



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Final

Watershed Agreement, Project Plan & Programmatic Environmental Assessment for Addressing Resource Concerns from Mushroom Composting in Watersheds of Southern Chester County, Pennsylvania

PREPARED BY



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

IN COOPERATION WITH

Chester County Conservation District
with support from the Chester County Board of Commissioners
Chester County, Pennsylvania

JANUARY 2026

**Watershed Project Plan & Programmatic Environmental Assessment
for
Addressing Resource Concerns from Mushroom Composting
in Watersheds of
Southern Chester County, Pennsylvania**

Prepared By:

United States Department of Agriculture, Natural Resources Conservation Service, Pennsylvania

In Cooperation With:

Chester County Conservation District, with support from the Chester County Board of Commissioners

AUTHORITY

This Watershed Project Plan-Programmatic Environmental Assessment (Plan-PEA) is prepared under the authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law [PL] 83-566). The Plan-PEA is also prepared to meet NRCS' obligations to comply with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code § 4321 *et seq.*).

ABSTRACT

This document fulfills the requirements of NEPA and considers a United States Department of Agriculture, Natural Resources Conservation Service (NRCS) program under PL 83-566 to address water resource concerns associated with mushroom composting in watersheds of southern Chester County, Pennsylvania. The program would allow mushroom compost operators to address existing resource concerns such as nutrient runoff to surface waters and leaching into ground water. The program would also address potential resource concerns associated with the construction or operation of the selected conservation practices such as site selection, stormwater management, and waste management, or efficient operations, reuse of materials and waste, and additional labor (e.g., maintenance/repair, regulatory compliance, and site monitoring). If authorized, applicants would seek funds for unique, site-specific conservation practices that work in combination as conservation system(s) to address resource concerns from mushroom compost (MC) operations in southern Chester County, Pennsylvania.

The total estimated program installation cost is estimated to be **\$12,400,000**, of which approximately **\$9,500,000** would be paid from the Watershed and Flood Prevention Operations Program and **\$2,900,000** from local funds.

COMMENTS AND INQUIRIES

Comments and inquiries must be received by October 30, 2025. Submit comments and inquiries to: Heather Smeltz, Assistant State Conservationist for Water Resources, USDA – Natural Resources Conservation Service, 359 East Park Drive, Suite 2, Harrisburg, PA 17111-2747, **Email:** heather.smeltz@usda.gov, **Phone:** 717-237-22214 or **Toll Free:** 1-888-300-8379.

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Office of Management and Budget Fact Sheet

Summary of Watershed Project Plan & Programmatic Environmental Assessment for Addressing Resource Concerns from Mushroom Composting in Watersheds of Southern Chester County, Pennsylvania 6th Congressional District	
Authorization	Public Law (PL) 83-566 Stat. 666, as amended (16 United States Code [U.S.C.] § 1001 <i>et seq.</i>) of 1954.
Lead Sponsor	Chester County Conservation District, with support from the Chester County Board of Commissioners
Proposed Action	Authorize funds under PL 83-566 to administer a watershed protection program offering technical and financial assistance for water quality improvement projects at mushroom compost (MC) sites in southern Chester County, Pennsylvania.
Purpose and Need	The purpose of the proposed action is to address water quality concerns associated with MC operations within watersheds of southern Chester County, Pennsylvania. The proposed action is needed because the composting of residual substrate material contributes to pollutant loading in downstream surface waterbodies and groundwater. Since MC operators typically do not qualify for traditional U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) Farm Bill Assistance Programs, the proposed action would authorize an NRCS cost-share program to address water resource concerns from MC sites.
Description of the Preferred Alternative	The Preferred Alternative would provide federal technical and financial cost-share assistance for water quality improvements at MC sites in southern Chester County. Within the project area, applicants employing either passive or active composting techniques would propose improvements using conservation systems with demonstrated water quality benefits. Approved projects would account for site-specific conditions to maximize water quality benefits.
Program Project Measures	Stand-alone conservation practices are typically not suited to address the full scope and extent of water quality concerns relating to mushroom compost operations. However, certain conservation practices are central to designing an effective system for this purpose. One or more “core” conservation practices must therefore be included in conservation system designs to be eligible for inclusion in the proposed program. Core Conservation Practices include Composting Facility (317); Heavy Use Area Protection (561); Riparian Forest Buffer (391); Roofs and Covers (367); Sprinkler System (442); Waste Storage Facility (313); and Waste Treatment (629). Other conservation practices can be used in combination with the core practices to maximize the water quality benefits of the system. These “supporting” conservation practices are incorporated into designs to complete the proposed system consistent with the proposed program objectives. Supporting Conservation Practices include Access Road (560); Air Filtration and Scrubbing (371); Amendments for Treatment of Agricultural Waste (591); Constructed Wetland (656); Critical Area Planting (342); Diversion (362); Fence (382); Filter Strip (393); Grade Stabilization Structure (410); Grassed Waterway (412); Groundwater Testing (355); Hedgerow Planting (422); Lined Waterway or Outlet (468); Monitoring Well (353); Mulching (484); Nutrient Management (590); Obstruction Removal (500); Pond Sealing or Lining – Compacted Soil Treatment (520); Pond Sealing or Lining – Geomembrane

Summary of Watershed Project Plan & Programmatic Environmental Assessment for Addressing Resource Concerns from Mushroom Composting in Watersheds of Southern Chester County, Pennsylvania 6 th Congressional District			
	or Geosynthetic Clay Liner (521); Pond Sealing or Lining, Concrete (522); Pumping Plant (533); Riparian Herbaceous Cover (390); Roof Runoff Structure (558); Sediment Basin (350); Soil Carbon Amendment (336); Stormwater Runoff Control (570); Stream Crossing (578); Structure for Water Control (587); Subsurface Drain (606); Terrace (600); Underground Outlet (620); Vegetated Treatment Area (635); Waste Facility Closure (360); Waste Recycling (633); Waste Separation Facility (632); Waste Transfer (634); Waste Treatment Lagoon (359); Water and Sediment Control Basin (638); Well Commissioning (351); and Windbreak/Shelterbelt Establishment (380).		
Relevant Resource Concerns	Resource concerns identified through early scoping included increasing population growth and development, workforce housing and transportation costs, lack of community support and education with respect to mushroom farm benefits and practices, and supply and logistical challenges associated with MC distribution.		
RESOURCE INFORMATION			
Project Area			
Basin Name	Watershed Name (locally known as)	Subwatershed Name	12-digit Hydrologic Unit Code
Chesapeake Bay Watershed	Octoraro Creek	Tweed Creek-Octoraro Creek	020503061502
		Basin Run-Octoraro Creek	020503061503
	Little Elk Creek	Little Elk Creek	020600020202
	Big Elk Creek	Big Elk Creek	020600020203
		East Branch Big Elk Creek	020600020201
Delaware River Basin	White Clay Creek	West Branch White Clay Creek	020402050302
		Middle Branch White Clay Creek	020402050301
		Upper White Clay Creek	020402050306
		East Branch White Clay Creek	020402050303
		Lower White Clay Creek	020402050308
	Red Clay Creek	West Branch Red Clay Creek	020402050304
		East Branch Red Clay Creek	020402050305
		Red Clay Creek	020402050307

Summary of Watershed Project Plan & Programmatic Environmental Assessment for Addressing Resource Concerns from Mushroom Composting in Watersheds of Southern Chester County, Pennsylvania 6th Congressional District			
Characteristics of Project Area			
Land Area (acres)	109,285 (approx.)	Total Population (2021)	86,431 (est.)
No. of Mushroom Farms / Houses	53 / 1,990 (2023)	Per Capita Income	\$95,892
No. of Hydrologic Units (12-digit)	13	Population Below Poverty (%)	6.8
Climate	Humid continental	Land Ownership	Private (program) Public/Private (non-program)
Topography	Gently sloping	Land Use	Agriculture (program) Variable (non-program)
Population	86,431	Minority population	11.3%
Median Household Income (\$/year)	95,892	Population below poverty level	6.8%
ALTERNATIVES			
Alternatives Considered	Numerous structural and non-structural measures were considered and evaluated to implement the proposed action. These included more targeted measures such as siting and constructing a centralized, active composting facility with regional connectivity to MC sites. Ultimately, these various alternatives either failed to meet the purpose of and need for the proposed action or were not feasible for other reasons (e.g., cost, logistics, engineering, social, environmental, and institutional factors). Based on USDA Departmental Regulation 9500-13 (2017), <i>Conducting Analyses Under the Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies and Federal Water Resource Investments</i> (PR&G) criteria for completeness, effectiveness, efficiency, and acceptability, only two alternatives under consideration met the purpose and need of the proposed action, as formulated and evolved from early project scoping.		
No-Action Alternative	Under the No-Action Alternative, the NRCS would not offer a program to address resource concerns from MC operations in the project area. Many MC sites would continue to lack the controls necessary to prevent, capture, or treat water and wastewater prior to its reuse or release back into the environment. In the short term, composting operations would continue contributing to water quality degradation on and downstream of MC sites at levels commensurate with the status quo. Over time, water quality in project area watersheds would likely worsen.		

Summary of Watershed Project Plan & Programmatic Environmental Assessment for Addressing Resource Concerns from Mushroom Composting in Watersheds of Southern Chester County, Pennsylvania 6 th Congressional District				
Alternative 1 (Passive MC Operations Only)	Under Alternative 1, the NRCS would offer a PL 83-566 Land Treatment Program to address water quality concerns from passive MC operations in southern Chester County. While passive MC operators would be eligible to seek federal assistance, Alternative 1 would preclude active MC operators from participating in the program. Water quality improvements under Alternative 1 would be focused on a larger pool of operators with relatively small-scale operations. As such, the water quality benefits resulting from projects under Alternative 1 would occur at geographically disparate MC sites and accrue incrementally over a longer duration of time. The average and unit costs required to convert from passive to active MC operations under Alternative 1 would reflect the lack of any prior investment in such improvements. This would likely increase the upfront financial commitment required for improvements at passive MC sites; however, projects under Alternative 1 would be less complex and time-consuming to achieve return on investment.			
Alternative 2 (All MC Operations)	Under Alternative 2, the NRCS would offer a PL 83-566 Land Treatment Program to address water quality concerns from either passive or active MC operations in southern Chester County. By not limiting participation in the program, Alternative 2 would provide more administrative flexibility to focus on specific areas or concerns. Water quality improvements under Alternative 2 could focus on small and/or large-scale operations. As such, projects under Alternative 2 would increase the extent and scope of potential watershed benefits. By allowing large scale MC operators to participate in the program, the average and unit costs required to invest in improvements could be lowered; however, some projects under Alternative 2 would potentially be more complex and time-consuming to achieve return on investment.			
Impact Avoidance and Reduction Measures	Incorporated into the siting and design of the proposed action.			
COMPARISON OF PROGRAM BENEFITS ^{1/}				
Works of Improvement	Agriculture-related Damage Reduction			Benefit-to-Cost Ratio
	Other – Nutrient Management ^{2/}	Other – Physical Resource Effects ^{3/}	Annual Program Damage Reduction Benefits ^{4/}	Annual Program Damage Reduction Benefits ^{5/}
Land treatment – acres	14.8			1.36
Alternative 1 (Passive MC Operations Only)	\$ 7.3M	+ 1,132	\$ 1.5M	
Land Treatment -	28.0			

Summary of Watershed Project Plan & Programmatic Environmental Assessment for Addressing Resource Concerns from Mushroom Composting in Watersheds of Southern Chester County, Pennsylvania 6 th Congressional District				
acres				6.26
Alternative 2 (All MC Operations)	\$ 47.2M	+ 1,513	\$ 9.4M	
^{1/} Price base: 2024 dollars; cost estimates rounded. ^{2/} Total damage reduction benefits (i.e., \$/lbs. of nutrients/sediments reduced) based on a reimbursement timeframe of 5 years (i.e., program years 6-10). ^{3/} Cumulative, qualitative damage reduction benefits represented by Conservation Practice Physical Effects (CPPE) ranking for the corresponding (representative) conservation systems, organized by program alternative. ^{4/} Average program damage reduction benefits (i.e., \$/lbs. of nutrients/sediments reduced) based on a reimbursement timeframe of 5 years (i.e., program years 6–10). ^{5/} Benefit-to-Cost Ratio calculated as the annual program damage reduction benefits divided by annual program installation costs. Prepared: December 2024				

COMPARISON OF PROGRAM COSTS ^{1/}						
Alternative 1 – Passive MC Operations Only						
Assistance Type	PL 83-566 Funds		Other Funds		Total	
	\$	%	\$	%	\$	%
Financial ^{2/}	5.7M	75	1.9M	25	7.6M	100
Engineering/ Technical Assistance	1.1M	100	0	0	1.1M	100
Project Administration	0.3M	75	0.1M	25	0.4M	100
O&M	0	0	0.2M	100	0.2M	100
Other - Regulatory Permits	0	0	0.1M	100	0.1M	100
TOTAL COSTS	7.1M	-	2.3M	-	9.4M	-
Alternative 2 – All MC Operations						
Assistance Type	PL 83-566 Funds		Other Funds		Total	
	\$	%	\$	%	\$	%
Financial ^{2/}	7.5M	75	2.5M	25	10.0M	100
Engineering/ Technical Assistance	1.5M	100	0	0	1.5M	100
Project Administration	0.5M	71	0.2M	29	0.7M	100
O&M	0	0	0.3M	100	0.3M	100
Other - Regulatory Permits	0	0	0.2M	100	0.2M	100
TOTAL COSTS	9.5M	-	3.2M	-	12.7M	-
^{1/} Price base: 2024 dollars; cost estimates rounded. Prepared: December 2024 ^{2/} “Federal assistance shall not exceed the rate of assistance for similar practices under existing national programs.” The Environmental Quality Incentive Program allows a 75%/25% payment rate or a 90%/10% payment rate if an applicant self-certifies as Historically Underserved. The economics are based on the 75%/25% payment rate, but the 90%/10% payment rate will be used when appropriate. The federal funds will not exceed the amount shown.						

COMPARISON OF ENVIRONMENTAL EFFECTS			
Resource Concern	No-Action Alternative – Future Without Program	Alternative 1 – Future With Limited Federal Investment	Alternative 2 – Future With Full Federal Investment
Air Quality	No change from status quo.	Short-term, temporary, minor effects from emissions of dust or particulate matter and other criteria pollutants during construction. Minor, beneficial effects post-construction, including odor management.	Comparable to Alternative 1, but for: Potential increase in beneficial odor management effects from waste gasification. Potential increase in scope and extent of beneficial effects post-construction.
Ecologically Critical Areas	No change from status quo.	May affect but would not be likely to adversely affect threatened and endangered species and their habitat. Minor, localized, beneficial effects post-construction.	Comparable to Alternative 1, but for: Potential increase in scope and extent of beneficial effects post-construction.
Endangered and Threatened Species	No change from status quo.	Short-term, temporary, indirect effects during construction. Minor, localized, beneficial effects post-construction.	Comparable to Alternative 1, but for: Potential increase in scope and extent of beneficial effects post-construction.
Essential Fish Habitat	No change from status quo.	Short-term, temporary, negligible effects during construction. Minor, localized, beneficial effects post-construction.	Comparable to Alternative 1, but for: Potential increase in extent and scope of beneficial effects post-construction.
Fish and Wildlife	No change from status quo.	No direct resource effects. Short-term, temporary, indirect, negligible effects during construction. Minor, beneficial effects post-construction.	Comparable to Alternative 1.
Floodplain Management	No change from status quo.	Less-than-significant effects from construction in accordance with a Programmatic Agreement between the SHPO, SLO, applicant, and other interested parties. Minor, beneficial effects post-construction.	Comparable to Alternative 1.

COMPARISON OF ENVIRONMENTAL EFFECTS			
Resource Concern	No-Action Alternative – Future Without Program	Alternative 1 – Future With Limited Federal Investment	Alternative 2 – Future With Full Federal Investment
Historic Properties and Cultural Resources	No change from status quo.	Short-term, temporary, negligible effects during construction. Negligible, beneficial effects post-construction.	Comparable to Alternative 1.
Invasive Species	No change from status quo.	Short-term, temporary, negligible effects during construction. Minor, beneficial effects on local land use post- construction.	Comparable to Alternative 1.
Land Use, including Regional Water Resource Plans	No change from status quo.	Negligible, beneficial effects.	Comparable to Alternative 1, but for: Potential increase in extent and scope of beneficial effects post- construction.
Long-Range Weather Forecasting	No change from status quo.	Short-term, temporary, minor effects during construction. Minor, beneficial effects post- construction.	Comparable to Alternative 1.
Migratory Birds	No change from status quo.	Minor, beneficial effects.	Comparable to Alternative 1.
National Economic Development	No change from status quo.	Short-term, temporary, negligible effects during construction. Minor, localized, beneficial effects post-construction.	Comparable to Alternative 1.
Natural Areas	No change from status quo.	No or negligible effects.	Comparable to Alternative 1.
Prime Farmland and Farmland of Statewide Importance		Short-term, temporary, negligible effects during construction. Minor, beneficial effects post- construction.	Comparable to Alternative 1, but for: Potential increase in scope and extent of beneficial effects post- construction.

COMPARISON OF ENVIRONMENTAL EFFECTS			
Resource Concern	No-Action Alternative – Future Without Program	Alternative 1 – Future With Limited Federal Investment	Alternative 2 – Future With Full Federal Investment
Regional Water Resource Plans	No change from status quo.	No direct resource effects. Short-term, temporary, negligible effects during construction. Minor, localized, beneficial effects post-construction.	Comparable to Alternative 1.
Riparian Areas	No change from status quo.	Minor, temporary, direct and indirect, beneficial effects on local and regional economies. Minor, beneficial socioeconomic effects on local communities.	Comparable to Alternative 1, but for: Potential increase in scope and extent of beneficial effects on local and regional economies.
Socioeconomics	No change from status quo.	No appreciable effects during construction. Minor, beneficial effects post- construction.	Comparable to Alternative 1.
Soil Resources, including Stormwater Management	No change from status quo.	Short-term, temporary, minor effects during construction. Minor, beneficial effects post- construction.	Comparable to Alternative 1, but for: Potential increase in scope and extent of beneficial effects post- construction.
Sole Source Aquifers	No change from status quo.	No appreciable short- or long- term effects. Minor, beneficial effects post- construction.	Comparable to Alternative 1.
Water Quality	No change from status quo.	No direct resource effects. Short-term, negligible, indirect effects during construction. Negligible, beneficial effects post-construction.	Comparable to Alternative 1.
Water Resources	No change from status quo.	No direct resource effects. Short-term, negligible, indirect effects during construction. Negligible, beneficial effects post-construction.	Comparable to Alternative 1, but for: Potential increase in extent and scope of beneficial effects post- construction.

COMPARISON OF ENVIRONMENTAL EFFECTS			
Resource Concern	No-Action Alternative – Future Without Program	Alternative 1 – Future With Limited Federal Investment	Alternative 2 – Future With Full Federal Investment
Waters of the US	No change from status quo.	Short-term, temporary, minor effects from emissions of dust or particulate matter and other criteria pollutants during construction. Minor, beneficial effects post-construction, including odor management.	Comparable to Alternative 1, but for: Potential increase in beneficial odor management effects from waste gasification. Potential increase in scope and extent of beneficial effects post-construction.
Wetlands	No change from status quo.	Short-term, indirect, negligible effects during construction. Negligible, beneficial effects post-construction.	Comparable to Alternative 1.
Wild and Scenic Rivers	No change from status quo.	No direct, adverse effects. Temporary, minor, indirect, adverse effects during construction. Minor, beneficial effects post-construction.	Comparable to Alternative 1, but for: Potential increase in extent and scope of beneficial effects post-construction.
ALTERNATIVE 2 – ALL MC OPERATIONS (RECOMMENDED)			
Number of Direct Beneficiaries	To be determined by program participation.		
Other Beneficial Effects – Physical Terms	Refer to NRCS Field Office Technical Guide (FOTG) and the National Handbook of Conservation Practices (NHCP).		
Total Quantified Benefits (\$) ^{1/2/}	47.2M		
Benefit-to-Cost Ratio ^{1/3/}	6.26		
Cost-Share Period (years)	10		
Useful Life of Conservation Practices (years)	Varies by selected conservation practices.		
Period of Analysis for Program Lifetime (years)	10		

COMPARISON OF ENVIRONMENTAL EFFECTS			
Resource Concern	No-Action Alternative – Future Without Program	Alternative 1 – Future With Limited Federal Investment	Alternative 2 – Future With Full Federal Investment
Regional Economic Development Net Benefit (\$)	Not appreciable.		
^{1/} Price base: 2024 dollars; cost estimates rounded. Prepared: December 2024 ^{2/} Total program damage reduction benefits (i.e., \$/lbs. of nutrients/sediments reduced) for a reimbursement timeframe of 5 years (i.e., program years 6–10). ^{3/} Benefit-to-Cost Ratio calculated as the annual program damage reduction benefits divided by annual program installation costs.			
PROPOSED FUNDING SCHEDULE			
Year	Federal Funds (\$)	Non-Federal Funds (\$)	Total (\$)
2025-2026	0.95M	0.29M	1.24M
2026-2027	1.43M	0.44M	1.86M
2027-2028	1.90M	0.58M	2.48M
2028-2029	2.38M	0.73M	3.10M
2029-2030	2.85M	0.87M	3.72M
TOTAL ^{1/}	9.50M	2.90M	12.40M
^{1/} Columns may not sum to totals shown due to rounding.			
SUMMARY OF FINDINGS			
Cultural Resource Mitigation (\$)	0	0	0
Conclusions	Potential adverse effects under the Alternative 2 (Recommended) would be less-than-significant during construction. Minor, beneficial effects would occur post-construction.		
Areas of Controversy	None.		
Issues to be Resolved	None.		
Evidence of Unusual Congressional or Local Interest	None.		
Compliance	Is this report in compliance with executive orders, public laws, and other statutes governing the formulation of water resource projects? Yes <u> X </u> No <u> </u>		

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Chapter 1 – Introduction

Chester County, Pennsylvania leads the United States (US) in mushroom sales and production¹. The County's mushroom industry has an overall economic impact estimated to be more than \$1 billion annually. Growing mushrooms is also beneficial in that it requires many inputs that are byproducts of other agricultural practices (e.g., poultry and horse manure) (see Appendix C). Due to consolidation of the industry, mushroom growers in Chester County are becoming more efficient, producing more mushrooms with fewer farms (ACDS 2022; AMI 2018).

Another benefit of growing mushrooms is the residual substrate material generated in the process. Following a harvest, this nutrient-rich mushroom compost (MC) becomes a valued soil amendment. There are approximately 53 mushroom farms across southern Chester County and 17 mushroom composters serving those operations. Few have integrated composting into varied agricultural production operations onsite. Most mushroom producers rely on MC service providers to collect their spent mushroom substrate for transport to a privately operated, offsite composting facility or site. Regardless of where such operations take place, secondary use or application, excess nutrients and salts must be removed from the MC. If not managed or treated properly, these and other contaminants in MC contribute to reduced surface and ground water quality. In southern Chester County, where mushroom farms are concentrated, pollutants commonly associated with agriculture such as sediments, nutrients, and pesticides are water quality concerns (CCWRA 2020; PADEP 2020).

Most MC operators (e.g., producers, haulers, and site managers) view conservation practices for more effective storage, treatment, and disposal of MC as being cost-prohibitive or lacking in other incentives to justify the investment. A contributing factor is that MC operators generally do not qualify for traditional US Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) funds such as those allocated under the Environmental Quality Incentives Program (EQIP). There are three main reasons for this: 1) MC operators are not considered to be “engaged in agricultural production”; 2) land used for composting does not meet the definition of “agricultural land”; and 3) MC does not meet the definition of “agricultural product” (440 Conservation Programs Manual Part 515, Subpart F). Additionally, some MC haulers and storage operators are limited by or ineligible for such funds based upon their “adjusted gross income” (7 Code of Federal Regulations [CFR]) Part 1400, Subpart F).

