Knight's Run Farm, Cochranville, Octoraro Watershed, Chesapeake Bay Drainage

Chester County
Chesapeake Bay Tributary Strategy

Chester County Conservation District
February 17, 2005

Resolution

WHEREAS, the Chester County Conservation District Board of Directors adopted the **CHESTER COUNTY CHESAPEAKE BAY TRIBUTARY STRATEGY**, the county's requirement of the Chesapeake Bay 2010 Agreement on February 17, 2005; and

WHEREAS, the Chester County Chesapeake Bay Tributary Strategy includes strategies that promote the reduction of nutrient and sediment loading to the Chesapeake Bay, and

WHEREAS, the Chester County Conservation District Board of Directors recognize that the impact from the County's agriculture, development, municipal and industrial wastewater plants, and septic systems play a role in the decline of the Chesapeake Bay's water quality.

NOW, THEREFORE, be it resolved that on the 17th day of February 2005, the Board of Directors of the County of Chester do hereby adopt the CHESTER COUNTY CHESAPEAKE BAY TRIBUTARY STRATEGY as the required element of the Chesapeake Bay 2010 Agreement.

ATTEST:

Daniel J. Greig, District Manager

2/17/05

Date

Chester County Conservation District
Board of Directors

Thomas K. Brosius, Chairman

Robert Lange

Robert Lange, Vice Chairman

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ALP	Agricultural Land Preservation
AU	Animal Unit
BMP	Best Management Practice
CAFO	Concentrated Animal Feed Operation
CBF	Chesapeake Bay Foundation
CBTS	Chesapeake Bay Tributary Strategy
CBW	Chesapeake Bay Watershed
CCCD	Chester County Conservation District
CSP	Conservation Security Program
CWA	Chester Water Authority
DNCR	Department of Conservation of Natural Resources
EPA	Environmental Protection Agency
E&S	Erosion and Sedimentation
EWA	Elk Creek Watershed Association
MFEMP	Mushroom Farm Environmental Management Plan
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint source
NRCS	Natural Resources Conservation Service
OSDS	On Site Disposal Site
OWA	Octoraro Creek Watershed Association
PACD	Pennsylvania Association of Conservation Districts
PA DEP	Pennsylvania Department of Environmental Protection
PEACCE	Pennsylvania Environmental Agricultural Conservation Certification of Excellence
RMS	Resource Management System
SMS	Spent Mushroom Substrate
USDA	United States Department of Agriculture

ACKNOWLEDGEMENTS

The Chester County Conservation District gratefully acknowledges the participation and support of the many individuals, District and County staff, agencies, organizations, and other entities in the development of the *Chester County Chesapeake Bay Tributary Strategy*.

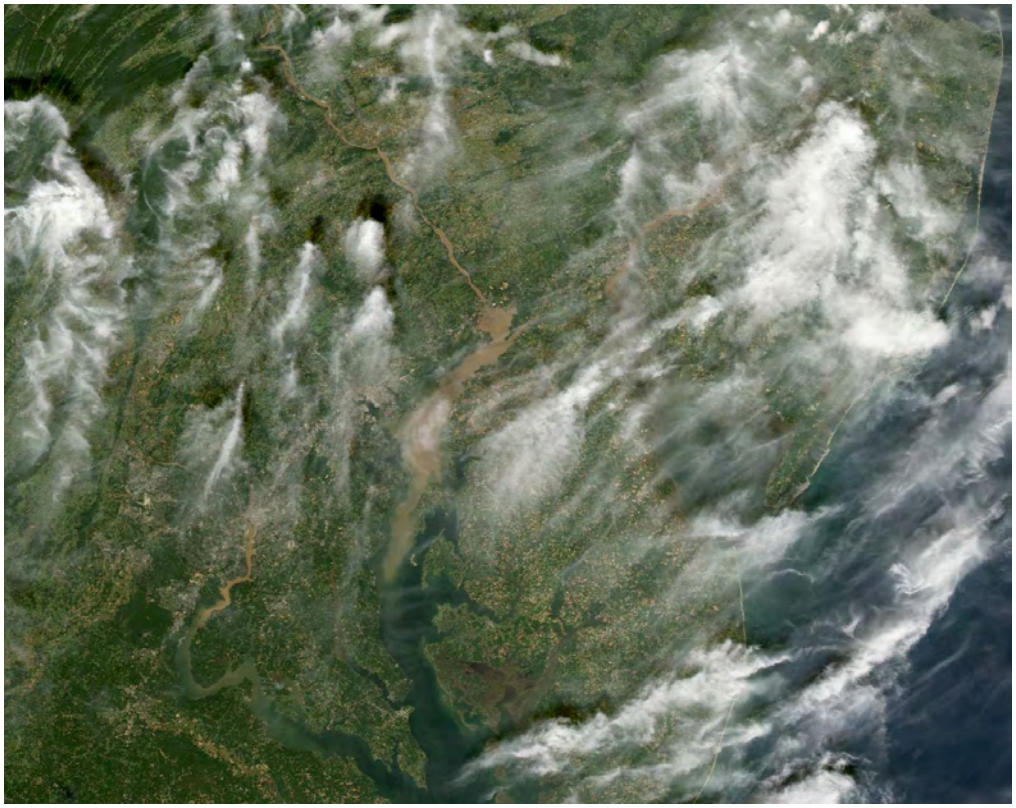
PART 1 - INTRODUCTION

Chester County is one of Pennsylvania's six original counties participating in the Chesapeake Bay Program. A delegation agreement was signed in 1985 to participate in the effort to restore the Chesapeake Bay.

The Chester County Conservation District is very proud of its accomplishments over the last twenty years. Although less than 20% of the County is in the Chesapeake Bay Watershed (CBW), the Chester County Conservation District (CCCD) has consistently been one of the most successful counties putting conservation on the ground to improve water quality. Large portions of the water quality improvements were funded in part by the Chesapeake Bay Program.

Even though there have been numerous improvements within the Chesapeake Bay Watershed, water quality goals have not been accomplished. Therefore, the Chester County Conservation District has created a Chesapeake Bay Tributary Strategy (CBTS) to target specific nutrient and sediment reductions by 2010. Specific implementation strategies have been identified to reduce the impact on the Bay from agriculture, municipal and industrial wastewater, development, forests, and septic systems. The goals that have been set are very aggressive and may be difficult to attain. In order to reach the goals set forth for 2010, it is the responsibility of Chester County to raise its standards.

In September 2004, Tropical Storm Ivan generated record-setting polluted runoff that overwhelmed the upper Bay, as shown above in this NASA satellite photo. The huge sediment plume extended from the Susquehanna Flats to the Choptank River.



PART 2 – BACKGROUND

County Description

Chester County lies in southeastern Pennsylvania, approximately 35 miles west of the city of Philadelphia. William Penn created the County in 1682 as one of the three original counties of Pennsylvania. The county is 762 square miles, or approximately 487,500 acres in size. There are 73 municipalities, consisting of 1 city, 15 boroughs, and 57 townships. All of the townships are 2nd Class except Caln Township, which is a 1st Class Township. The Class of a township is determined by the State based on established criteria.

The population of the County in 2000 was 433,501 people. This is an increase of 57,105 (15.2%) from 1990. Chester County is the 7th most populated county in the State based on the 2000 Census. There are four County parks (Hibernia/Hatfield, Nottingham, Warwick, and Springton Manor) and two County trails (Struble and Chester Valley). Three additional County Parks have been acquired, and facilities are under construction. The County is also home to many Federal, State, and municipal parks. There are 175,363 acres of farmland in Chester County and 1,424 farms according to the 1997 U. S. Census of Agriculture. The median sales price of all homes sold in 2001 was $200,000. In 2000 and 2001, the County Planning Commission estimates that there were 7,557 new housing units added to the housing supply.

Chesapeake Bay Watershed Area

The Chester County portion of the Chesapeake Bay Watershed is situated in the Lower Susquehanna East Watershed, and is comprised of the following watersheds: the Octoraro Creek, Pequea Creek, Northeast Creek, Elk Creek (Little and Big), and Conestoga Creek. These watersheds, combined, comprise 142 square miles (91,061 acres), and contain 20 municipalities, which includes a very large agricultural community.

