

## Chapter 18

# **Natural Resources**

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### **PHYSICAL LOCATION**

Shippensburg Borough and Shippensburg Township are located in the heart of Cumberland Valley, within the Ridge and Valley Province. Blue Mountain is situated towards the north (locally known as “North Mountain”) and South Mountain lies in a southeasterly direction from the Borough. The topography of the region itself can be described as gently rolling or relatively flat due to its location in a valley. The terrain has elevations ranging from approximately 640 to 720 feet.

### **STREAMS AND WATERSHEDS**

The watersheds and streams in the region are shown on Figure 18.1, Water Related Features Map. There are several streams which influence the region including the Middle Spring Creek, Burd Run, and a tributary to the Middle Spring Creek (locally known as “Branch Creek”), which carries the headwaters to the Middle Spring Creek from the Dykeman Spring area. The watersheds described on Figure 18.1 drain into the Middle Spring Creek Basin, which drains into the Conodoguinet Creek Watershed, and ultimately ends up draining into the Susquehanna River through the Lower Susquehanna River Subbasin. The Lower Susquehanna River Sub-basin has a total drainage area of 5,809 square miles and includes the drainage area of the Conestoga, Conodoguinet, Swatara, Conewago, and Penn’s Creeks and several nearby streams.

There are three watersheds within the region. Middle Spring Creek and Burd Run Watersheds drain almost the entire Township, while Rowe Run and Burd Run drain portions of the Borough. Dykeman’s Spring, located within the Borough, are the headwaters for the north-flowing Middle Spring Creek. Burd Run is located north of the Borough and flows in a westerly direction into Middle Spring Creek approximately 1.5 miles north of the downtown area. Figure 18.1 shows the locations of each watershed, as well as floodplain and wetland locations throughout the Borough and the Township.

### **FLOODPLAINS**

Floodplains are areas adjacent to watercourses which are covered by water during times of flooding. A 100-year floodplain is the area adjacent to a river or stream which has a 1% chance of being flooded during any one year, and is typically used for regulatory purposes. Floodplains should not be developed, due to the potential for damage to persons and property. If development occurs within the floodplain, it may limit the floodway, resulting in increased damage downstream because of resulting increased velocities of the floodwater downstream. Outdoor storage of materials within floodplains is not desirable because of the possibility of the materials being swept into the stream when flooding of the banks occurs. One hundred-year floodplains are shown from Federal Emergency Management Agency (FEMA) Maps. Detailed studies and calculations have not been performed to establish the extent of the 100-year floodplains for all watercourses. Any development proposed in the vicinity of watercourses would require the developer to obtain a calculated study of the 100-year floodplain if such studies have not been performed by FEMA.

Care must be taken in disturbing areas along watercourses because increased sedimentation within the stream (increased depositing of soil within the stream) can occur. Increased impervious cover along watercourses typically increases the volume of storm water runoff into the streams. This additional runoff can erode stream banks and channels. If sedimentation increases, streambeds may fill, causing floodwaters to affect a larger area. Floodplains for the Shippensburg region are depicted on Figure 18.1, the Water Related Features Map.

Wet (or “hydric”) soils and floodplains along watercourses should be preserved from development in the interest of environmental preservation. These areas act like a sponge when floodwaters rise; when coupled with established wetlands they filter out nutrients and other pollutants, thereby protecting the quality of the storm flow into local surface waters, all of which ultimately flow into the Susquehanna River. Impervious surfaces should be restricted from stream bank areas in order to facilitate absorption of storm runoff into the

ground. Such increased absorption can help to replenish groundwater and to decrease flood peaks, as less runoff will flow directly into the stream. Inadequate supply of groundwater may result in reduced flows of water in a stream during dry months, and the inability to sustain stream flow can mean a greater concentration of pollutants at periods of low flow.

The 2003 Cumberland County Comprehensive Plan identifies the following as benefits to preserving floodplains:

- to prevent property damage,
- to minimize danger to the public health by protecting the water supply and promoting safe and sanitary drainage,
- to reduce the financial burdens imposed on communities by flooding,
- to comply with provisions of the National Flood Insurance Program and the Pennsylvania Flood Plain Management Act,
- to provide sufficient drainage courses to carry abnormal flows of storm water during periods of heavy precipitation, and
- to provide areas for groundwater absorption for recharge of subsurface water supplies.