This Plan-PEA has been prepared in general accordance with the Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) implementing regulations (40 CFR § 1500–1508); USDA NEPA regulations (7 CFR § 650); National Environmental Compliance Handbook (190 General Manual Part 610); and the policy, direction, and guidance set forth in the National Watershed Program Manual (NWPM), National Watershed Program Handbook, USDA Departmental Regulation 9500-13, *Conducting Analyses Under the Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies and Federal Water Resource Investments* (PR&G) (USDA 2017b).

Pursuant to 36 CFR Part 800—Protection of Historic Properties, this Plan-PEA coordinates the National Historic Preservation Act (NHPA) Section 106 process (54 U.S.C. § 306108) for the NRCS' proposed undertaking concurrent with the NEPA process. It also facilitates the process by helping to identify

^a Annual mushroom sales makeup more than 60 percent of the county's total agricultural sales or approximately 75 percent of all mushroom sales in Pennsylvania.

relevant or interested consulting parties and define an area of potential effects (APE) for evaluating potential effects on historic properties and cultural resources.

1.1 Background

Chester County mushroom farms cultivate approximately 11.2 million square feet (257 acres) of growing space each year (ACDS 2022). The substrate on which mushrooms grow requires byproducts from other agricultural operations. This growing medium typically includes a mix of straw, hay, corn cobs, and horse and poultry manure. Once a harvest is complete, the MC is replaced with fresh substrate and the process starts again. The residual, nutrient-rich MC can be collected, stored, and applied to land to increase soil fertility for field-grown crops or home gardens. MC can also be used for other purposes such as fill for mine reclamation or stormwater management projects, among other commercial applications.

The lifecycle of MC involves multiple stepwise phases from substrate formation and preparation through post-production composting and reuse. The substrate is created using a farm-specific mix of raw material inputs such as horse manure, chicken litter, straw/hay, etc. Once formed, water is applied to the substrate to commence an initial composting phase in preparation for its use in the mushroom production process. The material is then sterilized. During a process known as “spawning,” natural materials (e.g., grains) are introduced to beds filled with mushroom substrate. These materials provide a host for mycelium on which mushrooms rely upon for growth. The growth cycle concludes with a mushroom harvest, the spent substrate is removed from the beds and moved or transported elsewhere for the post-production composting phase. The proposed action evaluated in this Plan-PEA is focused on this secondary composting phase, a process that results in the storage and/or reuse of MC as a soil amendment or for other purposes.

While residual MC can be directly applied to field crops as a soil amendment, it requires storage and is most often treated via composting prior to land application to remove excess nutrients and salts. Mushroom farms either store MC temporarily or compost the MC. The composting of residual MC can be passive (i.e., natural conditioning) or active (i.e., induced conditioning). The latter is accomplished through different methods of storing, handling, and mixing of the MC following a mushroom harvest. While passive composting may take up to a year to complete, active composting expedites this process to varying degrees dependent on the method employed. Large piles of residual MC placed on pervious surfaces that lack stormwater controls and treatment measures increase the risk of contaminant migration into surface and ground water (CCADC 2021).

When left in-situ for passive or active composting, excess salts, nutrients, and chemicals in pesticides leach from MC piles. Many of these constituents attach to sediments and move with stormwater to areas downstream for deposition or discharge into surface waters. Once deposited on the land surface, contaminated sediments may also leach downward into groundwater (Kaplan, L.A., et al. 2013). An estimated 50 percent of the approximately 750,000 tons of MC produced in Chester County each year is field composted (NRCS 2021). The improved storage, transfer, treatment, and application of MC are necessary components to address water quality concerns within the watersheds of southern Chester County.

1.2 Project Area

The watersheds in north, east, and central Chester County drain to the Delaware Bay; the western part of the county drains to the Chesapeake Bay. The project area includes five sub-areas in southern Chester

County, each comprised of one or more subwatershed unit(s) (US Geological Survey [USGS] hydrologic unit code [HUC] 12)² (Table 1-1 and Appendix C). The sub-areas were delineated based on the location of mushroom farms in this part of the county, including areas downstream where potential water quality effects associated with MC are currently evident or would be likely to occur in the future. Within the project area, the land around Kennett Square contains the largest concentration of mushroom farms.

Table 1-1. Project Area

Watershed ^{1/}	Subwatershed (HUC 12)	Project Area (acres) ^{2/}	Subbasin	Basin-Bay
Octoraro Creek	Tweed Creek-Octoraro Creek	12,442	Lower Susquehanna	Susquehanna River-Upper Chesapeake
	Basin Run-Octoraro Creek	633		
Little Elk Creek	Little Elk Creek	7,914	Chester-Sassafras	
Big Elk Creek	Big Elk Creek	17,004		
	East Branch Big Elk Creek	10,161		
White Clay Creek	West Branch White Clay Creek	6,361	Brandywine-Christina	Delaware River-Delaware
	Middle Branch White Clay Creek	8,729		
	Upper White Clay Creek	3,016		
	East Branch White Clay Creek	20,724		
	Lower White Clay Creek	303		
Red Clay Creek	West Branch Red Clay Creek	11,234		
	East Branch Red Clay Creek	6,448		
	Red Clay Creek	3,686		
Total:		108,655		

Sources: CCWRA 2001 and 2022b

^{1/} Common watershed names are color-coded to correlate with **Figure C-1** in **Appendix C**.

^{2/} Acreages calculated based upon USGS HUC 12 as edited by Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Natural Heritage Inventory, Environmental Review (October 6, 2022).

1.2.1 Current Water Quality Conditions

Publicly available water quality data confirms that many of the upstream surface waterbodies bisecting the project area are listed for one or more impairments commonly associated with agricultural land use. These water quality parameters include elevated levels of nutrients, total suspended solids, turbidity, biochemical oxygen demand, organic enrichment, eutrophication, phosphorus, and low dissolved oxygen. These conditions are indicative of the regional landscape of northern Chester County and southeast Pennsylvania where both agriculture and urban development contribute nonpoint source pollutants.

² The USGS HUC hierarchical land area classification system is based on surface hydrologic features that share a common geographical framework.

To characterize water quality effects associated with MC operations within the project area, leachate samples were taken from selected MC sites and compared to samples taken from the top layers of treatment lagoons, immediately downstream thereof. While the untreated leachate sites confirmed the presence of high levels of nutrients, salts, and bacteria, the treatment lagoon samples demonstrated the water quality benefits of using active composting techniques: more effective retention and treatment of constituents of concern in MC leachate. Although retention and treatment practices should be implemented for all MC operations in the project area, they are only required by regulation on operations permitted for active composting. The sampling data (see **Appendix D**) substantiated the water quality benefits of converting from passive to active composting techniques.

The leachate sampling within the project area showed that MC sites contribute to water quality degradation and that active composting is the more effective retention and treatment remedy. The resultant water quality data also linked the level of benefits to the scope of MC operations (i.e., benefits increase with MC throughput). Within the project area, active MC operators typically produced more MC as compared to passive MC operators.

1.3 Decision Framework

This Plan-PEA evaluates a proposed NRCS cost-share program under PL 83-566 to address water resource concerns from mushroom composting in southern Chester County, Pennsylvania. If authorized, the NRCS would request funding to administer land treatment contracts that provide technical and financial assistance to individual MC operators for water quality improvement projects. The proposed program would be supported by the sponsoring local organization (SLO), the Chester County Conservation District (CCCD).

The NRCS is the lead federal agency for this Plan-PEA and is responsible for issuance of a decision in accordance with the NEPA³. This Plan-PEA is a programmatic document evaluating the potential effects of the proposed action within a region of southern Chester County, Pennsylvania. This geographic area is defined based on a specific stakeholder group of relevance. Upon completion of the NEPA process and publication of a Final Plan-PEA and decision document, as appropriate, the NRCS will continually reevaluate its compliance with NEPA as necessary or every 5 years at a minimum.

The analyses in the Final Plan-PEA will remain valid in lieu of any new and substantial information or circumstances. If appropriate, the NRCS may also choose to *tier* from this document in the future in complying with NEPA for other relevant site-specific or later in stage proposed programs, plans, or policies.

Conservation practices were individually evaluated for applicability for inclusion in this project based on planned land use, conservation practice purpose related to the Project purpose, and the Conservation Practice Physical Effects. These practices will be used in a systems approach to address water quality issues related to mushroom composting. As more site-specific data becomes available, the NRCS would *tier* from this Plan-PEA to determine whether potential effects of that planned conservation system are consistent with those evaluated. Such a determination would be documented through preparation of an onsite environmental evaluation (EE) using Form NRCS-CPA-52 or separate or supplemental NEPA

³ NEPA requires environmental review of federal proposed actions with potential to affect the quality of the human environment on an individual or cumulative basis. An EA is prepared to determine whether a federal proposed action would, or likely would, result in significant adverse effects on natural, cultural, or socioeconomic resources.

documentation on a site- or project-specific basis to comply with NEPA. This streamlines the NEPA compliance process for the proposed action while ensuring that new or different alternatives or conditions are subject to further environmental review.

This NEPA process and reevaluation of the programmatic analyses documented in the Final Plan-PEA will also be used to streamline the NRCS' ongoing compliance with other related laws and regulations such as the NHPA and its implementing regulations at 54 U.S.C. Part 306108. All new or updated documents resulting from reevaluation of the Final Plan-PEA and decision document will be incorporated into the NEPA administrative record.

Chapter 2 – Purpose and Need for Action

The purpose of the proposed action is to address water quality concerns associated with MC operations within watersheds of southern Chester County, Pennsylvania. The proposed action would achieve this objective by funding Land Treatment Contracts for the authorized project purpose of Watershed Protection, as defined in the NRCS NWPM.

The proposed action is needed because the composting of residual substrate material contributes to pollutant loading in downstream surface waterbodies and groundwater during runoff-causing events. These concerns include sedimentation of surface waters, salt and nutrient loading to surface waters and groundwater, and related effects (e.g. increases in Biological Oxygen Demand [BOD]). Water quality impairments in the project area are associated with nutrients, total suspended solids, turbidity, BOD, organic enrichment, eutrophication, phosphorus, and low dissolved oxygen (PADEP 2022a and 2014; CBP 2022). According to [USEPA](#), approximately 52.7 miles of streams or rivers in the project area are listed as impaired. Due to the watersheds involved in the project, these impaired streams drain to both the Chesapeake Bay as well as the Delaware River Estuary.

MC sites are ubiquitous across the project area and most use passive composting, a less costly and less effective means of managing and treating MC runoff and leachate. Regulated “active” composting operations have facilities in place to capture runoff from the operation.

The proposed action is also necessary because many MC operators view conservation practices as being cost-prohibitive. Traditionally, compost haulers and storage operators are generally not eligible for funding assistance, including USDA-NRCS sources such as the Environmental Quality Incentives Program (EQIP).

Land used for composting is typically not eligible for enrollment in the EQIP program. The land being offered for application into the EQIP program is required to be “agricultural land, nonindustrial private forest land, Tribal land, or other land on which agricultural products, livestock, or forest-related products are produced. Agricultural products, as defined in 515.52 (1) (i) are generally considered crops.

Some storage operators and compost haulers may be ineligible for the EQIP program due to their Adjusted Gross Income, as per 7 CFR Part 1400 Subpart F.

For those operations that are eligible for the EQIP program, regulations, under 7 CFR Part 1400 Subpart A limits the payment per person or legal entity to \$450,000. This is the total amount that can be received under all EQIP within the current Farm Bill period. Depending on the cost of the project, this incentive payment may not be sufficient to be economically viable for the operator.

Without financial assistance, the cost of improvement projects is prohibitive despite strong community interest.

2.1 Program Objectives

The problem of agricultural non-point source pollution is ubiquitous across the project area. Given the breadth and depth of agricultural operations within this geography that contribute to the problem, effective management requires identifying and targeting specific types of operations. As such, the proposed action was developed to be broad in geographic scope but focused on a specific phase of the MC lifecycle. This approach also accounted for variations in the anticipated benefits and costs that would

result from the proposed action and alternatives considered. That is, benefits would accrue at a watershed-level but costs, unique to a specialized industry, would incur to the individual property owner.

The NRCS used early project scoping and consultation with the SLO to develop program objectives consistent with the purpose and need. These included:

- Prevent and minimize erosion and sedimentation by controlling or reducing the quantity, rate, and temperature of contaminants (e.g., nutrients, organic matter, or pathogens) in stormwater runoff and leachate.
- Properly store waste or wastewater to prevent discharges to the environment and increase management flexibility for its efficient utilization.
- Manage waste or wastewater to attain desired properties for land or commercial application, or as an input to other value-added products.
- Provide stable, non-eroding, impervious surface areas for composting and associated vehicle and equipment operation.
- Facilitate the efficient transfer, storage, treatment, and application of waste or wastewater through design, engineering, and administrative controls (NRCS 2022a).

2.2 Risk and Uncertainty

This section identifies and describes areas of risk and uncertainty associated with the proposed action. These factors are further described and considered in this Plan-PEA, where appropriate.

- Future land use in the project area is uncertain due to increasing population growth and development. Should this existing trend continue, increased imperviousness would likely result in water quality degradation above current baseline levels.
- Future supply and demand for mushrooms and MC as a soil amendment or multiple use product are uncertain in the marketplace. In combination with the seasonal demand for MC, market uncertainty creates logistical challenges for MC storage, transport, and distribution.
- Future climate change, including regional increases in average annual temperature and precipitation, could affect or alter the agriculture industry within Chester County.
- MC operations emit a strong odor on and immediately downwind of mushroom farms. Residents living and/or working in such areas often perceive the smell as a nuisance. Without an effective education and outreach campaign to facilitate CP investments, the proposed action may not be fully realized.
- Future labor supply in support of the mushroom industry is uncertain due to its reliance on immigrant workers. These workers must obtain an H-2A Visa for entry into the US for temporary or seasonal agricultural work. Additionally, the rental market in Chester County often precludes their ability to live near their place of work.
- Costs associated with the proposed action and alternatives are planning level estimates. The actual, final costs would be based upon currently unknown, future market for the design and construction of the applicable conservation practices.

2.3 Adaptive Management

Adaptive management is a deliberate, iterative, scientific based process of designing, implementing, monitoring, and adjusting an action or project component to reduce uncertainty and maximize achievement of project goals. Adaptive management measures are incorporated into all NRCS projects addressing natural resource concerns on private lands as part of their comprehensive planning process. As warranted, additional adaptive management measures are identified and evaluated in this Plan-PEA.

Chapter 3 – Scope of the Environmental Assessment

The NRCS and SLO initiated a scoping process to identify issues of economic, environmental, cultural, and social concerns in the project area. Watershed concerns were communicated and discussed with agencies, organizations, and local citizens at virtual public meetings held on February 2, 2021. Factors that would affect soil, water, air, plant, and animal resources were identified by multidisciplinary teams composed of engineers, biologists, economists, resource conservationists, water quality specialists, and others. Relevant information obtained from early project scoping is briefly summarized in Chapter 7 of this Plan-PEA. Appendix A contains a complete accounting of comments received from scoping participants.

3.1 Identification of Resource Concerns

Table 3-1 shows the concerns considered and provides information on their relevancy to the proposed action. Resource concerns determined to be irrelevant to, or not affected by, the proposed action are also listed, along with a brief justification or rationale for their dismissal. These concerns are not discussed or evaluated further in this Plan-PEA.

Table 3-1. Identified Resource Concerns

Resource	Relevant to Proposed Action?		Justification
	Yes	No	
Air quality	X		Under the federal Clean Air Act, the project area lies within the Southeast Pennsylvania Air Basin of the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE air quality control region. MC operations can produce an unpleasant odor. Residents or visitors immediately downwind of such operations may consider the odor to be a nuisance.
Coastal zone management		X	The project area lies outside the state-defined coastal zone.
Coral reefs		X	No coral reefs in or downstream of the project area.
Ecologically critical areas	X		The Chesapeake Bay Watershed and Delaware River Basin are federally designated ecologically critical areas.
Endangered and threatened species	X		Section 7 of the Endangered Species Act (16 United States Code [USC] Part 1531 et seq.) (ESA) requires federal agencies to consider potential impacts on ESA-listed plants, animals, and their designated “critical habitat.” Pennsylvania has a state-equivalent law for the protection of rare, threatened, or critically imperiled plant and animal species.
Essential fish habitat	X		The project area drains to federally designated <i>essential fish habitat</i> associated with the Delaware and Chesapeake bays.
Fish and wildlife	X		Potential to require coordination with state fish and wildlife agencies.

Resource	Relevant to Proposed Action?		Justification
	Yes	No	
Floodplain management	X		Components of projects under the proposed action could occur within Federal Emergency Management Administration-designated 100- or 500-year floodplains.
Forest resources		X	No appreciable effects on forest resources under the proposed action.
Historic properties and cultural resources	X		Potential to affect historic properties will be addressed through the execution of a Programmatic Agreement for a Phased Approach to section 106 in accordance with 36 CFR § 800.4(b)(2). This includes the potential to affect known, discovered, or culturally significant or sensitive, Native American sites within the project area.
Invasive species	X		Development under the proposed action could create opportunities for invasive species of plants or animals to populate portions of the project area.
Land use	X		Land use is required analysis by the PR&G; however, there is no imminent change in current land use associated with the proposed action.
Long-range weather forecasting	X		Required analysis by the PR&G.
Migratory birds	X		Migratory birds receive protection under the Migratory Bird Treaty Act of 1918 (16 USC Parts 703–712) and Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. Potential to affect migratory birds designated by the US Fish and Wildlife Service as birds of conservation concern.
National economic development	X		Required analysis by the PR&G. Benefit-to-cost ratio > 1 indicates a good value for the government; benefit-to-cost ratio < 1 can be offset by environmental and social benefits.
Natural areas	X		The project area encompasses all or parts of Pennsylvania Natural Heritage Inventory-designated natural heritage areas.
Parklands		X	No appreciable effects on parklands under the proposed action.
Prime farmland and farmland of statewide importance	X		Federal- and state-designated farmland is present in the project area.
Public health and safety		X	No appreciable effects on public health and safety under the proposed action.

Resource	Relevant to Proposed Action?		Justification
	Yes	No	
Regional water resource plans	X		Various regional water resource plans are associated with the project area.
Riparian areas	X		Riparian buffer zones are present in the project area.
Scenic beauty		X	No appreciable effects on scenic beauty under the proposed action.
Scientific resources		X	There are no known caves, fossil sites, or faults within the project area.
Sole source aquifers	X		A portion of the project area is a source of recharge for the New Jersey Coastal Plain Aquifer System.
Socioeconomics	X		Demographics and socioeconomic conditions are variable across the project area.
Soil resources, including stormwater management	X		Soils in the project area are conducive to agriculture and many are susceptible to rill and gully erosion.
Special aquatic sites		X	No special aquatic sites were identified in the project area.
Water quality	X		Potential to impact surface water quality pursuant to Section 401 of the federal CWA. Per Section 303(d) of the federal Clean Water Act (CWA) (33 USC §1251 et seq.), as amended, water quality degradation is evident throughout the project area based on the number and extent of surface water impairments (USEPA 2022a). State-designated Special Protection Waters occurs throughout the project area. Ground water quality is a concern relative to the use and condition of individual septic tanks and systems.
Water resources	X		Composting processes require water inputs
Waters of the US, including	X		Potential to impact waters of the United States pursuant to Section 404 of the federal CWA.
Wild and scenic rivers	X		The project area encompasses the northern extent of the White Clay Creek Wild and Scenic River System. Approximately 36 miles of Octoraro Creek are part of Pennsylvania's Scenic River System.

3.2 Identification of Ecosystem Services

Ecosystem services are beneficial effects that flow from nature to people. For analysis purposes in this Plan-PEA, ecosystem services are evaluated for their contribution(s) to three of four service categories. These include:

- *Provisioning* – tangible goods for direct human use and consumption (e.g., food, fiber, water, timber, or biomass);
- *Regulating* – environmental services that maintain or enhance livable conditions for people such as coastal resiliency, disease control, flood attenuation, water filtration, and crop pollination;
- *Cultural* – experiential services of value to people and communities (e.g., spirituality, aesthetics, historic preservation, and resource use/access); and

Supporting services (the basic ecological functions necessary to maintain conditions for life on Earth, including nutrient cycling, soil formation, and primary productivity) are not evaluated in this Plan-PEA because they give rise to and support the other three service categories (EEA 2019; USDA 2017b).

Project scoping identified the following primary resource concerns and their associated ecosystem service impacts for consideration in this Plan-PEA (Table 3-2).

Table 3-2. Identified Ecosystem Services

Service Category	Resource Concern	Resource Concern Description	Possible Effect(s)
Provisioning	Water Quality	Detachment and transport of soil particles caused by rainfall, melting snow, or irrigation.	sheet and rill erosion
		Detachment and transport of soil particles caused by wind.	wind erosion
		Gullies created by runoff that can enlarge a channel progressively by head cutting and/or lateral widening.	gully erosion
		Erosion resulting from poor land management practices, storm events, runoff, loss of vegetation, and/or land disturbance.	bank erosion from water conveyance channels
		Concentration of salts leading to salinity and/or sodic conditions or concentrations of other chemicals reducing productivity, limiting desired use, or populations of beneficial organisms.	concentration of salts or other chemicals poor plant growth due to hardened soils and impeded water intake
Regulating	Soils	Management-induced soil compaction at any level throughout the soil profile resulting in reduced plant productivity, biological activity, infiltration and aeration.	compaction
		Management-induced depletion of soil organic matter resulting in limited soil function and	organic matter depletion

Service Category	Resource Concern	Resource Concern Description	Possible Effect(s)
		processes that support plant productivity, biological activity and water and nutrient cycling.	
Cultural	Air Quality	Particulate matter (PM) and PM precursor emissions	respiratory and cardiovascular problems
		Odorous or other undesirable emissions	reduced quality of life/comfort

Chapter 4 – Affected Environment

This section describes the current ecological, physical, biological, economic, and social environment of the project area, including adjacent or downstream areas that could be affected by MC operations in southern Chester County. The project area is defined in **Section 1.4**. Relevant graphics, maps, and figures depicting the affected environment are noted in the resource descriptions below and included as Appendix C.

4.1 Air Quality

Pursuant to the federal Clean Air Act (CAA), Chester County is part of the [Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE metropolitan air quality control region \(AQCR\)](#). This AQCR failed to attain the 2015 ozone national ambient air quality standards (NAAQS) by the regulatory deadline of August 3, 2021. The US Environmental Protection Agency (USEPA) has reclassified these airsheds as a *moderate* nonattainment status for ozone. Under the CAA, *moderate* nonattainment areas face more stringent requirements designed to achieve attainment of the NAAQS (USEPA 2022b).

4.1.1 Mushroom Composting

MC operations emit hydrogen sulfide (H₂S) gases under anaerobic conditions (e.g., when moved or disturbed). The strong odor of H₂S gases emitted from MC is detectable on, adjacent to, or immediately downwind of compost sites or pads. Sensitive receptors (i.e., people) living or working near mushroom farms may perceive the smell as a nuisance.

The Pennsylvania Department of Health (PADOH) recently conducted air monitoring for H₂S near three mushroom operations in the project area. The data collected was evaluated for potential non-cancerous health effects (e.g., headaches, nausea, fatigue, and various other respiratory-related symptoms) on people living in the vicinity of such operations considering a range of H₂S exposure durations ranging from weeks to a year or longer. The evaluation concluded that short-term respiratory effects can be experienced from exposures of H₂S up to 14 days, particularly in sensitive populations; however, longer duration exposures were not likely to manifest as long-term health effects. PADOH recommended BMPs and engineering controls for operations near residential communities that emit high levels of H₂S (PADOH 2024).

Emissions from MC operations, regardless of odor, include a broad class of non-methane, non-ethane organic compounds (NMNEOCs) and ammonia. A subset of NMNEOCs and ammonia can react with nitrogen oxide (NO_x) to form ground level ozone and smog. As such, for air quality monitoring purposes, emissions of volatile organic compounds (VOCs) are typically measured in bulk rather than for specific NMNEOCs. Additionally, there are two primary greenhouse gases detected during mushroom composting, methane, and nitrous oxide.