Figure 2-1: Chester County Chesapeake Bay Watershed

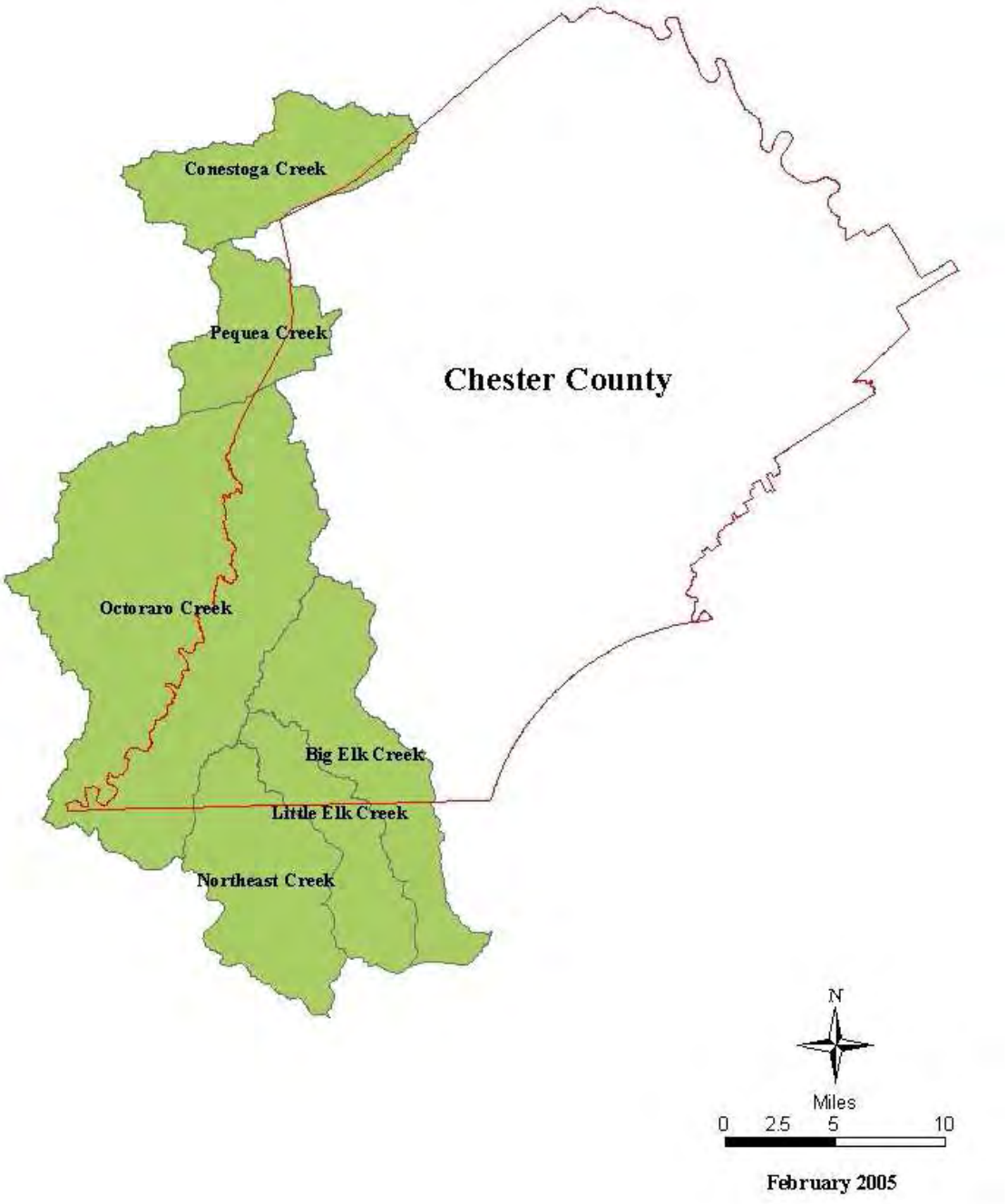


Table 2-1: Municipalities of the Watershed	
Atglen Borough	Oxford Borough
East Nottingham Township	Parkesburg Borough
Elk Township	Penn Township
Eleverson Township	Sadsbury Township
Franklin Township	West Caln Township
Highland Township	West Fallowfield Township
Honeybrook Township	West Nantmeal Township
Londonberry Township	West Nottingham Township
Lower Oxford Township	West Sadsbury Township
New London Township	Upper Oxford Township

Watershed Uses

On a Countywide basis, developed land and agriculture together occupy about two thirds of the land: approximately 42 percent in agricultural uses and 25 percent in developed land. Like the rest of the county, the Bay watershed has a dominance of agricultural land uses, with approximately 65 percent of the watershed is used for agricultural purposes.

Table 2-2: Agricultural Lands by Watershed

Watershed	Percent Agriculture Lands in 1998	Percent Agriculture Lands in 2020	1998-2020 Percent Change In Agriculture
Elk Creek (Little and Big)	53.7	51	-2.8
Northeast Creek	50.6	48.9	-1.7
Octoraro Creek	66.1	64.2	-1.8
Pequea Creek	64.1	62.1	-2
Conestoga Creek	N/A	N/A	N/A

Source: Water Resources Authority *Watersheds* Plan, 2002

Population Trends

The population of Chester County has been growing rapidly since the 1960s. The population nearly doubled between 1960 and 1995, increasing from 210,608 to an estimated 412,000. At 19 percent, Chester County had the third highest population growth rate in the Commonwealth between 1980 and 1990. This compares to a statewide population increase of only 0.1 percent and a national increase of 10 percent over the same time period.

County growth is projected to eventually slow to a rate of 6.3 percent between 2010 and 2020. Despite the slowing growth rate, the projected change in the population is an additional 80,000 residents between 1995 and 2020. Without careful planning, this significant increase in residents, coupled with the resulting demand for new homes and services, will result in a profound change to the Chester County landscape.

In the Bay portion of the county, population trends are similar to the rest of the county. The population in the 2000 census was 81,298. Estimates show an increase of 25 to 30 percent by 2020.

Table 2-3: Population by Watershed

Watershed	Estimated 1998 Population	Estimated 2020 Population	1998-2020 Est. Population Percent Change
Elk Creek (Little and Big)	26,998	33,900	25.56
Northeast Creek	15,288	19,079	24.79
Octoraro Creek	31,009	40,804	31.59
Pequea Creek	8,003	10,326	29.03
Conestoga Creek	N/A	N/A	N/A

Source: Water Resources Authority *Watersheds* Plan, 2002

Rate of Development

The most obvious indication of change in Chester County, and in the Bay watershed, is the widespread development that has occurred across every landscape. This development took place in many forms as new homes, corporate centers, industrial parks, and shopping centers were built. Development has affected many aspects of residents' lives, from more crowded schools and highways to the loss of scenic open space, farmland, and historic resources. It is not the new development, but the location and pattern of the development that has had the greatest impact on the Chester County landscape.

Table 2-4: Developed Lands by Watershed

Watershed	Percent Developed Lands in 1998	Percent Developed Lands in 2020	1998-2020 Percent Change In Developed
Elk Creek (Little and Big)	15.49	19.72	4.23
Northeast Creek	15.03	18.26	3.23
Octoraro Creek	8.3	10.82	2.52
Pequea Creek	11.44	14.83	3.39
Conestoga Creek	N/A	N/A	N/A

Source: Water Resources Authority *Watersheds* Plan, 2002

Table 2-5: Land Not Developed by Watershed

Watershed	Percent Not Developed Lands in 1998	Percent Not Developed Lands in 2020	1998-2020 Change In Percent Not Developed
Elk Creek (Little and Big)	30.24	28.7889	-1.45
Northeast Creek	34.09	32.5465	-1.55
Octoraro Creek	25.19	24.479	-0.71
Pequea Creek	23.61	22.2645	3.39
Conestoga Creek	N/A	N/A	N/A

Source: Water Resources Authority *Watersheds* Plan, 2002

The county today is experiencing tremendous growth pressures, partly because of its location between New York and Washington, and partly because of the amenities found here (i.e. an educated labor force, a high quality of life, and an efficient access to regional markets). Economic development in neighboring counties has led to increased residential development.

Recent development pressures, due in large part to the emergence of the automobile, led to suburban residential development and suburban centers outside urban areas (and along major transportation corridors). Such is the development pattern throughout the county. Land uses, or more specifically, growth pressures from Wilmington and Philadelphia, coupled with significant growth along the Route 30 corridor, have contributed greatly to the County's development. Theses pressures are spreading further westward everyday and are a very real concern for the entire watershed.

Trends in land use are seen on a regional basis and are expected to remain similar to the accelerated growth of recent years. The Chester County Planning Commission in *Landscapes*, the County's comprehensive plan, assessed some of the regional influences on growth.

Among these are:

New Castle County – Proposals exist for new travel lanes on DE Route 7 to the PA line, U.S. 202 between West Chester and the DE state line, and U.S. 322 between U.S. 1 and Interstate 95; New Castle County's population is expected to increase by upwards of 87,000 people over the next 20 years; commuters from Chester County to New Castle County are expected to grow (if the rate of increase from 1980 to 1990 continues, more commuters will travel to New Castle County than to Philadelphia in 5 years).

Philadelphia, Delaware, and Montgomery Counties – Population is expected to continue to decline in Philadelphia, contributing to out migration to the outlying counties (including Bucks and Chester Counties); growth along the Rt. 422 corridor has boomed, and a connection between Routes 422, 23 and 724 is envisioned to relieve congestion in and around Phoenixville; significant improvements to Rt. 202/422/PA Turnpike interchange are in progress (partly due to the mall expansions at King of Prussia); activity at the Delaware Port Authority has the potential of creating over 2,000 jobs by 2033.

Lancaster County – Rt. 30 is proposed to be widened from Rt. 896 to Gap, near the Lancaster /Chester county line; outlet growth continues to increase the number of tourists passing through the region.

Cecil County – Population is expected to grow by more than 20,000 people by 2020.

The above are but a few of the trends that are expected in the study area. In Chester County alone, population is expected to grow by more than 105,000 persons in 2020. Given the County's proximity to the Philadelphia International Airport, local and regional rail lines, the port facilities in Philadelphia and Wilmington, and the Federal, State, and local highway network, it stands to gain significantly as a prime location for business and industry.

Development Trends

Housing construction has taken place at an unprecedented pace in Chester County. Since 1970, the total number of houses in the County has increased by nearly 75 percent. Between 1970 and 1980, nearly 30,000 new homes were built, with the same number of houses added again between 1980 and 1990.

If the current trend continues, an additional 56,000 acres of land will be needed by 2020 to accommodate projected housing growth. This figure is in addition to the 68,000 acres currently in residential use. The large amount of residential land needed can be partially attributed to the wasteful land consumption pattern occurring in the County. Residential land consumption in Chester County, defined as acres used per housing unit, is the highest in the Philadelphia region. This low-density form of development has created the sprawling pattern of growth seen throughout the County. If this trend continues, the amount of land used by the average house will more than double - from one-half acre in 1970 to over one acre in 2020. As the land used per house increases, open space and farmland disappear at an increasingly rapid pace.

The types of homes being built also have a significant effect on the amount of acres used. Although only 60 percent of the total homes projected to be built are single-family detached, they will use 94 percent of all residential acreage needed between 1990 and 2020.

Conversion of Open Space and Farmland

The conversion of open space to residential and commercial uses in recent decades has been enormous. More land was altered by sprawling development in the past 25 years than in the entire previous 300 years of Chester County's history. Over 50,000 acres of once open land have been developed since 1970, much of it in the form of scattered, low density housing, shopping centers, and corporate and industrial parks. If this wasteful pattern of development continues unchanged, an additional 60,000 acres of open fields, farms, and woodlands will be gone by 2020.

The conversion of farmland has progressed at a frightening pace. In the five-year period between 1987 and 1992, more than 12,000 acres of farmland were converted to non-agricultural uses and 200 farms went out of business. Nearly 12 acres of farmland a day were converted to other uses during the high growth period of 1982 to 1992. At this rate of development, it would take less than 40 years to convert all remaining unprotected farmland in the County to non-agricultural uses. This trend must be slowed if agriculture is to continue to contribute to the economy and scenic beauty of Chester County.

Table 2-6: Chester County Change in Farmland, 1974 to 1992

	1974	1982	1987	1992
Number of Farms	1,791	1,825	1,573	1,367
Acres of Farmland	223,801	219,980	189,943	176,743
Farmland as % of County Land	46%	45%	39%	37%

Source: U.S. Census Bureau

Table 2-7: Chester County Increase of Housing Units, 1940 to 1990

	Number of Units	Increase by Decade	% Increase by Decade
1940	34,470	N/A*	N/A*
1950	42,143	7,673	22.30%
1960	58,974	16,831	39.90%
1970	80,457	21,483	36.40%
1980	110,183	29,726	36.90%
1990	139,597	29,414	26.70%

Source: U.S. Census Bureau *Not Available

To slow this trend, the state of Pennsylvania created the Agricultural Land Preservation Program in 1989 to aid the county in acquiring the development rights to prime agricultural lands throughout the county. Acceptance into the program is determined by a farm's soil characteristics, development potential, and proximity to other preserved farms and agricultural security areas. Chester County has been ranked the third highest county in the United States with regard to the amount of preserved farmland in the county; to date, 21,289 acres have been preserved. In the CBW specifically, 10,012 acres of farmland have been preserved. This effort is heavily contingent upon state funding and the support of the County's municipalities.

