



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE



DRAFT SUPPLEMENTAL WATERSHED PLAN #3

FOR REHABILITATION OF FLOODWATER RETARDING STRUCTURE PA-463 (LEAVITT BRANCH DAM)
OF THE BRODHEAD CREEK WATERSHED, MONROE COUNTY, PENNSYLVANIA

Prepared by



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

In Cooperation with

THE MONROE COUNTY CONSERVATION DISTRICT
AND THE MONROE COUNTY COMMISSIONERS

August 2026

USDA Non-Discrimination Statement

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotope, American Sign Language, etc.) should contact the State or local Agency that administers the program or contact USDA through the Telecommunications Relay Service at 711 (voice and TTY). Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at [How to File a Program Discrimination Complaint](#) and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Mail Stop 9410, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.

**PRELIMINARY DRAFT Supplemental Watershed Plan No. 3
For the Rehabilitation of Floodwater Retarding Structure PA-463 Leavitt Branch Dam
of the Brodhead Creek Watershed
Monroe County, Pennsylvania
Congressional District: 8**

Prepared by:

U.S. Department of Agriculture, Natural Resources Conservation Service

In Cooperation with:

Monroe County Conservation District and Monroe County Commissioners, Pennsylvania

AUTHORITY:

The original watershed work plan was prepared, and works of improvement have been installed under the authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566) as amended. The rehabilitation of the floodwater retarding structure PA-463 Leavitt Branch Dam of the Brodhead Creek Watershed is authorized under Public Law 83-566 (as amended), and as further amended by the Small Watershed Rehabilitation Amendments of 2000 (Section 313 of Public Law 106-472).

ABSTRACT:

PA-463 Leavitt Branch Dam was originally authorized under the Watershed Protection and Flood Prevention Act (Public Law 83-566) for the purposes of flood prevention and recreation. A subsequent Supplemental Watershed Plan removed recreation as an authorized project purpose, and the structure currently serves the authorized purpose of flood prevention. PA-463 Leavitt Branch Dam does not currently meet applicable United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and Pennsylvania Department of Environmental Protection (PADEP) Division of Dam Safety criteria and performance standards for hydraulic capacity and structural integrity. The dam was designed by NRCS in 1971 and constructed in 1976 as a high hazard potential dam. The purpose of the project is to reduce the risk of catastrophic dam failure and loss of life, while also providing continued flood protection to the downstream watershed area.

The Preferred Alternative includes Structural Rehabilitation of the dam and will include: repairing the principal spillway intake riser, modifying the auxiliary spillway, embankment reconstruction, sediment removal, vegetation clearing, access improvements, and BMP implementation. The preferred alternative will meet applicable NRCS and Commonwealth of Pennsylvania dam safety performance criteria and standards and maintain flood control and reduced damage while minimizing environmental, economic, and social impacts. The selected alternative provides the least impact to environmental, natural resources, social, and cultural resources, and represents the least cost alternative. Under the recommended plan, economic benefits will exceed project costs; total installation costs are estimated to be approximately \$27,565,400, of which \$8,606,000 will be incurred by the local Sponsor with \$18,959,400 funded by NRCS.

COMMENTS AND INQUIRIES:

Comments and inquiries must be received by October 23, 2026. Submit comments and inquiries to Mark Buckwalter, P.E., Ag/Civil Engineer, USDA/NRCS – PA, 359 East Park Drive, Suite 2, Harrisburg, PA, 717-237-2245, mark.buckwalter@usda.gov

Ancestral Land Acknowledgement

The Brodhead Watershed Project area lies within the ancestral homelands of Indigenous nations whose cultural, spiritual, and historical ties to the region long predate European settlement. These lands and waterways were traditionally used by Native communities for hunting, fishing, foraging, travel, and ceremonial purposes. In recognition of these enduring connections, government-to-government consultation has been initiated with the Absentee Shawnee Tribe of Indians of Oklahoma, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Onondaga Nation, Seneca-Cayuga Nation, Shawnee Tribe, and the Stockbridge-Munsee Community, Band of Mohican Indians. These Tribes and Nations hold ancestral, traditional use, or cultural resource claims within and in the vicinity of the project area. The project team acknowledges their sovereign status and the significance of their ancestral ties, and is committed to ongoing consultation that is respectful, transparent, and inclusive, in alignment with federal trust responsibilities and the requirements of the National Environmental Policy Act.

Summary (Office of Management and Budget Fact Sheet)

**Supplemental Watershed Plan No. 3
For the Rehabilitation of Floodwater Retarding Structure PA-463 Leavitt Branch Dam
Of the Brodhead Creek Watershed
Monroe County, Pennsylvania
Congressional District: 8**

Authorization for Rehabilitation / Supplemental Work Plan: The rehabilitation of the Brodhead Creek Watershed PA-463 Dam is authorized under Public Law 83-566 (as amended), and as further amended by the Small Watershed Rehabilitation Amendments of 2000 (Section 313 of Public Law 106-472).

Sponsor: Monroe County Conservation District and Monroe County Commissioners, Pennsylvania

Proposed Action: Rehabilitation of the Brodhead Creek Watershed PA-463 Leavitt Branch Dam flood control structure.

Purpose and Need for Action: The purpose of the Brodhead Creek Watershed PA-463 Dam rehabilitation project is to relieve dam safety concerns resulting from a catastrophic breach of the high hazard dam PA-463 and to provide flood protection to the watershed while minimizing environmental, economic, and social impacts. There is a need to reduce the risk of loss of life due to a breach of the existing dams and to reduce risk of flood damage within the downstream flood zone to homes, commercial facilities, existing infrastructure, agriculture, and future development.

Table S- 1: Property and Infrastructure Risk from Potential Breach of PA-463

Residential (#)	84
Commercial (#)	23
Institutional (#)	5
Bridges (#)	12
State Roads (mi)	9.79
Local Roads (mi)	3.21

Preferred Alternative: The Preferred Alternative involves structural rehabilitation of PA-463 and was identified as the Agency Preferred, National Economic Efficiency (NEE), and Locally Preferred (PR&G) Alternative. Selected through technical analysis and consultation with NRCS, the Preferred Alternative addresses key safety deficiencies including insufficient spillway capacity, overtopping risk during design storms, auxiliary spillway stability concerns, and inadequate internal drainage.

Project Measures: PA-463 Rehabilitation measures to be implemented consist of the installation of an armoring system within the auxiliary spillway and installation of a stilling basin to address stability integrity concerns; lengthening the effective weir crest length to pass the FBH without overtopping the dam; leveling the dam crest to provide required freeboard during design storm events; and making

repairs to the principal spillway intake riser..

Resource Information:

Table S- 2: Resource Information for the Brodhead Creek Watershed Structure PA-463

Latitude and Longitude:	41.208541N, -75.246839W
12-Digit Hydrologic Unit Code (HUC):	HUC 02040104(0901)
Watershed Size:	4,441.6 acres

Source: NEPAassist, 2025, Environmental Protection Agency

Table S- 3: Land Use in the Brodhead Creek Watershed structure PA-463

Land Use Cover in Brodhead Watershed	Acres	%
Open Water	262.9	3.05%
Developed, Open Space	554.4	6.44%
Developed, Low Intensity	82.5	0.96%
Developed, Medium Intensity	32.2	0.37%
Developed, High Intensity	6.4	0.07%
Barren Land	4.4	0.05%
Deciduous Forest	5896.0	68.47%
Evergreen Forest	27.3	0.32%
Mixed Forest	471.2	5.47%
Shrub/Scrub	5.1	0.06%
Herbaceous	92.9	1.08%
Hay/Pasture	80.9	0.94%
Woody Wetlands	1046.4	12.15%
Emergent Herbaceous Wetlands	48.0	0.56%
<i>Total Acres</i>	<i>8611</i>	<i>100%</i>

Source: National Land Cover Database, 2021, U. S. Geological Survey

Table S- 4: Land ownership in the drainage area above the dam for the Brodhead Creek Watershed structure PA-463

Land Ownership in the PA-463 Drainage Area Above the Dam	Acres		Percent	
Government	0		0%	
Commercial	137.4		84.9%	
Private	24.5		15.1%	
<i>Total</i>	<i>161.9</i>		<i>100%</i>	

Source: Monroe County, PA

Climate & Topography:

The average annual precipitation for Monroe County, Pennsylvania (Mount Pocono Weather Station) is 47.9 inches. In winter, the average-mean daily temperature is 25.3 degrees Fahrenheit (°F) and the average daily minimum is 17.7 °F. In summer, the average-mean daily temperature is 65.7 °F and the average daily maximum is 75.4 °F. The average frost dates in Monroe County, PA from 1971-2000 were September 29 - May 6 (Northeast Regional Climate Center.)

Slopes of the ground surface in the Brodhead project watershed vary from 0% to 32%, with an average slope of approximately 10%. The steepest portions of the watershed are generally located to the east of Leavitt Branch, while the flattest areas in the watershed are located along the riparian areas of Leavitt Branch.

The highest point in the watershed is at an elevation of 2,228 feet above mean sea level (MSL) along the northeastern border of the watershed. The highest lands in the watershed (approximately 1,800 to 2,100 MSL) are generally located in the north-western portion of the watershed with steep slopes and widening valleys. The lowest point in the watershed is at an elevation of 1,130 MSL, at the southern tip of the watershed where PA-463 meets the dam. Slope and topographic maps are appended.