4.2 Ecologically Critical Areas

The Octoraro, Big Elk, and Little Elk Creek watersheds, parts of which comprise the southwest portion of the project area, are located within the Susquehanna River Basin of the Chesapeake Bay Watershed (CBW). Under the NRCS' Regional Conservation Partnership Program (RCPP), the CBW is a designated Critical Conservation Area, an agricultural region of many stakeholders with common natural resource goals (NRCS 2022b).

The White Clay and Red Clay Creek watersheds, parts of which comprise the southeast portion of the project area, are located within the Delaware River Basin (DRB). The DRB is a designated estuarine system of national significance under the National Estuary Program (PDE 2017).

4.3 Endangered and Threatened Species

There are no federally protected plant species known to occur in the project area (USFWS 2022a). Numerous plants in Chester County receive protection at the state level under 17 Pennsylvania Administrative Code (PAC) Part 45, as listed in [Subchapter B](#); however, none are known to occur in areas that would be directly affected by the proposed action.

Table 4-1 identifies the state-designated endangered and threatened plant species for southern Chester County. An additional 19 endangered and threatened plant species present in southern Chester County are currently proposed for listing by the Pennsylvania Department of Conservation and Natural Resources (PA DCNR) (PNHP 2022a).

Table 4-2 lists the special status wildlife species associated with Chester County. These species include small mammals, amphibians and reptiles, birds, fish, and other aquatic species.

No ESA-designated critical habitat occurs within the project area; the nearest designated critical habitat occurs downstream in parts of Maryland and Delaware (NOAA 2022). These species and critical habitat areas include:

- Maryland darter (*Etheostoma sellare*) – two inlets of the Susquehanna River
- Chesapeake Bay distinct population segment (DPS) of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) – seven tributaries of the Chesapeake Bay
- New York Bight DPS of Atlantic sturgeon – Delaware River

Table 4-1. List of Endangered and Threatened Plant Species for Southern Chester County ^{1/2/}

Scientific Name	Common Name	State Status ^{3/}
<i>Ageratina aromatica</i>	Small-leaved white-snakeroot	PT
<i>Aletris farinosa</i>	Colic-root	PE
<i>Aristida purpurascens</i>	Arrow-feathered three awned	PT
<i>Asclepias variegata</i>	White milkweed	PE
<i>Asclepias verticillata</i>	Whorled milkweed	PT
<i>Bouteloua curtipendula</i>	Tall gramma	PT
<i>Carex bicknellii</i>	Bicknell's sedge	PE
<i>Carex longii</i>	Long's sedge	PT
<i>Carex lupuliformis</i>	False hop sedge	PE
<i>Carex typhina</i>	Cattail sedge	PE

Scientific Name	Common Name	State Status ^{3/}
<i>Cerastium velutinum</i> var. <i>villosissimum</i>	Goat Hill chickweed	PE
<i>Chrysopsis mariana</i>	Maryland golden-aster	PT
<i>Cirsium horridulum</i>	Horrible thistle	PE
<i>Clematis viorna</i>	Vase-vine leather-flower	PE
<i>Crocianthemum bicknellii</i>	Bicknell's hoary rockrose	PE
<i>Dichanthelium scoparium</i>	Velvety panic-grass	PE
<i>Ellisia nyctelea</i>	Ellisia	PT
<i>Euphorbia purpurea</i>	Glade spurge	PE
<i>Festuca paradoxa</i>	Cluster fescue	PE
<i>Fimbristylis annua</i>	Annual fimbry	PT
<i>Ilex opaca</i>	American holly	PT
<i>Iris prismatica</i>	Slender blue Iris	PE
<i>Juncus dichotomus</i>	Forked rush	PE
<i>Juncus scirpoides</i>	Scirpus-like rush	PE
<i>Linum intercursum</i>	Sandplain wild flax	PE
<i>Lobelia puberula</i>	Downy lobelia	PE
<i>Lyonia mariana</i>	Stagger-bush	PE
<i>Magnolia tripetala</i>	Umbrella magnolia	PT
<i>Magnolia virginiana</i>	Sweet Bay magnolia	PT
<i>Poa autumnalis</i>	Autumn bluegrass	PE
<i>Polygala curtissii</i>	Curtis's milkwort	PE
<i>Quercus falcata</i>	Southern red oak	PE
<i>Rubus cuneifolius</i>	Sand blackberry	PE
<i>Scleria pauciflora</i>	Few flowered nutrush	PT
<i>Sericocarpus linifolius</i>	Narrow-leaved white-topped aster	PE
<i>Spiranthes vernalis</i>	Spring ladies'-tresses	PE
<i>Sporobolus heterolepis</i>	Prairie dropseed	PE
<i>Symphyotrichum depauperatum</i>	Serpentine aster	PT
<i>Vernonia glauca</i>	Tawny ironweed	PE
<i>Viburnum nudum</i>	Possum-haw	PE

Source: PNHP 2015

^{1/} List of species identified from best available data and assumed to not include all potential endangered and threatened plant species for the project area.

^{2/} An unknown number of listed species for the project area were not named by the responsible jurisdictional agency.^{3/} State Status – PE (Pennsylvania Endangered); PT (Pennsylvania Threatened)

Table 4-2. List of Special Status Wildlife Species for Chester County

Scientific Name	Common Name ^{1/}	Federal Status ^{2/}	State Status ^{3/}
Mammals			
<i>Cryptotis parva</i>	North American Least Shrew	-	PE
<i>Myotis septentrionalis</i>	Northern Long-eared Bat	LT	PE
<i>Myotis sodalis</i>	Indiana Bat	LE	-
Amphibians & Reptiles			
<i>Acris crepitans</i>	Eastern Cricket Frog *	-	PE
<i>Glyptemys muhlenbergii</i>	Bog Turtle	LT	PE
<i>Lithobates sphenoccephalus utricularius</i>	Coastal Plains Leopard Frog *	-	PE
<i>Opheodrys aestivus aestivus</i>	Northern Rough Greensnake *	-	PE
<i>Pseudemys rubriventris</i>	Northern Red-bellied Cooter	-	PT
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	-	PT
Birds			
<i>Asio flammeus</i>	Short-eared Owl *	-	PE
<i>Asio otus</i>	Long-eared Owl *	-	PT
<i>Bartramia longicauda</i>	Upland Sandpiper	-	PE
<i>Botaurus lentiginosus</i>	American Bittern	-	PE
<i>Cistothorus platensis</i>	Sedge Wren *	-	PE
<i>Ixobrychus exilis</i>	Least Bittern	-	PE
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	-	PE
<i>Rallus elegans</i>	King Rail *	-	PE
<i>Spiza americana</i>	Dickeissel	-	PE
Fish & Aquatic Species			
<i>Percina bimaculata</i>	Chesapeake Logperch *	-	PT

Sources: USFWS 2022a; PNHP 2022a

^{1/} The * symbol indicates a Pennsylvania-designated *critically imperiled* species.

^{2/} Federal Status – LE (Listed Endangered); LT (Listed Threatened)

^{3/} State Status – PE (Pennsylvania Endangered); PT (Pennsylvania Threatened)

4.4 Essential Fish Habitat

No federally designated essential fish habitat (EFH) occurs within the project area; however, it drains to either the Chesapeake Bay or Delaware Bay both of which contain EFH. In total, EFH downstream of the project area includes habitat associated with more than 30 distinct life stages of fish species.

The Chesapeake Bay and Delaware Bay contain habitat areas of particular concern units for one species of shark and the summer flounder (NOAA 2022 and 2021).

4.5 Fish and Wildlife

The project area is part of the Piedmont Uplands ecoregion. Prior to human disturbance, this area was mostly forested with few open savannahs in serpentine barrens. Due to increases in industry, agriculture, and urban development, little to none of the original forest cover exists today in Chester County. Most wildlife habitat in the project area consists of previously disturbed, fragmented ecosystems of varying quality.

Wildlife species that have adapted well to these conditions include white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), and numerous species of birds, rodents, rodents, frogs, salamanders, snakes, and turtles. Typical species of fish include largemouth (*Micropterus salmoides*) and smallmouth (*Micropterus dolomieu*) bass, bluegill (*Lepomis macrochirus*), common carp (*Cyprinus carpio*), and white (*Pomoxis annularis*) and black (*Pomoxis nigromaculatus*) crappie (PNHP 2015).

4.6 Floodplain Management

The potential for flooding to occur in the project area, like the precipitation it receives, is relatively constant throughout the year. However, most floods occur during the spring as heavy rains combine with snowmelt, or during the hurricane season (1 June to 30 November) as larger storm systems move north-northeast along the Atlantic seaboard.

The project area includes all or parts of 100-year floodplains covering more than 6,500 acres of land area; 500-year floodplains cover approximately 240 additional acres (see Appendix C). Most or all municipalities in the project area have floodplain regulations in place (FEMA 2017).

4.7 Historic Properties and Cultural Resources

The NHPA and its implementing regulations at 36 CFR Part 800 define historic properties and cultural resources broadly as any prehistoric or historic district, site, building, structure, or object listed in, or eligible for listing in, the National Register of Historic Places (NRHP); records, artifacts, and physical remains associated with the NRHP-eligible historic properties; and properties of traditional, cultural, or religious importance to a Native American tribe or Native Hawaiian organization that meet National Register criteria. The NRCS adopts this definition in carrying out its federal responsibilities under the Act.

In accordance with Section 106 (54 USC § 306108) of the NHPA, the NRCS considers the potential effects of its proposed undertakings on historic properties and cultural resources. The NRCS must also comply with numerous other federal laws, regulations, policies, and directives put in place to protect such resources, including the Archaeological and Historic Preservation Act (16 USC § 469); American Indian Religious Freedom (42 USC § 1996); Archaeological Resources Protection Act (16 USC § 470aa–470mm); Native American Graves Protection and Repatriation Act (25 USC § 3001, *et seq.*); EO 13175, *Consultation and Coordination with Indian Tribal Governments* (2000); and EO 13007, *Indian Sacred Sites* (1996), among others.

The undertaking is predicated on voluntary landowner participation. This makes a definitive boundary for determining effect impossible until each landowner application is received and approved. Therefore, NRCS used the exterior boundaries of the five watersheds as a preliminary area of potential effect (APE), conducted review of Pennsylvania's Historic and Archaeological Resource Exchange (PA-SHARE) identified 273 archaeological sites, 2,049 historic architectural resources, and 21 historic districts that

have been previously recorded in the project area. Only three of the archaeological sites have been evaluated and recommended eligible for listing in the NRHP; an additional 520 architectural resources are listed in, or potentially eligible for listing. These include ten historic districts listed in the NRHP, and six historic districts determined potentially eligible for listing (see Appendix C). While large portions of the project area have a high probability for archaeological finds, project sites under the proposed action primarily consist of previously disturbed agricultural lands of limited extent.

4.8 Invasive Species

4.8.1 Vegetation

Invasive plants reproduce and spread rapidly over the landscape with limited natural controls (e.g., herbivores and disease) in place. According to [IMapInvasives](#), the project area contains more than 250 different invasive plant species. Some of the more documented invasive plants in the project area include autumn olive (*Elaeagnus umbellata*); amur honeysuckle (*Lonicera maackii*); Japanese hops (*Humulus japonicus*); royal paulownia (*Paulownia tomentosa*); fig-root buttercup (*Ficaria verna*); purple deadnettle (*Lamium purpureum*); burning bush (*Euonymus alatus*); multiflora rose (*Rosa multiflora*); and Oriental bittersweet (*Celastrus orbiculatus*).

4.8.2 Wildlife

Invasive animals consist of mammals, birds, fish, amphibians, reptiles, invertebrates, and their associated fungi or bacteria. These wide-ranging species threaten native wildlife directly (e.g., predation) and indirectly (e.g., habitat or ecosystem change). Invasive animals documented in the project area include the red-eared slider (*Trachemys scripta elegans*); giant gardenslug (*Limax maximus*); Japanese beetle (*Popillia japonica*); Oriental beetle (*Exomala orientalis*); brown marmorated stink bug (*Halyomorpha halys*); spotted lanternfly (*Lycorma delicatula*); harlequin cabbage bug (*Murgantia histrionica*); and cabbage white butterfly (*Pieris rapae*) (PNHP 2015).

4.9 Land Use

Chester County is part of the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD metropolitan statistical area. Located immediately west of the city of Philadelphia, the county ranks as one of the fastest growth areas in the state and nation. Rolling hills and valleys characterize the landscape of Chester County. Within the project area, fertile, loamy soils and a temperate climate provide favorable conditions for agriculture (see Appendix C). Based on the most recent available data agriculture (34.9 percent) is the predominant land use in Chester County (see Appendix C), followed by forested (25.9 percent) and single-family residential (19.2 percent) (Chester County Planning Commission 2017).

The 109,285-acre project area encompasses all or portions of 13 drainage basins in southern Chester County. The project area is further divided by its discharge points downstream that ultimately drain to either the upper Chesapeake Bay (i.e., the west-southwest portions) or the Delaware Bay (i.e., the central-southeast portions). These larger drainage basins are subject to interstate watershed management agreements due to their social, ecological, and economic importance.

4.10 Long-Range Weather Forecasting

The climate of Chester County is typical of the mid-Atlantic US. High humidity is relatively constant and average temperatures range from 82°F to 62°F in the summer, and from 25°F to 41°F in the winter. Annual precipitation is approximately 45 to 48 inches and, in general, evenly distributed throughout the year (CCWRA 2001). Over 90 percent of storm events in the county total less than 1-inch in rainfall. On average, one 2.5-inch storm occurs each year (FEMA 2017).

Although temperatures will continue to be variable from year-to-year, a [2021 Climate Change Impacts Assessment](#) for Pennsylvania projects the Commonwealth's average annual temperature to increase by 5.9 °F by 2050 from a baseline time period of 1971-2000. Average annual temperature data for Chester County shows a warming trend over the last century. From 1922-2022, the average temperature increased by +0.3 °F per decade or +3.0 °F; from 1972-2022 (50 years) by +0.6 °F per decade or +3.0 °F; and from 1997-2022 (25 years) by +0.4 °F per decade or +1.0 °F above the first-year baseline (NOAA 2023).

While climate models for Pennsylvania generally agree that temperatures across the Commonwealth will increase in the coming decades, how precipitation will change is more difficult to model due to limited statistical downscaling techniques (PADEP 2021). However, data for Chester County indicate a similar trend for future increases in average annual precipitation. From 1922-2022, the average precipitation increased by +0.7 inches per decade or +7.0 inches; from 1972-2022 (50 years) by +0.8 inches per decade or +4.0 inches; and from 1997-2022 (25 years) by +2.7 inches per decade or 6.8 inches above the first-year baseline (NOAA 2023).

For more inland areas such as Chester County, climate change risks primarily include heavy precipitation, flooding, and heat waves. These risk factors are most consequential for disadvantaged communities, particularly those situated in urban areas (PADEP 2021). According to the [Agency for Toxic Substances and Disease Registry](#), portions of the project area have overall social vulnerability index (SVI) scores ranging from 0.75 to 0.92 indicating a high level of vulnerability⁴. These areas generally occur in the southwest (Nottingham Township north-northeast through Oxford Borough); north-central (Penn Township east to Avondale Borough and through northern New Garden Township); and east-southeast (from Kennett Square Borough south to the state line with Delaware) parts of the project area (ATSDR 2020).

4.11 Migratory Birds

The project area lies within the Atlantic Flyway, a major north-south flyway for migratory birds in North America. Table 4-3 lists the migratory birds of conservation concern with potential to occur in the project area.

Table 4-3. Migratory Birds of Conservation Concern Associated with the Project Area.

Scientific Name	Common Name	Breeding Season
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	15 May to 10 October
<i>Setophaga cerulea</i>	Cerulean Warbler	28 April to 20 July
<i>Chaetura pelagica</i>	Chimney Swift	15 March to 25 August

⁴ SVI scores range from 0 (lowest vulnerability) to 1 (highest vulnerability).

Scientific Name	Common Name	Breeding Season
<i>Antrostomus vociferus</i>	Eastern Whippoorwill	1 May to 20 August
<i>Geothlypis formosa</i>	Kentucky Warbler	20 April to 20 August
<i>Setophaga discolor</i>	Prairie Warbler	1 May to 31 July
<i>Protonotaria citrea</i>	Prothonotary Warbler	1 April to 31 July
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	10 May to 10 September
<i>Euphagus carolinus</i>	Rusty Blackbird	Breeds elsewhere
<i>Hylocichla mustelina</i>	Wood Thrush	10 May to 31 August

Source: USFWS 2022a

4.12 Natural Areas

Designated natural heritage areas (NHAs) exist within the project area that contain one or more plant or animal species of concern, as determined by state or federal authorities, or important natural communities such as those with exceptional native biological diversity. State-designated NHAs in the project area are classified as either *core habitat* or *supporting landscape* areas; when present, the latter is typically delineated as a buffer around *core habitat* areas.

In addition to NHAs, natural areas within the project area include portions of the William Penn State Forest. Table 4-4 lists some of the more substantial (i.e., by size and/or conservation value) natural area designations associated with the project area (see Appendix C).

Table 4-4. Natural Area Designations Associated with the Project Area

Watershed	Natural Heritage Area	Important Bird Area
Octoraro Creek	Nottingham Serpentine Barrens.	State Line Barrens
	Goat Hill Serpentine Barrens	Octoraro Reservoir
	Oxford Airport Barrens	William Penn State Forest
Big and Little Elk Creek	Big Elk Creek	None identified.
	Chrome Serpentine Barrens	
	Ewing Road Wetland	
White Clay Creek	Middle Branch White Clay Creek	Laurels, King Ranch and Stroud
	West Branch White Clay Creek	White Clay Creek Wild and Scenic River Designated Area
	White Clay Creek	Stateline Woods Preserve
	Avondale Woods	
Red Clay Creek	Longwood Gardens	Red Clay Creek Valley

Sources: PNHP 2015 and 2022b

Watershed	Natural Heritage Area	Important Bird Area
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Ecosystem services associated with the many parks, natural areas, and public spaces within and adjacent to the project area include recreation (e.g., fishing, kayaking/boating, bird watching, hiking, and biking), rural landscapes, and historic buildings and sites, among other *cultural* services (refer to maps in Appendix C).

4.13 Prime Farmland and Farmland of Statewide Importance

Nearly 50 percent of soils in the project area are defined as “prime farmland” under the Farmland Protection Policy Act (7 USC Parts 4201-4209) (see Appendix C), as per Table 4-9 in Section 4.17. An additional 18 percent of soils are designated as “farmland of statewide importance.” Overall, 68 percent of project area soils are classified for physical and chemical properties that are highly conducive to crop production (NRCS 2022c).

4.14 Regional Water Resource Plans

Since 1983, the Chesapeake Bay Program and its partners have used written agreements to guide the restoration of the CBW and estuary. In accordance with [Pennsylvania’s Phase 3 Chesapeake Bay Watershed Implementation Plan](#) (2022), the CCCD maintains a County Implementation Plan (2014) to guide CBW restoration efforts within its jurisdiction (CCWRA 2022a).

There is one regional water resource plan that specifically addresses the project area, the *Integrated Water Resources Plan for Chester County, Pennsylvania, and its Watersheds* (2002) (Watersheds). Ecosystem services incorporated into the county’s land use planning processes via watersheds include ground water recharge, stream baseflows, stream channel stability, flood management, water quality, riparian buffers, and protection of aquatic species (CCPC 2018).

4.15 Riparian Areas

Pennsylvania requires municipalities to address the protection of natural resources in their comprehensive plan and zoning code by complying with minimum mandatory standards; optional standards for natural resources protection provide municipalities with discretion to address unique local conditions or preferences. Riparian area protection ordinances are optional standards, adopted by some municipalities in the project area, but not others (CCPC 2018).

Riparian area vegetation generally occurs within approximately 150 feet of surface waterbodies (Appendix C). Table 4-5 characterizes the nature and extent of riparian areas in the project area.

Table 4-5. Riparian Buffers in the Project Area

Watershed	Hardwood Cover in Riparian Zone (%) ^{1/}	Riparian Buffer Downstream of Farms (avg. ft.) ^{2/}	Riparian Zones in Project Area (acres) ^{3/}
Elk Creek ^{4/}	62.7	237.7	3,803
Octoraro Creek	62.6	277.6	1,438
Red Clay Creek	58.6	159.8	2,664

White Clay Creek	63.2	274.3	3,910
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Sources: USEPA 2022a and 2019

^{1/} *Hardwood Cover in Riparian Zone* defined as percent of land area within approximately 150 feet of waterbodies covered by hardwood trees or forests, or woody wetlands (USGS 2016).

^{2/} *Riparian Buffer Downstream of Farms* defined as average width of buffers contiguous to a stream and intersected by agricultural flow paths; excludes riparian areas not also containing an agricultural upslope (USGS 2016 and USDA 2010)

^{3/} *Riparian Zones in Project Area* defined as acreage of land within 150 feet of flowing surface water.

^{4/} Percentages for Elk Creek include Little and Big Elk Creek within the project area.

4.16 Socioeconomics

4.16.1 Population

Population characteristics and trends for the project area are summarized in Table 4-6.

Table 4-6. Population Characteristics for the Project Area

Jurisdiction	Population (2010)	Population Estimate (2021)	% Change (2010-2021)	Population Forecast (2040)	% Projected Change (2021-2040)
Chester County	498,886	538,649	+ 8.0	620,391	+ 15.2
Borough					
Avondale	1,265	1,267	+ 0.2	1,503	+ 18.6
Kennett Square	6,072	5,925	- 2.4	8,283	+ 39.8
Oxford	5,077	5,737	+ 13.0	6,103	+ 6.4
West Grove	2,854	2,767	- 3.0	3,129	+ 13.1
Total:	15,268	15,696	+ 2.8	19,018	+ 21.2
Township					
East Marlborough	7,026	7,529	+ 7.2	9,663	+ 28.3
East Nottingham	8,650	8,969	+ 3.7	11,007	+ 22.7
Elk	1,681	1,707	+ 1.5	1,943	+ 13.8
Franklin	4,352	4,424	+ 1.7	5,304	+ 19.9
Kennett	7,565	8,724	+ 15.3	10,593	+ 21.4
Londonderry	2,149	2,523	+ 17.4	2,889	+ 14.5
Lower Oxford	5,200	5,410	+ 4.0	6,080	+ 12.4
New Garden	11,984	11,393	- 4.9	13,779	+ 20.9
New London	5,631	5,801	+ 3.0	7,381	+ 27.2
Penn	5,364	5,640	+ 5.1	7,466	+ 32.4
Upper Oxford	2,484	2,550	+ 2.7	2,630	+ 3.1

Jurisdiction	Population (2010)	Population Estimate (2021)	% Change (2010-2021)	Population Forecast (2040)	% Projected Change (2021-2040)
West Fallowfield	2,566	2,457	- 4.2	2,739	+ 11.5
West Marlborough	814	818	+ 0.5	827	+ 1.1
West Nottingham	2,722	2,790	+ 2.5	2,895	+ 3.8
Total:	68,188	70,735	+ 3.7	85,196	+ 20.4
Project Area					
Total:	83,456	86,431	+ 3.6	104,214	+ 20.6

Sources: DVRPC 2021; USCB 2021, 2022a, and 2022b

4.16.2 Area Employment and Income

As an industry, agriculture employs approximately 2 percent of Chester County’s labor force. By comparison, agriculture employs nearly 9 percent of the labor force in the project area. As shown in Table 4-7, unemployment is lower in the county and project area as compared to the state.

Table 4-7. Labor Force Characteristics of the Project Area ^{1/ 2/}

Indicator	Municipalities in the Project Area	Chester County	Pennsylvania
Labor Force	47,037	291,100	6,448,000
Employed	45,154	282,600	6,175,000
Unemployed	1,862	8,500	273,000
Unemployment Rate	2.7 %	2.9 %	4.2 %

Sources: USCB 2021, 2022a, and 2022b; PA DL&I 2022

^{1/} Municipal data for the project area are 5-year estimates obtained from the 2016-2020 American Community Survey.

^{2/} County and state data are preliminary for August 2022, as obtained from the Pennsylvania Department of Labor and Industry.