Amount of Impervious Surface

Developed lands represent a substantial portion of the watershed's land area. Runoff from suburbs, industrial parks, commercial lands and roads contribute to the total nitrogen and total phosphorus loads to the Bay. Sediment runoff from construction areas can be very significant, but it is required to be controlled in accordance with Pennsylvania's Clean Streams Law through the implementation of sediment and erosion control plans.

As the number and size of roads, parking lots, and rooftops increase, and forest and open lands are replaced by industrial, commercial, and residential developments; the capacity of the terrain to soak up rainwater decreases dramatically – illustrated by the fact that a one-acre parking lot produces about 16 times the volume of runoff that comes from a one-acre meadow, and approximately 40 times the runoff from an acre of mature trees.

Parking lots and other types of impervious surfaces increase both the volume and the rate of surface water runoff as it makes its way into stream and river systems. These hydrologic changes alter the streams by scouring the bottom sediments and eroding stream banks. Such impaired streams carry large amounts of sediment and attached nutrients to the Bay.

The Environmental Protection Agency (EPA) ranks urban storm water runoff as the second most prevalent source of water quality impairment in the nation's estuaries. Whether they originate from air deposition, lawn fertilizer, or other sources, keeping excess nutrients out of the waterways requires effective management of storm water runoff.

Table 2-8: Impervious Surface Area by Watershed

Watershed	1998 Percent Impervious	2020 Percent Impervious	1998-2020 Percent Change In Impervious
Elk Creek (Little and Big)	0.07	0.09	15.54
Northeast Creek	0.07	0.08	14.67
Octoraro Creek	0.07	0.08	11.66
Pequea Creek	0.06	0.07	12.46
Conestoga Creek	N/A	N/A	N/A

Source: Water Resources Authority *Watersheds* Plan, 2002

Agricultural Profile

Agriculture in the Chester County portion of the CBW is comprised of two types of farmers: English and Plain Sect. Plain Sect farmers account for approximately one third of the agriculture in the watershed.

The English farmers range from small family farms to large Concentrated Animal Feeding Operations (CAFOs). There are four permitted CAFOs in the CBW. The CAFOs all operate within the regulations of the Clean Streams Law, and are required not only to implement resource management level conservation plans but also to permit annual stream testing from the county health department. Other English farmers in the CBW are generally smaller operations relying crop yields and the production from a smaller amount of livestock for their livelihood.

Plain Sect farmers often follow strict traditions based on their heritage that prohibits them from the use of modern machinery and technology. They rely heavily upon horse drawn implements to plant and harvest their crops. Generally their farms are smaller in size than their English counterparts. This is due to the limitation a horse drawn implement presents to the distance they can travel with them and the harvested crops without creating excessive economic hardships.

Amish farmers bailing hay.

Both groups present different challenges and opportunities for the CCCD. The District has been successful in creating and maintaining working relationships with both groups. This is a trend that is likely to continue in the future with the increase in development that is making farms closer neighbors to new development than ever before.

Water Quality Data

The three major pollutants targeted in the tributary strategy process are nitrogen, phosphorus, and sediment. More than half of the nitrogen and phosphorus loads to the Bay watershed originate from nonpoint sources. Most nonpoint source pollutants are created by runoff from agricultural lands, residential development, and other urban areas. The remaining nitrogen and phosphorus loads come from point source discharges such as municipal and industrial wastewater plants and residential septic systems. Soil erosion is considered 100 percent nonpoint source related, and it originates primarily from construction sites and stream banks.

Source Water Companies

The CBW is an important source of drinking water for the region; both the Chester Water Authority (CWA) and Pennsylvania/American Water Company rely heavily on the watershed as a main supply source. Both companies have been using the Octoraro Creek as a source of raw drinking water since the early 1970s.

The Chester Water Authority draws on the East branch of the Octoraro Creek and has monitored the intake water since the 1970s. They have seen a significant increase in the nitrogen in the source water since they began monitoring it. This increase has reached the 10-milligram per liter threshold and beyond. The current elevated nitrate levels have prevented CWA from drawing from the East Branch of the Octoraro Creek for the past 15 months. This has been caused by inability to dilute the water enough to reduce the nitrate levels to acceptable drinking water standards. The presence of additional nitrogen adds an expense to the treatment process and diverts funds from other areas of treatment.

The increase in nitrogen has been blamed on the intense agriculture use of the watershed. It is also being linked to the increased runoff of lawn fertilizer and other pollutants caused by the increased development of the watershed.

Watershed Associations

There are two associations operating in the watershed: the Elk Creeks Watershed Association (EWA) and the Octoraro Creek Watershed Association (OWA). EWA has been in existence since 1980 and has sponsored such projects as the schoolyard wetland restoration project, and they have placed identification signage throughout the watershed. OWA was created in 1967 and has been dedicated to protecting water quality, promoting sound land use, and raising environmental awareness. OWA has sponsored such endeavors as the Amish education outreach program (to have conservation added to the Amish school curriculum), a complete rivers conservation plan through the Department of Conservation of Natural Resources (DCNR), and multiple municipality meetings to promote the welfare of the watershed. Both organizations have been very proactive in their involvement with the community with their initiatives for cleaner and healthier streams.

Octoraro Nitrate Task Force

In January 2003, a task force was created to address elevated nitrate levels (>10mg/l) in the groundwater and surface water of the Octoraro watershed. The task force comprises 18 representatives from the local watershed and farmer associations, conservation Districts, water companies, and state (PA and MD) and Federal agencies. The plan of action is to acquire funding for: nonpoint source (NPS) pollution education in the watershed community (Amish and English/agriculture/homeowner/municipality); agriculture best management practice (BMP) construction; field research on agriculture BMP effectiveness in nitrate removal; and water quality data collection.

PART 3 - AGRICULTURE CHALLENGES AND STRATEGIES

Challenges Identification

The agricultural heritage of the Chesapeake Bay region is rich and multifaceted. Farms provide food and fiber; they also provide significant open space, and aesthetic and environmental values for all of us. Conserving farmlands in the watershed is a goal that the County wholeheartedly supports. In this effort, however, the county is not able to ignore agricultural land as a source of nonpoint pollution. Agricultural land, by acreage, remains the largest single nonpoint source of nutrient and sediment loads to the Bay.

Amish farmers plowing field

Agricultural lands account for 65 percent of the Chester County Bay Watershed. In the entire Chesapeake Bay watershed, agricultural lands contribute more nutrients to the Bay than any other land use. Agricultural operations produce roughly 41 percent of the nitrogen and 47 percent of the phosphorus loads going to the Bay. Agriculture also contributes about 63 percent of the Bay's sediment. Despite the significant efforts that have been made to reduce the environmental impacts, especially nitrogen and phosphorus runoff from manure, the Chesapeake Bay watershed ranks in the top 10 percent in the United States in terms of manure-related nitrogen runoff, leaching, and loadings from confined livestock and poultry operations. Additionally, areas in southeastern Pennsylvania rank in the upper 10 percent of watersheds nationally in the use of commercial nitrogen fertilizer.

To compound the problem, the county portion of the CBW faces a cultural difference. As mentioned earlier in the agriculture profile, there is a large Plain Sect population in the watershed. In their efforts to maintain their heritage, many Plain Sect farmers use full cultivation and other practices, which increase the sediment load to the Bay. The CCCD has had success in working with Plain Sect farmers; however, continued vigilance is required. It is necessary to address the sediment and nutrient loads created by Plain Sect farmers and place special attention on efforts to improve their conservation practices.

Implementation Strategies

A major component of the County's strategy is to address the increased nutrient and sediment loads created by agricultural land use. The following strategies were identified during the planning process. In order to reach the goals set by the CBTS initiative, the implementation of a combination of these strategies will be necessary. Each strategy provides some amount of reduction to nutrients and sediment. With a shortage of funds from the Chesapeake Bay Foundation (CBF) and other sources, an emphasis needs to be placed on achieving "the biggest bang for the buck."

No-Till

The use of no-till has been identified by NRCS as one of the Core 4 BMPs, because it is one of the most effective ways to reduce agricultural pollution to the Bay. It is also one of the most cost effective measures that could be taken by farmers. The use of no-till planting methods is proven to reduce the amount of nutrient and sediment runoff from crop fields if farmed correctly. Using the tables for edge of segment nitrogen and phosphorus loads for 300 acres, no-till would,on average, keep 1920 pounds of nitrogen and 332 pounds of phosphorus from reaching the bay.

A major part of this strategy focuses on educating cooperators on the benefits of no-till and the subsequent management changes in their operations. This section will be accomplished through one on one contact during field visits to individual operations. The second part of this strategy is to encourage operators to convert from conventional tillage to no-till using an incentive based program. Operators will be elgible to receive $20/acre, up to a maximum of 100 acres, if they agree to try the no-tilling system for a minimum of two years.

The Conservation District will partner with Natural Resources Conservation Service to take advantage of the added networking possibilities and the numorous training opportunities available to further staff's knowledge base on the subject. CCCD will work with NRCS to have no-till meetings available in Chester County. We will also have many opportunities to announce the dates of field days held in other counties and to speak at those field days about the opportunities in Chester County.

Resource Conservation for Implementing NRCS Chesapeake Bay EQIP Funding

This strategy will allow the District to help Natural Resource Conservation Service (NRCS), who has a reduced work staff, write contracts and install Best Management Practices (BMPs). With the passing of the new Farm Bill over $5.4 million has become available for BMPs in the Chesapeake Bay Watershed. The Chester County Conservation District would like to utilize the funding decidated to the Chesapeake Bay Watershed through the Farm Bill. The District would reprioritize it's current staff, to ensure that this position would not be receiving funding from any other staff or federal

funding. This staff position is currently 100% funded by the Chester County Conservation District.

This project is needed for multiple reasons. Most importantly this project would allow more conservation to be put on the ground utilizing a federal funding source. The project would easily see a 5:1 ratio of Federal Conservation Funding spent to DEP Chesapeake Bay Special Projects spent. The Chester County Conservation District would be able to spend $300,000 Farm Bill Chesapeake Bay Incentive payments to DEP's $60,000 of Special Project Funding. The Chester County Conservation District would use this project as an opportunity to go "door to door" and meet new participents. We would be able to enroll the operators that have not worked with the government in the past. Using the tables for edge of segment nitrogen and phosphorus loads for 1,500 acres, conservation planning would,on average, keep 3,300 pounds of nitrogen and 465 pounds of phosphorus from reaching the bay.

The District would work with NRCS to gain access to Tool Kit and other NRCS programs. Currently the Chester County Conservation District has one Certified Conservation Planner. The remaining five agricultural staff are currently in the process of becoming certified. In conversations with NRCS they are excited to give the Chester County Conservation District staff access to their system. We would be able to complete the contracting and planning for all contracts with the District Conservationist's oversight.

