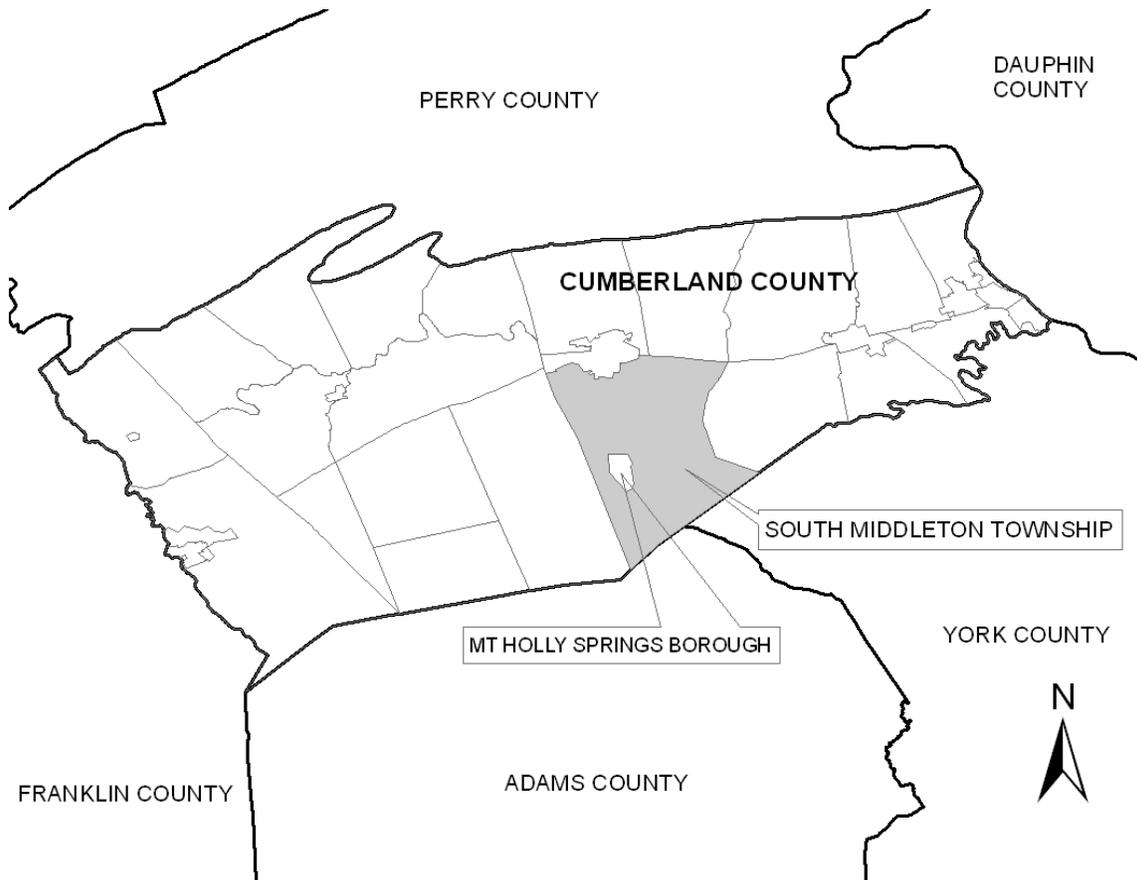


II. Physical and Demographic Analysis utilizing written description and mapping

A. Identification of planning area(s), municipal boundaries, Sewer Authority/Management Agency service area boundaries.

South Middleton Township lies in the south-central region of Cumberland County. The Planning Area consists of the entire municipality.



South Middleton is bordered on the north by Carlisle Borough, North Middleton and Middlesex Townships; on the east by Monroe Township; on the south by York and Adams Counties, with Dickinson Township on the Western border. The Township surrounds the Borough of Mount Holly Springs, although the Borough is not part of the Township. The Township is approximately 51.6 square miles.

South Middleton Township has the distinct benefit of a well-conceived, well-managed municipal sewerage and water network. The Township, through its Municipal Authority, provides sewer and water service to the major population centers surrounding the Borough of Mt. Holly Springs, throughout the areas surrounding the unincorporated Village of Boiling Springs and areas adjacent to the Borough of Carlisle.

