg Corridor WWTP, and the selected alternative for this portion of the Township is accordingly a “no action” alternative. The Study Area described in Chapter II, coincides with the existing service area.
- Embreeville Center Study Area – The selected alternative for the Embreeville Center Study Area is the “no-action” alternative. The Embreeville complex is largely unoccupied and very limited uses served by the Embreeville WWTP remain. Until such time as any future use or redevelopment for the Embreeville complex is determined, no projected sewage needs can be formulated and no determination of potential WWTP improvements or alternatives for wastewater treatment are feasible.

- Appleville Mobile Home Park Study Area – The selected alternative for the Appleville Mobile Home Park Study Area is the continued use of the existing on-lot community systems subject to the requirements of the On-Lot Management Ordinance to be adopted by the Township.
- Residential Study Area – The selected alternative for the Residential Study Area is continued use of on-lot systems in accordance with the Individual On-Lot Selection Strategy described in Table V-3 and subject to the On-Lot Management Ordinance to be adopted by the Township.

For all those areas of the Township that will continue to rely on on-lot systems for existing and future needs, this Act 537 Plan provides for an on-lot management program which requires regular system pumping by a property owner. A Draft On-Lot Management Ordinance can be found in Appendix O which describes the requirements of this program. All new development proposing individual on-lot systems will be subject to the Individual On-Lot Selection Strategy described in Table V-3.

Municipal commitments and costs of implementing the selected alternatives are limited to those associated with the adoption and administration of the On-Lot Management Ordinance. As detailed in Chapter VI, first year costs are estimated to be approximately $9,400, with subsequent annual costs of approximately $3,200. Net costs for the first year, less an anticipated DEP reimbursement grant of approximately 36%, are expected to be approximately $6,016. DEP grant reimbursement funding is currently somewhat indeterminate due to State budget cuts, but annual costs after first year implementation would be approximately $2,048, assuming the current level of reimbursement. Net actual program costs may increase or decrease depending upon the level of DEP funding available in the future. It is anticipated that existing Township personnel will adequately administer this program.

An implementation schedule is presented below.

Complete Draft Plan	April 2011
Public Agency Review	April – July 2011
30 Day Public Comment Period (Comments must be in writing)	May – June 2011
Board Adopts Plan and submits to DEP	August 2011
DEP Approves Plan (120 days)	Time Zero
Adopt On-Lot Management Ordinance	12 months after Time Zero

CHAPTER I

PREVIOUS SEWAGE FACILITIES PLANNING

A. Introduction

The purpose of this planning effort is to evaluate the current and future wastewater needs and conditions of West Bradford Township, and to identify wastewater alternatives that best meet the needs of the Township. It should be noted that consideration of the northwest section of the Township, which encompasses the DuPont wastewater treatment facility service area, was previously addressed by an approved 2002 Act 537 Plan. Discussion of this planning area is accordingly limited to conditions which have changed since the prior planning.

B. Analysis of Wastewater Planning Previously Completed Under the Sewage Facilities Act

1. Master Sewer Plan for Chester County, 1970

The County Plan was prepared in 1968 and revised in 1970 to fulfill the requirements of Act 537 which requires municipality to prepare and adopt a Plan which addresses existing and future wastewater disposal needs. The planning on a County-wide basis was performed by authorization from Chester County municipalities to satisfy the requirements of Act 537.

The County Plan analyzed the possibility of providing sewer facilities through 1978 and proposed sewer areas through the year 1988. The Plan called for West Bradford Township to be served by individual on-lot systems.

2. Master Plan for Sewage and Water Supply in West Bradford Township, 1977

The Master Plan for Sewerage and Water Supply was completed in August of 1977 to update the prior County-wide planning with regard to West Bradford Township. The plan offered the following conclusions and recommendations:

a. There are no municipally owned wastewater treatment facilities in West Bradford Township. The Broad Run Sewer Co., a public utility, operates a tertiary treatment plant at Saw Mill and Shadyside Roads with an outfall to the East Branch of the Brandywine Creek.

b. Existing land uses within West Bradford Township are predominately single family residential on lots larger than one acre and agriculture.

c. Most of the soils in West Bradford Township are adequate for on-lot waste disposal. The types of disposal systems to be utilized and permitted under current regulations include sand-lined trenches and elevated sand mounds.

The only areas not suitable for on-lot disposal in the Township are the flood prone areas, high water table soils, and steeply sloping sites.

d. Nine potential sites for land application of wastewater spray irrigation have been identified. Further design studies of the identified sites are required to confirm the location of optimum areas for land application and application rates.

e. The Embreeville State Hospital system has existing capacity and should be studied as an alternative treatment system if future development in the Romansville area requires construction of a sewage collection and treatment system in that area.

f. The population of West Bradford Township is anticipated to increase in the near future, based on the increasing number and frequency of requests from developers.

g. The Marshallton Area has the most serious problem at present because of very small lots and old systems. A record of the type and number of on-lot subsurface disposal system failures is documented by the Chester County Health Department.

h. The most cost-effective alternative for collection and treatment of wastewater from the Marshallton Area is secondary treatment followed by spray irrigation of effluent.

i. The most cost-effective method for providing sewage treatment to single family residences developed on one-acre lots and larger is through properly designed and maintained on-lot systems.

j. The apparent cost-effective alternative for increasing the Broad Run Sewer Company treatment capacity to approximately 450,000 gpd is through expansion of the existing tertiary treatment plant.

Based upon the above conclusions, the 1977 Master Plan for Sewerage and Water Supply in West Bradford Township made the following recommendations:

a. Request PA DEP to designate the Marshallton Service Area as a facilities planning area, assign a priority number to the proposed Marshallton Service Area, and proceed with preliminary design and detailed design for a collection and treatment facility.

b. Authorize the Broad Run Sewer Company to proceed with a Phase II expansion of their treatment plant with stream discharge for up to 1,500 EDU's or 450,000 gpd. Concurrently, investigate possible reuse of the

treated water. One consideration could be for irrigation water in Township open space lands.

c. Encourage water conservation measures for all new construction and existing construction in the Township.

d. Consider land application by spray irrigation for all future community treatment facilities in West Bradford Township and expansion of existing systems.

e. In order to implement the concept of utilization of spray irrigation, a soils and geologic study should be initiated to further evaluate, locate and define areas which could be designated as land disposal sites.

3. Route 162 Corridor Sewage Study, 1998

The Route 162 Corridor Sewage Study was a limited scope Act 537 Plan which evaluated alternatives to provide sewer to the lands bordering Route 162, including the villages of Marshallton and Romansville, and the proposed Tattersall development. The study identified Marshallton as an area with failing on-lot systems, and the Romansville area was identified as a long term need, not addressed by the selected alternative. The selected alternative was the construction of a lagoon treatment/spray irrigation system with a total design capacity of 135,000 gpd, sufficient to serve the needs of Marshallton and the Tattersall development. This system has been constructed and is currently owned and operated by the Township.

4. West Bradford Township Act 537 Sewage Facilities Plan Update, 2002

This Plan Update evaluated alternatives to accommodate the wastewater needs of the northwestern portion of the Township, including the proposed Orleans developments. The selected alternative was the construction of a lagoon treatment/spray irrigation system with a total design capacity of 146,500 gpd, sufficient to serve future growth in the planning area and the Orleans developments. This system has been constructed and is currently owned and operated by the Township.

C. Sewage Facilities Planning Not Implemented

There is no current Township Act 537 planning document that has not been carried out in accordance with applicable Pennsylvania Department of Environmental Protection (DEP) approvals.

D. Sewage Facilities Planning Anticipated by a Chapter 94 Corrective Action Plan

A Corrective Action Plan (CAP) was submitted to DEP in January 2009 by Utilities Inc. of Pennsylvania (UIP), which owns and operates the Broad Run Wastewater Treatment Plant and collection system serving a Pennsylvania Public Utility (PUC) defined area in the northeast portion of the Township. This CAP was required pursuant to the 2007 Wasteload Management Report, which identified a hydraulic overload at the Broad Run treatment facility.

The CAP indicated inflow and infiltration (I&I) abatement measures as the primary means of addressing the hydraulic overload, and also established that UIP will prepare an Act 537 Plan Update in coordination with West Bradford Township to fully address the needs of the franchise area.

As noted in the 2009 Wasteload Management Report for the UIP facilities, UIP has indicated that future growth in their franchise area will be accommodated by on-lot sewage systems, unless a developer requests public sewage service and sufficient capacity is deemed to be available. No current planning efforts beyond this determination have been submitted to the Township by UIP. Additional discussion of the UIP franchise planning area has been prepared by the Township and can be found in subsequent chapters of this planning effort.

E. Sewage Facilities Planning Module Revisions to the West Bradford Township Act 537 Plan

A summary of available Chester County Health Department records documenting revisions to the Township's Act 537 Plan through sewage facilities planning modules can be found in Appendix A.

In summary, all approved planning modules have provided for on-lot sewage systems except those neighborhoods which are within public sewage service areas. Mapping is provided in Chapter III which illustrates these areas.

CHAPTER II

PHYSICAL AND DEMOGRAPHIC ANALYSIS

A. Delineation of Study Areas

The Township has been divided into seven study areas to facilitate the analysis of various wastewater alternatives. These study areas are smaller portions of the Township that have similar characteristics and wastewater planning concerns. The following parameters were generally used to define the boundaries of the study areas: existing land use, zoning, physiographic features, established public sewer service areas, and future growth areas. Map II-1, entitled "Sewage Facilities Study Areas" illustrates these areas.

1. Utilities Incorporated of Pennsylvania (UIP) Study Area

a. Location

The UIP Study Area encompasses the current UIP franchise area as approved by the Pennsylvania Public Utilities Commission. Portions of this study area/franchise area are currently served by the UIP owned Broad Run wastewater treatment plant. It is the largest study area in the Township, and generally encompasses the northeast quadrant of the Township, with the exception of a much smaller, non-contiguous grouping of parcels to the west of the larger area.

b. Existing Land Use

Due to its size, the UIP Study Area encompasses a wide variety of zoning classifications and uses. Single family residential uses predominate, and additional uses including two elementary schools.

c. Future Land Use

Single family residences are expected to remain the predominant use in the future, in accordance with zoning designations for this area. More limited areas may be developed for commercial or industrial uses, also as provided for by the Township's zoning designations.

2. DuPont Wastewater Treatment Facility Study Area

a. Location

This study area encompasses the northwest portion of the Township, and is equivalent to the current service area for the DuPont lagoon treatment and spray irrigation disposal wastewater facility. The area is bounded by

East Fallowfield Township to the west, Caln Township to the north, and development parcel boundaries to the east and south.

b. Existing Land Use

Single family residential uses comprise the majority of this study area.

c. Future Land Use

Future land use is expected to continue as single family residential, commensurate with the permissible zoning uses for the area.

3. Romansville Study Area

a. Location

The Romansville Area is generally centered on the intersection of Strasburg and Shadyside Road, and includes the Village of Romansville, contiguous residential development, and proposed development lands identified as the Stargazers property.

b. Existing Land Use

Existing land use within the Romansville Area is primarily single family residential, with a very limited number of commercial, industrial (Armstrong Property), and institutional (Romansville Methodist Church) uses.

c. Future Land Use

With the exception of the Stargazers property, only a very limited number of parcels have significant future development potential. Future uses are expected to mirror current uses - primarily single family residential, with limited commercial, industrial, and institutional uses.

4. Strasburg Corridor Study Area

a. Location

This area spans parcels on the north and south sides of Strasburg Road in the Village of Marshallton and Tattersall development, as well as the Broad Run Estates development on the northeast and north sides of Broad Run Road and Leids Road respectively. These lands comprise the current service area for the Strasburg Corridor lagoon treatment and spray irrigation disposal wastewater facility.

b. Existing Land Use

The noted development lands consist of single family residential uses, while the Village of Marshallton has limited commercial uses in addition to residential.

c. Future Land Use

The current land use is expected to continue in the future.

5. Embreeville Center Study Area

a. Location

The Embreeville Center Study Area consists of an approximately 226 acre parcel of land located at the southernmost end of West Bradford Township, bordered by Strasburg Road to the north and Embreeville Road to the south.

b. Existing Land Use

The Embreeville Center consists of approximately 18 separate buildings located on a 226 acre (+/-) parcel. The property is under the ownership of the Pa Department of Public Welfare, and was formerly operated as a State Hospital. With the exception of the State Police building which was transferred through an interdepartmental agreement, the facility is not in active use.

c. Future Land Use

West Bradford Township is in negotiations with the Commonwealth to acquire the Embreeville Center. Should this acquisition proceed, the Township anticipates redevelopment of the site which may include single family residences, town homes, limited commercial/retail uses, and additional residential/institutional facilities to accommodate an age restricted and/or continuing care retirement community.

6. Appleville Mobile Home Park Study Area

a. Location

The Appleville Mobile Home Park is located on the east and west side of Marshalltown-Thorndale Road, south of its intersection with Hall Road.

b. Existing Land Use

Currently, the Appleville Mobile Home Park consists of approximately 230 individual mobile home units plus a farm market. Additionally, the majority of the land is under cultivation as an active orchard.

c. Future Land Use

Given the current use of the Park as both a residential mobile home park community with an established wastewater infrastructure and the operational status of the farm market and orchard, future land use is expected to continue in the same fashion.

7. Residential Study Area

a. Location

This area represents the balance of the Township not encompassed by the other Study Areas.

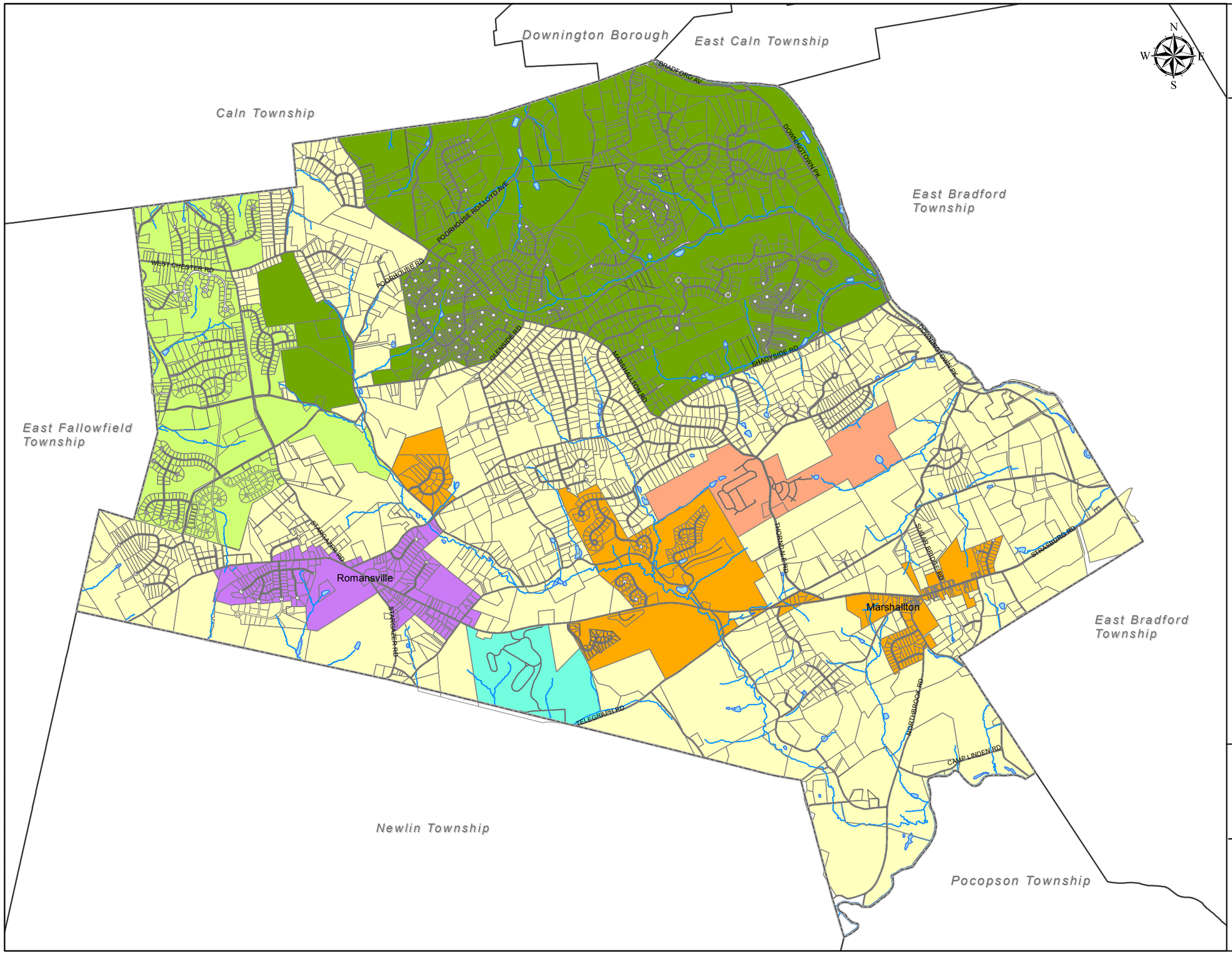
b. Existing Land Use

Single family residential uses on parcels of at least 1 acre in size comprise nearly all of this study area.

c. Future Land Use

Future land use is expected to continue as single family residential, commensurate with the permissible zoning uses for the area.

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Municipal Boundaries
- Parcels
- Roads
- Water Bodies
- Streams

Study Area

- Appleville Mobile Home Park Study Area
- DuPont Watewater Treatment Facility Study Area
- Embreeville Study Area
- Romansville Study Area
- Strasburg Corridor Study Area
- UIP Study Area
- Residential Study Area

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Water Bodies, Streams - Chester County Surface Water Features, www.pasda.psu.edu

0 1,250 2,500 5,000
Feet

MAP II - 1
SEWAGE FACILITY STUDY AREAS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WB\radford\20600401\GIS_job\Mapping\Act537_2010\MapII-1_StudyAreas.mxd

B. Drainage Basins, Hydrology, and Floodplains

1. Drainage Basins

West Bradford Township falls entirely within the Brandywine Creek Watershed. It is drained by the East and West branches of the Brandywine Creek and, at the heart of the Township, by the Broad Run Creek. All of these waters eventually drain to the estuary of the Delaware River, via the Christina River through Delaware. Drainage Basins within the Township are illustrated on Map II-2, Watersheds, Floodplains and Wetlands. Of particular significance for sewage planning are those watersheds with a DEP "special protection" designation, as will be discussed more fully in Chapter IV.

2. Hydrology

Stream flow during fair weather (apart from immediate storm flow) is derived primarily from ground water discharge. Groundwater occupies most of the open space in the rock below the water table. Because the rock underlying West Bradford Township is essentially impervious, most of the ground water is reserved in the unconsolidated weathered rock near the surface. Additional storage also occurs in fractures and solution openings in the deeper consolidated rock. Groundwater moves slowly from the point it enters the ground and moves towards the stream valleys where it's drained by the streams. The amount of water in transient storage at any one time is far greater than the amount being discharged by the stream at any given time. Even so, when water is withdrawn (whether by man or through evapotranspiration by vegetation) more rapidly than it is replenished by precipitation or returned through land application of wastewater, groundwater storage will decline and stream flow will be reduced. Lowest flows generally coincide with the peak of the growing season.

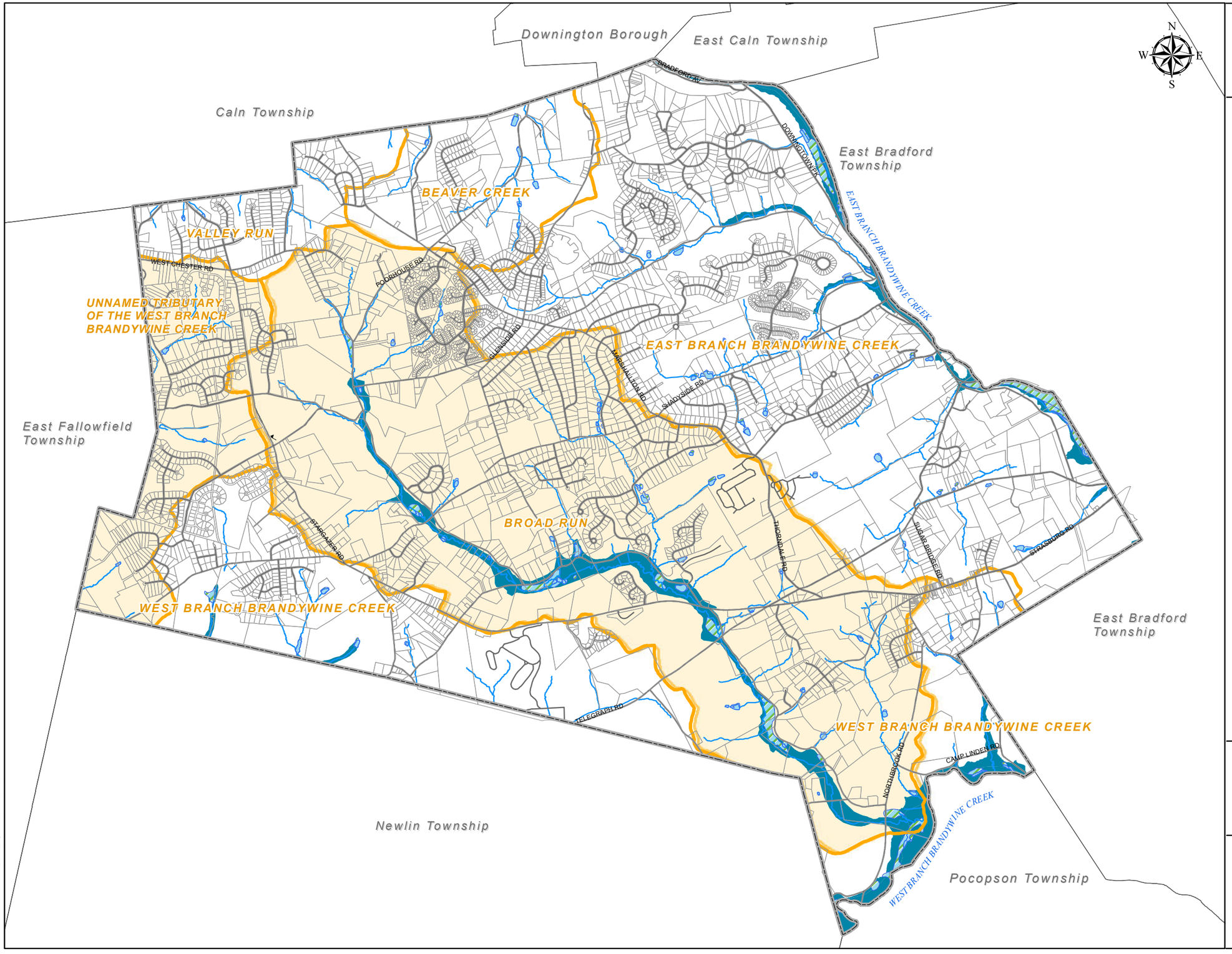
3. Floodplains

The floodplain areas are mapped by the Federal Emergency Management Agency (FEMA). The 100-year and 500 year floodplains have been identified and generally follow stream corridors. In addition to the areas mapped by FEMA, there are areas of alluvial or floodplain soils within the Study Area. The floodplains within the Township are illustrated on Map II-2.

C. Wetlands

Wetland areas are important local resource areas since they help reduce potential flood damage, act as important stormwater controls, are important vegetation and wildlife habitats, help to protect surface water quality by purifying overland flows of water, and are areas where recharge of the groundwater reservoirs occurs. For these reasons, and because the loss of wetlands has become an important environmental concern, these areas are protected by Federal and State regulations. Proposed development activity which will impact these

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Municipal Boundaries
- Parcels
- Roads
- Water Bodies
- Streams
- Watersheds
- Exceptional Value Watershed
- Wetlands
- 100 Year Floodplain

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Watersheds, Environmental Resources Research Institute, PADEP, www.pasda.psu.edu, Publication Date: September 2009
*Floodplain - FEMA Map Service Center, Publication Date: October 16, 2009
*Wetlands - National Wetlands Inventory (NWI), U.S. Fish & Wildlife Service and Chester County, Publication Date: 2000
*Water Bodies, Streams - Chester County Surface Water Features, www.pasda.psu.edu

0 1,250 2,500 5,000
Feet

MAP II - 2
WATERSHEDS, FLOODPLAINS & WETLANDS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26604401\GIS_Jobs\Mapping\Act537_2010\Map\II-2_WaterResources.mxd

areas must be reviewed and approved by the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the State Department of Environmental Resources.

Wetlands in the Township are also shown on Map II-2. The data are a product of the National Wildlife Inventory (NWI), published by the United States Fish and Wildlife Service (USFWS).

D. Soils

Soils lying above the water table have a natural ability to attenuate pollutants. The effectiveness of a soil in attenuating pollutants depends on its composition, thickness, and degree of saturation with water. There are five separate processes operating in soils that can help to remove contaminants. The sixth, evaporation, can increase the concentration of contaminants. The six processes are:

1. Filtration processes depend on the soil acting as a physical filter to trap suspended solids.

2. Sorption and adsorption processes involve soil particles physically and chemically capturing dissolved or suspended compounds.

3. Oxidation and reduction of contaminants can render them chemically inert or may hasten their precipitation out of solution.

4. Biological assimilation processes involve the uptake of contaminants by plant material.

5. Dilution and volatilization processes can decrease the concentration of contaminants in soils to acceptable levels

6. Evaporation processes can increase the concentration of contaminants.

The processes can be very effective in attenuating pollutants under the right conditions. Proper operation of on-site sewage disposal systems depends on these processes to treat wastewater effectively; if conditions are not suitable, potential pollution problems can result. It is important to note that once contaminants have reached groundwater, whether perched or regional, there are few mechanisms to remove or contain the contaminants. For this reason, DEP has established minimum criteria which must be met when applying various on-lot treatment technologies. Occasionally, classifications describing the depth and drainage class of a soil are used for descriptive purposes, and confer additional information about its suitability. For example, a deep, well drained soil which has 48 inches of suitable soil below the aggregate depth would meet the requirement for a standard in-ground sewage disposal system. Alternately, a minimum of 20 inches is required for most elevated sand mound applications. These soils are sometimes referred to as moderately well drained.

Floodplains, very wet soils, shallow soils, steep slopes, and areas with fractured rock are more susceptible to pollution because the contaminants can reach the groundwater without sufficient opportunity or time for the above processes to operate. These types of soils may be further described as having poorly drained conditions or a shallow depth class. These conditions, in turn, can contaminate surface water resources. Surface water can also be easily contaminated by system malfunctions in areas adjacent to stream corridors if untreated wastewater is not filtered and allowed to run off.

According to soil data and information produced by the National Cooperative Soil Survey, operated by the USDA Natural Resources Conservation Service (NRCS), there are fourteen major soil series in West Bradford Township. The NRCS soil data also includes interpretations regarding limitations (not suitability) for various types of on-lot sewage system technologies permissible in Pennsylvania. NRCS soil interpretations were evaluated for all soil map units in West Bradford with regard to the following conventional system designs: in-ground trench, elevated sand mound bed or trench, and subsurface sand filter trench. A copy of the associated NRCS soil limitations report can be found in Appendix B.

Trench technologies were evaluated where applicable in lieu of beds since trenches can generally be utilized anytime slope and soil conditions would allow for a bed configuration. Considering this, the technologies chosen for evaluation represent the majority of conventional, Chapter 73 compliant on-lot sewage systems that would be considered for use in West Bradford. Consideration of approved alternate technologies would expand potential suitability throughout the Township, but the more conservative standard of conventional technology was used for the purpose of this planning effort in accordance with DEP regulations and policies.

As noted above, NRCS soil interpretation reports were designed to represent limitations for on-lot sewage disposal, as opposed to suitability. These limitations are based upon factors such as slope, seasonal high water table, and slow percolation. Numerical values ranging from 0.01 to 1.00 are assigned for each salient factor within each soil map unit, with larger values equivalent to greater potential limitations. Limitations are also more broadly summarized by categorizing each soil type as slightly limited, moderately limited, or very limited.

Although the significance of slope is discussed more fully in the following section, inclusion of this factor in assessing soil conditions with regard to sewage disposal is necessary since slope is one of the defining criteria for soil map units.

For the purpose of this planning effort, soils in West Bradford have been classified into three on-lot disposal suitability categories based upon the NRCS interpretation of limitations: generally suitable (slightly limited), conditionally suitable (moderately limited), and generally unsuitable (very limited). Where a soil type had different NRCS limitation categories for the three system technologies evaluated, the least limiting technology was used for suitability classification. It should also be noted that several soil map units comprised primarily of urban land are described by the NRCS data as being

very limited for on-lot disposal, although the these soils generally consist of large development areas utilizing sewage systems permitted by the Chester County Health Department with no known widespread incidence of malfunction. Considering this apparent discrepancy, applicable soil map units have been classified as conditionally suitable. As with any broad scale assessment of soil conditions, site investigations will ultimately be required to confirm on-lot disposal suitability for any specific parcel.

A summary of the soil suitability classification for on-lot disposal systems is as follows:

- Soils Generally Suitable for On-lot Disposal Systems

  Approximately fifty-four (54%) percent of the soils in the Township are considered to be generally suitable for on-lot disposal. The Glenelg and Manor soil series predominate in this category.

- Soils Conditionally Suitable for On-lot Disposal Systems

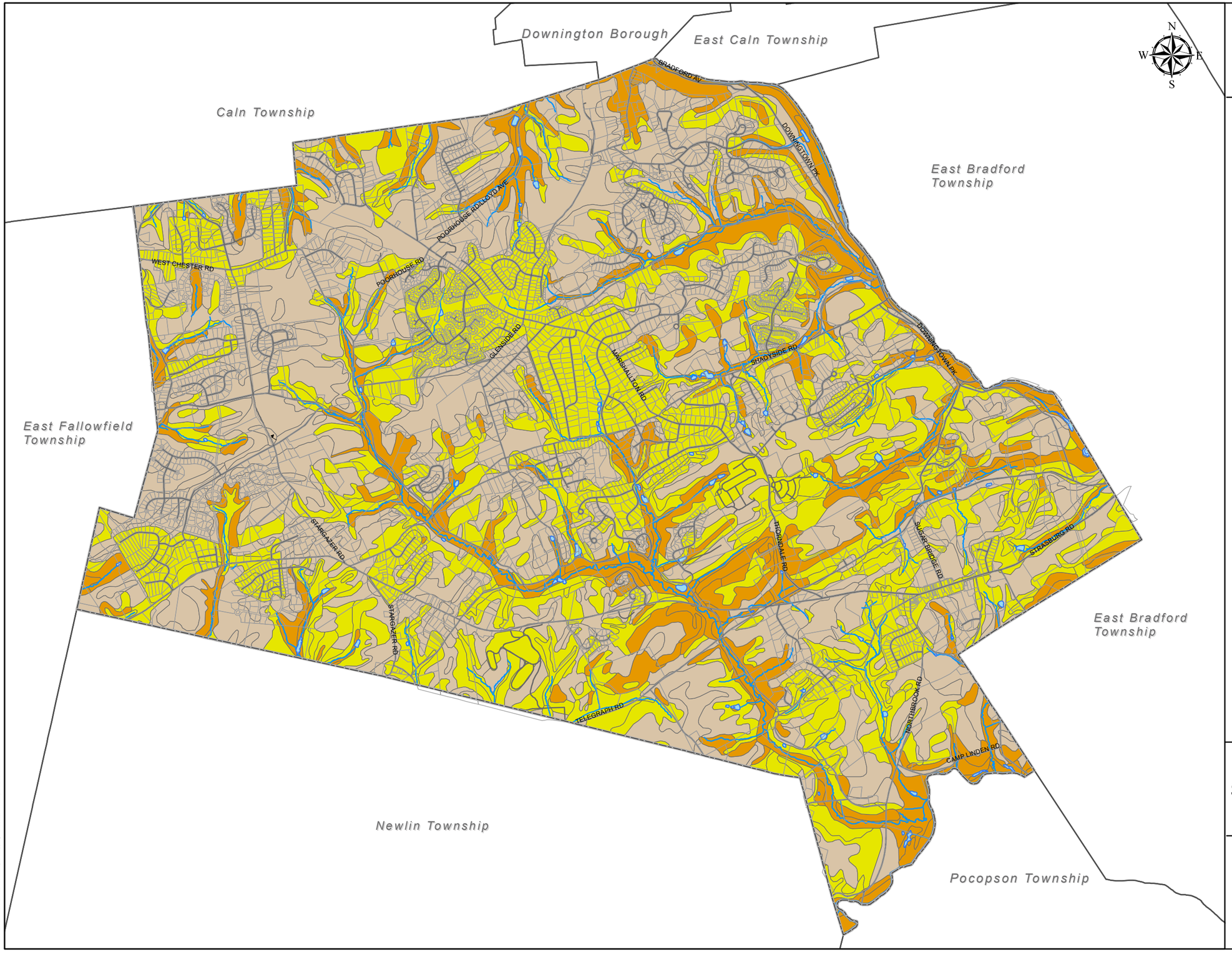
  Approximately twenty-nine (29%) percent of the soils in the Township are considered to be conditionally suitable for on-lot disposal. As above, the Glenelg and Manor soil series predominate in this category.

- Soils Generally Unsuitable for On-lot Disposal Systems

  Approximately sixteen (16%) percent of the soils in the Township are considered to be generally unsuitable for on-lot disposal. This group includes all floodplain soils, soils with a shallow or seasonal high water table, and soils indicative of steep (greater than 25%) slopes.

Map II-3 illustrates the distribution of these soil suitability classes in the Township, and Table II-1 presents soil series, map unit, suitability classification, acreage, and percent of Township for all soils mapped by the NRCS in West Bradford.

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Municipal Boundaries
- Parcels
- Roads
- Water Bodies
- Streams

Soil Suitability

- Generally Suitable
- Conditionally Suitable
- Generally Unsuitable

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Soils - Soil Survey Geographic database for Chester County, PA, Published by USDA Natural Resources Conservation Service, 2008.
*Water Bodies, Streams - Chester County Surface Water Features, www.pasda.psu.edu

0 1,250 2,500 5,000
Feet

MAP II - 3
SOIL SUITABILITY FOR ON-LOT SEWAGE DISPOSAL

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26600401\GIS_Job\Mapping\Act537_2010\Map\II-3_Soils.mxd

Table II-1
Soil Suitability for On-Lot Sewage Disposal

Soil Series	Map Symbol	Suitability	Acres	% of Township
Chester	CdA	Generally Suitable	4.4	0.04%
Chester	CdB	Generally Suitable	31.9	0.27%
Gladstone	GdA	Generally Suitable	6.8	0.06%
Gladstone	GdB	Generally Suitable	75.6	0.64%
Gladstone	GdC	Generally Suitable	82.0	0.69%
Glenelg	GgA	Generally Suitable	70.0	0.59%
Glenelg	GgB	Generally Suitable	1,915.4	16.10%
Manor	MaA	Generally Suitable	29.5	0.25%
Manor	MaB	Generally Suitable	1,118.8	9.40%
Manor	MaC	Generally Suitable	2,239.8	18.82%
Manor	MbB	Generally Suitable	5.3	0.04%
Manor	UrsB	Generally Suitable	71.9	0.60%
Udorthents	UdsB	Generally Suitable	0.8	0.01%
Udorthents	UugB	Generally Suitable	108.2	0.91%
Udorthents	UugD	Generally Suitable	677.1	5.69%
Chester	CdC	Conditionally Suitable	2.5	0.02%
Gaila	GaD	Conditionally Suitable	111.2	0.93%
Glenelg	GgC	Conditionally Suitable	799.5	6.72%
Glenelg	GgD	Conditionally Suitable	11.3	0.09%
Glenville	GlA	Conditionally Suitable	126.6	1.06%
Glenville	GlB	Conditionally Suitable	256.7	2.16%
Glenville	GlC	Conditionally Suitable	3.7	0.03%
Manor	MaD	Conditionally Suitable	1,697.6	14.27%
Manor	MbD	Conditionally Suitable	12.8	0.11%
Parker	PaB	Conditionally Suitable	39.4	0.33%
Parker	PaC	Conditionally Suitable	47.0	0.39%
Glenelg	UrmB	Conditionally Suitable	138.9	1.17%
Glenelg	UrmD	Conditionally Suitable	158.4	1.33%
Manor	UrsD	Conditionally Suitable	84.3	0.71%
Baile	Ba	Generally Unsuitable	66.5	0.56%
Baile	BaB	Generally Unsuitable	53.0	0.45%
Califon	CaA	Generally Unsuitable	27.5	0.23%
Califon	CaB	Generally Unsuitable	59.1	0.50%
Codurus	Co	Generally Unsuitable	184.4	1.55%
Cokesbury	CpA	Generally Unsuitable	21.4	0.18%
Cokesbury	CpB	Generally Unsuitable	21.8	0.18%
Comus	Cs	Generally Unsuitable	80.5	0.68%
Hatboro	Ha	Generally Unsuitable	326.7	2.75%
Lindsode	Ln	Generally Unsuitable	2.6	0.02%
Manor	MaE	Generally Unsuitable	681.2	5.72%
Manor	MaF	Generally Unsuitable	153.6	1.29%
Manor	MbF	Generally Unsuitable	66.0	0.55%
Parker	PaD	Generally Unsuitable	78.0	0.66%
Parker	PaE	Generally Unsuitable	68.7	0.58%
Parker	PaF	Generally Unsuitable	28.6	0.24%

E. Topography

The topography, or slope, of the land is another important consideration in determining suitability for wastewater disposal. The topography is also a controlling factor when evaluating wastewater collection and conveyance systems to serve a given area.

Slope, measured as the change in elevation over a horizontal distance, is a significant criterion in establishing feasibility of specific on-lot sewage system designs in accordance with the standards of Pa Code Title 25, Chapter 73. In general, areas with slopes of less than 15% allow for installation of on-lot sewage systems with few constraints, provided suitable soils exist. Areas with slopes in excess of 15% present potential constraints to the successful operation of on-lot soil absorption systems, and DEP requires more detailed design for individual on-lot systems on slopes between 15 and 25% for this reason. In areas where the slope exceeds 25%, the use of such systems is prohibited.

Severely eroded soils are also associated with steep slopes, and may present additional limitations on sewage system placement due to an insufficient depth to bedrock. Generally, these severely eroded soils are associated with and located in the same areas as those exhibiting slopes in excess of 15%. However, there are also limited areas which have undergone significant erosion, that are located on lesser slopes. Detailed tests will be necessary to determine feasibility of on-site sewage disposal in such areas or if alternative sewage disposal techniques would be preferable or necessary.

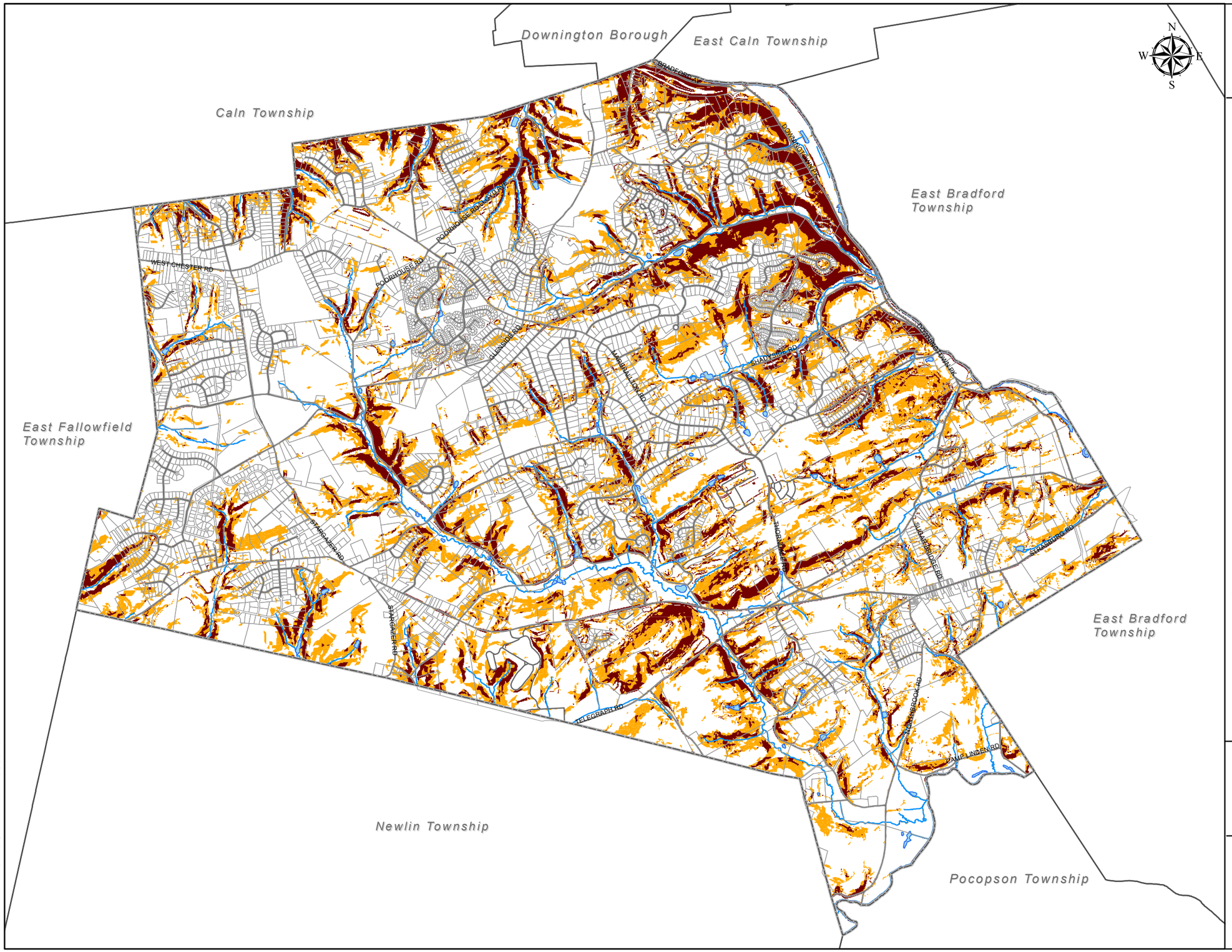
As shown in Table II-2 below, the majority of the Township has slopes of less than 15%, reflecting general suitability for on-lot sewage disposal. Approximately 20% of the Township encompasses slopes of between 15% and 25%, which may be conditionally suitable for on-lot disposal. The balance of the Township is characterized by steep slopes in excess of 25%, located primarily along river valleys, which generally prohibit the use of on-lot disposal systems.

Table II-2
Slope Classes

Slope Range	Suitability for On-lot Disposal	Percent of Township	Acreage
0-15%	Generally Suitable	68.3	8,129
15-25%	Conditionally Suitable	20.3	2,411
> 25%	Generally Unsuitable	11.4	1,360
	Total	**100.00**	**11,900**

Map II-4 further illustrates the distribution of these slope categories throughout the Township.

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Municipal Boundaries
- Parcels
- Roads
- Water Bodies
- Streams

Slopes

- Moderate Slopes, 15%-25%
- Steep Slopes, >25%

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Slopes - Chester County Planning Commission, 11/2006
*Water Bodies, Streams - Chester County Surface Water Features, www. pasda.psu.edu

0 1,250 2,500 5,000
Feet

MAP II - 4
SLOPES

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26606401\GIS_Job\Mapping\Act537_2010\MapII-4_Topography_Slopes.mxd

F. Geologic Features

West Bradford Township lies entirely within the Piedmont Province of the Appalachian Highlands, a band of rolling country that stretches from New York to Georgia. The "fall line," marking the transition from the Piedmont Province to the Coastal Plain, is located approximately 15 miles to the south, coursing southwesterly through northern Delaware and around the head of the Chesapeake Bay.

West Bradford Township is primarily underlain by moderately hard crystalline rock that has metamorphosed from softer sedimentary rock. Three major bands or rock courses traverse the Township in a northeast to southwest fashion: The Octoraro Phyllite to the north, a narrower band of Peters Creek schist in the center, and the mica schist of the Wissahickon formation to the south.

The schist is deeply weathered, occasionally as much as 100 feet. The relatively level character of much of the upland areas reflects deep weathering. It also has contributed to the erosion of the deep, steeply walled stream valleys, which dissect the upland, creating the pronounced sense of hill and valley in West Bradford. Deep weathering tends to improve both the percolation characteristics of the overlying soils and the potential for groundwater yields; nevertheless, careful study is necessary to ascertain those characteristics on a case-by-case basis. The rock material in the deeply weathered zone is known as saprolite or "rotten rock." Its presence to potentially great depths mandates precautionary testing prior to the design and construction of foundations for heavy structures.

A very small area of Franklin Marble crops out along a line followed roughly by the course of Telegraph Road, forming a valley transverse to that of the Broad Run and East Branch of the Brandywine. The Franklin Marble is a pre-Cambrian formation, one of the oldest rock formations in Chester County. It is comprised of metamorphosed limestone and is subject to the formation of a week carbonic acid solution through chemical reaction with and air and water. The acid works slowly to dissolve the rock, forming underground solution channels and potentially, sinkholes. This formation provides both a relatively high water yield and high susceptibility to groundwater pollution. While this formation must be viewed with caution, its small areal extent is largely coincidental with areas governed by the Township Flood Hazard District; hence, it is not likely to be subject to much development activity.

Felsic gneiss intrudes upon the area of mica schist in two bands. A small area overlaps the southeastern corner of the Township along the West Branch of the Brandywine. A larger band, some 1,800 feet in width, lies parallel and adjacent on the north side, to the band of Franklin Marble. A fault line coursing across the Township marks the boundary between the gneiss and the mica schist on the north. This rock is harder and more resistant to erosion than the mica schist; thus, it forms the highline of hills along the north side of the transverse valley, including the two prominent mounts standing sentinel astride the Broad Run valley at former Como Farm located on the lands of the Tattersall Development. It is less prone to weathering and lower in porosity than the schists. It offers good foundation support and potentially some value as crushed stone.

Considerably harder rock is found in the form of a long ribbon, or dike of Diabase coursing across the northwestern part of the Township, with a smaller dike located in the southeastern portion of the Township, just south of Marshallton. Diabase exhibits extremely low porosity and is practically impervious. Therefore, it can actually act as a dam to groundwater flow, increasing yields immediately up gradient while impeding down gradient flow. Diabase does not generally weather to any great depth but does tend to form boulders. It is excellent for foundation support.

Small areas of serpentine crop up in three scattered locations at the edges of the Township, on the boundaries with East Bradford, Newlin, and East Fallowfield Township. Serpentine is moderately hard and tends to weather slowly. It usually forms low, flat upland areas know as serpentine barrens. Groundwater in serpentine contains more dissolved salts that in other rocks, while the soils that develop atop it tend to be thin, poor, and often slightly acidic soil.

Map II-5 illustrates the geology of West Bradford Township.

West Bradford Township
Official Sewage Facilities Plan

Downington Borough
East Caln Township
Caln Township
East Bradford Township
East Fallowfield Township
Newlin Township
Pocopson Township

BRADFORD AV
DOWNINGTOWN PK
WEST CHESTER RD
POORHOUSE RD
POORHOUSE RD/LLOYD AVE
GLENSIDE RD
MARSHALLTON RD
SHADYSIDE RD
STARGAZER RD
THORNDALE RD
SUGAR BRIDGE RD
STRASBURG RD
TELEGRAPH RD
NORTHBROOK RD
CAMP LINDEN RD

Xo
Xu
Xpc
Xgw
fm
fgh
fgp

N
W
E
S

Legend

- West Bradford Township Boundary
- Municipal Boundaries
- Parcels
- Water Bodies
- Roads
- Streams

Geologic Formation Name (Map Symbol)

- Glenarm Wissahickon Formation (Xgw)
- Felsic and Intermediate Gneiss (fgh)
- Felsic Gneiss (fgp)
- Franklin Marble (fm)
- Octoraro Formation (Xo)
- Peters Creek Schist (Xpc)
- Ultramafic Rocks (Xu)

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Geologic Formation - Bedrock Geology of Pennsylvania digital maps, 1980 Wilmington Quandrangle, Published by Pennsylvania Bureau of Topographic and Geologic Survey, DCNR, 2001.
*Water Bodies, Streams - Chester County Surface Water Features, www.pasda.psu.edu

0 1,250 2,500 5,000
Feet

MAP II - 5
GEOLOGY

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WB\radford\26600-001\GIS_job\Mapping\Act537_2010\Map\II-5_Geology.mxd

G. Water Supply

Aqua America of PA provides public water service to portions of West Bradford Township and has a franchise area as approved by the Pennsylvania Public Utility Commission which encompasses the entirety of the Township. In areas not served by public water service, water is provided by on-site wells. Since a large percentage of Townships residents still rely on groundwater for their water needs, the quality of the regions ground water resources is critically important. This is an important factor to consider when evaluating land use, water resources, and wastewater planning.

H. Population and Housing

1. Population

Census data indicated a population of 10,406 in 1990 and 10,775 in 2000, representing an increase of approximately 3.5 %. Population forecasts from West Bradford Township and the Chester County Planning Commission are generally consistent and suggest more rapid growth subsequent to the 2000 census data. Table II-3 below summarizes population projections.

Table II-3
Population Projections

	Census		Projections			
Source	1990	2000	2010	2015	2020	2030
West Bradford Township[(1)]	10,406	10,775	12,500 - 13,250	n.a.	13,500 - 14,000	13,750 - 15,000
Chester County Planning Commission[(2)]	10,406	10,775	12,521	13,202	13,853	15,067

(1) West Bradford Township 2009 Comprehensive Plan
(2) Municipal Population Forecasts (2005 – 2035), utilizing Delaware Valley Regional Planning Commission 2007 projections

2. Housing

Housing units grew more rapidly than population between 1990 and 2000, increasing 7.7% from 3,217 units to 3,464 units. Reflecting the largely suburban nature of the Township, nearly 90% of the housing in 2000 was single family detached houses. An additional 857 housing units were constructed between 2000 and 2009, still primarily single family detached houses, representing an increase of approximately 24.7 %.

Chester County data further suggests a trend in declining occupancy for each residence, consistent with the more rapid growth in housing than population. The average occupancy declined from 3.20 persons per housing unit in 1990 to 2.98 in 2000. Although 2010 census data is not available at this writing, it is expected that this trend has continued to the present.

CHAPTER III

EXISTING SEWAGE FACILITIES

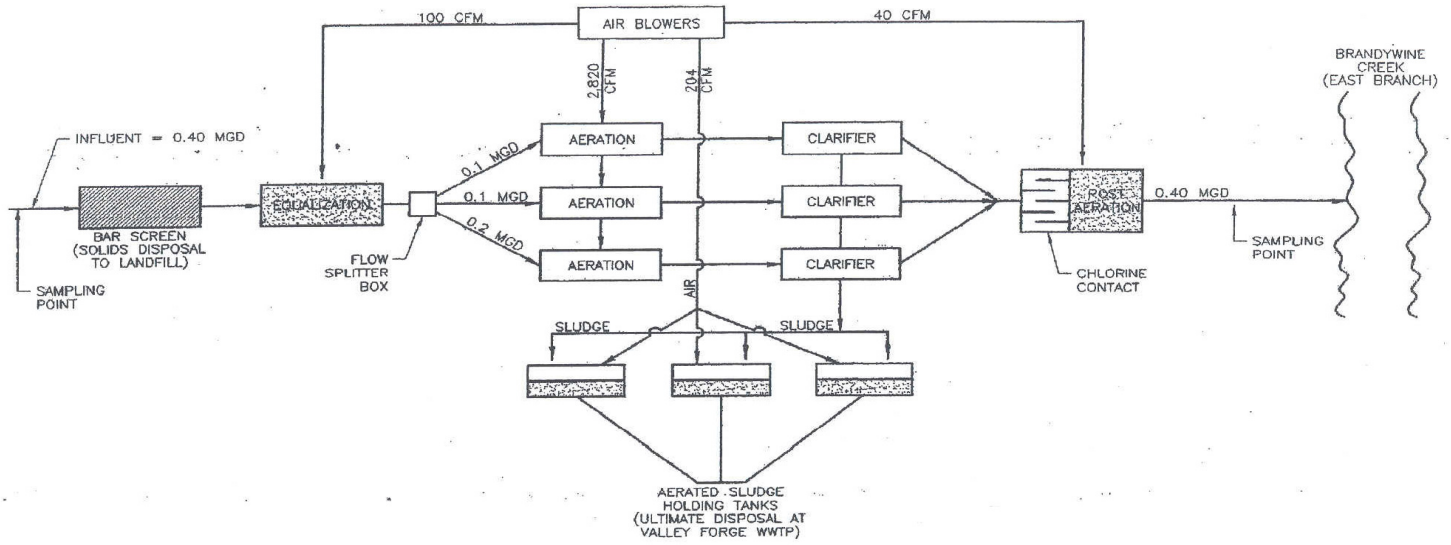
A. Public and Community Sewerage Systems

1. Broad Run / UIP Wastewater Treatment Plant

Utilities Incorporated of Pennsylvania (UIP) is the current owner and operator of the Broad Run Wastewater Treatment Plant. This facility was originally placed in operation in 1977 with a permitted capacity of 150,000 gpd (gallons per day). Several modifications and expansions have since been undertaken and the plant is currently operating under NPDES Permit No. PA 0043982 with a capacity of 400,000 gpd average monthly flow. The plant is located on Shadyside Road near Route 322 and utilizes an extended aeration treatment process that discharges to an unnamed tributary of the East Branch of the Brandywine Creek.

The major treatment processes include screening, flow equalization, aeration, clarification, chlorination, and post aeration. There are three distinct process trains for the aeration and clarification treatment. A schematic representation of the treatment process is shown in Figure III-1 below.

Figure III-1
Broad Run/UIP WWTP Treatment Process



Treated wastewater is required to meet the discharge limits as shown in Table III-1 on the following page.

Table III-1
UIP WWTP Effluent Permit Requirements
NPDES Permit No. PA0043982

5-day Biochemical Oxygen Demand	25 mg/L
Total Suspended Solids	30 mg/L
Ammonia, Summer	2.0 mg/L
Total Ammonia, Winter	8.0 mg/L
Phosphorus (as P), Summer	2 mg/L
Phosphorus (as P), Winter	NL
Fecal Coliform	200/100 ml as geometric mean
pH	6 - 9

This facility currently serves two elementary schools and residential development as summarized in Table III-2 below.