Nutrient Management Plans

This strategy will help to reduce nutrient loads created by agriculture. Chester County Conservation District is making a serious commitment in the CBW to reduce nutrient and sediment loads. Written and implemented NMPs will help these farms to use manure efficiently so that excess nutrients are not put on fields where they cannot be used by crops.

Funding of Nutrient Management Plans has dwindled in the last few years. There currently are no funds available to write plans. Farmers that are volunteers (not required to have plans under Act 38 regulations) are allowing their current plans to lapse due to the high cost of plan writing. New farms are not going into the program due to the high cost.

NMPs need to be in place for farms in critical areas or we will lose those gains that we have made in recent years in controlling nutrient runoff. Using the tables for nitrogen and phosphorus edge of segment loads, these NMPs written for 10 farms of 100 acres each (an average of English and Amish farms) would reduce nitrogen loads to the Chesapeake Bay totaling 8600 pounds of nitrogen. Phosphorus loads would be reduced by an average of 230 pounds.

Chester County Conservation District would like to be able to fund 10 or more Nutrient Management Plans per year. We would assess the need of individual farms in sensitive areas to establish nutrient management plans. This would allow CCCD to expand the

benefits of proper nutrient management to more of the Bay region of the County. The main objective is to reduce nitrogen and phosphorus loads to the Chesapeake Bay

Cover Crops

The use of cover crops was identified by the Chesapeake Bay Blue Ribbon Council as one of the most effective ways to reduce agricultural pollution to the Bay. It was also one of the most cost effective measures that could be taken by farmers.

Cover crops

Currently, approximately 50% of the watershed acres are in cover crops. The CCCD is planning to increase this number by 300 acres in cover crops during the first year, and an additional 300 acres the second year. CCCD will focus on increasing cover crops on all types of crop ground; however, priority will be given to corn silage crops the first year and double crop soybeans the second year. These "priority" crops were identified as important targets for cover crop use as they are more likely to increase sediment and nutrient runoff due to low winter residue cover. All cover crop planting will strive to meet an October 15th deadline to receive credit through NRCS.

Promoting the use of cover crops can be achieved through two different approaches. First, with the use of a combination of public and CBF funds, the District could provide farmers with the seed for the cover crops. This would encourage cover crop planting by reducing the costs incurred to the farmer. Second, the District could implement an incentive program that rewards farmers for planting cover crops by predetermined dates (Sept. 15, Oct. 1, Oct. 15). This program was modeled from the Maryland cover crop incentive program. The earlier the crops are planted, the greater the incentive rewarded to the farmer. Earlier planting increases the growth of the cover and provides more benefits to the farmer and the Bay.

TABLE 3-1: CHESTER COUNTY CHESAPEAKE BAY WATERSHED WINTER COVER CROP PROGRAM

Program Goals:

- Cover crops to follow the harvest of corn, sorghum, soybeans, tobacco and vegetables.
- Tiered payment rates based on planting date:
  - October 16th to November 1st: $20/acre
  - October 15th and earlier: $10/acre bonus (aerial seeding must be planted by 9/15 for bonus; broadcast/stalk chopping is ineligible)
  - NRCS will provide an additional $10/acre bonus under an EQIP contract for cover crops planted by October 1st (excludes aerial seeding and broadcast/stalk chopping). *A separate application must be completed.*

Important Dates

- Sign up period will begin on May 30th, 2005 and end on June 10th, 2005.
- Planting Dates:

Crop	Start	End
Spring Oats	8/1	10/1
Barley	9/1	10/15
Wheat	9/1	11/1
Triticale	9/1	11/1
Rye	3/31	11/1
Ryegrass	7/15	10/1
Rape and Canola	8/1	9/15

*Aerial Seeding and broadcast/stalk chopping planting dates:
August 1, 2005 to October 1, 2005

Fall Certification:

- Fall Certification for aerial seeding and broadcast/stalk chopping due by October 5th, 2005.
- Fall Certification for NRCS bonus is due by October 5th (aerial seeding & broadcast/stalk chopping do not qualify).
- Fall Certification for CCCD bonus eligibility is due by October 21st, 2005
- Fall Certification by applicant is due by November 4th, 2005.
- Kill down/suppression information is due by June 3rd, 2005.

Requirements:

- Applies to all Chesapeake Bay Watersheds in Chester County, Pennsylvania.
- Minimum of 5 acres per operating unit (farm operation) must be enrolled.
- Approval amount may not exceed 250 acres per operating unit (farm operation); additional funding will be prorated based on eligible funds.
- No nutrients of any source may be applied before March 1st, 2005.
  - An exception is allowed for fall application if livestock is present on the farm, there is inadequate manure storage, no other cropland or option is available and application is in accordance with NMP. Applicant must indicate intention of spreading manure on the application.
- All seed purchased for cover crop must be tested and properly labeled in accordance with the Pennsylvania Seed Law and regulations. All seed must be free of prohibited noxious weed seed, have a minimum germination rate of 80% and have no more than 16 restricted noxious weed seeds per pound. If the grower elects to use home grown seed, it must be tested prior to seeding for purity, germination and noxious weeds by a recognized seed laboratory.
- Grazing or "green chopping" for livestock forage (for on farm use only) is allowed after fall crop is well establish (+/- 80% cover).
- Applicants must be in good standing with the Chester County Conservation District to be eligible to participate.
- Applicants must have met the nutrient management requirements of the Water Quality Improvements Act of 1998.

Approval:

- Project approval, up to the initial 250 acre cap per operating unit (farm operation), will be made on a first come basis.
- Stand-by project approval will be pro-rated using remaining funds.

CCCD will maintain a list of the different types of cover crops planted and the different planting methods used by CBW farmers. This list will be distributed to farmers to allow them to see the various crop types and planting methods used to help them formulate there own cover crop program. The use of cover crop test plots was considered as another way to help farmers formulate their cover crop program, but the creation of a list was determined to be more cost effective and successful in showing the options available for cover crops.

The use of cover crops also provides the farm with an improved public perception. The surrounding community will see green fields during the winter months and will associate the green fields with sound farming practices that demonstrate the farm's concern for the environmental welfare of the land. Cover crops will also improve manure application by reducing the visual perception of the manure on the land and helping to hold the manure in place.

Funding is being sought through CBF and another venues to support seed purchase, incentive payment, and the monitoring of various cover crop planting times and crop selection.

Manure

Manure represents one of the largest sources of nonpoint pollution to the Bay. Utilizing the manure in a responsible and cost-effective manner is a problem with which every livestock farmer must work. Challenges facing farmers include availability of land to receive manure application, distance from manure storage to receiving land, and the sheer volume of manure created by livestock. All of these factors can create a financial burden to otherwise successful farms. To comprehend the sheer volume of manure created, on an animal unit (AU) basis (an animal unit is 1,000 pounds of the average live weight) the following manure production can be expected per day:

Liquid manure spreader

Table 3-2: Manure Production Per Day

Type	Amount
Lactating cows	106 lbs.
Steer	75 lbs.
Poultry	3.3 lbs.
Equine	45 lbs.
Swine	7 gallons

All numbers are per AU
Source: Agronomy Guide 2004

To deal with these large amounts of manure there are several strategies considered for implementation.

Identifying alternatives to manure hauling has and will continue to be addressed though agricultural staff discussions and meetings with farmers to discuss concerns associated with volume, application, and/or disposal of manure. These discussions have produced new ideas and alternatives to aid the farmers with their application and/or disposal needs. The CCCD is also expecting to discover and support, through CBF monies, innovative means for the application, disposal, and handling of manure.

The use of innovative technology to handle manure is an important strategy in this plan. CCCD will fully support any research or implementation of innovative ideas that will reduce the excess nutrients and quantity of manure. Several ideas have already been identified and are being pursued by the District.

For example, during the creation of the CBTS, a presentation was made to the planning team about a new innovative technology that can be used to reduce the nutrients and quantity of livestock manure and spent mushroom substrate (SMS). **Gasification** is a process that incinerates manure and SMS. The process leaves two end products: a small amount of nutrient rich ash and natural gas. The ash can be spread on the farm as fertilizer or sold as fertilizer for use by commercial entities. The natural gas that is created could be utilized by end users for the heating of water, the cooling or heating of a building through gas powered air conditioning units, or as another source of energy.

The CCCD is planning to work with the mushroom industry to make this innovative idea a reality in the CBW. Meetings are being planned to bring mushroom producers and industry representatives together to discuss the logistics and possible locations for a demonstration unit.

With innovation in mind, the concept of constructing a **community digester** in southern Chester County to handle the disposal of manure from area farmers has emerged. A proposed site for this digester would be at the Herr's Snack Foods production and main headquarters in Nottingham, PA. The energy produced from the digester could be used on-site for the factory. Regardless of the specific location of the digester, a "green" business of some variety would need to be established or to exist to receive the energy created from the digester. Utilizing the energy created from the digester would help power companies, which are required to have 15 percent of their energy generated from renewable sources, to achieve there renewable energy goals.

An air quality fine assessed to Herr Foods in southern Chester County, allowed the District to purchase a liquid manure injector. The Houle unit has a 5,250 gallon capacity with five injectors. The unit is available to farmers south of route 896 for a rental fee of $8 dollars per load. Herr Foods handles the delivery and pick up of the unit to farms. The unit is also available for farmers north of route 896 with prior permission from the District and an additional $20 dollar fee for delivery and pickup. The CCCD is also

investigating the feasibility of purchasing an injector attachment that could be used for operators who own liquid spreaders.

CCCD will continue to implement new nutrient management plans. Nutrient management plans are an effective way for operators to manage their resources and become accountable for their activities. Currently there are 14,095 acres with nutrient management plans, 54 plans total. To meet the CBTS goal, during the next year, 250 acres of farmland will have a nutrient management plan written for them additional 250 acres is planned for the second year. The District will continue the regular review of existing nutrient management plans, ensure compliance to the plan, and recommend improvements when needed. Existing plans currently receive a status review once every three years.

Liquid manure spreader owned by the Chester County Conservation District.

A problem throughout southeastern Pennsylvania, especially in Chester County, is the increase of complaints regarding the application of manure and the odor caused by it. Development pressures are making farms and development closer neighbors than ever before. CCCD will encourage farmers to be considerate of neighbors when spreading and utilizing aerators and injection, when possible, to reduce odor complaints. The District also responds to any complaint within three days and responds to the complainant within five days to ensure all situations are resolved properly.

Conservation Security Program (CSP)

The Conservation Security (CSP) Program supports ongoing conservation stewardship of agricultural lands by providing assistance to producers to maintain and enhance natural resources. The program is offered through the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS).

CSP cover photography

The CSP is designed to reward the best conservationists and motivate others to set new conservation goals. It is a voluntary program providing financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, and plant and animal life on private working lands. Working lands include cropland, grassland, prairie land, improved pasture, and rangeland, as well as forested land that is an incidental part of an agriculture operation. This program is currently available to farmers in the Northeast and Elk Creek watersheds; it is expected to be available to farmers in the Octoraro Watershed in the future as well.