These service areas, shown in Appendix G, are identified as follows:

1. Boiling Springs Area (Area I) - A sanitary sewer collection and conveyance network, and a water distribution system, are proposed throughout the residential, village and commercial zoning districts in and surrounding the unincorporated Village of Boiling Springs. This service area runs generally parallel to Forge Road and extends to Forge Road Acres Area of the Township. Except for the possibility of a developer utilizing Growth Boundary Development, no public water or sewerage services are proposed outside these zoning districts. The Growth Boundary Development is a provision in the Zoning Ordinance that would allow a developer on a parcel that has a common boundary with residentially zoned property to build upon 20% of the parcel, with 80% being placed in a restrictive covenant.

This area is tributary to the South Middleton Township Municipal Authority (SMTMA) wastewater treatment plant.

2. Carlisle Area (Area II) - This service area surrounds the Borough of Carlisle. Private development has resulted in public sewer and water service has been extended outward from the Borough into this designated service area. Sanitary sewer collection and conveyance networks, and a water distribution system, are proposed throughout the residential, village and commercial, and industrial zoning districts. With the exception of Growth Boundary Development, no public water or sewerage services are proposed outside these zoning districts.

This area is tributary to the Borough of Carlisle wastewater treatment plant.

3. Mt. Holly Springs West Area (Area III) - This service area surrounds the Borough of Mt. Holly Springs and drains to Pumping Station No. 3. This area is west of Mountain Creek. A sanitary sewer collection and conveyance network, and a water distribution system are proposed throughout the residential and village zoning surrounding the Borough.

With the exception of Growth Boundary Development, no public water or sewerage services are proposed the residential, village and commercial zoning districts in this service area.

This area is tributary to the Mount Holly Spring Borough wastewater treatment plant.

4. Mt. Holly Springs East Area (Area IV) - This service area surrounds the Borough of Mt. Holly Springs and drains to Pumping Station No. 1. This area is east of Mountain Creek. A sanitary sewer collection and conveyance

network, and a water distribution system are proposed throughout the village and industrial zoning surrounding the Borough.

With the exception of Growth Boundary Development, no public water or sewerage services are proposed the residential, village and commercial zoning districts in this service area.

This area is tributary to the South Middleton Township Municipal Authority (SMTMA) wastewater treatment plant.

5. Mt Holly Springs Gravity Area (Area V) - In addition, there are several small areas on the boundary with Mount Holly Springs that are gravity fed into Mount Holly's collection and conveyance network, and is tributary to the Mount Holly Springs wastewater treatment plant.

Water service within the Township generally follows the existing sewer service areas. According to all operations reports prepared by the Authority, ample supplies exist.

South Middleton Township has the capacity to accommodate its foreseeable growth. Utility planning for the future of the Township has been controlled so that active development occurs within areas targeted for public sewer and water service, and is discouraged in the non-service areas.

Those areas not served by public sewers, and not within the proposed public sewer service area, are considered to be located in the On-lot Sewage Management Area.

B. Identification of physical characteristics

Within South Middleton Township, there are seven (7) surface water streams that ultimately flow into the Susquehanna River. They include Letort Spring, Yellow Breeches Creek, Mountain Creek, Hunters Run, Old Town Run, Whiskey Spring and Little Dogwood Run. They are shown on the Watershed Map in Appendix N.

The Hydrology Map (Appendix O) shows the streams and flood prone areas of the Township. These include the 100 year floodplain, wetland areas, hydric soils, hydric inclusion soils, and sinkholes. Flood damage potential suggests these areas should be left undeveloped, in a natural state with few or no structural improvements. As development increases throughout the Township, flood prone areas are likely to increase as well as the severity of the flooding. The floodplain delineated on the map is based on the Federal Emergency Management Agency (FEMA) Federal Insurance Rate Map and shows the base flood elevation of the Yellow Breeches Creek in the Township.

The Yellow Breeches Creek represents the major flood hazard area in the Township. Other streams included with a flood hazard area are the LeTort Spring Run, Mountain Creek, Hunters Run, Old Town Run, Whiskey Run and Little Dogwood Run. A large portion of the hydric soils as well as wetlands are associated with the Creek itself, but there are wetlands and hydric soils associated with LeTort Spring Run in the north-central section of the Township, as well as with Mountain Creek in the southwestern portion of the Township.

Sinkholes, mentioned in the Geology section, are shown and are associated with the hydric inclusion soils. These soils which exhibit a natural tendency to flood pose major problems to urban development activities.