Table III-2
Broad Run WWTP Residential Connections

Development	Number of Homes
Bradford Glen/Victoria Crossing	476
Summit Ridge/Walnut Ridge/Valley Ridge	212
The Highlands	47
Brandywine Green, Phases I through III	206
Stonegate	102
Brandywine Ridge	143
Brandywine Green Phase IV	64
Sawmill Subdivision	66
Miscellaneous residences	6
Total	**1,322**

The collection system consists primarily of gravity interceptor and collection sewers, constructed of polyvinyl chloride (PVC) and concrete and ranging in diameter from 8 inches to 15 inches. There are currently 19 miles of sewer mains with approximately 450 manholes.

Two wastewater pumping stations serve the Broad Run facility: the Chestnut Lane Pumping Station and the Broadview East Pumping Station. These pumping stations discharge via force mains to terminal manholes, where the wastewater flows by gravity to the WWTP. No capacity problems or maintenance concerns have been noted by UIP for these pump stations.

The Broad Run WWTP has experienced hydraulic overload conditions in the recent past. In response to this condition, a hydraulic capacity study was performed in 2006 by Applied Water Management on behalf of UIP to determine if the plant could accommodate additional flow without making any changes or additions to the treatment process. This study recommended that no additional flow be accepted under the current plant arrangement and operating conditions due to peak daily flow limitations.

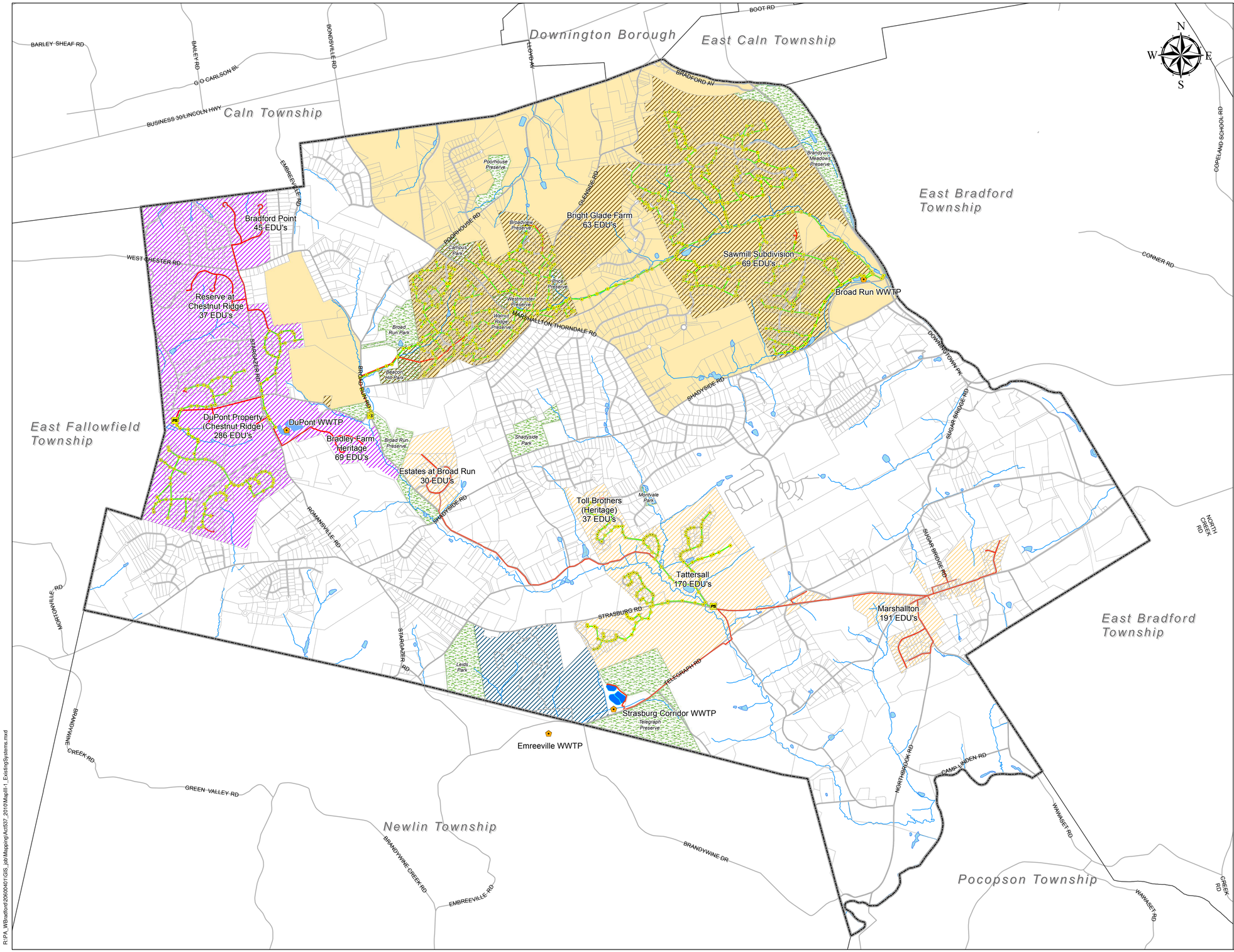
The 2007 Chapter 94 Wasteload Management Report identified an existing hydraulic overload at the Broad Run treatment facility, necessitating a Corrective Action Plan (CAP) per Chapter 94 regulations. UIP submitted a CAP to DEP in January 2009. The CAP indicated inflow and infiltration (I&I) abatement measures as the primary means of addressing the hydraulic overload, and also established that UIP will prepare an Act 537 Plan Update in coordination with West Bradford Township to fully address the needs of the franchise area. In accordance with the CAP, UIP has initiated flow monitoring, manhole inspection and repair, and sewer line televising and slip lining to lessen I&I impacts.

The 2009 Chapter 94 Wasteload Management Report indicated an annual average WWTP hydraulic loading of 279,000 gpd, with an average of 338,000 gpd for the three highest consecutive months. The highest average monthly flow indicated in the Report was 418,000 gpd in December, exceeding the permitted capacity of 400,000 gpd. A review of monthly discharge monitoring reports submitted to DEP by UIP for 2010 shows an average flow of 282,000 gpd for the year. The maximum three month average in 2010 was 396,000 gpd during January, February, and March, with the highest monthly average of 482,000 gpd recorded in March, exceeding the permitted capacity. Given these conditions and the DEP approved connection of an additional 98 residences within the existing Sawmill subdivision and the pending Heritage subdivision, additional I&I abatement measures will be needed to comply with the WWTP permit capacity. The 2009 Chapter 94 Report indicates such efforts will be ongoing. It should be noted that the recent semi-annual report submitted by UIP to DEP, reporting period June 2010 to November 2010, the average monthly flow was 223,000 gpd, with the highest maximum daily flow occurring during the month of September at 397,000 gpd.

As discussed in detail later in this planning effort, the 2009 Wasteload Management Report for the UIP facilities also indicates that future growth in their franchise area will be accommodated by on-lot sewage systems, unless a developer requests public sewage service and sufficient capacity is deemed to be available. No current planning efforts beyond this determination have been submitted to the Township by UIP.

The UIP Broad Run wastewater facilities are depicted on Map III-1 and the 2009 Wasteload Management Report can be found in Appendix C.

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Municipal Boundaries
- Parcels
- Roads
- Water Bodies
- Streams
- Parks and Preserves
- Manhole
- WWTP
- Pump Station
- Gravity
- Force Main
- Storage Lagoons
- DuPont Service Area
- Strasburg Corridor Service Area
- Embreeville Service Area
- UIP Service Area
- UIP Franchise Area

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Water Bodies, Streams - Chester County Surface Water Features, www.pasda.psu.edu
*Franchise Area - West Bradford Township
*Service Areas - West Bradford Township, Chapter 94 Reports

0 1,250 2,500 5,000
Feet

MAP III-1
EXISTING PUBLIC AND COMMUNITY SEWERAGE SYSTEMS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WB\radford\20606401\GIS_Job\Mapping\Act537_2010\Map3-1_ExistingSystems.mxd

2. DuPont Wastewater Treatment Facility

The DuPont Wastewater Treatment Facility (WWTF) was placed in operation in May 2006 and consists of treatment and storage lagoons with spray irrigation disposal. This facility is owned and operated by West Bradford Township under Water Quality Management Part II Permit No. 1504404, which recognizes a capacity of 146,500 gpd.

The treatment plant consists of an influent lift station, a comminutor, treatment and storage ponds, and effluent disinfection. A schematic representation of the treatment process is shown in Figure III-2. Permitted effluent limits are listed in Table III-3 below.

Table III-3
DuPont WWTF Effluent Limits

Parameter	Discharge Limitations (mg/l)		
	Average monthly	**Average Weekly**	**Instantaneous Maximum**
Flow (mgd)	0.146		
$CBOD_5$	25	40	50
Suspended Solids	30	45	60
Fecal Coliform	200/100 ml as geometric average		
pH	Within 6 to 9 standard units at all times		

The WWTF permit also includes requirements for quarterly groundwater monitoring. The 2010 Annual Groundwater Report for this facility evaluated all requisite monitoring results and indicated no trends or conditions which pose a threat to human health or the environment.

The DuPont facility service area is located in the northwest portion of the Township. Current users consist entirely of residential development, as summarized in Table III-4 below.

Table III-4
DuPont WWTF Current Connections

Development Name	Number of Homes Connected
DuPont Property (Chestnut Ridge)	195
Reserve at Chestnut Ridge	37
Bradford Point	38
Total	**270**

FIGURE III - 2
DUPONT WWTP
TREATMENT AND
DISPOSAL PROCESS
INFLUENT
LIFT STATION
W/ VALVE VAULT
COMMINUTOR W/
MANUAL BYPASS
SCREEN
AERATED TREATMENT
LAGOON W/ BAFFLE
STORAGE
LAGOON
HWL
LWL
CHLORINE
INJECTION
SPRAY
IRRIGATION
PUMP STATION
AIR
RELEASE
VALVE
CHLORINE
CONTACT
PIPES
SPRAY
FIELD A
AIR
RELEASE
VALVE
SPRAY
FIELD B

Hydraulic loading for this WWTF is monitored by an electromagnetic flow meter which measures the pumped flow from the influent lift station into the treatment lagoon. The flow is recorded on a chart recorder and by the operator on the daily bench sheet. The 2009 Wasteload Management report for this facility indicates average annual flows of 34,436 gpd and a three consecutive month maximum average flow of 38,711 gpd, well below the permitted capacity of 146,500 gpd. This Report further notes no problems with the WWTF or associated collection & conveyance system.

Wastewater in the DuPont WWTF service area is collected from the homes and conveyed to the treatment facility by a combination of gravity sewers, a pump station, and individual grinder pumps. The design of the sewers for the DuPont Property (Chestnut Ridge) includes individual residential grinder pumps to serve thirty (30) of the homes. A gravity sewer system conveys wastewater from another 225 homes in this development to a pump station located adjacent to Chestnut Lane near the western edge of the project. This pumping station was completed in 2006 and is in good condition. The pumping station is designed to convey 192 gpm at 127 feet TDH, which represents a peak flow factor of 4.9 based on the design flow of 56,250 gallons per day. A flow meter is located on the discharge of this pump station. Since the current flows are less than the design flow even on peak days, the pump station is more than adequate for existing conditions. Also, based on the projected hydraulic loading for the next 5 years as provided in the 2009 Wasteload Management Report, the design capacity of the pump station will not be exceeded in the foreseeable future.

Wastewater from the pump station adjacent to Chestnut Lane is transported through a 6" PVC force main directly to Manhole 22 located on a section of gravity sewer near the intersection of Romansville Road and Chestnut Lane. All of the sewers have been installed within the last few years in accordance with Township specifications and are in good condition.

From Manhole 22, the sewers flow by gravity to an influent lift pump station located at the treatment facility. This influent lift station, which was completed in 2006, consists of a precast concrete wet well with duplex submersible sewage pumps and a valve box. The influent pump station is in good condition. This pumping station is designed to convey 450 gpm at 45 feet TDH, which represents a peak flow factor of 4.4 based on the design flow of 146,500 gallons per day. Since the current flows are less than ½ the design flow even on peak days, the pump station is more than adequate for existing conditions. Also, based on the projected hydraulic loading for the next 5 years shown in the 2009 Wasteload Management Report, the design capacity of the pump station will not be exceeded in the foreseeable future.

The Township routinely visits the pump stations as part of the regular operating routine. Maintenance is performed as necessary. The Township also monitors the flows from the pump stations for signs of Infiltration and Inflow in the collection

system. Records indicate there are no significant increases of flow during wet weather.

The 2009 Wasteload Management Report can be found in Appendix D. Map III-1 illustrates the WWTF, service area, and collection and conveyance system.

3. Strasburg Corridor Wastewater Treatment Facility

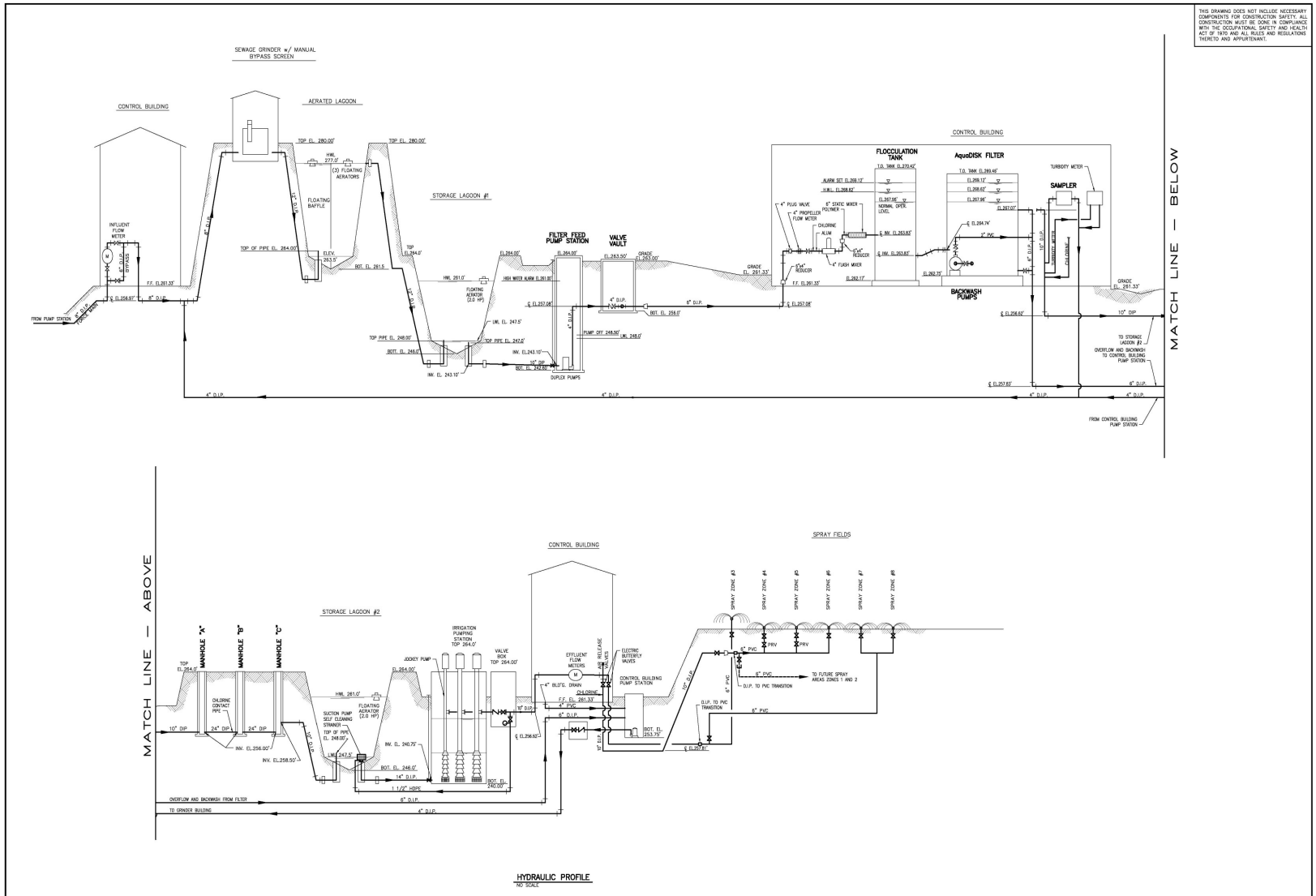
West Bradford Township was issued Water Quality Management Part II Permit No. 1500422 by the Department of Environmental Protection on April 19, 2001. Permit Amendment No. 1 was issued on October 2, 2003. Permit Amendment No. 2 was issued on January 24, 2007. The permit and amendments authorized the construction of the WWTF and collection system to serve the Strasburg Corridor Sewer Service Area which includes the Village of Marshallton, the Tattersall subdivision (including the Hertig Tract), and Broad Run Estates (Welsh Tract). These areas are served by gravity and/or low pressure sewers which discharge to the pumping station at the intersection of Broad Run Road and Strasburg Road. The pumping station discharges through a force main to the Strasburg Corridor WWTF on Telegraph Road. The WWTF utilizes aerated lagoon treatment with disposal of treated effluent via spray irrigation.

Since new development within the service area took place over a period of several years, the Strasburg Corridor WWTF was constructed in phases. The Phase 1 facilities, which consisted of the aerated and storage lagoons and three spray zones, were constructed during 2004 and began operation on January 12, 2005 when the PADEP authorized use of the headworks and treatment lagoon. On May 26, 2005 the PADEP authorized operation of the complete Phase 1 facility for a flow of 95,000 gpd.

For Phase 2, three more spray fields were constructed during the summer of 2007 to reach the design capacity of 135,000 gpd. Operation of the Phase 2 spray fields started with light applications to maintain the cover crop during the summer of 2008. Two additional spray fields, Spray Zones 1 and 2, were permitted but have not been constructed due to provisions of a settlement agreement. The overall capacity of the spray fields, not including Zones 1 and 2, is 185,000 gpd.

The treatment facility includes an aerated lagoon, two storage lagoons, a filter feed pumping station, chemical coagulation, a flocculation chamber, disk filtration and disinfection.

A schematic representation of the treatment process is shown in Figure III-3. Permitted effluent limits are listed in Table III-5 on Page III-10.



WEST BRADFORD TOWNSHIP
CHESTER COUNTY, PA.

American Consulting Engineers Council Member
Supporting Excellence in Engineering

URS

4051 Ogletown Road, Suite 300
Newark, DE 19713
Tel: 302.781.5900
Fax: 302.781.5901

APPROVED BY:

SCALE N.T.S.
DESIGNED
DRAWN
CHECKED
PEER REVIEWED
DATE 8/31/10

STRASBURG CORRIDOR WWTP

TREATMENT AND DISPOSAL PROCESS

REVISION 0
PROJECT 20600401
DRAWING FIGURE III - 3

Table III-5
Strasburg Corridor WWTF Effluent Limits

Parameter	Discharge Limitations (mg/l)		
	Average monthly	Average Weekly	Instantaneous Maximum
Flow (mgd)	0.135		
$CBOD_5$	25	40	50
Suspended Solids	30	45	60
Fecal Coliform	200/100 ml as geometric average		
pH	Within 6 to 9 standard units at all times		

The WWTF permit also includes requirements for quarterly groundwater monitoring. The 2010 Annual Groundwater Report for this facility evaluated all requisite monitoring results and indicated no trends or conditions which pose a threat to human health or the environment.

Current users consist primarily of residential development, as summarized in Table III-6 below.

Table III-6
Strasburg Corridor WWTF Current Connections

Development/Area	Number of Units Connected
Marshallton	191
Broad Run Estates	29
Tattersall (includes Heritage Development)	158
Total	**378**

The hydraulic loading to this WWTF is monitored with an electromagnetic flow meter on the influent pipe in the Control Building. The flow is recorded on a chart recorder and by the operator on the daily bench sheet. The 2009 Wasteload Management Report indicated an annual average flow of 49,077 gpd and a three consecutive month maximum average flow of 50,264 gpd, well below the permitted capacity of 135,000 gpd.

The collection and conveyance system for the Strasburg Corridor Wastewater Treatment Facility was constructed as part of private and municipal projects. West Bradford Township installed a low pressure sewer system to service the Marshallton Village area in 2004. Developers have built gravity and low pressure sewer systems to service the Estates at Broad Run subdivision and the Tattersall subdivision. All of the sewers have been installed within the last few years, thus they are new and in good condition.

All sewers discharge to the pumping station at the intersection of Broad Run Road and Strasburg Road. This pumping station was completed in 2005. The pumping station is designed to convey 350 gpm at 136 feet TDH, which represents a peak flow factor of 3.7 based on the treatment plant capacity of 135,000 gallons per day. Since the current flows are less than ½ of the design flow even on peak days, the pump station is more than adequate for existing conditions. Also, based on the projected hydraulic loading for the next 5 years as shown in the 2009 Wasteload Management Report, the design capacity of the pump station will not be exceeded in the foreseeable future.

The Township routinely visits the pump station as part of the regular operating routine. Maintenance is performed as necessary. Since the discharge from this pump station is the only source of flow to the Strasburg WWTF, the influent flow meter at the WWTF provides an accurate record of the pump station's output. The Township monitors the flows from the pump station for indications of I&I in the collection system. Records indicate there are no significant increases of flow during wet weather.

Map III-1 shows the existing sewers, pump station, wastewater treatment facility, and service area for the Strasburg Corridor WWTF. A copy of the 2009 Wasteload Management Report can be found in Appendix E.

4. Embreeville Center Wastewater Treatment Plant

The Embreeville WWTP was built in 1920 to serve the Embreeville State Hospital Complex, with all existing structures located in West Bradford. The WWTP is physically located on the potion of Embreeville lands located in Newlin Township. It owned by the Pennsylvania Department of Public Welfare, and operated by Cawley Environmental Services, Incorporated, under (NPDES Permit No. PA0029912). The WWTP discharges to the West Branch of the Brandywine Creek, and has a permitted flow of 100,000 gpd, although it is believed that it was approved for up to 400,000 gpd in the past. State operation of the Embreeville complex ceased several years ago, and very limited uses are presently active.

The Embreeville plant consists of the following systems:

- Comminutor / Manual Screen
- Chemical Feed Meter Building
- Flow Splitter
- Two Imhoff Tanks
- Two Trickling Filters
- Two Secondary Settling Tanks
- UV Disinfection Building
- Control Building
- Sludge Drying Beds (out of service and not useable)
- Generator Building

The flow process through the plant is described below and illustrated on Figure III-4.

The flow enters the plant through the comminutor chamber and flows under the chemical feed building where ferric chloride is added to the waste stream. The flow then proceeds to a flow splitter that divides the flow between the east and west trains of the wastewater plant. Each train diverts the flow to an Imhoff tank for solids reduction and removal then to a trickling filter for BOD treatment. The flow then enters a secondary settling tank for further solids removal. Sludge is recirculated to the splitter to assist in feeding the trickling filters. At this point in the system, the flow merges to a single pipe prior to the UV disinfection system and discharge to the stream. The sludge drying beds are designed to receive sludge from the Imhoff and secondary tanks for dewatering. The facility has a back-up generator for use during power outages.

The facility is currently permitted for a hydraulic loading of 0.1MGD. The permit does not provide an organic loading limit. It is believed that the plant was permitted for a higher flow, perhaps up to 0.4 MGD, in the past. However, it is anticipated that a significant upgrade could be required to increase the permitted flow to previous capacity levels.

A site visit conducted in 2006 indicated the following conditions for WWTP components:

Comminutor/Bar Screen - The comminutor is in a concrete chamber with a by-pass channel and a manual bar screen. There are signs of surcharge in the chamber and overflow into the manual bar screen area. The comminutor was operating at the time of the visit.

Chemical Feed Building Meter House - The chemical feed building is a brick and concrete structure that houses the chemical storage tank and chemical feed pumps. Previously a flow meter was installed in this building. Although the flow meter equipment is still located there, it is not in use and has been replaced by an effluent flow meter. At the time of inspection, the chemical feed equipment was not in service and out for repair. Both the ferric chloride storage containment and the building were in need of repair.

Flow Splitter - The structure seems to be sound. The railing and grating is in need of repair.

DISCHARGE TO STREAM
FM
FLOW METER
UV DISINFECTION
SECONDARY SETTLING TANKS
TRICKLING FILTER
TRICKLING FILTER
IMHOFF TANK 1
IMHOFF TANK 2
SPLITTER BOX
$FeCl_3$
COMMINUTOR W/ MANUAL BYPASS SCREEN
INFLUENT
FIGURE III - 4
EMBREEVILLE WWTP
TREATMENT AND
DISPOSAL PROCESS

Imhoff Tanks - The concrete structures of the Imhoff tanks appear to be sound, although the tanks are primarily below grade and not visible for detailed observation. The wooden weir structures are in need of repair. The sludge removal system is not operating on either tank. Sludge is removed by tank truck. The scum channels are in need of cleaning. Based on dimensions taken from design drawings and using an overflow rate of 600 gpd/ sq. ft., the two tanks could accommodate up to 600,000 gpd of flow if the necessary repairs were made.

Trickling Filters - The concrete structures appear to have been repaired on several occasions and are in need of repair at this time. The distribution arms seem to operate satisfactorily and distribute the flow evenly. The filter media seems adequate although there is minimal film growth on either filter. The discharge channel is in need of cleaning and has some accumulated solids and algae. At a loading rate of 50 gpd/sq. ft., the two trickling filters could treat approximately 440,000 gpd of flow.

Secondary Settling Tanks - The concrete structures appear to be sound. However, the sludge collection and removal system is not working and is in need of repair. Also the wooden weir structures are in need of repair. Water was present in both tanks although it was not readily evident if both were actually operating. It appears from the design drawings that the combination of both tanks would accommodate 400,000 gpd of flow if they could be restored to an operable condition.

UV Building - The UV building is structurally sound. However, the lower level of the building where the UV chamber is located is flooded with standing water. A temporary pump was set up to dewater the chamber at the time of the visit. A permanent sump pump is needed. The UV light bank is in need of repairs. The cover was not in place and several light banks were not operational. The hour meters on the UV controller need to be repaired.

The effluent flow meter is located after the UV chamber. The primary device for flow measurement is a flume, with an ultrasonic sensor for monitoring the water level in the flume. The controls are located in the upper level of the building.

Control Building - The control building is a brick structure. The vegetation is grown up around the building and it is in need of maintenance. The recirculation pumps inside the structure are also in need of repair and maintenance.

Sludge Drying Beds - The sludge drying beds are out of service. They have been overgrown with weeds and the sludge piping has been removed.

Generator Building - The generator building is a wooden shed-like structure with no foundation. Vegetation has taken over the area and when the door was disturbed, many bees came out of the structure. The inside of the building could not be inspected.

During the site visit, the operations log was reviewed and had very little data on the plant performance. The operator of the facility, Cawley Environmental Services, Inc. was contacted and they provided operational data for January 2005 through June 2006. This information was briefly reviewed and only one violation of Total Suspended Solids was noted. The average flow for this period was approximately 50,000 gpd, although the daily flow ranged from 8,500 gpd to 131,800 gpd. Widely fluctuating flows can be indicative of an I&I problem in the collection system, although this condition has not been verified for the Embreeville system. In general, the information provided by the operator indicates the effluent quality to be good. This is not unexpected since the actual flow is significantly lower than the design capacity.

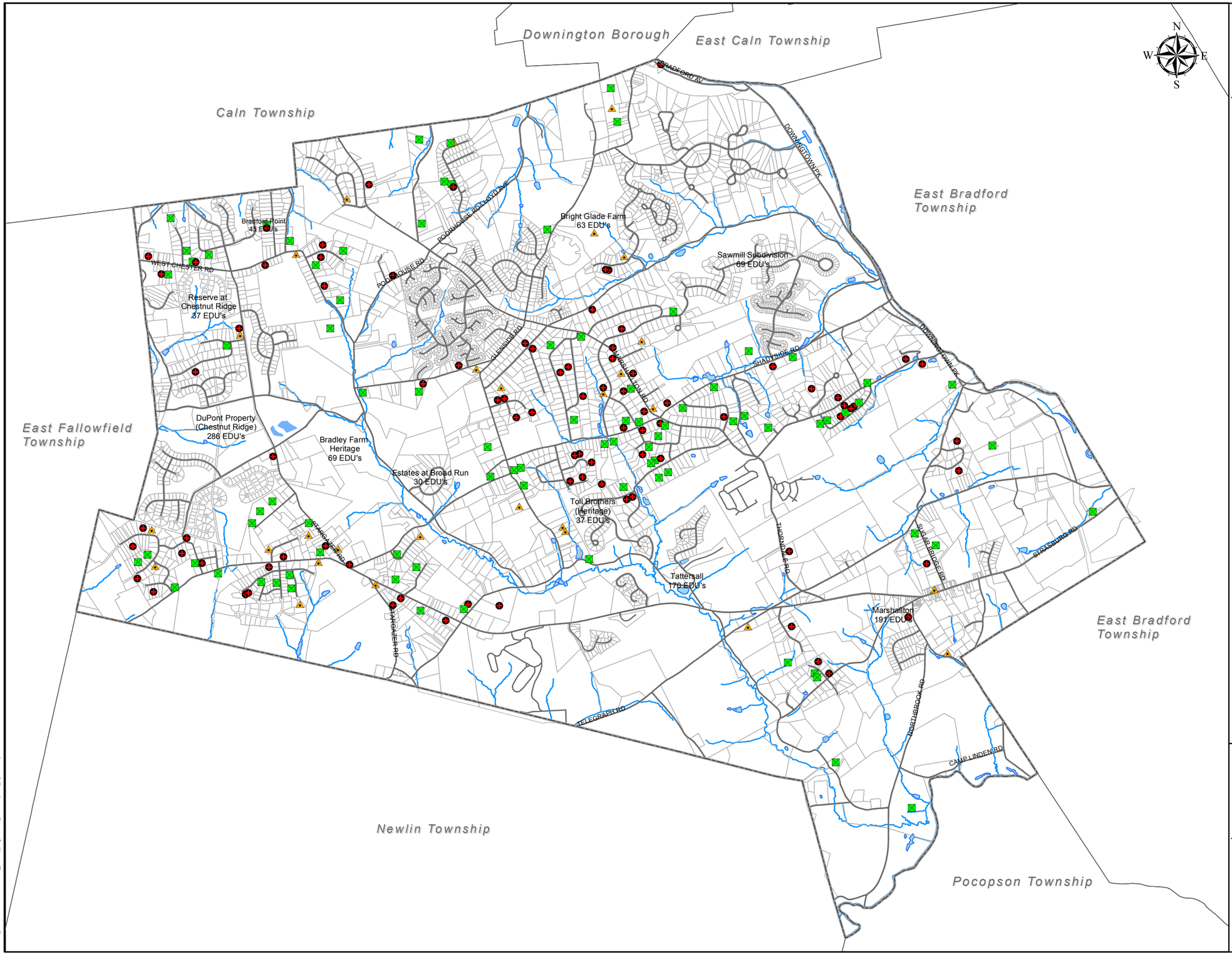
B. Existing On-Lot Sewage Facilities

All improved portions of West Bradford Township which are not served by the public and community sewerage systems discussed above utilize on-lot sewage facilities. In order to assess overall on-lot system conditions, URS Corporation met with representatives of the Chester County Health Department (CCHD). Additionally, CCHD records for sewage system permits issued in order to repair an existing condition were collected. Map III-2 provides a visual illustration of the repair permits issued by CCHD. Review of repair permit data can facilitate identification of clusters of on-lot failures which may warrant further investigation.

The CCHD repair permit data provides three categories: 1) system failure, 2) certification failure, and 3) unknown. System failure is typically an unambiguous situation where malfunction was noted. Certification failure may be the result of a regulatory malfunction, but is often a consequence of a property sale without such malfunction. In these cases, a private firm is hired to make a determination on the condition of the existing sewage system solely for the purpose of informing parties involved in the property sale. There are no mandatory standards for these private firms, and identified problems often address a range of issues that do not constitute a regulatory malfunction. Unknown classification may indicate a system failure or a private certification failure.

System failures and certification failures are equally divided at 86 permits for each, with an additional 28 permits issued due to unknown conditions. Few instances of repair permit activity exist in the southeast portion of the Township, and clusters of repair permitting activity generally center around the Romansville area and several older existing developments in the central portion of the Township, north of Tattersall and east of Shadyside Park. Consistent with this observation, CCHD representatives indicated the

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Municipal Boundaries
- Parcels
- Roads
- Water Bodies
- Streams

Repair Reason

- Certification Failure
- System Failure
- Unknown

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Water Bodies, Streams - Chester County Surface Water Features, www.pasda.psu.edu
*Septic Repair Permit Activity - Chester County Health Department, August 2010

0 1,250 2,500 5,000
Feet

MAP III-2
ON-LOT SEWAGE SYSTEM REPAIRS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WB\radford\26600-001\GIS_job\Mapping Act537_2010\MapIII-2_SystemRepairs.mxd

Romansville area to be of concern, although no problems were noted with regard to the developments in the central portion of the Township. A review of soils mapping as illustrated in Map II-3 suggests the majority of this area contains generally or conditionally suitable soil for on-lot system use. It is expected that the repair permit activity in the central portion of the Township is primarily a consequence of property transfers and older homes with typical occasional repair activity. In addition, the lot sizes in this area predominantly one acre or greater. Accordingly, this area has not been further investigated for the purpose of this planning effort.

Three areas were selected for more evaluation in accordance with CCHD recommendations and conditions noted above. Detailed discussion of each follows.

1. Appleville Mobile Home Park

The Appleville Mobile Home Park (MHP) is located on two separate parcels on the west and east sides of Marshallton-Thorndale Road. These lands are defined as the Appleville Mobile Home Park Study Area in Chapter II of this planning effort. The Park consists primarily of individual mobile home units, though there is a farm market which operates seasonally and contributes to the water usage and subsequent wastewater generation. Associated with the operation of the farm market, the majority of the acreage, which is not occupied by the mobile home units, is being actively managed as a productive orchard.

According to owner records, there are a maximum of 230 lots (or "units") which are able to be occupied at any one time. The total number of occupied units fluctuates; however the owners estimated that at the time of the field investigation only 3 or 4 of the 230 were vacant. The majority of the mobile home units, especially the more modern ones, contain laundry facilities; there is no separate laundry facility located on the premises.

The Appleville MHP and farm market are served by several on-lot disposal systems, with several noted incidences of malfunction. In response to complaints suggesting malfunction, CCHD investigations revealed a surface overflow of sewage in three separate locations, and a letter dated January 12, 2007 was issued by the CCHD referencing one of the surface overflows. In 2003, a separate surface discharge on the eastern side of Marshallton-Thorndale Road was sampled. The lab testing results indicated that the sample exceeded the maximum recommended levels for fecal coliform / fecal streptococcus (strep).

CCHD records were reviewed and a field investigation was conducted in an effort to determine type and functional status of the existing sewage systems. Limited permit data is available to document the multiple existing community on-lot sewage systems. On the western parcel, CCHD Permit # E 21290 documented three individual systems designated as A, B, and C. According to the CCHD Permit, system 'A' consists of 12,000 gallons of septic tank capacity, a 2,850 gallon dosing tank, and 9,312 square feet of inground absorption area. System 'B'

has 10,000 gallons of septic tank capacity, a 2,500 gallon dosing tank, and 7,178 square feet of inground absorption area. Similarly, system 'C' has 11,000 gallons of septic tank capacity, a 2,875 gallon dosing tank, and 8,536 square feet of inground absorption area. The area of the drainfields for systems 'A', 'B', and 'C' was documented by the CCHD as an area with a surface discharge. According to the permit, systems 'A', 'B', and 'C' together were designed to accommodate a total flow of 20,750 gallons per day. This permit was issued on August 8th, 1985.

An additional CCHD Permit (#083938) was referenced within Permit # E 21290. This permitted system was shown on a plot plan to contain three (3) septic tanks and a drainfield consisting of 2,250 square feet. There was no other reference to any information regarding this permit.

A field investigation of the on-lot disposal systems servicing the Appleville Mobile Home Park was conducted on October 23, 2007. Representatives of the MISA Corporation, owners / property managers of the Park, were also present to discuss their knowledge concerning the on-lot systems.

On the eastern parcel, the field investigation documented the location of five (5) separate areas containing septic tanks. Three of these areas appeared to contain one (1) septic tank, the fourth appeared to contain two (2) tanks, and the fifth area appeared to contain three (3) tanks. Three additional areas were indicated as possible drainfields, though no confirmation of this information was obtained. One of the drainfield areas indicated did coincide with an area investigated by the CCHD for a surface discharge. Due to the absence of any control panels and visual alarms, it does not appear that there are any dosing pumps associated with the system(s) located on the east side of the road.

On the western parcel, CCHD Permit # E 21290 documented three individual systems designated as A, B, and C; each of these was field verified from visual observations of surface features during the investigation. The area of the drainfields for systems 'A', 'B', and 'C' was documented by the CCHD as an area with a surface discharge. It appeared from the field investigation that a service road was placed into use which runs directly through portions of the drainfields.

In addition to the information contained in CCHD Permit # E 21290 and #083938, another four (4) separate areas appeared to contain one or more septic tanks, dosing tanks, and associated drainfields. Similar to the components on the eastern side of Marshallton-Thorndale Road, all of the additional components were verified only from a visual observation of tank lids, control panels, and vent pipes.

In summary, there are numerous on-lot systems servicing the Appleville Mobile Home Park. Only two of the systems were documented through CCHD Permit records. Accurate locations and designs are not available for the remainder of the systems. At least three areas of surface discharge have been documented by CCHD, although no direct observation of such malfunction was gleaned from the

field investigation. Without detailed additional site study, the capacity and hydraulic loading for each on-lot system cannot be accurately determined.

According to a representative of the MISA Corporation, the Appleville Mobile Home Park had a total consumption of 7,444,002 gallons of water during the twelve (12) month period from October 2006 through September 2007. This equates to an average daily flow of 20,395 gallons per day. Some fluctuation of this average flow likely exists due to the seasonal nature of farm market operations. Since the Park is "built-out", current flows are expected to remain static in the future.

2. Romansville Area

The Romansville area consists of 90 residential properties located on the north and south side of West Strasburg Road, west of its intersection with Romansville Road, and 115 properties located to the east of the intersection of Romansville Road and West Strasburg Road, for a total of 205 properties. This area comprises the Village of Romansville, the Romans Village development, and several contiguous parcels. Although the majority of the properties are residential, a small number of commercial and institutional uses also exist. The Romansville Study Area, as discussed in Chapter II and delineated on Map II-1, encompasses all existing sewage facilities discussed below, as well as a large contiguous future development tract (Stargazers) which is currently vacant.

Due primarily to older residences and small lot sizes, the Township's 1998 Act 537 planning effort for the Route 162 Corridor Study indicated this as a long term needs area to be included in future planning efforts. Current information provided by the CCHD also suggested this to be an area which warranted other investigation.

A door-to-door survey was conducted in order to gather detailed information on existing sewage systems and water supplies. This survey was conducted under the supervision of Certified Sewage Enforcement Officers (SEOs) in accordance with the guidelines of the DEP publication entitled *Sewage Disposal Needs Identification*. Respondent data collected can be found in Appendix F.

On September 21, 2007 a one-page letter from West Bradford Township was mailed to all the residents within the survey area explaining the survey process; also included with this letter was a copy of the actual survey form. Following this mailing, the initial door-to-door survey of all 199 improved properties was conducted on Saturday, October 6th and Saturday, October 13th. A third day, Saturday, October 20th was also utilized to conduct follow-up work at all the properties which did not have a prior respondent. Residents were asked a series of questions regarding their water supply and on-lot disposal system including any water contamination issues, the components of their on-lot systems, and any problems which they may have been experiencing with their on-lot systems.

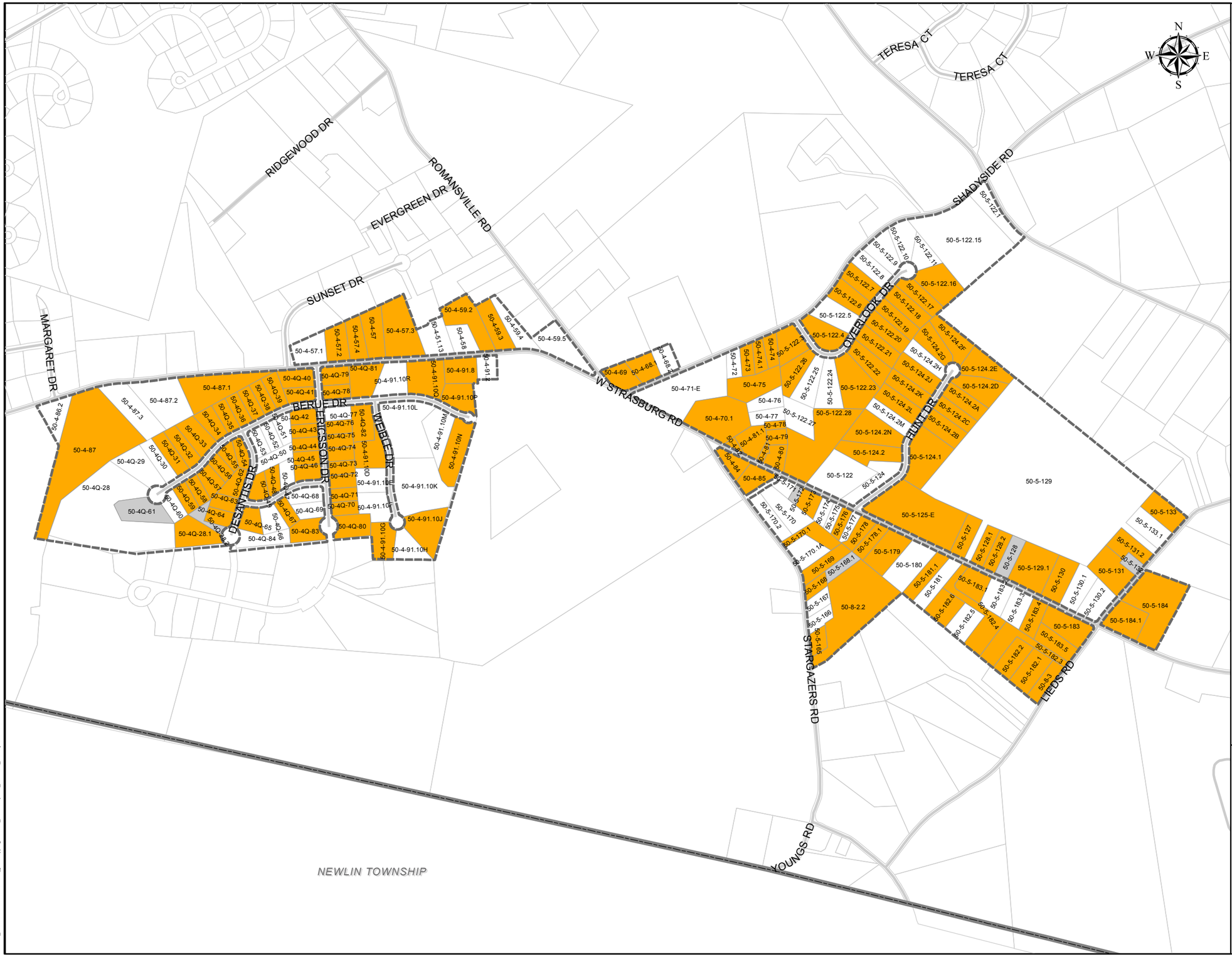
Weather conditions were generally favorable on all three days with mostly sunny skies and temperatures ranging from the mid 60's to low 80's. No water sampling was undertaken as part of the survey.

A total of 205 properties were visited by the end of the three survey days. Of this total, it was determined that 6 parcels were vacant. These parcels varied from those containing no structures, to those which contained a detached garage associated with a dwelling located on an adjacent parcel. As no respondent was possible for these six parcels, they were removed from the calculation of total respondents. After removing the vacant parcels, a total of 199 properties were eligible for a response. Of these, a total of 124 respondents were documented, producing a total response rate of 62.3%. Map III-3 illustrates the survey area, respondents, and vacant parcels.

Mapping of the individual respondent symptoms was prepared to illustrate survey results. Although DEP has established more generalized categories to assess malfunction status, as discussed below, a review of these maps will aid in determining the occurrence of each individual symptom. The maps are defined as follows:

Map III-4	Romansville Survey Area, Respondents Indicating System Overflow
Map III-5	Romansville Survey Area, Respondents Indicating Water Ponding or Surfacing
Map III-6	Romansville Survey Area, Respondents Indicating Wetness or Spongy Area
Map III-7	Romansville Survey Area, Respondents Indicating Green Lush Grass
Map III-8	Romansville Survey Area, Respondents Indicating Wastewater Backing into Building
Map III-9	Romansville Survey Area, Respondents Indicating Cesspool on Parcels < 1 Acre
Map III-10	Romansville Survey Area, Respondents Indicating Odors
Map III-11	Romansville Survey Area, Respondents Indicating Sluggish Drains

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- Survey Respondent
- Vacant Parcel

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

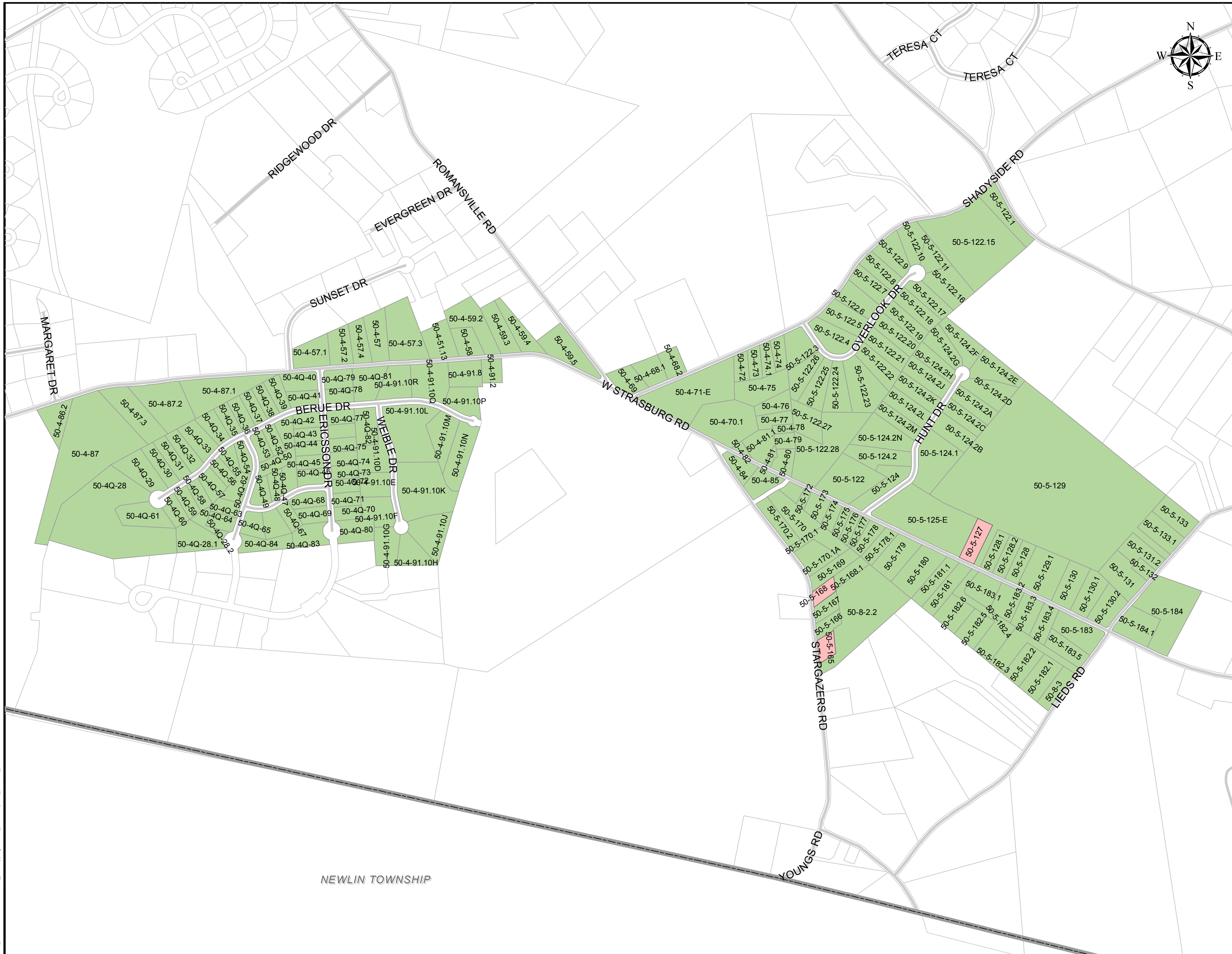
0 250 500 1,000
Feet

MAP III-3
ROMANSVILLE SURVEY AREA, RESPONDENTS, AND VACANT PARCELS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26060401\GIS_Job\Mapping\Act537_2010\Mapfill-3_Romans_SurveyArea.mxd

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- System Overflow

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

0 250 500 1,000
Feet

MAP III-4
ROMANSVILLE SURVEY AREA
RESPONDENTS INDICATING
SYSTEM OVERFLOW

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\20600401\GIS_job\Mapping\Act537_2010\MapIII-4_Romans_Overflow.mxd

West Bradford Township
Official Sewage Facilities Plan

Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- Water Ponding or Surfacing

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

0 250 500 1,000
Feet

MAP III-5
ROMANSVILLE SURVEY AREA
RESPONDENTS INDICATING
WATER PONDING OR SURFACING

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26600401\GIS_Job\Mapping\Act537_2010\MapIII-5_Romans_Ponding.mxd

West Bradford Township
Official Sewage Facilities Plan

Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- Wetness or Spongy Areas

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

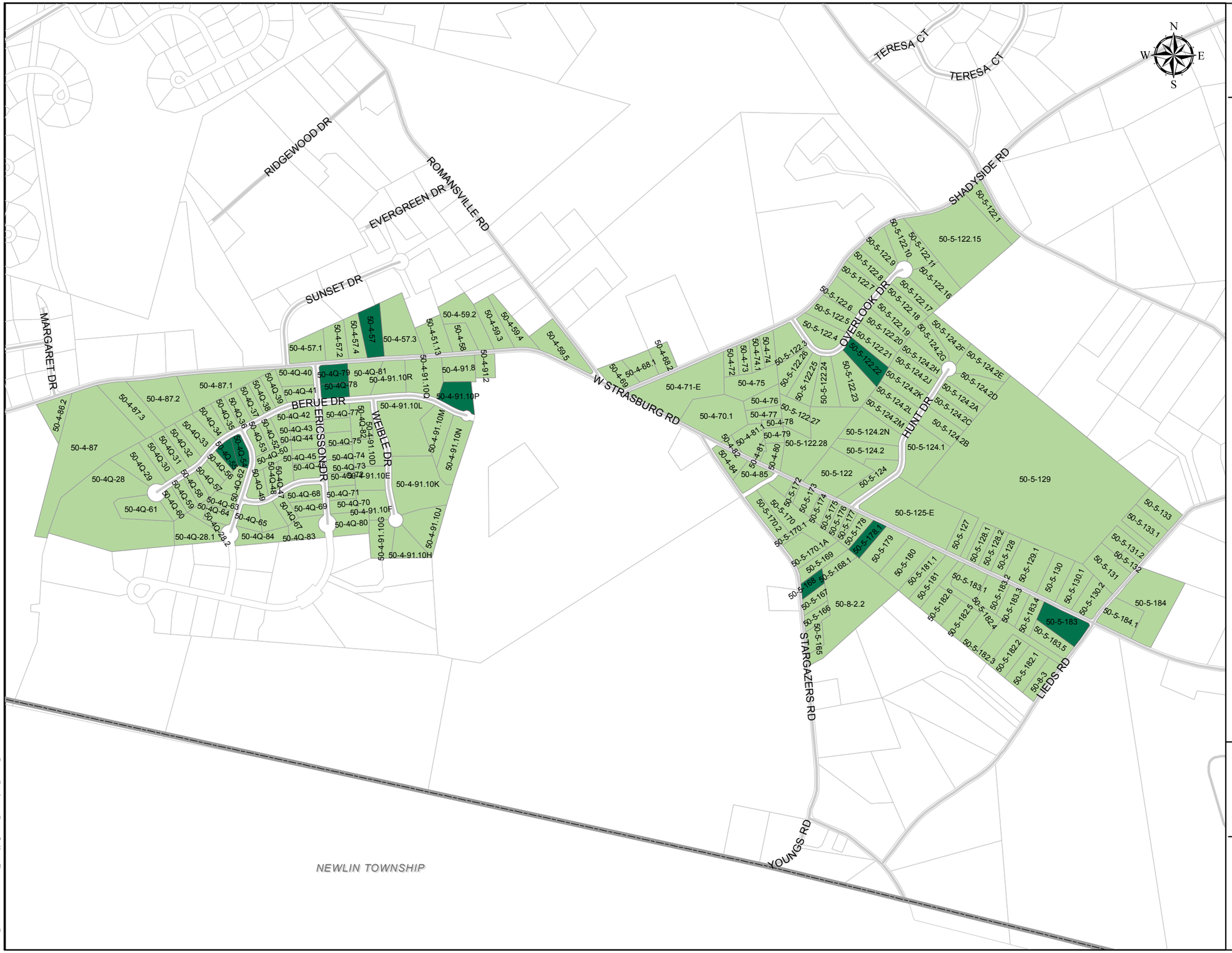
0 250 500 1,000
Feet

MAP III-6
ROMANSVILLE SURVEY AREA
RESPONDENTS INDICATING WETNESS OR SPONGY AREA

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WB\radford\26600401\GIS_job\Mapping\Act537_2010\Map\III-6_Romans_Wetness.mxd

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- Green Lush Grass

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

0 250 500 1,000
Feet

MAP III-7
ROMANSVILLE STUDY AREA
RESPONDENTS INDICATING GREEN LUSH GRASS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26600401\GIS_Job\Mapping\Act537_2010\Map\III-7_Romans_Grass.mxd

West Bradford Township
Official Sewage Facilities Plan

Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- Wastewater Backing Into Building

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

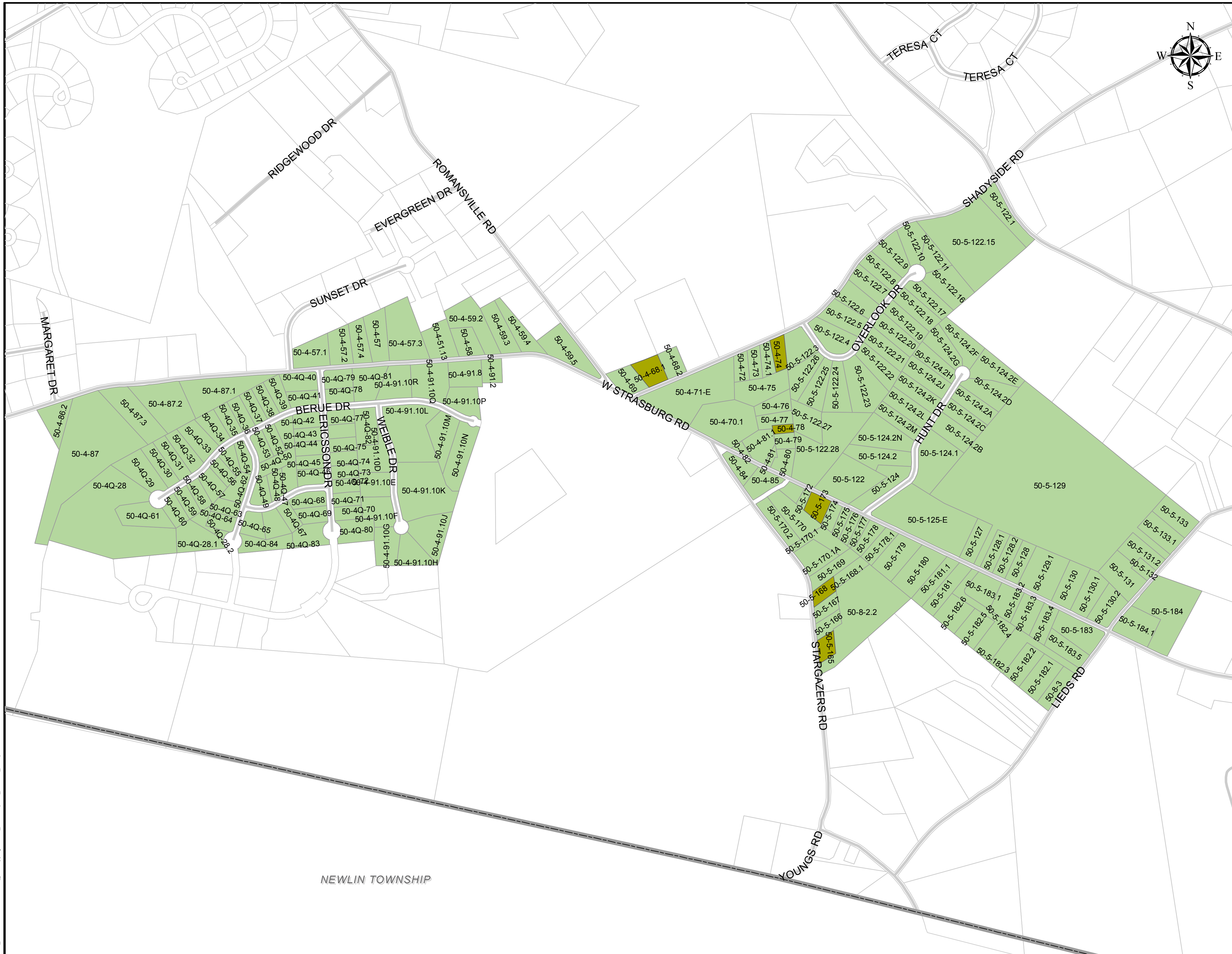
0 250 500 1,000
Feet

MAP III-8
ROMANSVILLE SURVEY AREA RESPONDENTS INDICATING WASTEWATER BACKING IN BUILDING

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26600401\GIS_Job\Mapping\Act537_2010\Map#III-8_Romans_InBuilding.mxd

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- Cesspool on Parcel <1 Acre

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

0 250 500 1,000
Feet

MAP III-9
ROMANSVILLE SURVEY AREA RESPONDENTS INDICATING CESSPOOL ON PARCELS <1 ACRE

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\20600401\GIS_job\Mapping\Act537_2010\MapIII-9_Romans_Cesspool.mxd

West Bradford Township
Official Sewage Facilities Plan

Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- Odor

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

0 250 500 1,000
Feet

MAP III-10
ROMANSVILLE SURVEY AREA RESPONDENTS INDICATING ODORS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26600-401\GIS_Job\Mapping\Act537_2010\Map III-10_Remans_Odor.mxd

West Bradford Township
Official Sewage Facilities Plan

Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- Sluggish Drains

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

0 250 500 1,000
Feet

MAP III-11
ROMANSVILLE SURVEY AREA
RESPONDENTS INDICATING SLUGGISH DRAINS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26600401\GIS_Job\Mapping\Act537_2010\MapIII-11_Remans_SluggishDrains.mxd

Additional evaluation of the survey data was conducted in accordance with the categories defined by DEP's *Sewage Disposal Needs Identification* document. This document breaks down sewage system status into the following four categories:

Confirmed Malfunctions – On-lot systems which exhibit documented surface malfunctions such as direct observation of absorption area overflows, positive dye tests, piped discharges, and photographic evidence of overflows are placed into this category. Any property served by a holding tank installed as a repair is also included in the confirmed malfunction category. For the purposes of the door-to-door survey, respondents which indicated either a seasonally wet absorption area and/or a wastewater backup were also placed into this category.

