LEBANON COUNTY IMPLEMENTATION PLAN

PREPARED BY:
THE LEBANON COUNTY CONSERVATION DISTRICT
USDA-NRCS FIELD OFFICE-LEBANON COUNTY

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COUNTY DESCRIPTION:

First settled in 1723, Lebanon County was created by an Act of Assembly in 1813 from portions of Dauphin and Lancaster Counties. The original German settlers tilled the valley's fertile soil, creating an economic base that continues today and blends with the residential, commercial and industrial development presently occurring. Also reflective of Lebanon County's "Pennsylvania Dutch" heritage are its pastoral landscape, attractive farms and outstanding dairy and livestock products, particularly Lebanon Bologna. Agriculture is still the predominant land use in Lebanon County with numerous swine, dairy, and poultry operations. Lebanon County also is blessed with an abundance of open space and conservation lands that provide numerous recreational opportunities (http://dsf.pacounties.org/lebanon/site/).

Lebanon County is located in south central Pennsylvania, approximately 25 miles east of Harrisburg and lies in both the Susquehanna and Delaware River Basins. Lebanon County is a 5th class county with a total land area of 362.9 square miles. Lebanon County is governed by 26 municipalities consisting of 18 townships, seven boroughs, and one city. In most instances land use decisions are governed by the Lebanon County Subdivision and Land Use Development Ordinance (revised Oct. 2002).

According to the 2000 census, Lebanon County's population measured 120,327 and 2003 estimates a population of 122,652. Lebanon County is growing rapidly, adding approximately 30,963 people to our population since 1960. With the increase in population comes the growth in residential development. More residential development is occurring on farmland than in our cities and towns. If left unmanaged, residential development could increase taxation, destroy open space, increase traffic congestion and decrease the quality of life in Lebanon County.

Agriculture contributes more in tax revenues than it demands in services. Agriculture keeps taxes lower by lessening demands for schools, police, sewer, water, roads, etc. Lebanon County has lost 17, 653 acres of farmland since 1987. This represents almost 13.9% of our county's 126,870 acres of prime farmland soils in 17 years. Lebanon County currently has 119,000 acres of farmland with an average size farm of 103 acres. Agriculture is our County's number one industry contributing $212,563,580 in sales in 2002. In addition, 4,137 people with wages totaling $86.4 million are employed in agri-business in Lebanon County.

WATER RESOURCES/QUALITY:

Pennsylvania's local watersheds are impacted by nonpoint sources of pollutants such as nutrients, bacteria, and sediment from surface runoff. According to the 305(b) Water Quality Assessment Report, agriculture is the number one source of groundwater contamination in Pennsylvania with 2,736 miles of impaired rivers and streams due to agriculture. According to PA DEP water quality data from the Unassessed Waters Program, in the south central DEP Region, over 67% of the impaired stream miles have agriculture listed as the source of impairment. Over 62% of impaired stream miles have siltation listed as the source of impairment. In addition to the Unassessed Waters Program, the Multi-state Chesapeake Bay Protection and Restoration Agreement has identified sediment pollution as a significant issue.

A substantial portion of the stream impairment within Lebanon County comes from sediment pollution. The major producer of sediment laden runoff in Lebanon County is agriculture. Although construction related activities contribute to the production of sediment laden runoff, their contribution is minimal and of relatively short duration. Upon project completion, construction sites are stabilized, significantly reducing the probability of sediment laden runoff leaving the site. A major problem observed by increased development is an increase in stormwater volume. Increased stormwater volume corresponds directly to increased flooding, stream bank erosion and contaminant transport. Lebanon County recently adopted a new Subdivision and Land Development Ordinance which address these stormwater issues by requiring volume reduction practices. Cahill Associates Inc., under contract with The Pennsylvania Department of Environmental Protection with assistance from the Pennsylvania Environmental Council, GeoSyntec Consultants, Low Impact Development, Amy Green Associates and input from individuals and design firms throughout the state is currently working on a final draft version of the Pennsylvania Stormwater Best Management Practices Manual. The purpose of the manual is to introduce practices and concepts which when implemented will improve stormwater management and reduce undesirable stormwater impacts throughout the state.

Lebanon County has 528.61 stream miles. According to the PA DEP 2004 Pennsylvania Integrated Water Quality Monitoring and Assessment Report 288.33 stream miles in Lebanon County are impaired. 233.08 miles are identified to be impaired with agriculture as the main source of impairment. Only 55.25 miles are impaired due to a non-ag source (most common source for these stream miles were AMD and urban runoff).

Thus, approximately 81% of Lebanon County's impaired streams are listed as impaired from agricultural sediment and nutrients. The majority of these impaired streams have Total Maximum Daily Loads (TMDLs) developed for the stream requiring a substantial reduction in sediment and nutrients. Lebanon County's Implementation Plan will aid in reaching the reductions proposed by the TMDLs.

WATERSHED PROFILES

SWATARA CREEK WATERSHED AND TRIBUTARIES (HUC CODES 2050305060 & 2050305090)

Beginning with the Swatara Watershed the first TMDL we will discuss is an unnamed tributary to the Swatara Creek. This TMDL states, "In 1996, Pa. DEP listed a portion of the UNT 09749 watershed under Section 303(d) of the Federal Clean Water Act as impaired due to organic enrichment and low dissolved oxygen from agricultural activities. The proposed plans provide calculations of the stream's total capacity to accept phosphorus. Based on an evaluation of the concentrations of nutrients in UNT 09749, phosphorus is the cause of nutrient impairment to the stream. The nutrient related impairment in the UNT 09749 watershed comes from nonpoint sources of pollution, primarily overland runoff from agricultural, developed, and disturbed land uses. In addition, there is one point source discharging nutrients to a stream segment in the watershed. Best Management Practices (BMPs) will be encouraged throughout the watershed to achieve the necessary load reductions. In addition, a reduction is recommended for one point source".

Un-named Tributary Swatara Creek Watershed TMDL, EPA August 2003 pages 1-5, 7.
The TMDL contained in this report was developed for an **UNT to Swatara Creek**, located in Lebanon County, Pennsylvania. The UNT's 5-digit stream code is 09749 and will be identified throughout this report as UNT 09749. UNT 09749 is part of State Water Plan subbasin 03C (Swatara Creek) and is located northwest of Palmyra in Lebanon County, Pennsylvania (Figure 1). Interstate 81 bisects the watershed. Access to the watershed is available by exiting I-81 at the Grantville exit, and traveling south to Route 22. Traveling approximately 2 miles east on Route 22 will bring you to the middle of the UNT 09749 watershed. The stream originates in the northeast corner East Hanover Township, draining a section of Blue Mountain. The stream flows for approximately 5 miles in a southerly direction to its confluence with Swatara Creek. The total watershed area for UNT 9794 is approximately 10 miles. Protected uses of UNT 09749 include aquatic life, water supply, and

recreation. The entire basin is currently designated as warm water fishes (WWF) under §93.9f in Title 25 of the Pa. Code (Commonwealth of Pennsylvania, 2001).

The UNT 09749 to Swatara Creek is located in the Great Valley and Appalachian Mountain Sections of the Ridge and Valley Province in eastern Pennsylvania. The watershed is typical of watersheds in the Ridge and Valley Province. It has a fairly uniform elevation in the valley section ranging from 360 to 520 feet and then rises sharply at the ridge from 600 to a maximum height of 1,273 feet. In general, the elevation decreases from northwest to southeast and the drainage follows this pattern. This area receives approximately 40 inches of precipitation per year. The surficial geology of the UNT 09749 watershed is 100% sedimentary. The strata include the Hamburg Sequence that is interbedded sedimentary units composed of shale with limestone and graywacke, the Martinsburg Formation that is a shale unit on the ridge, and the Tuscarora Formation that is a resistant sandstone unit that lies on the top of the ridge on Blue Mountain. The soils found in the UNT 09749 watershed are moderately deep and well drained with moderate to rapid permeability. A large extent of the soil is used for pasture and cropland; the remaining areas are typically forested. The erodibility (k) factor is a measure of inherent soil erosion potential based on the soils texture and composition. Soil erosion is not a major concern since the k factor for these soils range from 0.18 to 0.24.

Based on GIS datasets, land use values were calculated for the UNT 09749 watershed. Agriculture was the dominant land use at 59.75 percent. Forested areas account for 36.94 percent of the watershed. Developed areas are 2.52 percent of the watershed, comprised predominantly of low intensity residential and some commercial land. Water or disturbed areas cover the remaining 0.79 percent of the watershed area. Riparian buffer zones are nearly nonexistent in the hay and pasture lands. Livestock have unlimited access to streambanks throughout most of the watershed, resulting in streambank trampling and severe erosion.

Pennsylvania's 1996 303(d) list identified 2.0 miles of an UNT to Swatara Creek as impaired by nutrients emanating from agricultural activities in the basin (Table 1). The miles impaired were then increased on Pennsylvania's 1998 303(d). Figure 1 shows the segment addressed by this TMDL. The total phosphorus TMDL was developed to address organic enrichment and low dissolved oxygen associated with agricultural activities, as originally listed in the 1996 303(d) list and the current 305(b) database.

As part of the Pa. DEP's ongoing Unassessed Waters (UW) program and in anticipation of TMDL development, assessments were conducted in the UNT 09749 watershed in 1999. Although there are additional listings for designated use impairments on the 2002 303(d) list, this TMDL does not address those listings since the impairments are related to flow and habitat alterations. TMDLs are not the appropriate mechanism to address this type of stream impairment. TMDLs are designed to address pollutant loadings that cause a violation of water quality standards. There is no pollutant loading to address for this type of impairment.

Table 1. 1996 & 1998 303(d) Listings UNT 09749 Watershed					
1996 303(d) LIST					
STREAM NAME	STREAM CODE	SOURCE	CAUSE	MILES	
UNT to Swatara Creek	09749	Agriculture	DO/BOD	2.0	
1998 303(d) LIST					
SEGMENT ID	WATERSHED	STREAM CODE	SOURCE	CAUSE	MILES
1407	Swatara Creek	09749	Agriculture	Organic Enrichment / Low DO	4.33

***Crosskill Creek Watershed TMDL*,** EPA Date approved unavailable, pages 1-2.

Crosskill Creek is part of State Water Plan subbasin 07D (Swatara Creek) and is located primarily in western Berks County, Pennsylvania (Figure 1). A very small portion of the watershed drains part of northern Lebanon County. Access to the watershed is available by traveling north from Harrisburg on Interstate 81 and east on Interstate 78 to the Frystown Exit (Rte. 645). Crosskill Creek originates north of I-78 in Bethel Township and flows in a southeasterly direction for approximately 4.7 miles before its confluence with Little Swatara Creek near Crosskill Mills. The 18.8 square mile watershed contains a total of 25.7 miles of streams. This TMDL report covers only that portion of the watershed located above unnamed tributary 09929, which enter Crosskill Creek southeast of Meckville. The upper Crosskill Creek watershed covered by this TMDL consist of 4.5 square miles and 5.1 miles of streams, including Meck Creek.