Population and Demographics:

Table S- 5: Population & Demographics in Barrett Township

Beneficiary	Barrett Township	Monroe County	Pennsylvania	U.S.
Population (July 1, 2021) ¹	4,061	168,099	13,002,700	332,031,554
Under 18 Years of Age ²	738	31,935	2,620,346	72,323,400
Over 65 Years of Age ²	666	32,771	2,542,514	57,658,747
Per Capita Income ³	-	\$36,277	\$41,234	\$32,621
Median Household Income ³	\$84,974	\$80,656	\$73,170	\$75,149
Households, 2018-2022 ³	1,635	59,113	5,193,727	125,786,655
Median Value of Owner-Occupied Housing Units, 2014-2018 ³	-	\$221,100	\$226,200	\$281,900

Percent of Persons Living in Poverty ³	12.5%	11.3%	11.8%	11.5%
¹ U.S. Census Bureau, <i>Population Estimates Program</i> , Table SUB-MCD-EST2022-POP-42, May 2023 release. ² U.S. Census Bureau, <i>American Community Survey 5-Year Estimates</i> (2018–2022). ³ Data unavailable for towns under 5,000 population; Monroe County used as proxy where needed. Source: U.S. Census Bureau 2020-2022				

Table S- 6: Summary of Relevant Resource Concerns for the Proposed Action

Resource Concern	Rationale
Soil-Related Concerns	
Soil Resources	Project alternatives involve earth disturbance, grading, excavation, embankment modification, borrow/disposal activities, and temporary construction access that may affect existing soil resources. Soil resources were identified during scoping due to the potential for temporary and permanent disturbance of on-site soils associated with implementation of the proposed alternatives.
Erosion and Sedimentation	Project alternatives involving earth disturbance, stream work, dam rehabilitation, or dam decommissioning have the potential to affect erosion and sediment transport processes during construction and operation. Erosion and sedimentation were identified as relevant resource concerns due to the potential for sediment mobilization and downstream transport associated with construction activities and changes in dam operations or removal.
Water-Related Concerns	
Water Resources	PA-463 is located within the Leavitt Branch/Brodhead Creek watershed, where the dam influences local hydrology, stormwater attenuation, and downstream flow conditions. Water resources were identified during scoping because project alternatives may affect watershed hydrology, stormwater storage, downstream flow regimes, and overall watershed function.
Water Quality	Project alternatives may affect water quality through temporary construction-related turbidity, sedimentation, erosion, alteration of runoff patterns, and potential changes to stream and impoundment conditions. Water quality was identified as a relevant resource concern due to the presence of regulated water quality standards and designated uses within the watershed.

Resource Concern	Rationale
Floodplain Management	PA-463 provides flood attenuation benefits within the Brodhead Creek watershed, and project alternatives may alter flood storage, downstream flood elevations, and floodplain conditions. Floodplain management was identified during scoping because alternatives may affect flood risk, floodplain function, and consistency with applicable floodplain management requirements.
Waters of the U.S, Wetlands, & Special Aquatic Sites	Jurisdictional wetlands, waters of the United States, and other aquatic resources are present within and adjacent to the dam, spillway, and retarding pool areas. These resources were identified during scoping because project alternatives may require work within or adjacent to regulated aquatic resources and may result in temporary or permanent impacts subject to federal and state permitting requirements.
Regional Water Resource Plans	The project is located within a watershed subject to regional and local watershed planning efforts, including the Brodhead Watershed Conservation Plan. Regional water resource plans were identified during scoping to evaluate consistency of project alternatives with applicable watershed management goals, policies, and planning initiatives.
Air-Related Concerns	
Air Quality	Construction and implementation of project alternatives may generate temporary emissions from construction equipment, vehicle traffic, and earth disturbance activities. Air quality was identified during scoping to evaluate whether project-related emissions could affect local or regional air quality conditions.
Plant and Animal-Related Concerns	
Threatened & Endangered Species	Federally listed, proposed, and other protected species may occur within or adjacent to the project area based on USFWS and state resource agency records. Threatened and endangered species were identified during scoping because project alternatives may affect habitat, individuals, or designated/proposed critical habitat through vegetation clearing, construction disturbance, or hydrologic changes.
Migratory Birds	Migratory bird species may utilize habitats within and adjacent to the project area for nesting, foraging, or migration. Migratory birds were identified during scoping because project alternatives may involve vegetation clearing, construction disturbance, and temporary habitat disruption affecting protected migratory bird species.

Resource Concern	Rationale
Bald and Golden Eagles	Bald and golden eagles and/or suitable eagle habitat may occur within the broader project vicinity. This resource concern was identified during scoping because project alternatives may involve construction activities, vegetation disturbance, or noise that could affect eagle habitat or behavior.
Invasive Species	Invasive plant species are present within portions of the project area. Invasive species were identified during scoping because construction activities, earth disturbance, and equipment movement may introduce, spread, or exacerbate invasive species populations.
Fish & Wildlife	Aquatic and terrestrial wildlife habitats occur within and adjacent to the project area, including stream, floodplain, forest, and impoundment-associated habitats. Fish and wildlife were identified during scoping because project alternatives may affect habitat quality, movement corridors, aquatic communities, and wildlife use of the project area through construction activities or hydrologic changes.
Riparian Areas	Riparian areas are present adjacent to streams, spillways, and impoundment margins within the project area. Riparian resources were identified during scoping because project alternatives may involve disturbance, grading, vegetation removal, or hydrologic changes affecting riparian habitat and function.
Forest Resources	Forested areas occur within portions of the project area, including areas potentially needed for construction access, staging, borrow/disposal, and dam rehabilitation activities. Forest resources were identified during scoping because project alternatives may require vegetation clearing or result in temporary or permanent impacts to forested areas.
Human, Economic & Social Conditions	Rationale

Resource Concern	Rationale
Cultural Resources and Tribal Consultation	In accordance with Section 106 of the National Historic Preservation Act (36 CFR Part 800), consultation was initiated early in the project planning process with the Pennsylvania State Historic Preservation Office (PA SHPO) and federally recognized Tribes with ancestral ties to the project area. Federally recognized Tribes contacted included the Absentee Shawnee Tribe of Indians of Oklahoma, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Onondaga Nation, Seneca-Cayuga Nation, Shawnee Tribe, and the Stockbridge-Munsee Community. The Tribes were provided project information and afforded the opportunity to review and comment on the proposed undertaking and NRCS' determination of effect. The Eastern Shawnee Tribe, Shawnee Tribe, and the Stockbridge-Munsee Community responded and indicated that the proposed project would have no effect on historic properties of religious or cultural significance to their Tribes. No responses were received from the remaining contacted Tribes. The PA SHPO reviewed the project and concurred with NRCS' determination of No Effect on Historic Properties. Documentation of consultation, including letters and correspondence, is provided in Appendix A. The Phase 1 archaeological investigation identified no resources within the expected construction boundaries (location of disturbance). Access to the construction area will use extant roads and infrastructure.
Local, Regional and National Economy	Project alternatives may affect local and regional economic conditions through construction expenditures, protection of downstream economic assets, changes to tax base, and long-term maintenance or operational costs. Economic considerations were identified during scoping to evaluate the potential economic effects and feasibility of alternatives.
Public Health & Safety	PA-463 is a high hazard potential dam, and failure of the structure could pose a significant risk to downstream populations, infrastructure, and emergency response systems. Public health and safety were identified during scoping because the project is intended to address risks associated with potential dam failure and downstream flooding.

Resource Concern	Rationale
Scenic Beauty	Project alternatives may alter the visual character of the dam site and surrounding landscape through structural modifications, vegetation clearing, earth disturbance, and construction activities. Scenic beauty was identified during scoping due to the project's location within a visually sensitive rural watershed setting.
Land Use & Land Cover	Project alternatives may temporarily or permanently alter existing land uses and land cover through construction disturbance, staging, access improvements, floodplain changes, or changes in long-term site conditions. Land use and land cover were identified during scoping because alternatives may affect compatibility with existing and future land uses.
Ecosystems Services	Rationale
Provisioning	Project alternatives may affect provisioning ecosystem services, including water storage, groundwater recharge, and other natural resource functions associated with the watershed and dam impoundment system.
Regulating	Project alternatives may affect regulating ecosystem services such as flood attenuation, erosion control, stormwater storage, and water quality regulation within the watershed.
Supporting	Project alternatives may affect supporting ecosystem services, including habitat provision, nutrient cycling, and ecological functions that support aquatic and terrestrial ecosystems.
Cultural & Social	Project alternatives may affect cultural and social ecosystem services, including recreation, community stability, visual quality, and public use of surrounding lands and resources.
Other Concerns	Rationale
Transportation	Construction and implementation of project alternatives may affect transportation resources through construction traffic, equipment access, temporary roadway disruptions, and use of public transportation corridors serving the project area.
Maintenance and Management	Project alternatives may affect long-term operation, maintenance, and management requirements associated with PA-463, including changes in inspection, maintenance burden, access control, and site management needs.

Alternative Plans Considered:

Rehabilitation (Preferred Alternative): The Rehabilitation Alternative involves structural improvements to the PA-463 (Leavitt Branch) dam to meet current NRCS and PADEP dam safety criteria. Measures include making repairs to the principal spillway intake riser, modifying the auxiliary spillway,

rehabilitating the embankment, and implementing sediment removal and maintenance access improvements. This alternative addresses known deficiencies and significantly reduces the risk of breach failure, thereby maintaining downstream flood risk reduction benefits

No Action [National Environmental Policy Act - NEPA] and Future Without Project (FWOP) [PR&G]:

The No Action alternative and the FWOP represent the future conditions in which no federal or non-federal action is taken to correct identified deficiencies at the PA-463 dam. Over time, deterioration of structural components would continue, resulting in increased likelihood of dam breach. Failure by breaching during a significant storm event would likely result in catastrophic flooding, property loss, and potential loss of life downstream. This alternative serves as the baseline condition against which the impacts of other alternatives are evaluated. PA-463 is classified as a High Hazard Potential dam. A breach would result in extensive downstream inundation affecting approximately 112 structures and 12 bridges, with a Population at Risk (PAR) of at least 411 residents across 84 homes, along with 23 commercial and 5 institutional properties.

Decommissioning with Non-Structural Alternative: This alternative involves the removal of the flood detention capacity of PA-463 by removing a portion or all of the embankment material and restoring the function of the stream channel and 100-year floodplain. Costs for the decommissioning alternative would include construction (\$24.5 million for PA-463), floodproofing or buy-outs of downstream properties (\$9.8 million for PA-463), and additional unquantified costs to elevate or resize bridges and culverts (elevate or resize). Additionally, the decommissioning alternative would involve greater waterway and wetland impacts in comparison to other alternatives. It was determined that this alternative was not cost effective in comparison with other available alternatives. The evaluated construction cost of decommissioning with non-structural measures for PA-463 is approximately 34.3 million dollars in comparison to a construction cost of 25.8 million dollars for the rehabilitation alternative for the PA-463 dam site.