Suspected Malfunctions – Symptoms such as lush green grass, piped discharges without direct observation of sewage, absorption areas located in known unsuitable soils, and cesspools located in high density developments (lots less than one acre) warranted placement into this category.

Potential Malfunctions – This category is reserved for on-lot systems which appear to be operating satisfactorily but exhibited non-specific symptoms according to the survey results. These indicators included odors and sluggish drains. In the absence of any other symptoms, these indicators are not clear indication of a system malfunction.

No Malfunction – These are on-lot systems which appear to be operating satisfactorily and were constructed since system permitting requirements were initiated, and in accordance with those requirements. If a respondent did not indicate any of the possible symptoms, they were by default placed into this category.

Table III-7 illustrates the results of the survey respondents in consideration of the DEP categories discussed above. Where more than one malfunction symptom was noted, the symptom indicative of a greater need was incorporated in this analysis. For example, a respondent indicating both a system overflow and odors is evaluated relative to the overflow symptom only, since an odor concern is generally considered secondary.

Table III-7
Romansville Study Area
Summary of OLDS Malfunction Status based upon Door-to-Door Survey Results

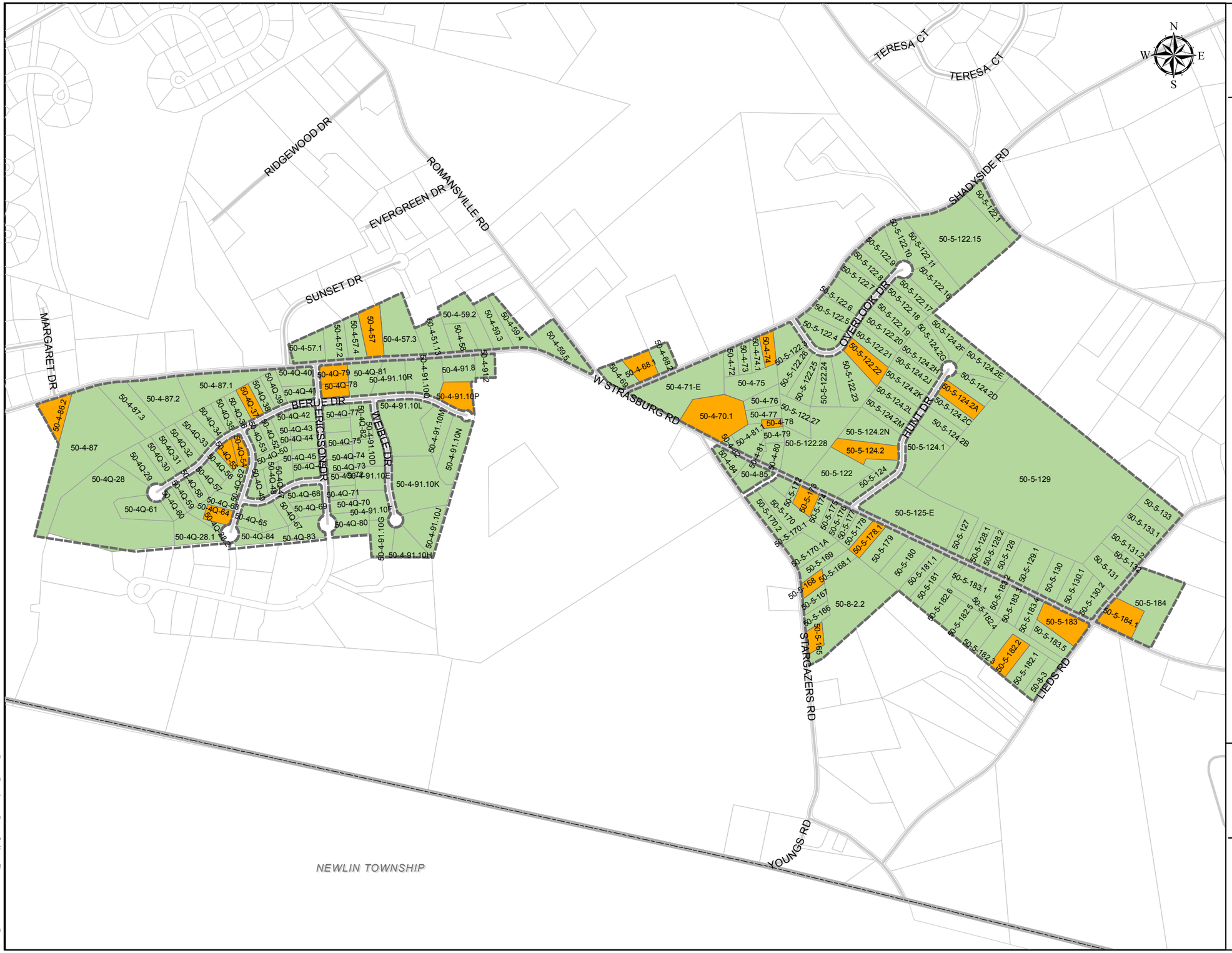
Malfunction Category	Symptom / Criteria	Respondents Indicating*	Percent of Total	Comments
Confirmed	System Overflow	3	8.9	Map III-12
	Wetness or Spongy Areas	2		
	Holding Tank	1		
	Wastewater Backing into Dwelling	2		
	Water Ponding or Surfacing	3		
	Total Confirmed	11		
Suspected	Lush Green Grass	8	9.7	
	Cesspool on Lot <1 Acre	4		
	Total Suspected	12		
	Total Confirmed and Suspected	23	18.6	
Potential	Odors	4	4.0	Map III-13
	Sluggish Drains	1		
	Total Potential	5	4.0	

* Data summarized to show more severe symptom where multiple symptoms noted
** 124 respondents total

Of the 124 respondents, 23 indicated symptoms which are indicative of either a confirmed or suspected on-lot system malfunction in accordance with DEP guidelines. These categories reflect conditions that should be considered by Township when evaluating alternatives for the study area. It should be noted that parcel 50-4-86.2 has been issued a holding tank permit by the CCHD due to lack of a suitable replacement area and a current malfunction. Although the survey respondent was a tenant unfamiliar with this situation, this property has nonetheless been categorized as a confirmed malfunction based on the CCHD data.

Map III-12 illustrates the parcels classified as exhibiting confirmed or suspected malfunction criteria, and Map III-13 shows those parcels consistent with potential malfunction criteria. The remainder of the Study Area parcels have been placed in the no malfunction category per the survey data.

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- Confirmed and/or Suspected Malfunctions

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

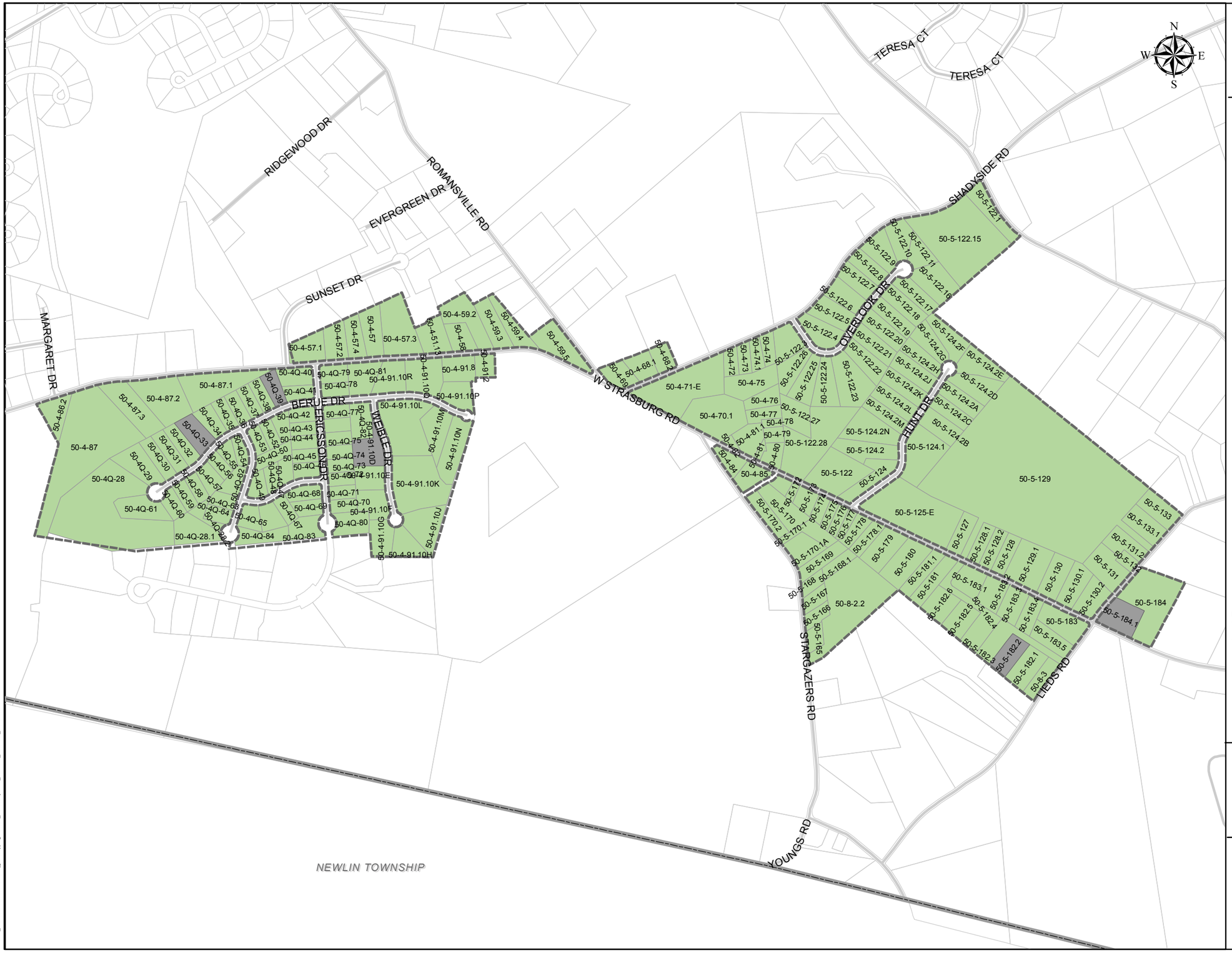
0 250 500 1,000
Feet

MAP III-12
ROMANSVILLE SURVEY AREA CONFIRMED AND SUSPECTED MALFUNCTIONS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26609401\GIS_Job\Mapping\Act537_2010\MapIII-12_Romans_Malfunctions.mxd

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Parcels
- Roads
- Study Area
- Potential Malfunctions

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on October 6, 13, & 20, 2007

0 250 500 1,000
Feet

MAP III-13
ROMANSVILLE SURVEY AREA
POTENTIAL MALFUNCTIONS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26600-401\GIS_Job\Mapping\Act537_2010\Map#III-13_Romans_Potential_Malfunctions.mxd

In summary, a response rate of 62.3% was achieved through the door-to-door survey of 199 improved properties. Of the 124 respondents, 23 or 18.6% indicated a suspected or confirmed malfunction, and another 4% indicated a potential malfunction, according to DEP criteria. In general, DEP considers a threshold of 25% confirmed and suspected malfunctions in determining a "needs" area, which is greater than the 18.6% determined through the survey; however, given the age of many residences, prevalence of small (less than 1 acre lots), and use of cesspools (albeit limited), some additional consideration may be warranted. A discussion of alternatives for this study area can be found in Chapter V.

3. Glenside Road Area

On December 9, 2007 a door-to-door survey was conducted among 12 properties located on Glenside Road, along the far northern border of West Bradford Township, near its contact with the Borough of Downingtown. The survey area is located in the Utilities Incorporated of Pennsylvania (UIP) public sewer service area of West Bradford Township. The survey was conducted by a certified SEO in accordance with the guidelines of the guidelines of the DEP publication entitled *Sewage Disposal Needs Identification*. This investigation was precipitated by CCHD concerns regarding the condition of the on-lot systems and the general site constraints of the properties in the area. Similar to the survey which was conducted in the Romansville area, respondents were asked a series of questions regarding the general operating condition of their on-lot system and their water supply. Respondent data can be found in Appendix G.

Of the twelve parcels which were indicated in the survey area, seven were either vacant or contained an abandoned building, leaving five as possible respondents. A graphical illustration of the survey area including vacant parcels, confirmed and suspected malfunctions is included as Map III-14. The following table provides a summary of the results of the survey:

Table III-8
Glenside Road Survey Area Summary

Property ID	Current Use	Comments
50-2-49	No dwelling, contains barn	N/A
50-2-50	four separate residences on parcel	Respondent indicated a system overflow if pumping not conducted every 6 months; laundry discharges to surface
50-2-50.1	residential dwelling	Respondent indicated that well was contaminated with fecal coliform bacteria
50-2-52	vacant parcel	N/A

Property ID	Current Use	Comments
50-2-53	residential dwelling	No respondent
50-2-54	vacant parcel	N/A
50-2-69	residential dwelling	No respondent; Vault privy observed behind residence
50-2-70	vacant parcel	N/A
50-2-71	abandoned dwelling	N/A
50-2-72	vacant parcel	N/A
50-2-74	vacant parcel	N/A
50-2-74.1	mobile home	Respondent pumps tank 1 or 2 times per month; system appears to overflow into adjacent stream

As evidenced by the summary table, three of the five possible respondents were documented, and of these, all three indicated a confirmed malfunction according to the criteria established in the DEP *Sewage Disposal Needs Identification* document. These confirmed malfunctions were indicated by a reported and observed system overflow (property ID 50-2-50 and 50-2-74.1, respectively) and indication of a laboratory test which documented fecal coliform contamination (property ID 50-2-50.1)

Although limited in overall numbers, this information results in a confirmed malfunction rate of 60% (3 out of 5). Although not specifically described in the DEP criteria, the presence of a vault privy on property ID 50-2-69 may suggest a suspected malfunction.

The geographic constraints of the survey area were also noted to be extremely restrictive, as only parcel 50-2-54, which is vacant, is larger than 1 acre. Both sides of Glenside Road contain slopes appearing to be in excess of 25%, which generally prohibits the placement of any on-lot disposal system. The five parcels which contain dwellings are further limited as the structures are either cut into the slopes, or located at the base of the steep slopes. These geographic constraints are a probable contributing factor to the number of undeveloped parcels in the survey area.

DOWNINGTON BOROUGH

50-2-54

50-2-74.1

50-2-69

50-2-70

50-2-71

50-2-74

50-2-72

50-2-53

50-2-52

GLENSIDE RD

50-2-50

50-2-50-1

50-2-49

N

W

E

S

West Bradford Township
Official Sewage Facilities Plan

Legend

- West Bradford Township Boundary
- Parcels
- Glenside Road Survey Area
- Survey Respondent
- Vacant Parcel
- Confirmed Malfunction

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Door-to-door survey conducted on December 9, 2007

0 250 500 1,000
Feet

MAP III-14
GLENSIDE SURVEY AREA, RESPONDENTS, & VACANT PARCELS

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WBradford\26060401\GIS_job\Mapping\Act537_2010\MapIII-14_Glenside_SurveyArea.mxd

C. On-Lot Septage Generation

As outlined above, areas of the Township outside of the public / community sewerage service areas rely upon onlot systems for sewage disposal, and the vast majority of these are individual on-lot systems. These systems, including the on-lot systems servicing Appleville Mobile Home Park, produce septage which is the material that accumulates in the septic tanks. For a system to function correctly, the septage must be removed from the septic tank periodically.

There are a number of parties involved in the creation, regulation and disposal of septage. The homeowner or party responsible for the septic system should ensure that the system is functioning properly through routine maintenance and periodic pumping.

Septic tanks are pumped by private companies or individual haulers which must be licensed by the Chester County Health Department. Once the septage is removed from the tank, it is the hauler's responsibility to see that the septage is disposed of in an approved disposal site, and in a safe manner. A list of licensed septage haulers for Chester County, prepared by the Chester County Health Department, is provided in Appendix H.

Disposal sites may be neighboring sewage treatment facilities, landfills, or agricultural lands where the septage is land applied as a fertilizer, usually after some level of additional treatment. Any of these sites which are utilized and acceptable for septage disposal are regulated and must be permitted by DEP. Disposal site owners should be familiar with the regulations governing the proper disposal of septage, and report any illegal dumping activities which may occur on the site. A municipality may further regulate septage handling and disposal as it sees fit through a sewage management ordinance.

CHAPTER IV

FUTURE GROWTH AND LAND DEVELOPMENT

A. Areas with Existing Developments or Plotted Subdivisions

The majority of the Township consists of areas with existing developments. Many of these neighborhoods are contiguous with others, forming relatively large areas of built-out residential lands. Recent developments and proposed subdivisions in the Township's various public sewage service areas are illustrated in the respective Chapter 94 Reports found in Appendices and presented in more detail under the discussion of future growth and projected sewage needs later in this chapter.

B. Existing Land Use

Existing land use in West Bradford Township is primarily low and medium density residential uses, which are spread fairly evenly throughout the Township. Limited commercial and industrial uses also exist. The Township has secured significant active recreational land, preserves and open space lands that protect many critical natural features and habitat areas.

C. Analysis of Planning Documents

1. Chester County Comprehensive Plan

The Chester County Comprehensive Plan *Landscapes2* was adopted in 2009. This Plan utilizes the concept of "livable landscapes" to provide a framework for protection and growth strategies within Chester County. The livable landscapes maps define the following areas in West Bradford Township:

- Suburban landscape – this generally comprises the area of the Township northwest of Telegraph Road and Sugars Bridge Road, exclusive of some areas with natural features such as forests, streams, and floodplains. Suburban landscapes are an element of the designated growth areas, where the County will encourage future development. Single family residences are the primary existing and projected use for these areas, and public water and sewage facilities are deemed appropriate.
- Rural landscape – this is the area of the Township not designated a suburban landscape. The rural landscape is characterized by open space dominated by woodland and other open areas. It contains agriculture and scattered residential lots and subdivisions on relatively large lots or with protected common open space. There is an auto-oriented land use pattern with limited non-residential uses. Development is primarily served by on-lot sewer and water systems. Rural landscapes are an element of the designated rural resource areas, where the County will not encourage development.

- Village landscape overlay – the villages of Marshallton and Romansville are designated villages within the larger suburban landscape. Villages contain small residential lots, historic resources, and limited commercial uses to serve the needs of the residents. They are not intended to be growth areas.
- Natural landscape overlay – these are areas with significant natural resources such as streams, floodplains, and forests. The Plan does not preclude development or agriculture in these areas, but calls for only low density land uses with special precautions to address natural constraints.

Chapter 11 of *Landscapes 2* discusses planning for utilities and infrastructure. The following policies are established for wastewater and water facilities:

UI 2.1 Encourage coordination of water and wastewater planning efforts, based on projections of growth and demand, evaluation of existing local treatment and supply capacity, and assessment of the availability of new water supply sources and viable wastewater disposal options.

UI 2.2 Support infrastructure expansion and improvements that are consistent with Landscapes2 and adopted regional and local plans that support projected future demands, avoid capacity shortfalls, protect natural resources, and provide safe and reliable utility services.

UI 2.3 Support planning efforts that evaluate projected water withdrawals and wastewater disposals in order to identify long term local and regional water supplies.

UI 2.4 Promote integrated water supply, wastewater, and land use planning efforts conducted in conjunction with affected municipalities, counties, and utility service providers.

UI 2.5 Maintain, upgrade, or expand existing public sewer and water facilities to support redevelopment and new development in designated growth areas, where consistent with local land use planning, while discouraging the extension of those facilities in the rural, agricultural and natural landscapes.

UI 2.6 Support public outreach that encourages water conservation and reuse, and the proper maintenance of on-lot sewage disposal systems and stormwater management facilities.

UI 2.7 Encourage innovative wastewater treatment and disposal systems with preference given to land application of treated wastewater, to maintain the watershed water balance.

UI 2.8 Support the rehabilitation of aging sewer and water supply infrastructure.

UI 2.9 Support regular and expeditious updates to municipal Act 537 plans, which designate areas for on-lot disposal and public sewer service, based on current local and regional plans, and are consistent with Landscapes2.

UI 2.10 Support development and redevelopment projects that implement current Act 537 plans, are consistent with designated public sewer service areas, and that respect natural resources and site constraints.

UI 2.11 Encourage local and regional planning that is consistent with the Pennsylvania State Water Plan, *Watersheds*, river basin, watershed, and other natural resource plans.

UI 2.12 Protect water supplies in those areas not served by public water through appropriate land use densities and development designs.

UI 2.13 Locate large water withdrawals and wastewater effluent disposal facilities where they have the least negative impact on aquifers, stream base flows, and other aquatic resources.

UI 2.14 Encourage homeowner and condominium associations, and corporate and institutional landowners to properly maintain stormwater and wastewater disposal systems located on their common open space lands.

UI 2.15 Support water conservation and re-use measures that reduce water supply demands.

2. West Bradford Township Comprehensive Plan

The West Bradford Township Comprehensive Plan was adopted in 2009 and presents the following three "fundamental goals":

- Maintain the existing quality of life for which the Township is known
- Uphold stewardship of the environment
- Ensure a sustainable community into the future

The Comprehensive Plan presents a detailed discussion of the Township's history, regional setting, demographics, natural features, transportation concerns, community services, and land use. All such elements are synthesized into a map in the Comprehensive Plan illustrating future land use and a list of recommendations which define the means of attaining the Plan goals.

The projected future land use generally mirrors existing use, with anticipated growth consistent with current zoning designations. A description of the eight land use categories depicted on the future land use map follows:

- Low Density Single Family Residential – This is currently the predominant land use in the Township, a condition which is expected to continue in the future. Accordingly, this use is and shall continue to be the base predominant zoning in the Township. Average lot size for this use is approximately 1.25 acres.
- Medium Density Single Family Residential – This use consists of approximately ten existing subdivisions, primarily located in the center portion of the Township served by public water and the UIP Broad Run public sewerage system. A majority of these subdivisions were developed before the Township allowed open space or cluster options in its Zoning Ordinance. Average lot sizes are approximately 0.5 acres.
- Townhome Residential - Attached dwellings using small lots where sewer and water infrastructure is available are associated with this use. The area designated for this use consists of the existing Meadowview development and surrounding preserved lands.
- Manufactured Housing Park - The only existing manufactured housing park within the Township is Appleville near the center of the Township on Marshallton Road. Although Appleville represents the extent of this use depicted on the Future Land Use Map, it is noted that manufactured housing may be erected by individual owners within other residential districts. In order to allow for affordable housing and to provide a range of housing opportunities, the Future Land Use Plan recommends proportionate expansion of the use as population increases.
- Commercial / Office - The Township currently has a small proportion of its land use total in commercial and office uses. In order to diversify land uses, provide for a more sustainable tax base, and to moderate district impacts, the Future Land Use Plan recommends proportionate expansion of these uses as the Township approaches build out. This is shown in areas where the transportation network can support such uses, specifically an area of existing commercial use within the Appleville Manufactured Housing park lands and an area south of West Strasburg Road near the southwest corner of the Township.
- Continuing Care / Mixed Use - The aging of the County's population has led to a growing need for non-traditional housing opportunities for seniors. Continuing care communities have been created to meet the unique, transitional housing needs of seniors. A master planned community under single ownership and control provides for a range of senior housing types. "They allow seniors to "age in place," with flexible accommodations that are designed to meet their health and housing needs as these needs change over time. The Future Land Use Plan proposes continuing care/mixed use for the Embreeville Study Area, should the Commonwealth owned and currently vacant Embreeville Center on these lands ever be surplused.
- Industrial / Special Use - Historically, small scale industrial and manufacturing uses have been located sporadically around the Township. While topography, transportation network, and other existing land uses do not favor high intensity industrial uses in the Township, it is required to be

provided for under State law. These uses are shown on both sides of Marshallton Thorndale Road near the northern border of the Township, where limited conflicts with other uses exist.

- Mixed Use Village Center – these areas consist of the existing Villages of Marshallton and Romansville with some contiguous parcels with remaining development potential. The Future Land Use Plan recommends maintaining the historic mix of commercial, civic, and residential uses in the villages, as well as provision of public water and sewage.

The final chapter of the Comprehensive Plan defines provides specific recommendations to achieve the Township's goals and objectives. These recommendations are categorized within identified key issues for historical resources, demographics, natural features, transportation, and community services. Key issues and recommendations which may impact water resources and sewage facilities are summarized below.

- New infrastructure should not be created unless it is supported by development.
- Capital replacement costs for sewage facilities should continue to be reflected as depreciated annual operating costs to the users of the services.
- Revise the Subdivision and Land Development Ordinance to define two slope categories – 15% to 25% (steep) and greater than 25% (very steep).
- Revise the Zoning Ordinance to net out a portion of steep slopes when determining lot area.
- Encourage the recharge of wastewater within the same watershed from which it came.
- Protect streams in the Township with emphasis on Exceptional Value streams such as the Broad Run.
- Protect wetlands in the Township, and continue the "net-out" of wetlands from lot areas in the Zoning Ordinance.
- Continue updating the Township's Act 537 Plan, as needed.
- Monitor failing on-lot systems and determine the feasibility of connecting these areas to a public sewage system.
- Promote the recharge of treated wastewater into the groundwater.
- Require any new development that proposes community sewage systems to provide areas to dispose of the treated effluent.

3. <u>West Bradford Township Open Space, Recreation, and Environmental Resources Plan</u>

The West Bradford Township Open Space, Recreation, and Environmental Resources Plan (OSRER) Plan was adopted in 1993. This document expanded primarily upon the goals and objectives of the Township's 1989 Comprehensive Plan, and put forth the Township's intentions of policy regarding future land use, natural features, historic preservation, and community facilities. Most of the parkland and facility acquisition goals of this plan have been met.

4. West Bradford Township Zoning Ordinance

The current Zoning Ordinance was originally adopted in 1977 and has been amended regularly since adoption. It allows for a range of uses including, residential, commercial, industrial, and mixed use development. As illustrated by Map IV-1 and corresponding Table IV-1, the majority of land in the Township is zoned R-1 for low density housing, open space and agriculture, with more dense residential, commercial, and industrial zoning occurring around the traditional village centers or Marshallton and Romansville and along Marshallton-Thorndale Road. Map IV-1 represents a current illustration of the Township zoning districts. Within each zoning district, the requirements and methods of sewer and water service have been determined in part by land use and minimum lot sizes.

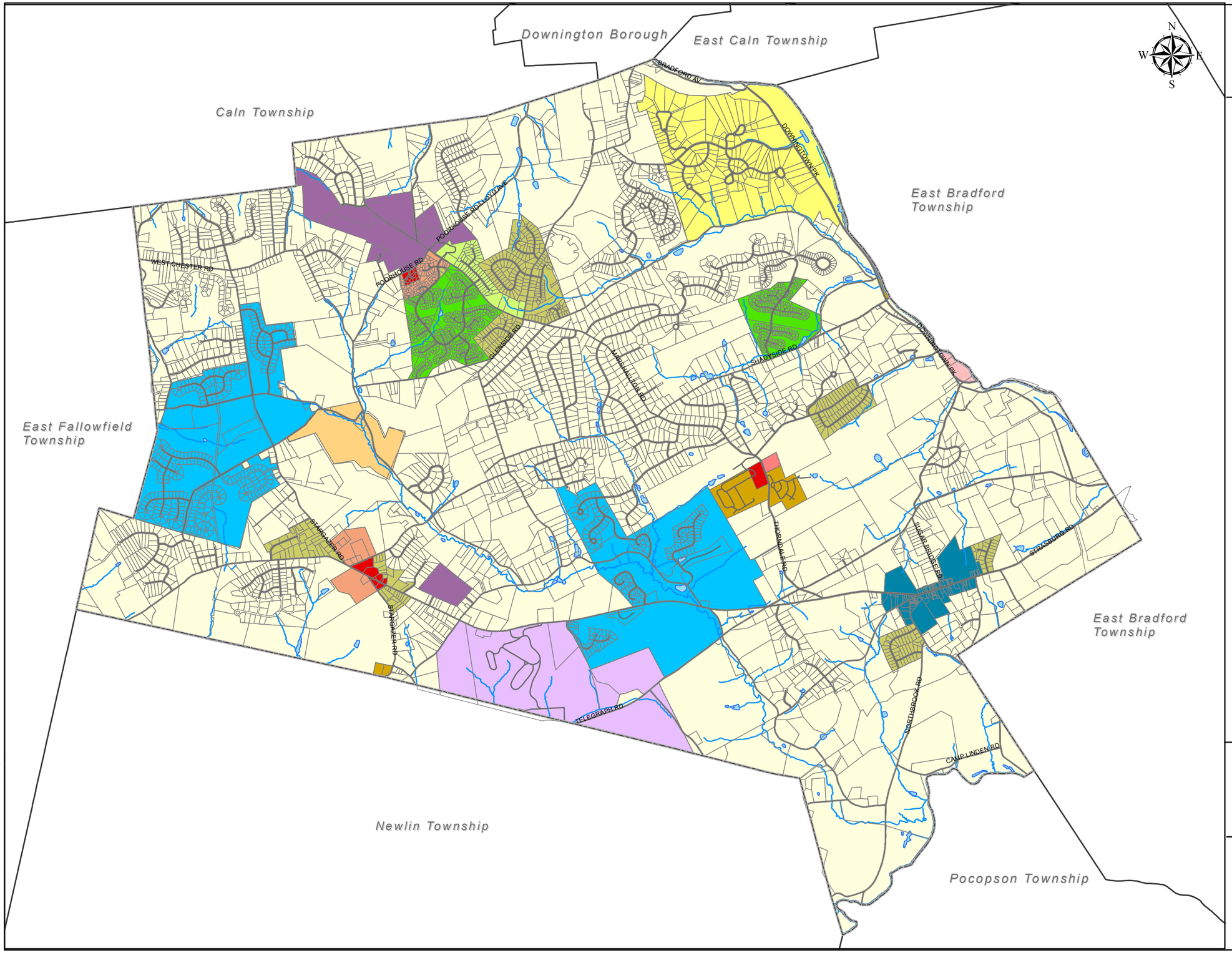
The Unified Development Area (UDA) district is a zone that becomes affixed as the base zone upon approval of a Master Plan by the Board of Supervisors. Its purpose is to combine a variety of uses creating a unified and harmonious development of primarily residential lands in order to establish continuity between uses in terms of character, scale, building massing, internal circulation patterns, and open space. The standards for this overlay district specify that treated effluent shall be returned to the groundwater via spray irrigation. UDA has been established for the DuPont Tract located in northwestern portion of the Township and the Tattersall Development west of Marshallton.

The Flood Hazard District recognizes that streams and waterways represent a significant natural resource to the citizens of the Township, as well as having inherent development limitations. These areas are important to the protection of the water supply, indigenous wildlife, and scenic beauty of the Township and therefore must be protected from all development. The Flood Hazard District is an overlay zone and thus adds to existing regulations in the district affected. However, it does not replace those regulations.

As indicated by Table IV-1 on the following page, just under 85% of the Township is a form of residential zoning, and there is a direct correlation between permitted dwelling unit densities and the use of public water and sewer.

Land uses allowed by zoning are generally consistent with existing sewage facilities planning, with many zoning districts providing for flexibility in lot sizes and density as may be appropriate for either individual on-lot systems or public sewage service.

West Bradford Township
Official Sewage Facilities Plan



Legend

- West Bradford Township Boundary
- Municipal Boundaries
- Parcels
- Roads
- Water Bodies
- Streams

Zoning

- R-1 - Residential
- R-1C - Residential
- R-2 - Residential
- R-2A - Residential
- R-2B - Residential
- R-3 - Residential
- R-4 - Residential
- R-5 - Residential
- TND-2 Traditional Neighborhood Development-2
- U.D.A. - Unified Development Area
- C-1 - Commercial
- C-2 - Commercial
- C-2A - Commercial
- IM - Institution/Mixed
- I - Industrial

Data Sources:
*Municipal Boundaries - CHESCO GIS Data Distribution CD, Release 2.4, 1/20/2006
*Parcels - West Bradford Township, 9/22/2010
*Water Bodies, Streams - Chester County Surface Water Features, www.pasda.psu.edu
Zoning - West Bradford Township, 12/20/2005

0 1,250 2,500 5,000
Feet

MAP IV - 1
ZONING

URS
Iron Hill Corporate Center
Sabre Building Suite 300
4051 Ogletown Road
Newark, DE 19713

R:\PA_WB\radford\26600-601\GIS_job\Mapping\Act537_2010\MapIV-1_Zoning.mxd

Table IV-1
West Bradford Township Existing Zoning

Zoning Designation	Major Uses / Densities [1]	Acres / Percent of Total
R-1 Residential	Single Family Detached Homes & Agriculture (1 d.u. / net acre)	8,741 (73.5%)
R-1C Residential	Single Family Detached Homes & Conservation (0.4 d.u. / net acre)	498 (4.2%)
R-2 Residential	Single Family Detached Homes with public sewer and water (1.75 d.u. / net acre)	308 (2.6%)
R-2A Residential	Single Family Detached Homes with public sewer and water (1.75 d.u. / net acre & cluster development setbacks)	245 (2.1%)
R-2B Residential	Single Family Detached Homes with public sewer and water (2 d.u. / net acre & cluster development setbacks)	49 (0.4%)
R-3 Residential	Manufactured Homes with public sewer and water (4 d.u. / net acre)	67 (0.6%)
R-4 Residential	Single Family or Multi-family dwellings with public sewer and water (5 d.u. / net acre)	71 (0.6%)
R-5 Residential	Single Family Attached Homes with public sewer and water (1 d.u. / gross tract acre w 75% open space)	109 (0.9%)
Residential Subcategory	**10,888 acres**	**84.8%**
C-1 Commercial	General Commercial Uses (0.7 acre lot size)	23 (0.2%)
C-2 Commercial	Agricultural Sales (0.45 acre lot size)	5 (0%)
C-2A Commercial	Nursery Sales & Goods Repair (6 acre lot size)	12 (0.1%)
Commercial Subcategory	**40 acres**	**0.3%**
I Industrial	Limited Industrial & Manufacturing, (2 acre lot size)	201 (1.7%)
Industrial Subcategory	**201 acres**	**1.7%**
IM Mixed Institutional	Institutional Uses (2 acre lot size)	418 (3.5%)
Institutional Subcategory	**418 acres**	**3.5%**
UDA Unified Development Overlay Area	Master Planned Residential & Commercial Uses (300 acre tract size)	1,051 (8.8%)
TND-2 Traditional Neighborhood Development	Mixed Residential & Commercial Uses with design controls (0.25 acre lot size)	100 (0.8%)
TND-1/VOD Traditional Neighborhood Development / Village Overlay District	Mixed Residential & Commercial Uses with design controls (20 acre tract size)	212* (1.8%)
Mixed Use Subcategory	**1,363 acres***	**11.4%**
TOTAL ACREAGE	**11,900 acres**	**100%**

* Overlay area exists in more than one zoning district; therefore totals are greater than 100%.

Source: Chester County Parcel Base 2007 as classified by West Bradford Township

[1] Please see Zoning Ordinance for full description

5. West Bradford Township Subdivision and Land Development Ordinance

The current West Bradford Township Subdivision and Land Development Ordinance (SLDO) was last revised in August of 2006. Among the stated purposes, the following are particularly relevant to sewage facilities planning:

- To assist in the orderly, efficient, and integrated development of land in accordance with the Comprehensive Plan
- To ensure coordination and conformance of subdivision and land development plans with the public improvement plans of the Township and to coordinate with the development of the surrounding communities.
- To provide for the proper extension of community facilities at minimum cost and maximum convenience.
- To assure that sites proposed for subdivision or land development are suitable for development and human habitation.
- To encourage subdivisions and land development to be harmonious with and protective of the existing natural resources of the Township.

Section 526 of this Ordinance specifies standards for sewage disposal facilities. All such facilities are required to be permitted in accordance with the rules and regulations of PA DEP and the Chester County Health Department, as well as consistent with the Township's Act 537 Sewage Facilities Plan. Design and construction must also be in accordance with all Township requirements and specifications.

Provision is also made in Section 526 for satisfactory maintenance and for either municipal ownership or regulation by the Pennsylvania Utility Commission of all community and public sewerage systems. Standards for individual on-lot systems are presented and are generally consistent with Chapter 73 requirements. Replacement absorption area sites are required and must be preserved by deed restriction in order to adequately ensure the long term needs of any applicable parcel. In recognition of the constraints steep slopes impose on proper sewage system functioning, new individual on-lot systems are prohibited on slopes of greater than 20%.

D. Land Use Regulations and Plans Relating to the Use and Protection of Water Resources

1. Chester County Water Resources Plan

Watersheds, a water resource plan for Chester County, was adopted in 2002 as an element of the County's Comprehensive Plan. This document analyzes current and predicted water resource concerns for each major watershed. Stormwater, wastewater disposal, and water supplies are discussed in terms of overall strategies to improve conditions and mitigate concerns within each watershed.

West Bradford Township lies entirely within the Brandywine Creek watershed, which is also the largest of the twenty-one separate watersheds identified in Chester County. Additionally, the Brandywine Creek is among two others which have been ranked as 'high priority' for overall management needs, in particular for stormwater management. Although not entirely confined to West Bradford Township, some of the management concerns associated with the Brandywine Creek watershed have been identified as the following:

- A substantial population growth by 2020;
- An increasing number of new and aging septic systems, and cumulative septic discharges
- Increasing pressures to expand water and wastewater infrastructure
- Predominant source of water supply for Chester County
- High volumes of surface water discharges

Furthermore, the Brandywine Creek watershed is broken down into subbains, and West Bradford Township encompasses three of these within its borders. They are identified as subbasins B8, B9, and B13; the East Branch of the Brandywine Creek / Taylor Run, the East Branch of the Brandywine Creek / Beaver Creek, and the West Branch of the Brandywine 310 Creek / Broad Run, respectively. Within the Broad Run subbasin, an exceptional value watershed is noted (water quality designations are discussed separately below).

The entirety of the Brandywine Creek watershed drains to the Christiana River Basin, for which the Environmental Protection Agency (EPA) has established Total Maximum Daily Load (TMDL) limits for point source discharges.

2. Water Quality Designations

In 1937, Pennsylvania passed the Clean Streams Law (Act 394), which enabled the State, through its agencies, to protect the quality of water. With amendments in 1972 to the Federal Water Pollution Control Act, which established uniform standards on effluent limitations for "point sources" of water pollution, came amendments to Act 394 to regulate discharges into state waters.

The Clean Streams Law is administered by the DEP. The various rules and regulations which DEP is required to follow are contained in chapters which specify the procedures to be utilized. Chapter 93, Water Quality Standards, contains designations for most of the State waterways plus standards that place limitation on the amount of dissolved solids that can be discharged into the various waterway segments. The waterway designations contained in Chapter 93 are based on uses which are to be protected such as aquatic habitats, water supplies, and recreational activities. There are also special designation categories for waters of special quality or environmental importance, called high quality (HQ) or exceptional value (EV). Reference is made to Map II-2 showing drainage basins within the Township.

The classification system is divided into four separate categories based on continued support of aquatic life and biological processes unique to water composition. They are: 1) Cold Water Fishes (CWF); 2) Warm Water Fishes (WWF); 3) Migratory Fishes (MF); and 4) Trout Stocking (TSF). These classifications require that the temperature and dissolved oxygen levels be maintained at levels adequate to support the various fish species indigenous to these waters, as well as the flora and fauna necessary to support these species. Chapter 93 also contains a list of allowable loading levels of various pollutants for the various designation categories. Not all potential pollutants are listed but the Act states that unlisted substances which are harmful to the designated use will be regulated by the DEP.

For the waterway segments identified as high quality or exceptional value, special protection measures are required by DEP for new sewage facilities. While such measures are typically germane to stream discharge proposals, recent policy clarifications have brought on-lot sewage systems within the purview of Chapter 93 anti-degradation requirements. Additional hydrogeologic studies and other measures to mitigate nutrient loadings on the waterway may be required by DEP for all such proposals in special protection watersheds.

As mentioned above, the regulation of new or expanded stream discharge is controlled by the DEP through the Clean Streams Law. It is, however, important for local municipalities to be actively involved in review of these permit applications or renewals, as provided by Act 394. Through this participation, local governments can help ensure that these resources are not degraded due to contamination problems as a result of system malfunction or overloading of contaminants.

Table IV-2 lists the designations for each of the identified river and stream segments within the Township. For the most current pollutant loading criteria and other requirements, a copy of Chapter 93 standards can be obtained from the Southeast Regional DEP office in Norristown

3. Township Regulations

The Township has provisions to address the importance of protecting water resources through each regional and local planning document previously discussed. In particular, Article 800 of the SLDO provides standards for stormwater management. Among the stated objectives of Article 800 are to:

a. Promote alternative project designs and layouts that minimize the impacts on surface and groundwater.
b. Minimize increases in runoff stormwater volume.
c. Provide review procedures and performance standards for stormwater planning and management.

Table IV-2
West Bradford Township Water Quality Designations

Waterway	Segment	Chapter 93 Designation[1]
West Branch Brandywine Creek	Main stem, dam at Valley Station to conf. with East Branch	WWF, MF
Unnamed Tributary to West Branch	Basin	EV, MF
East Branch Brandywine Creek	Main stem, Shamona Creek to conf. with West Branch	WWF, MF
Unnamed Tributaries to East Branch	Main stem, Shamona Creek to conf. with West Branch	WWF-MF
Broad Run	Basin	EV, MF
Beaver Creek	Basin, East Brandywine-Caln Township border to mouth	TSF, MF
Designations: CWF- Cold Water Fishes TSF - Trout Stocking MF – Migratory Fishes WWF - Warm Water Fishes HQ - High Quality EV – Exceptional Value		

Source: Chapter 93, Water Quality Standards, Title 25. Environmental Protection, PA Dept. of Environmental Protection, 1998.

d. Focus on infiltration of stormwater to maintain groundwater recharge, to prevent degradation of surface and groundwater quality, and to otherwise protect water resources.
e. Implement an illegal discharge detection and elimination system that addresses non-stormwater discharges into West Bradford's separate storm sewer system.
f. Provide proper operation and maintenance of all permanent stormwater management facilities and Best Management Practices (BMPs) that are implemented in West Bradford Township.

Detailed permanent stormwater management design standards and operation and maintenance responsibilities are defined to meet these objectives.

E. Future Growth

According to the U.S. Census Bureau, the Township's population increased from 2,996 in 1970 to 10,775 in 2000, an increase of 259%. This represents a population increase of 8.6% per year over the entire three decades. Current population forecasts by both West Bradford Township and the Chester County Planning Commission (CCPC) suggest a decline in this rate of growth subsequent to 2000. These local, county, and regional

planning agency projections are generally consistent, with projections by the Township presented in ranges that generally capture the specific figures provided by the CCPC. Table IV-3 illustrates these growth projections and also provides housing unit projections based upon the population data.

Table IV-3
Population and Housing Trends

	Population Forecasts		Housing Unit Forecasts[1]	
Year	West Bradford Township[2]	CCPC/DVRPC[3]	West Bradford Township	CCPC/DVRPC
2010	12,500 - 13,250	12,521	4,167 - 4,417	4,174
2015[4]	13,000-13,625	13,202	4,333 - 4,542	4,401
2020	13,500 - 14,000	13,853	4,500 - 4,667	4,618
2030	13,750 - 15,000	15,067	4,583 - 5,000	5,022

(1) Based upon population forecasts and assuming 3 persons per housing unit

(2) Source: West Bradford Township Comprehensive Plan 2009

(3) Source: CCPC Municipal Population Forecasts (2005 - 2035), based upon DVRPC data

(4) Township population forecasts extrapolated from Comprehensive Plan forecasts for 2010 and 2020 assuming linear growth

Using the median values of projected housing unit ranges as derived from West Bradford Township population projections in Table IV-2, estimates of additional dwelling units that may be constructed throughout the Township are as follows:

- 146 additional dwelling units for the period 2010 to 2015
- 292 total additional dwelling units for the period 2010 to 2020
- 500 total additional dwelling units for the period 2010 to 2020

Many factors may affect actual housing unit growth, most notably the current depressed housing market. Should this condition continue for an extended period, the number of housing units constructed will likely be less than the estimates above.

Additional discussion of projected growth and the future sewage needs of each Study Area are presented below.

F. Projected Sewage Needs and Wastewater Planning Needs

Projected sewage needs and wastewater planning necessary to address these needs are discussed below with regard to each Study Area.

1. Utilities Incorporated of Pennsylvania (UIP) Study Area

Although limited portions of this Study Area may be developed for commercial or industrial uses, single family residences are expected to remain the predominant use in the future, in accordance with zoning designations for this area.

Known development projects consist of build-out for subdivisions which have already received planning approval for service by the UIP Broad Run WWTP and the Smith Tract Subdivision, which is currently proposed to be served by a new public WWTP to be constructed on the development lands. The Township has approved revision to the Act 537 Plan for the Smith Tract (DEP planning module code no. 1-15959-135-3KLM). Longer term projections of sewage needs are expected to reflect the overall Township growth, proportionate to the development lands in this area.

Table IV-4 illustrates the projected sewage needs for this Study Area for 5, 10, and 20 year intervals. Additional evaluation of projected ultimate sewage needs for this area assuming full build out of all large parcels is illustrated in Appendix I. It should be noted that the information in Appendix I was prepared to facilitate UIP considerations of alternatives in the course of this planning effort, and is not intended to represent sewage needs within the planning horizon of this document.

Projections for the entire Study Area do not necessarily define the sewage needs of the UIP Broad Run WWTP – as noted, the Smith Tract has been approved by the Township for service by a new wastewater facility but service by the Broad Run WWTP may still be considered, and Township zoning further allows for development in this area to be served by individual on-lot sewage disposal systems in lieu of public sewage. Additional discussion of these alternatives can be found in Chapter V.

The primary sewage planning needs of this Study Area are:

- Evaluate how future growth will be served
- Identify means of meeting the long term needs of existing residences, including the subset of this area along Glenside Road which was evaluated in depth per CCHD concerns and discussed in Chapter III.

2. DuPont Wastewater Treatment Facility Study Area

Future land use is expected to continue as single family residential, commensurate with the permissible zoning uses for the area. Most of this area, which is equivalent to the current DuPont WWTP Service Area, is either developed land or land with ongoing development projects. Since CCHD repair permit data indicates no significant areas of malfunction, future wastewater needs are expected to be limited to completion of approved projects and potential development of limited remaining potential development land. There are no known projects which have not already received planning approval. Table IV-5 illustrates these DuPont WWTF needs.