The upper Crosskill Creek watershed drains land located in Appalachian Mountain and Great Valley Sections of the Ridge and Valley physiographic province. The Appalachian Mountain Section consists of numerous, long, narrow mountain ridges separated by narrow to wide valleys. The tops of the ridges are always several hundred feet higher than the adjacent valley, and some ridges are more than a thousand feet higher than the adjacent valley. Very tough sandstones occur at the crests of the ridges. Relatively soft shales and siltstones occur in most of the valleys. Some of the valleys are underlain by limestone and dolomite. The shales and siltstones are eroded more easily than the sandstones. As erosion proceeds, the slowly eroded sandstones form ridges while the shales and siltstones are eroded more rapidly to form the lowlands. The Great Valley Section consists of a very broad lowland area lying south of Blue Mountain in southeastern Pennsylvania. The lowland is characterized by gently undulating hills eroded into shales and siltstones on the north side of the valley and a lower elevation, flatter landscape developed on limestones and dolomites on the south side. The Crosskill Creek watershed is located on the northern edge of the Great Valley. Elevations in the portion of the basin covered by this TMDL ranges from 1,420 feet along the Berks and Schuylkill County lines to 480 feet at the confluence with UNT 09929.

Land use in the portion of the Crosskill Creek watershed covered by this TMDL report is dominated by forest (57%) and agriculture (40%). Approximately 3.3 miles of streams in the covered watershed flow through agricultural land use. Other land uses, including development, waterbodies and transitional lands account for roughly 3% of the watershed area. Single family homes on fairly large lots (> 5 acres) are becoming increasingly more prevalent in the more heavily forested portions of the watershed.

Protected uses of the Crosskill Creek watershed include aquatic life, water supply, and recreation. The entire basin is currently designated as Cold Water Fishes in Title 25 Pa. Code Department of Environmental Protection Chapter 93, Section 93.9o (Commonwealth of Pennsylvania, 2003). A total of 0.7 miles of Crosskill Creek appeared on the Department's 1996-303d list (Table 1). These impairments were identified as being caused by turbidity/suspended solids and bacteria/pathogens emanating from agricultural activities in the watershed and for dissolved oxygen/biological oxygen demand associated with a point source. Portions of the Crosskill Creek watershed are included in the 2004 Integrated List of all Waters as still impaired by suspended solids, dissolved oxygen/biological oxygen demand and pathogens. The old 305b/303d database used to produce the 303d list in the past contained the following statement regarding the point source related impairments to GIS segment 1425 – "TTMA STP DISCHARGE CAUSING ELEVATED BOD IMMEDIATELY BELOW

DISCHARGE POINT". "TTMA" is associated with NPDES Permit #PA0070360 (All American Travel Plaza) which discharges to UNT 09921 (UNT to Crosskill Creek) and not the portion of the basin for which this TMDL is being developed. Recent biological surveys have documented impairment from agricultural activities (seg ID 981124-1000-MSE) in the UNT 09921 basin, but not from point sources. There are no known NPDES permitted facilities located in the portion of the Crosskill Creek watershed covered by GIS segment 1425 or this TMDL.

Table 1 - 1996 303(d) and 2004 Integrated Water QualityMonitoringand Assessment Report Listings for Streams in the Crosskill Creek Watershed				
1996 303(d) LIST - Crosskill Creek UNT t UNT				
STREAM CODE	SOURCE	CAUSE		MILES
09919	**Agriculture**	**Turbidity/Suspended. Solids Bact/Pathogens**		**0.6**
Other Point Sources	**DO/BOD**		**0.1**	
2004 Integrated Water Quality Monitoring and Assessment Report - Crosskill Creek Watershed				
STREAM NAME STREAM CODE	GIS KEY	MILES	SOURCE	CAUSE
Crosskill Creek 09919	**1425**	**0.8**	**Agriculture**	**Suspended Solids**
Municipal Point Source*		**DO/BOD***		
1425b	**1.5**	**Agriculture**		**Pathogens**
20031028-0004-KRK	**2.2**	**Source Unknown**		**Pathogens**
Meck Creek 09930	**20031028-0004-KRK**	**2.9**	**Source Unknown**	**Pathogens**

*There are no NPDES permitted discharges located in the portion of the Crosskill Creek basin covered by segment 1425. This source appears to be an error in the 305b/303d database.

According to the Watershed Restoration Action Strategy (WRAS) State Water Plan for subbasin 07D-Swatara Creek Watershed, 98% of the subbasin was assessed under the Department's Unassessed Waters Program from 1996 through 1999. Results indicated that out of 905 total miles in the subbasin, 369 miles or 42% were impaired, with nutrients being the number one impairment. The WRAS also stated that the USGS studied the Swatara Creek Watershed in 1992 and 1995 as part of its nationwide National Water Quality Assessment Program (NAWQA). Their results found that nutrient concentrations in streams were high and often exceeded drinking water standards. Nitrate concentrations in water wells were among the highest in the nation. As noted in the TMDLs, the

WRAS also states that impacts from agriculture should decrease in surface waters if installation of BMPs continues.

LITTLE SWATARA CREEK AND TRIBUTARIES (HUC CODE 2050305070)

TMDLs have been developed for tributaries of the Little Swatara Creek; Earlakill Run, Deep Run, Deep Run, Beach Run, and Elizabeth Run Watersheds. All were written because of impairments noted in Pennsylvania's 1996 and 1998 303(d) list. The TMDLs state, "Excessive siltation and nutrient loads resulting from agricultural activities have been identified as causes of impairment". Each also states that implementation of Best Management Practices (BMPs) should achieve the loading reduction goals established by the TMDLs.

Earlakill Run Watershed TMDL, EPA April 2001, pages 1-2.

Earlakill Run is located approximately two miles east of Fredericksburg in Lebanon County, Pennsylvania (Figure 1). U.S. Route 22 and Interstate 78 cross the mainstem of Earlakill Run in the middle of the basin. Access to the watershed is available by traveling east on Rte. 22 from Fredericksburg or east on I-78 from the I-81 interchange. The stream originates in Bethel Township and flows for 4.1 miles to its confluence with Little Swatara Creek near Mt. Zion. There are a total of 5.4 miles of streams in the watershed, including 3 unnamed tributaries. Earlakill Run drains 4.38 square miles of the Ridge and Valley physiographic province. Land use in the basin is dominated by agriculture (90%). Other land uses are very limited, including forest (6%), development (3%), and wetlands/waterbodies (1%). Protected uses of the Earlakill Run watershed include aquatic life, water supply, and recreation. The entire basin is currently designated as Warm Water Fishes in Title 25 Pa. Code Department of Environmental Protection Chapter 93, Section 93.9o (Commonwealth of Pennsylvania, 1999).

The Department's 2000 305(b) report database indicates that all 5.43 miles of streams in the Earlakill Run watershed are impaired by agricultural activities. Although a number of other tributaries to Little Swatara Creek are also impaired by agricultural activities, recent assessments indicate that the mainstem Little Swatara Creek is attaining all its designated uses. Impairments in other tributaries to Little Swatara Creek will need to be addressed under TMDLs other than those developed for the Earlakill Run watershed.

Nutrients are reported as the cause of impairment in the mainstem of Earlakill Run, while nutrients and siltation are identified as causing impairments in all of its unnamed tributaries. Surveys conducted by the Department in the Earlakill Run watershed have clearly identified aquatic life use impairments due to extensive agricultural activities. Lack of riparian vegetation, pastures and croplands that extended right up to streambanks, and unrestricted livestock access to streams have all allowed excessive levels of sediment and nutrients to reach surface waters. These same conditions were noted in the watershed during a site visit conducted on September 13, 2000 as part of the TMDL development. Streambank erosion is prevalent in the basin, particularly in the many areas where livestock have unrestricted access to streams (Figure 2). Excess nutrients were causing increased algae growths (Figure 3) and sediment deposited in large quantities on the streambed was degrading the habitat of benthic macroinvertebrates.

Total Maximum Daily Loads (TMDLs) were developed for the Earlakill Run watershed to address impairments identified in Pennsylvania's 1996 and 1998 303(d) lists. The 1996 303(d) list included 3.8 miles of impaired streams in the Earlakill Run basin (Table 1). Designated use impairments in the mainstem of Earlakill Run were attributed to nutrient enrichment from agricultural activities. This listing was the result of a special nonpoint source survey conducted by the Department's Central Office in 1989. Chemical sampling consisted of one-time grab samples. Biological sampling included kick screen sampling of benthic macroinvertebrates. Benthic macroinvertebrates were identified to family in the field.

The entire Earlakill Run watershed was surveyed during 1997 as part of the Department's ongoing unassessed waters program. Data collected during the survey resulted in three unnamed tributaries being added to the 1998 303(d) list (Table 1). Use impairments to 1.34 miles of unnamed tributaries were identified as being caused by nutrients and siltation emanating from agricultural activities in the watershed. The 1998 303(d) list also included a GIS based revision to the mainstem miles listed in 1996, from 3.8 to 4.09 miles.

Table 1 identifies the stream segments that are addressed by the TMDLs developed for the Earlakill Run watershed. The TMDLs address agriculture related impairments caused by nutrients and siltation. A TMDL for phosphorus was chosen to address the nutrient impairments based on its being the limiting nutrient in the watershed. The sediment TMDL will address the siltation listings.