The current Shippensburg Borough Zoning Ordinance has identified the floodplains and has an overlay district mapped. The regulations and requirements should be strictly enforced for areas which are located within this overlay district.

## **WETLANDS**

Wetlands are generally found along watercourses or in other areas subject to frequent flooding, and are characterized by soil type and the presence of hydrophytic ("water-loving") vegetation, in addition to the presence of visible surface water. Locally, the lands adjacent to Middle Spring Creek and Burd Run as well as the Dykeman Spring area contain wetlands. Wetlands are typically rich in plant growth and provide habitat for a variety of animals. Furthermore, wetlands can protect water sources by acting as a natural filter, removing pollutants such as bacteria and sediment from surface water before it enters the ground. Development activity, including the placement of fill material, is already prohibited by the Pennsylvania Department of Environmental Protection and the U.S. Army Corps of Engineers.

The wetlands depicted on the Water Related Features Map (Figure 18.1) are from the National Wetlands Inventory, prepared by the Office of Biological Services, U.S. Fish and Wildlife Service. The wetlands inventory was prepared by stereoscopic analysis of high altitude aerial photographs, with the wetlands identified based on vegetation, visible hydrology, and geography. A detailed ground level analysis of any site may result in a revision of the wetland boundaries, and it is possible that small wetlands and those obscured by dense forest cover may not be identified.

## **GEOLOGY & GROUNDWATER**

Geology affects land use planning in that it is the chief determinant of groundwater supply. This is a critical consideration not only for homeowners with private, individual wells, but also for public water suppliers, who also largely rely upon groundwater sources, given the lack of surface supplies in this part of the state. Figure 18.2, the Geologic Formations and Aquifers Map, shows the boundaries of the geologic formations in the community along with the associated average aquifer yield in gallons per minute (gpm) for each formation. Detailed descriptions of each formation are provided in the Appendix, including descriptions of porosity and permeability, which indicate how susceptible each formation is to contamination.

Bedrock geology determines the groundwater storage and transmission characteristics of an area. Rock type, porosity, permeability, inclination of strata, faults, joints, fold, bedding planes, and solution channels are all parameters that affect groundwater movement and availability. In contrast, the initial quality of the

groundwater is a result of chemical interaction between the water and the surrounding bedrock. The more soluble the rock, the more it will allow compounds to become dissolved and affect the groundwater. For example, water from limestone aquifers are commonly considered "hard," due to its mineral content.

The Shippensburg Region is influenced by its location in the Ridge and Valley physiographic province. The mountains forming the northern and southern borders of Cumberland County are part of the ridge portion of this province. Quartzite, sandstones, and conglomerates are characteristic of this portion of the region. These rocks are generally tightly cemented with low porosity, but they also tend to be brittle, so numerous joints have developed. These joint openings produce a secondary porosity, which increases the permeability of the rock. In general, the number and size of joint openings decrease with depth. With quartzite, jointing is the most important factor in groundwater production.

The other dominant rock types in the Region are the limestone and dolomite characteristic of the Great Valley (Cumberland Valley) portion of the Ridge and Valley Province. Although limestone particularly is associated with high groundwater yield, this formation is also susceptible to sinkholes, surface subsidence, and groundwater contamination due to high porosity.

As shown on Figure 18.2, the highest average groundwater yield (measured in gallons per minute, or "gpm") is in the Rockdale Run Formation, with well yields up to 1,000 gpm.

## SOIL DESCRIPTIONS

In Pennsylvania, soils information is maintained at the County level, typically by individual County Conservation Districts. Soil surveys prepared by the conservation districts are entered into a statewide Soils Survey Geographic Database, which is then certified and managed by the United States Department of Agriculture, Natural Resources Conservation Service, and National Survey Center. The information was developed using a database called "SURGO." SURGO is the most up-to-date soil survey information available at the time this Plan was developed. Figure 18.3, Prime Agricultural Soils Classifications and Soil Name Chart, describes the types of soils and the prime agricultural soils classifications that are represented in the Shippensburg Region. Figure 18.4, the Soils Map, shows the location of each individual soil type in the Shippensburg Area.