Table IV-4
UIP Study Area Projected Sewage Needs

	DEVELOPMENT NAME	TOTAL EDUs	TOTAL FLOW (GPD)	PROJECTED SEWAGE NEEDS											
				CURRENT		0-5 YEAR		5 YEAR TOTAL		5-10 YEAR		10 YEAR TOTAL		20 YEAR TOTAL	
				EDUs	GPD	EDUs	GPD	EDUs	GPD	EDUs	GPD	EDUs	GPD	EDUs	GPD
UIP Broad Run WWTP[1]	Bradford Glen/Victoria Crossing	476	121,035	476	121,035			476	121,035			476	121,035	476	121,035
	Summit/Walnut/Valley Ridge	212	53,906	212	53,906			212	53,906			212	53,906	212	53,906
	Highlands	47	11,951	47	11,951			47	11,951			47	11,951	47	11,951
	Brandywine Greene Phase I - III	206	52,381	206	52,381			206	52,381			206	52,381	206	52,381
	Brandywine Green Phase IV	64	16,274	64	16,274			64	16,274			64	16,274	64	16,274
	Brandywine Ridge	143	36,361	143	36,361			143	36,361			143	36,361	143	36,361
	Stonegate	102	25,936	102	25,936			102	25,936			102	25,936	102	25,936
	Schools[2]	40	10,240	40	10,240			40	10,240			40	10,240	40	10,240
	Miscellaneous Residences	4	1,017	4	1,017			4	1,017			4	1,017	4	1,017
	Sawmill Subdivision[3]	69	17,545	35	8,900	34	8,645	69	17,545			69	17,545	69	17,545
	Heritage Subdivision[4]	64	16,274			64	16,274	64	16,274			64	16,274	64	16,274
	Broad Run WWTP Subtotal	1,427	362,919	1,329	338,000	98	24,919	1,427	362,919			1,427	362,919	1,427	362,919
	Smith Tract Subdivision	128	33,600			128	33,600	128	33,600			128	33,600	128	33,600
	Future unknown development[5]	177	45,007							73	18,562	73	18,562	177	45,007
TOTALS		**1,732**	**441,525**	**1,329**	**338,000**	**226**	**58,519**	**1,555**	**396,519**	**73**	**18,562**	**1,628**	**415,081**	**1,732**	**441,525**

(1) All flow projections based on 2009 Chapter 94 Report. Residential flows/EDU = approx 254 gpd based on 2009 3 mo. max flows with schools excluded

(2) West Bradford & Bradford Heights Elementary Schools. Flows based upon 2009 UIP Chapter 94 report. EDUs derived by dividing school flows by residential EDU value per note 1

(3) Approved planning module specifies 15,180 gpd total flows, projections shown based upon 2009 3 month max flows/EDU for existing residential connections

(4) Approved planning module specifies 14,080 gpd total flows, projections shown based upon 2009 3 month max flows/EDU for existing residential connections

(5) Assumes approximately 50% of estimated total Township future dwelling units per planning period, gpd/EDU per note 1

Table IV-5
DuPont WWTF Study Area Projected Public Sewage Needs

DEVELOPMENT NAME	TOTAL EDUs	PROJECTED SEWAGE NEEDS[1]									
		CURRENT		0-5 YEAR		5 YEAR TOTAL		10 YEAR TOTAL		10+ YEAR TOTAL	
		EDUs	GPD	EDUs	GPD	EDUs	GPD	EDUs	GPD	EDUs	GPD
DuPont Property (Chestnut Ridge)	286	195	48,750	60	15,000	255	63,750	286	71,500	286	71,500
Reserves at Chestnut Ridge	37	37	9,250			37	9,250	37	9,250	37	9,250
Bradford Point	45	38	9,500	7	1,750	45	11,250	45	11,250	45	11,250
Meadow View	69			45	11,250	45	11,250	69	17,250	69	17,250
Future unknown development	22									22	5,500
TOTALS	**459**	**270**	**67,500[2]**	**112**	**28,000**	**382**	**95,500**	**437**	**109,250**	**459**	**114,750**

(1) Projections for known developments based upon 2009 Chapter 94 Report. All flows calculated at 250 gpd/EDU

(2) Flows shown calculated at 250 gpd/EDU. Actual total 3 month maximum flows per 2009 Chapter 94 Report are 38,711 gpd

Table IV-6
Romansville Study Area Potential Public Sewage Needs

DEVELOPMENT NAME	TOTAL EDUs	PROJECTED SEWAGE NEEDS[1]					
		5 YEAR		10 YEAR		10 + YEAR	
		EDUs	GPD	EDUs	GPD	EDUs	GPD
Romansville							
Phase 1 Area Existing	41			41	9,225	41	9,225
Phase 1 Area Future	2			2	450	2	450
Phase 2 Area Existing	165			165	37,125	165	37,125
Phase 2 Area Future	17			10	2,250	17	3,825
Stargazers Village							
Phase 1	43	43	9,675				
Phase 2	46			46	10,350	46	10,350
Phase 3	60			60	13,450	60	13,450
TOTALS	**374**	**43**	**9,675**	**324**	**72,850**	**331**	**74,425**

(1) Projections based on flows of 225 gpd/EDU

Given that the sewage needs projections for this area are within the current DuPont WWTF capacity, necessary sewage planning is limited to addressing existing and future on-lot sewage system use in this area.

3. Romansville Study Area

With the exception of a large future development site known as the Stargazers property, limited future development potential exists. Future uses are expected to mirror current uses - primarily single family residential, with limited commercial, industrial, and institutional uses.

The Stargazers development is proposed for public sewage service and is anticipated to be constructed in three phases. Furthermore, the sewage needs evaluation of existing residences in the Romansville area suggest that additional analysis is warranted to address the long term needs of these properties.

As summarized in Table III-7, 18.6% of the Romansville area residents that were surveyed indicated sewage system conditions consistent with DEP definitions for confirmed or suspected malfunctions. These are the categories for which additional planning consideration is generally warranted due to higher risk for environmental health hazards. Although these survey results do not indicate a particularly high rate of concern, additional evaluation is warranted when viewed in conjunction with older residences and small lot sizes prevalent in the area. To facilitate flexibility in addressing these existing needs, the survey area was divided into two phases. Phase 1 generally consists of the older residences with smaller lots located in the western portion of the triangular area bounded by Strasburg Road, Stargazers Road, and Leids Road, as well as parcels contiguous with potential sewer line placement as would be needed to serve the old residents and small lots. Phase 2 comprises the balance of the Study Area, excepting the proposed Stargazers development. Appendix J provides parcel by parcel projections of existing and future sewage needs for the Phases 1 and 2 areas of Romansville. This phasing is illustrated and discussed more fully in Chapter V.

Table IV-6 summarizes the projected sewage needs of the Romansville Study Area with regard to the three proposed Stargazers development phases and the two Romansville phases discussed above. As indicated, the needs of the Romansville area residences have been determined as a concern which may warrant action in approximately ten years, given the relatively limited incidence of current malfunction indicated by the door-to-door survey.

Wastewater planning needed to address the needs of this Study Area are as follows:

- Evaluate alternatives to provide public sewage treatment and disposal capacity for the Stargazers development.
- Evaluate alternatives to address the needs of existing residences

4. Strasburg Corridor Study Area

This Study Area consists of the current Strasburg Corridor WWTF service area. Apart from build-out of already approved development, no additional needs have been identified at this time for service by the Strasburg Corridor WWTF. As evidenced by Chapter 94 report flow projections, the current WWTF is of adequate capacity to accommodate the known development flows. Accordingly, there are no apparent wastewater planning needs for this area at this time.

5. Embreeville Center Study Area

As previously noted, the Embreeville complex is largely unoccupied and very limited uses served by the Embreeville WWTP remain. Until such time as any future use or redevelopment for the Embreeville complex is determined, no projected sewage needs can be formulated. Considering this condition, it is infeasible to address wastewater planning for this area at this time.

6. Appleville Mobile Home Park Study Area

Future land use in this Study Area is expected to remain unchanged from the current residential mobile home park, farm market, and orchard. No additional wastewater flows are projected. As discussed in Chapter III, reported incidence of on-lot system malfunction nonetheless warrants additional planning to evaluate alternatives to address this condition.

7. Residential Study Area

Future land use is expected to continue as single family residential served by on-lot sewage systems, commensurate with the permissible zoning uses for the area. No significant clusters of on-lot system malfunction are suggested by CCHD repair permit activity, and wastewater planning needs for this area primarily consist of evaluating various on-lot alternatives to assure the long term needs of residences can be met.

CHAPTER V

WASTEWATER ALTERNATIVES

This chapter will identify the range of wastewater alternatives technically feasible for use in West Bradford Township. The alternatives will subsequently be reduced to those that are consistent with the Township's land use and natural resource protection policies. For that more narrow set of alternatives, a selection hierarchy of sewage system technologies will be presented; this prioritized ranking will then serve as the Township's statement of policy among the wastewater alternatives, putting any future providers of sewage facilities on notice as to the Township's requirements.

Alternatives will be further evaluated in relation to the planning needs for each of the Study Areas. 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 • Gravity Sewers -Conventional -Small Diameter • Pressure Sewers -Grinder Pump -STEP (Septic Tank Effluent Pump) • Vacuum Sewers	*Initial Treatment* • Septic Tank • Package Treatment Plant -Extended Aeration -Aerobic Units -SBR (Sequencing Batch Reactor) • Biological Contactors • Physical/Chemical • Lagoon/Pond • Marsh - Pond – Meadow *Advanced Treatment* • Peat filtration (on-lot) • Aerobic Tank (on-lot) • Sand Filtration • Constructed Wetlands	• On-lot Disposal -Standard Trench -Seepage Bed -Elevated Sand Mound -Drip Irrigation • Land Application • Discharge to Groundwater • Small Flow Stream Discharge • Small Flow Spray Irrigation • Evapotranspiration • Pump & Haul

As described below, all of these components are not considered appropriate and desirable to meet the wastewater needs of West Bradford Township. 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 System

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 and transport to another off-site location for final treatment and disposal. The OLDS represents the "non-sewered" option, where each lot has its own self-contained sewage system. The only piping associated with this system is that which connects the house or other structure being served to the treatment components.

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 for residential uses typically ranges from 1,000 to 1,500 gallons, dependent upon the number of bedrooms present. 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, 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. In-line lift stations can also be used if required by the terrain or for cost-effectiveness.

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 are 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

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 have proven more efficient at retaining solids, but single-compartment tanks have also 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 built-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 a significant portion of the total system cost. Therefore, the system with the lower average on-lot cost may 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. Increased operation and maintenance concerns (regular tank pumping) are usually associated with a STEP system.

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 on-lot. Septic tanks can be of various sizes with single-family on-lot tanks typically ranging from 1,000 to 1,500 gallons total capacity (depending on number of bedrooms) and communal tanks as large as needed. Two-compartment septic tanks are more efficient at retaining solids and have been required for new installations in

Pennsylvania since 1997 for this reason. Effluent filters at the tank outlet have also shown to be beneficial in minimizing transmittal or carry-over of solids.

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.

b. Package Treatment Plant

The term "package treatment plant" refers to commercially available prefabricated treatment plants or individual components. 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 a 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 are not cleaned without excavation of the filter. RISF's return a portion of the drainage back onto the filter surface. Sand filtration is also incorporated in the design of elevated sand mounds or subsurface sand filters for on-lot sewage systems.

f. Peat Filtration

A peat filter consists of a plastic shell encompassing a filter using specially treated peat-moss. Wastewater from a septic tank is piped into the shell where it is uniformly distributed over the entire surface of the filter by means of a gravity system. Wastewater is then cleansed by percolating through the peat-moss filter bed and is typically disposed of by a soil based on-lot absorption area. Peat filters are usually used for relatively low volume (individual on-lot) sewage systems where site constraints require additional treatment. The peat requires regular maintenance and periodic replacement to maintain treatment efficacy.

g. Constructed Wetlands

There are free surface (FSW) and subsurface wetlands (SSW). FSW show water at the surface amid the vegetation. SSW are 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 adapted to the wetland environment 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. Holding Tank

As defined by DEP regulations, a holding tank is a water-tight receptacle which receives and retains sewage by a water-carrying system and is designed and constructed to facilitate ultimate disposal of the sewage at another site. When used to service residential dwellings, holding tanks should be used only to repair an existing malfunction if no other option exists. The term 'holding tank' should not be confused with the term 'retaining tank', which by current DEP definition includes holding tanks as well as chemical toilets, privies, incinerating toilets, composting toilets, and recycling toilets; as described, the term 'retaining tank' embodies treatment methodologies as well.

b. On-lot Disposal

Septic tank or aerobic treatment 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 permissible on slopes up to a maximum of 25%.

Modifications of the standard trench system are implemented when dictated by particular soils, slopes, or other site considerations. Variations considered as "conventional" technology (i.e. documented in Chapter 73 of the DEP regulations) include seepage beds; subsurface sand filters; and elevated sand mounds. Additional options as may be appropriate for specific sites are called "alternate" technologies, and are described in the DEP publication entitled Alternate Systems Guidance. The most common alternate technologies in West Bradford are leaching chambers and drip irrigation.

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 a slope of less than or equal to 8%.

Subsurface sand filters are variations of either a subsurface seepage bed or trench system which include sand placement over the entire excavated area to bypass soils with unacceptable permeability prior to placement of stone

and pipe. Minimum sand depth is 12 inches and all such designs require pressure dosed distribution.

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.

Leaching chambers are semi-cylindrical plastic chambers installed with the open face on the bottom of a seepage bed or trench excavation. Multiple rows of chambers connected end-to-end may be installed in lieu of stone and pipe. Leaching chambers are currently deemed an alternate technology by DEP, although there are no significant maintenance concerns beyond those associated with a conventional stone and pipe subsurface system.

Drip irrigation systems have long been used for agricultural purposes but more recently have been adapted for wastewater treatment. Typically, wastewater effluent from a treatment system flows into a 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 small-diameter flexible drip irrigation tubing, with pressure- compensating emitters, installed in narrow trenches within the root zone of vegetation either growing or proposed for the waste receiver site. The emitters equalize a wide range of pressure and provide a controlled discharge of filtered wastewater to the soil. It should be noted that, although large volume drip irrigation systems are currently being considered in many areas of Chester County, there are a limited number of operational community systems in place from which to obtain historical data on effluent quality and operations and maintenance. Prior to design of any drip irrigation disposal system, consideration should be given to groundwater mounding and the potential for a nitrogen plume. Any consideration of drip irrigation should also entail documentation being provided by the manufacturer concerning non-freezing during cold weather.

Other modifications to the preceding five subsurface soil absorption systems include dosing systems, alternating absorption areas, and evapotranspiration 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. On-lot disposal technologies such as elevated sand mounds, subsurface sand filters, and various alternate systems require such pressure

dosing to better accommodate marginal soils by ensuring more effective distribution.

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.

Evapotranspiration systems do not rely on soil, slope, or percolation for any treatment or disposal of sewage effluent. These systems are essentially self-contained greenhouses which utilize evaporation and vegetative growth to assimilate effluent. Plant growth within the greenhouse must be harvested on a regular basis to ensure the continued efficiency of the treatment system. Currently, there is only one DEP-approved evapotranspiration bed contained within a greenhouse system in Pennsylvania.

c. Land Application

Treated and disinfected wastewater effluent is applied by sprinkling to vegetated soils that have demonstrated acceptable levels of permeability. Effluent is further treated as it travels through the soil matrix by filtration, absorption, ion exchange, precipitation, and 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 (primarily nitrogen), reduce erosion and maintain soil permeability.

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 an appropriate receiving water body is available, the level of treatment required may vary depending on local regulations, stream water quality and other site-specific conditions. The current zero net total nitrogen and total phosphorous loading policy pursuant to the Chesapeake Bay Tributary Strategy may limit the use of new stream discharge systems in West Bradford Township. The presence of EV and HQ streams in the Township may further constrain this disposal method.

e. 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. The current zero net total nitrogen and total phosphorous loading policy pursuant to the Chesapeake Bay Tributary Strategy may limit the use of disposal via groundwater discharge in West Bradford Township.

f. Small Flow Treatment Facilities (SFTF) with Stream Discharge

In floodplain soils, areas of an extremely high seasonal water table, or areas where the soils will not support soils-based effluent disposal methods, stream discharge may be installed as an individual on-lot system.

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 under Pa Code Title 25, Chapter 93 as Exceptional Value (EV) and may only discharge into a High Quality (HQ) stream when used to repair a malfunctioning system. The applicability of new small flow treatment facilities is limited in West Bradford by the presence of EV and HQ streams and the policies of the Chesapeake Bay Tributary Strategy program.

g. Small Flow Treatment Facility with Spray Irrigation

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. 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 (generally two 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 discharge a pre-determined volume of effluent for a short period of time each day. This is usually done at night to avoid a nuisance situation with people or domestic animals.

B. Applicability of Wastewater Alternatives

The general applicability of the various wastewater technology alternatives to West Bradford Township are presented in Table V-2. This preliminary evaluation is based upon environmental impacts, local site conditions, existing wastewater infrastructure, and the known success or limitations of each technology. This provides a more narrowed set of technical alternatives to be evaluated.

Table V-2
General Applicability of Wastewater Alternatives for West Bradford Township

ALTERNATIVE	APPLICABLE YES/NO	COMMENTS
COLLECTION SYSTEM ALTERNATIVES		
Conventional Gravity Sewer	Yes	Topography limits applicability without pump stations
Small Diameter Gravity Sewers	No	May require septic tank replacement, increased O&M (tank pumping), can cause odors with lagoon treatment
Grinder Pump Pressure Sewers	Yes	Topography appropriate within Township
STEP Pressure Sewers	No	May require septic tank replacement, increased O&M (tank pumping), can cause odors with lagoon treatment, more cost effective alternatives available
Vacuum Sewers	No	Increased O&M over more cost-effective alternatives available
TREATMENT ALTERNATIVES		
Individual Septic Tanks	Yes	May be insufficient treatment for new development in special protection watersheds
Aerobic Tanks	Yes	More expensive, more maintenance than septic tank
Physical-Chemical Systems	Yes	Applicable for specific circumstances
Sand Filter	Yes	Applicable for specific circumstances
Peat Filter	Yes	Applicable for specific circumstances
Constructed Wetlands	Yes	Requires "greenhouse" for year-round use; may be cost prohibitive
Community Septic Tanks	Yes	Generally limited to small community systems. May be insufficient treatment for new development in special protection watersheds
Aerobic Units (Biological Treatment)	Yes	More expensive, more maintenance than septic tank
Lagoons (Biological Treatment)	Yes	Not practical for small systems; may be insufficient treatment for new development in special protection watersheds
Physical-Chemical Systems	Yes	Applicable for specific circumstances
Intermittent Sand Filter	Yes	Applicable for specific circumstances
Constructed Wetlands	Yes	Applicable for specific circumstances
DISPOSAL ALTERNATIVES		
Individual Holding Tanks	No	Costly to maintain and DEP regulations limit use as a permanent system. Generally applicable for repairs only.
Land Disposal Conventional (subsurface, ESM)	Yes	Preferred alternative
Drip Irrigation	Yes	Requires Soil Scientist evaluation
Spray Irrigation	Yes	Limited applicability due to area required
Stream Discharge	No	Inconsistent with Township policies and may be constrained where in special protection watersheds.
Community Holding Tanks	No	Costly to maintain and DEP regulations limit use as a permanent system. Temporary use only may be applicable.
Land Disposal Conventional (subsurface, ESM)	Yes	Dependent upon available soils
Drip Irrigation	Yes	Requires Soils & Hydrogeologic Investigations
Spray Irrigation	Yes	Requires Soils & Hydrogeologic Investigations
Discharge to Groundwater	No	Inconsistent with Township policies and may be constrained where in special protection watersheds.
Stream Discharge	No	Inconsistent with Township policies and may be constrained where in special protection watersheds.

It should be noted that the potential for regional wastewater treatment was discounted from the list of alternatives applicable to this planning effort. As will be discussed later in this chapter, projected known public sewage needs appear to be feasibly addressed by existing facilities within the Township, or modification thereto. The next section outlines a wastewater system selection strategy.

C. Wastewater System Selection Strategy

The United States Environmental Protection Agency estimates that approximately 25% of all housing units in the U.S. utilize on-lot systems for treatment and disposal of their wastewater. While these systems include a variety of components and configurations, the most common is the septic tank/soil absorption system. Traditionally, on-lot systems have been used because of the large natural capacity of the soil to assimilate pollutants in wastewater.

In areas of the Township where individual on-lot disposal cannot be utilized, either because of housing density or where existing systems are failing and cannot be repaired cost-effectively, treated wastewater effluent can be safely discharged into community on-lot systems or onto the land via slow rate application (i.e. spray irrigation). As previously noted, discharge to surface waters in West Bradford Township is inconsistent with Township policies and constrained where in a special protection watershed.

Wastewater system alternatives can be divided into two general categories, briefly defined as follows:

1. <u>Individual On-lot Disposal Systems</u>

   Individual on-lot disposal systems utilize on-site treatment and disposal to serve a single use, independent of other parcels or systems. Although residential use is the primary application, on-lot systems serving commercial or institutional uses which generate sewage flows commensurate with those of single family residences may also be most appropriately defined in this category.

   Table V-3 lists the most common available technologies for individual on-lot disposal systems in descending order of Township preference. For example, a conventional standard in ground disposal system would be preferable to an alternate drip irrigation system which would, in turn, be preferable to a holding tank. The terms ‘conventional’, ‘alternate’, and ‘experimental’ are used as defined in PA Code Title 25, Chapter 73.1. It should be noted that replacement areas are required by the Township Subdivision and Land Development Ordinance for all new development, and the policy described in Table V-3 is applicable to both primary and replacement areas in these cases.

Table V-3
Individual On-Lot Disposal System (OLDS) Selection Strategy

POLICY

Encourage individual on-site treatment and disposal wherever feasible (depending on site characteristics and density requirements). Repair existing OLDS where conditions require. Replacement areas required for all new land development.

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 Township that a more preferred technology cannot be utilized then the next technology on the list is evaluated. The Township shall consider physical and environmental limitations, but not costs, in its evaluation of the feasibility of a preferred technology. This evaluation of technologies is subject to Township review and approval and must fully comply with DEP wastewater regulations.

TECHNOLOGY EVALUATION

A. Conventional on-lot sewage disposal systems
    1. Standard inground system (beds or trenches)
    2. Subsurface sand filter system (beds or trenches)
    3. Elevated system (sand mound bed or trenches)
    4. Individual residential spray irrigation system (IRSIS)
B. Alternate on-lot sewage disposal systems (pursuant to current Pa DEP Alternate Systems Guidance Document)
    1. Leaching chambers
    2. Drip irrigation system
    3. At-grade system
    4. Additional peat-filter option systems
    5. At-grade system on limiting zones less than 20 inches
C. Small flow treatment facility with stream discharge (SFTF, repairs only)
D. Experimental on-lot sewage disposal system (repairs only)
E. Individual holding tank (repairs only).

The general hierarchy of the preferences presented in Table V-3 is further described as follows:

a. Conventional Sewage System – for the purposes of this Plan, a conventional sewage system is defined as a system employing the use of demonstrated on-lot sewage treatment and disposal technology in a manner specifically recognized by Title 25, Chapter 73 of the PA Code. The term does not include any technologies classified as alternate or experimental by the PA DEP or use of any technologies in a manner deemed alternate or experimental by the PA DEP.

b. Alternate Sewage System – those technologies and uses specifically described the PA DEP Alternate Systems Guidance document. Additional technical complexity typically accompanying such systems can lead to increased operation and maintenance concerns, and the Township accordingly prefers conventional systems. It is noted, however, that use of alternate technology may nonetheless be acceptable if needed to repair an existing malfunction or where the technology proposed is the most viable for a particular application, as demonstrated in accordance with the selection strategy outlined in Table V-3.

c. Small Flow Treatment Systems (SFTF) – these are typically proposed where no suitable soil based absorption area is feasible and stream discharge is utilized. Such technologies may also be proposed to mitigate significant groundwater quality limitations in conjunction with land based disposal. SFTF's have significant operation and maintenance responsibilities, and discharge limitations due to stream quality designations further restrict applicability in a large portion of West Bradford Township. Consequently, the Township desires to limit use of SFTF's to repair of existing malfunctions.

d. Experimental Sewage System – the feasibility of technologies defined as such by PA DEP is not yet demonstrated and the Township intends to allow such systems only if needed to repair an existing malfunction.

e. Holding Tanks – these are generally only acceptable when no other means is available to address an existing malfunction.

As can be seen from the descriptions above, West Bradford Township prefers conventional technologies to minimize environmental, operational, and maintenance impacts, although it is recognized that alternate technologies may be most appropriate in some cases. A matrix describing application of these technologies in detail has been prepared by the Pennsylvania Association of Township Supervisors (PSATS) and can be found in Appendix K.

It should be noted that current DEP policies with regard to on-lot sewage disposal in special protection watersheds, which encompass a large portion of West Bradford Township, may constrain use of conventional sewage systems. Where applicable, alternate technologies may be required to achieve reductions in nitrogen loading.

2. Community Sewage System

A community sewage system is a sewage facility, whether publicly or privately owned, for the collection of sewage from two or more lots, or two or more equivalent dwelling units and the treatment or disposal, or both, of the sewage on one or more of the lots or at another site. Both community *on-lot* disposal systems and community *sewerage* systems are encompassed in this definition.

A community on-lot system uses a system of piping, tanks or other facilities for collecting, treating and disposing of sewage into a soil absorption area. Design flows for these systems are defined in Chapter 73. Although many technologies associated with individual on-lot systems are applicable per Chapter 73, the increased flows and operation and maintenance concerns for a community on-lot system warrant increased scrutiny by the Township.

A community sewerage system is a publicly or privately owned community sewage system which uses a method of sewage collection, conveyance, treatment and disposal other than renovation in a soil absorption area. Wastewater is collected within a designated service area. Treatment and disposal are accomplished at a central treatment and disposal facility.

West Bradford Township's land use planning documents do not generally provide for community sewage systems, although non-residential uses are permitted which may require technology consistent with DEP community system definitions. Where any use of a community system is proposed, the type of treatment and disposal technologies for new community sewerage systems and new community on-lot disposal systems will be considered by the Township in accordance with the selection strategy presented in Table V-4. This consideration will take place during the Township's review of the alternatives analysis within sewage planning modules. The Township will consider site constraints and other site planning issues, but not cost, when deciding upon treatment and disposal technologies. DEP requirements for special protection watersheds may also require advanced treatment to achieve nutrient loading limits for a community sewerage system. Similar treatment may be required for any community on-lot system, subject to design flows and satisfactory hydrogeologic testing. All references in Table V-4 to conventional and alternate technologies are as defined in Chapter 73 and the DEP Alternate Systems Guidance document respectively.

Table V-4
Community Sewage System Selection Strategy

POLICY

Community systems may be used to serve new development where dictated by permissible density and/or wastewater flows which are inconsistent with individual on-lot system use. Replacement disposal areas are required for new community on-lot systems and new community sewerage systems proposing subsurface disposal areas (including drip irrigation), unless a community system is required to address existing malfunctions.

METHODOLOGY

Evaluate the following wastewater technologies in sequence, beginning with Technology A for community sewerage systems and community on-lot disposal systems requiring a DEP permit and/or with design flows greater than 2,000 gpd, and Technology F for all other community on-lot disposal systems. 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 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

Community Sewerage Systems and Community On-Lot Disposal Systems requiring a DEP Permit and/or With Design Flows Greater Than 2,000 GPD.

A. Lagoon treatment/slow rate land application (spray irrigation)
B. Advanced mechanical treatment plant/ slow rate land application (spray irrigation)
B. Advanced mechanical treatment plant/drip irrigation
C. Advanced mechanical treatment plant/subsurface disposal
D Advanced mechanical treatment plant/stream discharge (only to correct malfunctions)
E. Central holding tank (temporary only).

Community On-Lot Disposal Systems (less than 2,000 gpd flow per Ch. 73)

F. Septic tank/free access intermittent sand filter or peat filter/ conventional subsurface disposal
G. Septic tank/buried intermittent sand filter/ conventional subsurface disposal
H. Aerobic unit/ free access intermittent sand filter or peat filter/ conventional subsurface disposal
I. Aerobic unit/ buried intermittent sand filter/ conventional subsurface disposal
J. Alternate treatment and/or disposal technologies (subject to Township approval for each)
K. Central holding tank (temporary only, financial security required)

Notes:

1. All community septic tanks to be fitted with effluent filter
2. Stream discharge and projects in special protection watersheds may be subject to Chapter 93 limitations

D. Alternative Wastewater Facilities for Study Areas

For purposes of analysis and consideration of appropriate alternatives, West Bradford Township's land area is divided into three study areas, as shown in Map II-1. The study areas are:

1. UIP Study Area
2. DuPont WWTF Study Area
3. Romansville Study Area
4. Strasburg Corridor Study Area
5. Embreeville Study Area
6. Appleville Mobile Home Park Study Area
7. Residential Study Area

Each study area, or group of areas, also has particular wastewater planning needs related to natural characteristics, existing land use, and proposed land use. These wastewater planning needs were identified in Chapter IV and a discussion of commensurate alternatives follows.

1. <u>UIP Study Area</u>

As discussed in Chapter IV, identified five year sewage needs for this area may be adequately served by the existing UIP Broad Run facilities, provided I&I abatement measures continue to document sufficient capacity gains. The primary sewage planning needs of this Study Area are:

- Evaluate how future growth will be served.
- Identify means of meeting the long term needs of existing residences, including the subset of this area along Glenside Road which was evaluated in depth per CCHD concerns and discussed in Chapter III.

Alternatives are identified and discussed below in accordance with these planning needs.

a. No-Action Alternative

The Township may elect to take a no-action alternative regarding the properties located in this Study Area, indicating the continued use of existing on-lot systems and service by the UIP WWTP for all currently approved connections, with no additional planning provisions.

As noted in the 2009 Wasteload Management Report for the UIP facilities, UIP has indicated that future growth in their franchise area is expected to be accommodated by on-lot sewage systems, unless a developer requests

public sewage service and sufficient capacity is deemed to be available. Since UIP has decided not to provide for additional public sewage capacity at this time, and limited existing WWTP capacity may be available to serve any growth beyond those connections already approved, a no-action alternative with regard to UIP facilities has some merit.

Under this alternative, new development would be served by individual on-lot systems (consistent with the current approved planning) unless sufficient UIP sewerage system capacity exists, in which case a site specific planning module may be considered by the Township. Existing on-lot sewage systems would be repaired as needed to meet the long term needs of these residences.

While consistent with Township zoning designations, which provide for both on-lot sewage systems and public sewage facilities in this area, a no action alternative may be insufficient with regard to the long term needs of existing residences. As discussed in Chapter III, some residences along Glenside Road have been identified which have existing problems. Given the limited number of properties involved and the lack of proximity to any existing public sewage infrastructure, it is not economically feasible to extend public sewer to the Glenside Road residences. Consideration beyond a no-action alternative may nonetheless be warranted to mitigate problems in this area and better provide for the long term sewage needs of all residences with on-lot sewage systems in the UIP Study Area.

b. New or Expanded Community/Public Sewage System

West Bradford will require that any new or expanded public sewerage facilities rely upon land application disposal in lieu of stream discharge. This position is also documented in the June 24, 2004 Settlement Agreement between UIP and DEP which was negotiated pursuant to a UIP filing for franchise area expansion with the Pennsylvania Public Utility Commission. See Appendix L. Consistent with this determination, the Township has recently approved a planning module revision to the Act 537 Plan to provide for construction of an MBR treatment plant with drip irrigation disposal on the Smith Tract development, located within the UIP franchise area. The planning module for this project (DEP Code # 1-15959-135-3KLM) should be consulted for additional details.

A desktop evaluation of potential spray irrigation disposal lands and capacities was conducted to facilitate consideration of this alternative. As illustrated in Appendix M, multiple potential land application parcels were identified for possible consideration of new or expanded UIP facilities, but no additional investigation has been conducted due to the UIP determination that no new or expanded facilities will be considered at this

time. In consideration of the downturn of the housing market and the lack of significant known sewage needs, additional evaluation of land application alternatives may be appropriately addressed by future planning efforts.

Future planning to provide for any new or expanded public sewerage facilities may be conducted pursuant to a site specific planning module if a development provides additional treatment and disposal capacity to effectively expand UIP capacity in the Study Area. Any future planning to provide for new or expanded public sewage facilities in this Study Area will be subject to the technology selection strategy of Table V-4.

c. Repair, Replacement, or Upgrading of Existing Malfunctioning Systems

This alternative is appropriate on a case-by-case basis to remediate existing malfunctioning systems. Table V-3 should be utilized in the process for the repair, replacement, or upgrading of malfunctioning on-lot systems.

d. Small Flow Treatment Facilities (SFTF)

The use of multiple small flow treatment facilities is generally not a viable solution, as this creates a proliferation of sewage discharges which require regular operation, maintenance, and Township administration issues. Each small flow treatment facility is generally rated for a flow not to exceed 2,000 gallons per day (GPD), or the equivalent of 5 dwelling units.

Operation, maintenance, and administrative challenges suggest this alternative should be discounted from further consideration for new development. In accordance with the selection strategy from Table V-3, SFTF's may remain a viable alternative only if required to abate a sewage system malfunction.

e. Use of Alternative Methods of Collection and Conveyance

As noted in table V-2, several methods of collection and conveyance would be technically feasible for consideration in West Bradford, but conventional gravity sewers and grinder pump/low pressure sewer system are the preferred alternatives due to decreased operation and maintenance costs and prior Township experience. Since no new sewer extensions are proposed for UIP facilities at this time, no additional evaluation of this alternative is warranted for the purpose of this planning effort.

f. Holding Tanks

Holding tanks should only be utilized as a last option for correcting malfunctioning on-lot systems, in accordance with Table V-3. A holding tank generally consists of an enclosed concrete tank with a minimum of three days capacity, after which it must be pumped out and the contents disposed at another location. Holding tanks require regular maintenance in the form of pump outs in order to prevent overflow and create an additional public health hazard. Their use is typically governed by a municipal ordinance, which sets forth specific additional usage requirements and establishes penalties for non-compliance. Installation of holding tanks throughout the Study Area is not a viable means of addressing long term sewage needs, although limited application may be needed to correct a malfunction in accordance with the OLDS selection strategy.

g. Sewage Management Program

The implementation of a sewage management program, in conjunction with the continued use of the on-lot systems, may be an appropriate alternative to address the long term sewage needs of properties served by on-lot sewage systems in this Study Area. A detailed discussion regarding the merits and implementation of a sewage management program are discussed in section E.

h. Non-Structural Comprehensive Planning Alternatives

Non-structural planning alternatives include revision to the Township's Comprehensive Plan, Zoning Ordinance, or Subdivision and Land Development Ordinance to improve consistency with Act 537 planning for the Study Area. Since no significant inconsistency is noted between these planning documents and the feasible alternatives noted above for this Study Area, consideration of non-structural planning alternatives is discounted from further consideration.

2. <u>DuPont WWTF Study Area</u>

As noted in Chapter IV, the sewage needs projections for this area are within the current DuPont WWTF capacity. Needed sewage planning for this area is accordingly limited to addressing the long term needs of parcels served by on-lot systems. Alternatives are identified below in accordance with these planning needs.

a. No-Action Alternative

The Township may elect to take a no-action alternative regarding the properties located in this Study Area. This alternative would involve the continued use of existing on-lot systems where applicable and service by the DuPont WWTF for all currently approved connections and future development in the service area as delineated in the Township's 2002 Act 537 Plan, with no additional planning provisions.

Given sufficient DuPont WWTF capacity relative to projected sewage needs and the lack of any identified cluster of on-lot sewage system malfunction, a no-action alternative may merit consideration.

This alternative may nonetheless fail to adequately consider the long term sewage needs of on-lot sewage systems in this area.

b. New or Expanded Community/Public Sewage System

The identified sewage needs of this portion of the Township can be adequately accommodated by the existing DuPont WWTF; this alternative is without merit relative since the DuPont WWTF Study Area has sufficient capacity to meet future needs.

c. Repair, Replacement, or Upgrading of Existing Malfunctioning Systems

Since no significant incidence of malfunction has been identified, this alternative is appropriate on a case-by-case basis to remediate malfunctioning systems as may be identified in the future. Table V-3 should be utilized in the process for repair, replacement, or upgrading of malfunctioning on-lot systems.

d. Small Flow Treatment Facilities and Package Treatment

The use of multiple small flow treatment facilities as a widespread means of addressing sewage needs is generally not a viable solution, as this creates a proliferation of sewage discharges which require regular operation, maintenance, and Township administration issues. Each small flow treatment facility is generally rated for a flow not to exceed 2,000 gallons per day (GPD), or the equivalent of 5 dwelling units.

This alternative may be appropriately utilized only as necessary to correct an existing sewage system malfunction, in accordance with the selection strategy defined in Table V-3.

e. Use of Alternative Methods of Collection and Conveyance

As noted in Table V-2, several methods of collection and conveyance would be technically feasible for consideration in West Bradford, but conventional gravity sewers and grinder pump/low pressure sewer systems are the preferred alternatives due to decreased operation and maintenance costs and prior Township experience. Since no new sewer extensions are proposed to serve the needs of this Study Area, no additional evaluation of this alternative is warranted.

f. Holding Tanks

Holding tanks should only be utilized as a last option for correcting malfunctioning on-lot systems, in accordance with Table V-3. A holding tank generally consists of an enclosed concrete tank with a minimum of three days capacity, after which it must be pumped out and the contents disposed at another location. Holding tanks require regular maintenance in the form of pump outs in order to prevent overflow and create an additional public health hazard. Their use is typically governed by a municipal ordinance, which sets forth specific additional usage requirements and establishes penalties for non-compliance. Lack of identified malfunctions suggests this alternative is only applicable as may be needed to address future sewage system repairs.

g. Sewage Management Program

The implementation of a sewage management program may be a feasible alternative to ensure increased longevity of existing and future on-lot sewage systems in this Study Area. The merits and implementation of a sewage management program are discussed in section E.

h. Non-Structural Comprehensive Planning Alternatives

Non-structural planning alternatives include revision to the Township's Comprehensive Plan, Zoning Ordinance, or Subdivision and Land Development Ordinance to improve consistency with Act 537 planning for the Study Area. Since no significant inconsistency is noted between these planning documents and the feasible alternatives noted above for this Study Area, non-structural planning alternatives are discounted from further consideration.

3. Romansville Study Area

The wastewater planning needed to address the needs of this Study Area was identified in Chapter IV as follows:

- Evaluate alternatives to provide public sewage treatment and disposal capacity for the entire Stargazers development.
- Evaluate alternatives to address the needs of existing residences that were the subject of the door-to-door survey.

Alternatives are discussed below in accordance with these planning needs.

a. No-Action Alternative

Current sewage facilities planning for this area designates only on-lot sewage system use. This alternative is infeasible for the Stargazers development due to the proposed density and lot sizes, and may not be the most effective means to address the long term needs of existing residences.

b. New or Expanded Community/Public Sewage System

The Stargazers development will require public or community off-site sewage facilities due to the proposed density and lot sizes, as will be addressed more fully through a developer sponsored planning module. Additional consideration of this alternative may be also warranted with regard to existing on-lot sewage system conditions in the Romansville area, as discussed in detail in Chapter III.

Treatment and disposal capacity to serve flows in excess of the projected five year needs is available within the current permitted capacity for either the DuPont WWTF or the Strasburg Corridor WWTF; however, insufficient capacity is presently available at either facility to accommodate the total future sewage needs. Although additional planning and site investigations may be needed for long term alternatives to serve this Study Area, discussion of potentially feasible alternatives as considered in the course of this planning effort is provided below. These alternatives are as follows:

- Expanded DuPont WWTF with revised EDU value
- Existing DuPont WWTF with revised EDU value in conjunction with new treatment and disposal facilities on the Smith Farm property
- Expanded Strasburg Corridor WWTF

Detailed evaluation of each follows.

1) Expanded DuPont WWTF with Revised EDU Value

Although the five year needs of this Study Area can be accommodated within the DuPont facility assuming Act 537

allocations consistent with the currently approved 250 gpd/EDU value, a review of flow data for this facility as well as the Strasburg Corridor WWTF indicates this EDU value to be overly conservative, limiting the Township's ability to serve sewage needs in a cost effective manner. The Strasburg Corridor WWTF is similar to the DuPont facility but uses an EDU value of 225 gpd, which is also consistent with DEP approvals for other lagoon treatment and spray irrigation facilities elsewhere in Chester County.

Flow data included in the 2009 Chapter 94 Reports for both facilities substantiate that the use of 225 gpd/EDU is still conservative enough to provide a substantial buffer for future inflow and infiltration (I&I) concerns. It should be noted, however, that collection and conveyance systems tributary to both facilities consist of relatively new construction with substantial use of low pressure sewer systems, greatly diminishing infiltration concerns for the foreseeable future.

Since the DuPont facility is relatively new and approved projects have continued to connect as construction progresses, a static evaluation of flows per all EDUs connected is infeasible. In contrast, The Strasburg Corridor facility saw virtually no change in the number of connections throughout 2009 – only 1 EDU was connected. Table V-5 illustrates calculated flows per EDU using the most conservative approach of evaluating annual flow data with respect to only the EDUs connected at the end of 2008 (which would inflate the actual flow per EDU for a growing facility such as DuPont).

Table V-5
Flows Per EDU

		DuPont WWTF	Strasburg Corridor WWTF
EDUs connected at end of 2008		235	377
2009 ave. monthly flow (gpd)	total flow	34,436	49,077
	flow per EDU	147	130
2009 3 month max. flow (gpd)	total flow	38,711	50,264
	flow per EDU	165	133
2009 max. month flow (gpd)	total flow	39,998	51,460
	flow per EDU	170	136

Using the most conservative EDU flow of 170 gpd based upon the maximum month flows for the DuPont facility, a buffer of 55 gpd/EDU would exist at an assigned 225 gpd/EDU. As noted, this is artificially high due to calculation methods which err on the side of caution. A more reasonable flow per EDU for the DuPont facility may be derived by dividing the 3 month maximum flow by the average number of connections in 2009 (253), which results in a flow of 153 gpd/EDU and a greater safety factor of 72 gpd/EDU.

In consideration of the above, the Township intends to change from 250 gpd/EDU to 225 gpd/EDU for the DuPont WWTF. Table V-6 illustrates the resulting needs projections assuming connection of the Romansville Study Area.

As indicated, the five year needs and a portion of the ten year needs can be served within the current 146,500 gpd permitted capacity. A total of 180,850 gpd capacity would be needed to serve all identified ten year needs. This figure would increase to approximately 187,375 gpd to serve all identified future needs.

Given the feasibility of serving the Romansville area at the existing DuPont WWTF for a period in excess of five years, the Township may elect to phase planning for this alternative. Needs up to a period of ten years and within the available WWTF capacity may be served at the existing DuPont facility (subject to additional planning module approval and/or collection and conveyance planning where applicable), and additional planning would be submitted when needed to fully document WWTF expansion.

A desktop analysis of Township-controlled spray irrigation land at the DuPont WWTP indicates adequate capacity may exist to accommodate all future needs. Additional planning would be necessary to confirm said capacity and identify other required WWTP upgrades.

Table V-6
DuPont WWTF Projected Public Sewage Needs
Romansville Study Area Connection

DEVELOPMENT NAME	TOTAL EDUs	PROJECTED SEWAGE NEEDS[1]									
		CURRENT		0-5 YEAR		5 YEAR TOTAL		10 YEAR TOTAL		10+ YEAR TOTAL	
		EDUs	GPD	EDUs	GPD	EDUs	GPD	EDUs	GPD	EDUs	GPD
DuPont Property (Chestnut Ridge)	286	195	43,875	60	13,500	255	57,375	286	64,350	286	64,350
Reserves at Chestnut Ridge	37	37	8,325			37	8,325	37	8,325	37	8,325
Bradford Point	45	38	8,550	7	1,575	45	10,125	45	10,125	45	10,125
Meadow View	69			45	10,125	45	10,125	69	15,525	69	15,525
Romansville											
Phase 1 Area Existing	41							41	9,225	41	9,225
Phase 1 Area Future	2							2	450	2	450
Phase 2 Area Existing	165							165	37,125	165	37,125
Phase 2 Area Future	17							10	2,250	17	3,825
Stargazers Village											
Phase 1	43			43	9,675	43	9,675	43	9,675	43	9,675
Phase 2	46							46	10,350	46	10,350
Phase 3	60							60	13,450	60	13,450
Future unknown development	22									22	4,950
TOTALS	**833**	**270**	**60,750[2]**	**155**	**34,875**	**425**	**95,625**	**804**	**180,850**	**833**	**187,375**

(1) Projections for approved developments based upon 2009 Chapter 94 Report. All flows calculated at 225 gpd/EDU

(2) Flows shown calculated at 225 gpd/EDU. Actual total 3 month maximum flows per 2009 Chapter 94 Report are 38,711 gpd

2) Existing DuPont WWTF with revised EDU value in conjunction with new treatment and disposal facilities on the Smith Tract Subdivision

As discussed above, current projections indicate that the existing DuPont WWTF can adequately handle Romansville area flows for a period of between five and ten years. This projection assumes full build-out of all approved projects within the 10 year period. A capacity shortfall of 34,350 gpd would exist to handle all ten year needs, which would increase to 40,875 gpd for the total future sewage needs. Provision exists for the Township to construct additional treatment and disposal facilities to address these long term capacity shortfalls on proposed Smith Tract development lands, located in close proximity to the DuPont WWTF.

The Smith Tract Subdivision is located within the UIP franchise area and adjacent to the DuPont WWTF service area. This project has proposed construction of a new public sewage facility to serve the 33,862 gpd needs of the development (calculated at 262.5 gpd/EDU) and 40,000 gpd additional capacity to serve future Township needs. Treatment and disposal would be via a membrane bio-reactor (MBR) treatment facility with ultraviolet disinfection and drip irrigation disposal located on development lands. A planning module for this proposal (DEP Code No. 1-15959-135-3KLM) was approved by the Township and submitted to DEP, although the developer is currently in the process of investigating service by the existing UIP Broad Run WWTP in lieu of the new sewage facility.

Regardless of UIP Broad Run WWTP service, agreements between the developer and the Township provide for Township use of development lands for construction of the treatment and disposal facilities as may be needed to serve Township needs. If the Smith Tract were to proceed with the proposed MBR and drip irrigation system, the Township may construct an expansion of this facility when needed to accommodate 40,000 gpd. Should the projected Smith Tract flows of 33,862 gpd instead be approved for service by the UIP facility, the full drip irrigation disposal capacity of 73,862 gpd may be constructed and used by the Township.

It should be noted that disparate EDU values result in differing needs calculations for flows served by the DuPont WWTF and the proposed Smith Tract facility. Projected capacity needs for the DuPont facility as indicated in Table V-6 were calculated by multiplying the number of EDUs by 225 gpd; serving any of these needs by the proposed Smith Tract facility would require greater additional capacity than Table V-6 would suggest, since flows to the Smith Tract system would be calculated based upon 262.5

gpd/EDU, a value that is generally required by DEP due to limited storage and drip irrigation disposal.

Assuming available DuPont WWTF capacity were used to serve a portion of the Romansville needs, the additional capacity required for excess flows treated at the proposed Smith Tract facility would accordingly be 40,075 gpd for ten year needs and 47,688 for total future needs. The former would be generally feasible under the currently approved scenario allowing 40,000 gpd Township capacity, and the latter would be feasible if the full Smith Tract facility capacity were available to the Township.

In addition to treatment and disposal concerns within this alternative, it should be noted that additional collection and conveyance infrastructure would be required to transfer wastewater from the DuPont WWTF to the Smith Tract WWTP.

Given potential uncertainty with Smith Tract development circumstances and the feasibility of serving a significant portion of the Romansville area needs within existing DuPont WWTF capacity, phasing any planning for this alternative may be most appropriate. Needs up to a period of ten years may be served at the existing DuPont facility (subject to additional planning module approval and/or collection and conveyance planning where applicable), and additional planning would be submitted when needed to resolve the Smith Tract facility uncertainties and serve additional Romansville area needs.

It also should be noted that serving the Romansville area solely by the proposed Smith Tract facility may be technically infeasible. Table V-7 provides a recalculation of Romansville needs based upon 262.5 gpd and illustrates the need for capacity in excess of that currently documented for the Smith Tract facility.

3) Expanded Strasburg Corridor WWTF

Table V-8 illustrates projected Strasburg Corridor WWTF capacity needs if the Romansville Study area were connected to this facility. The current permitted capacity of 135,000 gpd would suffice for all indicated five year needs, but a capacity increase to approximately 180,000 gpd would be required to serve remaining needs.

The capacity of the Strasburg WWTF is currently limited by the available storage volume. The addition of approximately 7.5 million gallons of storage would enable the Township to maximize the existing 185,000 gpd disposal capacity.

Table V-7
Romansville Study Area Needs
Proposed Smith Tract MBR/Drip Irrigation Facility

DEVELOPMENT NAME	TOTAL EDUs	PROJECTED SEWAGE NEEDS[1]					
		5 YEAR		10 YEAR		10 + YEAR	
		EDUs	GPD	EDUs	GPD	EDUs	GPD
Romansville							
Phase 1 Area Existing	41			41	10,763	41	10,763
Phase 1 Area Future	2			2	525	2	525
Phase 2 Area Existing	165			165	43,313	165	43,313
Phase 2 Area Future	17			10	2,250	17	3,825
Stargazers Village							
Phase 1	43	43	11,288				
Phase 2	46			46	12,075	46	12,075
Phase 3	67			67	15,025	67	15,025
TOTALS	**381**	**43**	**11,288**	**331**	**83,950**	**338**	**85,525**

(1) Projections based on flows of 262.5 gpd/EDU

The following modifications would be necessary to realize the above disposal capacity of 185,000 gpd:

a) Two Cell Aerated Lagoon
   2-10 HP Aerators in Cell 1 (No Changes)
   2-10 HP Aerators in Cell 2 (Add to Existing)

b) Storage Lagoon #1
   Utilize 0.754 MG Permanent Storage for Treatment
   2-2 HP Aerators (Add to Existing)
   3.786 MG Temporary Storage Remaining

c) Filter
   no change, should be suitable for 185,000 gpd

d) Storage Lagoon #2
   4.96 MG Temporary Storage

e) Storage Lagoon (Proposed)
   MG Temporary Storage

f) Spray Fields
   no change (fields 6, 7, and 8 added)

Table V-8
Strasburg Corridor WWTF Projected Sewage Needs
Romansville Study Area Connection

		PROJECTED SEWAGE NEEDS[1]									
	TOTAL	CURRENT		0-5 YEAR		5 YEAR TOTAL		10 YEAR TOTAL		10+ YEAR TOTAL	
DEVELOPMENT NAME	EDUs	EDUs	GPD	EDUs	GPD	EDUs	GPD	EDUs	GPD	EDUs	GPD
Marshallton Area	191	191	42,975			191	42,975	191	42,975	191	42,975
Broad Run Estates (Welsh Tract)	30	29	6,525	1	225	30	6,750	30	6,750	30	6,750
Tattersall (incl. Heritage Dev.)	202	158	35,550	21	4,725	179	40,275	202	45,450	202	45,450
Romansville											
Phase 1 Area Existing	41							41	9,225	41	9,225
Phase 1 Area Future	2							2	450	2	450
Phase 2 Area Existing	165							165	37,125	165	37,125
Phase 2 Area Future	17							10	2,250	17	3,825
Stargazers Village											
Phase 1	43			43	9,675	43	9,675	43	9,675	43	9,675
Phase 2	46							46	10,350	46	10,350
Phase 3	60							60	13,450	60	13,450
TOTALS	**797**	**378**	**85,050[2]**	**65**	**14,625**	**443**	**99,675**	**790**	**177,700**	**797**	**179,275**

(1) Projections for approved developments based upon 2009 Chapter 94 Report. All flows calculated at 225 gpd/EDU

(2) Flows shown calculated at 225 gpd/EDU. Actual total 3 month maximum flows per 2009 Chapter 94 Report are 50,264 gpd

Additional land would be required for the new storage lagoon, and subsurface investigations would need to be performed to determine site suitability.

Uncertainty with future use or redevelopment of the Embreeville Complex, adjacent to the Strasburg WWTF, may render the long term feasibility of this alternative indeterminate. If all Romansville needs were served by an expanded Strasburg Corridor WWTF, potential for similarly serving future Embreeville uses and discontinuing the existing stream discharge for Embreeville may be constrained. Furthermore, sufficient land area currently exists on the Embreeville Complex to construct the additional lagoon (subject to detailed site investigations), which suggests that any future Strasburg Corridor WWTF expansion may be most effectively considered in concert with Embreeville redevelopment. Additional evaluation would be required once Embreeville Complex uses become known to address these concerns.

Similar to alternatives discussed above involving the DuPont WWTF, the Township could elect to phase Romansville service at the Strasburg Corridor WWTF. Under this scenario, Romansville needs for a period of between five ten years could be served at the existing facility (subject to additional planning module approval and/or collection and conveyance planning where applicable), and additional planning would be prepared when needed to document specific capacity increases as would be necessary for the balance of Romansville needs. This approach may, however, be less desirable than for the DuPont facility due to unresolved Embreeville Complex sewage concerns.

c. Repair, Replacement, or Upgrading of Existing Malfunctioning Systems

This alternative is appropriate on a case-by-case basis to remediate existing malfunctioning systems. Table V-3 should be utilized in the process for the repair, replacement, or upgrading of malfunctioning on-lot systems.

d. Small Flow Treatment Facilities (SFTF)

The use of multiple small flow treatment facilities is generally not a viable solution, as this creates a proliferation of sewage discharges which require regular operation, maintenance, and Township administration issues. Each small flow treatment facility is generally rated for a flow not to exceed 2,000 gallons per day (GPD), or the equivalent of 5 dwelling units.

Operation, maintenance, and administrative challenges suggest this alternative should be discounted from further consideration for new

development. In accordance with the selection strategy from Table V-3, SFTF's may remain a viable alternative only if required to abate a sewage system malfunction.

e. Use of Alternative Methods of Collection and Conveyance

The Stargazers Village development has proposed a grinder pump/low pressure sewer system which would convey flows to the DuPont WWTF. Although such a low pressure sewer system is generally acceptable to the Township due to successful implementation elsewhere (e.g. Marshallton) additional collection and conveyance alternatives were investigated with regard to the balance of potential Romansville public sewerage service. The alternatives evaluated are as follows:

- All grinder pump system
- All gravity system
- Mixed gravity and grinder pump system

Maps in Appendix N illustrate these alternatives assuming treatment and disposal at the DuPont WWTF.

Probable cost estimates are provided in Appendix N for the all grinder system and mixed gravity and grinder pump station. Probable cost estimates are not provide for the all gravity system due to the need for numerous pump stations and the likelihood of unfeasible exorbitant costs based on previous experience. It is also noted that the cost estimates provided herein were prepared in 2008. While the estimates may have changed as of the date of this writing, the relative difference between the alternatives likely remains valid.

Any consideration of collection and conveyance alternatives to serve Romansville, whether treatment and disposal at the DuPont WWTP or Strasburg Corridor WWTF, must consider collection and conveyance alternatives that may be approved for the Stargazers Development by the time of said consideration.

f. Holding Tanks

Holding tanks should only be utilized as a last option for correcting malfunctioning on-lot systems, in accordance with Table V-3. A holding tank generally consists of an enclosed concrete tank with a minimum of three days capacity, after which it must be pumped out and the contents disposed at another location. Holding tanks require regular maintenance in the form of pump outs in order to prevent overflow and create an additional public health hazard. Their use is typically governed by a municipal ordinance, which sets forth specific additional usage requirements and establishes penalties for non-compliance.

g. Sewage Management Program

The implementation of a sewage management program, in conjunction with the continued use of on-lot systems, may be a cost effective alternative to ensure increased longevity of existing systems and minimize necessity for repairs in lieu of near term service by public sewerage facilities. A detailed discussion regarding the merits and implementation of a sewage management program are discussed in section E.

h. Non-Structural Comprehensive Planning Alternatives

Non-structural planning alternatives include revision to the Township's Comprehensive Plan, Zoning Ordinance, or Subdivision and Land Development Ordinance to improve consistency with Act 537 planning for the Study Area. Since no significant inconsistency is noted between these planning documents and the feasible alternatives noted above for this Study Area, non-structural planning alternatives are discounted from further consideration.