TABLE 1 - 1996 AND 1998 303(D) LISTINGS FOR STREAMS IN THE EARLAKILL RUN WATERSHED						
1996 303(d) LIST						
STREAM NAME (STREAM CODE)	MILES	SOURCE		CAUSE		ADDRESSED BY TMDL
Earlakill Run (09912)	3.8	Agriculture		Nutrients		Yes
1998 303(d) LIST						
STREAM NAME (STREAM CODE)	GIS KEY	MILES	SOURCE	CAUSE	YEAR LISTED	ADDRESSED BY TMDL
Earlakill Run (09912)	1423	4.09	Agriculture	Nutrients	1996	Yes
Earlakill Run, Unt (09913)	970528-0840-DSB	0.7	Agriculture	Nutrients	1998	Yes
				Siltation	1998	Yes
Earlakill Run, Unt (09914)	970528-0840-DSB	0.41	Agriculture	Nutrients	1998	Yes
				Siltation	1998	Yes
Earlakill Run, Unt (09915)	970528-0840-DSB	0.23	Agriculture	Nutrients	1998	Yes
				Siltation	1998	Yes

Deep Run Watershed TMDL, EPA April 2001 pages 1-2.

The **Deep Run watershed** is located approximately three miles northeast of Lebanon in Lebanon County, Pennsylvania (Figure 1). Access to the watershed is available by traveling east of Lebanon on Rte.422 for approximately 5 miles and turning north on Rte. 645 in Myerstown. The stream originates near Kutztown in Jackson Township and flows for 5.1 miles to its confluence with Little Swatara Creek near Freeport Mills. There are a total of 7.44 miles of streams in the watershed, including 3 unnamed tributaries. Deep Run drains 6.21 square miles of the Ridge and Valley physiographic province. Land use in the basin is dominated by agriculture (83%) and forest (15%). Other land uses are very limited, including development (1%), and wetlands/waterbodies (1%). Protected uses of the Deep Run watershed include aquatic life, water supply, and recreation. The entire basin is currently designated as Warm Water Fishes in Title 25 Pa. Code Department of Environmental Protection Chapter 93, Section 93.9o (Commonwealth of Pennsylvania, 1999).

The Department's 2000 305(b) report database indicates that all 7.44 miles of streams in the Deep Run watershed are impaired by agricultural activities. Although a number of other tributaries to Little Swatara Creek are also impaired by agricultural activities, recent assessments indicate that the mainstem Little Swatara Creek is attaining all its designated uses. Impairments in other tributaries to Little Swatara Creek will need to be addressed under TMDLs other than those developed for the Deep Run watershed.

A combination of nutrients and siltation are identified as the causes of impairment in the Deep Run basin. Historical surveys conducted by the Department in the Deep Run watershed have clearly identified aquatic life use impairments due to extensive agricultural activities. Lack of riparian vegetation, pastures and croplands that extended right up to streambanks, and unrestricted livestock access to streams have all allowed excessive levels of sediment and nutrients to reach surface waters. These same conditions were noted in the watershed during a site visit conducted on September 27, 2000 as part of the TMDL development. Unrestricted livestock access to streambanks was observed throughout the basin (Figure 2) and sediment deposited in large quantities on the streambed was degrading the habitat of benthic macroinvertebrates (Figure 3).

Total Maximum Daily Loads (TMDLs) were developed for the Deep Run watershed to address impairments identified in Pennsylvania's 1996 and 1998 303(d) lists. The 1996 303(d) list included 2.2 miles for the mainstem of Deep Run (Table 1). Designated use impairments in the mainstem of Deep Run were attributed to nutrient enrichment from agricultural activities. This listing was the result of a special nonpoint source survey conducted by the Department's Central Office in 1989. Chemical sampling consisted of one-time grab samples. Biological sampling included kick screen sampling of benthic macroinvertebrates. Benthic macroinvertebrates were identified to family in the field.

The entire Deep Run watershed was surveyed during 1997 as part of the Department's ongoing unassessed waters program. Data collected during the survey resulted in 5.42 additional stream miles being added to the Department's 305(b) report database (Table 1). The new database entries included 3.08 miles of the mainstem and 2.34 miles of unnamed tributaries. Nutrients and siltation emanating from agricultural activities were identified as the cause of impairments for all the newly listed segments.

Unfortunately, the 1998 303(d) list contained erroneous listings for Deep Run and unnamed tributaries to Deep Run. The mistake occurred, because there are two separate streams named Deep Run in State Water Plan 07D. The situation is further complicated because both Deep Runs are tributaries to Little Swatara Creek. Each Deep Run and all their unnamed tributaries have been assigned unique 5-digit stream codes. The watershed covered by this report includes Deep Run (stream code 09909) and its three unnamed tributaries (stream codes 64532, 64533, and 09910). Agriculture is the only source of impairment documented in the Deep Run (09909) watershed. The "other" Deep Run watershed consists of Deep Run (stream code 09896) and an

unnamed tributary (stream code 09897). Documented impairments in this "other" Deep Run watershed have be linked to agriculture, municipal point sources, industrial point sources, and urban runoff/storm sewers. The 1998 303(d) list mistakenly placed all impairments in these two distinct watersheds under a single Deep Run or UNT Deep Run. Impairments in the "other" Deep Run (09896) watershed will need to be addressed by TMDLs other than those contained in this report.

Table 1 identifies the stream segments that are addressed by the TMDLs developed for the Deep Run watershed. The TMDLs address agriculture related impairments caused by nutrients and siltation. A TMDL for phosphorus was chosen to address the nutrient impairments based on its being the limiting nutrient in the watershed. The sediment TMDL will address the siltation impairments. Both TMDLs will apply to all 7.44 stream miles in the Deep Run basin. Those mainstem segments identified as impaired by nutrients only, are also being included in the sediment TMDL. This decision was based on observations made during a visit to the watershed on September 27, 2000. Siltation related habitat degradation was present along the entire length of Deep Run, with the most severe impacts occurring in the middle to lower reaches. Based on observations made during the field view of the watershed, there is no justifiable reason to exclude the lower 2.02 miles of the mainstem from the sediment TMDL.

TABLE 1 - 1996 AND 1998 303(D) LISTINGS FOR STREAMS IN THE DEEP RUN WATERSHED

1996 303(d) LIST

STREAM NAME (STREAM CODE)	MILES	SOURCE	CAUSE	ADDRESSED BY TMDL
Deep Run (09909)	2.2	Agriculture	Nutrients	Yes

2000 305(b) REPORT DATABASE
(Correct listing for the 1998 303(d) list)

STREAM NAME (STREAM CODE)	GIS KEY	MILES	SOURCE	CAUSE	YEAR LISTED	ADDRESSED BY TMDL
Deep Run (09909)	1421	2.02	Agriculture	Nutrients	1996	Yes
	970528-0855-DSB	3.08	Agriculture	Nutrients	1998	Yes
				Siltation	1998	Yes
Deep Run, Unt (64532)	970528-0855-DSB	1.27	Agriculture	Nutrients	1998	Yes
				Siltation	1998	Yes
Deep Run, Unt (64533)	970528-0855-DSB	0.41	Agriculture	Nutrients	1998	Yes
				Siltation	1998	Yes
Deep Run, Unt (09910)	970528-0855-DSB	0.66	Agriculture	Nutrients	1998	Yes
				Siltation	1998	Yes

Section 303(d) of the Clean Water Act (CWA) and the Environmental Protection Agency (EPA)'s Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for waterbodies that are identified on the state's Section 303(d) list and not meeting their designated uses. TMDLs represent the total pollutant loading from point, nonpoint, and natural background sources, including a margin of safety, that a waterbody can receive without violating water quality standards. The TMDL process establishes the allowable loadings of pollutants for a waterbody based on the relationship between pollution sources and instream water quality conditions. By following the TMDL process, states can establish water quality-based controls to reduce pollution from both point and nonpoint sources to restore and maintain the quality of their water resources (EPA, 2001). The state regulatory agency for Pennsylvania is the Department of Environmental Protection (DEP). As required by the Clean Water Act, Pennsylvania DEP develops and maintains a listing of all impaired waters in the state that details the pollutant(s) exceeding water quality standards and the potential source(s) of each pollutant. This list is referred to as the 303(d) list. As part of the settlement of a TMDL lawsuit in Pennsylvania1, EPA agreed to develop or approve TMDLs for waters included on Pennsylvania's 1996 303(d) List of Impaired Waters under a specified timeframe. The TMDLs in this report were developed in partial fulfillment of that lawsuit and address three streams on Pennsylvania's 1996 Section 303(d) list, Deep Run, Beach Run, and Elizabeth Run, located in Lebanon County.

Deep Run, Beach Run, and Elizabeth Run Watershed Nutrient TMDL, EPA approval date unavailable, pages 1-1 – 1-3 & 1-6 – 1-8.

Deep Run, Beach Run, and Elizabeth Run are located in the northeast section of Lebanon County, in central Pennsylvania. Deep Run, Beach Run, and Elizabeth Run are part of the same drainage network; Elizabeth Run is formed by the confluence of Deep Run and Beach Run. These streams are tributaries of Little Swatara Creek, in the lower *1 American Littoral Society and Public Interest Research Group of Pennsylvania v. EPA* Susquehanna River Basin. A map depicting the location of Deep Run, Beach Run, and Elizabeth Run is presented in Figure 1-1. Stream segments in the Deep Run, Beach Run, and Elizabeth Run watersheds (located in Pennsylvania State Water Plan 7-D) were first reported as impaired on Pennsylvania's 1996 303(d) List of Impaired Waters. Additional segments and impairment sources were subsequently added on Pennsylvania's 1998 and 2002 303(d) lists. Each stream segment in these watersheds is identified by a unique code, referred to as a

stream code. The stream codes for each stream segment in Deep Run, Beach Run, and Elizabeth Run are presented in Figure 1-2, and will be used to describe the impairment listings for these streams. All stream segments in Deep Run, Beach Run, and Elizabeth Run are currently listed as impaired.

The four stream segments comprising Beach Run (stream codes 9898-9901) were reported on Pennsylvania's 1998 Section 303(d) list as impaired due to siltation from storm sewers and urban runoff. One segment of Deep Run (stream code 9896) was reported on the 1996 303(d) list as impaired from the segment mouth to 0.9 miles upstream due to nutrients and sediment from agricultural and point sources. The remainder of this segment (from 0.9 miles upstream of the mouth to 2.7 miles upstream) was reported as impaired on the 1998 Section 303(d) list. The other stream segment (stream code 9897) in Deep Run was reported on the 1998 Section 303(d) list as impaired due to nutrients and sediment from agricultural and urban sources. In addition to the stream segments comprising Deep Run and Beach Run, five additional stream segments comprise the Elizabeth Run watershed. Stream code 9891 was first listed as impaired for nutrients and sediment on the 1996 Section 303(d) list, which stated that the impairment was due to point sources. In 1998, the listing for this segment was updated to include agriculture as a source of impairment in addition to point sources. Four stream segments in Elizabeth Run (stream codes 9892-9895) were reported on the 1998 303(d) list as impaired due to nutrients and sediment from agricultural sources.
Table 1-1 tracks the various Section 303(d) listings addressed in this TMDL.