After a farmer has become enrolled, 50 percent cost share opportunities become available to them for future conservation work. Cost share can be obtained for such practices as precision agriculture; dairy feed management, and other innovative practices. Eligibility requirements for the program focus on conservation work already done and the records kept of farm operations. In anticipation of this program spreading to other watersheds, CCCD is encouraging all farmers to keep more accurate records and continue implementing conservation practices.

Octoraro Watershed onto 303D List

The nitrate level of the Octoraro watershed has been increasing significantly during the past 20 years as per water quality testing by the Chester Water Authority. The Octoraro Watershed Association has requested the Pennsylvania Department of Environmental Protection (PA DEP) to assess the waters within the Octoraro and designate the watershed on the 303d list of impaired streams. The designation would provide new sources of funding to the watershed for BMP implementation. Discussions with PA DEP indicate the entire watershed will be assessed by the end of 2005.

Resource Management System (RMS) Level Conservation Plans

Using the tools available, the CCCD will strive to hold area farmers to higher standards by promoting the voluntary implementation of Resource Management System (RMS) level plans and nutrient management plans. Currently, there are approximately 29,000 acres of farmlands with conservation plans written for them in the Bay watershed. RMS level plans require a farmer to address all the resources of the farm including soil, water, air, plants, animals, and humans. The District has set a goal of writing six RMS level conservation plans per year for CBW operators and continue this pace until all farms in the watershed have plans written. Writing plans is only the first step; the District has been, and will continue, working with operators to have 100 percent completion of their plan's implementation requirements in a timely manner.

Since 1994, all Agricultural Land Preservation (ALP) farms have been required to implement conservation plans at the RMS level. ALP farms are already inspected once per year, other farms are not. CCCD will conduct regular reviews of conservation plans of area farmers for compliance and implementation by combining them with the three year status reviews for nutrient management plans to maximize staff time.

Mushroom Farm Environmental Management Program

Chester County is unique by being home to almost all of the Commonwealth's mushroom farms. The District has been very proactive in working with these operators to promote their contribution to the farming community and economy and help them become more environmentally conscious. Like all farms in the County, mushroom farms are becoming close neighbors with development. Mushroom farms are known for having a "unique" odor associated with the composting process required for growing mushrooms. The District, as of late, has been handling more odor complaints than ever before and is

seeking innovative solutions to reduce odors and improve the relationship mushroom farms have with their neighbors.

Mushrooms

The District created a Mushroom Resource Conservationist position in 1998 with the assistance of state funds. The specialist works directly with the mushroom farmers to help them implement conservation practices and develop Mushroom Farm Environmental Management Plans (MFEMP). These plans help mushroom farm operators identify their operation's impacts to the environment and serve as a guide for them to change their practices to reduce this impact. The District will continue to write, implement, and review approved Mushroom Farm Environmental Management Plans. A Growing Greener Grant was awarded to the County on November 8, 2004, for a period of two years. The $65,000 dollar grant will be used to fund staff positions and write and implement 12 MFEMPs throughout the county. At least one MFEMP will be written each year for a CBW mushroom site. The District will also continue to pursue additional sources of funding for the District Mushroom Resource Conservationist position.

PEACCE Program

The mission of the PEACCE (Pennsylvania Environmental Agricultural Conservation Certification of Excellence) program is:

> To promote environmentally safe agricultural practices among livestock and poultry producers, to encourage them to minimize risks to the environment and in turn minimize personal liability, and to recognize those producers who meet or exceed standards as established by the Pennsylvania Environmental Agricultural Conservation Certification of Excellence.

Farmers' benefit from this program by developing good public relations and community image, promoting environmentally safe agriculture, minimizing the risk of nuisance issues and litigation, and reaping possible insurance benefits. Currently there are six farmers certified countywide, with three certified farmers in the CBW. The CCCD will encourage eight farmers (four per year) to become PEACCE certified. Participating farmers will receive newsletters and be promoted by the District as environmentally conscious operators on our website and through press releases. A PEACCE presentation will be made during annual farmer roundtable

PEACCE program seal

meetings. PEACCE farm field days will also be held for area farmers to visit participating farms.

Ombudsman Program

The Ombudsman program promotes a sound working relationship between municipalities and their farmers. Chester, Lancaster, and Berks counties were the three pilot counties in this program. Chester and Lancaster County have a shared program coordinator on staff to promote the program and aid the Districts as needed. CCCD is planning to work with Ombudsman staff to conduct educational meetings and field days for area farmers to promote the program. Ombudsman presentations will be made during the annual farmer roundtable meetings and field days. One annual meeting will be held to educate municipal officials on the CBTS, agriculture land preservation, open space initiatives, water resource issues (NPS, groundwater, storm water issues), and agriculture law updates. During this meeting, the Ombudsman coordinator will work to make municipal officials more aware of their responsibility to their farming constituents and to work with them, rather than against them.

Prototype Farm

After the completion of this plan, it would be useful to showcase a prototype farm or farms where targeted BMPs could be displayed. This could be accomplished through the Ombudsman/PEACCE programs, both of which aid farmers in coordinating their activities with their municipalities. The farm will be used for field days to educate farmers about BMPs.

Phytase Program

Holstein cows

Since manure is one of the main sources of nutrient pollution to the Bay, reducing the amount of manure is an important initiative of this strategy. In conjunction with that initiative, reducing the excess nutrients in the manure is vital. On average, a dairy cow absorbs only 20 percent of the phosphorous incorporated into feed, poultry and swine absorb even less. The remaining phosphorous is excreted in the manure by each animal every day. Phytase additive programs help swine and poultry absorb more of the phosphorous from their feed. This helps improve livestock nutrient levels and reduce the amount of phosphorous in manure. A similar concept that is becoming popular with the dairy industry is precision feeding. Precision feeding helps dairy producers feed a more accurate amount of nutrients to their cattle and waste less through manure. Both of these programs could be implemented

further by working with commercial distributors of feed. The following chart shows the goals set by CCCD for the use of Phytase and precision dairy feeding:

Table 3-3: Phytase Program Goals

Animal Type	1st Year	2nd Year	Total
Swine	500	500	1000
Poultry	200	200	400
Dairy	250	250	500

*All numbers are AU's

Training of District Staff

District agricultural staff need to be cross-trained to address nutrient management, conservation planning and implementation, and erosion and sedimentation (Chapter 102/105). Training would allow District staff to be more knowledgeable about the resources available and the regulations governing farmers. This is a strategy the District is currently undertaking through constant attendance at state and federal training programs. The creation of a shared position on staff for agriculture and erosion and sedimentation (E&S) teams was implemented in January of 2005. This position will help to bridge the information gap between the two teams.

All agricultural District staff are nutrient management certified within the first six months of their hire. The District will continue to require this training of new employees and encourage all staff to attend agricultural and conservation training offered by NRCS and other organizations. Continuing these trainings is an important part of the knowledge base that allows District staff to be a valuable resource to the County's cooperators.

National Resources Conservation Service (NRCS)

The District will continue working with NRCS to implement traditional conservation practices utilizing EQIP and CSP monies (CREP). This will be facilitated through the District's regular weekly meetings with NRCS staff to review conservation efforts of area farmers. Meetings will also continue to be held to suggest and/or review existing and new BMP implementation projects.

Wetlands and Stream Restorations as an Agricultural BMP

Wetlands and stream restorations are important agricultural BMPs because they act to protect water quality and reduce the volume and velocity of the water due to upstream development. To continue restoring these vital resources, new funding is being sought through the Chesapeake Bay Foundation, the National Fish and Wildlife Foundation, Ducks Unlimited, Growing Greener, Source Water Protection, and the Penn Foundation.

PA DEP Enforcement

While the District always uses voluntary cooperation first in all cases, it is not always effective. In cases where voluntary efforts have failed repeatedly, a meeting will be scheduled with the farmer and PA DEP staff to discuss compliance and possible enforcement action (conservation plan, MFEMP violations).

Integrator

Many of the swine farmers, as well as other livestock, are contracted with integrators to raise the animals on their farms. The District will continue to use integrators as a channel to resolve conservation and nutrient management problems on the farm. Integrators will also be used as a source for disseminating information concerning the CBTS and farming in the future. An annual roundtable meeting of industry integrators and milk co-ops will be held to discuss the implementation of the CBTS and other concerns of the industrial representatives.

EDUCATION/PUBLIC AWARENESS

Conduct Farmer Roundtables to Formulate and Evaluate CBTS

To measure and evaluate the success of implementing the CBTS, feedback and discussion from farmers will be solicited. The first of these roundtable discussions was held on January 11, 2005, at Duane Hershey, Ar-Joy Farms, Cochranville with six area farmers representing livestock production, grain and hay production; CAFO and non-CAFO; Amish and English. This meeting will continue to be held biannually to continue to modify and enhance the CBTS based on State updates, success of implementation and reduction statistics, and feedback from the roundtable discussions. One of the two meetings will be held at a Plain Sect farm and focus on the issues and concerns specific to their operations.

Farmer cultivating field

Conduct Public Education Programs Biannually

CCCD alone, or in cooperation with the Octoraro Nitrate Task Force, will hold field days on targeted BMPs: precision agriculture, cover crops, no till demonstrations, nutrient management, such as the "nutrient and farming workshop" as conducted on March 3, 2004. The District will also contract with firms, businesses, and individuals to conduct workshops to on targeted BMPs at various locations throughout the watershed.

Promote Amish One Room School House Curriculum

Amish school children walking to school

The Amish farmers represent a substantial portion of the watershed's farmers and need to be educated on the BMPs and practices available to use on their farms. The District is planning to work with the Octoraro Watershed Association to coordinate and integrate BMP education in the schools. This would include meeting with the Amish school boards and the watershed liaison to promote BMP education curriculum and the CBTS.

Provide Transportation to Amish Residents to Education Sessions

Amish carriage

Amish residents traditionally are not permitted to own automobiles; this can make it difficult for them to attend meetings that are not in proximity to them. CCCD vehicles will be used for one-on-one meetings with farmers and to provide transportation to other meetings. The District is also considering other methods to increase Amish farmer attendance at public meetings such as renting vans or buses to transport large groups of farmers from the nearby area.

Survey Area Farmers for Opinions on Target BMPs

The District intends to designate CCCD staff and/or interns to poll farmers door to door for information on the level of interest in the implementation of targeted BMPs. This information will aid CCCD in the successful implementation of BMPs throughout the farming community.

Create Educational Literature

The District will continue to develop fact sheets on conservation practices, programs, and target BMPs for dissemination among farmers. CCCD will also continue to distribute CCCD Cooperator's Handbooks (PACD Mini-grant, 2003) with each new Request for Assistance for conservation planning.