The "farmland classification" column identifies soils as prime farmland, farmland of statewide importance, or farmland of local importance. These categories are based upon the productivity of each soil type for food products, feed, fiber, forage, and oilseed crops as determined by the Natural Resources Conservation Service (NRCS), a federal agency committed to the management and maintenance of the natural resources that support American agriculture. All soils are assigned a "class" number based upon agricultural suitability. There are eight classes (identified by Roman numerals), with "I" being the best, most productive soil in the country and "VIII" being the worst, including swamplands and gravel pits.

The definition of "prime farmland" has been established nationwide by the U.S. Department of Agriculture to include Class I and Class II soils. These are the classifications used by the Agricultural Preservation Board to determine eligibility in the Cumberland County Farmland Conservation Easement Program. Prime farmland has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks. Its soils are permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it either does not flood frequently during the growing season or is protected from flooding. Figures 18.3 and 18.4 identify prime farmland as well as soils defined by the Commonwealth of Pennsylvania as "farmland of statewide importance" based upon conditions specific to Pennsylvania.

Stewards of prime farmland soils should recognize that soil properties are only one of several criteria that make for "prime" soil. Other factors include land use, frequency of flooding, irrigation, water table, and susceptibility to wind erosion.

- **Land use** - Prime farmland is designated independently of current land use, but it cannot be areas of water or urban or built-up land.
- **Frequency of flooding** - Some soil types include both prime farmland and land not prime farmland because of variations in flooding frequency.
- **Irrigation** - Some soil types include areas that have a developed irrigation water supply that is dependable and of adequate quality along with areas lacking such a supply. For these soil types, only the irrigated areas meet the prime farmland criteria.
- **Water table** - Some soil types include both drained and undrained areas; only the drained areas meet the prime farmland criteria.
- **Wind erodibility** - Susceptibility to erosion by wind is determined by a combination of soil characteristics and the climate. Due to varying climatic conditions, it is possible for a single soil type to be prime farmland in one part of a survey area but not in another.

Figure 18.3 Prime Agricultural Soils Classifications and Soil Name		
Soil Symbol	Farmland Classification	Soil Name
CsA	All areas are prime farmland	CLARKSBURG SILT LOAM
DrB	Farmland of statewide importance	DRYRUN GRAVELLY LOAM
DuB	All areas are prime farmland	DUFFIELD SILT LOAM
DuA	All areas are prime farmland	DUFFIELD SILT LOAM
DuC	Farmland of statewide importance	DUFFIELD SILT LOAM
EdB	All areas are prime farmland	EDOM SILTY CLAY LOAM
EdC	Farmland of statewide importance	EDOM SILTY CLAY LOAM
Fu	All areas are prime farmland	FUNKSTOWN SILT LOAM
HaB	All areas are prime farmland	HAGERSTOWN SILT LOAM
HaA	All areas are prime farmland	HAGERSTOWN SILT LOAM
HaC	Farmland of statewide importance	HAGERSTOWN SILT LOAM
HcD	Not prime farmland	HAGERSTOWN SILT LOAM, ROCKY
HcC	Not prime farmland	HAGERSTOWN SILT LOAM, ROCKY
HcB	Farmland of statewide importance	HAGERSTOWN-CARBO SILTY CLAY LOAMS
HcC	Not prime farmland	HAGERSTOWN-CARBO SILTY CLAY LOAMS
HbB	All areas are prime farmland	HAGERSTOWN-CARBO SILTY CLAY LOAMS
HkB	Not prime farmland	HAGERSTOWN-ROCK OUTCROP COMPLEX
HkD	Not prime farmland	HAGERSTOWN-ROCK OUTCROP COMPLEX
HdF	Not prime farmland	HAGERSTOWN-ROCK OUTCROP COMPLEX
HdB	Not prime farmland	HAGERSTOWN-ROCK OUTCROP COMPLEX
HdD	Not prime farmland	HAGERSTOWN-ROCK OUTCROP COMPLEX
HuA	All areas are prime farmland	HUNTINGTON SILT LOAM
Jg	All areas are prime farmland	JUGTOWN SILT LOAM
Ls	All areas are prime farmland	LINDSIDE SILT LOAM
Me	Not prime farmland	MELVIN SILT LOAM
Me	Farmland of statewide importance	MELVIN SILT LOAM
MnA	All areas are prime farmland	MONONGAHELA SILT LOAM
MuB	All areas are prime farmland	MURRILL CHANNERY LOAM
MuA	All areas are prime farmland	MURRILL CHANNERY LOAM
MrB	All areas are prime farmland	MURRILL GRAVELLY LOAM
Pe	Farmland of statewide importance	PENLAW SILT LOAM
Ph	All areas are prime farmland	PHILO SILT LOAM
Pt	Not prime farmland	PITS AND QUARRIES
Pu	Not prime farmland	PURDY SILT LOAM
RyB	All areas are prime farmland	RYDER-NOLLVILLE CHANNERY SILT LOAMS
Ub	Not prime farmland	URBAN LAND AND UDORTHERTS
Uu	Not prime farmland	URBAN LAND-HAGERSTOWN COMPLEX
UhB	Not prime farmland	URBAN LAND-HAGERSTOWN COMPLEX
W	Not prime farmland	WATER