C. Soils

The soils information included in this plan is based on the Soil Survey of Cumberland and Perry Counties, issued April 1986. The Major Soil Types map (Appendix R) illustrates the location of the six soil associations found in South Middleton Township. A description of the soils found in the Township is vital to understanding the appropriate land use applications.

The **Hagerstown-Duffield** association, which encompasses 38% of the land area in the Township, is the predominate association, and is confined to the northern third of the Township. This association is shown on the Agricultural Soils map (Appendix S) as an area of prime agricultural soil. It consists of about 60% Hagerstown soils, 20% Duffield soils and 20% minor soils. Both the Hagerstown and Duffield soils are deep and well drained. The Hagerstown soils are level to moderately steep and the Duffield soils are mostly level to sloping. Minor soils included in this association are Huntington, Edom, Penlaw, Murrill and Neshaminy soils on the uplands and Lindside and Melvin soils on the floodplains. The soils in this association are among the best agricultural soils in the County. Limitations for agricultural uses are slope, erosion, rock outcrops and sinkholes. Limitations for non-agrarian use also include possible groundwater contamination due to seepage along fracture lines.

The next largest soils association in the Township is the **Hazelton-Clymer** association. This association comprises 23% of the land area and is composed of 40% Hazelton soils, 15% Clymer Soils and 45% minor soils. It is located in the southeastern section of the Township as well as south, east and west of the Borough of Mount Holly in areas of slope greater than 15%. This soils series is deep and well drained. The Hazelton soils are mainly sloping to very steep, while the Clymer soils are nearly level to moderately steep. Although woodland is the predominant land use in this association some areas are used for home sites. Steep slopes and stones in the surface are the major limitations for use.

The **Highfield-Glenville** association encompasses 17% of the Township. It consists of nearly level to very steep soils located on the tops and sides of

mountains and ridges found in the southwestern portion of the Township. Highfield soils, which comprise 63% of this association, are deep, well drained and are nearly level to moderately steep. Glenville soils comprise 25% of the association and minor soils are included in the remaining 10%. Glenville soils, which are deep and moderately well drained to somewhat poorly-drained, are nearly level to gently sloping. The soils in this association are suitable for most agricultural uses. The major limitations are slope, seasonal high water table, moderate available moisture capacity and stoniness for both agricultural and non-agricultural uses.

The **Murrill-Laidig-Buchanan** association comprises 11 % of the Township area. It consists of 35% Murrill soils, 20% Laidig soils, 15% Buchanan soils and 30% minor soils. This association is located in an east-west strip south of Rt. 174. Murrill soils are deep, well drained and nearly level to moderately steep. Laidig soils are deep, well drained and gently sloping to moderately steep. A fragipan exists in the subsoil. Buchanan soils are similar to the Laidig series except they are moderately to somewhat poorly drained. Soils in this association are mainly used for cropland, pasture and woodland. Primary limitations include slope, stoniness, reduced permeability and a seasonal high water table.

The **Monongahela-Atkins-Middlebury** association is located along the Yellow Breeches Creek and makes up 7% of the soils in the Township. It is comprised of about 35% Monongahela soils, 25% Atkins soils, 10% Middlebury soils and 30% minor soils. These deep, nearly level and gently sloping soils are moderately well drained to poorly drained. They are formed in alluvium. The Monongahela soils are deep and moderately well drained. They are nearly level and gently sloping and occur on the stream terraces. Atkins and Middlebury soils are located on the floodplains and are nearly level. Both the soil series are deep but the Atkins soils are poorly drained whereas the Middlebury soils are moderately well drained to somewhat poorly drained. Pasture and woodland is the primary land use of this association; however, the soils are generally suitable for most agricultural uses. Flooding and a seasonal high water table are the major limitations for use for both agricultural and non-agricultural uses.

The **Athol-Neshaminy** association represents about 4% of the soils in the Township and is located in a narrow band in the northeast quadrant. This association, which occurs on gently sloping and sloping terrain in upland valley areas, is comprised of about 45% Athol soils, 40% Neshaminy soils and 15% minor soils. Both of the major soil series in this association are deep and well drained. The soils in this association are suitable for both agricultural and most non-agricultural uses. The major limitations for use are slope, high content of coarse fragments, low strength, large stones on the surface and hazard of erosion.