4.16.3 Socioeconomics of the Mushroom Industry

Table 4-8 compares mushroom production in Chester County from 2007 to 2017. Largely driven by mushroom farms in Chester County, the mushroom industry in Pennsylvania generates more than \$750 million in sales of mushrooms, spawn, casings, and compost each year. Including the sales of related products, the industry’s total economic impact is estimated at more than 1 billion dollars annually. Employment in the mushroom industry also generates a substantial amount of state tax revenue and post-harvest MC has market potential beyond its traditional reuse as a soil amendment.

Fresh or cured MC is a viable “green” product as an organic soil amendment and fertilizer for crop production systems; however, its low value and seasonal demand as a soil amendment relative to its volume continues to limit its profitability as a retail product. More effective management, marketing, and distribution of MC presents an opportunity to address this challenge.

Ecosystem services generated from the *provisioning* of MC in the marketplace are primarily associated with its properties as a soil amendment. When properly managed, MC improves soil structure; provides nutrients and promotes their uptake by plants; increases soil microbial populations, cation exchange capacity, and aeration; improves plant root structure and soil water status; and reduces soil compaction. MC also lends well to commercial applications such as land reclamation and structural erosion and sedimentation controls.

Table 4-8. Mushroom Production, Chester County, Pennsylvania (2007-2017)

Agricultural Statistic	2007	2017	Percent Change
Farms with Production	76	68	- 11
Sales (\$)	345,915,268	450,377,718	+ 30
Production Area (square feet)	13,796,600	13,453,166	- 2

Source: USDA 2017a

4.17 Soil Resources, including Stormwater Management

Most of the project area lies within the upland section of the Piedmont Province, a physiographic area formed from the weathering and erosion of schist, gneiss, metaquartzite, and other metamorphic and igneous rocks. The rounded hills and valleys that characterize the county resulted from the varied resistance to weathering and erosion of the different rocks. Elevations within the project area are variable but generally range from 200 to 600 feet above mean sea level (CCWRA 2001).

Most soils in the project area are moderately well to well drained. The depth to any restrictive layer across is greater than 20 inches; the depth to the permanent water table is 2 feet or more (NRCS 2022c). Table 4-9 characterizes the predominant soils associated with the project area, defined as a soil series equal to or greater than 1 percent of its land area.

Ecosystem services provided by soil resources include water filtration, carbon sequestration, nutrient cycling, and stormwater management.

Table 4-9. Predominant Soils in the Project Area

Soil Series	Percent of Project Area (%)	Drainage Class	Range in Slope (%)	Erosion Potential (Kw) ^{1/}	Compost Rating ^{2/}	Farmland Status
Baile	3	poor	0–8	0.37	poor	-
Califon	1	moderately well	0–15	0.32	poor to fair	prime farmland
Chester	2	well	0–65	0.43–0.49	fair	prime farmland
Chrome	2	well	0–45	0.32	poor	farmland of statewide importance

Soil Series	Percent of Project Area (%)	Drainage Class	Range in Slope (%)	Erosion Potential (Kw) ^{1/}	Compost Rating ^{2/}	Farmland Status
Clarksburg	1	moderately well	0–25	0.37	fair	prime farmland
Codorus	3	moderately well	0–3	0.32	fair	prime farmland
Cokesbury	1	poor	0–8	0.20–0.37	poor	-
Conowingo	1	moderately well	0–15	0.43	fair	farmland of statewide importance
Conestoga	2	well	0–25	0.43	fair	prime farmland
Edgemont	2	well	0–70	0.10–.15	poor	-
Gailla	1	well	2–25	0.37	poor	prime farmland
Gladstone	6	well	0–65	0.15–.28	poor	prime farmland
Glenelg	36	well	0–55	0.37–.43	poor to fair	-
Glenville	5	moderately well or somewhat poor	0–15	0.49–.55	poor	prime farmland
Hatboro	3	poor	0–3	0.37	poor	-
Manor	19	well	0–60	0.28–.49	poor to fair	-
Neshaminy	1	well	0–70	0.17–0.37	poor	prime farmland
Parker	2	somewhat excessive	3–70	0.10–0.32	poor	prime farmland
Urban Land	9	-	-	-	-	-
Water	< 1	-	-	-	-	-

Source: NRCS 2022c.

^{1/} Factor Kw (whole soil) is an indicator of soil susceptibility to sheet and rill erosion. Based primarily on percentage of silt, sand, and organic matter, and soil structure. Kw values range from 0.02 to 0.69. In general, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

^{2/} Based upon soil properties conducive for use as a natural composting medium to assist in biological degradation of organic material. Rates soils (i.e., good, fair, or poor) from the surface to 79 inches considering relevant factors such as workability, depth to bedrock and water table, erosion, and slope.

4.17.1 Stormwater Management

All municipalities in the project area have adopted the minimum provisions of Chester County's Stormwater Management Plan; however, agricultural activities in (as defined at 25 PAC Part 102) are exempt from state mandated erosion and sediment controls (CCWRA 2002).

4.18 Sole Source Aquifers

The interior most portions of the New Jersey Coastal Plain Aquifer underlie lands to the east-southeast of the project area in Delaware, as well as a small portion of northeast Chester County (USEPA 2022d). As such, portions of the project area likely contribute to recharge of this sole source aquifer either downstream or downgradient of Chester County towards the south-southeast.

4.19 Water Quality

4.19.1 Surface Waters

Pursuant to the federal Clean Water Act (CWA), the Pennsylvania Department of Environmental Protection (PADEP) sets and enforces water quality standards for the surface waters of the Commonwealth. Most streams in Chester County are listed as “impaired” under the CWA or below the water quality standards set based on their designated human use or natural function (PADEP 2022c). Total maximum daily loads (TMDLs) associated with the project area currently include the Chesapeake Bay TMDL (nutrients and sediments) and a series of TMDLs for streams within the Christina River Basin (bacteria, nutrients, and sediments), including White Clay Creek.

Water quality impairments in the project area are associated with nutrients, total suspended solids, turbidity, biological oxygen demand, organic enrichment, eutrophication, phosphorus, and low dissolved oxygen (PADEP 2022a and 2014; CBP 2022). According to [USEPA](#), approximately 52.7 miles of streams or rivers in the project area are listed as impaired. These waterbodies are part of the Red Clay (14.6 miles), White Clay (29.1 miles), and Elk (9.0 miles) Creek watersheds. However, according to more recent assessment data from the [PADEP](#), waterbodies with one or more impairments (i.e., aquatic life, recreational, fish consumption, or potable water supply) extend throughout the entire project area (see Appendix C).

Contaminants in surface water commonly associated with the mushroom composting industry include nutrients from organic matter such as nitrogen and phosphorous, chemicals in pesticides, pathogens, bacteria, and sediments. To manage or control flies and fungus gnats, mushroom growing facilities are licensed to spray chemical products (e.g., methoprene and cyromazine, among others). There are also fungal infections in mushrooms that are controlled by chemicals such as benomyl, thiabendazole, and chlorothalonil. Following a mushroom harvest, residual MC also contains varying amounts of salt in the form of positively charged cations of potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), and sodium (Na^+). These soluble salts can leach into stormwater the excess amounts of which are a water quality concern.

Contaminant concentrations in residual MC can vary based upon the makeup of the original substrate, wet or dry weight of the post-harvest MC, duration of exposure to environmental elements, and stage of anaerobic decomposition. The monitoring and management of these variables during MC operations largely determines the nature and extent of water quality impacts downstream of such sites.

4.19.1.1 Pennsylvania Special Protection Waters

Table 4-10 identifies state-designated special protection waters in the project area. The high quality (HQ) streams in the project area are further classified as trout stocking-migratory fishes (TSF-MF) waters; the exceptional value (EV) streams are further classified as migratory fishes (MF) waters (refer to maps in Appendix C). Other surface waterbodies in the project area are classified as TSF-MF or cold water fishes (CWF)-MF waters (CCWRA 2022c and 2015).

Table 4-10. Special Protection Waters within the Project Area

Subwatershed	HQ Streams	EV Streams
Elk Creek	Big Elk Creek Little Elk Creek Ways Run Hodgson Run	Jordan Run Barren Brook
Octoraro Creek	-	Black Run Unnamed tributary of Octoraro Creek
White Clay Creek	-	East Branch White Clay Creek

Sources: CCWRA 2001 and 2022b.

4.19.1 Ground Water

Ground water quality in the project area is generally in compliance with water quality standards. The main MC constituents of concern with potential to affect ground water resources are the same as those described above for surface waters. MC constituents released into the environment can be transported offsite and pose a risk to drinking water sources.

Based on ground water samples collected between 1925 and 2001, agriculture land use within the project area can be linked to higher levels of dissolved oxygen, nitrate and nitrite, dissolved phosphorus, and pesticides. However, the number of samples detected above a regulatory threshold or minimum reporting level were few to none over this period (CCWRA 2019).

Table 4-11 averages the relevant and available water quality sampling data for watersheds in the project area.

Table 4-11. Water Quality Data by Watershed ^{1/}

	pH ^{3/}	Total Dissolved Solids ^{4/}	Dissolved Oxygen ^{5/}	Ammonia dissolved	Nitrate dissolved ^{6/}	Nitrite dissolved ^{6/}	Ortho- phosphate dissolved ^{6/}
Watershed Name	std.	mg/L ^{2/}					
Octoraro Creek	7.8	216	13.9	< 0.014	8.33	0.004	0.016
Elk Creek	6.9	150	12.8	< 0.017	5.68	0.007	0.041
White Clay Creek	8.0	260	13.1	< 0.018	4.69	0.062	0.101
Red Clay Creek	7.6	332	11.9	< 0.096	3.98	0.031	0.019

Source: USGS 2022.

	pH ^{3/}	Total Dissolved Solids ^{4/}	Dissolved Oxygen ^{5/}	Ammonia dissolved	Nitrate dissolved ^{6/}	Nitrite dissolved ^{6/}	Ortho- phosphate dissolved ^{6/}
Watershed Name	std.	mg/L ^{2/}					

^{1/} Data presented is averaged across water sampling locations within each watershed. All samples collected in the fall, as reported: Octoraro Creek (2015, 2017, and 2020); Elk Creek (2008 and 2021); White Clay Creek (2002, 2008, 2011, 2013, 2016, 2021); and Red Clay Creek (2019 and 2021) (USGS 2022).

^{2/} mg/L (milligrams per liter) are equivalent to ppm (parts per million).

^{3/} pH values are on a scale from 0 to 14, with 7 considered neutral. Solutions with a pH below 7 are considered acidic and those with a pH above 7 are considered basic. The pH scale is logarithmic, meaning that every one-unit change in pH represents a ten-fold change in acidity (USEPA 2021c).

^{4/} Total dissolved solids derived from specific conductance using factor of 0.6712. Specific conductance is a conductivity measurement made at or corrected to 25° C; salinity is a strong contributor to conductivity (FONDRIEST 2022).

^{5/} Dissolved oxygen (DO) is an indicator of biological health. For example, the range in tolerance for DO in fish is 0.0 to 10 or too low (0.0-3.0), stressful (3.0-7.0), and supportive (8.0-10.0) dependent on species (USEPA 2021a).

^{6/} Ammonia, nitrate, and nitrite are the inorganic forms of nitrogen bioavailable for aquatic plant and algae growth. Ammonia is most toxic to aquatic life while nitrate and nitrite are most common in surface waters with high nitrogen concentrations. Orthophosphate is the inorganic form of phosphorus taken up by aquatic plants and algae (USEPA 2021b).

4.20 Water Resources

Water supply systems within the project area range from privately owned wells to larger community supply systems with extensive, interconnected piping systems. Sources of water include reservoir intakes (36 percent), in-stream intakes (47 percent), and wells (11 percent). Public water systems in the project area are associated with population centers (i.e., incorporated areas). All other portions of the project area rely on wells for potable water and reservoir or stream intakes for non-potable water.

In general, mushroom composting does not require substantial inputs of water due to the wet weight of the material collected following a harvest. As natural precipitation provides water for passive compost operations, water needs for active composting could be higher depending on the amount of rainwater capture or recycled water use involved in a particular operation. Since mushroom farm operations are most concentrated in the White Clay and Red Clay Creek watersheds, these farms use a higher proportion of the water budget.

4.21 Waters of the United States

Table 1-1 above identifies the main tributaries of the Susquehanna River and Delaware River within the project area and characterizes the watersheds (i.e., USGS HUC-12) associated with the project area. Some of these drainage areas extend into Maryland and Delaware to the south-southeast of the project area. The Octoraro Creek watershed contains approximately 311 miles, the subwatershed with the longest length of streams/rivers project area, as seen in Table 4-12.

Table 4-12. Watershed Characteristics for the Project Area

Watershed (HUC-12)	Total Stream Length (mi) ^{1/}	Total Drainage Area (ac) ^{2/}	Drainage in Project Area (%)
Octoraro Creek	311	119,793	11.4
Elk Creek	164	61,536	57.0 ^{3/}

Watershed (HUC-12)	Total Stream Length (mi) ^{1/}	Total Drainage Area (ac) ^{2/}	Drainage in Project Area (%)
White Clay Creek	176	68,984	56.7
Red Clay Creek	103	34,821	61.4
Total:	754	285,134	38.3

Sources: CCWRA 2001 and 2022b.

^{1/} Total stream length includes portions of watersheds in Maryland and Delaware.

^{2/} Total drainage area includes portions of watersheds in Maryland and Delaware.^{3/} Percentage includes Little and Big Elk Creek within the project area.

ac = acres; mi = miles

4.22 Wetlands

Increased agriculture and urban development over many decades have largely determined the location, extent, and type of wetland communities that remain today. Most consist of small, previously disturbed fragments of wetland vegetative communities scattered throughout the project area. Wetlands in the project area range in land cover from forest to marshes to open meadows and their composition varies by local disturbance regimes, soils, and hydrologic conditions (CCWRA 2001).

According to the US Fish and Wildlife Service’s (USFWS) National Wetland Inventory, the project area contains approximately 376 acres of freshwater emergent wetlands and 941 acres of freshwater forested/shrub wetlands. The project area also includes approximately 402 acres of freshwater ponds and 44 acres of lakes (USFWS 2022b).

4.23 Wild and Scenic Rivers

4.23.1 National Wild and Scenic Rivers System

The White Clay Creek Wild and Scenic River System includes an area from the confluence of the East and Middle Branches in London Britain Township, Pennsylvania, downstream to its confluence with the Christina River in New Castle County, Delaware. The system includes a total of 199 river miles, including 173 miles designated as *recreational* and 26 miles designated as *scenic* (NPS 2021; DRBC 2022).

4.23.2 State Scenic Rivers System

Approximately 36 miles of Octoraro Creek met the PA DCNR’s scenic and pastoral criteria and were incorporated into the system in 1983. The westernmost portion of the project area is bounded by a classified segment of Octoraro Creek (PA DCNR 2022) (see Appendix C).

Chapter 5 – Alternatives

NEPA and the PR&G require objective exploration and evaluation of reasonable alternatives to a proposed action. This chapter describes the alternative formulation, evaluation, and selection process undertaken during preparation of this Plan-PEA.

Consistent with the purpose and need statement (see Chapter 1), a reasonable alternative is one that meets the primary objective of the SLO—to address water quality concerns associated with MC operations in watersheds of southern Chester County, Pennsylvania.

5.1 Alternative Formulation

Alternative formulation for the proposed action was premised on the following principles:

- Federal assistance shall support the scope and breadth of MC operations across the project area.
- Funding decisions shall not support or create a competitive advantage amongst the pool of potential applicants.
- Evaluation criteria for decision support shall be based on the Federal Objective and PR&G.

Early project scoping for the proposed action assisted with alternative formulation. For example, information and data obtained from scoping were used to:

- Refine the purpose and need statement (see Chapter 2).
- Narrow the scope of analysis to only potential resource concerns relevant to the proposed action.
- Consider a program of land treatment contracts with individual MC operators.

Alternatives were initially formulated to provide a common or multiple common composting treatment sites. Operators would bring their compost to a common location for treatment. It was quickly realized that this alternative was impractical based on existing infrastructure, land availability, etc.

The Red-White Clay Creeks PL83-566 Watershed Project was implemented in the 2000's as a watershed protection project using individual landowner contracts for land treatment in Chester County. This historical Watershed Project informed the alternative formulation for this proposed watershed protection project. The shift to consideration of land treatment contracts was supported by both NRCS Pennsylvania and the SLO.

In consultation with the SLO and other project stakeholders, the NRCS conducted a thorough review of all the conservation practices to evaluate their effectiveness in meeting the identified program objectives. The screening of conservation practices specific to Pennsylvania's mushroom industry as a means of implementing the proposed action informed the formulation of alternatives. The initial list of conservation practices and more specific program objectives supported alternative formulation as screening criteria for consistency with the purpose and need of the proposed action.

5.2 Alternatives

5.2.1 Alternatives Considered but Dismissed

As described above in Section 5.1, multiple alternatives formulated for the proposed action were considered but dismissed upon further evaluation. The structural alternative that initially received considerable support from project stakeholders is briefly described below, along with an alternative considered as part of the NRCS conservation practice evaluation.

5.2.1.1 Centralized Active MC Facility Alternative

This alternative would offer federal cost-share assistance to construct a regional MC facility in the project area. Technical and financial assistance under this alternative would focus solely on the siting, design, and construction of an appropriately sized facility for this purpose. Logistically, the facility would provide individual MC operators with a centralized capability for the storage, treatment, and/or distribution of MC within or beyond the project area. Under this alternative, strategically located staging platforms within the project area would facilitate MC collection and transport. The centralized facility would help to address local supply and demand issues associated with MC operations. In the longer term, this alternative would help bridge the gap between local MC operators and more distant and diverse markets for the use of MC in the commercial sector (e.g., mine reclamation, pond construction, contaminant cleanup, stormwater management, or as fill material for transportation projects).

However, the Centralized Active MC Facility alternative would also be subject to substantial potential risk and uncertainty. These concerns primarily related to the siting and design of such a facility (e.g., land acquisition and land use compatibility), the infrastructure necessary to support its operation (e.g., roadway condition and capacity), and unknown future market demand for MC use in other commercial applications. Therefore, this alternative was dismissed from further analysis as not practical or feasible (NWPM 501.37; USDA 2017b).

5.2.1.2 Full Conservation Practices Alternative

This alternative would make the full suite of the NRCS' Pennsylvania conservation practices available to program applicants to achieve program objectives. Almost 140 conservation practices could be used as stand-alone or combined conservation systems, so long as they achieve the desired results. Under this alternative, applicants would have the flexibility to propose more wide-ranging practices increasing the scope and extent of water quality improvement projects that could be approved for technical and financial assistance. However, upon evaluating the complete portfolio of NRCS conservation practices applicable to Pennsylvania, the increased flexibility offered did not outweigh the increased risks assumed by program participants under this alternative. Reduced efficiency and additional costs would be incurred by the increased time and money associated with developing and reviewing proposals that would fall outside the program's purview. Therefore, this alternative was dismissed from further analysis in this Plan-PEA.

5.2.2 Alternatives Selected for Further Analysis

Scoping for the proposed action ultimately determined that only a flexible cost-share program catered to individual MC operators would constitute a reasonable alternative. In other words, only such a program would be consistent with the purpose and need of the proposed action.

Based on PR&G criteria (USDA 2017b), these alternatives were subject to further evaluation. However, it was determined that only two such alternatives would meet the purpose and need of the proposed action: a program for passive MC operators only (Alternative 1); and a program for both passive and active MC operators (Alternative 2).

Under Alternatives 1 and 2, applicants for federal cost-share assistance could be evaluated on the merits of their unique project proposals considering a particular site, operation, capability, or resource. Only Alternatives 1 and 2 would allow these considerations on a case-by-case basis. Therefore, Alternative 1 (Passive MC Operations Only) and Alternative 2 (All MC Operations), along with the No-Action Alternative, are carried forward for more detailed analysis in this Plan-PEA.

5.2.2.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, the NRCS would not offer a program to address resource concerns from MC operations in southern Chester County. Most MC sites would continue to lack the controls necessary to prevent, capture, or treat water and wastewater prior to its discharge into the environment. In the short term, MC operations would continue contributing to reduced surface and ground water quality at levels commensurate with existing conditions. Over time, unless state regulations change, the cumulative adverse effects of MC operations on water quality would likely increase in severity and intensity.

While the No-Action Alternative would not satisfy the purpose of and need for the proposed action, it is retained to provide a comparative baseline against which to analyze the effects of the action alternatives, as required under the CEQ regulations (40 CFR § 1502.14(c)). The No-Action Alternative reflects the status quo and serves as a benchmark against which the effects of the proposed action can be evaluated.

5.2.2.2 Alternative 1 – Passive MC Operations Only (Future with Limited Federal Investment [FWLFI])

Scoping for the proposed action ultimately determined that only a flexible cost-share program catered to individual MC operators would constitute a reasonable alternative. Alternative 1 develops a PL 83-566 Land Treatment Program, offering incentive payments to mushroom composters for the implementation of site-specific planned conservation practices. Operators would apply to the program with a proposed project and the program would implement projects based on the merit of the project. The program would employ methodology to screen and rank applicant projects, evaluate and compare the potential benefits, and design and construct the projects that reflect the highest net benefit based on project ranking criteria. As the program is based on voluntary participation, exact project sites have not been identified. The specific measures installed would be driven by program participation and evaluated on a site-specific basis.

Based on review and evaluation of 137 NRCS' Pennsylvania conservation practices, seven practices were identified as being most relevant or suitable to accomplishing the specific program objectives. These are the core conservation practices shown in Table 5-1. The applicability of these conservation practices were further validated by representative MC site investigations, preliminary conservation system designs, and the collection of associated cost data (see Appendix D). Each land treatment project would be required to include one or more core conservation practices to be eligible for the program. Supporting practices, Table 5-2, can be installed with an associated core practice to enhance a project or increase the benefits of the conservation system. As shown in Table 5-1 and Table 5-2, the effectiveness of these conservation practices was validated by the NRCS Conservation Practice Physical Effects (CPPE) database. Justification for conservation practice non-inclusion is provided in Appendix D.

Table 5-1. Mushroom Composting Core Conservation Practices

Conservation Practice Standard (CPS)	CPS Code	CPPE Water Quality Score ^{1/}	CPPE Air Quality Score ^{2/}	Justification
Composting Facility	317	18	8	Used to compost manure and other organic material; one purpose is to reduce water pollution potential. Typically involves installation of impervious pad for either bins or a windrow composting system.
Heavy Use Area Protection	561	15	5	Used to stabilize or protect an intensively used area; one purpose is to protect or improve water quality. Typically involves installation of impervious slab to prevent infiltration and allow collection of runoff.
Riparian Forest Buffer	391	98	25	Used to reduce transport of sediment to surface water, and reduce transport of pathogens, chemicals, pesticides, and nutrients to surface and ground water by planting an area adjacent to and up-gradient from a watercourse or water body with trees and/or shrubs.
Roofs and Covers	367	15	1	The purpose of the practice is: protect clean water by excluding precipitation from potential contaminants; improve waste management and utilization to protect nearby surface water quality; and/or reduce emissions of ammonia, odorous sulfur compounds, greenhouse gases, volatile organic compounds, and particulate matter to improve air quality. Typically involves installing a roof (and sometimes sides) over a waste storage facility, heavy use area, composting facility, or waste treatment facility.
Sprinkler System	442	42	15	This practice is often used by the industry to land apply wastewater to a treatment area.
Waste Storage Facility	313	16	13	Store liquid (wastewater) or solid waste to minimize or eliminate the impacts on surface water; minimize or eliminate the impacts on groundwater resources; and/or minimize emissions such as greenhouse gases to improve air quality. Typically involves installation of concrete structure or HDPE-lined storage pond.
Waste Treatment	629	31	12	Used to change the characteristics of agricultural waste to improve water quality in surface and ground water by better management of excess nutrients from manure or agricultural waste; improve air quality by reducing particulate and greenhouse gas emissions and objectionable odors from manure or agricultural waste; facilitate desirable handling and storage properties of manure or agricultural waste; and/or convert manure and other agricultural waste into organic amendment beneficial to soil health.