4. Strasburg Corridor Study Area

As noted in Chapter IV, there are no apparent wastewater planning needs for this geographic area at this time. Apart from build-out of already approved development, no additional needs have been identified for service by the Strasburg Corridor WWTF. As evidenced by Chapter 94 report flow projections, the current WWTF is of adequate capacity to accommodate the known development flows.

A "no action" alternative is consequently the only alternative relevant to this Study Area. Existing and approved connections will continue to be served at the Strasburg Corridor WWTF, and additional planning will be prepared when identified needs arises which would require WWTF service.

5. Embreeville Study Area

As previously discussed, the Embreeville complex is largely unoccupied and very limited uses served by the Embreeville WWTP remain. Until such time as any future use or redevelopment for the Embreeville complex is determined, no projected sewage needs can be formulated and no determination of potential WWTP improvements or alternatives for wastewater treatment are feasible.

A "no action" alternative is consequently the only alternative relevant to this Study Area. Existing connections will continue to be served at the Embreeville WWTP, and additional planning will be prepared when a future use for the Embreeville complex is clearly determined.

6. Appleville Mobile Home Park Study Area

Since the Appleville area consists of developed lands with no future growth indicated, alternatives below are discussed only as applicable to addressing existing needs.

a. Continued Use of On-Lot Systems/No-Action Alternative

This alternative would provide for continued use of the multiple privately owned community on-lot sewage systems serving Appleville. Systems would be repaired as needed in the future in accordance with the selection strategy of Table V-4. Prior incidence of malfunction as discussed in Chapter III suggests consideration beyond a no-action alternative may be warranted.

b. Continued Use of On-Lot Sewage Systems with Management Program

The Township may choose to implement a Sewage Management Program, in conjunction with the continued use of the existing on-lot systems within the Mobile Home Park. This option would provide for a more involved effort on the part of the Township, while still allowing the owners of the Park to be responsible for the operation and maintenance of the on-lot systems.

Within this alternative, the Township would exercise its right to oversee the proper operation and maintenance of the on-lot systems, and also provide for additional requirements and considerations as it sees fit within this scope.

Initially, the owners would be charged with providing whatever level of maintenance required in order to keep all the on-lot systems functioning properly. In view of the CCHD investigations discussed in Chapter III, this may initially entail pump outs of the system(s) as often as necessary in order to abate any surface discharges.

Should the owners decide that the more frequent pump outs are cost prohibitive, they may then elect to take further steps to repair any of the systems under their own direction in accordance with the selection strategy of Table V-4 and all applicable CCHD or DEP requirements.

Overall, the Township would maintain the right to provide for proper operation and maintenance, while potentially recouping any financial outlay for work performed in accordance with an appropriately structured ordinance. Additional discussion of on-lot sewage management alternatives can be found in Section E of this Chapter.

c. Repair, Replacement, or Upgrading of Existing Malfunctioning Systems

This alternative is appropriate on a case-by-case basis to remediate malfunctioning systems, and as such is synonymous with alternative a. (continued use of on-lot systems). Table V-4 should be utilized in the process for repair, replacement, or upgrading of malfunctioning on-lot systems. See additional discussion below regarding new community sewage facilities.

d. Small Flow Treatment Facilities and Package Treatment

The use of multiple small flow treatment facilities to address malfunctioning on-lot community systems is generally not a viable solution, as this would create an unnecessary proliferation of sewage discharges which require regular operation, maintenance, and Township administration issues. Each small flow treatment facility is generally rated for a flow not to exceed 2,000 gallons per day (GPD), or the equivalent of 5 dwelling units, which would address only a small subset of the Appleville community. This alternative is accordingly discounted from further consideration.

e. Use of Alternative Methods of Collection and Conveyance

A current need for collection and conveyance alternatives has not been identified.

f. Holding Tanks

A holding tank generally consists of an enclosed concrete tank with a minimum of three days capacity, after which it must be pumped out and the contents disposed at another location. Holding tanks require regular maintenance in the form of pump outs in order to prevent overflow and create an additional public health hazard. Their use is typically governed by a municipal ordinance, which sets forth specific additional usage requirements and establishes penalties for non-compliance. Holding tanks should only be utilized as a last option for correcting malfunctioning on-

lot systems, and are generally not a feasible option for addressing a community system malfunction due to required tank volume and pumping costs.

g. New Community Sewage System(s)

Under this alternative, a new community sewage system or multiple new systems would be constructed to serve the existing needs of this area. Although Township commitment to implement such an alternative on private lands would be constrained, general feasibility has been investigated to facilitate relative consideration of all alternatives.

For the purposes of this section, and consistent with recent DEP guidance, the figures of 400 GPD/EDU for subsurface disposal and 262 GPD/EDU for land application disposal were used to project design flows. Further coordination with DEP is recommended if a new community sewage system is to be pursued, since lower design flows based on water meter data may be feasible.

1) Subsurface Disposal

Utilizing standard residential flows of 400 gallons per EDU per day, and assuming only deep, well drained soils, the following estimates have been developed:

Table V-9
In-ground Subsurface Disposal Sizing

Daily Flow(1)	Estimate of DWD Soils Total Area Required at:	
	1.19 sqft/gal/day (minimum allowable perc rate)	3.35 sqft/gal/day (maximum allowable perc rate)
92,000 GPD	3 – 6 acres	7 – 14 acres

(1) 400 GPD/EDU multiplied by 230 units

The Estimate of Total Area Required assumes the use of trenches with a 5' separation based upon the indication of site slopes exceeding 8%. The final area required may vary significantly from these estimates due to additional design considerations such as soils, setbacks and isolation distances, wooded areas, and steep slopes.

Based upon a review of soils and aerial mapping of the Appleville Mobile Home Park parcels, and applying standard buffers from restrictive features, approximately 125 acres of deep, well drained soils are present. Of the 125 acres, approximately 22 acres are located outside of the orchard plantings. Therefore, this alternative

appears technically feasible whether or not encroachment into the orchard plantings is proposed. However, it should also be noted that the 22 acres identified outside of the orchard plantings consist of 8 individual, smaller areas extending to the furthest extent of the two parcels. Design and construction of a system to deliver effluent to all of these areas may not be practical.

2) Spray and/or Drip Irrigation Disposal

Utilizing standard PaDEP application rates for moderately well drained and well drained soils in open, grassed areas the following estimates have been developed:

Table V-10
Spray and / or Drip Irrigation Disposal Sizing

Daily Flow[2]	Estimate of Total Spray Area Required [3] at:		Estimate of Total Drip Area Required [4] at:	
	3,169 gal/acre/day (MWD soils)	6,018 gal/acre/day (DWD soils)	3,300 gal/acre/day (MWD soils)	6,400 gal/acre/day (DWD soils)
60,260 GPD	25 - 30 acres	15 - 20 acres	20 - 25 acres	11 - 16 acres

(2) Flow figure is based upon 262 GPD/EDU times 230 units.
(3) Estimate reflects a 10% contingency to account for sprinkler design layout in addition to an assumed 50 foot spray field buffer.
(4) Estimate reflects a 10% contingency to account for drip field design layout.

The use of mechanical treatment for denitrification prior to disposal may eliminate the need for treatment lagoons. However, seasonal application of treated effluent will result in the requirement for storage lagoons when wastewater application is not permissible. The estimates for total spray and / or drip area do not include the area required for storage lagoons.

Similar to evaluation for standard in-ground disposal, and based upon the estimated 125 acres of deep, well drained soils which are mapped, this alternative also appears technically feasible. However, if application is limited to areas outside of the orchard plantings, this alternative appears only marginally feasible, as the estimates provided above are in the range of 11 to 30 acres. Also, it is again noted that the 22 acres of area outside of the orchard plantings is comprised of 8 individual areas, further limiting the design options that may avoid encroachment on the orchard / tree farm. As noted above, the estimates do not include the area required for storage lagoons.

Alternative discussion above is intended solely to demonstrate general feasibility. The final sizing and suitability for any

community system utilizing subsurface disposal, spray, and / or drip irrigation is dependent on detailed soils testing, including additional permeability and hydrogeologic testing, which may affect the standard PaDEP application rates listed. Additionally, significantly more area can be required for a spray irrigation scenario based upon increased buffer distances for disposal fields. Additional planning would accordingly be required were this alternative to be pursued.

h. Connection to Public Sewerage Facilities

Utilizing a flow of 225 GPD/EDU, the Appleville Mobile Home Park would generate approximately 53,000 GPD public sewage flows. There is not sufficient capacity available at either the existing DuPont WWTP or the Strasburg Corridor WWTP to accommodate these additional flows. Unlike the needs of other Study Areas as may be considered for service at either WWTF, the Appleville property appears to be capable of supporting a new community system if needed, and connection to public sewage facilities is consequently discounted from further consideration at this time.

i. Non-Structural Comprehensive Planning Alternatives

Non-structural planning alternatives include revision to the Township's Comprehensive Plan, Zoning Ordinance, or Subdivision and Land Development Ordinance to improve consistency with Act 537 planning for the Study Area. These documents appear to be consistent with the needs of this Study Area, and no non-structural alternatives need be considered.

7. Residential Study Area

As discussed in Chapter IV**,** no significant clusters of on-lot system malfunction are suggested by CCHD repair permit activity, and wastewater planning needs for this area primarily consist of evaluating various on-lot alternatives to assure the long term needs of residences can be met.

a. Continued and Future Use of Individual On-lot Systems / No-Action Alternative

Based upon the absence of an identified existing need within this area, the Township may elect to take a no-action alternative regarding these properties and indicate the continued use of on-lot systems. Sewage for new development and repair of malfunctioning systems would be addressed in accordance with the OLDS Selection Strategy described in Table V-3.

b. Continued and Future Use of Individual On-lot Systems with Sewage Management

The implementation of a sewage management program, in conjunction with the continued and future use of on-lot systems, may be a cost effective alternative to ensure increased longevity of existing systems and minimize necessity for repairs. A detailed discussion regarding the merits and implementation of a sewage management program can be found in section E.

c. New Community Sewage Systems

Township zoning for this Study Area generally provides for lot sizes which would permit individual on-lot systems. The need for community sewage systems to serve new development is accordingly limited; however, any such proposal as may be otherwise acceptable to the Township will be subject to the selection strategy of Table V-4.

d. Repair, Replacement, or Upgrading of Existing Malfunctioning Systems

Since no significant incidence of malfunction has been identified, this alternative is appropriate on a case-by-case basis to remediate malfunctioning systems as may be identified in the future, and as such is generally synonymous with alternative a. (continued and future use of individual on-lot systems). Table V-3 should be utilized in the process for repair, replacement, or upgrading of malfunctioning on-lot systems.

e. Small Flow Treatment Facilities and Package Treatment

Consistent with the selection strategy of table V-3, this alternative may only be considered as needed to correct an existing sewage system malfunction.

f. Use of Alternative Methods of Collection and Conveyance

A need for collection and conveyance alternatives has not been identified.

g. Holding Tanks

Holding tanks should only be utilized as a last option for correcting malfunctioning on-lot systems, in accordance with Table V-3. A holding tank generally consists of an enclosed concrete tank with a minimum of three days capacity, after which it must be pumped out and the contents disposed at another location. Holding tanks require regular maintenance in the form of pump outs in order to prevent overflow and create an additional public health hazard. Their use is typically governed by a municipal ordinance, which sets forth specific additional usage requirements and establishes penalties for non-compliance.

h. Non-Structural Comprehensive Planning Alternatives

Non-structural planning alternatives include revision to the Township's Comprehensive Plan, Zoning Ordinance, or Subdivision and Land Development Ordinance to improve consistency with Act 537 planning for the Study Area. Although most of these documents appear to be consistent with the needs of the Rural study Area, the Township may elect to amend the Zoning Ordinance to preclude area and bulk standards in the R-1 and R-2 Zoning Districts commensurate with community sewage systems if this alternative is not desired for the rural area.

E. Management System for Individual OLDS

Table V-11 outlines five options for Township involvement in the management of individual on-lot sewage 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 Township in system ownership and maintenance.

For West Bradford Township, Option 2 is selected. 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. This management option will be implemented with a Township Ordinance. A draft ordinance can be found in Appendix O which encompasses associated requirements.

The intent of an expanded Township role, including the public education program, is to take a proactive approach to system maintenance. Preventative maintenance has value in assisting in the prevention of premature system failures. Several factors contribute to inadequate maintenance, including:

Uninformed property owner. This can occur when residents accustomed to public sewers relocate to a more rural area, such as West Bradford Township, 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.

Table V-11
Individual OLDS Management Program Options

1. PRIVATE OWNERSHIP/PRIVATE OPERATION AND MAINTENANCE

A. OLDS ownership by property owner;
B. Property owner has sole responsibility for OLDS operation and maintenance; and
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-PUMP OUT

A. OLDS ownership by property owner;
B. Property owner responsible for OLDS operation and maintenance;
C. Township requires proof-of-pump out of septage once every three years from all parcels (or other specified period); and
D. Township administers Public Education Program (as in 1C above).

3. PRIVATE OWNERSHIP/PRIVATE OPERATION AND MAINTENANCE WITH PUBLIC ASSURANCE PROGRAM

A. OLDS ownership by property owner;
B. Property owner responsible for OLDS operations and maintenance;
C. Township monitors OLDS operation and inspects system annually (or other specified period);
D. Township requires proof-of-pump out of septage at least once every three years or at the direction of the inspector; and
E. Township administers Public Education Program (as in 1C above).

4. PRIVATE OWNERSHIP/PUBLIC OPERATION AND MAINTENANCE

A. OLDS ownership by property owner;
B. Township responsible for OLDS operation and maintenance through structured program;
C. Property owner becomes a customer and pays a user fee; and
D. Township administers Public Education Program (as in 1C above).

5. PUBLIC OWNERSHIP/PUBLIC OPERATION AND MAINTENANCE

A. Township owns all OLDS;
B. Township responsible for OLDS operation and maintenance as in #4 above.
C. Property owner becomes a customer and pays a user fee; and
D. Township administers Public Education Program (as in 1C above).

The Township's policies toward individual wastewater system maintenance can be categorized according to four types of systems: 1) functioning individual OLDS; 2) failing individual OLDS; 3) alternate individual systems, experimental individual systems, and small flow treatment facilities serving individual residential uses, including land application and stream discharge disposal methods and; 4) holding tanks.

1. Functioning Individual OLDS

Consistent with Option 2 in Table V-11, the Township's policies toward currently functioning and all future OLDS on parcels subject to the proposed Ordinance are suggested as follows:

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 all property owners, stressing the need and means of OLDS maintenance. The program would include provision of literature to all Township residents describing on-lot system functions, importance of maintenance, and guidance to address malfunctions.

2. Failing Individual Systems

Any community that relies heavily on individual OLDS will experience some number of failing systems. 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 failing systems, the Township's policies will include:

a. Providing owners of failing 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 Chester County Health Dept. to evaluate clusters of individual systems to determine if future planning for a community system may be a feasible solution.

c. Require new development in the vicinity of identified clusters of need, as described above, to consider incorporating the identified needs in planning modules, as applicable to the proposed development type.

3. Alternate Individual Systems, Experimental Individual Systems, and Small Flow Treatment Facilities Serving Individual Residential Uses

For new or replacement individual systems using technology deemed alternate by DEP, 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. In cases where an alternate technology requires more complex maintenance than conventional OLDS, the Township will consider additional oversight to ensure adequate operation and maintenance.

As presented in Table V-3, the Township desires to restrict use of experimental systems and small flow treatment facilities to repairs for existing systems where conventional or alternate technologies are not feasible.

For applicable above noted technologies, the Township will require a site specific maintenance agreement with the property owner that provides for regular inspection of the system and the payment of a fee by the property owner to cover Township costs. Provision for such agreements is defined in the draft On-Lot Management Ordinance in Appendix O.

4. Holding Tanks

As previously noted, permanent use of holding tanks will only be considered as an acceptable remedy for lots with malfunctioning systems where no other alternative is feasible. Associated maintenance responsibilities are defined in the draft On-Lot Management Ordinance in Appendix O.

F. Management of Community Systems

The Township intends to own and operate any privately-constructed community systems serving multiple property owners, 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. Community systems constructed to serve a single owner may be allowed to remain under private ownership, but would nonetheless be subject to all Township policies regarding design, construction, and maintenance. On this basis, the Township will be the responsible party for the management of all community systems. The roles of the Chester County Health Department and the Pennsylvania Department of Environmental Protection will be in the areas of permitting, monitoring, and enforcement.

The Township will demand a high level of quality in the design and construction of the community systems built in West Bradford, perhaps exceeding those of DEP. For example, advanced treatment technologies and replacement disposal areas may be required. The choice of community systems shall be done in accordance with the community sewage system selection strategy from Table V-4.

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 for 18 months 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 on-lot systems will be further covered by the management program, as documented in the draft On-Lot Management Ordinance found in Appendix O.

CHAPTER VI

ALTERNATIVES EVALUATION

A. Consistency Evaluation

Under the Act 537 planning process, feasible alternatives as identified in Chapter V must be further evaluated for consistency with other environmental planning and regulatory programs, financial feasibility, and administrative requirements. The consistency of these alternatives relative to applicable planning and regulatory programs is discussed in the following sections.

1. COWAMP/208 Water Quality Management Plan

A Comprehensive Water Quality Plan (COWAMP) has been developed under Sections 4 and 5 of the Clean Streams Law and 208 of the Clean Water Act. For purposes of identification with the COWAMP/208 Water Quality Management Plan for southeastern Pennsylvania prepared in 1978, West Bradford Township falls within the Brandywine Sub-basin (Figure 1-2, Study Area Reference Map). The feasible alternatives presented in Chapter V are not in conflict with the water quality goals of the COWAMP, which are predicated on the mandates established in the Federal Water Pollution Control Act Amendments of 1972, the Pennsylvania Clean Streams Law, and the Pennsylvania Sewage Facilities Act (Act 537).

2. Chapter 94 Municipal Wasteload Management Plan

a. Broad Run / UIP Wastewater Treatment Plant

Per the 2009 Chapter 94 Report for the Broad Run WWTP, no hydraulic or organic overload is projected within the 5-year period. As mentioned in Chapter III, the 2007 Chapter 94 indicated an existing hydraulic overload based on the maximum 3 month average. As a result of that 2007 Chapter 94 Report, UIP submitted a Corrective Action Plan (CAP) to DEP that indicated I&I abatement measures as the primary means of addressing the overload. In accordance with the CAP, UIP has initiated manhole inspection and repair, sewer line televising and lining. As reflected in the alternatives discussed in Chapter V of this current Plan, the 2009 Chapter 94 Report states that the future needs of the Broad Run franchise area will be served by on-lot systems, except in situations where a developer may request public sewer service and adequate capacity in the UIP facilities is satisfactorily documented to serve the subject development. Any such capacity would result from ongoing I&I abatement measures.

The pertinent 2009 Chapter 94 hydraulic flow data for the Broad Run / IUP WWTP are as follows:

Permitted Capacity	-	400,000 gpd
2009 Average Annual Flow	-	279,000 gpd
2009 Maximum Month Flow	-	418,000 gpd
2009 Maximum 3 Month Average	-	338,000 gpd
Projected 2014 Annual Average	-	311,000 gpd
Projected 2014 Max 3 Month Average	-	386,000 gpd

Although the 2010 Chapter 94 Report has not been completed as of the date of this writing, a review of the 2010 Monthly Operating Reports (MORs) indicates an average flow of 282,000 gpd for the year. The maximum three month average in 2010 was 396,000 gpd during January, February, and March, with the highest monthly average being 482,000 gpd in March.

All of the alternatives discussed herein are consistent with the 2009 Broad Run WWTP Chapter 94 Report and current CAP information.

b. DuPont Wastewater Treatment Plant

Per the 2009 Chapter 94 Report for the DuPont WWTP, no hydraulic or organic overload is projected within the 5-year period. Chapter V of this current plan does consider the use of the DuPont WWTP to accommodate the potential needs of the Romansville Study Area including the Stargazers Development. This potential use of the DuPont WWTP does take into consideration the remaining future needs of the DuPont WWTP Study Area including the buildout of the DuPont Property (Chestnut Ridge), Bradford Point, and Meadowview Subdivisions.

The pertinent 2009 Chapter 94 hydraulic flow data for the DuPont WWTP are as follows:

Permitted Capacity	-	146,500 gpd
2009 Average Annual Flow	-	34,436 gpd
2009 Maximum Month Flow	-	39,998 gpd
2009 Maximum 3 Month Average	-	38,711 gpd
Projected 2014 Annual Average	-	62,186 gpd
Projected 2014 Max 3 Month Average	-	69,648 gpd

All of the alternatives discussed herein are consistent with the 2009 DuPont WWTP Chapter 94 Report.

c. Strasburg Corridor Wastewater Treatment Plant

Per the 2009 Chapter 94 Report for the Strasburg Corridor WWTP, no hydraulic or organic overload is projected within the 5-year period. Chapter V of this current plan does consider the use of the Strasburg Corridor WWTP to accommodate the potential needs of the Romansville Study Area including the Stargazers Development. Said potential use of the Strasburg Corridor WWTP does take into consideration the remaining future needs of the Strasburg Corridor Study Area, including the buildout of the Broad Run Estates (Welsh Tract) and Tattersall subdivisions.

The pertinent 2009 Chapter 94 hydraulic flow data for the Strasburg Corridor WWTP are as follows:

Permitted Capacity	-	135,000 gpd
2009 Average Annual Flow	-	49,077 gpd
2009 Maximum Month Flow	-	51,460 gpd
2009 Maximum 3 Month Average	-	50,264 gpd
Projected 2014 Annual Average	-	54,027 gpd
Projected 2014 Max 3 Month Average	-	56,728 gpd

All of the alternatives discussed herein are consistent with the 2009 Strasburg Corridor WWTP Chapter 94 Report.

3. Title II and VI of the Water Quality Act of 1987

The Water Pollution Control Revolving Loan Fund Component of the PennVest Program provides for capitalization under the Federal Water Quality Act of 1987. The Township will not be seeking PennVest funding to implement the proposed alternatives.

4. Comprehensive Plans

As discussed in Chapter IV, the West Bradford Comprehensive Plan creates 8 land use categories that mirror existing development patterns and new growth consistent with existing zoning designations. The various alternatives discussed in Chapter V of this current Plan utilize existing treatment plants or on-lot systems. Alternatives that utilize the DuPont WWTP, accommodate the buildout of approved developments in the DuPont Study Area, the existing community of Romansville and the proposed Stargazers development which is consistent with the Township Zoning Ordinance and Comprehensive Plan. Alternatives that utilize the Strasburg Corridor WWTP, accommodate the buildout of approved developments in the Strasburg Corridor Study Area, the existing community of Romansville and the proposed Stargazers development which is consistent with the Township Zoning Ordinance and Comprehensive Plan. All of the alternatives discussed herein are consistent with the West Bradford Comprehensive Plan.

As discussed in Chapter IV of this current Plan, the Chester County Comprehensive Plan, *Landscapes2,* identifies West Bradford Township as falling into four of the *Livable Landscapes*, which are the *Suburban Landscape, Rural Landscape, Village Landscape Overlay* and the *Natural Landscapes Overlay.* The identified alternatives appear to be consistent with *Landscapes2.*

Chester County has also adopted a water resources plan, *Watersheds,* as an element of the County Comprehensive Plan. Salient objectives and strategies are generally consistent with *Landscapes2*. The identified alternatives appear to be consistent with *Watersheds*

5. Anti-degradation Requirements of Chapters 93, 95, and 102

Chapters 93 and 95 of Pa Code Title 25 address water quality criteria of receiving streams and wastewater treatment requirements, respectively. The use of a stream discharge alternative under either the individual on-lot or community sewage system selection strategies described in Chapter V is discouraged, as subsurface and/or land application alternatives must be fully explored first. Should any future stream discharge proposal be presented to the Township, conformance with all applicable anti-degradation requirements will be required.

Recent DEP policies regarding Chapter 93 anti-degradation requirements may also impact alternatives for new wastewater facilities using land application or subsurface disposal in portions of each Study Area located within special protection watersheds. Discussion for each applicable Study Area is presented below.

- UIP Study Area – Only the westernmost portions of this area fall within the Broad Run, a special protection watershed. Compliance with applicable anti-degradation requirements would be required for construction of treatment and disposal facilities on the Smith Tract development as discussed in the planning module for this project recently approved by the Township. Although the planning module addressed these requirements, DEP approval remains outstanding and it is currently unknown whether this development will proceed as planned. Although implementation would be subject to a future planning effort, it should be noted that construction of any such facilities to serve the larger needs of the Township may require additional investigation document conformance with the anti-degradation requirements.

- DuPont WWTF Study Area – no alternatives are identified which would require new or expanded sewage facilities to serve the needs of this Study Area, and no conflict exists. See additional discussion below regarding the Romansville Study Area.

- Romansville Study Area – This Study Area is not within a special protection watershed; however, some alternatives have been identified which would result in sewage treatment and disposal in other areas of the Township. All alternatives identified to meet the five year needs of this Study Area would require no new or expanded public sewage facilities outside of the Study Area, so no conflict exists. Alternatives to serve the needs of this Study Area for a period of ten years or greater involve expansion of the DuPont WWTF, the Strasburg Corridor WWTF, or construction of the above noted treatment and disposal facilities on the Smith Tract. Although additional planning will be required to expand or construct any of these facilities, it should be noted that the DuPont WWTF and the proposed Smith Tract facilities are within special protection watersheds and additional investigation may be required in the future pursuant to Chapter 93 anti-degradation requirements.

- Appleville Mobile Home Park Study Area – Although portions of this area are within the Broad Run special protection watershed, no alternative has been identified which would result in new or expanded sewage facilities at this time. No conflict exists.

- Residential Study Area – Portions of this area are within special protection watersheds. Although additional DEP requirements may apply for individual or community sewage systems constructed in these areas in the future, the Township will require compliance with all such standards and no conflict consequently exists.

The Embreeville and Strasburg Corridor Study Areas require no consideration of anti-degradation requirements since no new treatment and disposal facilities are proposed at this time.

Chapter 102, which relates to erosion and sediment control measures, is applicable to alternatives that may result in earth disturbance activities of greater than 5,000 square feet. Any such construction of facilities as contemplated in the alternatives in this current Plan will be in accordance with Erosion and Sediment Control Plans consistent with Chapter 102.

6. State Water Plan

The current State Water Plan, approved by Secretary of DEP in 2009, provides a set of tools and principles to decision-makers responsible for the management of water resources within the Commonwealth. The State Plan identifies West Bradford as falling with the Brandywine Creek Watershed of the Lower Delaware Sub-basin within the Delaware Region. The most relevant goal and objective of the State Water Plan relative to this Act 537 Plan is:

- Reduce point source discharges of toxics and wastewater and promote land application and appropriately scaled wastewater treatment systems.

All of the alternatives discussed herein, are consistent with the 2009 State Water Plan.

7. Pennsylvania Prime Agricultural Land Policy

It is the policy of the Commonwealth to conserve, protect, and encourage the development and improvement of its agricultural lands for the production of food and other agricultural products. It is also the policy of the Commonwealth to protect and conserve agricultural lands as valued natural and ecological resources, which provide needed open spaces for clean air as well as for aesthetic purposes. None of the proposed alternatives is inconsistent with these goals.

8. County Stormwater Management Plan

No Stormwater Management (Act 167) Plan currently exists for the watersheds in West Bradford Township. The alternatives discussed within this current Plan are consistent with the County-wide Act 167 Plan dated June 25, 2010.

9. Wetland Protection Standards

No wetland disturbance is directly proposed pursuant to this planning effort, and no inconsistency exists.

10. Pennsylvania Natural Diversity Inventory (PNDI)

None of the identified alternatives involve site disturbance or construction at this time, so no PNDI inconsistency exists.

11. Pennsylvania Historic Preservation Act

None of the identified alternatives involve site disturbance or construction at this time, so no PHMC inconsistency exists.

B. Resolution of Inconsistencies

It does not appear that any of the feasible alternatives are inconsistent with the programs and policies discussed above.

C. Water Quality Standards and Effluent Limitations

The identified alternatives have been selected in part to meet or exceed existing DEP water quality standards and permitting requirements for individual and community sewage systems. As previously noted, DEP may also require additional hydrogeologic studies and other measures to demonstrate satisfaction of Chapter 93 anti-degradation

requirements in special protection watersheds. Therefore, no negative impact on water quality standards or effluent limitations is anticipated.

D. Costs

Capital cost estimates for various collection and conveyance alternative to serve the Romansville Study Area are discussed in Chapter V and provided in Appendix N. As will be discussed in Chapter VIII, the selected alternative for the Romansville Study Area will be continued use of on-lot systems in accordance with and On-Lot Management Ordinance to be adopted by the Township. As such no additional cost analysis for present net worth, financing, administration, or operation and maintenance is merited.

Of the remaining alternatives, only implementation of an on-lot sewage management program will result in direct costs to the Township. Projected costs for implementation and ongoing administration of the sewage management program identified in Chapter V and further described by the draft ordinance in Appendix O are as follows:

Implementation (1st Year)

Chester County Health Department Septage Management Database Subscription	$1,200
Preparation of additional database content to identify all subject parcels	$4,000
Preparation and dissemination of public education materials	$2,000
Completion and adoption of draft ordinance	$1,000
Administration of database and pumping requirement (partial year)	$1,200
Subtotal	$9,400
Less anticipated DEP reimbursement (Approx. 36% assumed)	-$3,384
Total net projected 1st year costs	$6,016

Administration (2nd Year Onward)

Chester County Health Department Septage Management Database Subscription	$1,200
Administration of database and pumping requirement	$2,000
Subtotal	$3,200
Less anticipated DEP reimbursement (Approx. 36% assumed)	-$1,152
Total net projected annual costs	$2,048

It should be noted that the Pennsylvania Code provides for DEP reimbursement of Act 537 approved sewage management programs up to 85% of program costs where sewage system permitting is administered by a local agency, such as the Chester County Health Department in the case of Chester County municipalities. Although reimbursement at the 85% level has typically been granted, recent State budget constraints have limited the amount currently available to fund this program. At this writing, DEP has implemented a policy whereby eligible reimbursement grant applications will be funded at 42.5% of the prior level, which is a reduction commensurate to the overall program funding cuts. The 36% reimbursement assumed in the cost projections above is based upon this figure (42.5% of 85% equals approximately 36%). Actual reimbursement amounts for future

years may be higher or lower depending upon available DEP funding, and the Township may consider implementation of a fee to residents for administration of the sewage management program as deemed appropriate when actual program costs and DEP reimbursement amounts are determined. The draft ordinance in Appendix O includes provision for the establishment of such a fee.

E. Funding

As will be discussed in Chapter VIII, the selected alternative for the Romansville Study Area will be continued use of on-lot systems in accordance with and On-Lot Management Ordinance to be adopted by the Township. As such no additional analysis of potential funding methods is merited.

Funding assistance for Township costs related to the on-lot sewage management program is available through DEP at an annual reimbursement rate of up to 85%, although funding for this program has been cut due to State budget constraints and reimbursement applications for the current fiscal year are anticipated to be funded at a rate of approximately 36% of program costs.

F. Phasing

The alternatives discussed in Chapter V to address the wastewater needs of the Romansville Study Area via the DuPont WWTP or the Strasburg Corridor WWTP do consider phasing . Since the selected alternative for the Romansville Study Area will be continued use of on-lot systems, no additional consideration of phasing is merited. The Implementation Schedule found in Chapter VIII provides a more specific timetable for addressing the wastewater needs of the Township.

G. Administrative Requirements and Legal Authority

The Township currently owns and operates the DuPont WWTP and the Strasburg Corridor WWTP as well as the corresponding collection and conveyance systems. Any alternatives involving these systems are within the administrative and legal authority of the Township to implement.

The selected alternative for the Broad Run Study Area is use of on-lot systems for new development except in situations where the developer requests service by the WWTP and sufficient capacity exists in the existing facility. On-lot systems would be considered in accordance with the Individual On-Lot Selection Strategy contained herein under Township Act 537 authority.

Chapter V evaluated several alternatives to address the sewage needs of the Appleville Mobile Home Park. As will be discussed in Chapter VIII, the selected alternative will be continued use of the existing on-lot systems subject to an On-Lot Management Ordinance to be adopted by the Township. The ordinance will grant the Township appropriate legal authority relative to the management of the on-lot system.

In addition to the Appleville Mobile Home Park, all on-lot systems will be subject to the above-mentioned Ordinance. It is anticipated that existing Township staff, in coordination with a qualified consultant as may be utilized by the Township, will be capable of program implementation. Legal authority for the sewage management program is provided by Title 25, Chapter 71 of the Pennsylvania Code.

CHAPTER VII

INSTITUTIONAL EVALUATION

A. Existing Authorities

There are no existing municipal wastewater authorities in West Bradford Township.

B. Institutional Alternatives

1. On-Lot Systems

As indicated in Chapter V, the Township will adopt an On-Lot Management Ordinance that will require property owner to submit proof of pump out in accordance with the ordinance requirements. The On-Lot Management Ordinance will be administered by existing Township staff with consultant assistance if necessary. This Ordinance addresses both individual and community on-lot systems, the latter of which would provide for Appleville MHP oversight.

2. DuPont WWTP and Strasburg Corridor WWTP

The Township currently owns and operates the DuPont WWTP and the Strasburg Corridor WWTP as well as the respective corresponding collection and conveyance systems. Any alternatives involving these systems will be administered by existing Township staff with consultant assistance if necessary.

3. Broad Run WWTP

The Broad Run WWTP is currently owned and operated by Utilities, Inc. of Pennsylvania (UIP). Any alternative involving the Broad Run WWTP will be administered by the UIP subject to the rules and regulations of the Pennsylvania Public Utilities Commission and also subject to Township Act 537 planning and the laws of the Commonwealth as stipulated in the Settlement Agreement described in Chapter VI of this Plan.

C. New Administrative Activities

New administrative and legal activities to be completed and adopted to ensure implementation of the selected alternatives are limited to the sewage management program. As previously noted, an ordinance adoption process is required and commensurate Township administrative efforts will be required to implement the program.

D. Selected Institutional Alternative

The selected method of administering Act 537 Plan implementation is a combination of Township staff and UIP, as described above.

CHAPTER VIII

SELECTED ALTERNATIVES AND IMPLEMENTATION SCEDULE

For each of the Study Areas identified in Chapter II, the following feasible wastewater alternatives have been selected that best meet the needs of the Township.

A. Selected Alternatives

1. Utilities Incorporated of Pennsylvania (UIP) Study Area

New development will be served by individual on-lot sewage systems in accordance with the Individual On-Lot Disposal Selection Strategy described in Table V-3, except in situations where a developer requests service by the Broad Run WWTP. Where service is requested at the WWTP, a development may be served only if UIP demonstrates to the satisfaction of the Township and DEP that adequate capacity to serve the project exists within the current 400,000 gpd WWTP capacity. The Township will consider such Broad Run WWTP service on a case-by-case basis through the sewage facilities planning module process. All existing and future on-lot systems within the Study Area will be subject to the On-Lot Management Ordinance to be adopted by the Township.

The Glenside Road area of the UIP Study Area will continue to be served by on-lot systems and will be subject to the On-Lot Management Ordinance to be adopted by the Township. Due to the number of systems involved (5) and the distance to existing sewer facilities, it is financially infeasible to serve the Glenside Road area with public sewer. The Township will continue to monitor the situation through information collected through the On-Lot Management Ordinance and will seek to address any failing on-lot systems by connecting such systems to new development within the vicinity of the Glenside Road area that seeks to utilize public sewer.

The Smith Tract area of the UIP Study Area may be served by an MBR WWTP as described in the Planning Module (DEP Code # 1-15959-135-3KLM), which has been approved by the Township and forwarded to DEP. Alternately, service by the UIP Broad Run WWTP may be considered provided adequate capacity is deemed available as discussed above. A revised Planning Module would be required to fully address Smith Tract service by the Broad Run WWTP.

Justification for the selected technical alternative for this Study Area is as follows:

a. Existing wastewater needs will be effectively addressed by continued use of the Broad Run WWTP for existing public sewer users in accordance with rules and regulations of the PUC. Existing on-lot systems within the Study Area will be subject to the On-Lot Management Ordinance to be adopted by the Township.

b. Future wastewater needs are effectively served by utilizing on-lot systems or by connection to the Broad Run WWTP. Future needs served by on-lot systems will be in full compliance with all DEP requirements and long-term adequacy will be further assured through both regular maintenance via the On-Lot Management Ordinance to be adopted by the Township and through existing requirements for replacement disposal areas in the Township's ordinances. Future wastewater needs served by the Broad Run WWTP will be subject to the rules and regulations of the PUC and the conditions of the Settlement Agreement described in Chapter V.

c. Operation and maintenance of the on-lot systems is defined as the primary responsibility of the property owner, with Township oversight and enforcement through the On-Lot Management Ordinance to be adopted by the Township. Operation and maintenance of the Broad Run WWTP and the associated collection and conveyance system is the responsibility of UIP in accordance with the rules and regulations of the PUC. The Planning Module for the Smith Tract approved by the Township provides for the WWTP and drip irrigation system to be constructed by the developer and dedicated to the Township.

d. The selected alternative involving use of on-lot systems is a cost-effective means of ensuring adequate sewage facilities. Under the On-Lot Management Ordinance to be adopted by the Township, the property owner will continue to be responsible for the operation and maintenance with the public education program and oversight provided by the Township.

e. Management and administrative systems are readily available to implement the selected alternative.

f. No infrastructure financing is required, and costs related to the on-lot sewage management program are anticipated to be partially financed through DEP under existing provisions of Title 25, Chapters 71 and 72 of the PA Code.

Limited need exists for consideration of non-structural alternatives, since the selected technical alternatives are generally consistent with current Township planning documents.

2. DuPont Wastewater Treatment Facility Study Area

Identified sewage needs within this Study Area can be adequately served by the existing DuPont WWTP. Future development within this Study Area may be served by the DuPont WWTP provided adequate capacity is deemed to exist in consideration of Romansville Study Area needs, as discussed below. The EDU value for the DuPont WWTP will also be revised from 250 gpd/EDU to 225 gpd/EDU as discussed below and as discussed in the Chapter V discussion regarding the Romansville Study Area. Where provided for by Township Zoning Ordinance standards, individual on-lot sewage systems may also be permitted subject to the On-Lot System Selection Strategy described in Chapter V.

Justification for the selected technical alternatives for this Study Area is as follows:

a. Existing wastewater needs will be effectively addressed by continued use of the DuPont WWTP. Existing on-lot systems within the Study Area will be subject to the On-Lot Management Ordinance to be adopted by the Township.

b. Future wastewater needs are effectively served by the DuPont WWTP or by on-lot systems. As indicated in Chapter V of this current Plan, adequate capacity exists with the DuPont WWTP to serve the future needs of the Study Area, including the buildout of the DuPont Property (Chestnut Ridge), Bradford Point, and the Meadow View developments. On-lot systems within the Study Area will be in full compliance with all DEP requirements and long-term adequacy will be further assured through both regular maintenance via the On-Lot Management Ordinance to be adopted by the Township and through existing requirements for replacement disposal areas in the Township's ordinances.

c. Operation and maintenance of the DuPont WWTP will continue to occur through the Township. Operation and maintenance of the on-lot systems is defined as the primary responsibility of the property owner, with Township oversight and enforcement through the On-Lot Management Ordinance to be adopted by the Township.

d. The selected alternative involving the use of the DuPont WWTP is a cost-effective means of ensuring adequate sewage facilities. New development utilizing the DuPont WWTP will be responsible for installing the internal collection and conveyance systems as well as the connection to the WWTP. New development utilizing the DuPont WWTP will also be responsible for payment of the appropriate tap fees. Under the On-Lot Management Ordinance to

be adopted by the Township, for those lots served by on-lot systems, the property owner will continue to be responsible for the operation and maintenance of the systems with the public education program and oversight provided by the Township.

e. Management and administrative systems are readily available to implement the selected alternative.

f. No infrastructure financing is required, and costs related to the on-lot sewage management program are anticipated to be partially financed through DEP under existing provisions of Title 25, Chapters 71 and 72 of the PA Code.

Limited need exists for consideration of non-structural alternatives, since the selected technical alternatives are generally consistent with current Township planning documents.

g. Flows per EDU – Chapters III and V of this current Plan describe the existing DuPont WWTP and the Strasburg Corridor WWTP and the potential future flows to both facilities. Previous approved Act 537 planning for the Strasburg Corridor WWTP reflected a flow per EDU of 225 gpd/EDU. Based on the 2009 Chapter 94 Reports for both facilities, the estimated flow per EDU is as follows:

		DuPont WWTF	Strasburg Corridor WWTF
EDUs connected at end of 2008		235	377
2009 ave. monthly flow (gpd)	total flow	34,436	49,077
	flow per EDU	147	130
2009 3 month max. flow (gpd)	total flow	38,711	50,264
	flow per EDU	165	133
2009 max. month flow (gpd)	total flow	39,998	51,460
	flow per EDU	170	136

Based on the above information, continued usage of a rate of 250 gpd/EDU for the DuPont Wastewater Treatment Facility Study Area appears overly conservative and limits the Township's ability to serve sewage needs in a cost-effective manner. As such, this current Plan establishes a flow of 225 gpd/EDU for the DuPont Wastewater Treatment Plant Study Area.

3. Romansville Study Area

The selected alternative for the existing residences in the Romansville Study Area is continued use of on-lot systems subject to the On-Lot Management Ordinance to be adopted by the Township. Chapter III of this Plan describes the results of a door-to-door survey conducted in 2007 which indicated that confirmed and suspected malfunctions were limited to 18.6% of the respondents, and the Township has accordingly classified this level of need as appropriate for further consideration in ten years. The Township will continue to monitor the situation with information obtained through the On-Lot Management Ordinance, and if future sewer service is necessary, it is anticipated that said service will be provided at the DuPont WWTP. If and when future service is necessary, additional Act 537 planning will be provided.

For the five year needs of the Stargazers Development, the selected alternative is connection to the DuPont WWTP. As indicated in Chapter V of this Plan, adequate capacity exists at the DuPont WWTP to accommodate the five year needs of the Stargazers Development in addition to the all projects currently approved for service at the DuPont facility. The five year needs of the Stargazers Development correspond to Phase 1 of the development consisting of 43 lots. Additional planning may be required to provide for additional treatment and disposal capacity to accommodate the ultimate needs of this project depending upon the extent to which the sewage needs of existing residences in Romansville are accommodated, as illustrated in Table V-6. Phased planning module submissions for the Stargazers project will be considered by the Township in concert with additional planning for any increased treatment and disposal capacity deemed necessary for this Study Area. The Township will also require consideration of the potential needs of existing residences in any conveyance infrastructure proposed by the Stargazers project.

The EDU value for Romansville Study Area, including the Stargazers Development, will also be revised from 250 gpd/EDU to 225 gpd/EDU as discussed below and as discussed in the Chapter V.

Justification for the selected technical alternative for this Study Area is as follows:

a. Existing wastewater needs of the Study Area will continue to rely on on-lot. On-lot systems within the Study Area will be subject to the On-Lot Management Ordinance to be adopted by the Township.

b. For the five year needs of the Stargazers development, future wastewater needs are effectively served by the DuPont WWTP. As

indicated in Chapter V of this Plan, adequate capacity exists at the DuPont WWTP to accommodate this portion of the Stargazers development in addition to all projects currently approved for service at the DuPont facility.

The future wastewater needs of the Village of Romansville will continue to be served by on-lot systems. On-lot systems within the Study Area will be in full compliance with all DEP requirements and long-term adequacy will be further assured through both regular maintenance via the On-Lot Management Ordinance to be adopted by the Township and through existing requirements for replacement disposal areas in the Township's ordinances.

c. Operation and maintenance of the DuPont WWTP will continue to occur through the Township. Operation and maintenance of the on-lot systems is defined as the primary responsibility of the property owner, with Township oversight and enforcement through the On-Lot Management Ordinance to be adopted by the Township.

d. The selected alternative involving the use of the DuPont WWTP for the five year needs of the Stargazers Development is a cost-effective means of ensuring adequate sewage facilities. New development utilizing the DuPont WWTP will be responsible for installing the internal collection and conveyance systems as well as the connection to the WWTP. New development utilizing the DuPont WWTP will also be responsible for payment of the appropriate tap fees. Under the On-Lot Management Ordinance to be adopted by the Township, for those lots served by on-lot systems, the property owner will continue to be responsible for the operation and maintenance of the systems with the public education program and oversight provided by the Township.

e. Management and administrative systems are readily available to implement the selected alternative.

f. No infrastructure financing is required, and costs related to the on-lot sewage management program are anticipated to be partially financed through DEP under existing provisions of Title 25, Chapters 71 and 72 of the PA Code.

Limited need exists for consideration of non-structural alternatives, since the selected technical alternatives are generally consistent with current Township planning documents.

g. Flows per EDU – Chapters III and V of this current Plan describe the existing DuPont WWTP and the Strasburg Corridor WWTP and the potential future flows to both facilities. Previous approved Act 537 planning for the Strasburg Corridor WWTP reflected a flow per EDU of 225 gpd/EDU. Based on the 2009 Chapter 94 Reports for both facilities, the estimate flow per EDU are as follows:

		DuPont WWTF	Strasburg Corridor WWTF
EDUs connected at end of 2008		235	377
2009 ave. monthly flow (gpd)	total flow	34,436	49,077
	flow per EDU	147	130
2009 3 month max. flow (gpd)	total flow	38,711	50,264
	flow per EDU	165	133
2009 max. month flow (gpd)	total flow	39,998	51,460
	flow per EDU	170	136

Based on the above information, continued usage of a rate of 250 gpd/EDU for the Romansville Study Area appears overly conservative and limits the Township's ability to serve sewage needs in a cost-effective manner. As such, this current Plan establishes a flow of 225 gpd/EDU for the Romansville Study Area.

4. Strasburg Corridor Study Area

Very limited new development potential exists within the Study Area. What new development potential does exist can be served by the Strasburg Corridor WWTP. The Study Area described in Chapter II, coincides with the existing service area.

Justification for the selected technical alternative for these Study Areas is as follows:

a. Existing wastewater needs will be effectively addressed by continued use of the Strasburg Corridor WWTP.

b. Future wastewater needs are effectively served by the Strasburg Corridor WWTP or by on-lot systems. As indicated in Chapter V of this current Plan, adequate capacity exists with the Strasburg Corridor WWTP to serve the future needs of the Study Area, including the buildout of the Broad Run Estates (Welsh Tract) and the Tatersall (including Heritage) developments.

c. Operation and maintenance of the Strasburg Corridor WWTP will continue to occur throughout the Township.

d. The selected alternative involving the use of the Strasburg Corridor WWTP is a cost-effective means of ensuring adequate sewage facilities. New development utilizing the Strasburg Corridor WWTP will be responsible for installing the internal collection and conveyance systems as well as the connection to the WWTP. New development utilizing the Strasburg Corridor WWTP will also be responsible for payment of the appropriate tap fees.

e. Management and administrative systems are readily available to implement the selected alternative.

f. No infrastructure financing is required.

Limited need exists for consideration of non-structural alternatives, since the selected technical alternatives are generally consistent with current Township planning documents**.**

5. Embreeville Center Study Area

The selected alternative for the Embreeville Center Study Area is the "no-action" alternative. As previously discussed, the Embreeville complex is largely unoccupied and very limited uses served by the Embreeville WWTP remain. Until such time as any future use or redevelopment for the Embreeville complex is determined, no projected sewage needs can be formulated and no determination of potential WWTP improvements or alternatives for wastewater treatment are feasible.

A "no action" alternative is consequently the only alternative relevant to this Study Area. Existing connections will continue to be served at the Embreeville WWTP, and additional planning will be prepared when a future use for the Embreeville complex is clearly determined.

6. Appleville Mobile Home Park Study Area

The selected alternative for the Appleville Mobile Home Park Study Area is the continued use of the existing on-lot system subject to the requirements of the On-Lot Management Ordinance to be adopted by the Township. As was described in Chapter V, based on a review of Health Department records, field investigations and a desktop analysis of soils, it is likely that suitable area, under the current control of the mobile home park, exists for appropriately sized subsurface replacement systems or for spray and/or drip irrigation disposal systems. No expansion of the mobile home park that would increase future wastewater needs is contemplated in this current Plan.

Justification for the selected technical alternative for these Study Areas is as follows:

a. Existing wastewater needs will be effectively addressed by continued use of the existing on-lot system serving the mobile home park.

b. Future wastewater needs beyond the current needs are not contemplated in this current Plan.

c. Operation and maintenance of the on-lot system serving the Appleville Mobile Home Park will continue to be provided by the mobile home park owners. The Township will provide oversight of the system in accordance with the On-Lot Management Ordinance to be adopted.

d. The selected alternative involving the use of the existing on-lot system is a cost-effective means of ensuring adequate sewage facilities. Operation and maintenance costs are borne by the existing mobile home park tenants.

e. Management and administrative systems are readily available to implement the selected alternative. These systems involve ownership and operation by the mobile home park owners.

f. No infrastructure financing is required

Limited need exists for consideration of non-structural alternatives, since the selected technical alternatives are generally consistent with current Township planning documents.

7. Residential Study Area

New development will be served by individual on-lot sewage systems in accordance with the selection strategy of Table V-3. Existing residences will continue to be served by individual on-lot sewage systems. Property owners will be responsible for repairing malfunctioning systems as needed, and all systems will be subject to the on-lot sewage management program.

8. On-Lot Sewage Management Program

An on-lot sewage management program is an element of all Study Area selected alternatives discussed above. As discussed in Chapter V, West Bradford Township will implement a program consistent with option 2 of Table V-11, which provides for public education and Township oversight of treatment tank pumping every three years. A draft ordinance describing the proposed Township management oversight can be found in Appendix O.