## STEEP SLOPES - TOPOGRAPHY

The topographic features of the landscape derive from the structure and weathering characteristics of the underlying bedrock. The more weather-resistant rock is responsible for areas of higher elevation, while less resistant rock, such as limestone, tends to erode to form low-lying valleys.

Slope is measured by the change in vertical elevation (the “rise”) over some horizontal distance (the “run”). This measurement is then expressed as a percentage. For example, if the ground rises two feet over a distance of twenty feet, then the slope is 2/20, or 10%. Areas that have slopes greater than 15% are deemed to have severe limitations to development. In general, development of such land can result in hazardous winter road conditions, costly excavation, erosion and sedimentation issues (a particular concern where the land may be cultivated), and accelerated velocity of stormwater runoff. Furthermore, conventional on-lot sewage disposal systems will not function properly where slope exceeds 15%. While specially designed systems will work in such areas, even custom installations will not function when the slope exceeds 25%. In steep areas, development should be controlled such that natural vegetative cover is maintained to the greatest extent possible, and erosion controls instituted. Without such cover, stormwater runoff can rapidly erode the slopes.

The slopes are shown on Figure 18.5, the Natural Resources Map. There is only one area identified as containing slopes from 15% to 24% within the Borough Limits.

## NATURAL AREA INVENTORY SITES

In 1997, the Tri-County Regional Planning Commission produced a Natural Areas Inventory (NAI) for Cumberland, Perry, and Dauphin Counties that included descriptions, maps, and rankings of sites of ecological significance. This study was adopted in 2000. The emphasis of the inventory was on locations of species listed as rare, threatened, or endangered as well as exemplary natural communities. In 2003, the NAI was updated to include new information based on fieldwork completed since the original publication. The NAI Report presents the areas known to contain outstanding floral, faunic, and geologic natural features, providing maps of the best natural communities (habitats) and all the known locations of animal and plant species of special concern (endangered, threatened, or rare) in the study area. The maps are coded using the Pennsylvania Natural Diversity Inventory (PNDI) coding system that is unique to each element on a given USGS topographic map. Natural communities are identified as “NC,” plants as “SP,” animals as “SA,” and geologic features as “GE.” These alphabetic codes are then followed by a three-digit number in order to identify a specific location or feature. Individuals seeking information on an individual site or species location must contact the Pennsylvania Science Office of The Nature Conservancy. An approximate location of the NAI sites are found on Figure 18.5, the Natural Resources Map.

## SITES OF STATEWIDE SIGNIFICANCE

The Shippensburg Region includes one area of statewide significance: the Middle Spring Creek area. Figure 18.6 explains the code information found on the USGS Quadrangle Map for Shippensburg (duplicated here as Figure 18.7) and the significant features of the area. Located in Shippensburg Borough, Shippensburg Township, Hopewell Township, and Southampton Township (Franklin County), Mill Spring Creek is ranked “4” on a one-to-five scale, with “1” indicating the most important sites.

Two Middle Spring Creek area is notable for the presence of two animal species of interest, identified here as “SA901” and “SA598.”

- **SA901** - The supports a good-quality population of this species. Several dozen individuals including juveniles were observed at four separate observation points along a moderate gradient section of Middle Spring Creek. Downstream where Middle Spring Creek enters Conodoguinet Creek, two adults of this species were also observed. Conodoguinet Creek is gravel and cobble-bottomed with riffles and runs along this section. The population is probably most successful in Middle Spring Creek with its cooler temperatures. Associated species include creek chub, blacknose dace, longnose dace, flathead minnow, bluegill, pearl dace, and juvenile wild brown trout. The population and the quality of the habitat in Middle Spring Creek are threatened by excessive siltation from agricultural runoff and by industrial pollution. Maintaining a vegetated buffer along the creek and avoiding disturbances to the stream and its banks will help this species as well as many others continue to persist at this site. The Pennsylvania Department of Environmental Protection (DEP) has classified this creek as a “Cold Water Fishery.”