Table 1-1: Pennsylvania Section 303(d) Listings for Deep Run, Beach Run, Elizabeth Run Addressed in this TMDL (SWP 07-D)

Section 303(d) List	Stream	Stream Code/ Segment ID	Impairment Listing	
1996	Deep Run	9896	Turb/Suspended Solids	Industrial point sources, agriculture
	Beach Run	Not listed		
	Elizabeth Run	9891	Turb/Suspended Solids	Industrial point sources
1998	Deep Run	6441, 970528-1000-DSB, 970528-0855-DSB	Suspended Solids, Siltation	Industrial point source, agriculture, urban runoff/storm sewer
	Beach Run	970528-1010-DSB, 970528-0945-DSB	Siltation	Agriculture, Urban Runoff/StormSewer
	Elizabeth Run	6440, 970528-1010-DSB	Suspended Solids, Siltation	Industrial point source, agriculture
2002	Deep Run	6441, 970528-1000-DSB	Suspended Solids, Siltation	Industrial point source, agriculture, urban runoff/storm sewer
	Beach Run	970528-0945-DSB	Siltation	Urban runoff/storm sewer
	Elizabeth Run	6440, 970528-1010-DSB	Suspended Solids, Siltation	Industrial point source, agriculture
2004*	Deep Run	6441, 970528-1000-DSB, 20031028-0003-KRK	Suspended Solids, Siltation	Industrial point source, agriculture, urban runoff/storm sewer
	Beach Run	970528-0945-DSB	Siltation	Urban runoff/storm sewer
	Elizabeth Run	6440, 970528-1010-DSB	Suspended Solids, Siltation	Industrial point source, agriculture

* Pennsylvania's 2004 Integrated Report has not yet been approved by EPA.

The analyses and results presented in this report establish sediment TMDLs Deep Run, Beach Run, and Elizabeth. Nutrient TMDLs and loading reductions for these segments are addressed in a separate report.

EPA regulations require that TMDLs be based on the applicable water quality standards. Water quality standards consist of designated uses for a waterbody and water quality criteria necessary to support those designated uses, as well as an antidegradation section. According to Pennsylvania

Water Quality Standards, the term *water quality criteria* are defined as "numeric concentrations, levels or surface water conditions that need to be maintained or attained to protect existing and designated uses."

Pennsylvania Water Quality Standards (§ 93.3 of the Code of Pennsylvania) designate water uses which shall be protected, and upon which the development of water quality criteria shall be based. These include the protection of potable water supplies as defined by the Federal Safe Drinking Water Act (42 U.S.C.A. § 300F), or by other water users that require a permit from the Department under the Pennsylvania Safe Drinking Water Act (35 P. S. § 721.1—721.18), as well as water supply for wildlife, industry, livestock, and irrigation. The maintenance and propagation of aquatic life, including coldwater and warmwater fisheries, and anadromous and catadromous fishes which ascend into flowing waters to complete their life cycle, are also protected as designated uses of Pennsylvania's waters. Pennsylvania Water Quality Standards also serve to designate waters in the state for primary contact recreation, fishing, boating, esthetics, and navigation.

Sediment was listed as a cause of impairment in Deep Run, Beach Run, and Elizabeth Run. However, Pennsylvania has not currently established numeric water quality criteria for sediment. In the absence of specific water quality criteria, the General Criteria defined by Pennsylvania provides a narrative criteria for the protection of a waterbodies designated uses.

The General Criteria defined in Pennsylvania's Water Quality Standards (§ 93.6 of the Code of Pennsylvania) provides general, narrative criteria for the protection of designated uses from substances that may interfere with attainment of such uses. The general water quality criteria state: *"Water may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life. In addition to other substances listed within or addressed by this chapter, specific substances to be controlled include, but are not limited to, floating materials, oil, grease, scum and substances which produce color, tastes, orders, turbidity or settle to form deposits."*

This report addresses the sediment impairment and establishes sediment TMDLs for Deep Run, Beach Run, and Elizabeth Run. In the subsequent sections of this report, watershed and environmental monitoring data used in TMDL development for these streams are discussed and

analyzed. Sources of sediment in the watershed are described and analyzed. After reviewing the available watershed and environmental monitoring data, a technical approach was developed and used to estimate mass loading rates of sediment to the streams. In addition, the methodology used to quantify sediment load reductions necessary to obtain designated uses for Deep Run, Beach Run, and Elizabeth Run was developed. A reference watershed approach was used to determine the necessary load reductions for sediment. These approaches and calculations are presented in Sections 3.0 and 4.0 of this TMDL report. TMDL allocations for Deep Run, Beach Run, and Elizabeth Run are presented in Section 5.0. Finally, reasonable assurance and implementation for these TMDLs is discussed in Section 6.0, and public participation is discussed in Section 7.0.

QUITTAPAHILLA CREEK WATERSHED
(HUC CODE 2050305080)

This county implementation plan would also aid in meeting the goals of the TMDL for the **Quittapahilla Watershed**, which was developed to address impairments noted in Pennsylvania's 1996 and 1998 303(d) list and the 2000 305(b) report. This TMDL states, "Excessive sediment and nutrient loads resulting from agriculture activities have been identified as one of the primary causes of impairment in the basin". This TMDL also states "best management practices will be installed throughout the watershed to achieve the necessary loading reductions".

Quittapahilla Creek TMDL. EPA April 2001 pages 1-7

Quittapahilla Creek is located in Lebanon County, Pennsylvania (Figure 1). U.S. Route 422 parallels most of the Quittapahilla Creek mainstem. The watershed can be accessed by traveling east on Rte. 422 from Hershey, PA or west on Rte. 422 from Reading, PA. The stream originates in South Lebanon Township and flows for 16.8 miles to its confluence with Swatara Creek near Valley Glenn. There are 7 named tributaries in the watershed, including Killinger Creek, Gingrich Run, Buckholder Run, Bachman Run, Beck Creek, Snitz Creek, and Brandywine Creek (Figure 2). Quittapahilla Creek drains 77 square miles of the Ridge and Valley and the Piedmont physiographic provinces. Protected uses of the Quittapahilla Creek watershed include aquatic life, water supply, and recreation. The entire basin is currently designated as Trout Stocking in Title 25 Pa. Code Department of Environmental Protection Chapter 93, Section 93.9o (Commonwealth of Pennsylvania, 1999).

Land use in the basin is dominated by agriculture (67%). Development covers nearly 13% of the basin with the city of Lebanon and Palmyra Borough being the largest urban areas. Slightly more than

18% of the Quittapahilla Creek basin can be described as “open space” (i.e., forest, wetlands, and/or waterbodies).

Surveys conducted in the Quittapahilla Creek watershed by the Department in 1989, 1996, and 1999 clearly identified aquatic life use impairments due to extensive agricultural activities. Lack of riparian vegetation, pastures and croplands that extended right up to streambanks, and unrestricted livestock access to streams have allowed excessive levels of sediment and nutrients to reach surface waters. These same conditions were noted in the watershed during a site visit conducted in August 2000 as part of the TMDL development. Excess nutrients were causing increased algae growths (Figure 4) and sediment deposited in large quantities on the streambed was degrading the habitat of benthic macroinvertebrates (Figure 4).

Total Maximum Daily Loads (TMDLs) were developed for the Quittapahilla Creek watershed to address siltation, suspended solids, and nutrient impairments identified in Pennsylvania’s 1996 and 1998 303(d) lists and 2000 305(b) report. The 1996 303(d) list included 23.7 miles of impaired streams in the Quittapahilla Creek basin (Table 1). Designated use impairments attributed to nutrient enrichment from agricultural activities were identified in the Bachman Run, Beck Creek, Killinger Creek, and Snitz Creek basins. These listings were the result of chemical and biological sampling conducted by the Department’s Central Office in 1989. The sampling was done as part of a special nonpoint source survey. Chemical sampling consisted of one-time grab samples. Biological sampling included kick screen sampling of benthic macroinvertebrates. Benthic macroinvertebrates were identified to family in the field. Water samples contained elevated levels of nitrogen and phosphorus. Benthic macroinvertebrate communities consisted of 5 or fewer families.

TABLE 1 - 1996 303(d) LISTINGS IN THE QUITTAPAHILLA CREEK WATERSHED

STREAM	MILES	SOURCE	CAUSE
Bachman Run	4.7	Agriculture	Nutrients
Beck Creek	7.5	Agriculture	Nutrients
Killinger Creek	5.5	Agriculture	Nutrients
Snitz Creek	6	Agriculture	Nutrients

The 1998 303(d) list included one additional listing in the Quittapahilla Creek watershed, along with GIS based revisions to the miles of impairment listed in 1996 (Table 2). Nearly 4.1 miles of streams in the Gingrich Run basin (a tributary to Killinger Creek) were identified as being impaired by suspended solids from agriculture and organic enrichment/low dissolved oxygen from urban runoff/storm sewers. This listing resulted, in part, from an October 1996 investigation by the Department's South-central Regional Office regarding impacts from a lumber mill located in the headwaters of the basin. The survey documented that Gingrich Run was severely impacted by stormwater runoff from the site, which carried wood fibers, sawdust, mulch, and leachate from wood by-products. Approximately one mile of Gingrich Run was degraded by the presence of solids and bacterial and/or fungal growths. When the individual who conducted the investigation looked at the list of sources and causes available at the time, there was no better option for the impairments being caused by the lumber mill available than the selected urban runoff/storm sewer and organic enrichment/low D.O. In retrospect, the identified source and cause were probably inappropriate. This impairment caused by the lumber mill, should not have been included in the 1998 303(d) list, since it was the result of a compliance/enforcement issue and not addressable by the TMDL process. Under a Consent Order issued in 1997, corrective actions have been taken at the site to eliminate the impacts, including placing all wood products under cover and on an impervious surface. The organic enrichment/low D.O. impairments included in the 1998 303(d) list no longer exist in the Gingrich Run

TABLE 2 -	**1998 303(D) LISTINGS IN THE QUITTAPAHILLA CREEK WATERSHED**			
STREAM	**GIS KEY**	**MILES**	**SOURCE**	**CAUSE**
Bachman Run	1401	4.7	Agriculture	Nutrients
Beck Creek	1404	7.5	Agriculture	Nutrients
Gingrich Run	7037	4.09	Agriculture	Suspended Solids
			Urban Runoff/Storm Sewers	Organic Enrichment/Low D.O.
Killinger Creek	1399	5.5	Agriculture	Nutrients
Snitz Creek	1405	6	Agriculture	Nutrients

The 2000 305(b) report indicates that there are 88.91 miles of streams in the Quittapahilla Creek watershed. Ninety five percent of these stream miles (84.78 miles) are identified as impaired (Table

3).GIS based depictions of these impaired segments can be found in Appendix B. The Quittapahilla Creek watershed was surveyed in 1999 as part of the Department's ongoing unassessed waters program. Only 1.82 miles of stream (2%) were found to be supporting designated aquatic life uses. There are 2.31 stream miles (3%) in the basin that have not yet been assessed. The identified sources of impairment included agriculture, crop related agriculture, urban runoff/storm sewers, and bank modification. Causes of impairment include nutrients, siltation, suspended solids, organic enrichment/low D.O., flow alteration, and other habitat alterations. Agriculture was identified as the sole source for 40.19 (47%) of the impaired miles (Table 4). Agriculture and urban runoff/storm sewers were listed as the sources of impairment for 27.13 miles (32%). Only 17.46 miles (21%) of impaired stream segments in the Quittapahilla Creek watershed do not have agriculture listed as a source.