Project Costs: The total project costs (Preferred Alternative) for PA-463 are shown in Table S-7 below:

Table S- 7: Estimated Project Costs - Preferred Alternative for Rehabilitation of PA-463 Leavitt Branch Dam

Preferred Alternative	Source				Total Eligible Installation Costs
	PL 83-566 Funds		Other Funds		
	Cost	Percent	Cost	Percent	
Construction	\$15,959,400	65%	\$8,544,400	35%	\$24,503,800
Engineering	\$2,750,000	100%	\$5,000	0%	\$2,755,000
Project Administration	\$250,000	98%	\$5,000	2%	\$255,000
Real Property Rights	0	0%	\$39,100	100%	\$39,100
Permits	0	0%	\$12,500	100%	\$12,500
Total Costs	\$18,959,400	69%	\$8,606,000	31%	\$27,565,400

Annual O&M Costs	0	0%	\$4,500	100%	n/a
------------------	---	----	---------	------	-----

1. Price base 2025.

2. Maximum Public Law 83-566 cost-share is 65% of eligible cost-sharable items, not to exceed 100% of total construction costs

Project Benefits: Following the Principles, Requirements, and Guidelines (PR&G) planning policy, the Federal investments in water resources should strive to maximize public benefits, with appropriate consideration of costs. Public benefits measured as positive ecosystem services encompass environmental, economic, and social goals; include monetary and non-monetary effects; and may include both quantified and unquantified measures. The preferred alternative maximizes net public benefits, with appropriate consideration of costs, consistent with the Principles and Requirements for Federal Investments in Water Resources (PR&G).

Number of Direct Beneficiaries/ Population at Risk (PAR): The Preferred Alternative, structural rehabilitation of the PA-463 (Leavitt Branch) dam, maximizes these public benefits by reducing downstream flood risk, preserving critical infrastructure, and enhancing life safety for vulnerable populations. The project directly benefits approximately 112 structures, and 12 bridges located downstream of the dam. The Population at Risk is identified at 411 residents across 83 single family residences, 1 apartment building, 23 commercial buildings, 1 school, 3 churches, and 1 post office that would be exposed to potentially catastrophic flood impacts in the event of dam failure under the No Action condition. In calculating the PAR, occupancy factors were not implied to community structures (schools, churches, post office) to avoid double counting individuals who are assumed to be at their residences. Structures with inundation levels above 1 foot were used to determine the PAR, which includes 67 residential homes and 23 commercial properties.

Benefits of the Preferred Alternative at the PA-463 dam site includes:

1. Reduction in the population at risk by reducing the possibility of dam failure.
2. Improving the constructed level of flood protection and associated flood damage reduction benefits for residents, businesses, community and civic facilities, and infrastructure within the downstream floodplain.
3. Reduction in the sponsor's liability associated with the operation of a flood retarding structure which does not meet current dam safety engineering and performance criteria.
4. Protection of real estate values downstream within the downstream floodplain.
5. Provides an extended service life of 100 years.

Benefit Cost Ratio: 0.15

Discount Rate: 3%

Net Beneficial Effects: \$-764,018 (Net average annual equivalent benefits of \$134,506 - \$898,524 in average annual equivalent costs)

Table S- 8: Funding Schedule

Need Budget Year	Federal Funds (PL-566)						Non-Federal Funds (Local)					
	Eng. Serv.	Geo-Tech	Proj. Admin.	Mitigation	Construction	Total	Real Property	Proj. Admin.	Mitigation	Construction	Permits	Total
1	\$675,000	\$75,000	\$90,000			\$840,000		\$1,000				\$1,000
2	\$450,000		\$90,000			\$540,000	\$39,100	\$1,000				\$40,100
3	\$50,000		\$90,000	\$65,000		\$205,000		\$1,000	\$35,000		\$12,500	\$48,500
4	\$75,000		\$300,000		\$7,963,745	\$8,338,745		\$1,000		\$4,288,170		\$4,289,170
5	\$75,000		\$300,000		\$7,963,745	\$8,338,745		\$1,000		\$4,288,170		\$4,289,170
Total	\$1,325,000	\$75,000	\$870,000	\$65,000	\$15,927,490	\$18,262,490	\$39,100	\$5,000	\$35,000	\$8,576,340	\$12,500	\$8,667,940

Note: This schedule indicates the year when funds are expected to be expended.

Period of Analysis: The total period of analysis is 105 years, consisting of a 100-year evaluated project life, which reflects the design life of the rehabilitation measures, plus a 5-year implementation period to account for project planning, design, and construction (2 years).

Evaluated (Project) Life: 100-years

Environmental Effects: Minor permanent and temporary impacts are expected at the PA-463 dam site to implement the preferred alternative. These impacts are elaborated below and generally include stream impacts at the immediate downstream toe of slope associated with the embankment and outlet works improvements and tree removal to install erosion protection measures at the downstream end of the auxiliary spillway. There will be temporary displacement of wildlife during construction due to construction activity and noise. However, species are anticipated to return following construction. Best Management Practices will be implemented to reduce transport and the introduction of invasive plant species and reduce erosion and sedimentation into the outlet channel of the PA-463 dam site and into Leavitt Branch.

Controversial Issues: There have been no controversies or controversial issues identified to date.

Issues to be Resolved: None identified to date.

Evidence of Unusual Congressional or Local Interest: None

Compliance Certification: Is this report in compliance with executive orders, public laws, and other statutes governing the formulation of water resource projects? Yes X No__

Table of Contents

0. Changes Requiring a Supplement.....	1
0.1 Changes Requiring the Preparation of a Supplemental Watershed Plan	1
1. Watershed Planning Background.....	2
1.1 Authority	2
1.2 Sponsor	2
1.3 Cooperating Agencies.....	2
1.4 Planning Area.....	2
1.4.1 Selected Watershed.....	2
1.4.2 Study Area.....	2
1.4.3 Area of Potential Effects for NHPA Section 106 Compliance.....	3
1.5 Planning Process and Study Scope	3
1.5.1 Stepwise Planning Process.....	3
1.5.2 Ecosystem Services Framework.....	4
1.5.3 Period of Analysis.....	5
1.5.4 Scope of the Watershed Project Plan	5
1.6 Related Projects and Studies	7
2. Purpose and Need.....	7
2.1 Purpose and Need for Action	7
2.1.1 Purpose	7
2.1.2 Need.....	7
2.2 Problems and Opportunities	7
2.2.1 Problems	7
2.2.2 Opportunities	8
2.3 Planning Objectives	8
2.4 Federal Objectives	8
2.5 Constraints and Considerations.....	8
3. Affected Environment: Current and Future Conditions.....	9
3.1 Current Conditions of the PA-463 Leavitt Branch Dam	9
3.1.1 Operation and Maintenance.....	9
3.1.2 Sedimentation Rate	9
3.1.3 Breach Analysis & Hazard Classification	10
3.1.4 Consequences of Dam Failure	10
3.2 Resource Categories and Ecosystem Services of Concern	11
3.3 Inventory of Existing Resources, Conditions, and Ecosystem Services.....	17

3.3.1	Soil-related Concerns.....	17
3.3.2	Water-Related Concerns.....	21
3.3.3	Plant and Animal-Related Concerns	26
3.3.4	Human Use-Related Concerns	30
3.4	Future Forecast Conditions	37
4.	<i>Formulation of Alternatives</i>	39
4.1	Alternative Formulation Process	39
4.1.1	Guiding Principles	39
4.1.2	Alternative Formulation Criteria.....	39
4.1.3	Risk and Uncertainty.....	39
4.2	Alternatives Considered	41
4.2.1	No Action / Future without Project (FWOP) / Future without Federal Investment (FWOFI) Alternative 41	
4.2.2	Action Alternatives	42
4.2.3	Locally Preferred Alternative	46
4.3	Alternatives Considered but Eliminated from Detailed Study.....	46
4.4	Final Array of Alternatives	49
5.	<i>Environmental Consequences: Evaluation of Alternatives.....</i>	51
5.1	Summary and Comparison of Alternatives-Planning Process.....	51
5.2	Summary and Comparison of Alternatives – Ecosystem Services.....	55
5.3	Effects of Individual Alternatives Relative to Resource Concerns	61
5.3.1	Soil-Related Concerns	62
5.3.2	Water-Related Concerns.....	64
5.3.3	Plant and Animal-Related Concerns	70
5.3.4	Human-Use Related Concerns	76
5.3.5	Summary of Effects.....	Error! Bookmark not defined.
6.	<i>Preferred Alternative</i>	93
6.1	Rationale for the Preferred Alternative.....	93
6.2	Measures to be Installed	93
6.3	Irreversible or Irretrievable Commitment of Resources	94
6.4	Areas of Controversy.....	94
6.5	Permits and Compliance.....	95
6.6	Mitigation of Potential Effects	96
6.7	Costs and Cost-Sharing	96
6.8	Ecosystem Services Benefits	97
6.9	Installation & Financing.....	98
6.9.1	Installation	98

6.9.2	Responsibilities	98
6.9.3	Contracting	100
6.9.4	Real Property Rights	100
6.10	Operation, Maintenance & Replacement	100
6.11	Emergency Action Plan	100
6.12	Economic Tables and Structural Tables.....	101
7.	<i>Consultation, Coordination & Public Participation</i>	<i>106</i>
7.1	Consultation	106
7.1.1	Standard Requirements	106
7.2	Coordination	109
7.3	Public Involvement.....	110
7.4	Plan Development and Review	111
7.5	Distribution List.....	112
8.	<i>References.....</i>	<i>115</i>
8.1	Previous Reports and References.....	115
8.2	Literature Cited	115
9.	<i>List of Preparers.....</i>	<i>119</i>
10.	<i>Appendices.....</i>	<i>122</i>