Sources: [FOTG | PA, Section 4 - Practice Standards and Supporting Documents](#) and [Conservation Practice Physical Effects \(CPPE\)](#) (2024)

^{1/} Conservation Practice Physical Effect considering water quality resource concerns including: Nutrients Transported to Surface Water, Nutrients Transported to Ground Water, Pathogens and Chemicals from Manure, Bio-solids or Compost Applications Transported to Surface Water, Pathogens and Chemicals from Manure, Bio-solids or Compost Applications Transported to Ground Water, Sediment Transported to Surface Water, Sediment Transported to Ground Water, Pesticides Transported to Surface Water, Pesticides Transported to Ground Water, Salts Transported to Surface Water, and Salts Transported to Ground Water

^{2/} Conservation Practice Physical Effect considering air quality resource concerns including: Emissions of Particulate Matter (PM) and PM Precursors, Emissions of Greenhouse Gasses – GHGs, Emissions of Ozone Precursors, Objectionable Odor, and Emissions of Airborne Reactive Nitrogen

Table 5-2. Mushroom Composting Supporting Conservation Practices

Conservation Practice Standard (CPS)	CPS Code	CPPE Water Quality Score ^{1/}	CPPE Air Quality Score ^{2/}	Justification
Access Road	560	18	1	Access roads are often needed to allow vehicular traffic to move between roadways, composting areas, waste storage areas, and heavy use areas.
Air Filtration and Scrubbing	371	17	0	This practice could be used with a roof and cover or as part of a waste treatment (incineration or gasification) system to reduce air emissions.
Amendments for Treatment of Agricultural Waste	591	36	12	This practice could be used in combination with a waste storage facility to improve/protect air or water quality.
Constructed Wetland	656	29	22	Constructed wetlands are used to treat runoff from mushroom wharves.
Critical Area Planting	342	63	9	Practice is commonly used to stabilize soil after implementation of a heavy use area, manure storage facility, etc.
Diversion	362	36	11	This practice may be needed to divert clean stormwater away from the composting or waste storage area.
Fence	382	18	3	As per CPS 313, a fence is required around impoundments, excavated ponds, and uncovered tanks which have exposed walls less than 5 feet above the ground surface.
Filter Strip	393	34	19	Could be used as a strip or area of herbaceous vegetation situated between disturbed land and environmentally sensitive areas (e.g. streams).
Grade Stabilization Structure	410	14	2	May be needed with a grassed waterway to control grade as part of the stormwater control system on the operation.
Grassed Waterway	412	48	10	This practice may be needed as part of the stormwater control system on the operation.
Groundwater Testing	355	0	0	Groundwater testing is required when a passive mushroom composting operation is permitted by the state as an active mushroom composting operation.
Hedgerow Planting	422	3	7	Similar to CPS 380 this practice establishes dense vegetation in a linear design for the purpose of reducing and intercepting airborne particulate matter, chemicals, and odors, and/or reducing airflow across contaminant or dust sources, and creating living visual screens.
Lined Waterway or Outlet	468	23	7	This practice may be needed as part of the stormwater control system on the operation.
Monitoring Well	353	0	0	Monitoring wells are required when a passive mushroom composting operation is permitted by the state as an active mushroom composting operation.
Mulching	484	34	5	Mulching is often used to establish vegetation after ground disturbance.
Nutrient Management	590	43	20	Needed for the land application of finished compost/wastewater runoff to provide nutrients or as a soil amendment
Obstruction Removal	500	3	0	Existing infrastructure may need to be removed to facilitate installation of proposed conservation practices.
Pond Sealing or Lining - Compacted Soil Treatment	520	24	9	May be used to line a stormwater pond. Should not be used as part of a waste storage pond.
Pond Sealing or Lining - Geomembrane or	521	24	9	This practice may be used to line a waste storage pond.

Conservation Practice Standard (CPS)	CPS Code	CPPE Water Quality Score ^{1/}	CPPE Air Quality Score ^{2/}	Justification
Geosynthetic Clay Liner				
Pond Sealing or Lining, Concrete	522	24	9	This practice may be used to line a waste storage pond or provide a stabilized access to pump out of the facility.
Pumping Plant	533	28	0	This practice may be used to transfer wastewater to a storage facility or treatment area.
Riparian Herbaceous Cover	390	78	25	The main purpose is not water quality protection, but could be included with a riparian forest buffer.
Roof Runoff Structure	558	21	9	This practice may be needed as part of the stormwater control system on the operation.
Sediment Basin	350	15	11	May be used to capture compost-laden leachate, allowing the compost to settle out within the basin.
Soil Carbon Amendment	336	25	4	This practice can allow mushroom compost to be land applied as a carbon amendment, providing that it meets standards set in CPS 590, Nutrient Management.
Stormwater Runoff Control	570	17	6	This practice may be needed as part of the stormwater control system on the operation.
Stream Crossing	578	14	2	May be needed with an access road.
Structure for Water Control	587	23	1	Practice may be used for collecting stormwater, mushroom compost leachate, or wastewater.
Subsurface Drain	606	37	6	Practice us used as a groundwater control and/or leak detection mechanism for CPS 313 Waste Storage Facility.
Terrace	600	27	4	This practice may be needed as part of the stormwater control system on the operation.
Underground Outlet	620	12	-3	This practice may be needed as part of the stormwater control system on the operation.
Vegetated Treatment Area	635	24	9	This practice is used to develop a grassed treatment area for surface application of wastewater.
Waste Facility Closure	360	11	4	This practice may be used to close an existing waste facility that is either too small or in an undesirable location.
Waste Recycling	633	22	10	This practice allows the use of byproducts of agricultural production or the agricultural use of non-agricultural byproducts.
Waste Separation Facility	632	29	12	This is often used as an on-lot solid separation screen and riser box.
Waste Transfer	634	5	12	This practice is used to collect and move liquid wastewater through a pipeline to storage or treatment.
Waste Treatment Lagoon	359	17	15	A treatment lagoon can be used to reduce nitrogen, phosphorus, and biological oxygen demand of the effluent.
Water and Sediment Control Basin	638	7	0	This practice may be needed as part of the stormwater control system on the operation.
Well Decommissioning	351	10	8	This practice seals and permanently closes an inactive, abandoned, or unusable monitoring well.
Windbreak/ Shelterbelt Establishment	380	86	6	Trees planted in rows for the purpose of reducing and intercepting airborne particulate matter, chemicals, and odors, and/or reducing airflow across contaminant or dust sources, and creating living visual screens.

Sources: [FOTG | PA, Section 4 - Practice Standards and Supporting Documents](#) and [Conservation Practice Physical Effects \(CPPE\)](#) (2025)

Conservation Practice Standard (CPS)	CPS Code	CPPE Water Quality Score ^{1/}	CPPE Air Quality Score ^{2/}	Justification
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^{1/} Conservation Practice Physical Effect considering water quality resource concerns including: Nutrients Transported to Surface Water, Nutrients Transported to Ground Water, Pathogens and Chemicals from Manure, Bio-solids or Compost Applications Transported to Surface Water, Pathogens and Chemicals from Manure, Bio-solids or Compost Applications Transported to Ground Water, Sediment Transported to Surface Water, Sediment Transported to Ground Water, Pesticides Transported to Surface Water, Pesticides Transported to Ground Water, Salts Transported to Surface Water, and Salts Transported to Ground Water

^{2/} Conservation Practice Physical Effect considering air quality resource concerns including: Emissions of Particulate Matter (PM) and PM Precursors, Emissions of Greenhouse Gasses – GHGs, Emissions of Ozone Precursors, Objectionable Odor, and Emissions of Airborne Reactive Nitrogen

Under Alternative 1, the NRCS would offer a PL 83-566 Land Treatment Program to address water quality concerns from passive MC operations in southern Chester County. Alternative 1 would preclude active MC operators from participating in the program.

Conservation systems associated with Alternative 1 would vary in scope, extent, and cost as their design would be determined by site- and operator-specific conditions. Applicant-proposed systems under this alternative would also be subject to NRCS review and approval to determine program eligibility. Once built and operational, the performance of such systems would be subject to routine inspection, maintenance, and, if necessary, repair as stipulated by cost-share agreement. Typical conservation systems and suites of practices anticipated under Alternative 1 are summarized below in Table 5-3.

Table 5-3. Typical Conservation Practices included with Alternative 1 Mushroom Compost Land Treatment Systems

Land Treatment System	Typical Conservation Practices Standards (Code) ^{1/2/}
Convert Passive to Active (mushroom compost runoff control, capture and treatment)	Composting Facility (317) Fence (382) Heavy Use Area (560) Pumping Plant (533) Sprinkler System (442) Vegetated Treatment Area (635) Waste Storage Facility (313) Waste Transfer (634)
Convert Passive to Active with Roof (roof the mushroom compost to prevent runoff)	Composting Facility (317) Heavy Use Area (560) Roofs and Covers (367)

^{1/} Practices are listed in alphabetical order, core conservation practices in **bold** font.

^{2/} Practices necessary for stormwater and/or erosion and sediment control not shown.

Conservation systems under Alternative 1 would be comprised of basic, well-established practices that are relatively easy to construct and operate. However, in some instances, converting from passive to active MC operations would require a more substantial upfront financial commitment to achieve return on investment.

Water quality improvements under Alternative 1 would be focused on a larger pool of operators with relatively small-scale operations. As such, the water quality benefits resulting from projects under Alternative 1 would occur at geographically disparate MC sites and accrue incrementally over a longer duration of time. The average and unit costs required to convert from passive to active MC operations under Alternative 1 would reflect the lack of any prior investment in such improvements. This would likely increase the upfront financial commitment required for improvements at passive MC sites; however, projects under Alternative 1 would be less complex and time-consuming to achieve return on investment.

5.2.2.3 Alternative 2 – All MC Operations (Future with Full Federal Investment [FWFFI])

Under Alternative 2, the NRCS would offer a PL 83-566 Land Treatment Program, using the same conservation practices as in Alternative 1 (Table 5-1 and Table 5-2), to address water quality concerns from either passive or active MC operations in southern Chester County. This is an incremental increase over Alternative 1 by not limiting participation in the program. Alternative 2 would provide more administrative flexibility to focus on specific areas or concerns.

Conservation systems associated with Alternative 2 would vary in scope, extent, and cost as their design would be determined by site- and operator-specific conditions. Applicant-proposed systems under this alternative would also be subject to NRCS review and approval to determine program eligibility. Once built and operational, the performance of such systems would be subject to routine inspection, maintenance, and, if necessary, repair as stipulated by cost-share agreement. Typical conservation systems and practices anticipated under Alternative 2 are summarized below in Table 5-4.

Table 5-4. Typical Conservation Practices included with Alternative 2 Mushroom Compost Land Treatment Systems

Land Treatment System	Typical Conservation Practice Standards (Code) ^{1/2/}
Convert Passive to Active (mushroom compost runoff control, capture and treatment)	Composting Facility (317) Fence (382) Heavy Use Area (560) Pumping Plant (533) Sprinkler System (442) Vegetated Treatment Area (635) Waste Storage Facility (313) Waste Transfer (634)
Convert Passive to Active with Roof (roof the mushroom compost to prevent runoff)	Composting Facility (317) Heavy Use Area (560) Roofs and Covers (367)
Convert Active to Active with Roof (roof the mushroom compost to prevent runoff)	Composting Facility (317) Heavy Use Area (560) Roofs and Covers (367)
Install Waste Treatment (gasification or incineration of mushroom compost)	Heavy Use Area (560) Roofs and Covers (367) Waste Treatment (629)

^{1/} Practices are listed in alphabetical order, core conservation practices in **bold** font.

^{2/} Practices necessary for stormwater and/or erosion and sediment control are not shown.

The potential increase in program participation under Alternative 2 would provide the NRCS and SLO with more administrative flexibility. Further, the additional conservation systems made eligible under this alternative would increase their ability to focus on specific areas or concerns and, if appropriate, support the deployment of emerging practices or technologies. Because active operators in the project area typically manage larger volumes of MC, the scope and extent of water quality benefits could increase from a program under Alternative 2.

Water quality improvements under Alternative 2 could focus on small and/or large-scale operations. As such, projects under Alternative 2 would increase the extent and scope of potential watershed benefits. By allowing large scale MC operators to participate in the program, the average and unit costs required to invest in improvements could be lowered; however, some projects under Alternative 2 would potentially be more complex and time-consuming to achieve return on investment.

5.3 Summary and Comparison of Alternatives

Table 5-5 compares the No-Action/Future without Federal Investment (Future Without Program), Alternative 1 – Passive MC Operations Only (Future with Limited Federal Investment), and Alternative 2 – All MC Operations (Future with Full Federal Investment).

Table 5-5. Summary and Comparison of Alternative Project Plans.

Watershed Project Plan Element	Item or Concern	No-Action – Future without Program Alternative	Alternative 1 – Passive MC Operations Only	Alternative 2 – All MC Operations (Recommended)
Estimated Program Benefits/Costs				
Measures to Address	Regional and National Economic Efficiency	–	7.3M	47.2M
	Water Quality	–	+	+
	Soil Health	–	+	+
	Odor Management	–	+	+
	Cumulative CPPE Rank:	0	+ 1,132	+ 1,513
Installation Cost (\$)	NRCS Contribution	0	7.1M	9.5M
	Cost-Share Contribution	0	2.5M	2.9M
	Total:	0	9.6M	12.4M
NEE Account (\$)	Annualized Program Costs			
	Installation	0	1.1M	1.5M
	Operation, Maintenance & Replacement	0	02	0.03M
	Other Direct Costs	0	-	-
	Total:	0	1.12M	1.53M
	Annualized Program Benefits/Costs			
	Benefits	0	1.52M	5.10M

Watershed Project Plan Element	Item or Concern	No-Action – Future without Program Alternative	Alternative 1 – Passive MC Operations Only	Alternative 2 – All MC Operations (Recommended)
	Costs	0	1.14M	1.58M
	Benefit-to-Cost Ratio	n/a	1.36	6.26
Anticipated Environmental Effects				
Resource Concerns	Air Quality	No change from status quo.	Short-term, temporary, minor effects from emissions of dust or particulate matter and other criteria pollutants during construction. Long-term significant, beneficial effects on local air quality and minor, beneficial effects on regional air quality, including odor management.	Comparable to Alternative 1, but for: Potential increase in beneficial odor management effects from waste gasification and covering leachate ponds. Potential increase in scope and extent of beneficial effects post-construction.
	Ecologically Critical Areas	No change from status quo.	Short-term, indirect, negligible effects during construction. Negligible, beneficial effects post-construction.	Comparable to Alternative 1.
	Endangered and Threatened Species	No change from status quo.	May affect, but would not be likely to adversely affect threatened and endangered species and their habitat. Minor, localized, beneficial effects post-construction.	Comparable to Alternative 1, but for: Potential increase in scope and extent of beneficial effects post-construction.

Watershed Project Plan Element	Item or Concern	No-Action – Future without Program Alternative	Alternative 1 – Passive MC Operations Only	Alternative 2 – All MC Operations (Recommended)
	Essential Fish Habitat	No change from status quo.	Short-term, temporary, indirect effects during construction. Minor, localized, beneficial effects post-construction.	Comparable to Alternative 1, but for: Potential increase in scope and extent of beneficial effects post-construction.
Resource Concerns (cont'd)	Fish and Wildlife	No change from status quo.	Short-term, temporary, negligible effects during construction. Minor, localized, beneficial effects post-construction.	Comparable to Alternative 1, but for: Potential increase in extent and scope of beneficial effects post-construction.
	Floodplain Management	No change from status quo.	No direct resource effects. Short-term, temporary, indirect, negligible effects during construction. Minor, beneficial effects post-construction.	Comparable to Alternative 1.

Watershed Project Plan Element	Item or Concern	No-Action – Future without Program Alternative	Alternative 1 – Passive MC Operations Only	Alternative 2 – All MC Operations (Recommended)
	Historic Properties and Cultural Resources	No change from status quo.	Less-than-significant effects from construction in accordance with a Programmatic Agreement between the SHPO, SLO, and consultation with non-signatories in accordance with 36CFR800.2(a)(4), including federally recognized Native American tribes and other interested parties. Minor, beneficial effects post-construction.	Comparable to Alternative 1.
Resource Concerns (cont'd)	Invasive Species	No change from status quo.	Short-term, temporary, negligible effects during construction. Negligible, beneficial effects post-construction.	Comparable to Alternative 1.
	Land Use, including Regional Water Resource Plans	No change from status quo.	Short-term, temporary, negligible effects during construction. Minor, beneficial effects on local land use post-construction.	Comparable to Alternative 1.
	Long-Range Weather Forecasting	No change from status quo.	Negligible, beneficial effects.	Comparable to Alternative 1.

Watershed Project Plan Element	Item or Concern	No-Action – Future without Program Alternative	Alternative 1 – Passive MC Operations Only	Alternative 2 – All MC Operations (Recommended)
	Migratory Birds	No change from status quo.	Short-term, temporary, minor effects during construction. Minor, beneficial effects post-construction.	Comparable to Alternative 1.
	National Economic Development	No change from status quo.	Minor, beneficial effects on economic development and the environment.	Comparable to Alternative 1.
	Natural Areas	No change from status quo.	Short-term, temporary, negligible effects during construction. Minor, localized, beneficial effects post-construction.	Comparable to Alternative 1.
	Prime Farmland and Farmland of Statewide Importance	No change from status quo.	No or negligible effects	Comparable to Alternative 1.
Resource Concerns (cont'd)	Regional Water Resource Plans		Short-term, temporary, negligible effects during construction. Minor, beneficial effects post-construction.	Comparable to Alternative 1, but for: Potential increase in scope and extent of beneficial effects post-construction.
	Riparian Areas	No change from status quo.	No direct resource effects. Short-term, temporary, negligible effects during construction. Minor, localized, beneficial effects post-construction.	Comparable to Alternative 1.

Watershed Project Plan Element	Item or Concern	No-Action – Future without Program Alternative	Alternative 1 – Passive MC Operations Only	Alternative 2 – All MC Operations (Recommended)
	Socioeconomics	No change from status quo.	Minor, temporary, direct and indirect, beneficial effects on local and regional economies. Minor, beneficial socioeconomic effects on local communities.	Comparable to Alternative 1, but for: Potential increase in scope and extent of beneficial effects on local and regional economies.
	Soil Resources, including Stormwater Management	No change from status quo.	Short-term, temporary, minor effects during construction. Minor, beneficial effects post-construction.	Comparable to Alternative 1, but for: Potential increase in scope and extent of beneficial effects post-construction.
	Sole Source Aquifers	No change from status quo.	No appreciable effects during construction. Minor, beneficial effects post-construction.	Comparable to Alternative 1.
Resource Concerns (cont'd)	Water Quality	No change from status quo.	Short-term, temporary, minor effects due to construction. Direct local beneficial long-term and negligible beneficial regional effects post-construction.	Comparable to Alternative 1.

Watershed Project Plan Element	Item or Concern	No-Action – Future without Program Alternative	Alternative 1 – Passive MC Operations Only	Alternative 2 – All MC Operations (Recommended)
	Water Resources	No change from status quo.	No direct resource effects. Short-term, negligible, indirect effects during construction. Negligible, beneficial effects post-construction.	Comparable to Alternative 1.
	Waters of the US,	No change from status quo.	No direct resource effects. Short-term, negligible, indirect effects during construction. Direct local beneficial long-term and negligible beneficial regional effects post-construction.	Comparable to Alternative 1.
	Wetlands	No change from status quo.	Short-term, temporary, minor effects from emissions of dust or particulate matter and other criteria pollutants during construction. Minor, beneficial effects post-construction, including odor management.	Comparable to Alternative 1, but for: Potential increase in beneficial odor management effects from waste gasification. Potential increase in scope and extent of beneficial effects post-construction.
Resource Concerns (cont'd)	Wild and Scenic Rivers	No change from status quo.	Short-term, indirect, negligible effects during construction. Negligible, beneficial effects post-construction.	Comparable to Alternative 1.

Chapter 6 – Environmental Consequences

This chapter describes the environmental consequences of the No-Action Alternative (Future without Program [FWOP]), Alternative 1– Passive MC Operations Only (FWLFI), and Alternative 2– All MC Operations (FWFFI). The potential beneficial and adverse effects of each alternative are evaluated below for the resources described in **Chapter 4**. This chapter also evaluates the potential cumulative effects of the considered alternatives.

The resource analyses below will assist in the determination of whether to fund a program to meet the SLO's objective and, if so, what such a program requires to achieve the objective. The latter includes, but is not limited to, the administrative, technical, and financial resources necessary to implement the program in compliance with applicable federal, state, and local laws and regulations.

The NRCS developed and analyzed numerous scenarios for the conservation practices included in the proposed action. These scenarios were used to conceptually frame the considered program alternatives in this Plan-PEA. Appendix D contains additional information regarding these scenarios and the data generated for each to support of the decision-making process.

As described in this Plan-PEA, the NRCS defines a program framework for implementing the proposed action and alternatives. That framework is comprised of the core and supporting conservation practices, which are routinely subject to regulatory and technical review to ensure their currency and effectiveness. Prospective cost-share applicants under Alternative 1 or Alternative 2 would adapt these conservation practices to propose site-specific conservation systems for NRCS review and consideration. This program framework is designed to meet the SLO's water quality improvement objectives. Therefore, adherence to applicable conservation practices criteria under Alternative 1 or Alternative 2 would produce beneficial effects, as identified by the individual conservation practice standard. These may include, but are not limited to, the following:

- Protects, improves, and maintains surface and ground water quality.
- Manages overland and below ground transport of excess nutrients, organics, and other chemicals.
- Stabilizes areas subject to soil erosion and minimizes concentrated flow erosion.
- Manages overland and below ground transport of sediments.
- Converts organic waste into a soil amendment to provide plant-available nutrients and suppress plant disease.
- Improves waste or wastewater management and utilization.
- Conserves energy by reducing mass and improving the handling characteristics of waste or wastewater.
- Improves soil and plant condition, productivity, health, and vigor.
- Conserves water resources via more efficient applications and operations.
- Protects and restores riparian zone ecological communities, including wetlands and floodplains.
- Improves the quality of, and provides connectivity within/between, aquatic and terrestrial habitats.
- Provides management control to accomplish conservation objectives.

- Conveys, captures, detains, and infiltrates runoff.
- Reduces odorous or undesirable air emissions, including particulate matter.

These and other beneficial effects of the involved conservation practices are therefore incorporated into the program by design.

Other potential effects of the proposed action and alternatives are identified and described below. For purposes of analysis in this Plan-PEA, potential resource effects are described as follows:

- *Beneficial* – positive effects that improve or enhance resource conditions.
- *Negligible* – negative effects likely to occur but at levels not readily observable by evaluation.
- *Minor* – observable, measurable, tangible negative effects qualified as below significance.
- *Significant* – obvious, observable, verifiable adverse effects not mitigable to below significance.

As defined above, only effects identified as *significant* are considered *adverse*; those identified as *negligible* or *minor* constitute *less-than-significant* effects. As warranted, the *context* and *intensity* of effects are further characterized as direct or indirect; short- or long-term; and temporary, intermittent, or permanent.

6.1 Air Quality

6.1.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, air quality would continue under current conditions in the short term. Over time, human- and natural-induced events would determine changes in future air quality.

6.1.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Under Alternative 1, air quality within the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE region, including Chester County, would continue to be in non-attainment with the NAAQS for ozone (2015), and in attainment for all other NAAQS criteria pollutants (i.e., PM 10, PM 2.5, SO₂, and CO).

Construction activities under Alternative 1 would generate short-term, temporary, minor emissions of dust or particulate matter and other criteria pollutants. Adherence to standard construction site practices and protocols would lessen potential effects, as would variations in the timing and location of construction projects across the project area. Under Alternative 1, individual projects requiring more in-depth analysis would be subject to a general conformity applicability determination for compliance with the NAAQS for ozone and ozone precursors.⁵

Locally, the long-term presence of hydrogen sulfide may be significantly reduced by prevention of anaerobic conditions on passive composting operations by converting the operation to active. Active composting allows more aerobic conditions of the material, reducing the H₂S released.

⁵ The Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE AQCR is required to demonstrate attainment of the NAAQS for ozone by August 3, 2024. Under the CAA, the regulatory threshold for ozone (i.e., 0.070 ppm) is based on a 3-year average of the annual fourth highest daily maximum 8-hour average concentration.