Encourage Farmers to Create a Website for Their Farm

It is no mystery; farmers are facing a growing problem, development. The regional development pressures facing the county are forcing farm ground to grow houses rather than crops. The new crop of homes replaces farming neighbors with residential neighbors that are often not familiar with farming. New neighbors often require the farmer to become an advocate for the farm, battling negative public perception of the farms perceived detrimental affect on the environment.

To combat the complaints and problems plaguing farmers, the Chester County Conservation District (CCCD) is promoting the use of a website for each farm on the World Wide Web. The site would contain information such as: farm size, farm practices, a copy of their approved conservation plan, pictures, farm news, and links to other agencies (including CCCD, USDA, PSDA, other area farmers' websites, etc.). CCCD will also provide a link on its website to area farmers' websites. Providing information for the public will allow the farmer to have a voice and show they are taking proactive steps in improving the environment of their farm.

A website is already being created by a large southern Chester County dairy and crop farm. The creation of their website is meant to combat the negative public perception of the farm. By taking an active step in involving neighbors and the community in the farm, the farm hopes to show neighbors they are environment friendly and stewards of the land.

PART 4 - MUNICIPAL AND INDUSTRIAL WASTEWATER CHALLENGES AND STRATEGIES

Municipal and industrial wastewater treatment plants through the entire Chesapeake Bay watershed are responsible for 21 percent of the total nitrogen pollution and 22 percent of the total phosphorus pollution delivered to the Bay. They are not a major source of sediment.

Municipal and industrial wastewater plants throughout the watershed are operating treatment systems every day that are treating wastewater before it enters the receiving stream. Major new investments in nutrient removal at wastewater plants are needed to restore water quality in the Chesapeake Bay. With more people moving into the Bay watershed every year, the nutrient load that must be treated grows continually. Fortunately, newer and more cost-effective nutrient removal technology is available, but financing is needed.

Wastewater treatment facility

CHALLENGES IDENTIFICATION

There are approximately 35 wastewater treatment plants operating in the Bay portion of the county. Many of these treatment plants are small package treatment plants in small communities and developments. There are a few larger municipal plants in Oxford, Atglen/Christiana, and Honeybrook. All of these treatment plants are regulated through NPDES permits and PA DEP inspections and regulations. The county has little control over the regulation and enforcement of regulations concerning these plants.

IMPLEMENTATION STRATEGIES

PA DEP Regulations

All wastewater treatment plants in Pennsylvania are permitted and monitored through the PA DEP. A revision of regulations with changes focused on the reduction of nitrogen and phosphorous in the effluent would work to improve water quality. Currently, the PA DEP NPDES permit does not require the regulation of phosphorous. Implementing new stringent regulations will require the implementation of new technology, and regulations will require all plants to become more effective in the wastewater treatment. The District will push for reductions in the nitrogen and phosphorous loads treatment plants are permitted to discharge.

Promote Innovative New Technology

The wastewater treatment field is a highly innovative field with new methods and techniques for more effective treatment becoming available constantly. The District will promote the use of new technology to municipalities and private plants that are considering upgrading their facilities. This could be accomplished through a workshop where Bay treatment plant operators and owners would be invited to learn about new technologies from vendors and public entities.

EDUCATION/PUBLIC AWARENESS

Educational Tours

Treatment plants are traditionally viewed with a certain "stigma" about their part in the pollution of the environment. The District will help organize tours for school groups, interested community groups, and private individuals to educate them on the benefits of treatment plants and the role they play in the protection of the environment.

PART 5 – DEVELOPMENT CHALLENGES AND STRATEGIES

Development in the watershed is amplifying nutrient and sediment loads from urban and suburban areas. With the rapid pace of forest and farmland conversion and the hardening of the landscape, the natural hydrology of the watershed is being radically altered. Therefore, in addition to reducing today's nutrient and sediment loads, support must be given to preventive strategies such as "low impact development" methods for storm water management, conservation of forests and open lands, and preservation and restoration riparian forest buffers.

Suburban development outside of Atlanta, Georgia

CHALLENGES IDENTIFICATION

In natural (undeveloped) conditions, rainfall infiltrates slowly into the ground. Natural biologic processes cleanse the water as it moves through vegetation and soil and into groundwater. Runoff usually travels at a slow, meandering pace. Particles and sediments settle out along the way, ridding the water of impurities before it flows into rivers and streams.

Development drastically alters these conditions. Impervious surfaces such as buildings, roads, parking lots, and sidewalks prevent rain from soaking into the ground. There is less vegetation to soak up, store, and evaporate water. As a result, storm water runoff over the land surface greatly increases, even during small rainstorms. This alteration of the water cycle has significant impacts to rivers and streams:

- Increased runoff volume and speed cause flooding and erosion, and destroy natural habitat.
- Because less water infiltrates into the ground, less groundwater recharge occurs. This reduces steam base flows, which is harmful to fish and aquatic organisms.
- Impervious surfaces retain heat, which increases runoff temperature during warm weather. This raises the temperature of the receiving waters, negatively impacting aquatic life.
- Storm water runoff collects oil, fertilizers and pesticides, metals, chemicals, sediments, bacteria, and other pollutants, and carries them into rivers and streams.

- Traditional storm water management basically seeks to eliminate runoff. Gutters, drains, and pipes collect runoff from impervious surfaces and convey it to discharge points. Large volumes of untreated storm water rapidly discharge into natural water bodies.

Protecting our rivers and streams is vital for a great number of uses, including fish and wildlife habitat, recreation, and drinking water. As the region continues to grow and develop, the harmful effects of excessive storm water runoff will only increase – unless we change our course.

IMPLEMENTATION STRATEGIES

Rain Barrel Program

Rain barrels capture rainwater from residential roofs into a barrel, and the collected water can be used to water plants. The barrels collect the water before it becomes a source of nonpoint pollution. The CCCD distributed approximately 300 barrels in 2004 to residents of the Brandywine-Christina watershed. A program similar to this could be duplicated in the Chesapeake Bay watershed promoting reuse and stopping nonpoint pollution. The District is planning to seek funding to purchase and distribute 50 rain barrels per year in the Bay watershed.

Rain barrels distributed by CCCD

Urban Tours of Storm Water BMPs

The CCCD completed a Growing Greener grant for the PA DEP in 2002 to create a tour of urban sites demonstrating innovative urban storm water BMPs. A manual of the tour was created and made available in print and on the CCCD website. Since its addition to the website, it has become the most downloaded file from the site.

Stream Restoration

Stream restoration helps to prevent in-stream erosion from occurring. It works by slowing sediment transport that can carry nutrient pollution. The CCCD recently completed a project in Atglen Borough, a Chesapeake Bay municipality, at Phase I and II of Penningtonville Meadows. The project created 539 linear feet of stable stream bank and prevented approximately 159 tons of soil sediment loads from entering the watershed.

Stream restoration project at Norwood road in Chester County.

Storm Water Management Solution

Across the region and country many new developments are utilizing different approaches that significantly lessen storm water impacts. Capturing, treating, and infiltrating storm water on site is the new focus. Storm water management becomes an integral element of site and building design, rather than a consequence or afterthought of development. This approach possesses both strong environmental benefits and great possibilities to enhance developed or developing properties.

The use of reduced paved surfaces promotes storm water infiltration into the ground and decreases surface runoff by:

- Retaining the natural landscape by protecting and encouraging trees and open space;
- Minimizing pavement through approaches like narrow driveways, parking lot spaces, and travel lanes; and
- Using permeable surfaces such as permeable pavement, turf block, and gravel instead of concrete.

Any impervious area that drains into the storm water systems is a "connect impervious area." These areas can be "disconnected" by directing the runoff elsewhere. Most commonly residential downspouts are routinely directed to landscaped areas or rain barrels.

- Intercept Storm water. Capturing rainwater before it comes into contact with an impervious surface. Trees, ecoroofs and roof gardens all intercept rainfall.
- Detain and infiltrate storm water. Storing storm water to allow it to soak in to the ground or move more slowly into the storm system. Planter boxes, infiltration basins, swales, soakage trenches, and drywells all provide infiltration.
- Filter storm water. Filtering out pollutants as storm water moves through vegetated facilities such as planter boxes, swales, filter strips, infiltration basins and sand filters. My other question is: What is this a list of?

These processes realize significant benefits: Runoff volume, speed, and temperature are reduced; groundwater recharge and stream base flows are replenished; and the quality of runoff entering rivers and streams is improved. Consequently, development achieves a better balance with the natural water cycle and becomes water-quality-friendly.

In addition to improving the health of the region's water resources, techniques that control storm water runoff on site can offer many other advantages:

- Improve air quality by filtering out air pollutants.
- Reduce air temperature through shading and decreased impervious surfaces.
- Provide wildlife habitat.
- Add aesthetic appeal and increase property value.
- Reduce energy costs by insulating and shading buildings.
- Collect water for reuse, reducing the amount of water we use.

- Help meet the challenge of allowing for development while preserving water quality, which directly impacts a region's livability.

BMPs – New and Innovative

The best time to prevent storm water problems is to plan well for the location and design of new development in the first place. The best time to install controls for storm water runoff is during construction of new buildings and developments. Most local jurisdictions have local erosion and sediment control ordinances, but overall development in the watershed is not controlling storm water runoff of sediment, nutrients and other pollutants effectively. Storm water pollution prevention programs need to be supported and strengthened.

Even in urban areas with longstanding storm water management programs, few actions have been taken to install BMPs retroactively (or "retrofitting") in already developed areas. Generally, land and building owners in previously developed areas are not required to address storm water unless significant redevelopment of the land occurs.

The least costly solution is to plan for growth in appropriate places ahead of time, and then to incorporate storm water controls into construction plans for new development or redevelopment. Control measures are much more economical as part of new construction. A buyer will generally absorb these expenses as part of the overall construction cost, thereby minimizing the costs to the local government.

EDUCATION/PUBLIC AWARENESS

Conduct Public Education Programs

To bring about a change in the current view of stormwater problems associated with development, the District, alone or in conjunction with other agencies, will hold public education programs. The programs will focus on such topics as pervious pavement surfaces, stormwater ordinances, maintenance of existing basins, and retrofitting developed communities.

PART 6 – FORESTS CHALLENGES AND STRATEGIES

Forested riparian (meaning "along the water") buffers are as essential to watersheds as ground water and rainfall. An inter-connected network of forested riparian buffer is essential for a healthy and thriving ecosystem. The benefits of the forested buffer cannot be mimicked by any other BMP or management practice. Forested buffers along stream banks protect stream waters from direct sunlight and resulting high temperatures, provide detritus in the stream that serves as food and shelter for aquatic species, and stabilizes stream banks, stream channels and floodplains from the erosion and scour of high velocity flood flows. These forested buffers also serve as the link between terrestrial wildlife and their source of water, food and cover. The roots absorb nutrients and other pollutants from ground water as it migrates through the root zone, plant stems and leaves filter sediment and pollutants from overland flow of storm water.