B. Financing Plan

No capital financing will be required to implement the selected alternatives

C. Implementation Schedule

The Implementation Schedule for the selected alternatives is as follows:

Complete Draft Plan	April 2011
Public Agency Review	April – July 2011
30 Day Public Comment Period (Comments must be in writing)	May – June 2011
Board Adopts Plan and submits to DEP	August 2011
DEP Approves Plan (120 days)	Time Zero
Adopt On-Lot Management Ordinance	12 months after Time Zero

Appendix A:

DEP Approved Planning Modules

WEST BRADFORD TOWNSHIP
DEP APPROVED PLANNING MODULES

Developer/Subdivision Name	No. of Lots	Date Received	PA DEP Code No.	DEP Approval Date
Fox Fire Corporation (building planning co.) (Whiteford Assoc.)	85 +/-	12/4/1975	1-15959-001-3	
Thomas E. Wetzel	3	2/4/1976	1-15959-002-1	
Earl S. Stoltzfus	5	3/2/1976	1-15959-003-1	
Thomas E. Wetzel	4	3/3/1976	1-15959-004-1	
J. Richard Vishneski	14	3/10/1976	1-15959-005-3	
Roland & Meisberger	3	5/20/1976	1-15959-006-1	
J. C. Hamilton, Inc.	45	6/4/1976	1-15959-007	
Folk, Folk & LaDrew	4	5/27/1976	1-15959-008-1	
Raymond & Mary Meisberger	3	6/4/1976	1-15959-010-1	
Clairemont Development Corp.	139	6/30/1976	1-15959-009-4	7/9/1976
J. R. Vishneski	25	8/27/1976	1-15959-011-3	
Edwin F. Schofield	3	8/30/1976	1-15959-012-1	
Abbie Young	2	10/5/1976	1-15959-013-1	
Horace Rodgers	3	11/5/1976	1-15959-014-1	
James T. Davis & Joyce M., h/w	2	11/5/1976	1-15959-015-1	
Henson M. Evans, Jr.	2	12/14/1976	1-15959-016-1	
Rockland Builders	4	2/18/1977	1-15959-017-1	
Douglas R. & Maryann C. Barr	3	2/18/1977	1-15959-018-1	
J W H Construction Company	67	3/15/1977	1-15959-019-3	4/14/1977
Strasburg Associates	3		1-15959-020-1	
T. H. Biondi	94	4/27/1966	1-15959-021-	
Creagh Knoll Associates	362	5/16/1977	1-15959-022-4	6/23/1977
Toll Brothers	404	5/16/1977	1-159-59-023-4	6/23/1977
George M. Seeds	3	5/6/1977	1-15959-024-1	
Charles M. Dumont	2	5/6/1977	1-15959-025-1	
Nils F. Edwards	3	5/12/1977	1-15959-026-1	
Virginia R. Supplee	2	8/8/1977	1-15959-027-1	
Hillcrest Associates	4	9/9/1977	1-15959-028-1	
Jean P. Eckbold	2	10/7/1977	1-15959-029-1	
Richard Brothers Colonial Woods II	45	10/3/1977	1-15959-030-1	
Clairmont Development (Romig Tract)	85	11/3/1977	1-15959-031-3-4	10/4/1978
Valley Wood Acres, Inc.	14	11/3/1977	1-15959-032-4	11/23/1977
William H. Rolland, et al	3	11/04/77	1-15959-033-1	
Clyde Busby	3	11/09/77	1-15959-034-1	
Broad Run Sewer Co. M	0.35 MGD	11/23/77	1-15959-035-4	11/29/1977
Stephen Hoyt	20	11/09/77	1-15959-036-3	
Douglas Myers	2	11/29/77	1-15959-037-	12/15/1977
J. R. Vishnoski	4	11/15/72	1-15959-038-1	
Arthur Boesler	15	12/08/77	1-15959-039-3	
Bradford Meadows, Inc.	1/3/1900	12/28/77	1-15959-040-1	
Thomas E.Wetzle	3	12/28/77	1-15959-041-1	
Charles Cann	2	01/23/78	1-15959-42-1	
Beverly J. Henry	2	01/23/78	1-15959-043-1	
Clairmont, Summit Ridge, Sec. 3	52	02/01/78	1-15959-044-4	
William Gregson	5	02/14/78	1-15959-045-1	
J. Richard Ushveski	11	03/13/78	1-15959-046-3	
James C. Hamilton, Inc. (Woodcroft)	43	03/17/78	1-15959-047-3	
Bradford Meadows	28	04/10/78	1-15959-049-3	
Evans	9	05/01/78	1-15959-050-1	
John M. Thompson, II	3	05/01/78	1-15959-051-1	
Brown Honeycutt	2	05/23/78	1-15959-052-3	
B. J. Development Ridgewood	5	6/?/78	1-15959-053-1	
B. J. Development	18	05/23/78	1-15959-054-3	
The Bentley Corporation	3	06/23/78	1-15959-055-1	
Philip Young	2	08/27/78	1-15959-056-3	
Vishnaski/Mattson (Andrea Valley)	7		1-15959-057-1	
Raymond Musberger	2	08/02/78	1-15959-058-1	
Virginia R. Supplee	3	09/11/78	1-15959-059-1	
Ken S. Risser	9	09/11/78	1-15959-060-1	
Penn Woods	16	11/01/78	1-15959-061-3	
J. R. Vishniski	8	11/01/78	1-15959-062-1	
Mac Michael	5	11/01/78	1-15959-063-1	
J. R. Vishniski	2	11/01/78	1-15959-064-1	
Lenard Paul Scheiffel	2	11/15/78	1-15959-065-1	
Bedwell	36	10/03/78	1-15959-066-1	
Chesnut Oak Hills	8	11/28/78	1-15959-067-1	
Creagh Knoll Assoc., Brandywine Green II & III	122	03/19/79	1-15959-068-4	4/5/1979
Margaret Anderson	2		1-15959-069-1	
James & Eleanor Palmatire	2	03/30/79	1-15959-070-1	

WEST BRADFORD TOWNSHIP
DEP APPROVED PLANNING MODULES

Developer/Subdivision Name	No. of Lots	Date Received	PA DEP Code No.	DEP Approval Date
Risser	3	03/06/79	1-15959-071-1	
Frances and Pat Downes	2	04/26/79	1-15959-072-1	
James & Gloria Hamilton	2	04/29/79	1-15959-073-1	
Cerritelli	3	04/28/79	1-15959-074-1	
Lenard Paul Scheiffel	3	06/01/79	1-15959-075-1	
John Scott Estate	39	07/02/79	1-15959-076-3	
Philadelphia Electric	3		1-15959-077-1	
Hennesey Bros.	2	8/13/1979	1-15959-078-1	
Meisberger	2	10/01/79	1-15959-079-	
Curtis Bedwell	35	10/01/79	1-15959-080-	
Philadelphia Electric	3	10/01/79	1-15959-081-	
Carl & Vanessa Hamilton	2	09/05/79	1-15959-082-	
Andara Valley / Vishneski	13	11/26/79	1-15959-083-	
Williams et al	2		1-15959-084-	
Nils F. Edwards	3		1-15959-085-	
John Williams	6	03/17/80	1-15959-086-3	
Willard Pusey	2	05/12/80	1-15959-087-1	
Robert Williams	2	05/12/80	1-15959-088-1	
Grayson L. Whitney, et al	2	09/30/80	1-15959-089-	
Hansen Evans	3	09/30/80	1-15959-090-	
Desiree C. Sharp	2	10/29/880	1-15959-091-1	
Chamberlain, Angelina F.	3	12/30/80	1-15959-093-3	
Dave Ericsson c/o Conrey	37	01/21/81	1-5959-093-3	
Phillips, Donald K. Maryanne	2	03/27/81	1-15959-094-	
Kinter, James and Elsie	2	03/27/81	1-15959-095-	
Remington, Florence Schofield	2	03/27/81	1-15959-096-	
Spring One Farms c/o J. R. Vishmeski	3	03/27/81	1-15959-097-1	
Toll Brothers, Inc. Bradford Alan IV	127	04/22/81	1-15959-098-	
J. R. Vishneski (Spring Oaks II)	38	05/15/81	1-15959-099-3	
Rodgers, Horace W.		05/15/81	1-15959-100-	
Roman Village	0	05/28/81	1-15959-101-	
Pomilo, James J. & Theresa C.	2	09/15/81	1-15959-102-1	
Caldwell, et al	0		1-15959-103-1	
Colonial Mortgage South	3		1-15959-104-1	
Spring Oaks Farm II	6		1-15959-105-1	
Hodge, Robert H.	5	04/30/82	1-15959-106-01	
Village of Arden Grove	8	05/04/82	1-15959-107-01	
Omalo Acres	2	07/29/82	1-15959-108-01	
U. Pavell	2	08/17/82	1-15959-109-1	
Spring Oaks II	3	08/25/82	1-15959-110-1	
J. R. Vishniski Hail Lane	4	08/25/82	1-15959-111-1	
Andrea Valley	2	08/25/62	1-15959-112-1	
Fox Trail 3-5-6 new	3		1-15959-113-1	
Barclay, Mary	2	01/26/83	1-15959-114-1	
Ushnaski, J. R.	3	01/03/83	1-15959-115-1	
Appleville - East	7	02/11/83	1-15959-116-3	
Richard D. Fenimore, et al	2	02/16/83	1-15959-117-4	
Doug Turper	2	04/20/83	1-15959-118-1	
Wishniski	28	04/25/83	1-15959-119-3	
Sanderson	2	05/09/83	1-15959-120-3	
DeVito, Dominic	2	05/17/83	1-15959-121-1	
Wishniski	2	04/26/83	1-15959-122-1	
Anderson, Albert & Margaret	2	06/01/83	1-15959-123-	
Hodge, Telegraph Road	2	05/24/83	1-15959-124-	
Triad Assoc.	46	08/01/83	1-15959-125-	
Supplee, Virginia & John	4	08/01/83	1-15959-126-1	
Highland Orchards	6	08/01/83	1-15959-127-1	
Smith, Gary W. & Victoria C.	2	09/01/83	1-15959-128-1	
Shannon, Mildred P.	3	09/01/83	1-15959-129-1	
Roman Village	5	09/13/83	1-15959-130-1	
Robert Hodge	83	09/19/83	1-15959-131-1	
Robert Hodge	83	09/19/83	1-15959-132-4	
Jamison, Ralph E.	2	09/29/83	1-15959-133-1	
Bookmiller, Wayne	2	11/30/83	1-15959-134-1	
Community Baptist Church	2	01/11/84	1-15959-135-1	
Baskmiller, Wayne	2	01/25/84	1-15959-136-1	
Brandhof, R. G.	4	02/01/84	1-15959-137-1	
Gas Frank Estates	4	03/02/84	1-15959-138-1	
Vern Weldman	15	03/20/83	1-15959-138-3	
Carey, Charles R.	3	05/25/84	1-15959-140-1	
Santner & Volk	3	06/28/84	1-15959-141-1	
Deer Crossing	27	06/28/84	1-15959-142-3	

WEST BRADFORD TOWNSHIP
DEP APPROVED PLANNING MODULES

Developer/Subdivision Name	No. of Lots	Date Received	PA DEP Code No.	DEP Approval Date
Vishneski - Telegraph Rd.	6	03/10/84	1-15959-143-1	
Komig Tract -Colonial Tract	66	07/27/84	1-15959-144-	
J. R. Vishneski - Hall Road	6	07/27/84	1-15959-145-	
Fox Den - Hoyt	2	08/01/84	1-15959-146-1	
Paulson, Jacob R.	4	10/01/84	1-15959-147-1	
Widen, Norman G. & Annette	2	10/29/84	1-15959-148-1	
1st	102	01/08/85	1-15959-149-3	
Deer Crossing	29	07/23/86	1-15959-150-3	
Mattson, John W.	4	02/15/85	1-15959-151-1	
Beard, Mark & Nancy B.	3	03/01/85	1-15959-152-1	
Kucera, David G.	3	03/28/85	1-15959-153-1	
Vishneski , J. Richard	8	04/29/85	1-15959-154-1	
Fichter, Jeffrey & Linda	2	04/29/85	1-15959-155-1	
Wanta, Cordelia	2	04/29/85	1-15959-156-1	
Washington	Lot line change	06/12/85	1-15959-157-	
Ches. BFRR Developers	13	09/24/85	1-15959-158-3x	
Seeds, Mildred E. et al	2	10/28/85	1-15959-159-	
Perdue, Gray, Gilbert & Willard		11/15/85	1-15959-160-1	
Stouff, Edw. & Dorothy	2	11/27/85	1-15959-160-1	
Colonial Woods II, Laura Cashman Marshman	28	12/11/85	1-15959-161-	
David Davidege	2		1-15959-162-1	
Camp Linden	2	04/02/86	1-15959-164-1	
J. R. Lums Co.	12 Industrial	04/17/86	1-15959-165-3A	
DeRemigio, James	2	05/07/86	1-15959-167-1	
MacMichael / Davidge	2	05/07/86	1-15959-168-1	
Fichter, F. Jeffrey & Linda C.	2	05/07/86	1-15959-169-1	
McHara, Ian & Carol S.	2	05/28/86	1-15959-170-1	
Case, Harrington M. & Kathryn M.	2	05/28/86	1-15959-171-1	
Woodstock / Vishneski	8	07/25/86	1-15959-172-1	
Stouffer T. Edward, Hillcrest II	5	07/29/86	1-15959-173-1	
Ferncliff Farm	20	09/03/86	1-15959-174-3	
Malacinski	3	09/03/86	1-15959-175-1	7/19/1988
Robert & Elizabeth Hodge	2	10/09/86	1-15959-176-	
Ferncliff Farm	2	10/09/86	1-15959-177-1	
			1-15959-178-	
Shady Meadows Farm	23	10/15/86	1-15959-179-	
Enoches	3	10/21/86	1-15959-180-1	
Viewpoint Properties	3	11/03/86	1-15959-181-1	
Johnston Subdivision	54	12/05/86	1-15959-182-3A	
Stouff	48	12/16/86	1-15959-183-3A	
Swedenborgian Church	5 bldgs.	01/06/87	1-15959-184-1	
Leidy Gold	2		1-15959-185-1	
Toll Brothers, Inc.	48	01/29/87	1-15959-186-	
Barrington Associates, Inc.	1	02/24/87	1-15959-187-	
Hagele	5	03/04/87	1-15959-188-1	
Cottman & Coslett	19	04/29/87	1-15959-189	see 1-159; 204 3ABC
Mohler		05/27/87	1-15959-190-	
Bransford	3	05/26/87	1-15959-191	
Marks Organization	229	6/4/87 - 10/8/87	1-15959-192-3ABC	
Hanson	2	09/01/87	1-15959-193-1	
Wagner	10		1-15959-195-1	
Pusey	2		1-15959-196-1	
Robinson	2	07/20/87	1-15959-197-1	
Campanaro	2	09/11/87	1-15959-198-1	
Vishneski		11/13/87	1-15959-200-317	completed 9/5/9?
Brandywine Green	94	11/21/82	1-15959-201-4	
Book & Bone	2	11/25/87	1-15959-202-1	
Pozza, Gina	2	12/08/87	1-15959-203-1	9/10/1989
Cottman & Coshett	40	12/29/87	1-15959-204-3A	
Dennis Roof	2	01/19/88	1-15959-205-1	
Vishneski / Rivers	2	01/19/88	1-15959-206-1	
Reynolds	2	02/08/88	1-15959-207-1	
Wanta	230	02/16/88		
Woodland	10	02/16/88	1-15959-208-3A	12/18/?
James H. Nelms	41	02/16/88	1-15959-209-4	
Krapf, Drew W.	3	04/13/88	1-15959-210-1	
Paul / Oak Hill Assoc.	25	05/26/88	1-15959-211-3A	
Kris Vollrath	2	07/05/88	1-15959-213-	
Michael Breitz	2	07/12/88	1-15959-214-1	completed
Jonathens Woods (Colonial Woods II)	10	07/29/88	1-15959-216-1	completed
Downingtown School District		08/01/88	1-15959-217-4	2/1/1989

WEST BRADFORD TOWNSHIP
DEP APPROVED PLANNING MODULES

Developer/Subdivision Name	No. of Lots	Date Received	PA DEP Code No.	DEP Approval Date
Scott	2	10/11/88	1-15959-218-	
Richard King	1	10/25/88	1-15959-219-	
Campbell		11/07/88	1-15959-220-1	
Como Farms (Ferguson and Flynn)	199		1-15959-221-	
The Martin Organization	126	11/10/88	1-15959-222-4	3/22/1989
Josephine Taylor	3	01/18/89	1-15959-223-1	
Terri Hill Subdivison	3	02/03/89	1-15959-224-1	
John & Arleen Pecone	2	02/09/89	1-15959-225-3A	
Fox Knoll Associates	2		1-15959-226-	
Mayes	2	03/09/89	1-15959-227-1	
Evan & 100	4		1-15959-228-1	4/12/1990
Ralph T. Fairweather	2	06/03/89	1-15959-229-	
Glen Allison	2	06/03/89	1-15959-230-1	12/29/1989
Roberta Roberts	2	06/05/89	1-15959-231-1	
Starzers Construction & Design	30	06/23/89	1-15959-166-	
L. H. Finelli	21	06/23/89	1-15959-232-2	
Mike Zapen	2	07/06/89	1-15959-234-1	
Lenard Humphry III	2	06/29/89	1-15959-233-1	
Cornwath		08/01/89	1-15959-235-1	7/10/1996
Rennzetti/WFO Development Commercial		8/11/1989	1-15959-236-3A	
Anthony Cozzone	2		1-15959-237-1	
Jefferis	3		1-15959-238-1	
Carter R. Led, Jr. (Ferncliffe Farms)	10	12/04/89	1-15959-239-1	3/2/1990
Plough Farm & Commercial			1-15959-240-	
Cohen	land planning		1-15959-241-1	
John Klein	land planning		1-15959-242-1	
William Wright	2		1-15959-243-	
George A. Mershon	34		1-15959-244-	
Visheski	2	02/12/90	1-15959-245-1	
Joseph Virgulti	2	04/03/90	1-15959-247-	
R. Chad Vishneski	11		1-15959-248-2	
Michael Breitz	2	05/03/90	1-15959-249-1	complete
Wayne Francesco / Ed Rivers	add on	05/07/90	1-15959-250-	
Charles DuMont	3	05/11/90	1-15959-251-1	complete
Margaret Green	add on		1-15959-252-	
Jim Leonard (PECO) / Ann Vilchak	add on	06/11/90	1-15959-253-	complete
Margaret Uhlman	6	09/21/90	1-15959-254-1	
Cahill Associates	23 edus	10/01/90	1-15959-255-	
Uhlman	6	10/30/90	1-15959-2661	
George Meili	2	12/03/90	1-15959-257-1	
Norma Smith Mecke	3	12/03/90	1-15959-258-1	
Phil Stergin	2	12/31/90	1-15959-259-1	
Monenec & Associates	stream discharge	05/29/91	1-15959-260-	
Snow Ridge as a community system		08/05/91	1-15959-261-	
Fox Trail III	24	09/27/91	1-15959-262-2	complete
Fisher Homes, Inc.	2	10/03/91	1-15959-263-1	complete
MISA Corporation	325.06 acres	03/26/92	1-15959-264-	
David Onschak			1-15959-265-1	
James H. Hamilton	4	09/25/92	1-15959-266-1	
PECO Tract (Bell Atlantic Mobile Systems)	land planning	10/02/92	1-15959-267-	complete
Nancy Hess (Mildred Shannon)	add on		1-15959-268-	
Jefferson Bank				
Pacoast Estates		03/03/93	1-15959-270-1	
Mauer, Robert & Gertrude	4	05/24/93	1-15959-271-1	
Village Builders, Inc.	17,600 gallon	07/06/93	1-15959-272-3A	

Appendix B:

NRCS On-Lot System Soil Interpretations

Selected Soil Interpretations

Chester County, Pennsylvania

[The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

*This soil interpretation was designed as a "limitation" as opposed to a "suitability". The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation.

Map symbol and soil name	Pct. of map unit	Septic System In Ground Trench (conventional) (PA) *		Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ba:							
Baile	85	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Seasonal high water table	1.00	Seasonal high water table	1.00
		Slow percolation >12"	1.00	Slow percolation 12-20"	1.00	Slow percolation 12-36"; can not use system	1.00
		Slope	0.01	Slope	0.18	Slow percolation 36-60"	1.00
						Slope	0.01
BaB:							
Baile	85	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Seasonal high water table	1.00	Seasonal high water table	1.00
		Slow percolation >12"	1.00	Slow percolation 12-20"	1.00	Slow percolation 12-36"; can not use system	1.00
		Slope	0.08	Slope	0.35	Slow percolation 36-60"	1.00
						Slope	0.08
CaA:							
Califon	90	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Seasonal high water table	1.00	Seasonal high water table	1.00
		Slow percolation >12"	1.00	Slope	0.18	Slow percolation 12-36"; can not use system	1.00
		Slope	0.01			Slow percolation 36-60"	1.00
						Slope	0.01
CaB:							
Califon	82	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Seasonal high water table	1.00	Seasonal high water table	1.00
		Slow percolation >12"	1.00	Slope	0.35	Slow percolation 12-36"; can not use system	1.00
		Slope	0.08			Slow percolation 36-60"	1.00
						Slope	0.08

Selected Soil Interpretations

Chester County, Pennsylvania

Map symbol and soil name	Pct. of map unit	Septic System In Ground Trench (conventional) (PA) *		Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CdA:							
Chester	92	Moderately limited		Slightly limited		Very limited	
		Slow percolation >12"	0.89	Slope	0.25	Slow percolation 12-36"; see criteria	0.99
		Slope	0.03			Slow percolation 36-60"	0.97
						Slope	0.03
CdB:							
Chester	91	Moderately limited		Slightly limited		Very limited	
		Slow percolation >12"	0.89	Slope	0.31	Slow percolation 12-36"; see criteria	0.99
		Slope	0.05			Slow percolation 36-60"	0.97
						Slope	0.05
CdC:							
Chester	100	Moderately limited		Moderately limited		Very limited	
		Slow percolation >12"	0.89	Too steep	0.85	Slow percolation 12-36"; see criteria	0.99
		Slope	0.46			Slow percolation 36-60"	0.97
						Slope	0.46
Co:							
Codorus	85	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Flooding	1.00	Seasonal high water table	1.00
		Flooding	1.00	Low potential seasonal high water table	0.67	Flooding	1.00
		Fast percolation >12"	1.00			Slow percolation 12-36"; see criteria	0.99
		Slope	0.01	Slope	0.18	Slow percolation 36-60"	0.97
						Potential fast percolation 36-60"	0.02
CpA:							
Cokesbury	85	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Seasonal high water table	1.00	Seasonal high water table	1.00
		Slow percolation >12"	1.00	Slow percolation 12-20"	0.50	Slow percolation 12-36"; can not use system	1.00
		Slope	0.01	Slope	0.18	Slow percolation 36-60"	1.00
						Slope	0.01

Selected Soil Interpretations

Chester County, Pennsylvania

Map symbol and soil name	Pct. of map unit	Septic System In Ground Trench (conventional) (PA) *		Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CpB:							
Cokesbury	90	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Seasonal high water table	1.00	Seasonal high water table	1.00
		Slow percolation >12"	1.00	Slow percolation 12-20"	0.50	Slow percolation 12-36"; can not use system	1.00
		Slope	0.08	Slope	0.35	Slow percolation 36-60"	1.00
						Slope	0.08
Cs:							
Comus	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Potential slow percolation >12"	0.01	Slope	0.18	Slow percolation 12-36"; see criteria	0.99
		Slope	0.01			Slow percolation 36-60"	0.97
						Slope	0.01
GaD:							
Gaila	85	Moderately limited		Very limited		Very limited	
		Too steep	0.95	Too steep	1.00	Bedrock, above 72"	1.00
		Potential bedrock near 60"	0.33			Too steep	0.95
						Slow percolation 12-36"; see criteria	0.94
						Potential slow percolation 36-60"	0.27
GdA:							
Gladstone	90	Slightly limited		Moderately limited		Very limited	
		Potential bedrock near 60"	0.33	Slow percolation 12-20"	0.50	Slow percolation 12-36"; can not use system	1.00
		Slope	0.01	Slope	0.18	Slow percolation 36-60"	1.00
						Bedrock, above 72"	1.00
						Slope	0.01
GdB:							
Gladstone	93	Slightly limited		Slightly limited		Very limited	
		Potential bedrock near 60"	0.33	Slope	0.40	Bedrock, above 72"	1.00
		Slope	0.12			Slow percolation 12-36"; see criteria	0.96
						Slow percolation 36-60"	0.49
						Slope	0.12

Selected Soil Interpretations

Chester County, Pennsylvania

Map symbol and soil name	Pct. of map unit	Septic System In Ground Trench (conventional) (PA) *		Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GdC:							
Gladstone	90	Slightly limited		Moderately limited		Very limited	
		Slope	0.46	Too steep	0.85	Bedrock, above 72"	1.00
		Potential bedrock near 60"	0.33			Slow percolation 12-36"; see criteria	0.96
						Slow percolation 36-60"	0.49
						Slope	0.46
GgA:							
Glenelg	100	Very limited		Slightly limited		Very limited	
		Bedrock, above 60"	1.00	Slope	0.18	Bedrock, above 72"	1.00
		Slow percolation >12"	0.89			Slow percolation 12-36"; see criteria	0.99
		Slope	0.01			Slow percolation 36-60"	0.97
						Slope	0.01
GgB:							
Glenelg	92	Moderately limited		Slightly limited		Very limited	
		Slow percolation >12"	0.89	Slope	0.40	Slow percolation 12-36"; see criteria	0.99
		Slope	0.12			Slow percolation 36-60"	0.97
						Slope	0.12
GgC:							
Glenelg	90	Moderately limited		Moderately limited		Very limited	
		Slow percolation >12"	0.89	Too steep	0.85	Slow percolation 12-36"; see criteria	0.99
		Slope	0.46			Slow percolation 36-60"	0.97
						Slope	0.46
GgD:							
Glenelg	90	Moderately limited		Very limited		Very limited	
		Too steep	0.92	Too steep	1.00	Slow percolation 12-36"; see criteria	0.99
		Slow percolation >12"	0.89			Slow percolation 36-60"	0.97
						Too steep	0.92

Selected Soil Interpretations

Chester County, Pennsylvania

Map symbol and soil name	Pct. of map unit	Septic System In Ground Trench (conventional) (PA) *		Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GlA:							
Glenville	90	Very limited		Moderately limited		Very limited	
		Seasonal high water table	1.00	Potential seasonal high water table	0.98	Seasonal high water table	1.00
		Slow percolation >12"	1.00	Slow percolation 12-20"	0.79	Slow percolation 12-36"; can not use system	1.00
		Slope	0.01	Slope	0.18	Slow percolation 36-60"	1.00
						Slope	0.01
GlB:							
Glenville	90	Very limited		Moderately limited		Very limited	
		Seasonal high water table	1.00	Potential seasonal high water table	0.98	Seasonal high water table	1.00
		Slow percolation >12"	1.00	Slow percolation 12-20"	0.79	Slow percolation 12-36"; can not use system	1.00
		Slope	0.12	Slope	0.40	Slow percolation 36-60"	1.00
						Slope	0.12
GlC:							
Glenville	100	Very limited		Moderately limited		Very limited	
		Seasonal high water table	1.00	Potential seasonal high water table	0.98	Seasonal high water table	1.00
		Slow percolation >12"	1.00	Too steep	0.85	Slow percolation 12-36"; can not use system	1.00
		Slope	0.46	Slow percolation 12-20"	0.79	Slow percolation 36-60"	1.00
						Slope	0.46
Ha:							
Hatboro	95	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Seasonal high water table	1.00	Seasonal high water table	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Slow percolation >12"	0.89	Slope	0.18	Slow percolation 12-36"; see criteria	0.99
		Slope	0.01			Slow percolation 36-60"	0.97
						Slope	0.01

Selected Soil Interpretations

Chester County, Pennsylvania

Map symbol and soil name	Pct. of map unit	Septic System In Ground Trench (conventional) (PA) *		Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ln:							
Lindside	85	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Flooding	1.00	Seasonal high water table	1.00
		Flooding	1.00	Low potential seasonal high water table	0.67	Flooding	1.00
		Potential karst	0.30	Potential karst	0.30	Slow percolation 12-36"; see criteria	0.99
		Potential slow percolation >12"	0.05	Slope	0.18	Slow percolation 36-60"	0.98
		Slope	0.01			Potential karst	0.30
MaA:							
Manor	100	Slightly limited		Slightly limited		Very limited	
		Potential slow percolation >12"	0.01	Slope	0.18	Slow percolation 12-36"; see criteria	0.99
		Slope	0.01			Slow percolation 36-60"	0.49
						Slope	0.01
MaB:							
Manor	95	Slightly limited		Slightly limited		Very limited	
		Slope	0.12	Slope	0.40	Slow percolation 12-36"; see criteria	0.99
		Potential slow percolation >12"	0.01			Slow percolation 36-60"	0.49
						Slope	0.12
MaC:							
Manor	95	Slightly limited		Moderately limited		Very limited	
		Slope	0.46	Too steep	0.85	Slow percolation 12-36"; see criteria	0.99
		Potential slow percolation >12"	0.01			Slow percolation 36-60"	0.49
						Slope	0.46
MaD:							
Manor	97	Moderately limited		Very limited		Very limited	
		Too steep	0.92	Too steep	1.00	Slow percolation 12-36"; see criteria	0.99
		Potential slow percolation >12"	0.01			Too steep	0.92
						Slow percolation 36-60"	0.49
MaE:							
Manor	98	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Potential slow percolation >12"	0.01			Slow percolation 12-36"; see criteria	0.99
						Slow percolation 36-60"	0.49

Selected Soil Interpretations

Chester County, Pennsylvania

Map symbol and soil name	Pct. of map unit	Septic System In Ground Trench (conventional) (PA) *		Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MaF:							
Manor	100	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Potential slow percolation >12"	0.01			Slow percolation 12-36"; see criteria	0.99
						Slow percolation 36-60"	0.49
MbB:							
Manor, very stony	100	Slightly limited		Slightly limited		Very limited	
		Slope	0.05	Slope	0.31	Slow percolation 12-36"; see criteria	0.99
		Potential slow percolation >12"	0.01			Slow percolation 36-60"	0.49
						Slope	0.05
MbD:							
Manor, very stony	100	Moderately limited		Very limited		Very limited	
		Slope	0.80	Too steep	1.00	Slow percolation 12-36"; see criteria	0.99
		Potential slow percolation >12"	0.01			Slope	0.80
						Slow percolation 36-60"	0.49
MbF:							
Manor, very stony	100	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Potential slow percolation >12"	0.01			Slow percolation 12-36"; see criteria	0.99
						Slow percolation 36-60"	0.49
PaB:							
Parker	96	Very limited		Slightly limited		Very limited	
		Fast percolation >12"	1.00	Slope	0.40	Bedrock, above 72"	1.00
		Slope	0.12	Slight voided fragments	0.08	Slow percolation 12-36"; see criteria	0.94
		Slight voided fragments	0.08			Potential fast percolation 36-60"	0.18
		Potential bedrock near 60"	0.03			Slope	0.12
						Slight voided fragments	0.08

Selected Soil Interpretations

Chester County, Pennsylvania

Map symbol and soil name	Pct. of map unit	Septic System In Ground Trench (conventional) (PA) *		Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PaC:							
Parker	97	Very limited		Moderately limited		Very limited	
		Fast percolation >12"	1.00	Too steep	0.85	Bedrock, above 72"	1.00
		Slope	0.46	Fast percolation 12-20"	0.50	Slow percolation 12-36"; see criteria	0.94
		Slight voided fragments	0.08	Slight voided fragments	0.08	Slope	0.46
		Potential bedrock near 60"	0.03			Potential fast percolation 36-60"	0.18
						Slight voided fragments	0.08
PaD:							
Parker	97	Very limited		Very limited		Very limited	
		Fast percolation >12"	1.00	Too steep	1.00	Bedrock, above 72"	1.00
		Too steep	0.92	Fast percolation 12-20"	0.50	Slow percolation 12-36"; see criteria	0.94
		Slight voided fragments	0.08	Slight voided fragments	0.08	Too steep	0.92
		Potential bedrock near 60"	0.03			Potential fast percolation 36-60"	0.18
						Slight voided fragments	0.08
PaE:							
Parker	98	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Fast percolation >12"	1.00	Fast percolation 12-20"	0.50	Bedrock, above 72"	1.00
		Slight voided fragments	0.08	Slight voided fragments	0.08	Slow percolation 12-36"; see criteria	0.94
		Potential bedrock near 60"	0.03			Potential fast percolation 36-60"	0.18
						Slight voided fragments	0.08
PaF:							
Parker	85	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Fast percolation >12"	1.00	Slight voided fragments	0.08	Bedrock, above 72"	1.00
		Slight voided fragments	0.08			Slow percolation 12-36"; see criteria	0.94
		Potential bedrock near 60"	0.03			Potential fast percolation 36-60"	0.18
						Slight voided fragments	0.08

Selected Soil Interpretations

Chester County, Pennsylvania

Map symbol and soil name	Pct. of map unit	Septic System In Ground Trench (conventional) (PA) *		Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
UdsB:							
Udorthents, schist and gneiss	95	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Slow percolation 12-20"	1.00	Seasonal high water table	1.00
		Slow percolation >12"	1.00	Miscellaneous area	1.00	Bedrock, above 72"	1.00
		Miscellaneous area	1.00	Slope	0.31	Slow percolation 12-36"; can not use system	1.00
		Potential bedrock near 60"	0.48			Slow percolation 36-60"	1.00
		Slope	0.05			Miscellaneous area	1.00
UrmD:							
Urban land	65	Not rated		Not rated		Not rated	
Glenelg	30	Moderately limited		Very limited		Very limited	
		Slow percolation >12"	0.89	Too steep	1.00	Slow percolation 12-36"; see criteria	0.99
		Slope	0.80			Slow percolation 36-60"	0.97
						Slope	0.80
UrsB:							
Urban land	50	Not rated		Not rated		Not rated	
Manor	30	Slightly limited		Slightly limited		Very limited	
		Slope	0.05	Slope	0.31	Slow percolation 12-36"; see criteria	0.99
		Potential slow percolation >12"	0.01			Slow percolation 36-60"	0.49
						Slope	0.05
UrsD:							
Urban land	50	Not rated		Not rated		Not rated	
Manor	30	Moderately limited		Very limited		Very limited	
		Slope	0.80	Too steep	1.00	Slow percolation 12-36"; see criteria	0.99
		Potential slow percolation >12"	0.01			Slope	0.80
						Slow percolation 36-60"	0.49
UugB:							
Urban land	80	Not rated		Not rated		Not rated	

Selected Soil Interpretations

Chester County, Pennsylvania

Map symbol and soil name	Pct. of map unit	Septic System In Ground Trench (conventional) (PA) *		Septic System Sand Mound Bed or Trench (PA) *		Septic System Subsurface Sand Filter Trench (standard) (PA) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
UugB:							
Udorthents, schist and gneiss	15	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Slow percolation 12-20"	1.00	Seasonal high water table	1.00
		Miscellaneous area	1.00	Miscellaneous area	1.00	Bedrock, above 72"	1.00
		Bedrock, above 60"	1.00	Slope	0.31	Slow percolation 12-36"; can not use system	1.00
		Slope	0.05			Slow percolation 36-60"	1.00
						Miscellaneous area	1.00
UugD:							
Urban land	80	Not rated		Not rated		Not rated	
Udorthents, schist and gneiss	15	Very limited		Very limited		Very limited	
		Seasonal high water table	1.00	Too steep	1.00	Seasonal high water table	1.00
		Miscellaneous area	1.00	Slow percolation 12-20"	1.00	Bedrock, above 72"	1.00
		Bedrock, above 60"	1.00	Miscellaneous area	1.00	Slow percolation 12-36"; can not use system	1.00
		Slope	0.80			Slow percolation 36-60"	1.00
						Miscellaneous area	1.00

Appendix C:

Chapter 94 2009 Municipal Wasteload Management Report - UIP

PA CODE TITLE 25

CHAPTER 94

2009 MUNICIPAL WASTELOAD MANAGEMENT REPORT

WEST BRADFORD TOWNSHIP

CHESTER COUNTY

March 2010

Prepared for:

Utilities, Inc. of Pennsylvania (UIP)
1201 Saw Mill Road
Downingtown, PA 19335

Prepared by:

AMERICAN WATER

Applied Water Management, Inc.
453 Boot Road
Downingtown, PA 19335
610-873-5700

2009 MUNICIPAL WASTELOAD MANAGEMENT REPORT
BROAD RUN WASTEWATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP
CHESTER COUNTY, PA

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF EXHIBITS

2009 CHAPTER 94 REPORT

SIGNATURES

PERMITTEE:

NAME: Mr. Tony Sharp, Regional Manager

ORGANIZATION: Utilities, Inc. of Pennsylvania (UIP)

ADDRESS: P.O. Box 379
Dunkirk, MD 20754

410-286-5533 PHONE

410-286-5532 FAX

This Chapter 94 Report prepared by Applied Water Management, Inc.has been reviewed and as a representative of the permittee, I am satisfied with its content.

AUTHORIZED SIGNATURE: _____ _____ DATE

TITLE _____

PREPARER:

NAME: Preethy Dileepkumar

ORGANIZATION: Applied Water Management, Inc.

ADDRESS:
453 Boot Road
Downingtown, PA 19335

610-873-5700 PHONE

610-873-5705 FAX

This report has been prepared in accordance with Title 25, Part 1, Subpart C, Article II, Chapter 94, of the Commonwealth of Pennsylvania Regulations.

AUTHORIZED SIGNATURE: _____ _____ DATE

TITLE Project Engineer

2009 MUNICIPAL WASTELOAD MANAGEMENT REPORT
BROAD RUN WASTEWATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP
CHESTER COUNTY, PENNSYLVANIA

March 2010

1.0 GENERAL INFORMATION

This annual wasteload report has been prepared for the Broad Run wastewater treatment plant (WWTP) and collection system, located in the northern portion of West Bradford Township in Chester County, Pennsylvania. This report has been prepared for the year 2009, in accordance with Chapter 94, Title 25 of the Rules and Regulations of the Pennsylvania Department of Environmental Protection (PADEP). The Broad Run WWTP operates under sewage NPDES Permit No. PA0043982, originally issued to the Broad Run Sewer Company.

The WWTP was placed in operation in 1977 and since then, has undergone several modifications and expansions to accommodate new residential development. In August 1992, Utilities, Inc. took ownership of the Broad Run Plant. On February 20, 1997, PADEP recognized the transfer of ownership from the Broad Run Sewer Company to Utilities, Inc. of Pennsylvania (UIP). The plant is an extended aeration treatment process that discharges treated effluent to an unnamed tributary to the East Brandywine Creek.

2.0 CURRENT SERVICE AREA

UIP owns and operates the sanitary sewer collection system that serves its franchise area, consisting primarily of residential customers, in West Bradford Township, Chester County, Pennsylvania. UIP provides collection, treatment and disposal of wastewater for approximately 1,322 connection units including 2 elementary schools. The occupancy of the two schools in 2007 was 1,221 taking into account students and staff. The total occupancy of the two schools decreased from 1,221 in 2007, then to 1,050 in 2008 and remained the same in 2009. PADEP approved a flow allocation for public schools with cafeterias and gyms at 13 gpd/person. Based on a typical school year, the schools generate an estimated 10,240 gpd of flow on an average daily basis.

Sawmill Estates subdivision is part of this total, which consists of 66 connections. No additional connections were made in 2009 and as of December 2009, 33 of the 35 single family units remain occupied leaving only 2 unoccupied. No schedule is available as to the completion of the remaining 31 units.

Existing developments along with the number of existing homes for each development are outlined as follows:

• Bradford Glen/Victoria Crossing	476 homes
• Summit Ridge/Walnut Ridge/Valley Ridge	212 homes
• The Highlands	47 homes
• Brandywine Green, Phases I through III	206 homes
• Stonegate	102 homes
• Brandywine Ridge	143 homes
• Brandywine Green Phase IV	64 homes
• Sawmill Subdivision	66 homes
• Miscellaneous Residences	6 homes
Total	1,322 homes

The collection system consists primarily of gravity interceptor and collection sewers; however, there are two wastewater pumping stations located within the franchised area; the Chestnut Lane Pumping Station and the Broadview East Pumping Station. Wastewater flows are pumped via force mains to terminal manholes, where the wastewater flows by gravity to UIP's Broad Run WWTP, located on Saw Mill Road in Downingtown, PA.

The Broad Run Sanitary Sewer Collection System is comprised of gravity sewer lines constructed of polyvinyl chloride (PVC) pipe and concrete ranging in size from 8" to 15". There are currently 19 miles of sewer main located throughout the collection system with approximately 450 manholes. Refer to Exhibit 1 for the collection system map, which

illustrates the existing sewer collection system. Sewer lines and/or manholes that were inspected and televised have been highlighted and sections that were repaired have also been noted for reference purposes.

3.0 CURRENT HYDRAULIC LOADING

The Broad Run WWTP is equipped with influent and effluent flow meters to continuously measure and record flows. The Chestnut Lane and Broadview East Pump stations are also equipped with flow meters. A calibration report for the plant and pump stations are included in Exhibit 2.

Permitted hydraulic capacity at Broad Run WWTP is 0.400 Million Gallons per Day (MGD) as an average monthly flow basis. The hydraulic loadings at the treatment plant from 2005 through 2009 are presented in Table 1 and are depicted graphically in Figure 1. The average hydraulic loading for 2009 was 0.279 MGD, which is 0.007 MGD lower than 2008's average flow of 0.286 MGD. The average of the highest three consecutive months for 2009 was 0.338 MGD which occurred during October, November, and December of 2009. Those three months had significant rainfall and snow with total precipitation of 18.3 inches. The average monthly flow during December was 0.418 MGD and was the highest monthly average in 2009, which exceeded the permitted capacity of 0.400 MGD. The flow projection factor (average of the ratios of maximum three-month average flow to average annual flow) for the last five years is 1.2, similar to 2008. Refer to Table 1 for the flow projection factors calculated over the past five years.

Except for December 2009, average monthly flows in 2009 were well below the permitted flow capacity. Table 3 provides precipitation data collected at the WWTP during 2009. A total of approximately 8.6 inches of precipitation occurred in December, which was the primary cause of the elevated flow during that month.

During 2006, AWM performed a hydraulic rate study of the Broad Run WWTP to determine if additional flow could be treated at the plant. The result of the study determined that no additional available hydraulic capacity exists over and above the

BROAD RUN SEWER PLANT
2009 WASTELOAD MANAGEMENT REPORT

TABLE 1
SUMMARY OF MONTHLY HYDRAULIC LOADINGS (MGD)

MONTH	2005	2006	2007	2008	2009	5 Year Average
January	0.411	0.364	0.399	0.295	0.246	
February	0.346	0.360	0.297	0.357	0.229	
March	0.353	0.311	0.422	0.399	0.224	
April	0.468	0.285	0.483	0.323	0.253	
May	0.321	0.262	0.413	0.311	0.299	
June	0.281	0.309	0.360	0.276	0.311	
July	0.267	0.370	0.298	0.234	0.242	
August	0.248	0.253	0.262	0.235	0.268	
September	0.215	0.249	0.238	0.245	0.259	
October [1]	0.241	0.247	0.234	0.229	0.280	
November [1]	0.245	0.339	0.252	0.246	0.315	
December [1]	0.287	0.341	0.295	0.278	0.418	
Min month	0.215	0.247	0.234	0.229	0.224	
Avg annual	**0.307**	**0.308**	**0.329**	**0.286**	**0.279**	**0.302**
Max month	0.468	0.370	0.483	0.399	0.418	
Max 3 Months Average [1]	0.394	0.345	0.439	0.360	0.338	
Flow Projections Factor [2]	1.3	1.1	1.3	1.3	1.2	1.2
School Occupancy	900	1,135	1,221	1,050	1,050	
School Flows (gpd)[3]	0.009	0.011	0.012	0.010	0.010	
Residential Connected Units [4]	1,252	1,254	1,273	1,322	1,322	
Flow Per Connection (gpd)	238	236	249	208	203	227

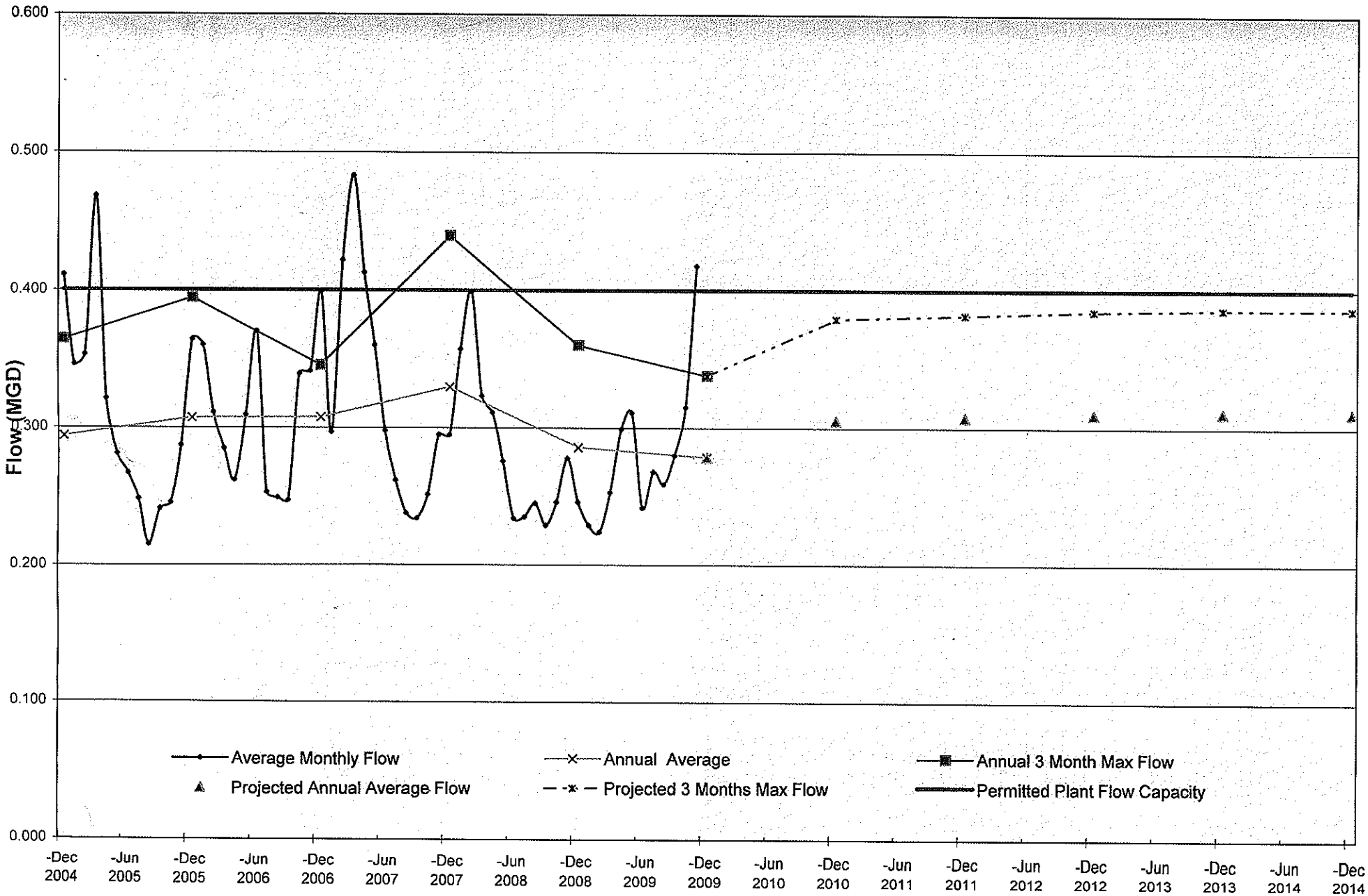
1 Represents the five years rolling average of the highest three consecutive month's flows.

2 Ratio between the max 3- month average flow and the annual average flow .

3 School flows calculated by using 13 gpd/person (DEP planning number) multiplied by 3/4 (length of school year)

4 Residential connections do not include school occupancy numbers

BROAD RUN SEWER PLANT
2009 WASTELOAD MANAGEMENT REPORT
WWTP HYDRAULIC LOADINGS AND PROJECTIONS
FIGURE 1



BROAD RUN SEWER PLANT
2009 WASTELOAD MANAGEMENT REPORT

TABLE 2
SUMMARY OF MONTHLY ORGANIC LOADINGS

MONTH	2005	2006	2007	2008	2009	5 Year Average
January	533	527	484	*	409	
February	449	521	360	396	370	
March	458	450	512	483	337	
April	607	413	586	563	284	
May	416	379	501	536	345	
June	364	448	437	412	371	
July	346	536	362	507	297	
August	322	366	318	355	421	
September	279	361	289	458	312	
October	313	358	284	428	287	
November	318	491	305	288	293	
December	372	494	358	464	562	
Min month	279	358	284	288	284	
Avg annual	**398**	**445**	**400**	**445**	**357**	**409**
Max month	607	536	586	563	562	
Organic Projection Factor[1]	1.5	1.2	1.5	1.3	1.6	1.4

1. Ratio between the max month average and the annual average organic loadings.

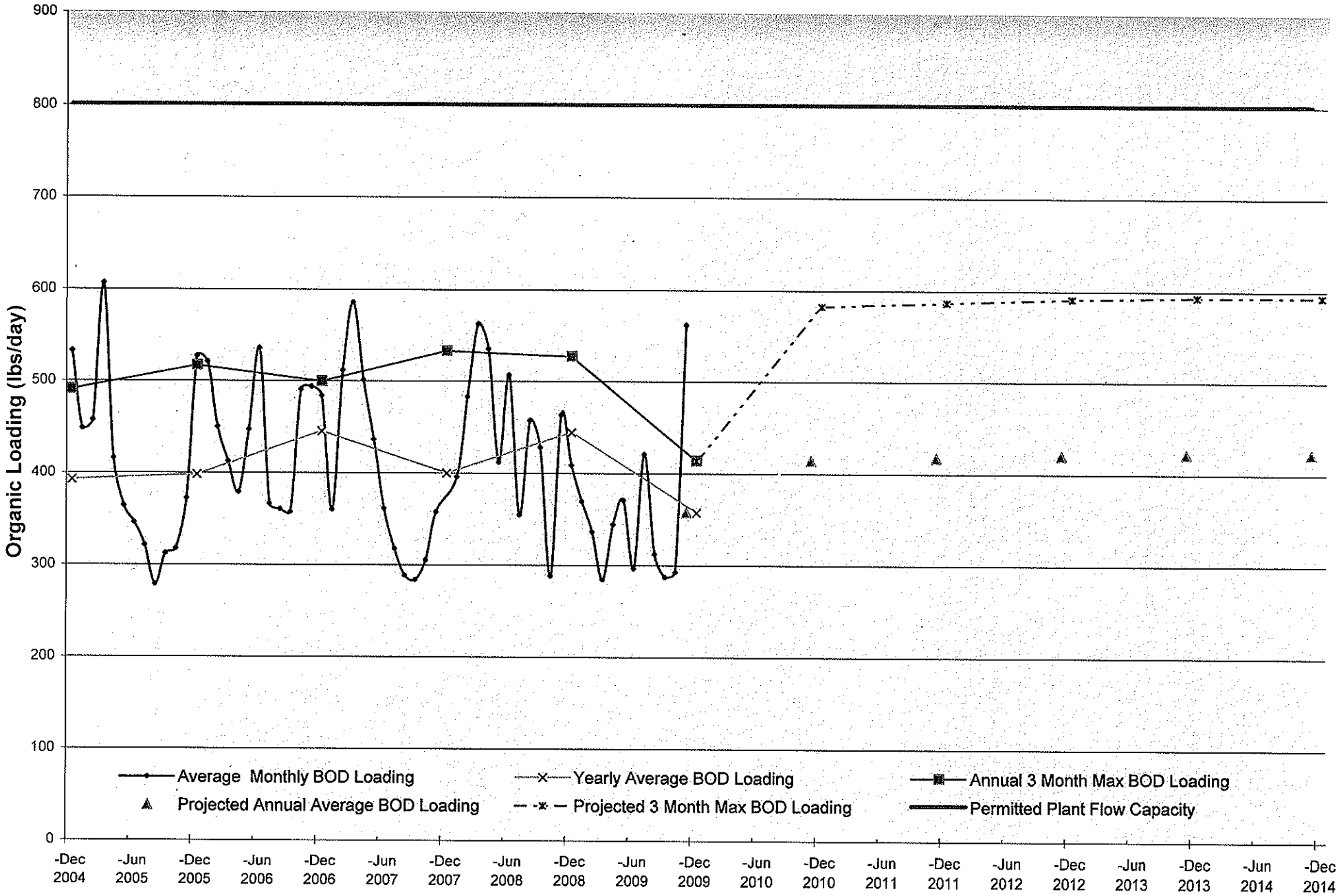
BROAD RUN SEWER PLANT
2009 WASTELOAD MANAGEMENT REPORT

TABLE 3
2009 PRECIPITATION DATA

Month	Precipitation (inches)		
	Rain	Snow	Total Precipitation
January	1.8	7.0	2.5
February	2.0		2.0
March		8.0	0.8
April	7.3		7.3
May	6.2		6.2
June	5.0		5.0
July	3.3		3.3
August	8.0		8.0
September	3.8		3.8
October	7.8		7.8
November	1.9		1.9
December	6.9	17.0	8.6
Yearly Totals	54.02	32	57.22

Source: Broad Run Wastewater Treatment Plant

BROAD RUN SEWER PLANT
2009 WASTELOAD MANAGEMENT REPORT
WWTP ORGANIC LOADINGS AND PROJECTIONS
FIGURE 2



permit limit of 400,000 gpd at the plant. The hydraulic capacity is limited mainly by the modeled and projected rise in the sludge blanket in the clarifier, which is based upon a hydraulic model simulation. Conveying additional flow to the plant over the permit limit is not recommended given the existing facility configuration. (Refer to the report on the Broad Run Wastewater Treatment Plant Evaluation, dated November 2006) as prepared by AWM.

The estimated flow per connection in 2009 was 203 gpd per connection based on 1,322 units connected. The flow per connection has marginally decreased from 208 gpd per connection in 2008. Refer to Table 1 for the flow per connection in the past five years.

4.0 CURRENT INFLUENT ORGANIC LOADING

Twenty four (24) hour composite influent BOD samples were taken for each month in 2009. Influent sample results are summarized in Table 2. The average influent BOD_5 for the periodic testing from 2005 through 2009 was 409 lbs/day. The BOD_5 results have historically varied from one sample to the next. This is likely due to the I&I that the system has experienced causing dilution of flow. The average of the actual and measured 2009 influent BOD_5 results was 155 mg/l. Broad Run has taken influent samples in 2009 and will continue to take influent samples in the future to provide "real" organic loadings to the plant for the year.

This has become a part of their standard operating procedure (SOP). All influent testing is conducted by an independent lab. In 2009, UIP has had no NPDES violations with respect to BOD loadings or any other parameter for that matter.

Monthly influent organic loadings for the past five years are presented in Table 2 and graphically in Figure 2. Loadings were calculated using the average of the influent BOD_5 analyses for the year and the average monthly flow for that year. Prior to 2008, BOD influent concentration was estimated.

The organic plant capacity of 801 lbs/day was estimated using the permitted flow of 400,000 gpd and a BOD_5 concentration of 240 mg/l. The monthly average organic loading for 2009 was calculated using the actual measured BOD_5 result and the average flow for the month. The annual average organic loading for 2009 was 357 lbs/day and the highest average month's loading was 562 lbs/day that occurred in December 2009. Further, the monthly average and highest monthly average organic loadings in 2009 is below the estimated plant capacity of 801 lbs/day. The projected annual average and three month maximum BOD_5 loadings for the next five years are within the plant's organic capacity. The organic loading projection factor (average ratio of the highest monthly loading to the annual average loading for the last five years) in 2009 was 1.4 and has varied between 1.3 and 1.6 in the past five years. Refer to Table 2 for the organic projection factors over the past five years.

5.0 PROJECTED HYDRAULIC LOADING

The total number of homes scheduled for connection to the Broad Run WWTP over the next five years is presented in Table 4.

The Sawmill Subdivision is an approved subdivision that received Act 537 Planning Module Approval in June 2004. It is approximately 50% complete. The approval is to serve a total of 66 lots. The project is approved for 15,180 gallons per day to be treated at the Broad Run Plant. Currently there are 35 units connected to the system with no schedule to connect the remaining 31 units, but will most likely occur over the next five years for planning purposes.

Proposed developments in the service area have been used to project the future flows to the Broad Run Plant. The 5-year flow projections have been summarized in Table 5 and depicted graphically on Figure 1. An estimated unit flow of 227 gpd per residential connection (past five years average flow per connection) from Table 1 was used to estimate future flows for all proposed projects. The estimated flow per connection was calculated by dividing the average daily flow for the year by the number of connected units in that year. This incorporates flows for two elementary schools, which includes a

BROAD RUN SEWER PLANT
2009 WASTELOAD MANAGEMENT REPORT

TABLE 4

KNOWN FUTURE GROWTH FOR THE NEXT FIVE YEARS

DEVELOPMENT/SUBDIVISION	TOTAL UNITS	CURRENT NUMBER OF CONNECTIONS AS OF 2009	PROJECTED INCREASE BY 2014
EXISTING DEVELOPMENTS ALREADY BEING SERVED			
Bradford Glen/Victoria Crossing	476	476	Built Out
Summit/Walnut/Valley Ridge	212	212	Built Out
Highlands	47	47	Built Out
Brandywine Greene, Phase I – III	206	206	Built Out
Brandywine Ridge	143	143	Built Out
Brandywine Greene, Phase IV	64	64	Built Out
Stonegate	102	102	Built Out
Schools	2	2	Built Out
Sawmill Subdivision 1	69	35	34
PROPOSED DEVELOPMENTS			
Heritage Subdivision	64	0	*64
MISCELLANEOUS			
Miscellaneous Residences	4	4	0
TOTAL	1389	1291	34

Sawmill Subdivision's connections is spread out over the next 4 years. 10 units for the next three years and 5 units in the forth year.