Conservation Practices associated with Alternative 1, such as CPS 317 (Composting Facility) would result in significant, beneficial effects on local air quality and minor, beneficial effects on regional air quality, including odor management

6.1.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on air quality under Alternative 2 would be comparable to those described above for Alternative 1 with additional long-term beneficial effects.

Operators with sufficient MC throughput could propose construction and operation of a waste gasification or incineration facility (CPS 629 Waste Transfer). While such a facility would generate some emissions of carbon monoxide, particulate matter, nitrogen oxides, and carbon dioxide, emissions of H₂S gases, NMNEOCs, and ammonia would simultaneously decrease. The latter would result in long-term, minor, beneficial effects on odor management.

Under Alternative 2, waste gasification would comply with the NAAQS or other applicable provisions of the CAA. Given the small scale of proposed operations, and limited pool of qualified operators, potential effects on air quality would likely be minor and the resultant emissions would fall below regulatory thresholds. If necessary, pollution control devices or technologies would be incorporated into project designs to avoid or minimize adverse effects on air quality.

Operators with existing leachate storage ponds could propose a cover over the pond (CPS 367 Roofs and Covers) to eliminate the addition and associated treatment of rainwater. By doing so, H₂S and other odorous gases can be collected and treated, providing an improvement in local air quality.

The application of Conservation Practices on a broader range of MC operations associated with Alternative 2 would result in significant, beneficial effects on local air quality and minor, beneficial effects on regional air quality, including odor management.

6.2 Ecologically Critical Areas

6.2.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, conditions within the CBW and DRB would continue in accordance with the status quo. Nonpoint sources of pollution from land use, such as nutrients and sediments in surface and ground water, would continue to move in the water column and via recharge through soil media. Potential adverse effects on water quality would accrue to areas downstream. Over time, without collective management action, adverse effects ecologically critical areas would likely increase in scope and extent.

6.2.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Projects under Alternative 1 would increase the potential for erosion and sedimentation (E&S) to occur during construction. Sediments and contaminants in runoff could leach into groundwater or discharge into downstream surface waters. However, these potential effects would be avoided or minimized by required stormwater management measures and BMPs. Since project sites would be located upstream of the CBW and DRB, potential effects from the construction of Alternative 1 would be short-term, indirect, and negligible.

Projects under Alternative 1 would convert from passive to active MC operations. This would result in long-term, minor, beneficial effects on local water quality conditions upstream of the CBW and DRB.

6.2.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on the CBW and DRB under Alternative 2 would be comparable to those described above for Alternative 1.

6.3 Endangered and Threatened Species

6.3.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, endangered and threatened species would continue to persist under current conditions. Water quality and quantity in the project area would continue to affect the health and well-being of species occurring therein.

6.3.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Suitable habitat for the Indiana and northern long-eared bats, various woodlands, would not likely occur on or adjacent to project sites under Alternative 1. Wetlands, suitable habitat for the bog turtle, would be avoided by design under Alternative 1; however, if present within 300 feet of a project site involving land disturbance, applicants would be required to conduct a Phase I bog turtle survey unless potential indirect effects could be demonstrably avoided.

Under Alternative 1, in consultation with the SLO, applicants would review publicly available data to identify federal- and state-listed species of plants and animals with potential to occur onsite. Specifically, each individual project proposal under Alternative 1 would include a completed EE using NRCS form CPA-52. This would ensure that applicants conduct a planning level assessment for the presence of endangered and threatened species using the Pennsylvania Natural Diversity Inventory (PNDI), the Commonwealth's primary source of information regarding such species. During review of project proposals, the NRCS would validate the accuracy of these initial assessments and findings.

Applicants under Alternative 1 would also be required to document and evaluate baseline environmental conditions associated with a proposed project site. As warranted, a species survey by a qualified biologist or botanist would be required to inform project siting and design. Projects under Alternative 1 would be expected to avoid or minimize potential adverse effects on sensitive natural resources by design (e.g., minimum buffer zone requirements). Should potential exist for a project to affect endangered or threatened species or their suitable habitat, the NRCS would consult with the USFWS on federally listed species, and with the Pennsylvania Game Commission, Pennsylvania Fish and Boat Commission, or PA DCNR for potential effects on state-listed species. In such cases, the consultation process would determine the necessary steps for a project to proceed in compliance with applicable laws and regulations.

By letter (see Appendix A), the USFWS Pennsylvania Field Office indicated potential effects on T&E species under the proposed action and alternatives would be adequately addressed by the required site-specific project reviews.

With these measures in place, and the NRCS' continued compliance with Section 7 of the ESA, projects under Alternative 1 may affect, but would not be likely to adversely affect, endangered and threatened species or their suitable habitat. Conservation practices associated with Alternative 1 (such as CPS 313 to

store and CPS 442 with CPS 635 to treat mushroom compost leachate) would result in localized, beneficial effects on T&E species in terms of habitat and water quality.

6.3.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on endangered and threatened species or their habitat under Alternative 2 would be comparable to those described above for Alternative 1.

6.4 Essential Fish Habitat

6.4.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, EFH would continue to persist under current conditions. Water quality and quantity in the project area would continue to affect the health and function of EFH in areas downstream.

6.4.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

No federally designated EFH would be affected by projects under Alternative 1. Additionally, the NRCS would require all applicants with project sites that discharge to Pennsylvania special protection waters, including those designated for fisheries management, to obtain and adhere to the conditions of an applicable national pollutant discharge elimination system (NPDES) permit and post-construction stormwater management (PCSM) plan (see Section 6.20.2), as appropriate. With these regulatory compliance measures in place, Alternative 1 would result in short-term, temporary, negligible effects on localized fish habitats.

Conservation practices associated with Alternative 1 would result in negligible, beneficial effects on localized fish habitats.

6.4.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on EFH under Alternative 2 would be comparable to those described above for Alternative 1.

6.5 Fish and Wildlife

6.5.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, fish and wildlife would continue to persist under current conditions. Water quality and quantity would continue to affect the health and well-being of fish and wildlife in and around the project area.

6.5.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Potential adverse effects on fish and wildlife could result from projects under Alternative 1 involving land disturbance, vegetation removal, and the use of construction vehicles and equipment. These activities would likely disturb (e.g., construction noise) or displace some wildlife at project sites. In some instances, slower, less-mobile species could be inadvertently killed; however, most wildlife would relocate to other areas of nearby suitable habitat. Potential adverse effects on fish could occur in areas immediately downstream of a project site due to increased E&S and an associated reduction in habitat quality.

Projects under Alternative 1 would have measures in place to reduce potential effects on fish and wildlife. Prior to the start of construction activities, visual surveys would be conducted to identify and deter wildlife from the area, and standard construction vehicle/equipment operational procedures would minimize wildlife exposure to construction-related noise. Additionally, stormwater management requirements and best management practices (BMPs) would reduce potential adverse effects on fish and wildlife from construction-related E&S. With these measures in place, only short-term, temporary, negligible effects on fish and wildlife would occur during construction activities under Alternative 1.

Projects under Alternative 1 would also be sited and designed to avoid and minimize potential adverse effects on sensitive natural resources. Applicants would be required to establish minimum buffer zones to protect streams, wetlands, or floodplains on or downstream of project sites. Conservation practices associated with Alternative 1 would result in minor, beneficial effects on fish wildlife due to improved water and habitat quality.

6.5.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on fish and wildlife under Alternative 2 would be comparable to those described above for Alternative 1.

6.6 Floodplain Management

6.6.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, floodplains would continue to persist under current conditions. Floodplains in the project area immediately downgradient or downstream of MC operations would continue to receive storm runoff and sediments from such sites.

6.6.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Under Alternative 1, potential effects on the quality or function of floodplains from construction activities (e.g., E&S and contaminant spills) would be minimized by required stormwater management measures and adherence to waste management plans and protocols. Project sites under Alternative 1 would also be required to maintain a buffer of at least 100 feet from floodplains. With these measures in place, short-term, indirect, negligible effects on floodplains would result from construction under Alternative 1.

Conservation practices associated with Alternative would result in minor, beneficial effects on floodplains from improved stormwater (e.g., onsite infiltration and treatment) and vegetation management.

6.6.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on floodplains under Alternative 2 would be comparable to those described above for Alternative 1.

6.7 Historic Properties and Cultural Resources

6.7.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, historic properties and cultural resources would continue to be managed in accordance with the status quo.

6.7.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Projects under Alternative 1 would be subject to a Programmatic Agreement for a phased approach to compliance with Section 106 of the NHPA ([36 CFR § 800.4\(b\)\(2\)](#)) between the NRCS, SHPO, Advisory Council on Historic Preservation (ACHP); appropriate Federally recognized Native American Tribes, Bands, and Nations; and, additional consulting parties pursuant to 36 CFR Part 800.2(c)(5). The terms of this agreement would guide the investigation, assessment, and management of historic properties and cultural resources at the individual project level. The Programmatic Agreement would be maintained for 10 years unless terminated by the completion of Alternative 1.

Per the Programmatic Agreement, all projects under Alternative 1 would be carried out in compliance with the guiding regulations at 36 CFR Part 800. Pursuant to [36 CFR Part 800.14\(b\)](#), in considering a proposal for cost-share assistance, the NRCS would administer a site-specific project review under Section 106 of the NHPA. Section 106 consultations would be carried out for each individually proposed project site. As a result, projects under Alternative 1 would fully consider and evaluate potential effects on historic properties and cultural resources. Prior to approving a project proposal for cost-share assistance, the NRCS would identify any necessary avoidance, minimization, or mitigation measures for such resources. These measures would then be formalized as part of NRCS' cost-share agreement ([36 CFR § 800.6\(b\)\(1\)\(i\)](#)) with the parties involved in the proposed undertaking.

By letter (see Appendix A), the Pennsylvania State Historic Preservation Office indicated no concerns regarding the proposed action and alternatives given consultation procedures stipulated by an agreed upon Programmatic Agreement.

Therefore, with adherence to the provisions of a Programmatic Agreement,⁶ potential effects on historic properties and cultural resources are expected to be less-than-significant under Alternative 1.

6.7.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Projects under Alternative 2 would be carried out as described above under Alternative 1. Therefore, potential effects on historic properties and cultural resources under Alternative 2 would be less-than-significant.

6.8 Invasive Species

6.8.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, invasive species would continue to persist under current conditions.

6.8.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Under Alternative 1, construction activities would increase potential to introduce or exacerbate the spread of invasive species at project sites. Vehicles, equipment, and materials (e.g., fill soils) transported to and from sites would increase these risks. However, preventative measures such as vehicle/equipment washing and materials selection would reduce potential effects during construction. Revegetation of project sites post-construction using CPS 342 Critical Area Planting would further minimize potential

⁶ In lieu of an executed Programmatic Agreement for projects under Alternative 1, standard NHPA Section 106 procedures would apply.

effects from invasive species. Therefore, potential effects from invasive species associated with construction activities would be short-term, temporary, and negligible under Alternative 1.

Conservation practices associated with Alternative 1 involving the protection or restoration of native plants, shrubs, or trees (CPS 391 Riparian Forest Buffer) would result in negligible, beneficial effects by reducing the spread of invasive species in localized areas.

6.8.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects from invasive species under Alternative 2 would be comparable to those described above for Alternative 1.

6.9 Land Use

6.9.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, the NRCS would not authorize a cost-share program under PL 83-566 to address water quality concerns associated with MC operations. Land use planning and management in the project area would continue in accordance with the status quo.

MC operators would remain ineligible to receive federal assistance from NRCS agricultural programs under the No-Action Alternative. Projects that fund, plan, and implement conservation practices to address water quality concerns from MC operations in the project area would be less likely to occur.

6.9.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Under Alternative 1, construction activities would temporarily increase the potential for E&S, accidental spills, and similar impacts. However, potential effects would be avoided or minimized by project-specific regulatory compliance measures and BMPs. Therefore, construction under Alternative 1 would have short-term, temporary, and negligible effects on land use.

Conservation practices associated with Alternative 1 would result in more efficient and effective MC operations. This would result in minor, beneficial effects on local land use conditions.

6.9.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Projects under Alternative 2 would have comparable effects on watershed management to that of Alternative 1.

6.10 Long-Range Weather Forecasting

6.10.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, a gradual increase in annual average temperature and precipitation would be anticipated in the project area for the foreseeable future.

6.10.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Potential long-term weather effects for projects under Alternative 1 would not be appreciable in the short-term. Should the regional climate continue to warm at or above its current rate consistent with longer term projections, so could the conditions suitable for agricultural crop production. Although these potential effects are not reasonably foreseeable for the proposed action, projects under Alternative 1 would

facilitate more effective and efficient MC operations. Such improvements would conserve energy and water. The protection, maintenance and improvement of environmental conditions under Alternative 1 would also preserve the natural function benefits of vegetation, wetlands, and floodplains, amongst others. Additionally, should adaptation be necessary in the future, temperature and rainfall projections would be considered in the design of conservation practices. Therefore, Alternative 1 would result in negligible, beneficial effects on long-range weather forecasts.

6.10.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

The potential long-range weather effects under Alternative 2 would be comparable to those described above for Alternative 1.

6.11 Migratory Birds

6.11.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, migratory birds would continue to persist under current conditions. Water quality would continue to affect the health and well-being of migratory birds that utilize the project area on a seasonal or temporary basis for breeding, feeding, or stopover (i.e., rest during migration).

6.11.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

There is potential for migratory birds to be present on or around project sites under Alternative 1 during construction, including some USFWS-designated birds of conservation concern. However, since birds possess a relatively high degree of mobility, it is likely migratory birds would relocate a safe distance to other nearby lands with suitable habitat. Under Alternative 1, the NRCS would ensure a pre-construction visual survey is conducted or more specific seasonal restrictions are in place to minimize or avoid potential effects on migratory birds.

With these measures in place, potential effects on migratory birds under Alternative 1 would be short-term, temporary, and minor.

As appropriate, potential effects on migratory birds following construction would be addressed via the inclusion of protective measures in cost-share agreements. Conservation practices associated with Alternative 1 would result in minor, beneficial effects on migratory birds from localized improvements in water and habitat quality.

6.11.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on migratory birds under Alternative 2 would be comparable to those described above under Alternative 1.

6.12 National Economic Development

6.12.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, no investment in water resources would occur and conditions within the project area would continue in accordance with the status quo. Nonpoint sources of pollution from land use, such as nutrients and sediments in surface and ground water, would continue to move in the water column and via recharge through soil media. Potential adverse effects on water quality would accrue to

areas downstream. Over time, without collective management action, adverse effects on water resources would likely increase in scope and extent.

6.12.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Proposed conservation systems under this alternative would modernize the infrastructure necessary to conduct more effective and efficient MC operations. Development of such systems would also incorporate environmental protection and mitigation measures by design. al protection. These sustainability benefits would occur locally and intermittently across the project area on privately owned and operated properties for the duration of the propped action. Therefore, as a water resource investment, projects under Alternative 1 would result in minor, beneficial effects on economic development and the environment.

6.12.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on the water resources investment under Alternative 2 would be comparable to those under Alternative 1.

6.13 Natural Areas

6.13.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, governmental agencies and interested organizations and groups would continue to manage natural areas in the project area for various purposes.

6.13.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Projects under Alternative 1 would only occur on privately owned and operated properties. Therefore, no direct adverse effects on natural areas would result from Alternative 1. Potential adverse effects on natural areas adjacent to, or in the immediate vicinity of, project sites would include localized noise, traffic, and viewshed obstruction or degradation. However, these potential effects would be minimized by standard construction site measures and BMPs. Construction under Alternative 1 would result in potential short-term, temporary, negligible effects on natural areas in the project area.

Conservation practices associated with Alternative 1 would have minor, localized, beneficial effects on water, air, and the aesthetics of natural areas in the project area.

6.13.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on natural areas under Alternative 2 would be comparable to those under Alternative 1.

6.14 Prime Farmland and Farmland of Statewide Importance

6.14.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, including federal- and state-designated farmland in the project area would persist under current conditions. Over time, changes in property ownership, land use, and management could alter, disturb, amend, or otherwise affect such designations.

6.14.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Soils with properties conducive to agriculture are ubiquitous in the project area, including federal- and state-designated farmland. However, Alternative 1 would not alter or change the existing agricultural land use of any involved sites. As such, no or negligible effects on prime farmland or farmland of statewide importance would result from Alternative 1.

6.14.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on prime farmland or farmland of statewide importance under Alternative 2 would be the same as those described under Alternative 1.

6.15 Regional Water Resource Plans

6.15.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, federal, state, and local government authorities with jurisdiction or interested organizations or groups would continue to advance watershed management objectives in the project area. Regional water resource planning would continue in accordance with the status quo.

MC operators would remain ineligible to receive federal assistance from NRCS agricultural programs under the No-Action Alternative. Projects that fund, plan, and implement conservation practices to address water quality concerns from MC operations in the project area would be unlikely to occur.

6.15.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

During construction, Alternative 1 would increase the potential for erosion and sedimentation, the release of contaminants into the environment, and related impacts to occur. However, these potential effects would be minimized by standard construction site measures and BMPs. The severity of such effects would be further reduced by the variable timing of construction activities over a 10-year program period. Therefore, construction under Alternative 1 would result in potential short-term, temporary, negligible effects on regional water resource plan objectives.

Conversely, conservation practices associated with Alternative 1 would contribute to many of the watershed management objectives in the project area as espoused by applicable regional resource plans (see Section 4.14). Many natural function benefits derived from these conservation practices facilitate ecosystem services such as water quality, ground water recharge, and onsite infiltration of stormwater, among others. Other beneficial effects would include the protection of sensitive or valued resources, more and better outdoor recreational opportunities, and the maintenance of natural aesthetics and scenery. Conservation practices under Alternative 1 would therefore result in minor, beneficial effects on regional water resource plans applicable to the project area.

6.15.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on regional water resource plans under Alternative 2 would be comparable to those described under Alternative 1.

6.16 Riparian Areas

6.16.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, riparian areas in the project area would continue to persist under current conditions. The protection of riparian areas would continue to fall under the jurisdiction of local municipalities in southern Chester County.

6.16.2 Alternative 1 –Passive MC Operators Only (Future with Limited Federal Investment)

Projects under Alternative 1 would maintain a minimum buffer of 100 feet from riparian areas. Therefore, no direct adverse effects on riparian areas would occur. Construction activities under Alternative 1 could affect the quality or function of riparian areas downstream of project sites (e.g., E&S and contaminant spills). However, regulatory compliance measures for stormwater and contractual requirements for waste management would avoid or minimize potential effects.

With these measures in place, potential effects on riparian areas under Alternative 1 would be short-term and negligible.

In the long-term, conservation practices associated with Alternative 1, such as CPS 391 Riparian Buffer, can result in significant, beneficial effects on the floodplain. Other practices located over 100' away from the riparian corridor (which are expected to be installed more frequently than CPS 391) would result in minor, beneficial effects on floodplains from improved stormwater management (e.g., CPS 313 Waste Storage, CPS 317 Composting, and CPS 442 Sprinkler System).

6.16.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on riparian areas under Alternative 2 would be comparable to those described above under Alternative 1.

6.17 Socioeconomics

6.17.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, demographic and socioeconomic conditions in the project area would continue in accordance with the status quo. Over time, these conditions would change based on increases or decreases in the population, market conditions, and related factors.

6.17.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Projects under Alternative 1 would provide a local and regional economic stimulus in relation to the sites selected for cost-share assistance. Under Alternative 1, applicants would obtain specialized architecture/engineering services to conduct initial site investigations and prepare design plans and blueprints in accordance with proposed CP criteria. With the NRCS' approval of a cost-share agreement, construction firms would acquire the necessary materials and equipment, and employ personnel, to construct the approved conservation practices. During construction, personnel, vehicles, and equipment would be transported to and from a site where local expenditures and incidental spending would occur. As such, construction under Alternative 1 would result in minor, temporary, direct and indirect, beneficial effects on local and regional socioeconomics in the form of economic stimulus.

Conservation practices associated with Alternative 1 would result in localized improvements to water and air quality. Additionally historically underserved applicants would qualify for higher cost-share rates under Alternative 1, making the program more accessible across socioeconomic lines.

Applicants self-certifying as historically underserved (Limited Resource, Beginning, Socially Disadvantaged, or a Veteran Farmer) would be eligible for a 90 percent cost share rate instead of 75 percent (similar to the Farm Bill programs). Therefore, minor, beneficial socioeconomic effects would accrue to local communities from CP establishment under Alternative 1.

6.17.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential socioeconomic effects under Alternative 2 would be comparable to those described above under Alternative 1.

6.18 Soil Resources, including Stormwater Management

6.18.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, soils in the project area would persist under current conditions. Over time, changes in property ownership, land use, and management could alter, disturb, amend, or otherwise affect soils.

6.18.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Under Alternative 1, construction activities involving vegetation removal, excavation, trenching, grading, leveling, or other types of earth work would disturb soils. Potential effects would include increased soil loss via E&S, contaminant releases (e.g., petroleum, oils, and lubricants), and soil compaction, etc. Potential effects on soil quality and function would result from construction under Alternative 1.

However, prior to construction, applicants would be required to conduct site-specific investigations to inform the siting, design, and operation of proposed conservation practices. These prerequisites would include demonstrating compliance with applicable stormwater management regulations for the involved conservation practices. Regulatory compliance measures would require adherence to stormwater, waste, and spill response plans during construction. Conservation practices associated with Alternative 1 would also be designed to avoid or minimize potential effects on local soils. For example, avoiding steep slopes that are more susceptible to erosion and establishing buffer zones along waterways. With these measures in place, construction activities would minimize the potential effects on local soils such as reduced soil quality and function or increased E&S. These effects would be short-term, temporary, and minor under Alternative 1.

Once operational, conservation practices under Alternative 1 would stabilize areas susceptible to erosion, capture, detain and treat contaminated runoff, and improve soil health and productivity on or in the vicinity of project sites. These practices would result in minor, beneficial effects on soil resources under Alternative 1.

6.18.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on soils and stormwater management under Alternative 2 would be comparable to those described above under Alternative 1.

6.19 Sole Source Aquifers

6.19.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, use and management of the New Jersey Coastal Plain Aquifer as a source of drinking water would continue in accordance with the status quo. Over time, the productivity of the aquifer as a drinking water supply would be determined by water withdrawal and natural recharge rates.

6.19.2 Alternative 1 –Passive MC Operators Only (Future with Limited Federal Investment)

During construction, potential effects on the New Jersey Coastal Plain Aquifer system under Alternative 1 would not be appreciable.

Conservation practices associated with Alternative 1 would result in minor, beneficial effects on groundwater recharge in localized areas of project sites through more effective stormwater management (e.g., runoff conveyance, treatment, and infiltration).

6.19.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on sole source aquifers under Alternative 2 would be comparable to those described above under Alternative 1.

6.20 Water Quality

6.20.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, water resources in the project area would continue to persist under current conditions. Federal, state, and local government authorities with jurisdiction therein would continue to regulate the quality and use of surface and ground water. Runoff and leachate from MC sites would continue to be managed in accordance with a CCCD-approved Mushroom Farm Environmental Management Plan (MFEMP) and/or with the conditions set forth in a site-specific NPDES permit.

6.20.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Projects under Alternative 1 would involve earthwork such as excavation, backfill, and compaction. These activities would expose soils and increase their susceptibility to water and wind erosion. During construction, surface and ground water on or downstream of project sites could be affected by increased E&S and pollutant loading.

Potential effects on water quality from projects under Alternative 1 would be managed on a site-specific basis. Projects involving land disturbance would require compliance with applicable stormwater management regulations, including E&S measures and BMPs. Under Alternative 1, projects disturbing 5,000 square feet or more of land would require preparation of a CCCD-approved E&S plan. Projects involving 1-acre or more of land disturbance would require an individual NPDES permit or coverage under a general NPDES permit for *Stormwater Discharges Associated with Construction Activities*.

Coverage under a general NPDES permit would further require that pre-development hydrology be maintained, as demonstrated in a post-construction stormwater management (PCSM) plan and report. Following construction, exposed soils would be graded to conform to local topography and achieve

positive surface drainage. Applicable project sites under Alternative 1 would also be restored and revegetated with native plants and trees to achieve a minimum of 70 percent uniform vegetative cover. As documented in CP plans and designs, all temporary E&S practices or measures would be maintained until permanent stabilization of a project site post-construction.