Forested riparian corridor

A substantial body of scientific research documents the need and functions of forested riparian buffers. As yet, no model is readily available to determine optimum riparian buffer width for site-specific conditions (such as size of the contributing runoff area, upland slope, stream size, soil and bedrock characteristics, etc.). The functions needed to protect and restore the streams of the study area include water temperature moderation (shading), stream bank stabilization, margin for stream movement and meandering, source of aquatic food and shelter, and nutrient and sediment removal.

Research has confirmed that in addition to width and vegetation, the length and interconnectedness are also very important in achieving these functions. Thus, extending and connecting buffers to the maximum extent possible along water features to create a "network" of forested riparian buffers is a critical element of watershed management.

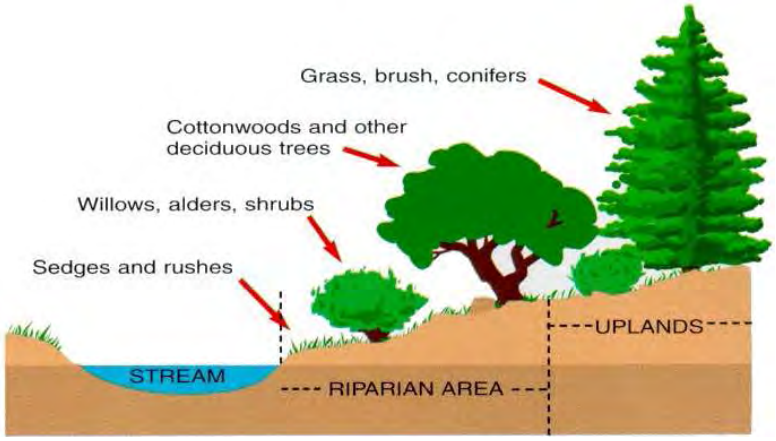


Diagram of riparian area

The benefit of riparian buffers in removing nonpoint source pollutants from farmland is also well documented in the scientific literature. The following summarizes results from many research studies:

Research continues to strive to develop methods of calculating riparian buffer widths based on specific site conditions. The size of the stream may be less important than the size of the land area draining to the buffer and the type and quantity of pollutants in that drainage area. This is because the buffer's purpose is to infiltrate slowly and cleanse the overland flow and shallow ground water draining from upland areas.

The consensus of the various guidance documents that are available recommend that the minimum 100-foot width include three zones:

A streamside zone that is an "undisturbed forest" zone immediately adjacent to the stream with natural vegetation consisting of predominantly trees with shrubs and undergrowth. This zone provides tree and other vegetation to stabilize stream banks; shading to the stream; leaves, limbs and other organic matter that provide food and shelter for aquatic living resources; infiltration of overland runoff; removal of sediments and nutrients through filtering and uptake by the vegetation; and a margin of protected land area for movement and meandering of the stream channel.

A "managed forest" zone that is adjacent to the undisturbed forest zone, with native vegetation consisting of trees with undergrowth, grasses, etc. This zone provides infiltration of overland runoff, removal of nutrients and sediments by the filtering of overland runoff through the vegetated ground cover, and removal of nutrients from infiltrated runoff and shallow ground water by the roots of trees and plants. This zone must be "managed" or maintained to exclude invasive species and to periodically prune the trees and shrubs to continue vigorous growth that results in continued uptake of nutrients.

A "filter zone", forming the upland side of the buffer and immediately adjacent to the managed forest zone which consists of grasses, forbs and dispersion features. This zone provides for surface runoff to be dispersed by shallow sheet flow prior to entering the forested zone to enhance the infiltration and reduce erosion. The vegetation and dispersion features (such as level spreaders) remove sediments from the runoff and slow the velocity of the runoff to reduce erosion and enhance infiltration through the forested zone. The vegetation also removes nutrients through uptake by the roots. This zone must also be managed by occasional (i.e., annual) mowing (to encourage continued plant growth and nutrient uptake) and to maintain the dispersion features.

Stream with healthy riparian vegetation

Trees are the primary performers among the vegetation of forested buffers as they absorb more nutrients than shrubs and grasses. Their leaf litter and detritus on the ground helps

slow down and remove sediments from overland flow. Their canopies provide shade for the stream and drop material that provides shelter for in stream habitats.

The meadow grasses of the filter stream are also important as they serve to disperse the incoming overland flow before it enters the forested zones, thus allowing more infiltration and less erosion to occur. They also filter out sediments and take up nutrients as the water passes through the filter zone.

Lawn grasses and other maintained landscape areas generally provide no buffering benefit. In fact they can contribute to impairing streams by the overuse of fertilizer and pesticide chemicals. Planting lawn grasses to the stream's edge creates a root mass that does not allow stream channels to meander and migrate as they should, and results in excessive stream erosion.

The table 6-1 summarizes some of the many benefits that forested riparian buffers provide for watershed resources as well as for watershed communities.

Table 6-1: Benefits of Forested Riparian Buffers

1. Reduces watershed imperviousness by 5% (average 100 ft width buffer)
2. Distances areas of impervious cover from the stream
3. Improves septic system effectiveness prior to effluent seeping to stream
4. Reduces small drainage problems and complaints regarding standing water, backyard flooding, and bank erosion
5. Allows for lateral migration of stream meandering and widening while protecting property and structures
6. Conveys floods effectively
7. Protects streambanks from erosion
8. Increases property values
9. Increases pollutant removal in ground water
10. Increases pollutant removal from surface runoff
11. Provides foundation for present or future greenways
12. Provides food and habitat for instream aquatic resources (fish, insects, benthic organisms, etc.)
13. Moderates stream temperatures by reducing extreme warm temperatures and increasing extreme cold temperatures to provide necessary aquatic habitat conditions
14. Protects associated wetlands
15. Prevents disturbance of steep slopes and prevents severe runoff and erosion rates from those slopes
16. Preserves important terrestrial habitat and transition zones (1 mile of stream corridor provides 25 to 40 acres of habitat)
17. Provides migration corridors for wildlife conservation
18. Provides essential habitat for amphibians that require both aquatic and terrestrial habitats and depend on riparian environments to complete their life cycle
19. Reduces barriers to fish migration
20. Protects headwater streams from extensive modification from storm drain enclosures/channel hardening
21. Provides space for other stormwater treatments and BMPs
22. Allows space and access for future stream restoration, bank stabilization, or reforestation.

Source: Watersheds Plan, Water Resources Authority, 2002

CHALLENGES IDENTIFICATION

Riparian Areas Being Used for Grazing and Development

Holstein cows grazing

The land surrounding streams is usually some of the last open land in a community. This often occurs because this land is more susceptible to flooding and erosion during storm events. In recent years, however, riparian areas have seen an increase in development due to the intense development pressures of the region. This practice has been creating problems for municipalities and the environment by reducing or eliminating the vegetated buffer along the stream banks.

Farms have traditionally used the land surrounding streams for grazing livestock. This is often the case because the land is not suitable for planting due to seasonal high water tables and flooding, and it provides livestock access to water in the stream for drinking.

IMPLEMENTATION STRATEGIES

Riparian Restoration

Restoring the riparian corridor to improve water quality is achieved currently through CREP and CRP programs through the county. The District also has initiated several stream restoration programs in developed areas to improve water quality and reduce stream bank erosion to prevent flooding. In conjunction with CBF, over 40 miles of stream bank has been restored. The District is planning to restore an additional 50 acres of stream banks over the next two years.

Riparian Maintenance Grant

Many of the fenced riparian areas of the county are in need of maintenance to restore them to the original planned state and maximize their benefit to the stream. The District applied for a PA DEP Growing Greener grant on February 5, 2005, with the Lancaster County Conservation District to receive funding to maintain existing riparian areas.

AmeriCorps

The District is looking to utilize AmeriCorps to perform riparian maintenance as their project. The District would provide the replacement trees and tools needed to complete the maintenance.

Promote CREP

One of the most effective tools for establishing forest buffers throughout the watershed has been the Conservation Reserve Enhancement Program (CREP). CREP is a voluntary land retirement program that helps agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water. The program is a partnership among landowners and state and federal governments. CREP is an offshoot of the country's largest private-lands environmental improvement program – the Conservation Reserve Program (CRP).

CREP project in southern Chester County

CREP provides farmers with a sound financial package for conserving and enhancing the natural resources of farms. Over 90 percent of all riparian forest buffer restoration completed throughout the entire Bay watershed to date has been accomplished through support provided by CREP.

EDUCATION/PUBLIC AWARENESS

Amish Education

Amish and Plain Sect farmers often convert riparian corridors into fields and grazing areas. The District, in conjunction with the watershed associations, will continue to educate all farmers on the important role that riparian corridors play in the water quality of the stream.

PART 7 - SEPTIC SYSTEMS CHALLENGES AND STRATEGIES

Failed septic system discharge

The possible degradation of water quality in surface and ground water from on-site sewage disposal systems (OSDS) is a concern in Chester County. Water quality degradation may result from contaminants including, but not limited to, nitrates, bacteria, endocrine disrupting chemicals and steroid compounds. Environmental and health problems associated with excessive amounts of certain forms of nitrogen in the environment have been well documented. For example, high concentrations of nitrate in drinking water supplies can cause methemoglobinemia, or "blue baby" syndrome, in infants. Some contaminants, such as bacteria and nitrates are the result of the nature of an on-site sewage disposal system. Other contaminants, such as endocrine disrupting chemicals and steroid compounds travel through on-site sewage disposal systems from households using various pharmaceuticals for medicinal purposes.

Unfortunately, government funding is scant for research regarding surface and ground water contamination from on-site sewage disposal systems. Unlike the state of Maryland, Chester County does not have a task force in place to steer efforts for studies into the surface and ground water contamination from on-site sewage disposal systems. Chester County, along with the other five Health Departments in Pennsylvania, looks to the Pennsylvania Department of Environmental Protection (PA DEP) for guidance and information in order to protect the environmental health of the County.

Methods have been developed that reduce nitrate levels in on-site sewage disposal system effluent before discharge into the system's absorption area. Denitrification units can be installed prior to discharge of sewage effluent to the surrounding soil. However, the units can be cost prohibitive to individual homeowners and are not currently widely used in Chester County.

PA DEP now requires consultants who either install on-site sewage disposal systems, or wish to develop a given area, to collect data that determines the baseline nitrate level in the proposed area of on-site sewage disposal system installation. If water sample results from water supply wells within a quarter-mile buffered area around a proposed lot indicate an elevated nitrate level, then preliminary hydrologic studies must be conducted to determine the possible impact on ground water.