* PADEP has approved 14,080 gpd flow for the Heritage development.

BROAD RUN SEWER PLANT
2009 WASTELOAD MANAGEMENT REPORT

TABLE 5
SUMMARY OF THE HYDRAULIC LOADINGS PROJECTIONS

MONTH	2010	2011	2012	2013	2014	5 Year Average
Projected Annual Average Flow	**0.305**	**0.308**	**0.310**	**0.311**	**0.311**	**0.309**
Projected Max 3 Months Average (mgd)	0.379	0.382	0.385	0.386	0.386	
Projected Hydraulic Peak Factor [1]	1.24	1.24	1.24	1.24	1.24	1.24
Projected School Occupancy	1,050	1,050	1,050	1,050	1,050	
Projected School Flows (gpd)[2]	0.010	0.010	0.010	0.010	0.010	
Projected Residential Connected Units[3]	1,332	1,342	1,352	1,357	1,357	
Projected Flow Per Connection (gpd)	222	222	222	222	222	222

1. Ratio of Projected Annual Average Flow and Projected Max 3 Months

2. Assuming no change in the number of students

total current occupancy of 1,050 students and staff. The average of the flows per connection for 2009 is 203 gpd/residential unit.

The projected average flow to the treatment plant at the end of the next five-year period is 0.311 MGD, which is approximately 77% of the permitted capacity. The 5-year projected three month maximum hydraulic loading is 0.386 gpd or 96% of the rated capacity. Note the projected 3 month maximum hydraulic loading reduced from 0.397 in 2008 to 0.386 in 2009, respectively. Similarly, the projected 3 month maximum hydraulic loading should presumably be reduced in 2010 after I&I reduction measures are implemented (refer section 8 for additional details). Except for the remainder of the Saw Mill Development and the Heritage Residential Development, no future development is planned at this time over the next five years.

6.0 PROJECTED ORGANIC LOADING

The projected organic loading for the next five years is summarized in Table 6 and presented in Figure 2. The projected average organic loadings was developed using the projected average daily flow for each of the next five years and the average influent BOD_5 concentration for 2005 through 2009.

The projected average daily organic loading for 2014 is 422 lbs/day or 52% of the "design" capacity, based upon 801 lbs/day. The projected maximum month loadings were calculated by multiplying the five-year average projection factor by the average organic load. The projected maximum monthly load for 2014 is 593 pounds per day or 74% of the "design" capacity. The historic and "design" organic loading are depicted graphically in Figure 2.

7.0 FLOW METERING UPDATE

2009 flow data in this report demonstrates that the Broad Run WWTP experienced hydraulic loading greater than the NPDES permitted average monthly flow of 0.400

BROAD RUN SEWER PLANT
2009 WASTELOAD MANAGEMENT REPORT

TABLE 6

SUMMARY OF THE ORGANIC LOADINGS PROJECTIONS

MONTH	2010	2011	2012	2013	2014	5 Year Average
Projected Annual Flow (mgd)	0.305	0.308	0.310	0.311	0.311	
Projected Annual Organic Loading	**414**	**417**	**420**	**422**	**422**	**419**
Projected Max 3 Months Average	582	587	591	593	593	
Projected Organic Peak Factor	1.4	1.4	1.4	1.4	1.4	1.4

MGD in the month of December 2009, due to snow and rainfall while other months in 2009 were a good deal less than the permitted flow.

Consequently, UIP shall continue with flow metering to support I/I reduction. The 2008 corrective action plan (CAP) to address this hydraulic condition was to effectively meter flow and to invoke I&I reduction measures throughout the Broad Run collection system. Section 8 details the 2009 I&I reduction measures taken at Broad Run.

In 2009, the PADEP approved to release and grant 14,080 gpd as available capacity to serve the proposed Heritage Development. No other development is planned to be connected in the future, over the next five years, until further flow reduction is demonstrated with respect to its collection system and WWTP. No additional connections will be connected to the system unless additional connection capacity credits are first granted by PADEP.

In February 2009, an influent flow meter was installed at the WWTP to monitor flows to the facility. Since March 2008, both the Chestnut Lane and Broadview East pumping stations were equipped with permanent flow meters to monitor flows from these facilities. Also in March 2009, UIP purchased and installed two interceptor flow meters that were strategically placed to gather flow data in the collection system. The two temporary portable interceptor meters are Teledyne® ISCO 2150 area velocity flow modules and were installed in manholes 20 and 25 along Sawmill Road. Weekly readings were downloaded via laptop using Flowlink® 5.1 software from April 1 through June 30, 2009. The flow data for each monitoring location are provided in Exhibit 3, along with the daily precipitation amounts. Based on our initial analysis of the data, it does not appear that large rain events significantly increased the flow between the two manholes in that designated subsurface area. Therefore, there may not be significant I/I issues specific to that study area.

The influent flow meter at the WWTP utilizes a dual flume configuration and is designed to record total and individual flows to each of the two flow equalization tanks. Daily influent flow readings are recorded onto a weekly pen chart recorder. The influent flow

meter system consists primarily of two Palmer Bowlus flumes and a Partlow MRC 7800 chart recorder with dual sensors.

UIP will continue to evaluate the condition of the collection system and will, through televised inspection of lines, smoke testing, additional flow metering and other methods, will identify and correct specific sources of I&I as needed.

8.0 SEWER MAINTENANCE AND I/I REDUCTION MEASURES

Portions of the sewage collection system are now more than 25 years old, while other portions have recently been installed. I&I investigations have verified some deteriorating conditions within the collection system and these sewers and manholes have been repaired accordingly. UIP has made, and continues to make, efforts to improve the condition of the collection system.

In accordance with UIP's Corrective Action Plan, they have undertaken a sewer inspection and repair program in an effort to minimize and eliminate major sources of I&I. Most of the efforts have taken place since May 1996 because, prior to that, UIP was focusing their efforts on capital improvements at the wastewater treatment plant. Refer to 2008 chapter 94 report for a summary of the sewer inspections and repairs conducted by UIP in 2008.

UIP has implemented plant, interceptor and pump station flow metering. In addition, UIP performed inspections of the collection system to identify and repair infiltration and inflow problem areas. UIP. UIP conducted various I/I reduction measures in 2009. Please refer to the June 2009 Semi-annual report as prepared by UIP and the December 2009 Semi-annual report as prepared by FX Browne, Inc., for associated details. However, excerpts and a summary of I/I reduction measures are provided below:

Field inspection of sanitary manholes were conducted throughout the collection in June 2009 by Mr. Rehab, Inc. Manhole inspections were conducted along: Old Shadyside Road, the Virginia Glenn development, the Penn's Woods development, Chestnut Lane,

Ashcom Drive, Lawson Lane, Sawmill Road, the Chestnut Lane Pump Station, and the Chestnut Lane Pump Station right-of-way. In 2009, a total of 87 manholes were inspected and a total of 1,626 lf of sewer mains were televised. Details are included below:

A. Manholes – 87 Manholes were inspected and numerous problems were identified including cracks, leaks, broken benches, broken frames, road/hillside runoff, roots and debris. A manhole inspection report is provided in Exhibit 4. During this reporting period, 13 manholes were raised and 5 manholes received a grout injection treatment to eliminate leaking. Work will continue during 2010 to continue repairing damaged or inadequate manholes.

B. Sewer Line Televising – A total of 1,626 feet of sewer line was televised in June, 2009 along Ashcom Drive, Witherspoon Drive, and North Glen Drive. A summary of the televising results is provided in Exhibit 5. Two off-set or separated joints were observed between manholes 7 and 7.1 on Ashcom Drive, and one off-set or separated joint was observed between manholes 6.1 and 6.2 on North Glen Drive. Additionally one lateral connection on Ashcom Drive (between manholes 7 and 7.1) is suspected to be leaking or may be defective. These sewer line deficiencies will be included in the 2010 rehabilitation program.

A summary of the 2009 sewer system evaluation is provided in Exhibit 6. The study area included: Old Shady Road R/W, Virginia Glen Development, Penn's Woods, Chestnut Lane, Ashcom Drive, Larson Lane, Sawmill Road R/W, Chestnut Lane Pump Station and R/W, Walnut Ridge, Carlise Lane, Kerwood Lane, Westminster Drive, Ridgeview Circle, Broadview East, and Glenside Road.

C. Future 2010 I&I Investigation and Reduction Measures Additional sewer inspections are anticipated in the future. UIP plans to continue with the following work in 2010:

1. UIP will continue to measure flow at the plant's influent metering location, as well as the Chestnut Lane Pump Station and the Broadview East Pump Station locations
2. UIP will continue to make I&I repairs based on identified problem areas.
3. UIP will continue to identify any new sources of I&I within their service area that have not yet been evaluated.
4. UIP will continue to work with West Bradford Township on its Act 537 Plan.

As mentioned above, the I&I investigation and reduction measures have begun and UIP will implement the remaining I&I investigation and reduction measures in the future, as deemed necessary by UIP and PADEP in 2010 and beyond.

9.0 SEWER EXTENSIONS

No new sewer extensions were constructed in 2009.

10.0 SANITARY PUMP STATIONS

Two pump stations (PS) exist in the Broad Run sewer collection system: the Chestnut Lane PS located at the intersection of Broad Run Road and Chestnut Lane; and the Broadview East PS, located at the end of the cul-de-sac on Broadview East Road. Both stations are inspected daily by treatment plant personnel and equipped with an autodialer to notify the operator in the event of a high level alarm or loss of power. In the event of power loss, each station has an emergency generator to provide backup power. The Chestnut Lane Pump Station is controlled by an ultrasonic level transmitter with a backup float system. Overall, the stations are in general working condition.

Since March 2008, permanent flow meters were installed at the Chestnut Lane and Broadview East Pumping Stations. The Chestnut Lane and Broadview East Pumping Stations are both equipped with permanent Teledyne ISCO flow modules. Flow data from the modules is downloaded via laptop on a bi-weekly basis. Table 7 includes 2009 average flow data to these two pump stations, based upon meter readings.

SUMMARY OF MONTHLY PUMP STATION HYDRAULIC FLOW (MGD)
2009 WASTELOAD MANAGEMENT REPORT

TABLE 7
SUMMARY OF MONTHLY PUMP STATION HYDRAULIC FLOW (MGD)

MONTH	CHESTNUT LANE	BROAD VIEW EAST
January	0.086	Not Available
February	0.084	Not Available
March	0.083	Not Available
April	0.087	0.017
May	0.096	0.025
June	0.071	0.025
July	0.062	0.022
August	0.062	0.021
September	0.064	0.016
October	0.062	0.018
November	0.060	0.016
December	0.068	0.022
Min month	0.060	0.016
Avg annual	**0.074**	**0.020**
Max month	0.096	0.025
Peak Instantaneous Flow	**N/A**	**N/A**

Characteristics of the Broadview East pump station is provided in the table below:

BROADVIEW EAST PUMP STATION	
Homes Connected:	68
Average Flow per Unit	203 gpd (2009 average flow per unit)
Average Flow per day	20,000 gpd or 13.8 gpm (2009 Data)
Peaking Factor	4.2
Estimated Peak Flow per day	84,000 gpd or 55 gpm
Description	Duplex Submersible
Pumps Rating	99 gpm at 48 TDH
Auxiliary Power	Generator
Meter	Teledyne ISCO flow modules

In terms of the existing and projected flows at the two pump stations, the projected 2-year maximum flow for the Broadview East pump station is not expected to increase from the current levels, because there are no planned projects or connections scheduled within the next two years, tributary to this pump station. The operating flow rate of the pumps installed in the Broadview East pump station is 99 gpm and the PS has a maximum inflow rate of 55 gpm; therefore, the pumps are sized adequately to handle flow during peak flow conditions, given suitable peaking factors:

Regarding Chestnut Lane Pump Station, projected 2-year maximum flow for this station is not expected to increase from the current levels, because there are no planned projects or connections scheduled within the next two years, tributary to this pump station. The only increase in flow to this pump station over the next five years could come from an increase in school attendance, which is assumed to be minimal. The operating flow rate of the pumps installed in the Chestnut Lane PS is 315 gpm and the PS has a maximum inflow rate of 235 gpm; therefore, the pumps are sized adequately to handle flow during peak flow conditions, given suitable peaking factors. Characteristics of the Chestnut Lane pump station are provided in the table below.

CHESTNUT LANE PUMP STATION	
1. Homes Connected:	368
Average Flow per Unit	203 gpd (2009 average flow per unit)
Average Flow per Day	74,000 gpd (2009 Data)
2. School Flows:	508 students
Average flow per student:	13 gpd (PA DEP Manual – Page 41)
Estimated flow per day:	6,604 gpd
Length of School year:	¾ year
Total School Flow	4,953 gpd
Total Estimated Flow per Day	80,600 gpd (1 and 2)
Peaking Factor	4.2
Estimated Peak Flow per day	338,530 gpd or 235 gpm
Description	Duplex Submersible
Pumps Rating	315 gpm
Auxiliary Power	Generator
Meter	Teledyne ISCO flow modules

11. INDUSTRIAL WASTES

The Broad Run WWTP only accepts wastewater from private homes and two elementary schools. UIP does not currently accept, nor does it intend to receive any industrial wastewater in the future.

12. ACT 537 UPDATE

UIP has continued correspondence with the DEP and West Bradford Township regarding the Act 537 Plan. UIP has decided that future lots in their franchise area will be served by on-lot systems, except in situations where a builder/developer requests that a development be served by public sewer for either residential and/or commercial use. If approached by a developer for public sewer service, UIP will evaluate whether or not they can adequately provide such service. Therefore, at this time, no additional wastewater treatment capacity is needed for the UIP franchise area above its current 400,000 gpd permitted capacity.

EXHIBITS

EXHIBIT 1

West Bradford Township UIP Service Area Map

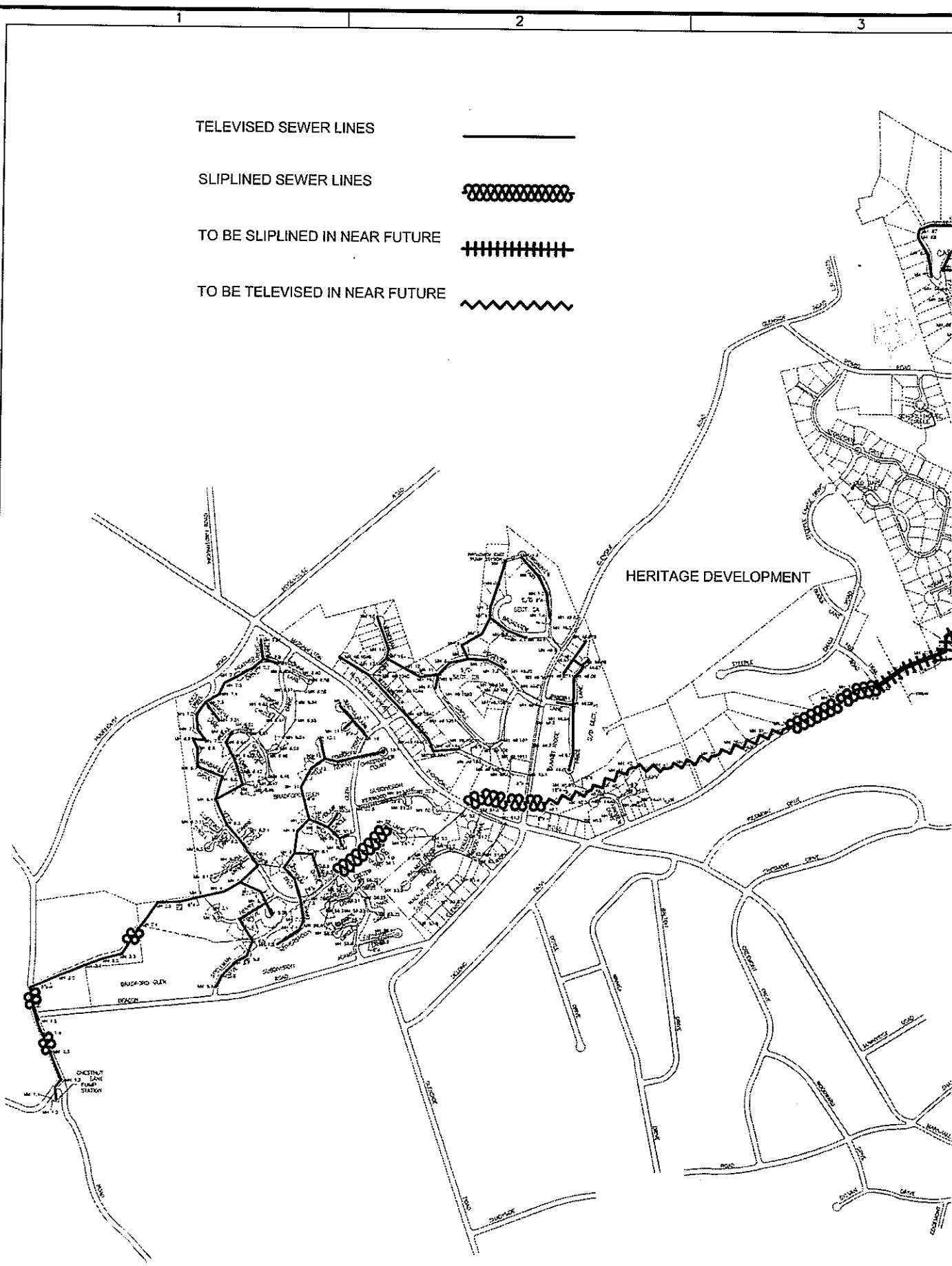


EXHIBIT 2

Calibration Records

To: Chuck Madison / Glen Bruce
Co./Dept:
Fax #:
From: 610-269-8715
W.G. Malden
Phone: 717-768-0800
Fax: 717-768-0802

W.G. MALDEN
P.O. BOX 196, EAST EARL, PA 17519
PHONE: (717) 768-0800 FAX: (717) 768-0802

SERVICE REPORT

CHUCK MADISON
UTILITES INC. OF PA
1201 SAWMILL ROAD
DOWNINGTOWN, PA 19335

SERVICE DATE: 11/9/2009
METER#: C1022 AB
LOCATION: BROAD RUN WWTF INF
SERIAL #: 12747
MANUFACTURER: EASTECH/PARTLOW
RECORDER: MRC 7800
TRANSMITTER: 2220
PRIMARY: (2) 12" PALMER BOWLUS
MAXIMUM CAPACITY: 1000 GPM EACH
SERVICE CONTRACT: ANNUAL

WORK PERFORMED

CLEANED EQUIPMENT: X **PRIMARY:** X

RECORDER CALIBRATION **CHECKED AT:** 0, 50 & 100%
ERROR: 0% **CORRECTED ACCURACY:** ±1%

TOTALIZER CALIBRATION **CHECKED AT:** 0, 50 & 100%
ERROR: 0% **CORRECTED ACCURACY:** ± 1/2%

TRANSMITTER CALIBRATION
SIMULATED HEAD RISES AND FLOW MEASUREMENTS
ERROR: 0% **CORRECTED ACCURACY:** ±1%

COMMENTS: REQUESTED SERVICE TO CHECK CALIBRATION OF INFLUENT METER. PERFORMED VOLUMETRIC FILL TEST AT INFLUENT TANK.FOUND METER WITHIN 1/2%. ALSO, INSTALLED REPLACEMENT FLOWMETER AT PLANT EFFLUENT. CALIBRATED AND LEFT EQUIPMENT OPERATING PROPERLY.

SERVICE REPRESENTATIVE: DAVID/BOB **PERSON SEEN:** GLEN BRUCE
copies:

W.G. MALDEN
P.O. BOX 196, EAST EARL, PA 17519
PHONE: (717) 768-0800 FAX: (717) 768-0802

SERVICE REPORT*

CHUCK MADISON
UTILITES INC. OF PA
1201 SAWMILL ROAD
DOWNINGTOWN, PA 19335

SERVICE DATE: 11/9/2009
METER#: C1022 AA
LOCATION: BROAD RUN WWTF EFFLUENT
SERIAL #: 10552
MANUFACTURER: EASTECH/BADGER
RECORDER: 3000
TRANSMITTER: 2210
PRIMARY: 90° V-NOTCH
MAXIMUM CAPACITY: 600,000 GPD
SERVICE CONTRACT: ANNUAL

WORK PERFORMED

CLEANED EQUIPMENT: X **PRIMARY:** X

RECORDER CALIBRATION* **CHECKED AT:** ZERO & SPAN
ERROR: 0% **CORRECTED ACCURACY:** ±1%

TOTALIZER CALIBRATION* **CHECKED AT:** 0, 25, 50, 75 & 100%
ERROR: 0% **CORRECTED ACCURACY:** ± 1%

TRANSMITTER CALIBRATION*
SIMULATED HEAD RISES AND FLOW MEASUREMENTS
ERROR: 0% **CORRECTED ACCURACY:** ±1%

COMMENTS: INSTALLED NEW EFFLUENT METER AND PERFORMED ANNUAL CALIBRATION. LEFT EQUIPMENT OPERATING PROPERLY

SERVICE REPRESENTATIVE: BOB AND DAVID **PERSON SEEN:** MARK / GLENN
copies:

W.G. MALDEN
P.O. BOX 196, EAST EARL, PA 17519
PHONE: (717) 768-0800 FAX: (717) 768-0802

SERVICE REPORT

CHUCK MADISON
UTILITES INC. OF PA
1201 SAWMILL ROAD
DOWNINGTOWN, PA 19335

SERVICE DATE: 6/3/2009
METER#: C1022 AC
LOCATION: CHESTNUT LANE-PS
SERIAL #:
MANUFACTURER: CENTRAL ELECTRONICS
RECORDER: N/A
TRANSMITTER: PSM 660B
PRIMARY: WET WELL 72"
MAXIMUM CAPACITY: N/A
SERVICE CONTRACT: ANNUAL

WORK PERFORMED

CLEANED EQUIPMENT: X **PRIMARY:** X

RECORDER CALIBRATION **CHECKED AT:**
ERROR: 0% **CORRECTED ACCURACY:**

TOTALIZER CALIBRATION **CHECKED AT:** 0, 50 & 100%
ERROR: 0% **CORRECTED ACCURACY:** ± 1/2%

TRANSMITTER CALIBRATION
VOLUMETRIC DRAW DOWN AND FILL TEST
ERROR: 0% **CORRECTED ACCURACY:** ±3%

COMMENTS: LEFT EQUIPMENT OPERATING PROPERLY.

SERVICE REPRESENTATIVE: DAVID AND DENNIS BAKER
PERSON SEEN: MARK
copies:

COPY

EXHIBIT 3

Interceptor Flow Data and Rainfall

(Taken from FX Browne, Inc. Semi Annual Report, Dated 2009)

Interceptor Flow Data and Rainfall Data					
Date	Flow at MH25 (gpd) Upslope	Flow at MH20 (gpd) Downslope	Difference	% Difference	Rainfall (inches)
4/1/2009 0:00	0.209	0.216	0.007	3.2	0.3
4/2/2009 0:00	0.206	0.182	(0.024)	-13.2	0.4
4/3/2009 0:00	0.235	0.244	0.009	3.7	0.5
4/4/2009 0:00	0.223	0.202	(0.021)	-10.4	1.1
4/5/2009 0:00	0.252	0.213	(0.039)	-18.3	0
4/6/2009 0:00	0.251	0.218	(0.033)	-15.1	0
4/7/2009 0:00	0.209	0.203	(0.006)	-3.0	0
4/8/2009 0:00	0.224	0.191	(0.033)	-17.3	0
4/9/2009 0:00	0.232	0.189	(0.043)	-22.8	0
4/10/2009 0:00	0.237	0.191	(0.046)	-24.1	0.2
4/11/2009 0:00	0.249	0.273	0.024	8.8	0
4/12/2009 0:00	0.217	0.257	0.040	15.6	1.1
4/13/2009 0:00	0.203	0.247	0.044	17.8	0
4/14/2009 0:00	0.227	0.261	0.034	13.0	0.5
4/15/2009 0:00	0.241	0.265	0.024	9.1	0.5
4/16/2009 0:00	0.223	0.247	0.024	9.7	0.7
4/17/2009 0:00	0.224	0.242	0.018	7.4	0
4/18/2009 0:00	0.244	0.257	0.013	5.1	0
4/19/2009 0:00	0.236	0.277	0.041	14.8	0
4/20/2009 0:00	0.233	0.261	0.028	10.7	0.9
4/21/2009 0:00	0.234	0.248	0.014	5.6	0.8
4/22/2009 0:00	0.238	0.247	0.009	3.6	0
4/23/2009 0:00	0.223	0.243	0.020	8.2	0.3
4/24/2009 0:00	0.219	0.237	0.018	7.6	0
4/25/2009 0:00	0.239	0.258	0.019	7.4	0
4/26/2009 0:00	0.251	0.281	0.030	10.7	0
4/27/2009 0:00	0.231	0.25	0.019	7.6	0
4/28/2009 0:00	0.231	0.241	0.010	4.1	0
4/29/2009 0:00	0.223	0.237	0.014	5.9	0
4/30/2009 0:00	0.209	0.233	0.024	10.3	0
5/1/2009 0:00	0.247	0.244	(0.003)	-1.2	0
5/2/2009 0:00	0.258	0.266	0.008	3.0	0.2
5/3/2009 0:00	0.284	0.288	0.004	1.4	1.6
5/4/2009 0:00	0.304	0.306	0.002	0.7	0.5
5/5/2009 0:00	0.289	0.287	(0.002)	-0.7	0
5/6/2009 0:00	0.282	0.286	0.004	1.4	2.6
5/7/2009 0:00	0.371	0.403	0.032	7.9	0
5/8/2009 0:00	0.323	0.343	0.020	5.8	0
5/9/2009 0:00	0.342	0.36	0.018	5.0	0
5/10/2009 0:00	0.349	0.362	0.013	3.6	0.1
5/11/2009 0:00	0.32	0.323	0.003	0.9	0
5/12/2009 0:00	0.306	0.31	0.004	1.3	0.1
5/13/2009 0:00	0.302	0.275	(0.027)	-9.8	0
5/14/2009 0:00	0.306	0.313	0.007	2.2	0
5/15/2009 0:00	0.33	0.338	0.008	2.4	0.1
5/16/2009 0:00	0.333	0.339	0.006	1.8	0.29
5/17/2009 0:00	0.357	0.373	0.016	4.3	0.1
5/18/2009 0:00	0.314	0.318	0.004	1.3	0
5/19/2009 0:00	0.305	0.304	(0.001)	-0.3	0.2

Interceptor Flow Data and Rainfall Data					
Date	Flow at MH25 (gpd) Upslope	Flow at MH20 (gpd) Downslope	Difference	% Difference	Rainfall (inches)
5/20/2009 0:00	0.301	0.304	0.003	1.0	0
5/21/2009 0:00	0.295	0.301	0.006	2.0	0
5/22/2009 0:00	0.297	0.291	(0.006)	-2.1	0
5/23/2009 0:00	0.292	0.285	(0.007)	-2.5	0
5/24/2009 0:00	0.288	0.287	(0.001)	-0.3	0.19
5/25/2009 0:00	0.311	0.32	0.009	2.8	0
5/26/2009 0:00	0.272	0.286	0.014	4.9	0.21
5/27/2009 0:00	0.27	0.281	0.011	3.9	0
5/28/2009 0:00	0.264	0.271	0.007	2.6	0.31
5/29/2009 0:00	0.287	0.296	0.009	3.0	0
5/30/2009 0:00	0.289	0.303	0.014	4.6	0
5/31/2009 0:00	0.287	0.303	0.016	5.3	0
6/1/2009 0:00	0.259	0.27	0.011	4.1	0
6/2/2009 0:00	0.256	0.263	0.007	2.7	0.47
6/3/2009 0:00	0.277	0.284	0.007	2.5	0.18
6/4/2009 0:00	0.296	0.306	0.010	3.3	1.04
6/5/2009 0:00	0.358	0.376	0.018	4.8	0.62
6/6/2009 0:00	0.331	0.351	0.020	5.7	0
6/7/2009 0:00	0.322	0.341	0.019	5.6	0
6/8/2009 0:00	0.292	0.303	0.011	3.6	0
6/9/2009 0:00	0.316	0.33	0.014	4.2	0.4
6/10/2009 0:00	0.308	0.329	0.021	6.4	0.4
6/11/2009 0:00	0.285	0.311	0.026	8.4	0.1
6/12/2009 0:00	0.285	0.306	0.021	6.9	0
6/13/2009 0:00	0.313	0.322	0.009	2.8	0.3
6/14/2009 0:00	0.337	0.342	0.005	1.5	0
6/15/2009 0:00	0.291	0.299	0.008	2.7	0
6/16/2009 0:00	0.279	0.278	(0.001)	-0.4	0
6/17/2009 0:00	0.273	0.272	(0.001)	-0.4	0.64
6/18/2009 0:00	0.304	0.308	0.004	1.3	0
6/19/2009 0:00	0.29	0.289	(0.001)	-0.3	0.17
6/20/2009 0:00	0.317	0.325	0.008	2.5	0.6
6/21/2009 0:00	0.305	0.309	0.004	1.3	0
6/22/2009 0:00	0.282	0.295	0.013	4.4	0
6/23/2009 0:00	0.267	0.271	0.004	1.5	0
6/24/2009 0:00	0.264	0.267	0.003	1.1	0
6/25/2009 0:00	0.274	0.267	(0.007)	-2.6	0
6/26/2009 0:00	0.29	0.256	(0.034)	-13.3	0
6/27/2009 0:00	0.256	0.259	0.003	1.2	0
6/28/2009 0:00	0.27	0.27	0.000	0.0	0.18
6/29/2009 0:00	0.267	0.25	(0.017)	-6.8	0
6/30/2009 0:00	0.259	0.237	(0.022)	-9.3	0
AVG	0.274	0.281			

EXHIBIT 4

2009 Manhole Inspection Report

(Taken from FX Browne, Inc. Semi Annual Report, Dated 2009)

MR. REHAB, INC.
Three Long Lane
Mechanicsburg, PA 17050

UTILITY INC. OF PA
SUMMARY SPREADSHEET OF MANHOLE INSPECTIONS

								MANHOLE SURCHARGING				REPAIR / REHAB RECOMMENDATIONS										
INSPECTION DATE	MANHOLE No.	STREET OR LOCATION	DEPTH (FEET)	TYPE	AT, ABOVE (+), or BELOW (-) GRADE	MH INSERT	EVIDENCE OF LEAKS?	EVIDENCE	DEPTH FROM BOTTOM (FEET)	OVERALL CONDITION	GENERAL COMMENTS AND OBSERVATIONS	Repair / Seal Riser	Install Frame Seal	Raise Manhole to Grade	Raise Manholes, Complete	Install Manhole Insert	Grout Infection	Grout Injection Complete	Build Bench & Channel	Replace/Repair/Install Steps	Cementitious Lining	ESTIMATED REPAIR / REHABILITATION COST
02-Jun-09	2.5	Chestnut Lane P.S. R/W	11.5	Brick	+2'	Not Required	Yes	No	N/A	Good	Active leak above influent pipe - 300 GPD						$1,050					$1,050
02-Jun-09	2.6	Chestnut Lane P.S. R/W	9.6	Precast	+3"	Not Required	Yes	No	N/A	Good	Weeper- no vehicular access/could use 202 hand carry equipment						$1,050					$1,050
02-Jun-09	3	Chestnut Lane P.S. R/W	9.1	Precast	+1 1/2"	Not Required	No	No	N/A	Good												$0
02-Jun-09	4	Chestnut Lane P.S. R/W	9.5	Precast	+1"	Not Required	No	N/A	N/A	Good												$0
02-Jun-09	2.4	Chestnut Lane P.S. R/W	11.5	Precast	+24"	Not Required	No	Yes	1.0	Good	Paper and rocks in channel and effluent pipe											$0
02-Jun-09	2.3	Chestnut Lane P.S. R/W	7.8	Precast	+24"	Not Required	No	No	N/A	Good												$0
02-Jun-09	2.0	Chestnut Lane P.S. R/W	7.2	Precast	+12"	Not Required	No	No	N/A	Good												$0
02-Jun-09	2.1	Chestnut Lane P.S. R/W	6.4	Precast	AT	Not Required	No	No	N/A	Good												$0
02-Jun-09	2.2	Chestnut Lane P.S. R/W	6.0	Precast	AT	Not Required	No	No	N/A	Good												$0
02-Jun-09	17	Old Shadyside Road R/W	12.4	Precast	AT	Not Required	No	No	N/A	Good												$0
02-Jun-09	16	Old Shadyside Road R/W	6.8	Precast	AT	Not Required	No	No	N/A	Good	Manhole frame is broken											$0
02-Jun-09	15	Old Shadyside Road R/W	15.0	Precast	AT	Not Required	No	No	N/A	Good												$0
02-Jun-09	14	Shadyside Road R/W	7.3	Precast	+8"	Not Required	No	No	N/A	Good												$0
02-Jun-09	12	Shadyside Road R/W	10.1	Precast	+1"	Not Required	No	No	N/A	Good												$0
02-Jun-09	11	Shadyside Road R/W	8.1	Precast	+7 1/2"	Not Required	No	No	N/A	Good												$0
02-Jun-09	10	Shadyside Road R/W	8.3	Precast	AT	Not Required	No	No	N/A	Good												$0
02-Jun-09	2	Sawmill Road	8.2	Precast	AT	Required	No	No	N/A	Good						$75						$75
02-Jun-09	4	Sawmill Road	4.0	Precast	-4"	Existing	No	N/A	N/A	Good				$1,500	17-Jul-09							$1,500
02-Jun-09	5	Sawmill Road	5.0	Precast	-2"	Existing	No	No	N/A	Good				$1,500	17-Jul-09							$1,500
02-Jun-09	6	Sawmill Road	7.2	Precast	-1"	Existing	No	No	N/A	Good					AT Grade							$0
03-Jun-09	7	Sawmill Road	7.0		-7"	Required					Paved over-could not open			$1,500	7/15/2009	$75						$1,575
02-Jun-09	8	Sawmill Road	6.8	Precast	-4"	Required	No	No	N/A	Good				$1,500	7/15/2009	$75						$1,575
02-Jun-09	9	Sawmill Road	6.7	Precast	-6"	Required	No	No	N/A	Good				$1,500	7/15/2009	$75						$1,575
03-Jun-09	2	Old Shadyside Road R/W	6.3	Precast	AT	Not Required	No	No	N/A	Good												$0
03-Jun-09	4	Old Shadyside Road R/W	5.3	Precast	+2 1/2 "	Not Required	No	No	N/A	Good												$0
03-Jun-09	1	Sawmill Road R/W	6.3	Precast	AT	Required	Yes	Yes	1.0	Fair to Good	Cracked riser-leaking	$350				$75						$425
03-Jun-09	5	Old Shadyside Road R/W	5.3	Precast	+24"	Not Required	No	No	N/A	Good	Lateral full of roots											$0
03-Jun-09	6	Old Shadyside Road R/W	5.7	Precast	+24"	Not Required	No	No	N/A	Good												$0
03-Jun-09	7	Old Shadyside Road R/W	7.2	Precast	+36"	Not Required	No	No	N/A	Good												$0
03-Jun-09	8	Old Shadyside Road R/W	10.3	Precast	AT	Not Required	No	No	N/A	Good												$0
03-Jun-09	9	Old Shadyside Road R/W	7.4	Precast	AT	Not Required	No	No	N/A	Good												$0
03-Jun-09	3	Old Shadyside Road R/W	6.4	Precast	48"	Not Required	No	No	N/A	Good												$0

MR. REHAB, INC.
Three Long Lane
Mechanicsburg, PA 17050

UTILITY INC. OF PA
SUMMARY SPREADSHEET OF MANHOLE INSPECTIONS

								MANHOLE SURCHARGING				REPAIR / REHAB RECOMMENDATIONS										
INSPECTION DATE	MANHOLE No.	STREET OR LOCATION	DEPTH (FEET)	TYPE	AT, ABOVE (+), or, BELOW (-) GRADE	MH INSERT	EVIDENCE OF LEAKS?	EVIDENCE	DEPTH FROM BOTTOM (FEET)	OVERALL CONDITION	GENERAL COMMENTS AND OBSERVATIONS	Repair / Seal Riser	Install Frame Seal	Raise Manhole to Grade	Raise Manholes, Complete	Install Manhole Insert	Grout Injection	Grout Injection Complete	Build Bench & Channel	Replace/Repair/Install Steps	Cementitious Lining	ESTIMATED REPAIR / REHABILITATION COST
03-Jun-09	18	Old Shadyside Road R/W	5.7	Precast	AT	Not Required	No	No	N/A	Fair to Good	Riser -fair condition											$0
03-Jun-09	13	Old Shadyside Road R/W									Unable to locate											$0
03-Jun-09	36	Sawmill Road	17.9	Precast	AT	Existing	No	No	N/A	Good												$0
03-Jun-09	37	Sawmill Road	8.8	Precast	+8"	Not Required	No	No	N/A	Good												$0
03-Jun-09	38	Sawmill Road	8.0	Precast	AT	Required	No	N/A	N/A	Good						$75						$75
03-Jun-09	39	Sawmill Road	9.0	Precast	AT	Required	Yes	Yes	6.0	Poor to Good	H2S corrosion, Weepage at entire f cone and walls (Poor condition) 202 hand carry equipment, Manhole was grout-sealed					$75	$1,050	6/23/2009			$3,150	$3,225
03-Jun-09	40	Sawmill Road	8.9	Precast	+24"	Not Required	Yes	Yes	N/A	Poor to Good	H2S corrosion, 6 o'clock leaking at cone section 800 GPD, Manhole was grout-sealed						$1,050	6/23/2009			$3,115	$3,115
03-Jun-09	41	Sawmill Road	8.9	Precast	AT	Required	Yes	No	N/A	Fair to Good	H2S corrosion, Multiple loaks on first barrel section, Manhole was grout-sealed					$75	$1,050	6/23/2009			$3,115	$3,190
03-Jun-09	42	Sawmill Road	7.0	Precast	AT	Existing	No	No	N/A	Good												$0
03-Jun-09	44	Sawmill Road	12.5	Precast	+6"	Not Required	No	No	N/A	Good												$0
03-Jun-09	45	Sawmill Road	7.3	Precast	+24"	Not Required	No	No	N/A	Fair to Good	Steps are fair									$300		$300
03-Jun-09	46	Sawmill Road R/W	5.1	Precast	+1"	Not Required	No	No	N/A	Deteriorated to Good	Steps deteriorated due to hydrogen sulfide-if pressure applied will break									$150	$1,785	$1,935
03-Jun-09	3	Sawmill Road	7.7	Precast	-3"	Existing	No	No	N/A	Good				$1,500	17-Jul-09							$1,500
03-Jun-09	10	Sawmill Road	6.4	Precast	-5"	Required	No	No	N/A	Good					AT Grade	$75						$75
03-Jun-09	11	Sawmill Road	6.4	Precast	AT	Required	No	No	N/A	Good						$75						$75
03-Jun-09	12	Sawmill Road	6.9	Precast	AT	Required	No	No	N/A	Good						$75						$75
03-Jun-09	13	Sawmill Road	10.5	Precast	-1"	Existing	No	No	N/A	Good	Broken frame			$1,500	16-Jul-09							$1,500
03-Jun-09	14	Sawmill Road	5.6	Precast	-1"	Existing	No	No	N/A	Good				$1,500	16-Jul-09							$1,500
03-Jun-09	15	Sawmill Road	6.2	Precast	-3"	Existing	No	No	N/A	Good					AT Grade							$0
03-Jun-09	16	Sawmill Road	6.4	Precast	-1 1/2"	Existing	No	No	N/A	Good				$1,500	16-Jul-09							$1,500
03-Jun-09	17	Sawmill Road	5.0	Precast	-2"	Existing	No	N/A	N/A	Good					AT Grade							$0
03-Jun-09	18	Sawmill Road	7.5	Precast	AT	Required	No	No	N/A	Good	Broken frame					$75						$75
03-Jun-09	S-36	Sawmill Road	8.7	Precast	-1"	Required	No	No	N/A	Good					AT Grade	$75						$75
03-Jun-09	19	Sawmill Road	9.4	Precast	-5"	Existing	No	No	N/A	Good				$1,500	16-Jul-09							$1,500
03-Jun-09	20	Sawmill Road	9.6	Precast	-4"	Required	No	No	N/A	Good					AT Grade	$75						$75
03-Jun-09	21	Sawmill Road	8.5	Precast	AT	Required	No	No	N/A	Good						$75						$75
03-Jun-09	21-A	Sawmill Road	N/A	Precast	-1"	Existing		N/A	N/A	Fair to Good	Manhole has no channel or bench, standing water in manhole				AT Grade				$1,500			$1,500
03-Jun-09	22	Sawmill Road	9.4	Precast	AT	Required	No	No	N/A	Good						$75						$75
03-Jun-09	22-A	Sawmill Road	13.4	Precast	AT	Existing	No	No	N/A	Deteriorated to Good	Steps-deteriorated, Outside drop connection									$1,200		$1,200
03-Jun-09	23	Sawmill Road	9.3	Precast	AT	Required	No	No	N/A	Good						$75						$75
03-Jun-09	24	Sawmill Road	6.6	Precast	-6"	Required	No	No	N/A	Fair to Good	Cone and walls-fair condition-have evidence of being repaired			$1,500	15-Jul-09	$75						$1,575
04-Jun-09	25	Sawmill Road	6.8	Precast	AT	Required	No	No	N/A	Good						$75						$75
04-Jun-09	26	Sawmill Road R/W	6.7	Precast	-6"	Required	No	No	N/A	Good				$1,500	15-Jul-09	$75						$1,575
05-Jun-09	27	Sawmill Road	6.0	Precast	AT	Required	No	No	N/A	Good					AT Grade	$75						$75
05-Jun-09	28	Sawmill Road	7.0	Precast	AT	Required	No	No	N/A	Good						$75						$75
05-Jun-09	28A	Sawmill Road	8.6	Precast	AT	Required	No	No	N/A	Good						$75						$75
05-Jun-09	29	Sawmill Road	7.0	Precast	AT	Required	No	N/A	N/A	Good						$75						$75

MR. REHAB, INC.
Three Long Lane
Mechanicsburg, PA 17050

UTILITY INC. OF PA
SUMMARY SPREADSHEET OF MANHOLE INSPECTIONS

								MANHOLE SURCHARGING				REPAIR / REHAB RECOMMENDATIONS										
INSPECTION DATE	MANHOLE No.	STREET OR LOCATION	DEPTH (FEET)	TYPE	AT, ABOVE (+), or, BELOW (-) GRADE	MH INSERT	EVIDENCE OF LEAKS?	EVIDENCE	DEPTH FROM BOTTOM (FEET)	OVERALL CONDITION	GENERAL COMMENTS AND OBSERVATIONS	Repair / Seal Riser	Install Frame Seal	Raise Manhole to Grade	Raise Manholes, Complete	Install Manhole Insert	Grout Infection	Grout Injection, Complete	Build Bench & Channel	Replace/Reshape/Install Steps	Cementitious Lining	ESTIMATED REPAIR / REHABILITATION COST
06-Jun-09	30	Sawmill Road	7.1	Precast	-1 1/2"	Required	Yes	No	N/A	Fair to Good	Bench-3 o'clock -leaking 800 gpd			$1,500	15-Jul-09	$75	$1,050	6/23/2009				$1,675
06-Jun-09	31	Sawmill Road R/W	7.3	Precast	AT	Required	No	No	N/A	Good						$75						$75
06-Jun-09	32	Sawmill Road R/W	8.2	Precast	AT	Existing	No	No	N/A	Good	Riser has frame seal installed											$0
06-Jun-09	33	Sawmill Road R/W	5.8	Precast	AT	Existing	No	No	N/A	Good	Riser has frame seal installed											$0
06-Jun-09	34	Sawmill Road R/W	7.7	Precast	AT	Existing	No	No	N/A	Good	Riser has frame seal installed											$0
06-Jun-09	35	Sawmill Road R/W	10.9	Precast	AT	Existing	No	No	N/A	Good	Riser has frame seal installed											$0
22-Jun-09	53.7	Walnut Ridge	14.4	Precast	AT	Required	No	No	N/A	Good							$1,050					$1,050
22-Jun-09	58.2	Carlisle Lane	10.8	Poured Concrete	AT	Required	No	No	N/A	Good						$75						$75
22-Jun-09	58	Glen Drive	6.2	Other (describe in comments)	AT	Not Required	No	No	N/A	Good	MH Lined					$75						$75
22-Jun-09	56	Lawson Lane	14.0	Precast	AT	Not Required	No	No	N/A	Poor	H2S corrosion											$0
22-Jun-09	55	Lawson Lane	14.6	Precast	AT	Not Required	No	No	N/A	Deteriorated to Poor	H2S corrosion, Lid Cracked										$4,900	$4,900
22-Jun-09	54	Lawson Lane	10.1	Coated Brick	AT	Not Required	No	No	N/A	Poor	H2S corrosion										$5,110	$5,110
22-Jun-09	52.1	Kerwood Lane	7.3	Precast	AT	Not Required	No	No	N/A	Good											$3,535	$3,535
22-Jun-09	49.1041	Westminster Drive	12.1	Precast	AT	Not Required	No	No	N/A	Good												$0
22-Jun-09	1.2	Broadview East	7.9	Precast	AT	Not Required	No	No	N/A	Fair to Good												$0
22-Jun-09	49	Glenside Road	12.6	Precast	AT	Not Required	Yes	No	N/A	Poor	H2S corrosion, Leaking at influent pipe 7000 gpd, Manhole was grout-sealed						$1,050	6/23/2009	$1,500		$4,410	$5,910
22-Jun-09	49.1	Glenside Road	11.0	Precast	+1"	Not Required	No	No	N/A	Fair to Good												$0

EXHIBIT 5

2009 Televised Sewer Line Report

(Taken from FX Browne, Inc. Semi Annual Report, Dated 2009)

MR. REHAB, INC.
Three Long Lane
Mechanicsburg, PA 17050

UTILITY INC. OF PA
SUMMARY OF DEFECTS AND OBSERVATION FROM TELEVISION INSPECTION OF MAINLINE SANITARY SEWERS

										MAINLINE INFORMATION																		
										MAINLINE CRACKS			MAINLINE FRACTURES				OTHER DEFECTS AND OBSERVATIONS						SERVICE CONNECTION INFORMATION						
VAN-CAN SECTION No.	STREET OR LOCATION	MH to MH	TOTAL RUN LENGTH (L.F.)	DATE TELEVISED	LENGTH TELEVISED (L.F.)	PIPE SIZE (inches)	PIPE TYPE	JOINT LENGTH (feet)	TAPE No. or MEDIA	CIRCUMFERENTIAL	LONGITUDINAL	MULTIPLE	MULTIPLE FRACTURES	Circumferential Fracture	Longitudinal Fracture	SPIRAL FRACTURE	PROTRUDING PIPE	SAG	OFFSET (SEPARATED) JOINT	MATERIAL CHANGE	SAGS AND DEFLECTIONS (HOR.OR VERT.)	INSTANCES OF ROOT PENETRATION OR LEAKING JOINT	TOTAL	FACTORY - ACTIVE	FACTORY - CAPPED	BREAK-IN ACTIVE	BREAK-IN INTRUDING	LEAKING - SUSPECT - DEFECTIVE	COMMENTS
1	Ashcom Drive	7 to 7.1	178	22-Jun-09	179	8	PVC	13	DVD										6				6	6				1	
2	Ashcom Drive	7.1 to 7.2	230	22-Jun-09	230	8	PVC	13	DVD														5	5					
3	Witherspoon Dr	7.4 to 7.5	310	22-Jun-09	310	8	PVC	13	DVD														12	12					
4	Witherspoon Dr	7.4 to 7.3	115	22-Jun-09	115	8	PVC	13	DVD														2	2					
5	Witherspoon Dr	7.3 to 7.2	228	22-Jun-09	228	8	PVC	13	DVD														7	7					
6	North Glen Drive	6.1 to 6	132	22-Jun-09	132	8	PVC	13	DVD														0						
7	North Glen Drive	6.3 to 6.2	230	22-Jun-09	230	8	PVC	13	DVD														0						
8	North Glen Drive	6.2 to 6.1	202	22-Jun-09	202	8	PVC	13	DVD										1				0						

1,626 Total Footage Televised

EXHIBIT 6

2009 Sewer Inspections

(Taken from FX Browne, Inc. Semi Annual Report, Dated 2009)

MR. REHAB, INC.
Three Long Lane
Mechanicsburg, PA 17050

UTILITY INC. OF PA
PHYSICAL SURVEY SUMMARY RESULTS FOR WORK PERFORMED JUNE 2 THRU JUNE 25, 2009

Physical Survey Report

Inspection Date	Observation Manhole	location	Total Flow Observed (GPD)	Upstream Manhole	No. of Sewer Runs	Average Flow per Run (GPD)	Comment
02-Jun-09	17	Old Shadyside Road R/W	0	18	1	0	Total flow observed for 1 sewer run
02-Jun-09	16	Old Shadyside Road R/W	0	17	1	0	Total flow observed for 1 sewer run
02-Jun-09	15	Old Shadyside Road R/W	0	16	1	0	Total flow observed for 1 sewer run
02-Jun-09	14	Old Shadyside Road R/W	0	15	1	0	Total flow observed for 1 sewer run
02-Jun-09	12	Old Shadyside Road R/W	0	14	1	0	Total flow observed for 1 sewer run
02-Jun-09	11	Old Shadyside Road R/W	0	12	1	0	Total flow observed for 1 sewer run
02-Jun-09	10	Old Shadyside Road R/W	0	11	1	0	Total flow observed for 1 sewer run
04-Jun-09	10	Old Shadyside Road R/W	0	11	17	0	Total flow observed for 17 sewer runs (Delaware Lane)
04-Jun-09	10	Old Shadyside Road R/W	5,000	10.1	21	238	Total flow observed for 21 sewer runs (Delaware Lane)
04-Jun-09	2	Old Shadyside Road R/W	1,250	10	7	179	Total flow observed for 7 sewer runs
04-Jun-09	40	Virginia Glen Development	6,000	40.1	12	500	Total flow observed for 12 sewer runs
04-Jun-09	40	Virginia Glen Development	13,000	41	36	361	Total flow observed for 36 sewer runs, extends to Carolina Ridge
04-Jun-09	8	Penn's Woods	300	8.1	8	38	Total flow observed for 8 sewer runs
04-Jun-09	8	Penn's Woods	6,387	9	44	145	Total flow observed for 44 sewer runs, extends to Hampshire Hills Development
04-Jun-09	6	Chestnut Lane	16,920	6.1	4	4,230	Total flow for 4 runs
04-Jun-09	6	Chestnut Lane	17,500	7	29	603	Total flow for 29 runs. May have sump pumps connected due to flow was observed to increase to 57,435 gpd.
04-Jun-09	7	Ashcom Drive	5,081	7.1	5	1,016	Total flow observed for 5 sewer runs
04-Jun-09	7	Ashcom Drive	12,370	6	23	538	Total flow observed for 23 sewer runs, extends to Bradford Glen Subdividion
04-Jun-09	58	Lawson Lane	N/A	N/A	N/A	N/A	Chestnut Lane P.S. Force Main Discharge
04-Jun-09	58	Lawson Lane	500	58.1	16	31	Total flow observed for 16 sewer runs
04-Jun-09	46	Sawmill road R/W	500	46.01	12	42	Total flow observed in Price Lane for 12 sewer runs
04-Jun-09	46	Sawmill road R/W	N/A	58	N/A		Not Measured yet, need to isolate, Hydrogen Sulfide on Manhole walls
04-Jun-09	3	Chestnut Lane PS	0	4	1	0	Total flow observed for 1 sewer run
04-Jun-09	2.5	Chestnut Lane PS R/W	0	4	3	0	Total flow observed for 3 sewer runs
04-Jun-09	2.3	Chestnut Lane PS R/W	5,000	2.5	2	2,500	Total flow observed for 2 sewer runs, manhole 2.5 to 2.4 contains 2" of debris
04-Jun-09	1.6	Chestnut Lane PS	7,400	2.5	6	1,233	Total flow observed for 6 sewer runs
22-Jun-09	53.7	Walnut Ridge	0	53.2	6	0	Total flow observed for 6 sewer runs
22-Jun-09	53.7	Walnut Ridge	0	53.8	2	0	Total flow observed for 2 sewer runs
22-Jun-09	58.2	Carlise Lane	115	58.21	6	19	Total flow observed for 6 sewer runs
22-Jun-09	58.2	Carlise Lane	1,064	58.3	8	133	Total flow observed for 8 sewer runs

MR. REHAB, INC.
Three Long Lane
Mechanicsburg, PA 17050

UTILITY INC. OF PA
PHYSICAL SURVEY SUMMARY RESULTS FOR WORK PERFORMED JUNE 2 THRU JUNE 25, 2009

Physical Survey Report

Inspection Date	Observation Manhole	location	Total Flow Observed (GPD)	Upstream Manhole	No. of Sewer Runs	Average Flow per Run (GPD)	Comment
22-Jun-09	56	Lawson Lane	0	56.1	1	0	Total flow observed for 1 sewer run
22-Jun-09	56	Lawson Lane	N/A	N/A	N/A	N/A	Unable to measure from 56 to 57 due to P.S.
22-Jun-09	52.1	Kerwood Lane	600	52.2	5	120	Total flow observed for 5 sewer runs
22-Jun-09	49.1041	Westminster Drive	400	49.1042	5	80	Total flow observed for 5 sewer runs
22-Jun-09	49.105	Ridgeview Circle	N/A	N/A	N/A	N/A	Paved over
22-Jun-09	1.2	Broadview East	0	1.1	3	0	Total flow observed for 3 sewer runs
22-Jun-09	49.1	Glenside Road	1,200	49.101	19	63	Total flow observed for 19 sewer runs
22-Jun-09	49.1	Glenside Road	700	49.2	34	21	Total flow observed for 34 sewer runs

101,287 Total flow observed during this period (Gallons per day)

Appendix D:

Chapter 94 2009 Municipal Wasteload Management Report - DuPont

URS

LETTER OF TRANSMITTAL

Iron Hill Copporate Center
4051 Ogletown Road, Suite 300
Newark, Delaware 19713
302-781-5900

Date: March 26, 2010
Reference: DuPOnt Property WWTP
West Bradford Twp

To:
Ms. Dana Walker

Water Management
PA Dept. of Environmental Protection
2 East Main Street
Norristown, PA 19401

Attached are the following:

Copies	Date	No.	Description
2			2009 Chapter 94 Report DuPont Property WWTF

Remarks:

If you have any questions, or require additional information, please contact us.