Table 3 identifies those impaired segments that are addressed by the TMDLs developed for the Quittapahilla Creek watershed. The TMDLs address agriculture related impairments caused by siltation, nutrients, and suspended solids. A sediment TMDL was developed for the entire Quittapahilla Creek 3 watershed to address siltation listings. Phosphorus TMDLs were developed for the Bachman Run, Beck Creek, Killinger Creek, and Snitz Creek basins to address nutrient impairments. Phosphorus was chosen due to its being the limiting nutrient in these basins. The Gingrich Run segment listed for impairment due to suspended solids was addressed through a combination of load reductions under the Quittapahilla Creek sediment TMDL and the Killinger Creek phosphorus TMDL. Total suspended solids (TSS) include both an inorganic and an organic component. The sediment TMDL will reduce the inorganic portion of the suspended solids, while the organic fraction of TSS is addressed through the prescribed phosphorus reduction. This TMDL does not address any 303(d) listings for the category of flow alterations. TMDLs are not the appropriate mechanism to address this type of stream impairment. TMDLs are designed to address pollutant loadings that cause exceedances of water quality standards. There is no pollutant loading to address for this type of impairment.

TABLE 3 - IMPAIRED STREAM SEGMENTS IN THE QUITTAPAHILLA CREEK WATERSHED BASED ON 2000 305(b) REPORT						
STREAM NAME (STREAM CODE)	GIS KEY	MILES	SOURCE	CAUSE	YEAR LISTED*	ADDRESSED BY TMDL
Bachman Run (09724)	1401	4.87	Agriculture	Nutrients	1996	Yes
Bachman Run, Unt (09725)	990318-1000-MSE	1.15	Crop Related Agric	Siltation	2000	Yes
Bachman Run, Unt (09726)	990318-1000-MSE	0.79	Crop Related Agric	Siltation	2000	Yes
Beck Creek (09728)	1404	7.14	Agriculture	Nutrients	1996	Yes
Brandywine Creek (09734)	990329-1147-MSE	2.12	Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Brandywine Creek, Unt (09735)	990329-1147-MSE	0.92	Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Brandywine Creek, Unt (09736)	990329-1147-MSE	1.44	Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Brandywine Creek, Unt (09737)	990329-1147-MSE	0.79	Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Buckholder Run (09711)	990311-0928-MSE	1.69	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Gingrich Run (09710)	7037	4.09	Agriculture	Suspended Solids	1998	Yes
			Urban Runoff/Storm Sewers	Organic Enrichment/Low D.O.	1998	No
Gingrich Run, Unt (09712)	990311-0928-MSE	1.45	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Gingrich Run, Unt (09713)	990311-0928-MSE	0.33	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Killinger Creek (09705)	1399	5.27	Agriculture	Nutrients	1996	Yes
	990311-0928-MSE	1.26	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Killinger Creek, Unt (09706)	990311-0928-MSE	0.7	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Killinger Creek, Unt (09707)	990311-0928-MSE	0.91	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Killinger Creek, Unt (09708)	990311-0928-MSE	0.8	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Killinger Creek, Unt (09709)	990311-0928-MSE	0.98	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Killinger Creek, Unt (09714)	990311-0928-MSE	0.37	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Killinger Creek, Unt (09715)	990311-0928-MSE	0.09	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Killinger Creek, Unt (09716)	990311-0928-MSE	0.09	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
Killinger Creek, Unt (09717)	990311-0928-MSE	0.73	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes

TABLE 3 - continued						
STREAM NAME (STREAM CODE)	GIS KEY	MILES	SOURCE	CAUSE	YEAR LISTED*	ADDRESSED BY TMDL
Quittapahilla Creek (09691)	990311-1213-MSE	12.11	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
	990329-1336-MSE	4.66	Bank Modifications	Other Habitat Alterations	2000	No
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (064063)	990311-1213-MSE	1.15	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09692)	990311-1213-MSE	0.6	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09693)	990311-1213-MSE	0.43	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09694)	990311-1213-MSE	0.16	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09696)	990311-1213-MSE	0.48	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09697)	990311-1213-MSE	2.12	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09698)	990311-1213-MSE	0.05	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09699)	990311-1213-MSE	0.26	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09701)	990311-1213-MSE	0.58	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09702)	990311-1213-MSE	0.51	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No

TABLE 3 - continued						
STREAM NAME (STREAM CODE)	GIS KEY	MILES	SOURCE	CAUSE	YEAR LISTED*	ADDRESSED BY TMDL
Quittapahilla Creek, Unt (09704)	990311-1213-MSE	0.49	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09718)	990311-1213-MSE	1.36	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09719)	990311-1213-MSE	0.18	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09720)	990311-1213-MSE	0.5	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09721)	990311-1213-MSE	0.7	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09722)	990311-1213-MSE	0.54	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09723)	990311-1213-MSE	0.06	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09727)	990311-1213-MSE	0.76	Agriculture	Flow Alterations	2000	No
				Siltation	2000	Yes
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Quittapahilla Creek, Unt (09744)	990329-1336-MSE	6.36	Bank Modifications	Other Habitat Alterations	2000	No
			Urban Runoff/Storm Sewers	Flow Alterations	2000	No
Snitz Creek (09729)	1405	6.59	Agriculture	Nutrients	1996	Yes
Snitz Creek, Unt (09730)	990318-1110-MSE	1.79	Crop Related Agric	Siltation	2000	Yes
Snitz Creek, Unt (09731)	990318-1110-MSE	0.64	Crop Related Agric	Siltation	2000	Yes
Snitz Creek, Unt (09732)	990318-1110-MSE	1.44	Crop Related Agric	Siltation	2000	Yes
Snitz Creek, Unt (09733)	990318-1110-MSE	1.11	Crop Related Agric	Siltation	2000	Yes

***YEAR LISTED – When these TMDLs were written (Sept. 2000), the 2000 303(d) list had not been submitted to EPA. Segments identified as listed in 2000 are in the 305(b) report database and will appear on any 2000 303(d) list submitted to EPA.**

TABLE 4 - SOURCES AND CAUSES OF IMPAIRMENTS IN THE QUITTAPAHILLA CREEK BASIN BASED ON THE 2000 305(b) REPORT		
SOURCE(S)	CAUSE(S)	MILES IMPAIRED
Agriculture	Nutrients	23.87
Crop Related Agriculture	Siltation	6.92
Agriculture	Flow Alterations & Siltation	9.40
Agriculture Urban Runoff/Storm Sewers	Flow Alterations & Siltation Flow Alterations	23.04
Agriculture Urban Runoff/Storm Sewers	Suspended Solids Organic Enrichment/Low D.O.	4.09
Urban Runoff/Storm Sewers	Flow Alterations	6.44
Bank Modifications Urban Runoff/Storm Sewers	Other Habitat Alterations Flow Alterations	11.02

The Quittapahilla Creek Watershed Association has received grants and has hired Rocky Powell with Clear Creeks Consulting to complete an in depth watershed wide assessment. The assessment and an implementation plan are expected to be completed June 2006.

CONEWAGO CREEK WATERSHED
(HUC CODE 2050305100)

In addition Lebanon County encompasses a portion of the **Conewago Creek** Watershed which also has a completed TMDL. This particular TMDL states, "The Conewago Creek Watershed was determined to be impaired from excess nutrient and sediment contributions". This determination was made based on the health of the biological community residing in the water. The plan includes a calculation of the loading for both the nutrient and sediment that will meet the water quality objectives. In 1996, DEP listed a number of Streams in Conewago Creek Watershed under Section 303(d) of the federal Clean Water Act as impaired due to excess nutrient loading. Also, in 1998, DEP listed several other stream segments in the Conewago Creek Watershed under Section 303(d) of the federal Clean Water Act as impaired due to excess nutrient and sediment loading. All of the pollution in the Conewago Creek Watershed comes from non-point sources (NPS) of pollution. The pollutants come primarily from overland runoff. BMP's should be installed throughout the watershed to achieve the necessary loading reductions.

Conewago Creek Watershed TMDL, EPA April 2001, pages 6-7.

Total Maximum Daily Loads or TMDLs were developed for the Conewago Creek watershed to address the impairments noted on Pennsylvania's 1996 and 1998 Clean Water Act Section 303(d) Lists. It was first determined that Conewago Creek was not meeting its designated water quality uses for protection of aquatic life based on a 1994 aquatic biological survey, which included kick

screen analysis and habitat surveys. In 1997, the Department again surveyed the stream and found the stream to still be impaired. As a consequence of these surveys, Pennsylvania listed Conewago Creek on the 1996 and 1998 Section 303(d) Lists of Impaired Waters. The 1996 303 (d) List reported 10 miles of Conewago Creek to be impaired by agricultural nutrients. The 1998 list includes 15.8 miles of the Main stem (Segment ID 6432), 3.6 miles of an unnamed tributary (Segment ID 970701-0745-SAW), 11.2 miles of Lynch Run (Segment ID 970626-1200-SAW), and 5.7 miles of Hoffer Creek (Segment ID 970701-1035-SAW) (Table 1). Hoffer Creek and Lynch Run are tributaries of Conewago Creek. These segments were listed on the 1998 303 (d) List because of impacts by nutrients and/or siltation due to agriculture.