TABLES

Table S- 1: Property and Infrastructure Risk from Potential Breach of PA-463.....	II
Table S- 2: Resource Information for the Brodhead Creek Watershed Structure PA-463	III
Table S- 3: Land Use in the Brodhead Creek Watershed structure PA-463.....	III
Table S- 4: Land ownership in the drainage area above the dam for the Brodhead Creek Watershed structure PA-463	IV
Table S- 5: Population & Demographics in Barrett Township.....	IV
Table S- 6: Summary of Relevant Resource Concerns for the Proposed Action.....	V
Table S- 7: Estimated Project Costs - Preferred Alternative for Rehabilitation of PA-463 Leavitt Branch Dam.....	X
Table S- 8: Funding Schedule	XX
Table 1-1: NEPA and PR&G Comparison and Completion Checklist.....	4
Table 1-2: Brodhead Creek Watershed and Floodwater Detention Structure Sizes	5
Table 3-1: Brodhead Creek PA-463 Dam Reservoir Sediment Summary.....	10
Table 3-2: Property and Infrastructure Risk from Potential Breach of PA-463	11
Table 3-3: Resource Categories of Concern and Ecosystem Services Identified During Scoping	11
Table 3-4: Soils at PA-463, Dam Site and Flood Pool	18
Table 3-5: Soils in the Decommissioned PA-463 Downstream 100-Year Floodplain.....	18
Table 3-6: Soils Classification at PA-463 & Downstream 100-year Floodplain.....	19

Table 3-7: PA-463 Wetland Classification	22
Table 3-8: Species and Resources potentially impacted by activities in the Brodhead Creek watershed .	27
Table 3-9: PA-463 Socioeconomics and Civil Rights Report.....	31
Table 3-10: PA-463 Social and Economic Profile	33
Table 3-11: Land Use/Land Cover in PA-463's Affected Environment.....	35
Table 4-1: Number of Structures Impacted by a Breach of PA-463 Leavitt Branch Dam	42
Table 4-2: PA-463 Leavitt Branch Structural Rehabilitation Design Options.....	44
Table 4-3: PA-463 Leavitt Branch Decommissioning with nonstructural and Building Floodproofing Costs	45
Table 4-4: Summary of Alternatives Preliminary Screening Evaluation at PA-463.....	46
Table 4-5: Final Array of Alternatives for Rehabilitation of PA-463	49
Table 5-1: Summary and Comparison of Alternatives – PA-463 Planning Process.....	51
Table 5-2: NWPM Figure 501D-6: Ecosystem Services Tradeoff Analysis Summary for PA-463.....	56
Table 5-3: Summary and Comparison of PA-463 Alternatives - Effects on Resource Concerns and Ecosystems Services.....	Error! Bookmark not defined.
Table 6-1: (Economics Table 1) Estimated Installation Cost Structure PA-463, Brodhead Creek Watershed, PA, Dollars ^{1/}	101
Table 6-2: (Economics Table 2) Estimated Cost Distribution- Water Resource Project Measure, Structure PA-463 Brodhead Creek Watershed, PA, Dollars ^{1/}	102
Table 6-3: (Table 3) Structural Data – Dams with Planned Storage Capacity, Structure PA-463 Brodhead Creek Watershed, PA	103
Table 6-4: (Economics Table 4) Estimated Average Preferred Alternative Annual Costs, Structure PA-463, Brodhead Creek Watershed, PA, Dollars ¹	104
Table 6-5: (Economics Table 5) - Estimated Average Annual Flood Damage Reduction Benefits, Structure PA-463 Brodhead Creek Watershed, PA, Dollars ^{1/}	104
Table 6-6: (Economic Table 6) Comparison of Preferred Alternative Benefits and Costs, Structure PA-463 Brodhead Creek Watershed, PA, Dollars ^{1/}	105
Table 7-1: Consultations, Coordination, and Public Participation – PA-463.....	107
Table 7-2: PA-463 Supplemental Watershed Work Plan No. 3 – Distribution List	112
Table 9-1: PA-463 Supplemental Watershed Plan No. 3 - List of Preparers	119

APPENDICES

Appendix A – Comments and Responses
Appendix B – Project Map
Appendix C – Support Maps
Appendix D – Investigations and Analysis (IA Report)
Appendix E – Other Supporting Information
Appendix F – Environmental Assessment (EA)

0. Changes Requiring a Supplement

0.1 Changes Requiring the Preparation of a Supplemental Watershed Plan

Brodhead Creek PA-463, Leavitt Branch Dam, was originally authorized and designed under the PL-83-566 Watershed Protection and Flood Prevention Program in the early 1970s for the purposes of flood prevention and recreation. A supplemental watershed plan completed in 1971 modified the authorized purposes of the project and removed recreation as a project purpose, leaving flood prevention as the sole authorized purpose of the dam.

A second supplemental plan was completed in 1985 to address structural concerns associated with a sinkhole identified on the downstream embankment. Modifications were implemented to address embankment stability and seepage concerns identified at that time.

This document represents Supplemental Watershed Plan No. 3 and has been prepared to address current dam safety deficiencies identified through inspections and engineering evaluations. A subsequent assessment conducted by USDA NRCS on December 27, 2017 determined that the dam does not meet current NRCS (2015) and Pennsylvania Department of Environmental Protection (PADEP) Division of Dam Safety engineering criteria and performance standards. Detailed planning-level investigations confirmed multiple hydraulic and structural deficiencies.

Hydraulically, the dam is unable to safely pass flows from design storm events, including the Principal Spillway Hydrograph (PSH) and the Freeboard Hydrograph (FBH). The auxiliary spillway has experienced erosion due to activation. Additional deficiencies include inadequate filter and drain design, insufficient stability and integrity of the auxiliary spillway control section, and a lack of capacity to fully dewater the principal spillway hydrograph.

Preparation of Supplemental Watershed Plan No. 3 is required to address these deficiencies and to bring the dam into compliance with current NRCS and PADEP dam safety criteria while maintaining the authorized purpose of flood prevention.

1. Watershed Planning Background

1.1 Authority

Background: The Brodhead Creek PA-463 dam site is located in Monroe County, Pennsylvania. The project was originally planned and designed in 1961-1971 by the Soil Conservation Service (now the Natural Resources Conservation Service – NRCS) in conjunction with the Monroe County Conservation District and the Pike County Conservation District. The original design life of PA-463 was 50 years. The dam was constructed under the U.S. Department of Agriculture's (USDA's) Watershed Protection & Flood Prevention Act, in 1976 and 1975 respectively.

An amendment to PL 83 566, the Watershed Rehabilitation Amendments of 2000 (PL 106-472), Section 313, authorizes financial and technical assistance to rehabilitate dams under the USDA Watershed Rehabilitation Program. The rehabilitation of this dam site is authorized under this amendment.

1.2 Sponsor

The Project Sponsor is Monroe County, Pennsylvania, as represented by its Board of Commissioners. Monroe County Commissioners also serve as the Owner of each dam site and can perform the functions required in the NWPM 500.11 for project sponsors. The Monroe County Conservation District performs operational and maintenance duties for the dam sites.

1.3 Cooperating Agencies

None.

1.4 Planning Area

1.4.1 Selected Watershed

Leavitt Branch is a headwater tributary to Brodhead Creek, which ultimately discharges into the Delaware River in Stroudsburg, Monroe County, Pennsylvania. The PA-463 (Leavitt Branch Dam) project site is located within the Upper Brodhead Creek watershed (Hydrologic Unit Code [HUC] 12: 020401040901), which is a subwatershed of the larger Middle Delaware-Mongaup-Brodhead HUC 8 basin (02040104). The contributing watershed area upstream of PA-463 encompasses approximately 6.51 square miles (4,441.6 acres). A watershed location map is provided in Appendix B.

Although this watershed plan focuses on PA-463, it is important to acknowledge that PA-464 (Goose Pond Dam), another NRCS flood retarding structure within the Brodhead Creek watershed, is located approximately 1.5 miles east of PA-463. While both dams are components of the original Public Law 83-566 Brodhead Tributaries Watershed Project and have been evaluated concurrently, PA-464 is not located within the Area of Potential Effect (APE) for the PA-463 rehabilitation project. Therefore, PA-464 is not considered in the Affected Environment or Environmental Consequences analyses for this EA. A figure illustrating the relative location of both dam sites is included in Appendix B.

1.4.2 Study Area

The Study Area includes PA-463, its individual upstream flood pool, and the breach inundation area of the dam site to Creek Road. A map illustrating the study area is included in Appendix C.

The site watershed for PA-463 is located in the north central section of Barrett Township, Monroe County, PA. As described herein, the watershed is largely undeveloped, forested regions of the county. The Skytop community, state highway PA-390 and a small airport are examples of low impact development in the area.

1.4.3 Area of Potential Effects for NHPA Section 106 Compliance

The Area of Potential Effects (APE) was developed and submitted to the Pennsylvania State Historic Preservation Office (PA SHPO) for review through the PA-SHARE system in accordance with 36 CFR 800.4(a). The APE was established to account for both direct and indirect effects, including potential visual, auditory, and hydrologic effects associated with the proposed rehabilitation activities and potential changes in inundation limits.

In a letter dated April 28, 2025, PA SHPO reviewed the project information and determined that the project would have No Effect on above-ground historic properties within the APE. Documentation of SHPO coordination and concurrence is included in Appendix A. NRCS has made a reasonable and good faith effort to identify historic properties within the APE in accordance with 36 CFR 800.4(b). A map of the APE is provided in Appendix C. The APE for this project extends to an approximate .5-mile radius from the Location of Disturbance (LOD), which for this project, is the PA-463 dam site. The APE was modified from the standard 1-mile radius around dam centroid points to coincide with the watershed imposed by the steep terrain of the region. The APE for PA-463 extends along the Leavitt Branch valley, generally following the one percent (1%) return frequency storm event flood limits under a decommissioned dam scenario, for approximately 1-mile to its confluence with the Middle Branch of Brodhead Creek. The Leavitt Branch passes through the village of Canadensis, an unincorporated community in Barrett Township, and under state highway PA-443. The APE also extends 1.25 miles upstream of PA-463 to account for potential raising of the embankment and associated additional inundation limits. The Phase IA report, which includes a map of the APE, is located Appendix E.