The ultimate type of treatment and disposal system is a function of both the regulatory requirements and site conditions. Such conditions include the soil type (e.g., clay rock, sand), steepness of slope, depth to seasonal groundwater, setback to prominent site

features (e.g. creeks and banks), size and shape, and its existing state (e.g., a repair). Property owner involvement in maintaining on-site sewage disposal systems is critical. Chester County encourages homeowners to become knowledgeable concerning their on-site sewage disposal systems. Free brochures containing information about individual on-site sewage disposal systems are available at Chester County Health Department. Operation and Maintenance agreements between the owner of a given type of on-site sewage disposal system and the particular manufacturer of that system are put into place before final approval by the Chester County Health Department is given. Education and an acknowledged responsibility for the operation and maintenance of one's own on-site sewage disposal system is imperative to the system's ongoing function. It is the County's obligation to ensure that public health and the health of the environment is protected. Chester County enforces, on a county level, any regulations, policies, and actions enacted by the Commonwealth of Pennsylvania to reduce nutrient loads from on-site sewage disposal systems.

Countywide, there are over approximately 1300 on-site sewage disposal system permits issued every year from the Health Department. Most of these are conventional on-site sewage disposal systems; designed to remove solids and pathogens from wastewater in order to protect public and environmental health. Some systems, however, are malfunctioning due to age or neglect in operation and maintenance. A malfunction is defined as sewage that is reaching the surface of the ground or backing up into a home.

The larger overall problem is that the Commonwealth itself is the only government entity in Pennsylvania to make changes in regulations regarding on-site sewage disposal systems. The County has no authority to regulate the acceptable types of on-site sewage disposal systems used or how much treatment is required before discharge of effluent to the soils that surround the on-site sewage disposal system.

CHALLENGES IDENTIFICATION

Implementing Areas of Special Concern

Chester County Health Department has not identified any particular areas of special concern. Municipalities are responsible for the long-term sewage facilities within their borders. If an area containing on-site sewage disposal systems is starting to show a tendency toward malfunctioning systems, the municipality has the responsibility to determine and implement a resolution for the problem.

Future Use of Conventional Sewage Disposal Systems

PA DEP has recently announced the dissolution of the Experimental category of on-site sewage disposal systems in their Guidance. Most alternate systems, including but not limited to Leaching Chambers, At-grade Bed Systems, Drip Distribution, and A/B Soil Systems may be considered conventional in nature and experimental systems will be considered on a case-by-case basis.

Future Use of Community and Shared Systems

PA DEP has also recommended the increased use of Community and Shared Systems in order to consolidate proper treatment of effluent and also the operation and maintenance needs of planned developments. The shared-system philosophy goes hand-in-hand with the Chester County Planning Commission's recommendation for cluster housing and the curbing of sprawl development.

IMPLEMENTATION STRATEGIES

Identify Areas that Need Immediate Protection from OSDS Impacts

This assessment could be made based on soil characteristics, development patterns and intensity, and likely areas of future development. Identifying these areas for special attention from the Health Department would help to avoid problems from failing systems in the future.

Training and Licensing or Certification of OSDS Inspectors, Haulers, and Installers

Pennsylvania requires all those who inspect on-site sewage disposal systems to obtain a Sewage Enforcement Officer (SEO) Certification through the PA DEP. Chester County is one of six health departments in the state that employs SEOs for the purpose of enforcing state regulations in the County. In addition, the County requires liquid waste haulers who conduct business in the County to obtain a County-issued license. Installers of on-site sewage disposal systems are not required to obtain licensing or certification from the County.

Call for Immediate Measures to Address the Problems of Communities with Widespread Septic System Failure

Townships within Pennsylvania are given the task of tracking long-term sewage facilities (which includes on-site sewage disposal systems) within their borders. *Special Studie*s are conducted to identify potential or existing on-site sewage disposal systems problems. Proposed solutions are then submitted to PA DEP for approval. Chester County has a period of time in which to review the proposed solutions and offer comments.

Encourage the Widespread Adoption of Non-Traditional Systems, and Ensure that They Function Properly

PA DEP recognizes the need to consider non-traditional on-site sewage disposal systems in order to extend every possible opportunity for a parcel of land to be developed.

EDUCATION/PUBLIC AWARENESS

Chester County has produced many publications that are available to the public, which explain the use and maintenance of on-site sewage disposal systems. The publications are available at the County Health Department. In addition, periodically, local radio stations broadcast 30-minute taped radio interviews with Health Department personnel, featuring information on on-site sewage disposal systems.

PART 8 - EVALUATION
MEASURING SUCCESS AND EFFECTIVENESS

For this plan to be successful, it will need to be embraced by the community and in the Bay watershed. The District will work diligently to implement the strategies outlined in this strategy. The following timetable shows the Districts intended implementation plan for reducing sediment and nutrients to the bay.

STRATEGY IMPLEMENTATION TIMETABLE

January, February, March 2005 – Winter

- Conduct Farmer Roundtable – January 11, 2005, at the farm of Duane Hershey, Cochranville (see attached – Appendix C).
- Assist in conducting the Nutrients and Farming Workshop in cooperation with the Octoraro Nitrate Task Force and Solanco Young Farmers, March 2, 2005, Quarryville, PA.
- Submit Growing Greener Grant applications for Octoraro Stream Stabilization – Bryson Road, and Amish Outreach Program for Ag BMP Education.
- Request PA DEP assessment of Octoraro tributaries for 303d listing.
- Meet with agriculture/fertilizer representatives to discuss Chester County CBTS goals and objectives, and hold a luncheon roundtable to educate and distribute literature to farmers (identical format as used with farmer roundtable).

April, May, June 2005 – Spring

- Implement or oversee construction of Ag BMPs per Conservation Plan.
- Meet with OWA to discuss CBTS and integration into Amish Education Program.
- Coordinate and confirm methods of accurate record keeping with cooperators for Ag BMPs, particularly precision agriculture (strip level), cover crops, no-till acreage, and nutrient management.
- Enlist participants, acquire trees and begin planting trees with the TreeVitalize program for the Southeast Region.
- Meet with interested farmers and technology experts to address manure disposal through innovative methods, i.e. tours of digesters, biofuel heaters, and other energy saving/conservation methods/hardware; research and collaborate with interested farmers; and initiate contacts with corporations for funding and ideas, etc.
- Plant trees for targeted/funded buffers for riparian restoration
- Monitor and maintain existing buffers (trees, tubes, and invasives)

July, August, September 2005 – Summer

- Implement or oversee construction of Ag BMPs per Conservation Plan.
- Meet with interested farmers and technology experts to address manure disposal through innovative methods, i.e. tours of digesters, biofuel heaters, and other energy saving/conservation methods/hardware; research and collaborate with interested farmers; and initiate contacts with corporations for funding and ideas, etc.
- Conduct Field Day (Ag BMPs, prototype farm, CCCD cooperator operation).
- Conduct Farmer Roundtable.
- Survey farmers on CBTS and targeted Ag BMPs.
- Conduct Rain Barrel Program and distribute to target watersheds.
- Monitor and maintain existing buffers (trees, tubes, invasives).
- Conduct Cover Crop program for interested cooperators, and distribute seed.

October, November, December 2005 – Fall

- Implement or oversee construction of Ag BMPs per Conservation Plan.
- Meet with interested farmers and technology experts to address manure disposal through innovative methods, i.e. tours of digesters, biofuel heaters, and other energy saving/conservation methods/hardware; research and collaborate with interested farmers; and initiate contacts with corporations for funding and ideas, etc.
- Conduct Cover Crop program and monitor participating cooperators (300 acres planted).
- Plant trees for targeted/funded buffers for riparian restoration.
- Monitor and maintain existing buffers.
- Enlist participants, acquire trees and begin planting trees with the TreeVitalize program for the Southeast Region.
- Meet with OWA to discuss CBTS and integration into Amish Education Program.
- Evaluate and report first year implementation of CBTS.

January, February, March 2006 – Winter

- Conduct Farmer Roundtable.
- Assist in conducting the Nutrients and Farming Workshop in cooperation with the Octoraro Nitrate Task Force and Solanco Young Farmers, March 1, 2006, Octoraro Watershed
- Meet with interested farmers and technology experts to address manure disposal through innovative methods, i.e. tours of digesters, biofuel heaters, and other energy saving/conservation methods/hardware; research and collaborate with interested farmers; and initiate contacts with corporations for funding and ideas, etc.

April, May, June 2006 – Spring

- Implement or oversee construction of Ag BMPs per Conservation Plan.
- Meet with OWA to discuss CBTS and integration into Amish Education Program.
- Evaluate and adjust methods of accurate record keeping with cooperators for Ag BMPs, particularly precision agriculture (strip level), cover crops, no-till acreage, and nutrient management.
- Meet with interested farmers and technology experts to address manure disposal through innovative methods, i.e. tours of digesters, biofuel heaters, and other energy saving/conservation methods/hardware; research and collaborate with interested farmers; and initiate contacts with corporations for funding and ideas, etc.
- Plant trees for targeted/funded buffers for riparian restoration.
- Monitor and maintain existing buffers (trees, tubes, and invasives).

July, August, September 2006 - Summer

- Implement or oversee construction of Ag BMPs per Conservation Plan.
- Meet with interested farmers and technology experts to address manure disposal through innovative methods, i.e. tours of digesters, biofuel heaters, and other energy saving/conservation methods/hardware; research and collaborate with interested farmers; and initiate contacts with corporations for funding and ideas, etc.
- Conduct Field Day (Ag BMPs, prototype farm, CCCD cooperator operation).
- Conduct Farmer Roundtable.
- Survey farmers on CBTS and targeted Ag BMPs.
- Conduct Rain Barrel Program and distribute to target watersheds.
- Monitor and maintain existing buffers (trees, tubes, invasives).
- Conduct Cover Crop program for interested cooperators and distribute seed.

October, November, December 2006 – Fall

- Implement or oversee construction of Ag BMPs per Conservation Plan.
- Meet with interested farmers and technology experts to address manure disposal through innovative methods, i.e. tours of digesters, biofuel heaters, and other energy saving/conservation methods/hardware; research and collaborate with interested farmers; and initiate contacts with corporations for funding and ideas, etc.
- Conduct Cover Crop program and monitor participating cooperators (Goal - 300 acres planted annually)
- Plant trees for targeted/funded buffers for riparian restoration.
- Monitor and maintain existing buffers.
- Evaluate and report second year implementation of CBTS.

January 2005 – December 2006 (Continuous Implementation)

- Coordinate sign up for CCCD, PDS, USDA NRCS, USDA, and FSA cost share and incentive programs.
- Provide equipment loan to area farmers for manure injector and no-till vegetable planters.
- Conduct monthly meetings and field trips for the Octoraro Nitrate Task Force.
- Conduct RMS Conservation Planning and implementation.
- Conduct MFEMP creation and implementation.
- Conduct regular meetings of the PEACCE program and enlist new cooperators.
- Cross-train Ag Staff (Ag, Urban, and Watershed training) (established and filled position 1/05).
- Coordinate with USDA NRCS staff on conservation planning and implementation.
- Provide transportation for Plain Sect to educational sessions as needed.