The Pennsylvania approach to TMDL development involves comparing nutrient and sediment loads of the impacted watershed to those of a reference watershed. Based on the predominance of agricultural land use, nutrients and sediments are the most likely pollutants causing Conewago Creek to violate the aquatic life use. Therefore, the TMDLs propose reducing the phosphorus and sediment loadings in Conewago Creek Subbasins A and B to levels consistent with the Lehman-Muddy Run watershed and a portion of the Little Swatara Creek watershed (i.e. the reference watersheds). Because of the similarities in size and land use existing between the subbasins and the reference watersheds, achieving nutrient and sediment loadings in the Conewago Creek TMDL will ensure that the aquatic life use is achieved and maintained as evidenced in the reference watersheds.

Pennsylvania presently does not have water quality criteria for nutrients and sediments. It is for this reason, we developed a reference watershed approach to identify the TMDL endpoints or water quality objectives for nutrients and sediments in the impaired segments of the Conewago Creek watershed. The nutrient loading for this watershed only addresses phosphorus because it was determined that phosphorus was the limiting nutrient. Phosphorus is generally held to be the limiting nutrient in a waterbody when the nitrogen/ phosphorus ratio exceeds 10 to 1. This ratio in Conewago Creek is 21 to 1.

The Conewago Creek watershed TMDL Information Sheet that is attached to this document (Appendix A) provides a primer for TMDLs (What are they and why are we doing them?) and water quality standards (What makes up a water quality standard?). Appendixes B and C provide information on watershed hydrology and pollutant transport, and the method being used

by Pennsylvania for establishing TMDLs for stream segments impaired by nutrients and sediments.

Table 1. 303(d) Sub-List								
State Water Plan (SWP) Subbasin: 7-Conewago Creek Watershed								
Year	SWP	Miles	Segment ID	DEP Stream Code	Stream Name	Designated Use	Data Source	EPA 305(b) Cause Code
1996	07-G	10.0		09217	Conewago	TSF	305(b) Report	Nutrients
1998		15.8	6432	09217	Conewago	TSF	305(b) Report	Nutrients
1998	07-G	0.9	6434*	09217	Conewago	TSF	305(b) Report	Organic enrichment/ Low D.O. and Suspended solids
1998	07-G	5.1	970626-0830-SAW**	09217	Conewago	TSF	305(b) Report	Habitat alterations
1998	07-G	3.6	970701-0745-SAW	09217	Conewago	TSF	305(b) Report	Nutrients/Siltation
1998	07-G	5.7	970701-1035-SAW	09267	Hoffer Run	TSF	305(b) Report	Nutrients/Siltation/ Habitat alterations
1998	07-G	11.2	970626-1200-SAW	09232	Lynch Run	TSF	305(b) Report	Siltation/Turbidity

Trout Stocking = TSF
Hoffer Creek and Lynch Run are tributaries of Conewago Creek.
* Listing was for Municipal Point Source. TMDL completed for discharger in 1998.
** This TMDL does not address any 303(d) listings for the category of flow alterations. TMDLs are not the appropriate mechanism to address this type of stream impairment. TMDLs are designed to address pollutant loadings that cause exceedance of water quality standards. There is no pollutant loading to address for this type of impairment.

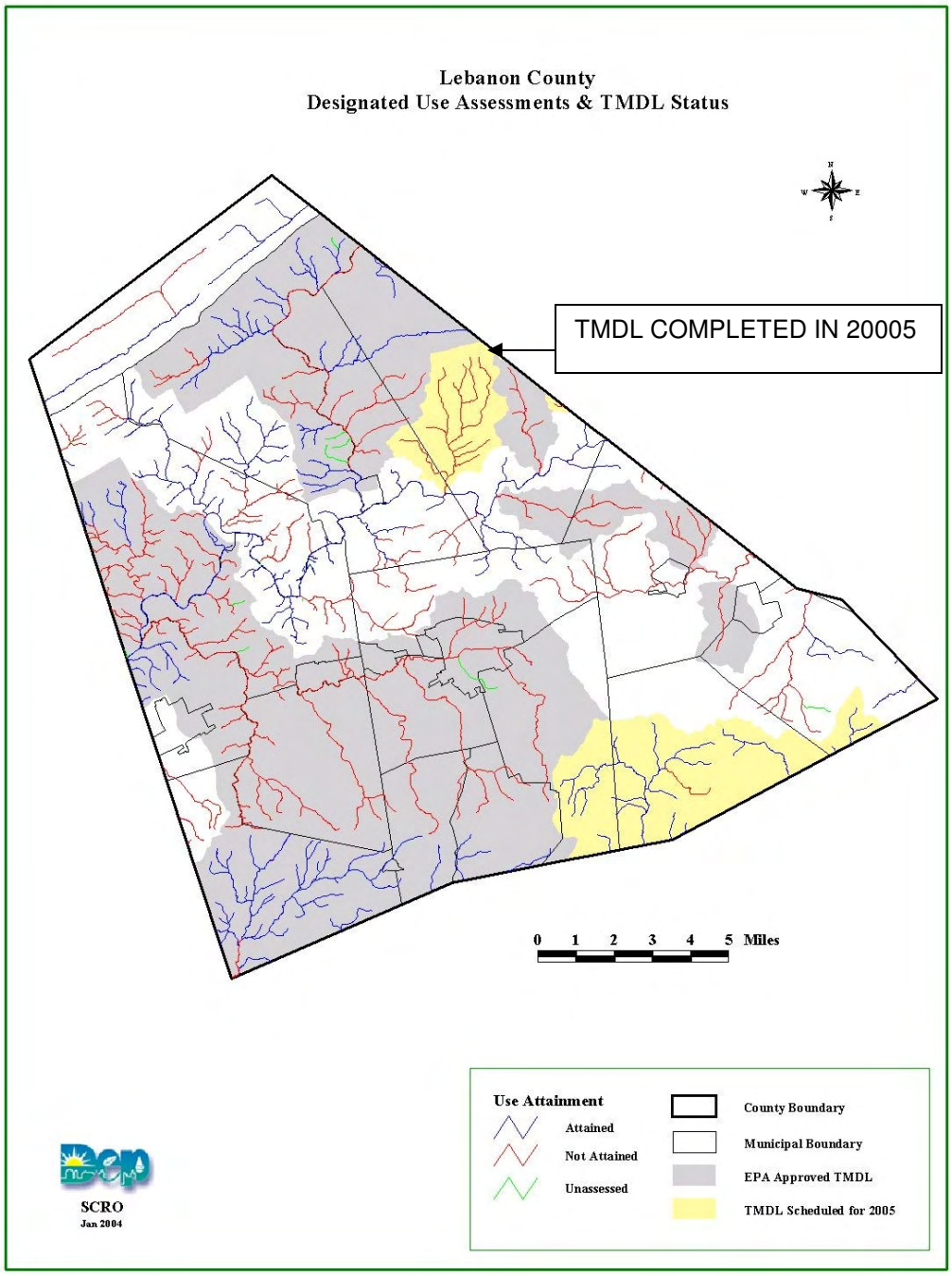
The Tri-County Conewago Creek Watershed Association has received grants and has hired consultant Mark Metzler with Rettew Associates Inc. to complete an in depth watershed assessment. The assessment and an implementation plan are expected to be completed in 2006.

COMPLETED TMDLs in Lebanon County

- Conewago Creek Watershed
- Crosskill Creek
- Deep Run Watershed
- Deep Run, Beach Run, Elizabeth Run
- Earlakill Run Watershed
- Owl Creek
- Quittapahilla Creek Watershed
- Unnamed Tributary Swatara Creek

TMDLs PROPOSED

- Hammer Creek
- Middle Creek



TRENDS OF SIGNIFICANCE TO WATER QUALITY

Trends and statistics for Lebanon County listed below are based from 1989-2003. Information was obtained from the Conservation Technology Information (http://www.ctic.purdue.edu/CTIC/CTIC.html) and the U.S. Department of Agriculture's-National Agriculture Statistics Service, Pennsylvania Statistical Office web pages (http://www.nass.usda.gov/pa/).

- ✓ The number of farms and the acres per farm has remained constant
- ✓ Total cattle (including milk) has been relatively unchanged and maintained approximately 50,000 head over the last 12 years
- ✓ The number of hogs has doubled, 2003 statistics indicate a total inventory of 102,000 hogs.
- ✓ Total chicken production has doubled, 2003 statistics indicate a total inventory of 3,293, 600 chickens.
- ✓ Hay-Production has decreased by 40%
- ✓ Hay Alfalfa-Production has decreased by 60%
- ✓ Soybeans-Production has been maintained over the last 12 years
- ✓ Corn for Grain-Production has increased 20% in acres planted
- ✓ Corn Silage-Acres harvested has doubled to a total of 23,300 acres
- ✓ Lebanon County residue management survey estimates that our conservation tillage practices are roughly half of the PA statewide average

These trends indicate that erosive cropping systems are becoming the norm throughout Lebanon County. A significant increase in corn and drop in hay alfalfa production will compound water quality impacts unless adequate structural BMP's or surface residue is increased. The hog and poultry industries have experienced significant growth as well. The distribution and agronomic application of this manure represents a large challenge. Over the last 15 years Lebanon County has intensified its agriculture while other counties have decreased production. The lack of adequate crop residue and distribution/application of manure from swine, dairy, and poultry operations appear to be the current challenges.

SEDIMENT AND NUTRIENT/SOURCE REDUCTIONS

For almost twenty years, through funding from DEP and through the SCC, Pennsylvania's 38 Chesapeake Bay conservation districts have been working with landowners to install agricultural Best Management Practices (BMPs). Over the years, close to $39,000,000 has been allocated and paid to farmers in the Pennsylvania Chesapeake Bay watershed. The Department has, over the same number of years, provided funding for these 38 Districts through Bay technicians, engineers and engineering assistants. The existing program has been very successful in providing the technical and financial assistance through these Districts that Pennsylvania's landowners have relied upon and

have come to respect. The program and the funding that it has provided has been critical to Pennsylvania's efforts in cleaning up local water quality and ultimately the Chesapeake Bay.

It is important that we recognize the past water quality accomplishments that the program has made. The existing established technical assistance infrastructure that has developed over the years by Districts has been critical to the past successes that have occurred in Pennsylvania. We feel that not enough credit has been given in the draft strategy to both the agricultural community and to the Districts, DEP, the SCC, and NRCS in our collective program and water quality accomplishments. Additionally, the improvements from BMPs already installed and still being installed will not result in immediate water quality improvement. These improvements will take time as the Bay itself must adjust to the diminished nutrient/sediment inflow from the tributaries.