1.5 Planning Process and Study Scope

1.5.1 Stepwise Planning Process

The Plan documents the planning process by which the NRCS, in cooperation with the Sponsor, provided technical assistance to the local Sponsors, technical advisors, and the public in addressing resource issues and concerns within the Brodhead Creek watershed. The process followed the nine-step conservation planning process as outlined in NRCS Title 180-600 National Planning Procedures Handbook. NRCS and the Sponsor worked together to identify problems and opportunities and define project objectives. DDK Engineering-JV was retained by NRCS to inventory resources, to analyze that data, and to formulate and evaluate the potential alternatives. NRCS and the Sponsor made the decisions documented in this Plan based on the developed alternatives.

This process provided opportunities for public, agency, and tribal participation in the federal planning process as per NEPA and NHPA requirements.

As described above, the analysis included consideration of the PR&G for Water and Land Related Resources Implementation Studies and Federal Water Resource Investments DM 9500-013 (2017). To demonstrate the integration of the NRCS nine-step process with NEPA and PR&G

procedures, Table 1-1 presents a comparison checklist showing how the project's planning steps align across these frameworks.

Table 1-1: NEPA and PR&G Comparison and Completion Checklist

✓	Steps in NRCS/NEPA Planning Process	✓	Steps in the PR&G Project Level Procedures
✓	1. Identify Problems and Opportunities	✓	1. Identify Problems and Opportunities
✓	2. Determine Objectives (NEPA Purpose & Need)		No equivalent step; objectives specified in the Federal Objective and Guiding Principles
✓	3. Inventory Resources	✓	2. Inventory Existing Resources & Conditions
✓	4. Analyze Resource Data	✓	3. Forecast Future Conditions
✓	5. Formulate Alternative	✓	4. Develop Array of Alternatives
✓	6. Evaluate Alternatives	✓	5. Evaluate Effects of Individual Alternatives
✓	7. Make Decisions	✓	6. Compare Alternatives and 7. Identify Recommended Alternative
	8. Implement the Plan		8. Implement and Evaluate
	9. Evaluate the Plan		See Step Above

(Source: PR&G DM9500-013 2017, Table 6)

1.5.2 Ecosystem Services Framework

As required in DM 9500-013, scoping for this Plan incorporates a framework for conducting an analysis of ecosystem services. The framework utilized for this project is the National Ecosystem Services Classification System (NESCO) Plus framework. To supplement this framework, the Final Ecosystem Goods & Services (FEGS) tool was utilized to identify beneficiaries, and environmental attributes in a structured, transparent, repeatable process.

Ecosystems Services include:

- 1) Provisioning services: tangible goods for human use such as food, clean air, fresh water, energy, fuel, forage, fiber, minerals, and navigation;
- 2) Regulating services: maintain natural processes which provide buffers against environmental catastrophes such as long-term storage of carbon; climate regulation; water filtration, purification, and storage; soil stabilization; flood control; and disease regulation;
- 3) Supporting services: underlying processes maintaining conditions for life such as pollination, seed dispersal, wildlife, soil formation, and nutrient cycling; and
- 4) Cultural and social services: services related to the cultural or spiritual needs of people such as educational, aesthetic, spiritual and cultural heritage values, recreational experiences, and tourism opportunities.

Resource concerns identified and evaluated under NEPA often are also categorized as or can be used as a proxy for the different ecosystem services.

1.5.2.1 Ecosystem Services Evaluation Approach

NRCS and the sponsors approached ecosystem services initially from a qualitative perspective to identify the types of services present in the watershed, and then specifically to identify those that could interact with (impact or be impacted by) the dams and those that could interact with potential management measures to address permit deficiencies at the dams. The public, Tribal Governments, and other agencies were invited to identify and refine ecosystem services concerns during scoping and at other points of participation in the planning process. A Level II Analysis in the context of the National Watershed Program refers to a detailed evaluation conducted during the watershed planning process. This analysis focuses on assessing the potential environmental, economic, and social impacts of proposed watershed projects. It aims to ensure that project plans are comprehensive, sustainable, and compliant with relevant regulations and policies.

The total cost of implementation (Federal Contribution), including any required permitting and mitigation, will exceed \$10,000,000. Therefore, the required level of analysis for ecosystem services is a Level II Analysis, as indicated in the 2024 National Watershed Program Manual 501.30.F.

1.5.3 Period of Analysis

The total period of analysis for PA-463 is 105 years, which includes a 5-year installation period to account for planning, design, permitting, and construction, followed by a 100-year evaluated project life that reflects the originally designed level of flood protection.

1.5.4 Scope of the Watershed Project Plan

Leavitt Branch is within the size limitations for its potential rehabilitation to be considered within scope of Public Law No. 83-566 § 2, as shown in Table 1-2.

Table 1-2: Brodhead Creek Watershed and Floodwater Detention Structure Sizes

	Watershed Size	Structure Size
--	----------------	----------------

PL83-566 Maximum	250,000 acres	12,500 acre-feet floodwater detention capacity
PA-463 Leavitt Branch Dam	4,165 acres	1,139.9 acre-feet
Brodhead Creek Watershed	18,624 acres	3,077.2 acre-feet floodwater retarding capacity

1.5.4.1 External Scoping

A Public Participation Plan (PPP) was prepared at the beginning of this effort and identifies the steps to be followed during the development of the Plan. As discussed in Section 1.5 above, this process has included (to date), the scheduling and holding of an initial public scoping meeting, a direct invitation to cooperating and participating agencies of likely affected federal, state, Tribal Governments, and local agencies, affected and interested people and the general public.

A second public meeting, along with the invitation to the public, agencies, and Tribal Governments occurred on February 8, 2024. In this meeting, the alternatives were reviewed along with the identification of a Preferred Alternative. Comments were solicited and included in the Plan.

1.5.4.2 Scoping Process

A scoping process was used to solicit information and input from the project owner, sponsors, local citizens, and other groups with vested interest in the watershed and project regarding the most relevant resource that requires consideration. The intent of the scoping process is to identify relevant issues, such as economic, environmental, cultural and social concerns in the watershed. The scoping process for PA-463 involved site investigations, a public meeting, and consultations with resource and jurisdictional agencies and tribal representatives.

1.5.4.3 Scoping Activities

Scoping letters were sent to public officials, resource agencies and local stakeholders informing them of the proposed project, requesting their input on relevant concerns and inviting them to a project scoping meeting. In addition, a notice was distributed to the public to attend an informational session. The public notice was published/announced in accordance with the county's public notice procedures as well as direct mailing to abutters and local newspapers.

NRCS issued a formal press release and posted project materials and notices on the NRCS Pennsylvania website. These efforts ensured that both agency partners and the general public had multiple avenues for accessing project information and submitting comments during the scoping process.

The initial scoping meeting and public informational session were held on April 21, 2022 (see Section 7). This was a hybrid meeting which took place at the Monroe County Public Safety Center, 100 Gypsum Road, Stroudsburg; and via Zoom. The full distribution list to agencies and groups is included in Appendix A.

The Alternatives Presentation public meeting was held on February 8th, 2024. This was a hybrid meeting which took place at the Barrett Township Building, located 1200 Route 390 in Cresco, PA.

1.6 Related Projects and Studies

This planning process utilized the Dam Assessment Report PA-463 dated December 27, 2016, which was conducted under authority of the Small Watershed Rehabilitation Amendments, PL 106-472. In parallel with this Plan, a separate but coordinated Plan was completed for PA-464 (Goose Pond Dam), located within the same watershed. Information from the PA-464 planning effort is referenced, where relevant, to support watershed-scale context and consistency and findings from both Plans were considered together in the evaluation of alternatives, environmental effects, and watershed-wide benefits.

2. Purpose and Need

2.1 Purpose and Need for Action

2.1.1 Purpose

The purpose of the proposed action is to rehabilitate PA-463 (Leavitt Branch Dam) to address identified dam safety deficiencies and reduce risks to human life, property, and infrastructure associated with potential dam failure. While also continuing to provide flood prevention benefits to the watershed, which was the original authorized purpose of the watershed dam.

2.1.2 Need

The need for the proposed action is based on identified hydraulic and structural deficiencies that prevent PA-463 from meeting current NRCS and Pennsylvania Department of Environmental Protection (PADEP) dam safety and performance criteria. Without corrective action, the dam would remain at risk of failure during large storm events, which could result in significant adverse effects to downstream populations, structures, infrastructure, and the surrounding community. Rehabilitation is needed to address these deficiencies and reduce the risk of catastrophic dam failure.

2.2 Problems and Opportunities

2.2.1 Problems

The following problems were identified through the watershed planning process:

Dam Safety Deficiencies

The problem is that PA-463 does not meet current federal and state dam safety and performance standards. Hydraulic and structural deficiencies have been identified that increase the risk of dam failure during design storm events.

Risk to Downstream Population and Infrastructure

The problem is that failure of PA-463 would pose significant risk to downstream populations and infrastructure located within the dam breach inundation area. Based on current breach analyses, approximately 221 persons are at risk, along with 84 residential structures, 23 commercial structures, 5 institutional structures, 12 bridges, and approximately 13 miles of state and local roads.

Dependence on Existing Flood Attenuation Benefits

The problem is that downstream communities currently receive flood attenuation and flood damage reduction benefits from PA-463. Loss of dam functionality would increase downstream flood risk and associated damage.

2.2.2 Opportunities

Implementation of the watershed rehabilitation plan presents the opportunity to:

1. Reduce the probability of catastrophic dam failure;
2. Reduce risks to human life and downstream infrastructure;
3. Maintain or improve flood risk management benefits where practicable;
4. Protect and, where feasible, enhance natural resource functions within the project area; and
5. Improve long-term dam performance and operational reliability.

2.3 Planning Objectives

Planning objectives describe the desired outcomes of the planning process and are used to formulate and evaluate alternatives. The planning objectives for PA-463 are to:

1. Reduce the risk of catastrophic dam failure at PA-463 throughout the project service life.
2. Reduce potential loss of life and damages to downstream populations, structures, roads, and bridges located within the breach inundation area.
3. Address identified hydraulic and structural deficiencies such that PA-463 meets applicable NRCS and PADEP dam safety and performance criteria.
4. Minimize adverse environmental, economic, social, and cultural impacts associated with implementation of the rehabilitation project.
5. Protect and, where practicable, enhance natural resource functions and ecosystem services within the project area.