Any projects under Alternative 1 requiring a NPDES permit occurring within a *special protection watershed* (i.e., indicating potential discharge to an HQ or EV waters) (see Appendix C) would be required to obtain an individual NPDES permit. Applicable project sites under Alternative 1 would also conform with Pennsylvania's antidegradation policy by employing *antidegradation best available combination of technologies* (ABACT) mitigation measures for E&S control and PCSM compliance.

With these measures in place, potential adverse effects on water resources under Alternative 1 would be short-term, temporary, and minor.

In the long-term, more effective processing of MC (using CPS 317 Composting) and prevention (using CPS 367 roofs and covers), storage (CPS 313 Waste Storage Facility) and treatment (CPS 442 Sprinkler System with CPS 635 Vegetated Treatment Area) of MC leachate would result in direct localized beneficial effects on surface and ground water quality. These effects would be diluted further from the MC operation, as surface waters move towards the Chesapeake Bay and Delaware Estuary.

6.20.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on water quality under Alternative 2 would be comparable to those under Alternative 1. However, by making active MC operations eligible for cost-share assistance, Alternative 2 would increase the extent and scope of these potential beneficial effects in the localized project area.

6.21 Water Resources

6.21.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, water resources in the project area would continue to persist under current conditions. Federal, state, and local government authorities with jurisdiction therein would continue to regulate the use of surface and ground water.

6.21.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Alternative 1 would use water to construct certain conservation practices. Although the volume of water required to support construction activities can be substantial, the scope, extent, duration, and timing of construction activities under Alternative 1 would be minimal given the regulatory setting and development context.

With respect to MC operations, water inputs are central to facilitating the composting process. While passive MC operations typically rely on rainwater for this purpose, active MC operations are often enclosed and typically require more frequent applications. Numerous supporting conservation practices associated with Alternative 1 may be used for the conveyance, capture, and reuse of rainwater in the composting process. Further, more effective and efficient MC operations under Alternative 1 would minimize potential increases in water demand associated with the use of active composting techniques.

Overall, no appreciable short- or long-term effects on local or regional water budgets would be anticipated to result from Alternative 1.

6.21.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on water resources under Alternative 2 would be comparable to those described above under Alternative 1.

6.22 Waters of the US

6.22.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, waters of the US would continue to persist under current conditions. Federal, state, and local government authorities would continue to regulate activities with potential to affect jurisdictional surface waters, including wetlands and special aquatic sites.

6.22.2 Alternative 1 –Passive MC Operators Only (Future with Limited Federal Investment)

Projects under Alternative 1 would maintain a buffer of at least 100 feet from surface waters identified as “waters of the US” under the CWA. . Therefore, no direct effects on these resources would result from Alternative 1.

Under Alternative 1, construction activities involving vegetation removal, excavation, trenching, grading, leveling, or other types of earth work would disturb soils. These activities would expose soils and increase their susceptibility to water and wind erosion, increasing the potential for E&S of downstream Waters of the US. Contaminants in runoff could also be transported overland for discharge into such waters. However, as described above, these potential effects would be avoided or minimized by regulatory compliance measures and BMPs. With these measures in place, Alternative 1 would result in potential short-term, negligible, indirect effects on jurisdictional waters of the US during construction.

Properly operated and maintained conservation practices associated with Alternative 1 that prevent (CPS 367 Roofs and Covers), store (CPS 313 Waste Storage Facility) and treat (CPS 442 Sprinkler System with CPS 635 Vegetated Treatment Area) MC leachate would result in direct localized beneficial effects on jurisdictional waters of the US immediately downstream of project sites. As the Waters of the US are diluted, the beneficial effect becomes negligible further downstream of the project site.

6.22.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Projects under Alternative 2 would maintain a buffer of at least 100 feet from regulatory Waters of the US. Potential effects on Waters of the US under Alternative 2 would be comparable to those described above under Alternative 1.

6.23 Wild and Scenic Rivers

6.23.1 No-Action Alternative (Future without Program)

Under the No-Action Alternative, the PA DCNR would continue to manage wild and scenic rivers in accordance with the status quo.

6.23.2 Alternative 1 – Passive MC Operators Only (Future with Limited Federal Investment)

Projects under Alternative 1 would maintain a buffer of at least 100 feet from designated wild and scenic rivers. Therefore, no direct effects on these resources would result from Alternative 1.

Under Alternative 1, construction activities involving vegetation removal, excavation, trenching, grading, leveling, or other types of earth work would disturb soils. These activities would expose soils and increase their susceptibility to water and wind erosion, increasing the potential for E&S of downstream surface waters. Additionally, contaminants in runoff could be transported overland for discharge into such waters. During construction, increases in noise and traffic or viewshed encroachment could also occur under Alternative 1. However, as described above, these potential effects would be avoided or minimized by regulatory compliance measures and BMPs. With these measures in place, Alternative 1 would result in potential short-term, indirect, negligible effects on wild and scenic rivers during construction.

Projects within the Octoraro Creek boundary would follow the guidance outlined in the consultation letter from the Pennsylvania Department of Conservation and Natural Resources, Bureau of Recreation and Conservation (see Appendix A).

Conservation practices associated with Alternative 1 would result in negligible, beneficial effects on wild and scenic rivers located downstream of project sites from more effective stormwater and waste management.

6.23.3 Alternative 2 – All MC Operators (Future with Full Federal Investment)

Potential effects on wild and scenic rivers under Alternative 2 would be comparable to those described above under Alternative 1.

6.24 Cumulative Effects Analysis

Cumulative effects can result from individually minor but collectively significant actions that overlap in space and time. As described in this Plan-PEA, the proposed action would contribute to cumulative effects in the project area when combined with other past, present, or reasonably foreseeable, future actions. The potential cumulative effects of the core conservation practices are shown in Table 6-1.

Table 6-1. Cumulative Effects of Core Mushroom Composting Conservation Practices on NRCS Resource Concerns

Resource Area	Category of Effects	Composting Facility CPS 317	Heavy Use Area Protection CPS 561	Riparian Forest Buffer CPS 391	Roofs and Covers CPS 367	Sprinkler System CPS 442	Waste Storage Facility CPS 313	Waste Treatment CPS 629
Water	Water quality and compliance with water quality standards					+/-		+
	Quality of receiving waters							
	Quality of water produced, and groundwater recharge			+				

	Water quality and aquatic habitats		+					
	Aquatic health for humans, domestic and wild animals	+					+	
Air	Air quality				+		+	+
	Greenhouse gases			-				
Plants	Landscape scale structure/ composition/ function			+				
Animals	Fish and wildlife habitat and biodiversity					+/-		
	Related health of humans and animals			+				
	Stream fauna, e.g., fish, invertebrates	+	+				+	
Humans	Public/private health and safety, community relations							+
	Public/private health, safety, and aesthetics		+					
	Income and income stability (individuals and community)	+/-	+/-	+	+	+/-	+/-	+
	Local business and support infrastructure			+				
	Recreational opportunities		+					
	Community acceptance of AFOs	+						
	Community health and well-being				+			
	Habitat suitability/health for humans						+/-	

Note: Effects are qualified with a plus (+) or minus (-). These symbols indicate only an increase (+) or a decrease (-) in the effect upon the resource, not whether the effect is beneficial or adverse.

The authorization of funds under a PL 83-566 Land Treatment Program to address water quality concerns constitutes a watershed-level program action. Therefore, the resource-specific impact analyses above address the cumulative effects of the evaluated alternatives, including the No-Action Alternative. Based on analysis, the No-Action Alternative would increase the potential for cumulative adverse effects on the resources in and around the project area. Alternatives 1 and 2 would create the potential for short-term, minor, cumulative adverse effects; however, these potential effects would be temporary and avoided or minimized by design. In the long term, Alternatives 1 and 2 would contribute to minor, beneficial, cumulative effects in and around the project area. Overall, no significant cumulative adverse effects would be anticipated.

6.25 Impact Reduction Measures

The NRCS uses a multidisciplinary, science driven process to develop conservation practice standards and define their unique specifications. Minimum criteria for planning, designing, installing, operating, and maintaining a conservation practice are first defined at a national level. States or localities may then modify a conservation practice to meet their specific needs so long as the minimum national criteria are met.

Only the installation of conservation practices that meet NRCS standards and specifications are eligible for funding through NRCS programs. To meet NRCS criteria for water quality improvement projects, the conservation practices selected for the proposed action would constitute a conservation management system designed to further the SLO's objective. Therefore, conservation practices under the proposed action and alternatives, as approved by the NRCS, would incorporate a wide variety of BMPs and impact reduction measures by design. These include, but are not limited to, the following practices or measures:

- Select and implement E&S BMPs and their design standards in accordance with the *Erosion and Sediment Pollution Control Program Manual* (2000, as updated), as appropriate.
- Select and implement PCSM BMPs and their design standards in accordance with the *Pennsylvania Stormwater Best Management Practices Manual* (2006, as updated), as appropriate.
- For projects located in a special protection watershed, maintain a minimum buffer of 150 feet from perennial or intermittent streams or other surface waterbodies. For all other projects, maintain a minimum buffer of 100 feet from perennial or intermittent streams or other surface waterbodies.
- Stabilize all areas disturbed by construction as soon as practicable post-construction to reduce the potential for erosion.
- To the extent practicable, revegetate disturbed areas in increments during construction or use temporary seeding or mulch until permanent vegetation is established; limit the amount and time bare soils are exposed to precipitation.
- When possible, establish construction staging areas on existing hardscape and at least 100 feet away from surface waters.
- Should any excavation encounter the water table, minimize potential effects through measures such as dewatering that would prevent discharge of contaminated water during construction.
- Adherence to the principles and practices identified in the *Best Practices for Environmental Protection in the Mushroom Farm Community* (2012).
- To the extent practicable, site new facilities and infrastructure within previously disturbed areas with minimal vegetation.
- Revegetate disturbed areas with native plant and grass species.
- Avoid construction (e.g., tree removal or noise-intensive activities) during the 15 August through 28 February nesting season of migratory birds documented to occur on or near project sites.
- Any agreed upon measures to avoid, minimize, or mitigate for potential effects on historic properties and cultural resources as stipulated by the Final Programmatic Agreement between the NRCS, SLO, SHPO, and other consulting parties.

Chapter 7 – Consultation, Coordination, and Public Participation

Consultation and coordination with federal, state, Tribal governments, local agencies, and members of the public at-large regarding the proposed action and alternatives has been ongoing since project inception.

Table 7-1 summarizes public involvement activities and regulatory consultations conducted by the NRCS, in coordination with the SLO (CCCD).

Table 7-1. Public Involvement Activities for the Proposed Action and Alternatives

Date	Type	Purpose	Participants
December 14, 2020	Survey; made available in English and Spanish	Solicit information from prospective stakeholders	American Mushroom Institute (AMI); mushroom farmers in southern Chester County
January 1, 2021	Letters, emails, website posts, community board posts, and local radio	Announcement of public and agency scoping meetings	AMI, including members; United States Department of Agriculture, Natural Resources Conservation Agency (NRCS); Chester County Conservation District (CCCD); other mailing list recipients (e.g., regulatory agencies, tribal representatives, non-governmental organizations, and community interest groups)
2020 to date	Informational (monthly teleconferences)	Project status updates	CCCD; NRCS; AMI
February 2, 2021	Agency and public scoping meetings (virtual)	Early project scoping	Same as above.
March 24, 2021	Informational (presentation)	Information share	NRCS and Oxford Region Planning Committee
August 10, 2021	Interview	Discuss regulatory context for proposed action	NRCS and Pennsylvania Department of Environmental Protection
April 8, 2023	Informational (presentation)	Information share	NRCS and Mushroom Farmers of Pennsylvania Committee
April 10, 2023	Letters, emails, and website posts	Announcement of alternatives review meeting	AMI, including members; NRCS; CCCD; other mailing list recipients
May 16, 2023	Public alternatives meeting	Solicit input on considered alternatives	Same as above.

7.1 Agency Consultations

As indicated in Table 7-1, agencies identified in the Public Participation Plan were invited to help scope the project as well as consider the alternatives. Agencies were formally invited via letter to participate in the Scoping Meeting and Alternatives Meeting. No agencies were identified or invited to become Cooperating Agencies.

A formal request for consultation on the preferred alternative was sent to the Federal Emergency Management Administration, National Oceanic and Atmospheric Administration, Army Corps of Engineers, USFWS, EPA, and PA DCNR, in August 2024. A copy of the request letter and responses is included in Appendix A.

Resulting from the formal request, PA DCNR engaged in consultation regarding the Octoraro Creek Pennsylvania Scenic Rivers Corridor. PA DCNR provided guidance for construction of projects to protect the scenic river values (see Appendix A).

USFWS was consulted in compliance with Section 12 of PL 83-566 and Section 7 of the Endangered Species Act (ESA). Their response is included in Appendix A.

Appendix A contains agency correspondence associated with the proposed action and alternatives.

7.2 Tribal Consultations

The Bureau of Indian Affairs, HUD Exchanges' Tribal Directory Assessment Tool, and the Pennsylvania Department of Transportation's Tribal Consultation website were queried to identify tribes claiming ancestral land in the project area. The leadership of the Absentee-Shawnee Tribe of Oklahoma, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Saint Regis Mohawk Tribe, Shawnee Tribe, and the Stockbridge-Munsee Community, Wisconsin were mailed certified letters requesting participation in the scoping process as well as alternatives development. The appropriate THPOs received courtesy copies of the letters (i.e., the proposed action would not occur on tribal lands), either via regular mail or email. No responses were received from the tribes.

The consulting list for federally recognized tribes was then narrowed to tribes with geographical interest based on archival research and publicly available information in the cultural heritage portions of each of the tribes' websites. Further consultation was only sent to this refined list which did not include all the tribes initially invited to scope the project. Accordingly, in September of 2023, the NRCS sent certified correspondence to the SHPO, Delaware Nation, and Delaware Tribe of Indians regarding the initiation of a Programmatic Agreement proposing a phased approach for compliance with Section 106 concerning the action and alternatives under consideration. In October of 2023, the SHPO responded to the NRCS expressing interest in participating in the draft and execution of NRCS' proposed Programmatic Agreement, dependent on the number of projects anticipated to occur. In October 2023, another attempt to engage the tribes was conducted through certified letter. The Delaware Nation did not respond but the Delaware Tribe of Indians requested participation in the drafting of the Agreement. In November 2023, a final attempt to engage the Delaware Nation via email was met with no response. The Programmatic Agreement was drafted, sent to the Advisory Council on Historic Preservation (ACHP), and then distributed to the SHPO, Delaware Tribe of Indians, and Delaware Nation, via certified letter, for signatures in August 2024. The executed copy of the Programmatic Agreement was signed by the NRCS, SHPO, and the Chester County Conservation District. It was then filed with the ACHP in October 2024.

Appendix A contains tribal correspondence associated with the proposed action and alternatives.

7.3 Review of the Draft Plan-EA

NRCS Pennsylvania led the preparation of the Draft Plan-PEA. Technical reviews were conducted by the NRCS State Office and NRCS National Watershed Management Center. A programmatic review was completed by NRCS National Headquarters.

NRCS published the Draft Plan-PEA on the NRCS-PA website for public review on October 1, 2025, for a 30-day comment period ending on October 30, 2025. Other public outreach activities for the Draft Plan-PEA included:

- NRCS notice to distribution list (September 24, 2025)
- NRCS press release (September 29, 2025)
- CCCD website announcement (October 1, 2025)
- AMI website announcement (October 1, 2025)

Upon close of the public review period, received comments were addressed and included in Appendix A. In the absence of significant adverse environmental effects, NRCS issued a Finding of No Significant Impact (FONSI), which was publicly noticed and distributed along with the final Plan-PEA. Final distribution also included posting to the NRCS website and continued availability at the Sponsor's office.

Chapter 8 – Preferred Alternative

8.1 Selection of the Preferred Alternative

Based on the watershed planning process the NRCS selected Alternative 2, providing funding to both passive and active MC operators, as the Preferred Alternative based on its ability to meet the purpose and need of the program and provide the desired beneficial environmental, social, and economic resource effects. The Preferred Alternative was the only alternative considered to maximize these benefits consistent with funding.

8.2 Rationale for the Preferred Alternative

EQIP is the cornerstone NRCS program for integrating conservation into agricultural working lands. Improved water and air quality, increased soil health, and reduced soil erosion and sedimentation are among the resource concerns targeted by the EQIP. Many surface waterbodies in Chester County do meet water quality standards. With population growth and development projected to increase in the coming decades, this resource concern is likely to continue if not worsen over time. Runoff and leachate from MC sites contribute to the types of water quality impairments found in southern Chester County.

Mushroom substrate production and use is integral to agriculture in southeast Pennsylvania, yet MC operators are generally ineligible for federal assistance under the EQIP. The Preferred Alternative would specifically address this anomaly consistent the identified watershed management program objectives (Section 2.1). The Preferred Alternative maximizes the Federal Objective and the potential ecosystem service benefits that could result from such a program. It also provides the needed flexibility to stand up, administer, and implement the program effectively.

All types of MC operations, compared to just passive operations (i.e., Alternative 1), would be eligible to receive federal assistance via cost-share agreement under the Preferred Alternative. Applicants would be evaluated based on their unique site conditions and operations. This would allow the full scope and breadth of resource concerns associated with MC sites in the project area to be addressed. It would also allow for more effective program administration in accordance with the Federal Objective and PR&G.

As discussed in **Chapter 6**, projects selected for funding under the Preferred Alternative could result in minor effects on environmental, cultural, and socioeconomic resources. Any potential effects would be temporary and minimized by site-specific impact reduction measures. In the long term, the beneficial effects of the Preferred Alternative would outweigh any short-term, adverse effects on resources. Beneficial effects would include improved surface and ground water quality, fish and wildlife habitat, natural areas, and recreation, among other ecosystem service benefits. These beneficial effects would be most evident in areas immediately downstream of the selected MC sites. Albeit to a lesser extent, beneficial effects would also accrue incrementally to the downstream waterbodies of the CBW and DRB, respectively. When compared to the No-Action Alternative, the Preferred Alternative would support the long-term sustainability and resilience of the mushroom industry in southern Chester County.

8.3 Measures to be Installed

The NRCS and SLO recognize the cumulative nature of water quality degradation in southern Chester County. The measures to be installed under the Preferred Alternative would contribute to water quality

improvements in the project area; however, it should be recognized that only a broader suite of programs, plans, and policies could maximize the Federal Objective.

The specific measures to be installed under the Preferred Alternative would be determined by program participation. However, most measures would involve construction of stable, impervious surfaces for MC storage and treatment; upslope practices to redirect stormwater away from compost piles; or downslope practices to capture, store, and treat leachate from MC piles. Applicants would be required to install one or more primary CP(s) (Table 5-1). Supporting, secondary conservation practices (Table 5-2) can be installed with a Primary CP if they are needed to complete a system. Whether stand-alone or a collective of conservation practices, projects approved under the Preferred Alternative would function as a conservation system in furtherance of the project objectives as developed during the scoping process.

The NRCS and SLO anticipate receiving two to three cost-share proposals from MC operators in the inaugural year (circa 2025) of the program. Solicitation and review of proposals would continue through approximately 2030. Approved projects would then be implemented from approximately 2031 to 2035.^{7 8}

8.4 Program Administration

The NRCS and SLO would coordinate and share responsibilities for administration of the Preferred Alternative. This coordination would extend to support offered by the AMI and other government or organizational participants with a vested interest in the program. NRCS, through a Cooperative Agreement with the SLO, would provide technical assistance funding for the SLO as well as the federal portion of funds for construction. The NRCS and SLO would provide technical assistance through a funded 0.5 full-time equivalent (FTE) Soil Conservationist and a 0.5 FTE Civil Engineering Technician to effectively guide the participation of interested MC operators (hereafter, applicants') in the program.

The review and approval of applicant-proposed conservation practices would consist of two phases. An initial review would be conducted to validate the feasibility and effectiveness of conservation practices for consistency with program objectives. Thereafter, applicants would have an opportunity to resolve or address any data gaps or deficiencies identified by the NRCS or SLO. A secondary review would evaluate proposals against four key programmatic criteria: (1) water quality; (2) other ecosystem services; (3) constraints and compliance; and (4) cost. The NRCS and SLO would consider all proposals that demonstrate compliance with applicable CP standards on an equal basis using criterion-specific factors to quantify their contribution to the Federal Objective. The resultant data would allow the NRCS and SLO to screen and rank the proposed projects based on their anticipated program benefits. Should resource limitations exist in any program year, the rankings would serve to prioritize the most beneficial projects.

The roles and responsibilities of program participation and administration are further described below.

8.4.1 Application, Approval, and Installation

To apply for federal cost-share assistance, interested applicants would select and evaluate CP(s). Such an evaluation would be required to demonstrate the feasibility and effectiveness of the proposed CP(s) consistent with applicant needs and program objectives. Data required to conduct an evaluation would

vary by site- and operator-specific conditions; however, all applicants would be required to have a current, up to date, SLO-approved MFEMP in place as a prerequisite.

Applications would be prepared using a modified version of the NRCS-CPA-1200 with a project-specific appendix document. To be considered for cost-share assistance, a project site must be part of a tract registered with the Farm Service Agency and meet the eligibility requirements for Highly Erodible Land and Wetland Conservation in accordance with [NRCS-CPA-026](#) and [Form AD-1026](#). Applicants for cost-share assistance will also be required to complete a Farm Operating Plan using [Form CCC-902](#) to establish operator signatory authority.

Supplemental application materials would include site-specific, baseline environmental and operational conditions. Although some applicants would have these data on hand (e.g., the MEFMP and similar records or documents), further, site-specific plans, assessments, investigations, surveys (e.g., natural or cultural resources), or samples (e.g., water or soil sampling) may be required to inform the site selection, design, and engineering of proposed CP(s). In consultation with the NRCS and the SLO, applicants would be solely responsible for this documentation as a required component of their cost-share proposal. Only applications deemed feasible and effective in achieving program objectives based on project ranking would be eligible for program funding.

For eligible, designed, and permitted projects, the SLO would solicit bids from contractors to implement the design, selecting the lowest responsible bid. The SLO would use NRCS funds for 75% or 90% of the construction cost, depending on if the applicant self-certified as historically underserved. The SLO would seek other funds to supplement NRCS funds for a project match/cost share. However, the applicant would be required to approve the low bid as they would be responsible for the remaining cost of the project. It is expected that the applicant would be required to pay 10% to 25% of the construction cost of the project.

Payment to the contractor from the SLO would then be contingent on certifying that the agreed upon criteria have been met for the involved conservation system. Following certification by the NRCS and SLO, the contractor would be issued payment for the contracted units of CP(s).

8.4.1.1 Technical Support and Guidance for Applicants

In support of the Preferred Alternative, the SLO would dedicate one 0.5 FTE, as needed, staff position with a working knowledge of applicable NRCS requirements and standards; in addition to the involved engineering staff, the NRCS would dedicate one 0.5 FTE, as needed, staff position to interface for and administer program activities. It is expected that these positions will be the equivalent of a Soil Conservationist and a Civil Engineering Technician.

During the proposal stage, the SLO would provide technical assistance to interested applicants. The SLO would also have discretion to offer technical services to interested applicants in areas such as conservation planning (e.g., MFEMP currency) and environmental compliance (e.g., NPDES permitting or environmental site assessments), among others. In this capacity, the SLO would be the central point of contact for interface between the applicant, NRCS, and/or third parties, as appropriate. Additionally, the SLO would interface with the AMI to support community education and outreach initiatives associated with the Preferred Alternative.

In consultation with the SLO, the NRCS would provide engineering staff development and installation of projects. This may include developing inventory and evaluation reports, completing designs, providing

construction quality assurance, and certification of constructed or installed CP(s) to facilitate applicant reimbursements in a timely manner. The latter would ensure applicable CP standards, specifications, and regulatory compliance measures are being met. Review of applicant proposals would also be the joint responsibility of the NRCS and SLO.