The Agricultural Soils map (Appendix S) shows areas of prime agricultural soils, i.e., those with the least slope and most fertility. Additional soils of statewide

importance are steeper, thinner, but still productive. The source of these classifications is the Soil Conservation Service (now known as the Natural Resources Conservation Service) soil survey. As shown on this map, the prime agricultural soils are mainly located in the northern two-thirds of the Township, while the other soils are scattered throughout the Township, with a concentration in the Township's southwestern sector.

D. Geologic Features

The Geology map (Appendix T), delineating carbonate and non-carbonate formations in the Township follows this section. Approximately the northern three-fourths of the Township is composed of carbonate formations. Fault lines, as well as caves are indicated on this map.

Identification of where fault lines lie is important in order to protect the groundwater resources in the Township. Wells in the carbonate rock reach aquifers that are capable of yielding very large quantities of water. These aquifers transmit large quantities of water by means of the rock fracturing which has occurred over geologic time, and has created open areas in the subsurface fractures (solution channeling). This solution channeling and subsequent dissolution of the limestone can lead to surface conditions such as sinkholes (sinkholes are indicated on the Hydrology map), closed depressions and others features collectively known as "karst topography." These features create potential pathways for contamination of the aquifers through the introduction of surface water into the subsurface. Infiltrating surface water may also cause unconsolidated material overlaying bedrock to migrate downward. These features indicate potential areas of structural weakness that may affect the integrity of building foundations, pipelines, roadways and other structures.

According to the Cumberland and Perry County Soil Survey, rainfall in this study area averages 40 inches per year. Of that, 22 inches is returned to the air by evaporation and transpiration, 6 inches is runoff, and 12 inches is infiltrated and becomes ground water. The primary source of water for urban, industrial and agricultural utilization is from dug and drilled wells, springs and storage reservoirs, and communities receive water supplies from streams, reservoirs, springs and wells. Boiling Springs is one of the largest springs in the state and has only slight variations in flow. The water is hard but yields large quantities.

E. Topography

Located in the Cumberland Valley, South Middleton Township has a wide range of topographic conditions; stream valleys to sharp mountain ridges. The area of greatest height and slope lies south of the old Reading Railroad line in the South Mountain ridges.

A wide band of gently rolling terrain stretches east-west across the central region of the Township along both sides of the Yellow Breeches Creek and extending north to the LeTort Spring Run watershed area. Along the edges of the LeTort watershed are some hillsides with slopes exceeding 15 percent.

On the top of South Mountain, the topography is generally a rolling level area with sloping land of less than 10 percent. The slope of land influences the location of development and use of land. Graded as a percent of slope, the Township has been delineated into 3 categories: areas with slope of less than 15 percent, areas with slope of 15-25 percent and areas with slopes exceeding 25 percent. The map entitled "Steep Slopes" in Appendix U, shows the general areas placed into the three categories of slope.

In general, slopes of less than 15% present few problems for most types of land uses; the flatter slopes sometime create problems in developing adequate stormwater management in intense development situations. As the slope of the land increases, urban type of development becomes less desirable and more expensive to build and maintain. Water runoff is greater in these areas. This increases erosion with resulting increased silting of stream channels causing increased flooding. Generally, areas of less than 15 percent are more appropriate for urban development. These areas of South Middleton Township are located north of the old Reading Railroad line extending northward to Carlisle.

The map shows that the areas with slope greater than 25% are located south and southeast of the Borough of Mount Holly Springs, where the South Mountain ridge transverses the Township in an east-west direction. This area does not lend itself well to development due to sparse vegetative cover and the potential for erosion and runoff. Intensive development is not practical in this area of the Township.

F. Potable Water Supplies

1. Supply System

The supply system that was installed somewhere around 1910 by J. C. Bucher has been abandoned. The current system is owned and operated by the South Middleton Municipal Authority. Over the years, the supply system has been enlarged by the development in 1972 of Well No. 1 located along Park Drive, across from PPG. Well No. 2 was installed in 1975 and is located one mile west of Boiling Springs, south of Route 174. Well No. 3 was installed in 1985 and is located across from the Forest Meadows development off Rockledge Drive, southwest of Carlisle.

In 1992, the Authority purchased a water distribution system from PA American known as Forge Road Acres. This system consists of a 270-lot subdivision in which there are 260 existing homes. During 2009, Well No. 1 pumped at an average rate of 1,220 GPM and Well No.2, 1,850 GPM. The combined flow pumped from both wells in 2009 was 3,080 GPM. Well No. 1 pumped a total of 347,511,000 gallons and averaged 952,085 GPD and Well No. 2 pumped a total of 464,472,000 gallons and averaged 1,272,526 GPD for a combined average of 2,224,611 GPD.