2.4 Federal Objectives

The Federal Objective, as set forth in the Water Resources Development Act of 2007, specifies that Federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by:

1. Seeking to maximize sustainable economic development;
2. Avoiding the unwise use of floodplains and minimizing adverse impacts to flood-prone areas; and
3. Protecting and restoring the functions of natural systems and mitigating unavoidable damage to those systems.

2.5 Constraints and Considerations

The following constraints and considerations were identified during the planning process:

1. The Sponsor owns the dam and has, or can obtain, the property rights necessary for construction, access, operation, and maintenance.
2. Project alternatives must be technically feasible and constructible given existing site topography, geology, hydrology, and infrastructure constraints.
3. Project alternatives must comply with applicable federal, state, and local permitting and regulatory requirements.
4. Project alternatives must consider environmental, cultural, and social resource impacts identified during the scoping and evaluation process.
5. Sponsor funding availability and timing of non-federal cost share may influence implementation timing and phasing.

3. Affected Environment: Current and Future Conditions

The Affected Environment is the physical area where resource concerns are present and could be affected by a potential project alternative.

The original dam was constructed for protection from the 100-year storm event. However upstream watershed determined during initial planning and design was approximately 1.2 square miles smaller than that calculated for this evaluation. As a result, the current configuration of PA-463 activates the auxiliary spillway during a storm event between the 25-year and the 50-year.

Unless otherwise stated, the Affected Environment includes the footprint of the existing dam, the potential flood pool, and the downstream areas within the breach inundation zone. Construction access and staging for the rehabilitation of PA-463 would occur within the existing dam footprint and adjacent maintained areas. No offsite staging areas are anticipated or required.

3.1 Current Conditions of the PA-463 Leavitt Branch Dam

3.1.1 Operation and Maintenance

The operation and maintenance of the dam is in compliance with the existing Operation and Maintenance Agreement. Routine maintenance activities include mowing of the embankment and auxiliary spillway areas one to two times per year, as well as the removal of woody debris and other obstructions from the dam face, riser structure, and spillway channel. The Sponsor also conducts visual inspections to monitor for erosion, signs of animal burrowing, and slope instability. Minor corrective measures, such as vegetation control and small-scale erosion repair, are implemented as needed.

Significant erosion occurred in the auxiliary spillway in June 2006 as a result of activation. The Sponsor partnered with NRCS to repair the auxiliary spillway at that time.

3.1.2 Sedimentation Rate

A very low volume of accumulated sediment exists in the PA-463 reservoir; the rate of accumulation is a magnitude below the rates used in the 1971 design calculations.

Table 3-1 summarizes the findings of the historical sedimentation rates and projected service life remaining for the dam. See Sediment Survey Memorandum, Appendix E.

Table 3-1: Brodhead Creek PA-463 Dam Reservoir Sediment Summary

	Submerged Sediment	Aerated Sediment
Original design sediment deposition volume (ac-ft) ¹	40.5	11.6
Actual sediment deposition volume (ac-ft)	1.53	0.48
Actual annual deposition rate (ac-ft/yr)	0.032	0.010
Remaining storage volume capacity (ac-ft)	16.1	75.0
Remaining storage life (years)	504	7,500

1. Original Design documents were prepared in 1969.

3.1.3 Breach Analysis & Hazard Classification

PA-463 was originally designed and constructed by NRCS as a High Hazard Potential dam, a classification which reflects the potential for loss of life and significant downstream impacts in the event of failure. PADEP classifies PA-463 as a Size Class B, Hazard Class 1 (B-1) dam, consistent with its potential for significant downstream risk. This classification has been reaffirmed through subsequent evaluations by the PADEP Division of Dam Safety and the U.S. Army Corps of Engineers.

Breaching scenarios of PA-463 evaluated four potential modes of dam failure during including the hydrologic event, seismic event, static failure event, and material deterioration. The most detrimental downstream inundation limits were attributed to the FBH hydrologic breach of PA-463. The FBH dam embankment breach was modeled with a peak pool elevation and an overtopping failure, demonstrating PA-463 fails to pass the NRCS and state standards of safety and performance for the design storm event. The seismic and static breach scenarios assumed a piping breach with the pool levels at the principal spillway and auxiliary spillway elevations, respectively. The material deterioration failure of PA-463 was evaluated and determined the auxiliary spillway breaches during the 380-year event. This mode of failure is the most likely breach scenario if the dam is left in the current condition. The NRCS standards are not met for PA-463 since the auxiliary spillway cannot safely pass the FBH design storm without breaching. Since PA-463 and PA-464 share an inundation boundary at the town of Canadensis, normal operating conditions of PA-464 was acknowledged in the breach models. The 380-year breach inundation mapping is included in Appendix C, which has been prepared in accordance with TR-210-60, extends from the base of the dam, down Leavitt Branch, along Brodhead Creek, and ends immediately after the Poplar Run confluence.

3.1.4 Consequences of Dam Failure

It was determined that PA-463's auxiliary spillway will breach during the 380-year storm event if left in current conditions. The updated dam breach analysis prepared for this Plan, in Table 3-2, indicates that failure of PA-463 would result in inundation of 84 residential structures, 23 commercial buildings, 5 institutional facilities, and 12 bridges, along with approximately 12.99 miles of roadways (9.79 miles of state and 3.21 miles of local roads). Based on standard U.S.

household occupancy rates, the Population at Risk (PAR) is estimated at approximately 411 individuals. These estimates are conservative and reflect permanent residents only; daytime populations within commercial and institutional structures could increase actual exposure. Affected infrastructure includes critical transportation corridors and public service buildings, which could significantly impede emergency response and recovery, as shown in Table 3-2. Inundation mapping and structure-specific risk areas are included in Appendix C.

Table 3-2: Property and Infrastructure Risk from Potential Breach of PA-463

Residential (#)	84
Commercial (#)	23
Institutional (#)	5
Bridges (#)	12
State Roads (mi)	9.79
Local Roads (mi)	3.21

3.2 Resource Categories and Ecosystem Services of Concern

A summary of the resource concerns and ecosystem services identified as relevant to the project during the scoping meeting for the Brodhead Creek dam site PA-463 is presented in Table 3-3.

Table 3-3: Resource Categories of Concern and Ecosystem Services Identified During Scoping

Item / Concern	Relevant to Proposed Action	Rationale
Soil-Related Concerns		
Soil Resources	Yes	Soil resources have the potential to be disturbed by construction activities.
Prime & Unique Farmland and Farmland of Statewide or Local Importance	Yes	These soils are present within the Affected Environment. There is the potential for some alternatives to impact these types of soils. Additionally, if fill for rehabilitation is required, it will be necessary to identify impacts, if any, to these soils.

Erosion & Sedimentation	Yes	PA-463 does not contain significant submerged or aerated sediment accumulation and dredging of the sediment pool is not required to achieve the required design life. However, some of the alternatives considered have the potential to cause erosion through the pool area if the dam were removed, as well as increase erosion and sedimentation downstream.
Water-Related Concerns		
Surface Water & Surface Water Quality	Yes	No waterbodies within the Affected Environment are listed as impaired. However, some alternatives may have an impact on water quality, including temperature and sediment.
Sole Source Aquifer	No	No. There are no designated Sole Source Aquifers within the project area or affected environment. This determination was made based on review of the U.S. Environmental Protection Agency (EPA) Sole Source Aquifer mapping and the U.S. Geological Survey (USGS) Sole Source Aquifer geographic data for Pennsylvania. The project area is not located within or adjacent to a designated Sole Source Aquifer.
Groundwater & Groundwater Quality	Yes	Groundwater resources may be affected by construction activities and changes in hydrology associated with dam rehabilitation or decommissioning. Considered under NEPA due to potential effects on water resources and public water supplies.
Floodplain Management	Yes	The project is located within a FEMA-mapped floodplain and involves a flood control structure. Subject to Executive Order 11988 (Floodplain Management) and NEPA evaluation of flood risk and floodplain impacts. Existing floodplain areas may be affected by some alternatives.
Coastal Zone Management Areas	No	The watershed is not located in a Coastal Zone Management Area as defined on the PA DEP Coastal Zone map.

Waters of the U.S., Wetlands, & Special Aquatic Sites	Yes	The retarding pools, surrounding wetlands, and associated streams within the Affected Environment are considered Waters of the U.S. Wetlands are present at and around the dam and retarding pools for each dam site. Each alternative will have temporary and permanent impacts on wetlands within the affected areas. There are no special aquatic sites present. The US Army Corps of Engineers (USACE) was consulted regarding the Proposed Action on 09/30/2024 (Appendix A).
Coral Reefs	No	This resource is not present in the watershed or Affected Environment.
Regional Water Resource Plans	Yes	The 2002 Brodhead Watershed Conservation Plan includes the tributaries of Brodhead Creek, which prioritizes maintaining and improving water quality, managing natural habitat to promote natural vitality and to maintain, protect, and enhance natural systems & ensure that the historic resources of the Brodhead watershed are preserved. The 2004 Water Resources Plan for the Delaware River Basin includes the Brodhead Creek. This plan prioritizes the prevention and minimization of flood-induced loss of life and property, and protect floodplain ecology, enhancing water-based recreation in the river and its tributaries and protecting, conserving and enhancing healthy and biologically diverse riparian and aquatic ecosystems.
Wild & Scenic Rivers	No	Brodhead Creek and its tributaries are not listed as part of any wild or scenic rivers.
Plant and Animal-Related Concerns		
Threatened & Endangered Species	Yes	Federally listed species may be present within the project area. Consultation is required under Section 7 of the Endangered Species Act and must be evaluated under NEPA. As such, consultation with the USFWS and review of the official IPaC species list identified three federally listed bat species. The endangered northern long-eared bat, Indiana bat, and the proposed endangered tricolored bat, as potentially

		present within the broader project area, including downstream floodplains and the breach inundation zone. While no threatened or endangered species or suitable habitats were observed at the dam site itself during field surveys, areas downstream were not field-verified and may contain habitat suitable for these species. There are no state-listed endangered or threatened species currently known within the Affected Environment.
Migratory Bird Treaty Act	Yes	Migratory birds are protected under the Migratory Bird Treaty Act (16 U.S.C. §§ 703–712). The project area provides potential habitat for migratory bird species; therefore, compliance with the MBTA and evaluation under NEPA are required.
Bald and Golden Eagles	Yes	Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668–668d). The potential presence of these species within the watershed requires consideration under NEPA and coordination with USFWS.
Essential Fish Habitat	No	No EFH was identified within the project watershed.
Ecologically Critical Areas	No	There are no critical habitats, including IBAs, within the Affected Environment.
Invasive Species	Yes	The reconnaissance survey for the dam sites identified the presence of invasive species including, but not limited to, multiflora rose, Japanese barberry, autumn olive, and garlic mustard. Construction activities have the potential to introduce or spread invasive species.
Fish, Wildlife & Aquatic Resources	Yes	Fish and wildlife resources may be affected by changes in hydrology, habitat conditions, or construction activities. These resources are evaluated under NEPA and relevant authorities such as the Fish and Wildlife Coordination Act (16 U.S.C. §§ 661–667e)..
Natural Areas	No	There are no natural areas within the Affected Environment area at the PA-463 dam site.