The Chesapeake Bay Program began in Lebanon County in 1985. Since that time Lebanon County alone has spent $1,335,285.86 on BMPs through the Chesapeake Bay Program. In addition, through programs such as Growing Greener and 319 Grants, Act 6, and various NRCS programs Lebanon County has spent an additional $2,126,942.80 on the implementation of BMPs. All together totaling $3,462,228.66 spent on BMPS since 1985 (TABLE 1).

While BMPs vary by program, you can see the trends for requested and implemented BMPs for each program have been;

CHESAPEAKE BAY PROGRAM & 319 GRANTS

- ✓ Manure Storages
- ✓ Nutrient Management Plans
- ✓ Streambank Fencing & Crossings
- ✓ Mortality Composters
- ✓ Pasture Management
- ✓ Barnyard & Runoff Controls
- ✓ Heavy Use Area Protection
- ✓ Grassed Waterways
- ✓ Diversions
- ✓ Roof Runoff Management
- ✓ Stormwater Control Structures

GROWING GREENER GRANTS

- ✓ Streambank Fencing & Crossing
- ✓ Mortality Composters
- ✓ No-till Planting & Cover Crops
- ✓ No-till Educational Workshop
- ✓ Barnyard Runoff Controls

PDIP-PLAN DEVELOPMENT INCENTIVES PROGRAM

- ✓ Nutrient Management Plans

ACT 6- NUTRIENT MANAGEMENT IMPLEMENTATION GRANT

- ✓ Waste Management System
- ✓ Manure Storage
- ✓ Streambank Fencing & Crossings
- ✓ Cover Crops
- ✓ Pasture Management
- ✓ Roof Runoff
- ✓ Manure Analysis
- ✓ Heavy Use Area Protection
- ✓ Barnyard Runoff
- ✓ Waterways
- ✓ Contour Strips
- ✓ Tile Drainage

CREP-CONSERVATION RESERVE PROGRAM
(Promotes the conversion of cropland/pastureland to conserving use BMPs)

- ✓ Riparian Buffers (including fencing & crossings)
- ✓ Warm and cool season grass plantings
- ✓ Grassed Waterways

GRP-GRASSLAND RESERVE PROGRAM
(Promotes the conversion of cropland or preserving existing grassland to pasture or hayland)

- ✓ Pasture and Hayland Planting

EQIP-ENVIRONMENTAL QUALITY INCENTIVES PROGRAM

- ✓ Manure Storages
- ✓ Barnyard Runoff Controls
- ✓ Streambank Fencing & Crossings
- ✓ Rotational Grazing System

LTA-LONG TERM AGREEMENTS

- ✓ Conservation Plans
- ✓ Nutrient Management Plans
- ✓ Manure Storages
- ✓ Stream Protection
- ✓ Grazing Land Protection
- ✓ Spring Developments
- ✓ Cropland Protective Cover
- ✓ No-Till Systems
- ✓ Waterways
- ✓ Terraces

Through input from the Lebanon County Conservation District Agricultural Staff, USDA-NRCS, and cooperating agencies it was agreed that Lebanon County's current needs include;

- ✓ funding for BMP implementation,
- ✓ funding for education and outreach efforts, and
- ✓ Funding for additional personnel to tackle these tasks.

Our agencies most frequently receive requests for BMP funding and design of Waste Management Systems, Barn Yard Management Controls, and Nutrient Management Control. We feel the frequency of these requests not only comes from the need, but because landowners are not aware of the other services and programs available. Thus leading to our next current need education and outreach. While programs are advertised we realize there is a large gap in the number of landowners being reached. Currently our programs are advertised at events such as; "Farm Family Day" and the Lebanon Area Fair, also through brochures, mailings, and news releases. We feel a large and important communication method for our programs is the communication among landowners and neighbors through word of mouth. Attendance at large events is an important factor however; it does leave a large gap in our education and outreach efforts. We feel it would be a great benefit if we had staff time to do "door to door" knocking to create a face to face relationship between landowners and district personnel to advertise our various programs. Thus leading to our third current need funding for additional staff. If we had additional funding to hire additional staff we could provide the service of door to door education and outreach of our programs. We could foster working relationships with our landowners and build up the trust that is sometimes lacking between farmers and government agencies and ultimately lead to more BMP implementation resulting in reduced sediment and nutrient pollution to the watersheds of Lebanon County.

Additionally, while our county implementation plan largely focuses on agricultural, it our goal as a conservation district to provide assistance, education and outreach to all aspects of life in Lebanon County. Our education efforts particularly, work to reach teachers, students, private landowners both rural and urban, municipalities, planning commissions and our local watershed and conservation organizations.

Regardless of the funding we do or do not receive, we will continue to serve our landowners to the best of our ability. We will continue to work with our partnering agencies such as USDA-NRCS, Penn State Cooperative Extension, DEP, Ducks Unlimited, Trout Unlimited, the Chesapeake Bay

Foundation, etc. The LCCD will continue to seek funding from these various organizations and through various funding sources such as; DEP's Growing Greener, EPA's 319 program, PACD mini-grant program, private organizations such as the William Penn Foundation and the Chesapeake Bay Small Watershed Grants. We will continue to assist USDA-NRCS with the design, technical assistance and implementation of BMPs through their various programs, and as required meet local municipalities' Ag waste storage ordinances.

COUNTY IMPLEMENTATION PLAN

Landowners generally wish to comply with their conservation plans by implementing the appropriate BMPs. However, lack of funding and inappropriate agricultural equipment often makes implementation difficult. While our County implementation plan incorporates minimal "out of the box" thinking as far as BMPs are concerned, it was prepared through the advice of our agricultural staff, NRCS, and partnering agencies for the needs of Lebanon County. Scientific and technical documents such as the Soil and Water Conservation Technical Guide have demonstrated proper implementation and management of these traditional BMPs work (ex. residue management=soil savings). Implementation of the suggested BMPs will continue to improve the soil quality and minimize runoff throughout Lebanon County watersheds. Our "out of the box" thinking lies more with the need for greater emphasis on education and outreach and program participation. Lebanon County typically has low program participation for many reasons; landowners unawareness of programs, low funding of programs, lack of communication between landowners and district/NRCS personnel, and the lack of relationships between landowners and district/NRCS personnel. Our County implementation plan states the need for education and outreach and program participation through our action steps and milestones which incorporate pasture walks, tillage walks and field days to help meet these needs.

Lebanon County's Implementation Plan will be incorporated into many existing and preliminary watershed plans. We will be aiding in reaching many of the Milestones of the Pennsylvania's NPS Management Program 1999 update. This strategy will aid in achieving the desired TMDLs for the Swatara, Little Swatara, Quittapahilla Watershed and Conewago Watershed as well as those on the horizon. We will be aiding in the Swatara's Rivers Conservation Plan and the Watershed Restoration Action Strategy (WRAS) for Swatara Creek Watershed by reducing non-point source pollution from agriculture operations. Through implementation of the strategy we will be aiding in the goals and objectives of many of our local watershed associations; including the Swatara Creek Watershed Association, Quittapahilla Watershed Association, Tri-County Conewago Creek Watershed

Association, Segloch Run/Furnace Run Watershed Alliance, Cocalico Creek Watershed Association as well as, other conservation organizations such as the Lebanon Valley Conservancy and Trout Unlimited. The proposed deliverables for the implementing this strategy are as follows:

1) Reduced surface water runoff
2) Improved surface water quality
3) Improved ground water quality
4) Overall improved stream health and habitat
5) Improved soil health and fertility
6) Improved soil retention/reduced erosion
7) Improved air quality

CRITICAL ISSUE:

Lebanon County is below the state average for implementation of Conservation Tillage Practices (no-till, reduced tillage) and an apparent general lack of understanding as to what is Conservation Tillage.

GOAL:

To increase the understanding of Conservation Tillage and to meet or exceed the statewide average of Conservation Tillage practices implemented. Also, by implementing correct Conservation Tillage practices we will be increasing carbon sequestration as the organic matter of soil is increased through these practices.

ACTION STEPS:

- ✓ Increase education and outreach efforts to landowners
- ✓ Over the next five years we will hold approximately two field days/"Conservation Tillage Walks" per year
- ✓ Partner with PSU Agronomist on education and outreach efforts
- ✓ Provide more info at various functions throughout the year to educate landowners (Farm Family Day, Lebanon Area Fair etc.)
- ✓ Seek funding for education and outreach efforts through mini-grant programs such as; PACD, WREN, and CVI
- ✓ Seek funding through grant sources (DEP-Growing Greener, 319,) Capital Area RC&D and USDA-NRCS programs for actual BMP implementation
- ✓ Fund implementation of conservation tillage and no-till through incentive or cost-share payments

REQUIRED RESOURCES:

- ✓ Financial assistance for workshops and field days
- ✓ Financial assistance for BMP implementation
- ✓ Financial assistance for personnel

OBSTACLES AND CONSTRAINTS:

- ✓ Lack of personnel and financial resources
- ✓ Landowner lack of education regarding Conservation Tillage practices
- ✓ Management challenges between manure incorporation and conservation tillage

MILESTONES:

- ✓ Hold two or more field days/Conservation Tillage Walks per year
- ✓ Securing funding and personnel to perform education and outreach efforts

MEASURABLE RESULTS:

- ✓ Reaching the state average of Conservation Tillage practices implemented
- ✓ Number of people reached through education and outreach efforts
- ✓ Increased soil organic matter leading to increased carbon sequestration
- ✓ Increased residue levels & infiltration leading to decreased nutrient & sediment loads in local streams

CRITICAL ISSUE:

Erosion over winter months and uptake of excess nutrients.

GOAL:

To select a priority TMDL watershed (sub-watershed) to educate landowners on the benefits of cover crops and increase implementation of cover crops in that selected watershed for maximum benefit. Also, by implementing cover crops we will be increasing carbon sequestration as the organic matter of soil is increased through these practices.