- **SA598** - During surveys in 2000, this endangered animal was discovered in a small wetland along the Middle Spring Creek on the southern edge of the county. Associated plant species include skunk cabbage, cattail, foxtail, spike rush, jewelweed, sedges, tearthumb, and mosses. The wetland is fed by groundwater and has standing water in some areas. The site has been disturbed, and threats to this animal include invasive species as well as further development. More surveys are needed at this site to determine the status of the population. Better management of the area should include removal of invasive species, maintaining a vegetated buffer along the creek, and avoiding disturbances to the stream and its banks.

The information in Figure 18.6 is from the Natural Areas Inventory. The Inventory document explains in more detail the items contained within each Natural Area.

**Figure 18.6 : USGS Quadrangle Map: Shippensburg Map Code Information**

Category	Species/ Type	Report Code	TNC Ranks*		State Status	Last Seen	Quality	Status
			Global	State				
Natural Communities:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Special Plants:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Special Animals:	N/A	SA504	G5	SIB	N	07-16- 92	E	N/A
	N/A	<b>SA598<sup>1</sup></b>	G3	S2	PE	06-03- 00	E	<b>NEW</b>
	N/A	SA901	G4	S4	PC	07-06- 97	B	N/A

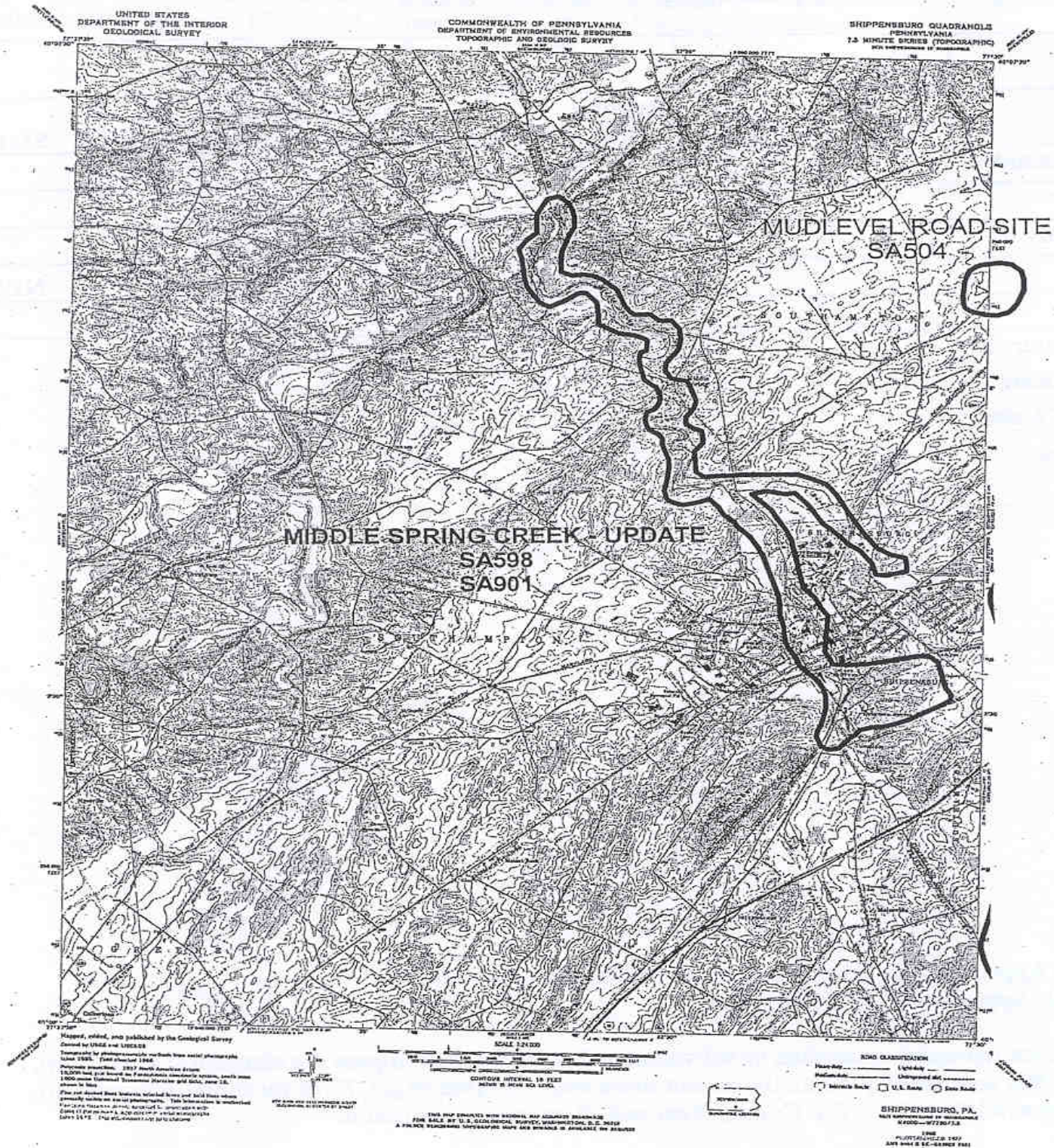
\* Please refer to Appendix I from the NAI for an explanation of Ranks and Legal Status.