Riparian Areas	Yes	Riparian areas are present in the vicinity of the Affected Environment. These are located along the edge of the retarding pool of the Proposed Action as well as along the streams entering and exiting the pools and downstream of PA-463.
Forest Resources	Yes	Forested areas are present within the project area and may be affected by construction activities. These resources are considered under NEPA due to their ecological function and potential for disturbance.
Human Use-Related Concerns		
Cultural Resources and Tribal Consultation	Yes	In accordance with Section 106 of the National Historic Preservation Act (36 CFR Part 800), the Natural Resources Conservation Service (NRCS), as the lead Federal agency, initiated consultation early in the project planning process with the Pennsylvania State Historic Preservation Office (PA SHPO) and federally recognized Tribes with ancestral ties to the project area. NRCS defined the Area of Potential Effects (APE), identified historic properties within the APE, and made a determination of effect for the undertaking in accordance with 36 CFR §§ 800.3 and 800.4. Federally recognized Tribes contacted included the Absentee Shawnee Tribe of Indians of Oklahoma, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Onondaga Nation, Seneca-Cayuga Nation, Shawnee Tribe, and the Stockbridge-Munsee Community. The Tribes were provided project information and afforded the opportunity to review and comment on the proposed undertaking and NRCS' determination of effect. The Eastern Shawnee Tribe, Shawnee Tribe, and the Stockbridge-Munsee Community responded and indicated that the proposed project would have no effect on historic properties of religious or cultural significance to their Tribes. No responses were received from the remaining contacted Tribes.

		The PA SHPO reviewed the project information and concurred with NRCS' determination of No Effect on Historic Properties. Documentation of consultation, including letters and correspondence, is provided in Appendix A.
Social Issues	No	Potential alternatives will not have impacts on social issues.
Local, Regional & National Economy	Yes	Some alternatives may impact the local and regional economy.
Public Health & Safety	Yes	The dam is classified as a high hazard structure. Potential failure presents a risk to human life and safety, requiring evaluation under NEPA and NRCS dam safety policy (NWPM 505).
Scenic Beauty	No	There are no formally designated areas of scenic beauty within the Affected Environment. PA-463 is not significantly visible outside of the Dam area.
Parklands	No	The PA-463 dam has no adjacent public recreational facilities; thus no impact is anticipated.
Significant Scientific Resources	No	No designated or recognized scientific resources, as defined under NRCS policy (190 NCHP 601.70), were identified within the project area; therefore, this resource concern is not applicable under NEPA.
Land Use & Land Cover	Yes	Land use and land cover may be affected by implementation of project alternatives. These resources are considered under NEPA due to potential changes in land use patterns and consistency with local planning and zoning.
Scoped Ecosystem Services of Concern		
Provisioning	Yes	Provisioning ecosystem services, including water-related resources, are considered under NEPA and NRCS planning policy (390 NWPM 506.0(A)) due to the role of the watershed in supporting water supply functions.
Regulating	Yes	Regulating ecosystem services, including flood attenuation, water quality, and erosion control, are relevant to the project and evaluated under NEPA and

		NRCS ecosystem services guidance (390 NWPM 506.0(A)).
Supporting	Yes	Supporting ecosystem services, such as habitat and ecological processes, are present within the project area and are evaluated under NEPA due to their role in maintaining ecosystem function.
Cultural and Social	Yes	Cultural and social ecosystem services are considered under NEPA and NRCS policy (390 NWPM 506.0(A)) due to their contribution to community well-being and social conditions.
Other Concerns		
Transportation	Yes	Temporary impacts may occur due to construction vehicle ingress and egress to the dam site, which will be managed by requiring the contractor to implement a proper Traffic Control Plan. Some alternatives may result in increased flood impacts on existing transportation infrastructure.
Maintenance and Management	Yes	Operation and maintenance requirements are considered under NEPA and NRCS policy as they relate to the long-term functionality and performance of the dam and associated infrastructure.

3.3 Inventory of Existing Resources, Conditions, and Ecosystem Services

Ecosystem services are identified with the relevant NEPA resource concern. To minimize duplication, no separate ecosystem services subsection is provided.

3.3.1 Soil-related Concerns

3.3.1.1 *Soil Resources (Regulating, Supporting Ecosystem Services)*

Based on a custom soil resource report generated by the NRCS Web Soil Survey on January 3, 2024, the primary soil types at each dam site were identified, along with those within the downstream area modeled without the dams in place. These soils are detailed in Table 3-4 and 3-5, and a soil map is provided in Appendix C.

Additionally, according to the PA DEP Environmental Search Tool, it was confirmed that there are no permitted activities, known contamination, or documented violations of environmental laws administered by PA DEP within the Affected Environment.

Table 3-4: Soils at PA-463, Dam Site and Flood Pool

MUSYM	Map Unit Name	Acres	%
As	Alluvial land	18.3	28.90%
LBE	Lackawanna and Bath soils, steep, rubbly	18.4	29.10%
LbB	Lackawanna channery loam, 0 to 8 percent slopes, extremely stony	1	1.60%
LbC	Lackawanna channery loam, 8 to 25 percent slopes, rubbly	0.5	0.70%
LyE	Lordstown and Oquaga channery loams, 25 to 70 percent slopes, extremely stony	10.3	16.40%
MoB	Morris channery silt loam, 0 to 8 percent slopes, extremely stony	0.1	0.20%
OxC	Oquaga-Lackawanna complex, 8 to 25 percent slopes, extremely stony	1.5	2.30%
WyB	Wyoming gravelly sandy loam, 3 to 8 percent slopes	6.6	10.50%
WyE	Wyoming gravelly sandy loam, 25 to 70 percent slopes	4	6.40%
WpB	Wellsboro channery loam, 0 to 8 percent slopes, extremely stony	2.5	3.90%
PA-463 Dam Site & Flood Pool Total		63.3	100.0%

Source: Web Soil Survey, 2024, United States Department of Agriculture Natural Resource Conservation Service

Table 3-5: Soils in the Decommissioned PA-463 Downstream 100-Year Floodplain

MUSYM	Map Unit Name	Acres	%
As	Alluvial land	10.4	45.70%
LbE	Lackawanna and Bath soils, steep, rubbly	0	0.00%

OxC	Oquaga-Lackawanna complex, 8 to 25 percent slopes, extremely stony	0.3	1.40%
Po	Pope silt loam	7.7	33.90%
Pp	Pope silt loam, high bottom	1.3	5.70%
WyE	Wyoming gravelly sandy loam, 25 to 70 percent slopes	1.8	7.70%
LyE	Lordstown and Oquaga channery loams, 25 to 70 percent slopes, extremely stony	1.3	5.60%
PA-463 Decommissioned Floodplain Total		22.7	100.0%

Source: Web Soil Survey, 2024, United States Department of Agriculture Natural Resource Conservation Service

3.3.1.2 Prime and Unique Farmland (Provisioning Ecosystem Service)

Prime and Unique Farmland of Statewide Importance present within the Affected Environment are summarized Table 3-6. There are 6.6 acres of statewide prime soil at the PA-463 dam site and 9 acres of prime farmland in the dam's downstream 100-year floodplain.

There are no soils classified as prime and unique farmland or farmland of statewide importance at the PA-463 dam site, but in the dam's downstream 100-year floodplain, there are 3.5 acres of statewide prime farmland and 42.6 acres of prime farmland. Total prime farmland and farmland of statewide importance within the project's overall Affected Environment is 61.7 acres. Prime and Unique Farmland maps are located in Appendix C.

Table 3-6: Soils Classification at PA-463 & Downstream 100-year Floodplain

Prime Farmland or Farmland of Statewide Importance in PA-463 Dam Site and Flood Pool			
MUSYM	Map Unit Name	Farmland Class	Acres
As	Alluvial land	Not prime farmland	18.3
LbE	Lackawanna and Bath soils, steep, rubbly	Not prime farmland	18.4
LbB	Lackawanna channery loam, 0 to 8 percent slopes, extremely stony	Not prime farmland	1
LbC	Lackawanna channery loam, 8 to 25 percent	Not prime farmland	0.5

	slopes, rubbly		
LyE	Lordstown and Oquaga channery loams, 25 to 70 percent slopes, extremely stony	Not prime farmland	10.3
MoB	Morris channery silt loam, 0 to 8 percent slopes, extremely stony	Not prime farmland	0.1
OxC	Oquaga-Lackawanna complex, 8 to 25 percent slopes, extremely stony	Not prime farmland	1.5
WyB	Wyoming gravelly sandy loam, 3 to 8 percent slopes	Farmland of statewide importance	6.6
WyE	Wyoming gravelly sandy loam, 25 to 70 percent slopes	Not prime farmland	4
WpB	Wellsboro channery loam, 0 to 8 percent slopes, extremely stony	Not prime farmland	2.5
OxC	Oquaga-Lackawanna complex, 8 to 25 percent slopes, extremely stony	Not prime farmland	1.5
PA-463 Dam Site & Flood Pool Total			63.3
Prime Farmland or Farmland of Statewide Importance in PA-463 Downstream 100-year Floodplain			
MUSYM	Map Unit Name	Farmland Class	Acres
As	Alluvial land	Not prime farmland	10.4
LbE	Lackawanna and Bath soils, steep, rubbly	Not prime farmland	0
LyE	Lordstown and Oquaga channery loams, 25 to 70 percent slopes, extremely stony	Not prime farmland	1.3
OxC	Oquaga-Lackawanna complex, 8 to 25 percent slopes, extremely stony	Not prime farmland	0.3

Po	Pope silt loam	All areas are prime farmland	7.7
Pp	Pope silt loam, high bottom	All areas are prime farmland	1.3
WyE	Wyoming gravelly sandy loam, 25 to 70 percent slopes	Not prime farmland	1.8
PA-463 100-year Downstream Floodplain Total			22.7

Source: Web Soil Survey, 2024, United States Department of Agriculture Natural Resource Conservation Service

3.3.1.3 Erosion & Sedimentation (Regulating Ecosystem Service)

Due to the drain being continually open at the dam, PA-463 traps limited sediment. Sediment is primarily trapped during periods of high flows when a pool is present behind the dam. The historical rate of sediment deposition is 0.042 ac-ft/year.