ACTION STEPS:

- ✓ Increase education and outreach efforts to landowners
- ✓ Over the next five years we will hold approximately two field days/"Conservation Tillage Walks" per year
- ✓ Partner with PSU Agronomist on education and outreach efforts
- ✓ Provide more information on cover crops at various functions throughout the year to educate landowners (Farm Family Day, Lebanon Area Fair etc.)
- ✓ Seek funding for education and outreach efforts through mini-grant programs such as; PACD, WREN, and CVI
- ✓ Seek funding through grant sources (DEP-Growing Greener, 319,) Capital Area RC&D and USDA-NRCS programs for actual BMP implementation
- ✓ Fund implementation of cover crops through incentive or cost-share payments

REQUIRED RESOURCES:

- ✓ Financial assistance for workshops and field days
- ✓ Financial assistance for BMP implementation
- ✓ Financial assistance for personnel

OBSTACLES AND CONSTRAINTS:

- ✓ Lack of personnel and financial resources
- ✓ Landowner lack of education regarding cover crops
- ✓ Landowners' perception of cost vs. benefit of cover cropping
- ✓ Management challenges between manure incorporation, cover crops, weather, and time

MILESTONES:

- ✓ Hold two or more field days/Conservation Tillage Walks per year
- ✓ Securing funding and personnel to perform education and outreach efforts

MEASURABLE RESULTS:

- ✓ Increased soil organic matter leading to increased carbon sequestration
- ✓ Reduced soil erosion and increase excess nutrient uptake leading to less impacts of these pollutants to watersheds
- ✓ Number of people reached through education and outreach efforts

CRITICAL ISSUE:

In Lebanon County there are a large number of farms with conservation plans that are outdated as well as a large number of farms that do not have a conservation plan.

GOAL:

LCCD and USDA-NRCS will work with landowners to update or implement 5000 acres of Resource Management System (RMS) conservation plans over the next year and approximately 25,000 acres through 2010.

ACTION STEPS:

- ✓ Continue to work with TSPs (Technical Service Providers) to update and implement new RMS conservation plans
- ✓ Seek more personnel to help update and implement conservation plans

REQUIRED RESOURCES:

- ✓ Financial assistance for staff and technology in order to write conservation plans

OBSTACLES AND CONSTRAINTS:

- ✓ Lack of personnel to meet conservation planning needs
- ✓ In Lebanon County not only are we not meeting current conservation planning needs but we also have a large back log of plans waiting to be written

MILESTONES:

- ✓ Implementing more than 5000 acres over the next year and to meet the planning needs of Lebanon County

MEASURABLE RESULTS:

- ✓ 5000 acres of RMS conservation planning written next year
- ✓ Benefits of various conservation practices associated with crop production

CRITICAL ISSUE:

In Lebanon County there are a large number of farms without Nutrient Management Plans (NMP) and a lack of implementation on the farms that do have them.

GOAL:

LCCD and USDA-NRCS will work to develop three NMP on farms where Bay funding is being spent (ACT 6 covers this BMP specifically) and we will work with landowners to update NMPs on five farms annually that have existing plans.

ACTION STEPS:

- ✓ Continue to work with TSPs to update and write NMPs
- ✓ Encourage TSPs to work more closely with landowners to produce an easily implemented and practical plan for the landowner
- ✓ Continue to work to update and review existing plans as necessary
- ✓ Educate landowners on proper implementation of NMP plans including record keeping
- ✓ Increase record keeping through the implementation of the CSP (Conservation Securities Program)

REQUIRED RESOURCES:

- ✓ Financial assistance for implementation of NMPs and staff to review and update plans
- ✓ Increased USDA-NRCS technical assistance to write phosphorous based NMPs

OBSTACLES AND CONSTRAINTS:

- ✓ Landowner understanding of NMPs
- ✓ Financial assistance for landowner implementation of BMPs in NMP
- ✓ Landowners' difficulty in keeping records/paperwork up to date

MILESTONES:

- ✓ Work with TSPs over the next three years to update all existing NMP from Nitrogen based to Phosphorous based plans
- ✓ Develop three new NMP and update five existing NMP annually

MEASURABLE RESULTS:

- ✓ Conversion of Nitrogen based plans to Phosphorous based plans
- ✓ Increased comprehension of NMP by landowners
- ✓ Better record keeping by landowners through education and improved plan implementation
- ✓ Proper application of nutrients leading to decreased nutrient loads in watersheds and groundwater

CRITICAL ISSUE:

In Lebanon County there are existing and new livestock operations without proper manure management or handling leading to the discharge of nutrients to ground and surface waters.

GOAL:

LCCD and USDA-NRCS will provide technical assistance towards the implementation of seven animal waste management systems over the next year and approximately thirty-five animal waste management systems through 2010 in order to prevent the discharge of nutrients to ground and surface waters.

ACTION STEPS:

- ✓ Continue to fulfill the requirements of the PA Clean Stream Law & USDA-NRCS Practice Standards
- ✓ Continue to work with USDA-NRCS towards the implementation of animal waste management systems including; design, construction certification, and cost share programs
- ✓ Continue to seek funding sources such as PA DEP's Growing Greener or EPA's 319 program, and ACT 6 for implementation costs
- ✓ Promote CNMP (Comprehensive Nutrient Management Plans)

REQUIRED RESOURCES:

- ✓ Financial assistance for both BMP implementation and staff to provide technical assistance

OBSTACLES AND CONSTRAINTS:

- ✓ Lack of program funding
- ✓ Lack of personnel

MILESTONES:

- ✓ Over the next year seven animal waste management systems will be implemented and certified

MEASURABLE RESULTS:

- ✓ Implementation of animal waste management systems resulting in less discharge of nutrients to ground and surface waters
- ✓ Better manure management and implementation of NMPs

CRITICAL ISSUE:

Improper handling, storage, and disposal of animal carcasses are leading to nutrient and pathogen contamination of ground and surface waters can lead to the transmission of pathogens and cause odor problems.

GOAL:

LCCD and USDA-NRCS will provide technical assistance towards the implementation of two roofed mortality composters over the next year and ten roofed mortality composters through 2010 in order to prevent nutrient contamination to ground and surface waters.

ACTION STEPS:

- ✓ Continue to educate landowners on the benefits of roofed mortality composters
- ✓ Continue to work with partnering agencies (USDA-NRCS, Penn State Cooperative Extension) for the implementation of roofed mortality composters
- ✓ Continue to seek funding sources through PA DEP's Growing Greener program, EPA-319, and USDA-NRCS programs
- ✓ Provide cost share funding for the construction roofed mortality composters

REQUIRED RESOURCES:

- ✓ Financial assistance for both BMP implementation and staff to provide technical assistance

OBSTACLES AND CONSTRAINTS:

- ✓ Lack of funding to implement BMP
- ✓ Landowner lack of awareness about program options
- ✓ Landowner lack of awareness regarding the impacts of improperly storing, handling, and disposal of animal carcasses

MILESTONES:

- ✓ Over the next year two roofed mortality composters will be implemented and certified

MEASURABLE RESULTS:

- ✓ Implementation of two roofed mortality composters resulting in less nutrient contamination to ground and surface waters
- ✓ Increased farm aesthetics and odor control
- ✓ Reduced potential for pathogen transmission

CRITICAL ISSUE:

Stream bank erosion due to unlimited cattle access

GOAL:

LCCD and USDA-NRCS will provide technical assistance towards the implementation 20,000 linear feet of fencing with off stream watering over the next year and approximately 100,000 linear feet through 2010 in order to prevent stream bank erosion and nutrient pollution from unlimited cattle access.

ACTION STEPS:

- ✓ Increase education and outreach efforts to landowners
- ✓ Provide more info at various functions throughout the year to educate landowners (Farm Family Day, Lebanon Area Fair, Lebanon County Builder's Show, etc.)
- ✓ Seek funding for education and outreach efforts through mini-grant programs such as; PACD, WREN, and CVI
- ✓ Seek funding through grant sources (DEP-Growing Greener, 319,) and USDA-NRCS programs for actual BMP implementation
- ✓ Seek funding and partner with other agencies on various stream bank fencing programs (USDA-NRCS, CREP Program, Chesapeake Bay Foundation, Ducks Unlimited, etc.)
- ✓ Provide cost-share funding for implementation of streambank fencing, crossings, and buffer plantings

REQUIRED RESOURCES:

- ✓ Financial assistance for both BMP implementation and staff to provide technical assistance

OBSTACLES AND CONSTRAINTS:

- ✓ Lack of funding to implement BMP
- ✓ Landowner mindset
- ✓ Increased landowner obligations
- ✓ Maintenance of fence
- ✓ Maintenance/control of invasive species and weeds
- ✓ Flooding concerns

MILESTONES:

- ✓ Over the next year 20,000 linear feet of fencing with off stream watering will be implemented and certified
- ✓ Securing funding for BMP implementation

MEASURABLE RESULTS:

- ✓ Implementation of 20,000 linear feet of stream bank fencing
- ✓ Reduced sediment and nutrient pollution to waterways

CRITICAL ISSUE:

Lack of functioning grassed and forest buffers to reduce sediment and nutrient pollution to waterways in both urban and rural areas.

GOAL:

LCCD and USDA-NRCS will provide technical assistance towards the implementation of 32 acres of grassed and forest buffers over the next year and approximately 320 acres through 2010 (this includes both rural and urban areas).

ACTION STEPS:

- ✓ Increase education and outreach efforts to landowners, municipalities, and developers
- ✓ Provide more info at various functions throughout the year to educate landowners, municipalities, and developers (Farm Family Day, Lebanon Area Fair, Lebanon County Builder's Show, etc.)
- ✓ Seek funding for education and outreach efforts through mini-grant programs such as; PACD, WREN, and CVI
- ✓ Seek funding through grant sources (DEP-Growing Greener, 319,) and USDA-NRCS programs for actual BMP implementation
- ✓ Seek funding and partner with other agencies on grass and forest buffer programs (USDA-NRCS, CREP Program, Chesapeake Bay Foundation, Ducks Unlimited, etc.)
- ✓ Provide cost-share funding for the implementation of grassed and forest buffers

REQUIRED RESOURCES:

- ✓ Financial assistance for both BMP implementation and staff to provide technical assistance

OBSTACLES AND CONSTRAINTS:

- ✓ Lack of funding to implement BMP
- ✓ Mindset that buffers are unattractive
- ✓ Maintenance/control of invasive species and weeds
- ✓ Required buffer width

MILESTONES:

- ✓ Over the next year 32 acres of grass and forest buffers will be implemented through landowner cooperation and changing of mindset
- ✓ Securing funding for BMP implementation

MEASURABLE RESULTS:

- ✓ Implementation of 32 acres of grass and forest buffers
- ✓ Reduced sediment and nutrient pollution to waterways