\*\* Please refer to Appendix II from the NAI for Quality ranks.

<sup>1</sup> Bolded print means this information was provided by the UPDATE of the NAI.

Figure 18.7- Natural Areas Inventory Sites (2003).

# SHIPPENSBURG QUADRANGLE UPDATED POLYGON





The areas are intentionally shown on the USGS Topographical map at a large scale so the species remain protected and that developers have a guide to determine whether or not their development would have specific impact on these endangered species habitats.

## SITES OF LOCAL SIGNIFICANCE

The following site has been listed in the NAI as an area of local significance based on size, diversity of wildlife, water quality protection, and recreation potential. While locally significant sites do not include high quality natural communities, and no species of special concern have been documented, they have the potential to accommodate rare species.

- *Gum Run Ponds* - This locally significant area consists of an aggregation of vernal pools at the base of South Mountain near the Franklin County border. The area is highly disturbed, with some of the ponds having been filled with trash or with slash from logging operations. Some intact pools still exist, however, and are potential habitat both for breeding amphibians and for plant species of concern.

## OTHER LOCALLY SIGNIFICANT SITES

The following areas have identified by the Borough and Township to be listed as a locally important sites, although they are not included in the NAI. Some of these provide wildlife habitat, while others are mentioned due to their proximity to important streams or water supply areas, or their potential as a recreational resource.

- *Dykeman Spring / Dykeman Park Wetlands Area* - Headwaters of Middle Spring Creek.
- *Municipal Well Sites* - Wellhead protection areas.
- *Branch Creek (of Middle Spring Creek)* - Headwaters of Middle Spring Creek. Branch Creek meanders through the downtown area of Shippensburg Borough and flows into Middle Spring Creek near Hoffman Mills.
- *Rails-to-Trails Greenway/trail system* - This local system is shown on the Community Facilities Map in this Plan. The Cumberland Valley Rails-to-Trails Council (CVRTC) is a non-profit, all-volunteer charitable corporation whose mission is to develop the 11-mile Cumberland Valley Trail from Shippensburg to Newville in Cumberland County. The Council maintains an official website at [www.cvrtc.org](http://www.cvrtc.org). A trail map taken from this website is provided here as Figure 18.8.
- *Burd Run* - Using a grant administered by the Cumberland County Conservation District, the Burd Run stream channel has recently been restored to its natural course. Shippensburg University students monitor this area on a regular basis for general condition, habitats, and soil conditions.
- *Burd Run Nature Trail/ Shippensburg Township Park* - This nature trail and park were developed as a cooperative effort among the Cumberland County Conservation District, Shippensburg Township, Shippensburg University, and the Conodoguinet Creek Watershed Association using a "Growing Greener" grant from the Pennsylvania Department of Environmental Protection. This site has a one-half mile path along the banks of Burd Run with nature interpretation stations set up along the trail. The nature trail will guide a visitor along the restored meandering stream course. The site has wetlands and springs that allow visitors to see birds, wildlife, and a variety of native trees and shrubs. In 2001, volunteers planted different native plant species around the wetland area that will mature into a forested riparian buffer for the site. The specific species are listed on the official brochure (duplicated here as Figure 18.9) and can be obtained from the Geography/Earth Science Department of Shippensburg University.