8.4.2 Operation, Maintenance, and Replacement

The terms of the Cooperative Agreement with the SLO would include a commitment to operate and maintain the installed CP(s) for the operational phase of all CP(s) included in the project. This phase would start post-construction and upon certification of applicable criteria by the NRCS and SLO. The SLO would enter into a contract with the applicant to ensure that the applicant is responsible for operation, maintaining, and replacing the CP(s) for the life of the project.

The design and operational life expectancy of CP(s) would set the timeframe(s) and determine the agreed upon commitment(s) codified by SLO and applicant agreement. Specific responsibilities for the involved parties would be outlined in an O&M plan for each conservation system. The operator-signed O&M plans would be added to approved designs and maintained onsite by the MC operator for the operational life of the CP(s). However, when necessary or warranted, O&M plans may be modified with the NRCS' approval.

During the operational phase of the Preferred Alternative, MC operators would be responsible for oversight and administration of O&M plans. The NRCS and SLO would provide technical assistance to MC operators on an as needed basis. Additionally, the NRCS and SLO would conduct spot checks of project measures to perform quality assurance reviews of the engineering and ongoing O&M. The MC operator would be responsible for maintaining the conservation system for the duration life of the CP(s) included in the system, including other required inspections and inspection-related maintenance or replacement costs.

8.4.3 Avoidance, Minimization, and Compensatory Mitigation Measures

The NRCS must ensure their proposed plans and activities (to include those funded by the agency) comply with applicable federal laws and regulations. Accordingly, as discussed in Section 8.4.1 above, applicants would be required to document baseline environmental and operational conditions unique to their site. In consultation with the SLO, applicants would use these data to determine if any project-specific mitigation measures (required or recommended) are necessary or warranted to avoid or offset potential adverse effects on environmental, cultural, or socioeconomic resources. The NRCS and SLO would provide technical assistance to identify, manage, and, when required, mitigate for these potential resource effects; however, all resource inventory, management, and mitigation costs would be borne by the applicant in lieu of obtaining non-federal funds for such purposes.

Under the Preferred Alternative, the NRCS anticipates that all or most potential resource effects would be mitigable by plan or design; compensatory mitigation would not be anticipated.

8.4.3.1 Programmatic Agreement(s)

Projects under the Preferred Alternative will be subject to the agreed upon provisions of a Programmatic Agreement for the Phased Application of the Section 106 Process with the SHPO and SLO. The NRCS will evaluate the potential for such resources to occur and the undertakings potential effects as stipulated in the Programmatic Agreement. The Delaware Nation and Delaware Tribe of Indians will be consulted

using standard Section 106 procedures as projects are accepted into the program. As every effort will be made to avoid identified cultural resources, it is not expected that mitigation will be needed.

8.4.3.2 Permits and Compliance

Compliance with applicable federal, state, and local laws and regulations (i.e., consultations, approvals, and permits required to implement the practices) would be required on an individual project basis. In consultation with the SLO, applicants would identify all such requirements during the proposal preparation phase.

The NRCS and SLO would ensure that all projects approved for cost-share under the Preferred Alternative adhere to minimum buffer protection zones for wetlands, floodplains, or other sensitive natural or cultural resources, as appropriate. Further, stormwater plans and permits, or other applicable regulatory approvals, would be obtained by applicants prior to construction start dates. These measures would be in place to prevent and minimize potential indirect adverse effects on sensitive natural or cultural resources. Projects within the Octoraro Creek Pennsylvania Scenic Rivers Corridor would be subject to recommendations provided by PA DCNR to protect the scenic river values.

To maintain compliance with NEPA, should potential exist for adverse impacts or extraordinary circumstances beyond those evaluated in this Plan-PEA, the SLO would consult with the NRCS to determine if new or supplemental NEPA documentation would be required. In consultation with the SLO, applicants may bear responsibility for any new or different NEPA driven mitigation measures.

Table 8-1 includes a matrix of participant roles and responsibilities under the Preferred Alternative, as described above.

Table 8-1. Program Participant Responsibility Matrix (x – will do, / - may do)

Requirement(s) ^{1/}	NRCS	SLO	Applicant
Contracting		x	
Quality Assurance	x	x	
Site Assessment/Evaluation	x	x	x
Application/MFEMP Currency	x	x	x
Application Review/Approval ^{2/}	x	/	
Project Design ^{3/}	/	/	x
Regulatory Compliance, including Mitigation ^{4/}	x	x	x
Construction Bidding /Contracting ^{5/}		x	x
Construction ^{6/}	x	x	x
Operation and Maintenance			x
Program Appraisal/Quality Assurance Review	x	x	
Project Certifications	x	x	
Project Close Out	x	/	

Requirement(s) ^{1/}	NRCS	SLO	Applicant
Project Reporting	x	/	

^{1/} The availability and use of other, non-federal funds to meet requirements are to be determined.

^{2/} Ranking projects is an inherently governmental function and, while informed by the SLO, will be at the discretion of NRCS.

^{3/} The NRCS or SLO will complete the design, depending on level of complexity. All NRCS- or SLO-led designs must be approved through the NRCS engineering job approval system. Those completed by a private engineer must obtain concurrence from the NRCS.

^{4/} In lieu of obtaining non-federal funds, any required mitigation costs are the responsibility of the applicant.

^{5/} The SLO will contract proposed projects via a formal bid/proposal solicitation process for procurement of services. Supplemental funding will be needed by the Applicant.

^{6/} Construction includes quality assurance, certification, and contractor payment.

8.5 Program Costs

The NRCS estimates a total program cost of **\$12,400,000** to implement and administer the Preferred Alternative. PL 83-566 funds would support **\$9,500,000** which includes 75 percent of total estimated construction costs (or 90 percent if the applicant is considered historically underserved) ; the remaining **\$2,900,000** and includes 25 percent of the total estimated construction costs would be contributed by other, non-federal funds. It is assumed that 15 percent of the total construction cost would be needed for the technical assistance to design and implement the projects.

The costs for each project would vary based on site-specific conditions (e.g., existing environment and operations) and the involved CP(s) (e.g., number, type, size, and complexity), and if the applicant is considered historically underserved. Program cost estimates include the design and construction of projects and were made based on the following assumptions:

- Cost estimates were prepared to account for all material, labor, and equipment necessary for the installation, operation, and maintenance of the programmatic CP(s). These planning level costs were estimated using the best available information about the projects without having detailed design information.
- Engineering costs were estimated as a percentage of the cost of construction.
- The costs presented are planning level estimates and do not reflect final costs. Detailed design and construction cost estimates would be completed prior to initiating projects. Final costs would only reflect the time and materials to perform the work.

The contribution of non-federal funds to implement projects under the Preferred Alternative would come primarily from the applicant; however, the SLO and other organizational interests may also contribute. To further incentivize program participation, the SLO would seek funding from other government or non-government environmental protection programs. However, contributions from the operations themselves would be the core source of funding to cover the full cost of project implementation. At a minimum, the applicant would be responsible for 10% of the cost of construction.

8.6 Program Authorization and Financing

The Preferred Alternative would be intended to supplement ongoing efforts to address watershed concerns. For example, EQIP and RCPP, both administered by the NRCS, the Agricultural Conservation Assistance Program, National Fish and Wildlife Federation Cornerstone and Conservation Partners grants (administered by the CCCD), and other ongoing and planned efforts would continue and be considered complimentary to other authorized programs or projects under PL 83-566.

Authorization of the Preferred Alternative would cover a period of 10 years commencing in 2025 and ending in 2034. Program administration would be divided into five-year increments starting with the solicitation, review, and approval of cost-share applications from 2025 to 2029. The next five years of the program would accommodate contractual obligations of five years or less (i.e., 2030 to 2034).

It is the intent of the SLO and NRCS to solicit project proposals within approximately 12 months of the completion of this Plan-PEA. Applicants would be ranked and evaluated annually to determine which projects should have funds obligated. Only practices that meet NRCS standards and specifications would be eligible for cost-share under the Preferred Alternative.

Under the Preferred Alternative, the NRCS would reserve the authority and right to discontinue or reduce program benefits based on changes in agency priorities, funding availability, or the failure of the applicant(s) to fulfill the provisions of a cost-share agreement.

8.6.1 Planned Sequence of Program Implementation

The planned sequence of program activities for each fiscal year under the Preferred Alternative, including procurement of an individual land treatment contract (LTC), is outlined in general terms below.

1. Program authorization and funding received by NRCS.
 - Review and finalize proposal evaluation and ranking criteria (NRCS and SLO).
2. Interested applicants provide/document MFEMP currency.
3. SLO solicits LTC applications for cost-share assistance.
 - Announce the application period (minimum of 30 business days from notice date) (SLO).
 - Prepare and submit an LTC application (Applicant).
4. NRCS and SLO evaluate/rank LTC applications, including environmental due diligence.
 - Issue or update application rankings on a quarterly basis (NRCS and SLO).
 - Evaluate program funding on a quarterly basis (NRCS).
5. NRCS and SLO issue LTCs to approved cost-share recipients.
 - Design, permit, and construct or install CP(s) (Applicant, in consultation with NRCS and SLO).
 - Certify adherence to applicable CP(s) standards and specifications (NRCS and SLO).

- Submit project records of environmental due diligence, including all regulatory permits and approvals (Applicant).
 - Issue cost-share payment / LTC closeout (NRCS, SLO, and Applicant).
6. NRCS, SLO, and applicants prepare/submit performance and financial reports on an annual basis.
 7. Applicants prepare a request for supplemental cost-share assistance or coordinate with NRCS and SLO for program closeout.

8.6.2 Contracting

Contractual services may be required for site assessment or survey, construction, operation and maintenance, or remediation, among other services. The applicant would be responsible for the oversight and administration of contracted services at the currently unknown site level.

8.6.3 Real Property and Relocations

No real property acquisition or relocation would occur under the Preferred Alternative. All construction would be completed on property either owned by or under the control of an approved applicant.

8.6.4 Financing

The NRCS would provide 75 percent of the total construction cost of the Preferred Alternative through PL 83-566 (or 90% if the applicant self-certifies that they are historically underserved). The applicant is responsible for securing funding for the remaining costs. Table 8-2 of the NEE presents the annual installation costs of the program, including the proportion of federal and non-federal funding sources.

It is anticipated that up to 15% of the required matching funds would leverage grants administered by the SLO. Cost-share applicants would finance at least 10% of projects. Other financing mechanisms would be sought and explored on a case-by-case basis, including the Conservation Loan Program available from the Farm Service Agency. Pennsylvania's Resource Enhancement and Protection program offers PA income tax credits to offset the cost of implementing conservation practices. The loan costs are not included in the NEE analysis.

8.6.5 Conditions of Federal Assistance

Program participation would be strictly voluntary based on application to the program. Participation in the program would be dependent on the applicant-proposed land use and practices to be installed. To be eligible for technical and financial assistance, participants would be required to demonstrate their contribution to the identified watershed concerns via submittal of a current, SLO-approved MFEMP. Federal assistance would only be provided to applicants demonstrating that only less-than-significant adverse impacts could result from a proposed project in the short-term, and beneficial effects would be anticipated over the long term. All such land treatment contracts would be signed within the first five years of the program and executed within a period of five years thereafter, extending to the tenth program year.

Federal assistance under the Preferred Alternative is conditional on completion of this Plan-PEA with a Finding of No Significant Impact (FONSI) and authorization of funding by the NRCS (acting on behalf of the Secretary of the Agriculture) to ensure the project meets 16 U.S.C. 1005.

8.7 Economic and Structural Tables

A summary of the economic analysis for Alternative 1 (FWLFI), Alternative 2 (FWFFI; Preferred Alternative), and No-Action Alternative (FWOP) is provided in **Section 5.3**. The associated program costs and benefits for southern Chester County, Pennsylvania (2023) are further detailed in the tables below. Table 8-2 (NWPM 506.11, Economic Table 1) presents the projected installation costs and the percentages of program costs to be shared by the SLO and NRCS, respectively.

Table 8-3 (NWPM 506.12, Economic Table 2) presents the program costs as well as the proportion of federal versus non-federal funding sources. The average annual NEE costs are shown in Table 8-4 (NWPM 506.18, Economic Table 4).

Table **8-5** (NWPM 506.20, Economic Table 5a) presents the estimated average annual watershed protection damage reduction benefits.

Table **8-6** (NWPM 506.21, Economic Table 6) compares the NEE average annual benefits and average annual costs.

Table 8-2. Economic Table 1 - Estimated Installation Costs, Southern Chester County, Pennsylvania ^{1/ 2/ 3/}

Work of Improvement	Unit	Number			Estimated Cost (dollars)		
		Federal Land	Non-Federal Land	Total	PL-83-566	Other	Total
LAND TREATMENT							
Evaluation Unit 1 Mushroom Compost Leachate/Runoff Collection & Treatment	No.	0	4	4	\$2,437,500	\$812,500	\$3,250,000
Evaluation Unit 2 Mushroom Compost Leachate/Runoff Prevention	No.	0	3	3	\$1,875,000	\$625,000	\$2,500,000
Evaluation Unit 3 Mushroom Compost Treatment	No.	0	1	1	\$3,000,000	\$1,000,000	\$4,000,000
Evaluation Unit 4 Riparian Area Treatment	Various	-	-	-	\$187,500	\$62,500	\$250,000
TOTAL LAND TREATMENT					\$7,500,000	\$2,500,000	\$10,000,000
TECHNICAL ASSISTANCE					\$1,500,000	\$0	\$1,500,000
PROJECT ADMINSTRATION					\$500,000	\$700,000	\$1,200,000
TOTAL PROJECT					\$9,500,000	\$3,600,000	\$12,700,000

^{1/} Price base: 2024 dollars; cost estimates rounded.

Prepared December 2024

^{2/} Costs for program alternatives assume 75 percent (federal) to 25 percent (other, non-federal) cost-share assistance, including project design and engineering, construction, and program administration.

^{3/} Project Administration also includes permitting and operation, maintenance, and replacement costs.

Table 8-3. Economic Table 2 - Estimated Cost Distribution-Structural Measures, Southern Chester County, Pennsylvania ^{1/}

Works of Improvement	Installation Cost–PL 83-566 (\$)				Installation Cost–Other Funds (\$)				Total Installation Costs (\$)
	Construct	Engineer	Admin	Total PL 83-566	Construct	Engineer	Admin ^{2/}	Total Other	
Land Treatment	7.5M ^{3/}	1.5M	0.5M	9.5M	2.5M ^{3/}	-	0.7M	3.2M	12.7M

^{1/} Price base: 2024 dollars; cost estimates rounded.

Prepared: December 2024

^{2/} Admin also includes permitting and operation, maintenance, and replacement costs.

^{3/} Includes \$0 of Public Law 83-566 funds and \$0 of other funds for cultural resource protection and mitigation measures.

Table 8-4. Economic Table 4 - Estimated Average Annual Program National Economic Efficiency (NEE) Costs, Southern Chester County, Pennsylvania ^{1/}

Works of Improvement	Program Outlays Amortization of Installation Cost (\$)	Program Outlays Operation, Maintenance, and Replacement Cost (\$) ^{2/}	Other Direct Costs	Total Costs (\$)
Land Treatment	1.50M	0.03M	-	1.53M

^{1/} Price base: 2024 dollars; cost estimates amortized over 10 years at a discount rate of 3.00 percent and rounded.

Prepared: December 2024

^{2/} Cost-share recipients are responsible for operation, maintenance, and replacement costs during or after the agreed upon contractual period.

Table 8-5. Economic Table 5a - Alternative 2 (Recommended) – Estimated Average Annual Program Watershed Protection Damage Reduction Benefits, Southern Chester County, Pennsylvania ^{1/ 2/ 3/}

Item	Damage Reduction Benefit, average annual	
	Agriculture-related	Nonagricultural-related
Onsite		
Crop Stand Damage	+	n/a
Land Voiding and Depreciation	+	+
Water Conservation	+	n/a
Maintaining Productivity	+	n/a
Other – Operational Efficiency	+	n/a
Other – Nutrient Management	\$ 4.7M	+
Other – Riparian Zone Protection	+	n/a
Onsite Total:	\$ 4.7M	\$0
Offsite / Public		
Maintaining Productivity for Future Generations	+	+
Sediment Damages	+	+
Property Values	+	+
Water Treatment	+	n/a
Recreation	+	+
Fish and Wildlife	+	+
Water Conservation	+	n/a
Other – Odor Management	+	+
Offsite / Public Total:	\$0	\$0
Total:	\$ 4.7M	\$0

^{1/} Price base: 2024 dollars; cost estimates rounded.

^{2/} Qualitative damage reduction benefits indicated by ‘+’ symbol.

Prepared: December 2024

Table 8-6. Economic Table 6 - Comparison of NED Benefits and Costs, Southern Chester County, Pennsylvania ^{1/}

Works of Improvement	Agricultural-related		Benefit to Cost Ratio ^{4/}
	Damage reduction, annual program		
	Other – Nutrient Management ^{2/}	Other – Physical Resource Effects ^{3/}	
Land treatment - acres	28.0		
Alternative 2 (FWFFI)	\$ 4.7M	+ 1,513	6.26

^{1/} Price base: 2024 dollars; cost estimates rounded.

Prepared: December 2024

^{2/} Total damage reduction benefits (i.e., \$/lbs. of nutrients/sediments reduced) based on a reimbursement timeframe of 5 years (i.e., program years 6-10).

^{3/} Cumulative, qualitative damage reduction benefits represented by Conservation Practice Physical Effects (CPPE) ranking for the corresponding (representative) conservation systems, organized by program alternative.

^{4/} Annual program damage reduction benefits (i.e., \$/lbs. of nutrients/sediments reduced) based on a reimbursement timeframe of 5 years (i.e., program years 6-10).

^{5/} Benefit-to-Cost Ratio calculated as the annual program damage reduction benefits divided by annual program installation costs.

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Chapter 10 – List of Preparers

Under the direction of NRCS, this Draft Plan-PEA was developed by the North Wind Resource Partnership. The staff responsible for preparation of this Draft Plan-PEA are listed in Table 10-1.

Table 10-1. List of Preparers.

Name	Title	Education	Professional Experience (years)	Other
US Department of Agriculture, Natural Resources Conservation Service - Pennsylvania				
Mark Buckwalter	Civil Engineer	B.S., Agricultural and Biological Engineering, Pennsylvania State University	14	P.E.
Mary Lynn Marks	Agricultural Economist	B.S., Food and Agricultural Business, University of Tennessee M.S., Agricultural Economics, University of Tennessee	2	
Christopher Plount	NRCS State Archaeologist	M.A. Cultural Resource Management, Adams State University, Alamosa Colorado	10	
Beth Sassaman	Supervisory District Conservationist	B.S., Biology, Cedar Crest College M.S., Biology, East Stroudsburg University of Pennsylvania	20	
Heather Smeltz	Assistant State Conservationist – Water Resources	B.S., Agricultural and Biological Engineering, Pennsylvania State University M.S., Biological and Agricultural Engineering, North Carolina State University	21	P.E.
Chester County Conservation District				
Paige LaDuca	Grant Coordinator	B.S., Regional /Environmental Planning, Indiana University of Pennsylvania	10	
Christian Strohmaier	Managing Director	B.A, Environmental Geography, Indiana University of Pennsylvania	27	Act 38 NMPR
North Wind Resource Partnership				
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Julia Fine	Project Manager	M.S., Civil Engineering, Villanova University	18	P.E.
Michael Robertson	Environmental Planner	B.S., Crop and Soil Environmental Science, Virginia Tech	15	AICP
Yan Duan	Water Resource Engineer	M.S., Civil & Environmental Engineering, University of Washington	10	P.E.
Niyati Jogani	Water Resource Associate	M.S., Civil & Environmental Engineering, Texas A&M University	7	P.E.

Name	Title	Education	Professional Experience (years)	Other
Eric Adams	Geospatial Analyst	B.S. Geology, Portland State University M.S., GIS, University of Utah	8	
Stephen Forney	Environmental Scientist	M.S., Environmental Science, Villanova University	9	

Chapter 11 – Distribution List

A Notice of Availability for the Draft Plan-EA was distributed to federal, state, and local agencies, community representatives, and area non-governmental organizations. The table below includes the agencies, representatives, and organizations on the mailing list.

Absentee-Shawnee Tribe of Oklahoma
American Mushroom Institute
Avondale Borough
Borough of Oxford
Borough of West Grove
Brandywine Conservancy
Brandywine Red Clay Alliance
Chester County Agriculture Development Council
Chester County Agriculture Land Preservation Board
Chester County Board of Health
Chester County Commissioners
Delaware Nation, Oklahoma
Delaware River Basin Commission
Delaware Tribe of Indians
East Nottingham Township
Eastern Shawnee Tribe of Oklahoma
FEMA Region III
Franklin Township
Kennett Township
New Garden Township
Office of the Governor
PA DCNR, Bureau of Recreation and Conservation
PA Fish and Boat Commission
PA State Conservation Commission
Pennsylvania House District 13
Pennsylvania House District 158
Pennsylvania House District 160
Pennsylvania Department of Community and Economic Development
Pennsylvania Historic and Museum Commission
Pennsylvania Natural Heritage Program
Pennsylvania Senate District 19
Pennsylvania Senate District 9
Pennsylvania's 5th Congressional District
Pennsylvania's 6th Congressional District
Saint Regis Mohawk Tribe
Shawnee Tribe
Stockbridge-Munsee Community, Wisconsin
Susquehanna River Basin Commission

The Chester County Press
U.S. Army Corps of Engineers
U.S. EPA, Region 3
U.S. Forest Service
U.S. Geological Survey
United States Senator John Fetterman
United States Senator Robert Casey, Jr.
USDA, Farm Service Agency
USDA, Rural Development
West Nottingham Township
White Clay Watershed Association

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Chapter 13 – Acronyms and Abbreviations

AMI	American Mushroom Institute
APE	Area of Potential Effects
AQCR	Air Quality Control Region
BMP	Best Management Practice
BOD	Biological Oxygen Demand
CAA	Clean Air Act
CBW	Chesapeake Bay Watershed
CEQ	Council on Environmental Quality
CCCD	Chester County Conservation District
CFR	Code of Federal Regulations
CP	Conservation Practice
CPS	Conservation Practice Standard
CWA	Clean Water Act
CWF	Cold Water Fishes
DPS	Distinct Population Segment
DRB	Delaware River Basin
EE	Environmental Evaluation
EFH	Essential Fish Habitat
EO	Executive Order
EQIP	Environmental Quality Incentives Program
E&S	Erosion and Sedimentation
ESA	Endangered Species Act
EV	Exceptional Value
FWFFI	Future With Full Federal Investment
FWLFI	Future With Limited Federal Investment
FWOP	Future Without Program
H ₂ S	Hydrogen Sulfide
HUC	Hydrologic Unit Code
HQ	High Quality

LTC	Long-Term Contract
MC	Mushroom Compost
MFEMP	Mushroom Farm Environmental Management Plan
MF	Migratory Fishes
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHA	Natural Heritage Area
NHPA	National Historic Preservation Act
NLCD	National Land Classification Database
NMNEOC	Non-Methane, Non-Ethane Organic Compounds
NOx	Nitrogen Oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWPM	National Watershed Program Manual
O&M	Operations and Maintenance
PA DCNR	Pennsylvania Department of Conservation and Natural Resources
PAC	Pennsylvania Administrative Code
PADEP	Pennsylvania Department of Environmental Protection
PADOH	Pennsylvania Department of Health
PCSM	Post-Construction Stormwater Management
PL	Public Law
Plan-PEA	Watershed Project Plan–Programmatic Environmental Assessment
PR&G	Planning Requirements and Guidance
RCPP	Regional Conservation Partnership Program
SHPO	State Historic Preservation Office
SLO	Sponsoring Local Organization
SVI	Social Vulnerability Index
TMDL	Total Maximum Daily Load
TSF	Trout Stocking
US	United States
USC	United States Code

USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound

Chapter 14 – Appendices

The Appendices to this Plan-PEA are provided as a separate document or file, as noted below.

Appendix A. Comments and Responses

Appendix B. Project Maps

Appendix C. Supporting Maps

Appendix D. Investigation and Analyses Report