Sent From: Craig S. Savage, P.E.

cc: Jack Hines
Randy Bemhke
Steve Fuller

2009 CHAPTER 94 REPORT

DUPONT PROPERTY WASTEWATER TREATMENT FACILITY
WEST BRADFORD TOWNSHIP
SIGNATURES

PERMITTEE:

NAME: Jack M. Hines, Jr.

ORGANIZATION: West Bradford Township

ADDRESS: 1385 Campus Drive
Downingtown, PA 19335

(610) 269-4174 PHONE (610) 269-3016 FAX

This Chapter 94 Report has been prepared by URS Corporation at the direction of West Bradford Township. We have reviewed this report and agree with its content.

AUTHORIZED SIGNATURE: _____ _____
Jack M. Hines, Jr. DATE

TITLE: Township Manager

PREPARER:

NAME: Craig S. Savage, P.E.

ORGANIZATION: URS Corporation

Iron Hill Corporate Center
4051 Ogletown Road, Suite 300
Newark, DE 19713

(302) 781-5900 PHONE (302) 781-5901 FAX

This Chapter 94 Report has been prepared in accordance with Title 25, Chapter 94, of the Pennsylvania Code to the best of my knowledge and belief.

AUTHORIZED SIGNATURE: Craig Savage 3/26/10
DATE

TITLE: Craig S. Savage, P.E.
Senior Project Manager

CHAPTER 94
MUNICIPAL WASTELOAD MANAGEMENT

DUPONT PROPERTY
WASTEWATER TREATMENT FACILITY
2009 ANNUAL REPORT

Prepared for:
West Bradford Township
1385 Campus Drive
Downingtown, PA 19350

March 2010

Prepared by:
URS Corporation
Iron Hill Corporate Center
4051 Ogletown Road, Suite 300
Newark, DE 19713

20814003.01000

TABLE OF CONTENTS

I. Introduction

Pursuant to Pennsylvania Chapter 94 Municipal Wasteload Management regulations and requirements, West Bradford Township has prepared this Municipal Wasteload Management Report for the DuPont Property Wastewater Treatment Facility (WWTF).

West Bradford Township was issued Water Quality Management Part II Permit No. 1504404 by the Department of Environmental Protection on January 21, 2005. A Minor Permit Amendment was issued on November 2, 2005. The permit and amendment authorized the construction of the wastewater treatment facility and collection system to serve the Dupont/Orleans Sewer Service Area which includes Bradford Point, the Reserve at Chestnut Ridge, DuPont Property (Chestnut Ridge) and Meadow View (Bradley Farm). These areas are served by gravity and/or low pressure sewers which discharge to the influent pumping station at the treatment plant. Portions of the DuPont Property (Chestnut Ridge) discharge to a pumping station located adjacent to Chestnut Lane. This pumping station discharges through a force main on Chestnut Lane to the gravity sewer on Romansville Road. The WWTF consists of treatment and storage lagoons which have a hydraulic capacity of 146,500 gallons per day (gpd). Disposal of treated effluent is via spray irrigation.

The facilities received authorization from PADEP to begin operation on May 10, 2006. Since new development is expected to occur over a period of time, connections will continue to take place and influent flow will increase for several years.

II. Hydraulic Loading

The hydraulic loading to the DuPont Property Wastewater Treatment Facility (WWTF) is monitored by an electromagnetic flowmeter which measures the pumped flow from the WWTF influent lift station into the treatment pond. The flow is recorded on a chart recorder and by the operator on the daily bench sheet.

The DuPont Property WWTF began receiving sewage on July 2006. Table 1 presents the average monthly influent flows since this date. By December 2006, a total of 177 dwelling units had connected and by December 2008, a total of 235 dwelling units had connected. Thirty five additional units were connected in 2009 to bring the total number of connections to 270. This increase in units resulted in an average flow of 34,436 gpd for 2009 compared to the average flow of 28,838 gpd in 2008. The flow gradually increased during the year as new homes were built and occupied. The number of connected units at the end of years 2006, 2007, 2008, and 2009 are also presented in Table 1.

The three consecutive months' maximum flow for 2009 occurred in the last three months of year. A Flow Projection Factor is calculated by dividing this three-month maximum by the yearly average daily flow. The resulting ratio for 2009 is 1.12. The average factor for years 2007 through 2009 is used to calculate the projected maximum hydraulic load in Section IV of this report.

TABLE 1

DUPONT WASTE WATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP
2009 WASTELOAD MANAGEMENT REPORT

SUMMARY OF AVERAGE MONTHLY HYDRAULIC LOADINGS

Permitted Capacity: 146,500 Gallons per Day

MONTH	Flow in Gallons Per Day					5 YEAR AVERAGE [2]
	2005	2006 [1]	2007	2008	2009	
January	NOT APPLICABLE		19,600	27,826	32,581	26,669
February			22,000	28,292	31,428	27,240
March			23,000	27,367	32,210	27,526
April			27,000	27,552	32,363	28,972
May			22,100	28,077	33,742	27,973
June			23,000	23,894	33,233	26,709
July		11,500	23,936	27,684	32,277	23,849
August		13,446	24,000	29,025	33,119	24,898
September		15,310	25,800	30,276	36,144	26,882
October		18,060	26,161	30,185	37,760	28,042
November		18,600	27,000	33,130	38,377	29,277
December		20,330	28,000	32,751	39,998	30,270
Min. Month		11,500	19,600	23,894	31,428	
Avg. Annual		**16,208**	**24,300**	**28,838**	**34,436**	**27,359**
Max. Month		20,330	28,000	33,130	39,998	
Max 3-Month Avg. Flow [3]		18,997	27,054	32,022	38,711	29,196
Flow Projection Factor [4]		1.10	1.11	1.11	1.12	1.12
EDU's Connected at year end		177	209	235	270	
Average Flow Per EDU, gpd		92	116	123	128	

[1] WWTP began operation July 2006. Increasing flows indicate build-out and continued connection within the sewer service area. The maximum 3-month average flow does not accurately reflect the maximum flow to the WWTP since connections continued throughout the year. A flow projection factor of 1.10 is assumed for 2006 since calculation based on actual data would not yield realistic results.

[2] Since WWTP has not been in operation for 5 years, averages are calculated for years 2006 to 2009.

[3] Represents the average of the three highest consecutive month's flow.

[4] Calculated by dividing the maximum 3-month average flow for the year by the average annual flow. Flow projection factor for 2006 is not used to calculate 5 year average factor since it is an assumed value.

III. Organic Loading

The design of the DuPont Property Wastewater Treatment Facility was based on a flow of 146,500 gallon per day and an average influent BOD_5 concentration of 300 mg/l. This results in a total organic design load of 367 pounds per day of BOD_5.

A summary of influent BOD_5 measurements for 2009 is shown in Table 2. In 2009, the average influent BOD_5 was 335 mg/l. This average value was multiplied by the average monthly flow to calculate the monthly organic loads which are presented in Table 3. The peak month organic load of 112 pounds per day occurred in December 2009.

An Organic Loading Projection Factor is calculated by dividing the peak month organic load by the yearly average organic load. The resulting ratio for 2009 is 1.16. The average factor for years 2007 through 2009 is used to calculate the projected maximum organic load in Section IV of this report.

TABLE 2

DUPONT WASTE WATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP
2009 WASTELOAD MANAGEMENT REPORT

2009 INFLUENT BOD_5

Date	Influent BOD_5
	mg/l
17-Mar	299
27-Mar	273
27-Apr	308
23-Apr	356
27-Apr	308
19-May	437
29-May	405
26-Jun	360
29-Jun	353
13-Jul	276
23-Jul	299
24-Aug	315
27-Aug	345
17-Sep	360
22-Sep	323
29-Oct	329
30-Oct	349
23-Nov	313
25-Nov	365
Average	**335**

TABLE 3

DUPONT WASTE WATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP
2008 WASTELOAD MANAGEMENT REPORT

SUMMARY OF AVERAGE MONTHLY ORGANIC LOADINGS

Permitted Capacity: 367 lb/day [1]

MONTH	Influent BOD_5 Loading in lb/day					5 YEAR AVERAGE [6]
	2005	2006 [2]	2007 [3]	2008 [4]	2009 [5]	
January	NOT APPLICABLE		58	88	91	79
February			65	90	88	81
March			68	87	90	81
April			79	87	91	86
May			65	89	94	83
June			68	76	93	79
July		29	70	88	90	69
August		34	70	92	93	72
September		38	76	96	101	78
October		45	77	96	106	81
November		47	79	105	107	85
December		51	82	104	112	87
ANNUAL						
Min. Month		29	58	76	88	
Avg. Annual		**41**	**71**	**91**	**96**	**80**
Max. Month		51	82	105	112	
Organic Loading Projection Factor [7]		1.20	1.15	1.15	1.16	1.15

[1] Based on the design capacity of 146,500 gpd and design influent BOD_5 of 300 mg/l.

[2] For 2006, organic loading is based on design influent BOD_5 of 300 mg/l and actual flow for the month.

[3] For 2007, organic loading is based on average measured BOD_5 of 352 mg/l and actual flow for the month.

[4] For 2008, organic loading is based on average measured BOD_5 of 380 mg/l and actual flow for the month.

[5] For 2009, organic loading is based on average measured BOD_5 of 335 mg/l and actual flow for the month.

[6] Since WWTP has not been in operation for 5 years, averages are calculated for years 2007 to 2009.

[7] The Organic Loading Projection Factor of 1.20 for 2006 is assumed since calculation based on actual data would not yield realistic results. Organic Loading Projection Factor for 2006 is not utilized to calculate the 5 year average factor since it is an assumed value.

IV. Projections for Hydraulic and Organic Loading

The 5 year projected connections and resulting hydraulic and organic loadings are shown in Table 4 and Figures 1 and 2. It is projected that the only future growth for the next 5 years will come from the approved DuPont Property (Chestnut Ridge), Bradford Point, and Meadowview subdivisions. The rate of growth is anticipated to be slow based on the current pace of development activity. All dwelling units in the Reserve at Chestnut Ridge development have already been connected.

The projected hydraulic loadings were determined by using 250 gpd per unit for the anticipated new connections. The projected three-month maximum hydraulic loads were calculated by multiplying the projected flows by the average Flow Projection Factor of 1.12 from Table 1.

The projected organic loading was determined by using the average 2009 influent BOD_5 concentration of 335 mg/l and the flow of 250 gpd per unit. The projected maximum organic loadings were calculated by multiplying the projected organic loads by the average Organic Loading Projection Factor of 1.15 from Table 3.

Current projections indicate that the facility will not reach the hydraulic or organic design capacity within the next five years.

TABLE 4
DUPONT WASTEWATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP

PROJECTED CONNECTIONS, FLOW AND ORGANIC LOAD
2008 TO 2013

Source	Total Units	2009 Actual Units	2010 Projected Units	2011 Projected Units	2012 Projected Units	2013 Projected Units	2014 Projected Units
DuPont Property (Chestnut Ridge)	286	195	10	10	10	15	15
Reserve at Chesnut Ridge	37	37	0	0	0	0	0
Bradford Point	45	38	5	1	0	0	0
Meadow View	69	0	0	9	9	12	15
Annual Units			15	20	19	27	30
Cumulative Units	437	270	285	305	324	351	381
Actual Annual Average Flow (GPD)		34,436					
Projected Average Flow from New Units (GPD)			3,750	5,000	4,750	6,750	7,500
Cumulative Average Annual Flow (GPD)			38,186	43,186	47,936	54,686	62,186
Projected 3 Month Max Flow (GPD) @ 1.12			42,768	48,368	53,688	61,248	69,648
Actual Annual Average Organic Loading (LBS/DAY)		96					
Projected Avg. Organic Load from New Units (LBS/DAY)			10	14	13	19	21
Cumulative Average Annual Organic Load (LBS/DAY)			106	120	134	153	174
Projected Max Month Organic Load (LB/DAY) @ 1.15			122	139	154	176	200

FIGURE 1

DUPONT WASTEWATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP

PROJECTED HYDRAULIC LOADING

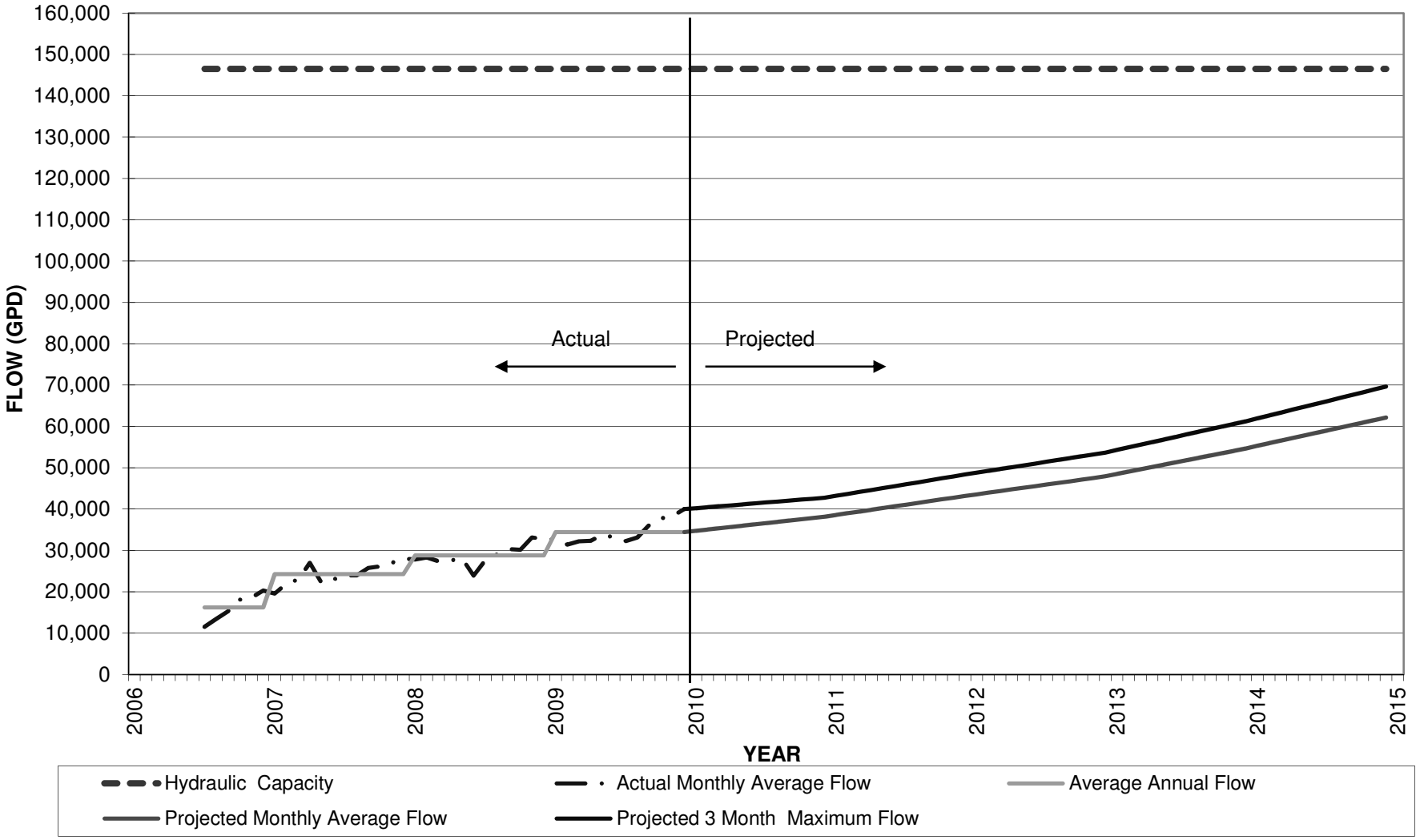
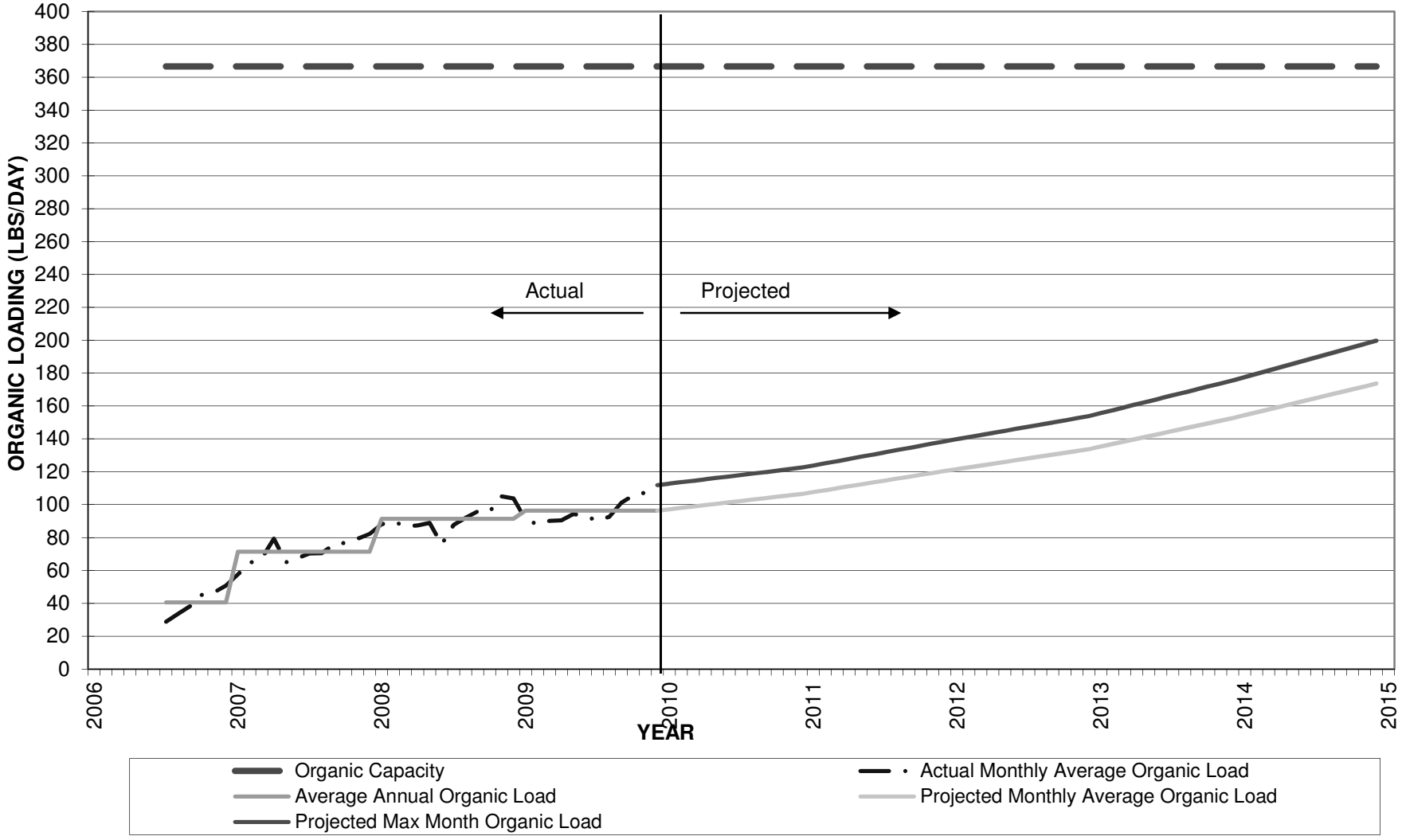


FIGURE 2

DUPONT WASTEWATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP

PROJECTED ORGANIC LOADING



V. Industrial Wastes

At this time the Dupont Property WWTF has no industrial users.

VI. Collection and Conveyance System

The collection and conveyance system for the DuPont Property Wastewater Treatment Facility consists of private and municipal projects. Wastewater is collected from the homes and conveyed to the treatment facility by a combination of gravity sewers, a pump station, and individual grinder pumps. The design of the sewers for the DuPont Property (Chestnut Ridge) includes individual residential grinder pumps to serve thirty (30) of the homes. A gravity sewer system conveys wastewater from another 225 homes in this development to a pump station located adjacent to Chestnut Lane near the western edge of the project. This pumping station was completed in 2006. It is new and in good condition. The pumping station is designed to convey 192 gpm at 127 feet TDH, which represents a peak flow factor of 4.9 based on the design flow of 56,250 gallons per day. A flow meter is located on the discharge of this pump station. Since the current flows are less than the design flow even on peak days, the pump station is more than adequate for existing conditions. Also, based on the projected hydraulic loading for the next 5 years shown in Table 4, the design capacity of the pump station will not be exceeded in the foreseeable future.

Wastewater from this pump station is transported through a 6" PVC force main directly to Manhole 22 located on a section of gravity sewer near the intersection of Romansville Road and Chestnut Lane. All of the sewers have been installed within the last few years thus, they are new and in good condition. No cleaning, repairs or rehabilitation of the collection system were required in 2009. No new sewer extensions were proposed, approved or constructed in 2009.

From Manhole 22, the sewers flow by gravity to an influent lift pump station located at the treatment facility. This influent lift station, which was completed in 2006, consists of a precast concrete wet well with duplex submersible sewage pumps and a valve box. It is new and in good condition. The pumping station is designed to convey 450 gpm at 45 feet TDH, which represents a peak flow factor of 4.4 based on the design flow of 146,500 gallons per day. Since the current flows are less than ½ the design flow even on peak days, the pump station is more than adequate for existing conditions. Also, based on the projected hydraulic loading for the next 5 years shown in Table 4, the design capacity of the pump station will not be exceeded in the foreseeable future. A magnetic flowmeter, which is installed in the valve vault at this lift station, provides a record of incoming flow to the treatment lagoon.

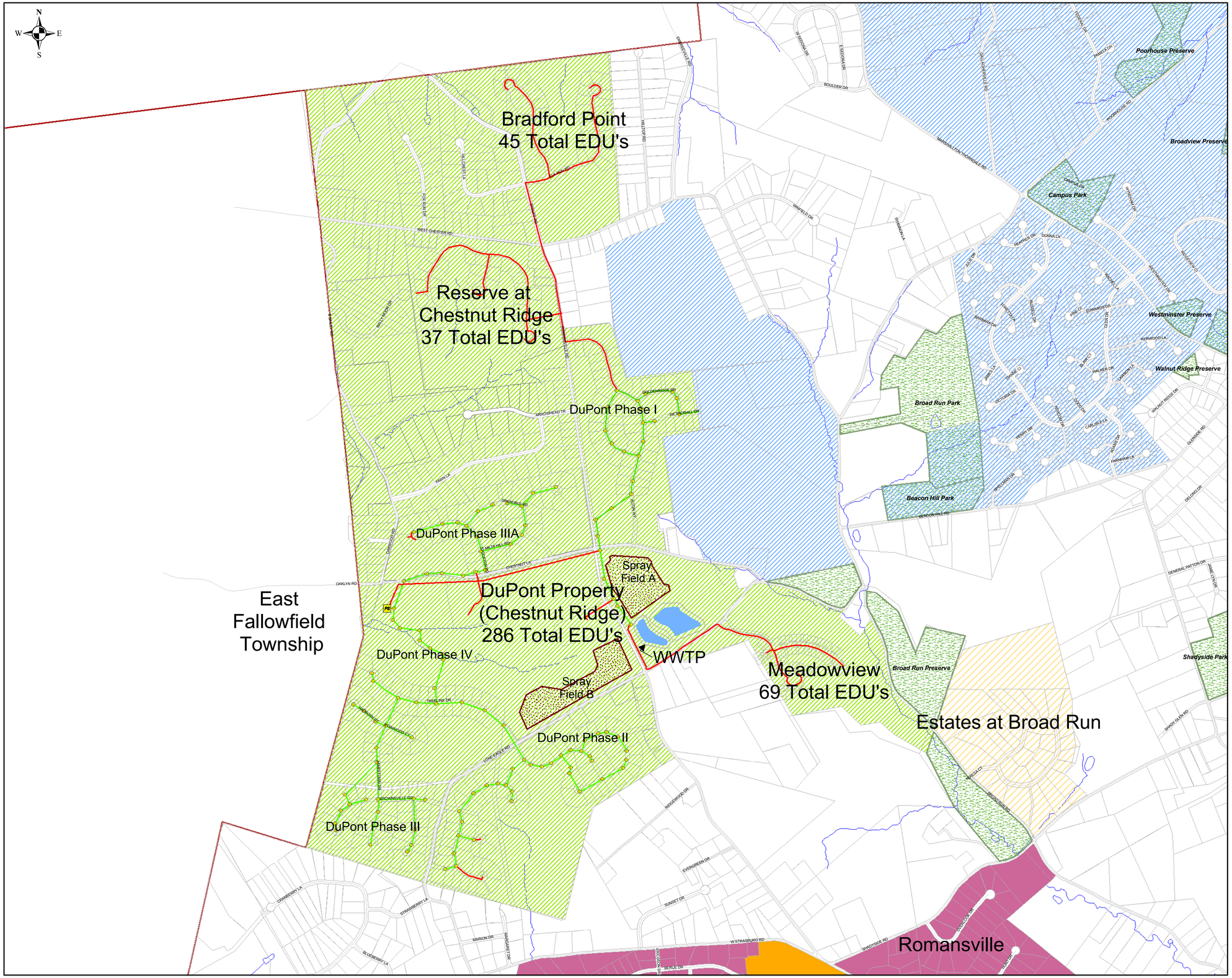
The Township routinely visits the pump stations as part of the regular operating routine. Maintenance is performed as necessary. No repairs were required in 2009. The Township monitors the flows from the pump stations for signs of Infiltration and Inflow in the collection system. Records indicate there are no significant increases of flow during wet weather.

A map showing all the existing sewers, pump station and wastewater treatment plant for the DuPont/Orleans Sewer Service Area is included in Attachment A.

ATTACHMENT "A"

DUPONT/ORLEANS SEWER SERVICE AREA

DuPont/Orleans Wastewater Facilities
Sewer Service Area
West Bradford Township



Legend

- Pump Station
- Manhole
- WWTP/Storage Lagoons
- Spray Field

Sewer Lines

- Gravity Main
- Force Main

Sewer Service Areas

- Broad Run Service Area
- Route 162 Service Area
- DuPont/Orleans Service Area

- Parks and Preserves
- Stargazers
- Romansville
- Municipal Boundary
- Parcels
- Streams

0 1,000 2,000

Feet

Sources :

Chester County Bureau of Land Records
GIS Data.

West Bradford Township

URS

Iron Hill Corporate Center
Sabre Building, Suite 300
4051 Ogletown Road
Newark, DE 19713
Tel: 302.781.5900
Fax: 302.781.5901

R:\PA_WBradford\20814003\GIS_Job\Mapping\DuPont_chap94_Updated_2009.mxd
March 26, 2010

Appendix E:

Chapter 94 2009 Municipal Wasteload Management Report - Strasburg

URS

LETTER OF TRANSMITTAL

Iron Hill Copporate Center
4051 Ogletown Road, Suite 300
Newark, Delaware 19713
302-781-5900

Date: March 26, 2010
Reference: Strasburg Corridor WWTP
West Bradford Twp

To:
Ms. Dana Walker

Water Management
PA Dept. of Environmental Protection
2 East Main Street
Norristown, PA 19401

Attached are the following:

Copies	Date	No.	Description
2			2009 Chapter 94 Report Strasburg Corridor WWTF

Remarks:

If you have any questions, or require additional information, please contact us.

Sent From: Craig S. Savage, P.E.

cc: Jack Hines
Randy Bemhke
Steve Fuller

2009 CHAPTER 94 REPORT

STRASBURG CORRIDOR WASTEWATER TREATMENT FACILITY
WEST BRADFORD TOWNSHIP
SIGNATURES

PERMITTEE:

NAME: Jack M. Hines, Jr.

ORGANIZATION: West Bradford Township

ADDRESS: 1385 Campus Drive
Downingtown, PA 19335

(610) 269-4174 PHONE

(610) 269-3016 FAX

This Chapter 94 Report has been prepared by URS Corporation at the direction of West Bradford Township. We have reviewed this report and agree with its content.

AUTHORIZED SIGNATURE: _____ DATE

TITLE: Jack M. Hines, Jr.
Township Manager

PREPARER:

NAME: Craig S. Savage, P.E.

ORGANIZATION: URS Corporation

Iron Hill Corporate Center
4051 Ogletown Road, Suite 300
Newark, DE 19713

(302) 781-5900 PHONE

(302) 781-5901 FAX

This Chapter 94 Report has been prepared in accordance with Title 25, Chapter 94, of the Pennsylvania Code to the best of my knowledge and belief.

AUTHORIZED SIGNATURE: Craig S. Savage 3/26/10 DATE

TITLE: Craig S. Savage, P.E.
Senior Project Manager

CHAPTER 94
MUNICIPAL WASTELOAD MANAGEMENT

STRASBURG CORRIDOR WASTEWATER TREATMENT FACILITY 2009 ANNUAL REPORT

Prepared for:
West Bradford Township
1385 Campus Drive
Downingtown, PA 19350

March 2010

Prepared by:
URS Corporation
Iron Hill Corporate Center
4051 Ogletown Road, Suite 300
Newark, DE 19713

20814002.01000

TABLE OF CONTENTS

I. Introduction

Pursuant to Pennsylvania Chapter 94 Municipal Wasteload Management regulations and requirements, West Bradford Township has prepared this Municipal Wasteload Management Report for the Strasburg Corridor Wastewater Treatment Facility (WWTF).

West Bradford Township was issued Water Quality Management Part II Permit No. 1500422 by the Department of Environmental Protection on April 19, 2001. Permit Amendment No. 1 was issued on October 2, 2003. Permit Amendment No. 2 was issued on January 24, 2007. The permit and amendments authorized the construction of the WWTF and collection system to serve the Strasburg Corridor Sewer Service Area which includes the Village of Marshallton, the Tattersall subdivision (including the Hertig Tract), and Broad Run Estates (Welsh Tract). These areas are served by gravity and/or low pressure sewers which discharge to the pumping station at the intersection of Broad Run Road and Strasburg Road. The pumping station discharges through a force main to the Strasburg Corridor WWTF on Telegraph Road. The WWTF utilizes aerated lagoons for treatment with disposal of treated effluent via spray irrigation.

Since new development within the service area was expected to take place over a period of several years, the Strasburg Corridor WWTF was constructed in phases. The Phase 1 facilities, which consisted of the aerated and storage lagoons and three spray zones, were constructed during 2004 and began operation on January 12, 2005 when the PADEP authorized use of the headworks and treatment lagoon. On May 26, 2005 the PADEP authorized operation of the complete Phase 1 facility for a flow of 95,000 gpd.

For Phase 2, three more spray fields were constructed during the summer of 2007 to reach the design capacity of 135,000 gpd. Operation of the Phase 2 spray fields started with light applications to maintain the cover crop during the summer of 2008. Two additional spray fields, Spray Zones 1 and 2, were permitted but have not been constructed due to provisions of a settlement agreement.

II. Hydraulic Loading

The hydraulic loading to the Strasburg Corridor Wastewater Treatment Facility (WWTF) is monitored with an electromagnetic flow meter on the influent pipe in the Control Building. The flow is recorded on a chart recorder and by the operator on the daily bench sheet.

The Strasburg Corridor WWTF began receiving sewage on January 12, 2005. Table 1 presents the average monthly influent flows since this date. By December 2006, a total of 371 dwelling units had connected and by December 2008, a total of 377 dwelling units had connected. One additional unit was connected in 2009. The average monthly flow of 49,077 gpd recorded during 2009 is slightly less than the 2008 average flow of 49,575 gpd. The number of connected units at the end of years 2006, 2007, 2008, and 2009 are also presented in Table 1.

The three consecutive months' maximum flow for 2009 occurred in the three months of March, April, and May. A Flow Projection Factor is calculated by dividing this three-month maximum by the yearly average daily flow. The resulting ratio for 2009 is 1.02. The average factor for years 2006 through 2009 is used to calculate the projected maximum hydraulic load in Section IV of this report.

TABLE 1

STRASBURG CORRIDOR WASTE WATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP
2009 WASTELOAD MANAGEMENT REPORT

SUMMARY OF AVERAGE MONTHLY HYDRAULIC LOADINGS

Permitted Capacity: 135,000 Gallons per Day

MONTH	Flow in Gallons Per Day					5 YEAR AVERAGE
	2005 [1]	2006	2007	2008	2009	
January	15,000	43,000	50,790	48,345	48,187	41,064
February	16,000	44,000	50,071	50,616	46,733	41,484
March	15,000	45,774	51,710	52,746	49,460	42,938
April	21,000	44,500	49,433	52,020	51,460	43,683
May	18,000	47,000	53,032	48,570	49,871	43,295
June	23,000	49,322	54,000	49,682	48,800	44,961
July	25,000	46,849	46,387	45,641	48,007	42,377
August	29,000	45,220	47,435	48,497	51,226	44,276
September	35,000	49,862	47,767	47,857	47,893	45,676
October	41,000	49,609	49,742	48,380	50,706	47,887
November	43,000	50,900	50,000	50,697	47,777	48,475
December	44,000	52,977	51,000	51,843	48,803	49,725
Min. Month	15,000	43,000	46,387	45,641	46,733	
Avg. Annual	**27,083**	**47,418**	**50,114**	**49,575**	**49,077**	**44,653**
Max. Month	44,000	52,977	54,000	52,746	51,460	
Max 3-Month Avg. Flow [2]	42,667	51,162	52,155	51,794	50,264	49,608
Flow Projection Factor [3]	1.10	1.08	1.04	1.04	1.02	1.05
EDU's Connected at year end		371	377	377	378	
Average Flow Per EDU, gpd		128	133	131	130	

[1] WWTP began operation January 12, 2005. Increasing flows indicate build-out and connection within sewer service area in 2005. A flow projection factor of 1.10 was assumed for 2005 since calculation based on actual data would not yield realistic results. Flow Projection Factor for 2005 is not utilized to calculate 5 year average factor since it is an assumed value.

[2] Represents the average of the three highest consecutive month's flow.

[3] Calculated by dividing the maximum 3-month average flow for the year by the average annual flow for the year.

III. Organic Loading

The design of the Strasburg Corridor Wastewater Treatment Facility (WWTF) was based on an ultimate flow of 135,000 gpd and an average influent BOD_5 concentration of 220 mg/l. This results in an ultimate organic design load of 248 pounds per day of BOD_5.

A summary of influent BOD_5 measurements for 2009 is shown in Table 2. The average influent BOD_5 was 302 mg/l. This average value was multiplied by the average monthly flow to calculate the monthly organic loads which are presented in Table 3. The peak month organic load of 130 pounds per day occurred in April 2009.

An Organic Loading Projection Factor is calculated by dividing the peak month organic load by the yearly average organic load. The resulting ratio for 2009 is 1.05. The average factor for years 2006 through 2009 is used to calculate the projected maximum organic load in Section IV of this report.

TABLE 2

STRASBURG CORRIDOR WASTE WATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP
2009 WASTELOAD MANAGEMENT REPORT

2009 INFLUENT BOD_5

Date	Influent BOD_5
	mg/l
28-Jan	303
29-Jan	235
11-Feb	294
19-Feb	336
17-Mar	249
26-Mar	189
16-Apr	261
15-May	246
27-May	328
2-Jun	354
29-Jun	330
8-Jul	278
22-Jul	300
5-Aug	330
26-Aug	380
25-Sep	386
28-Sep	368
12-Oct	219
30-Oct	332
19-Nov	254
24-Nov	380
22-Dec	270
29-Dec	331
Average	**302**

TABLE 3

STRASBURG CORRIDOR WASTE WATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP
2009 WASTELOAD MANAGEMENT REPORT

SUMMARY OF AVERAGE MONTHLY ORGANIC LOADINGS

Permitted Capacity: 248 lb/day Phase 2[1]

MONTH	Influent BOD_5 Loading in lb/day					5 YEAR AVERAGE
	2005 [2]	2006 [3]	2007 [4]	2008 [5]	2009 [6]	
January	28	100	133	132	121	103
February	29	103	132	138	118	104
March	28	107	136	144	125	108
April	39	104	130	142	130	109
May	33	110	139	132	126	108
June	42	115	142	135	123	112
July	46	109	122	124	121	105
August	53	106	125	132	129	109
September	64	116	125	131	121	111
October	75	116	131	132	128	116
November	79	119	131	138	120	118
December	81	124	134	141	123	121
ANNUAL						
Min. Month	28	100	122	124	118	
Avg. Annual	**50**	**111**	**132**	**135**	**124**	**110**
Max. Month	81	124	142	144	130	
Organic Loading Projection Factor [7]	1.20	1.12	1.08	1.06	1.05	1.08

[1] Based on Phase 2 design capacity of 135,000 gpd, and design influent BOD_5 of 220 mg/l.

[2] In 2005, organic loading is based on the design influent BOD_5 of 220 mg/l and actual flow for the month.

[3] In 2006, organic loading is based on average measured BOD_5 of 280 mg/l and actual flow for the month.

[4] In 2007, organic loading is based on average measured BOD_5 of 315 mg/l and actual flow for the month.

[5] In 2008, organic loading is based on average measured BOD_5 of 327 mg/l and actual flow for the month.

[6] In 2009, organic loading is based on average measured BOD_5 of 302 mg/l and actual flow for the month.

[7] Calculated by dividing the maximum month organic loading for the year by the average annual organic loading for the year. The Organic Loading Projection Factor of 1.20 for 2005 was assumed since calculation based on actual data would not yield realistic results. Organic Loading Projection Factor for 2005 is not utilized to calculate the 5 year average factor since it is an assumed value.

IV. Projections for Hydraulic and Organic Loading

The 5 year projected connections and resulting hydraulic and organic loadings are shown in Table 4 and Figures 1 and 2. It is projected that the only future growth for the next 5 years will come from the approved Tattersall and Broad Run Estates subdivisions. The rate of growth is anticipated to be slow based on the current pace of development activity. The existing dwelling units in the Village of Marshallton which are within the sewer service area have been connected.

The projected hydraulic loadings were determined by using 225 gpd per unit for the anticipated new connections. The projected three-month maximum hydraulic loads were calculated by multiplying the projected flows by the average Flow Projection Factor of 1.05 from Table 1.

The projected organic loading was determined by using the average 2009 influent BOD_5 concentration of 302 mg/l and a flow of 225 gpd per unit. The projected maximum organic loadings were calculated by multiplying the projected organic loads by the average Organic Loading Projection Factor of 1.08 from Table 3.

Current projections indicate that the facility will not reach the hydraulic or organic design capacity within the next five years.

TABLE 4
STRASBURG CORRIDOR WASTEWATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP

PROJECTED CONNECTIONS, FLOW AND ORGANIC LOAD
2008 TO 2013

Source	Total Units	2009 Actual Units	2010 Projected Units	2011 Projected Units	2012 Projected Units	2013 Projected Units	2014 Projected Units
Marshallton Area	191	191	0	0	0	0	0
Broad Run Estates (Welsh Tract)	30	29	0	1	0	0	0
Tattersall (incl. Heritage)	202	158	1	0	5	5	10
Annual Units			1	1	5	5	10
Cumulative Units	423	378	379	380	385	390	400
Actual Annual Average Flow (gpd)		49,077					
Projected Average Flow from New Units (gpd)			225	225	1,125	1,125	2,250
Cumulative Average Annual Flow (gpd)			49,302	49,527	50,652	51,777	54,027
Projected 3 Month Max Flow (gpd) @ 1.05			51,767	52,003	53,185	54,366	56,728
Actual Annual Average Organic Loading (lb/day)		135					
Projected Avg. Organic Load from New Units (lb/day)			1	1	3	3	6
Cumulative Average Annual Organic Load (lb/day)			136	136	139	142	148
Projected Max Month Organic Load (lb/day) @ 1.08			146	147	150	153	160

FIGURE 1

STRASBURG CORRIDOR WASTEWATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP

PROJECTED HYDRAULIC LOADING

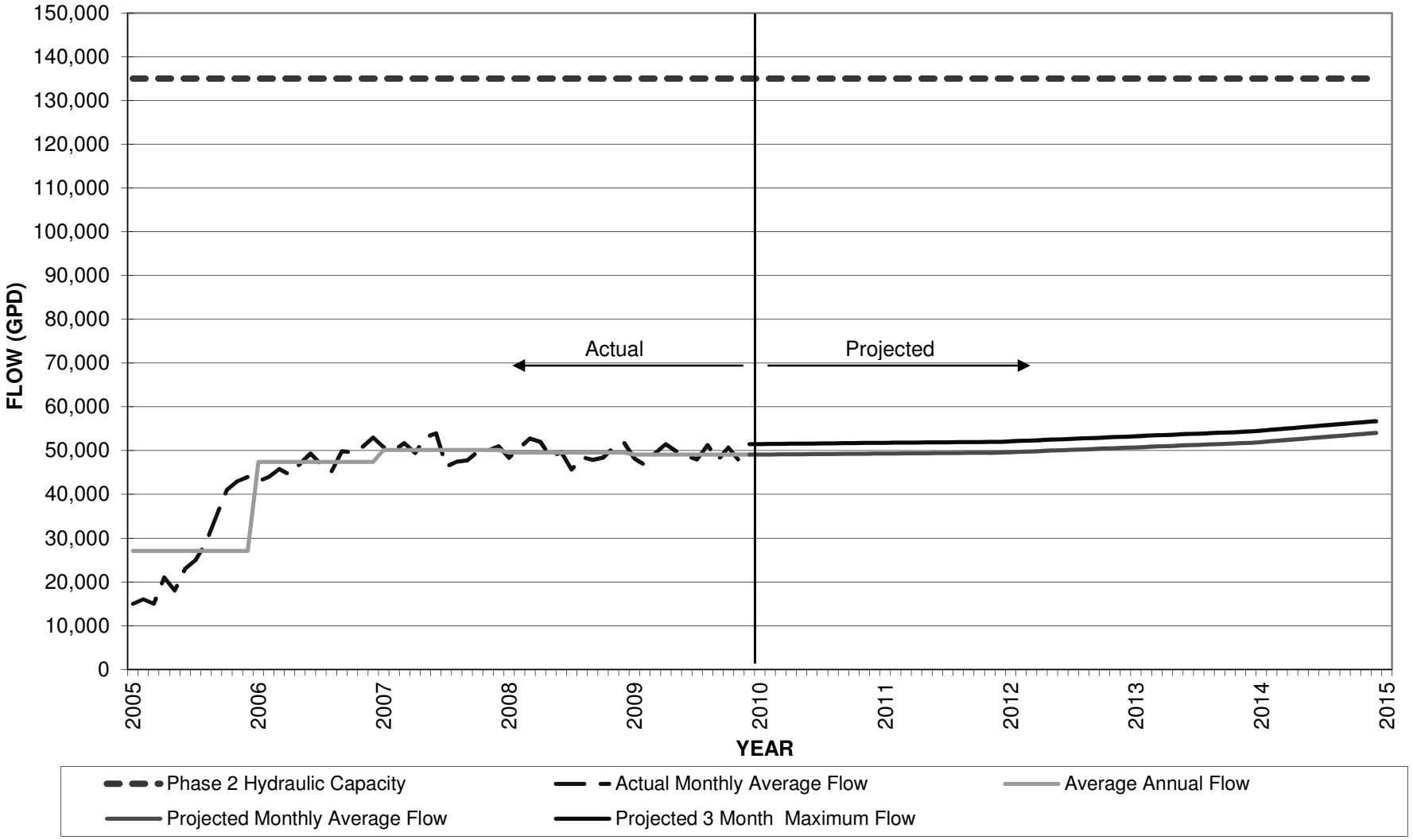
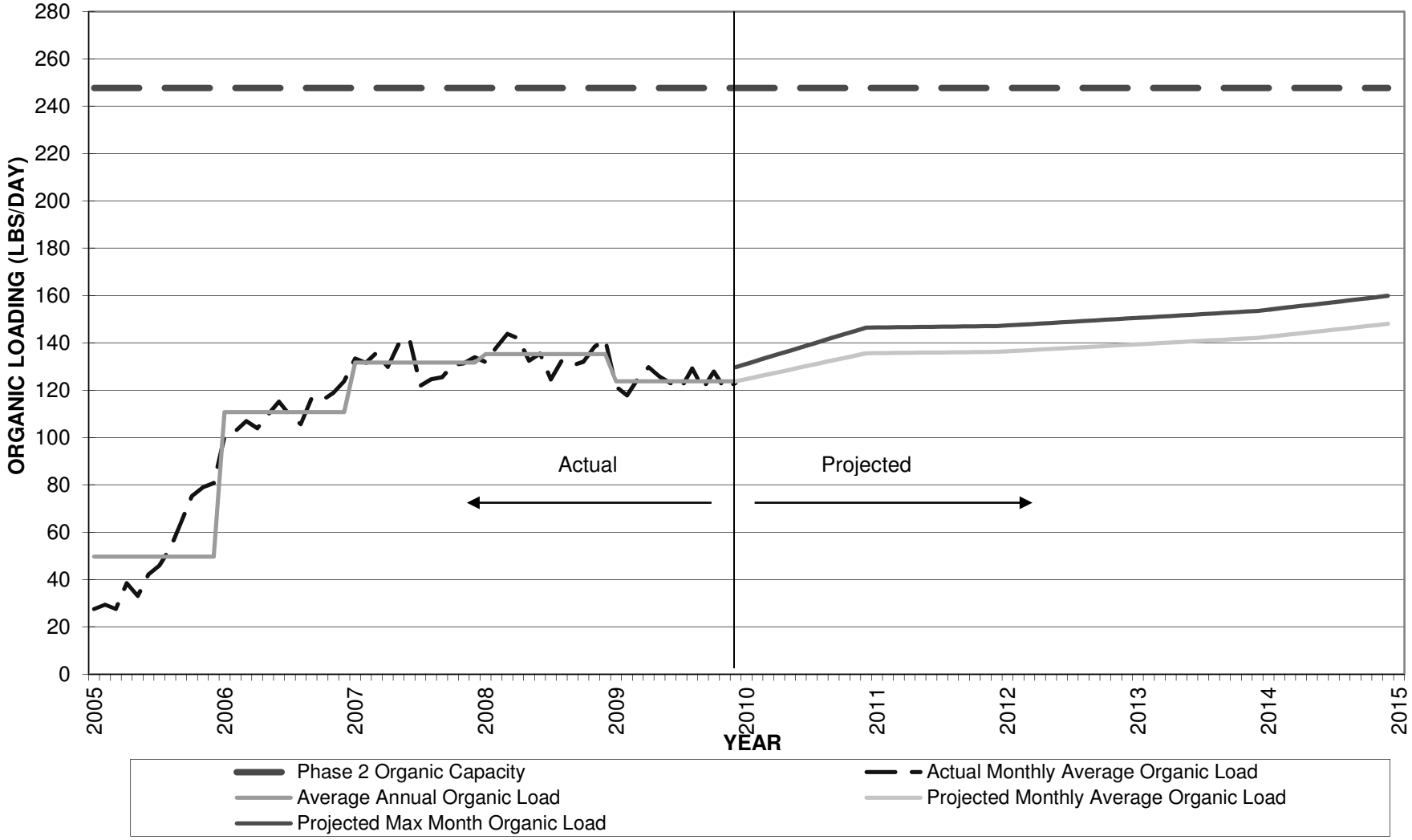


FIGURE 2

STRASBURG CORRIDOR WASTEWATER TREATMENT PLANT
WEST BRADFORD TOWNSHIP

PROJECTED ORGANIC LOADING



V. Industrial Wastes

At this time the Strasburg Corridor has no Industrial Users on the system.

VI. Collection and Conveyance System

The collection and conveyance system for the Strasburg Corridor Wastewater Treatment Facility was constructed as part of private and municipal projects. West Bradford Township installed a low pressure sewer system to service the Village Marshallton area in 2004. Developers have built gravity and low pressure sewer systems to service the Estates at Broad Run subdivision and the Tattersall subdivision. All of the sewers have been installed within the last few years, thus they are new and in good condition. No cleaning, repairs or rehabilitation of the collection system were required in 2009. No new sewer extensions were proposed, approved or constructed in 2009.

All sewers discharge to the pumping station at the intersection of Broad Run Road and Strasburg Road. This pumping station was completed in 2005. The pumping station is designed to convey 350 gpm at 136 feet TDH, which represents a peak flow factor of 3.7 based on the treatment plant capacity of 135,000 gallons per day. Since the current flows are less than ½ of the design flow even on peak days, the pump station is more than adequate for existing conditions. Also, based on the projected hydraulic loading for the next 5 years shown in Table 4, the design capacity of the pump station will not be exceeded in the foreseeable future.

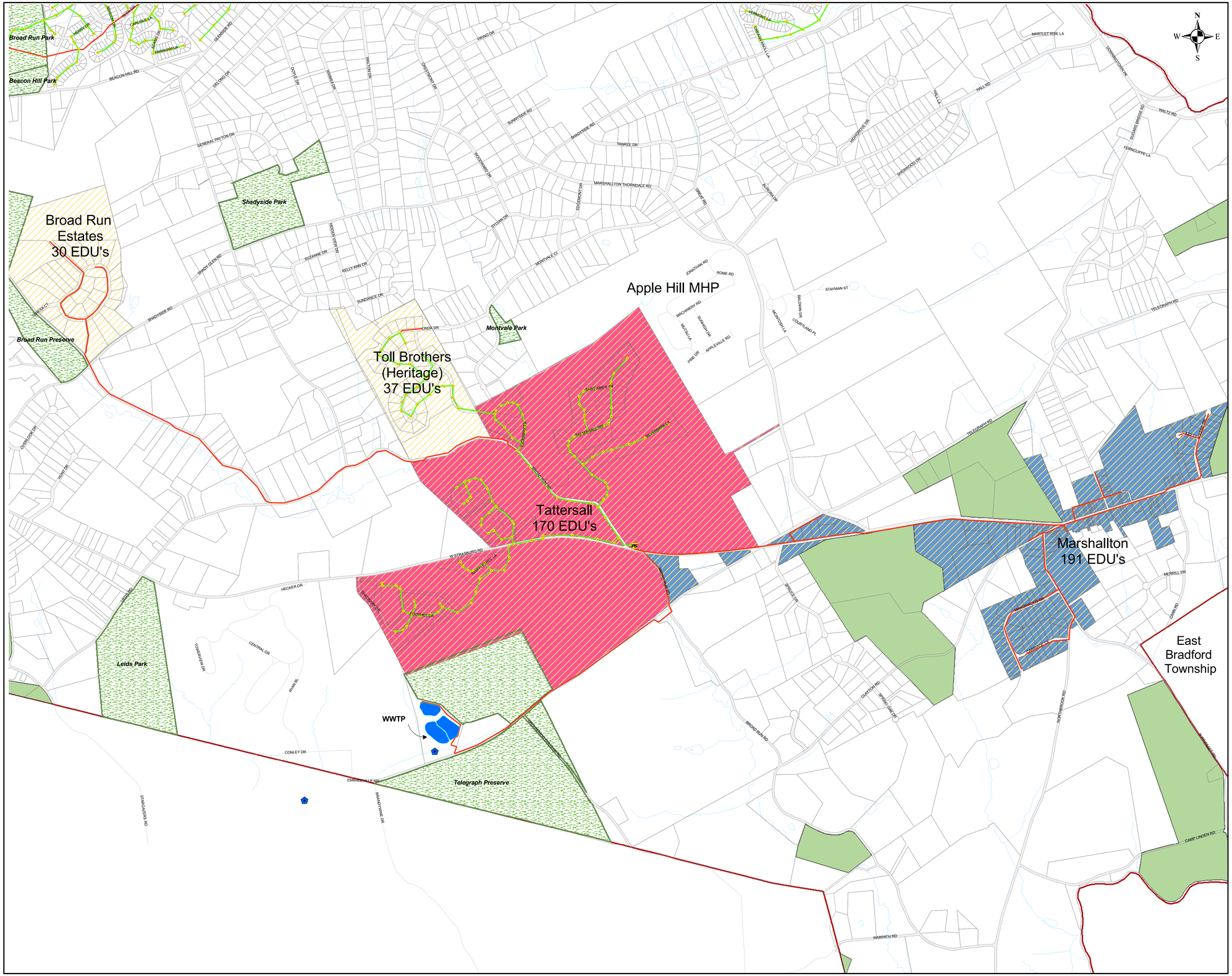
The Township routinely visits the pump station as part of the regular operating routine. Maintenance is performed as necessary. No repairs were required in 2009. Since the discharge from this pump station is the only source of flow to the Strasburg WWTF, the influent flow meter at the WWTF provides an accurate record of the pump station's output. The Township monitors the flows from the pump station for indications of Infiltration and Inflow in the collection system. Records indicate there are no significant increases of flow during wet weather.

A map showing all the existing sewers, the pump station and wastewater treatment plant for the Strasburg Corridor Sewer Service Area is included as Attachment A.

ATTACHMENT "A"

STRASBURG CORRIDOR WASTEWATER FACILITIES SEWER SERVICE AREA MAP

Strasburg Corridor Wastewater Facilities
Sewer Service Area
West Bradford Township



Legend

Sewer Features

- Manhole
- WWTP
- Pump Station
- Storage Lagoons

Sewer Lines

- Gravity
- Force Main

Sewer Service Area

- Strasburg Corridor Service Area

Open Space

- Easements
- Parks and Preserves
- Tattersall
- Marshallton
- Parcels
- Municipal Boundary
- Streams

0 1,400 2,800

Feet

1 inch = 700 feet

Sources :

Chester County Bureau of Land Records GIS Data.

URS

Iron Hill Corporate Center
Sabre Building, Suite 300
4051 Ogletown Road
Newark, DE 19713
Tel: 302.781.5900
Fax: 302.781.5901

R:\PA_WBradford\20814002\Mapping\strasburg_corr_chap94_2009.mxd · March 26, 2010