Figure 18.8: Cumberland Valley Rails-to-Trails Council Map from Shippensburg to Newville

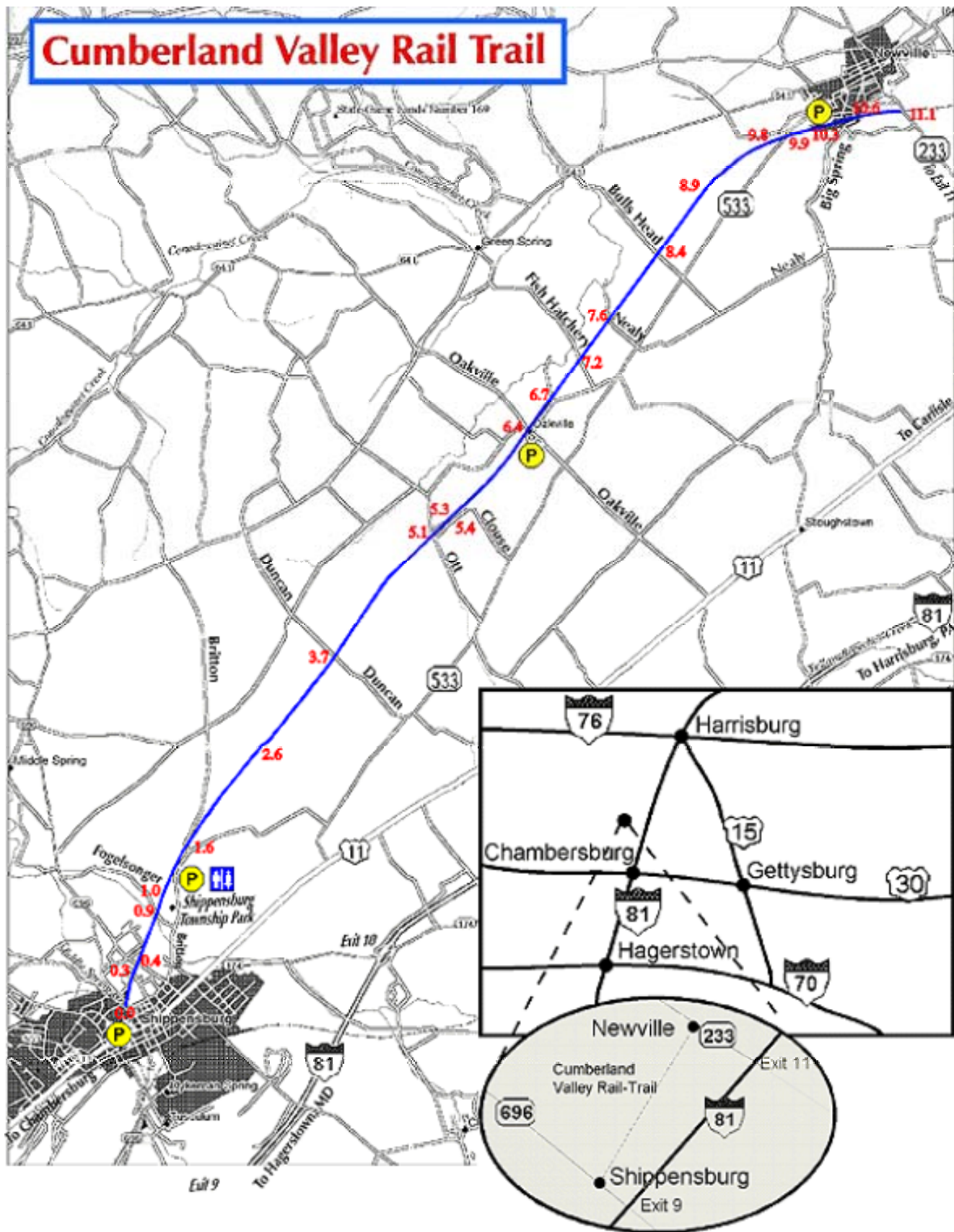


Figure 18.9: Official Brochure of the Burd Run Nature Trail/Shippensburg Township Park.