Well No.3 pumped at an average rate of 660 GPM and pumped a total of 119,691,000 gallons which is an average of 327,921 GPD. Water purchased from other suppliers during 2009 is as follows: From the Borough of Carlisle a total of 29,000 gallons or an average of 79 GPD and from the Borough of Mt. Holly a total of 797,000 gallons or an average of 2,184 GPD.

By totalizing all production sources, the total water produced for the year ending 2009 was as follows:

<u>SOURCE</u>	<u>TOTAL</u>
Well No. 1	347,511,000
Well No. 2	464,472,000
Well No. 3	119,691,000
From Carlisle	29,000
From Mt. Holly Springs	<u>797,000</u>
	932,500,000 Gallons

The average gallons per day (GPD) produced was 2,554,795. The ground water levels over pump suction of Well No. 1, No.2 and No.3 maintained an average of 43.3' peaking at 46.0', 43.8' peaking at 46.0' and 67.7' peaking at 74.0' respectively during 2009. The changes in water levels have had little significance since the wells were placed in operations, with the exception of the drought of 1991. Since that time, there have been no significant changes in ground water levels.

The supply system is operated automatically by sensing pressure drops during water demands throughout the system. This operation utilizes a level indicator transmitter at the storage tanks. The South Middleton Township distribution system is comprised generally of two components: the Well No.1 and Well No.2 Distribution System and the Well No. 3 Distribution System.

2. Well No. 1 and Well No. 2 Distribution System

The Well No.1 and 2 Distribution System contains Storage Tanks 1, 2 and 4.

Storage Tank No.1 is of the elevated type and has a capacity of 500,000 gallons; Storage Tank No. 2 is a stand pipe and has a capacity of 1,000,000 gallons; Storage Tank No.4 located next to Storage Tank No. 2, was constructed during 1992 and placed in operation on November 2, 1992. It is a standpipe and has a capacity of 4,000,000 gallons; with a total storage capacity of 5.5 million gallons and an average daily use of 2,205,000 gallons. During normal operation, the Authority presently maintains more than a 12 hour water supply in overhead storage for Well No. 1 and No. 2 distribution system. However, should system operation be interrupted without replenishment, the customers at the highest elevation would begin to experience decreased water pressure.

The hydraulic gradient of the storage tanks is located at an elevation that maintains a minimum pressure of 35 P.S.I. to the highest users on the system and a maximum pressure of 81 P.S.I. to the lowest users on the system.

The system was increased considerably with the signing of the Intermunicipal Water Agreement with Middlesex Township in 1984. The agreement was amended on November 20, 1997 to supply Middlesex Township with up to one and one half million gallons per day (1.5 MGD).

3. Well No. 3 Distribution System

The Well No.3 Distribution System contains Storage Tank No. 3, a standpipe with a capacity of 1,000,000 gallons. With this storage capacity and an average daily use of 396,000 gallons, the Authority presently maintains less than 8 hours of water supply in overhead storage in the Well No. 3 distribution system during normal operations. Should system operation be interrupted for more than 8 hours with no replenishment, the customers at the highest elevations would begin to experience decreased water pressure.

4. Interconnects

With the Intermunicipal Water Agreement which became effective January 1, 1985 between the Borough of Carlisle and South Middleton Township,

reserve capacity was allotted to South Middleton to purchase up to 500,000 GPD of water from the Carlisle Borough Water System. This allotment is to service those areas outside the Borough of Carlisle that are presently beyond South Middleton's own water supply source. There is presently one customer being served at the by the Carlisle system, located at 533 Highland Avenue.

In addition to the above Agreement, an Emergency Interconnect Agreement was made among the Borough of Carlisle (effective 1-1-85), Mt. Holly Springs Borough (effective 11-13-89), and South Middleton Township to provide a backup water supply should any party's source become inoperable. The Interconnection Agreement will provide up to a maximum of 700 GPM (Carlisle) and 350 GPM (Mt. Holly Springs) during the emergency duration.

A water supply service area map is included within Appendix Q.

F. Wetlands

Please refer to the Hydrology Map (Appendix O) and the discussion regarding Physical Features above.