3.3.2 Water-Related Concerns

3.3.2.1 Water Resources

PA-463 is located on the Leavitt Tributary, approximately 1-mile upstream from the confluence with the Middle Branch of Brodhead Creek. The normal pool covers an area of approximately 3.0 acres and an average water depth of 8.7 feet, and has a drainage area of 6.52 sq. mi.

3.3.2.2 Water Quantity (Regulating Ecosystem Service)

There have been 6 FEMA disaster declarations related to flooding for Monroe County from 1955-2024 (FEMA, 2024). According to the Monroe County Hazard Mitigation Plan (2021) the risk factor for flooding and levee failure is “low.” In Canadensis, this is largely due to the presence of the existing dam system. PA-463 was constructed in response to severe flooding and damage from a weather event in August 1955.

3.3.2.3 Water Quality, including Surface and Ground Water (Provisioning and Cultural and Social Ecosystem Services)

According to the 2024 Integrated Water Quality report, Leavitt Branch is not included in the 2022 report of Section 303(d) listed impaired waters. The surface waters are usable for crop production and recreation.

Based on information available through the Pennsylvania DEP eMap PA GIS platform, there are fifteen Public Water Systems located within a one-mile radius of PA-463. The groundwater source supplying the public water systems may be from a shallow aquifer located within the unconsolidated soils near the site or from a deeper bedrock aquifer originating in fractured rock beneath the project area. The systems are likely regulated as Transient Non-Community Water Systems and include uses such as camps, lodges, churches and restaurants.

3.3.2.4 Floodplain Management (Regulating Ecosystem Service)

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), Panels 42089C0109E and 42089C0128E (effective May 2, 2013, the area surrounding PA-463 and the majority of the downstream Affected Environment are designated as areas of minimal flooding, Zone X (Appendix C).

Development within the 100-year floodplain is governed by Section 265 of Barrett Township's Code of Regulations, adopted in 2013. Within the Affected Environment, floodplain mapping is limited primarily to areas in and around Canadensis. New development is permitted within the FEMA-designated floodplain, provided it is elevated at least one foot above the base flood elevation where such elevations are available. In areas lacking base flood elevation data, provisions are in place to determine appropriate building heights. However, new construction is strictly prohibited within the designated floodway.

3.3.2.5 Waters of the U.S., Wetlands & Special Aquatic Sites

Waters of the United States regulated under Section 10 and Section 404 of the Clean Water Act, includes intermittent and permanent streams, ponds, lakes (up to their ordinary high-water elevations), and most wetlands. At PA-463, the retarding pool, all intermittent and permanent streams, and wetlands are identified in Appendix D. The US Army Corps of Engineers (USACE) was consulted and concurred with regard to the Proposed Action on 09/30/2024 (Appendix A).

Wetlands (Regulating and Supporting Ecosystem Services)

A wetland and waterway site investigation were performed on June 6 and 7, 2022 at the PA-463 site. A total of five wetland areas were identified and located in the field. Wetlands identified and located in the field are summarized in Table 3-7 and shown in Figure 1. Additional wetland descriptions, including dominant vegetation and primary functions are provided, following Table 3-7.

Table 3-7: PA-463 Wetland Classification

Wetland ID	NWI Classification	Acreage
PA-463 (Leavitt Branch Dam)		
A	PEM ¹ /PSS	0.22
B	PEM	0.05
C	PEM/PSS	0.36
D	PEM/PSS	0.13
E	PFO	0.09

¹ NWI wetland classifications are as follows: PEM: Palustrine Emergent; PSS: Palustrine Scrub-Shrub; PFO: Palustrine Forested



Figure 1. PA-463 Wetlands Map

Wetland A is a PEM/PSS and is a linear feature located just north of a berm above the spillway. The wetland is dominated by soft rush (*Juncus effusus*), sedges (*Carex spp.*), meadowsweet (*Spiraea sp.*), rough-stemmed goldenrod (*Solidago rugosa*), and sensitive fern (*Onoclea sensibilis*). The principal function of this wetland is sediment/nutrient retention; it likely captures runoff flowing down the steep slope above the spillway.

Wetland B is PEM and is a stand of non-native common reed (*Phragmites australis*) perched in a break in the slope above the spillway. The wetland is dominated by common reed, with some scattered sensitive fern at its edges. The principal function of this wetland is sediment/nutrient

retention, though this function is likely minimal considering the size of the wetland.

Wetland C is a PEM/PSS wetland located along the toe of slope at the western edge of the spillway. The wetland is dominated by large willow shrubs (the size of small trees) (*Salix sp.*), soft rush, drooping sedge, and rough-stemmed goldenrod. The principal function of this wetland is wildlife habitat.

Wetland D is PEM/PSS and is located at the bottom of the spillway. The wetland is dominated by cattails (*Typha spp.*), sensitive fern, sedges, and willows, and it includes a small area of open water. The principal function of this wetland is wildlife habitat; it may serve as breeding habitat for amphibians in the spring.

Wetland E is a PFO and is located in a flat, mucky area east of the outlet stream. This wetland is dominated by jewelweed (*Impatiens spp.*), sensitive fern, eastern hemlock (*Tsuga canadensis*) and red maple (*Acer rubrum*) and is apparently fed by groundwater seepage. The principal function of this wetland is groundwater recharge.

Waterways (Provisioning, Regulating, and Cultural and Social Ecosystem Services)

The ordinary high-water mark (OHW) of the perennial stream at the outlet of the PA-463 dam (Leavitt Branch) was identified and field-verified during the site investigation. Leavitt Branch is a second-order tributary to the Middle Branch of Brodhead Creek and flows for approximately 1 mile from the dam outlet before joining the Middle Branch. From that confluence, water ultimately flows into Brodhead Creek, which is part of the Delaware River Basin.

Downstream of the dam, Leavitt Branch and its tributaries are considered Waters of the United States (WOTUS) under Section 404 of the Clean Water Act due to their perennial flow and surface connectivity to downstream navigable waters. The stream is designated as a High-Quality Cold-Water Fishery (HQ-CWF) under Pennsylvania's Chapter 93 Water Quality Standards, indicating elevated ecological value and the presence of naturally reproducing trout populations. The dam does not alter the Chapter 93 designation of Leavitt Branch; the HQ-CWF use applies to the full stream segment as listed in PADEP's Stream Designations by Basin. According to Pennsylvania's 2024 Integrated Water Quality Monitoring and Assessment Report, Leavitt Branch is attaining all designated uses both above and below the dam, with no recorded impairments. Therefore, the reservoir and dam structure are not currently impacting the designated aquatic life use of the stream.

These downstream waters, including riparian and wetland features, are considered jurisdictional and functionally connected to the broader aquatic ecosystem of the Brodhead watershed. They provide regulating ecosystem services benefits by intact natural stream systems, which include aquatic vegetation, wetlands, and bivalves within these systems that filter flowing water, remove harmful contaminants, and improve habitat quality for sensitive freshwater species. Additionally, wetlands and aquatic vegetation also serve to naturally attenuate flood flows by slowing runoff and absorbing excess water. They provide clean water for recreational fishing, boating, and swimming. The waters also contribute to the natural aesthetics of the area.

3.3.2.6 *Regional Water Resource Plans*

Monroe County's Hazard Mitigation Plan (2021) aims to reduce loss of life and property by addressing key risks, including flooding, one of the most frequent and costly hazards in the region. The 2021 plan update, developed with input from local officials, residents, and stakeholders, identifies flooding, flash flooding, and ice jam flooding as priority concerns. Many municipalities, particularly those along the Delaware and Lehigh Rivers, face recurring flood events that threaten infrastructure, disrupt transportation, and pose environmental risks, including hazardous material contamination.

To mitigate these impacts, Monroe County has established clear goals over the next five years, focusing on reducing flood-related damage, improving disaster response, promoting flood-resilient development, and protecting critical infrastructure. The county's commitment to hazard mitigation planning helps break the cycle of disaster damage and supports long-term community resilience.

The 2002 Brodhead Watershed Conservation Plan identifies concerns within the watershed that include (but are not limited to) the impacts of unplanned growth, stormwater runoff, development of wetlands and stream bank erosion. Leavitt Branch (PA-463) was identified in the Plan as one of the watershed's "special places." Goals that are directly relevant to this Supplemental Watershed Plan include the following:

- "Water Quality and Quantity: Maintain and improve water quality throughout the watershed and ensure that an adequate quantity of surface water and groundwater is maintained."
- "Fish and Wildlife Habitat – Manage natural habitat to promote natural vitality and to maintain, protect, and enhance natural systems."
- "Historic & Cultural Resources – Ensure that the historic resources of the Brodhead watershed are preserved and interpreted as educational examples of the area's heritage."

Brodhead Creek and its tributaries are part of the Delaware River Basin. The 2004 Water Resources Plan for the Delaware River Basin is a multi-state plan that outlines a unified vision for protecting, preserving and enhancing the Delaware River Basin. Plan goals that are relevant to this project include (but are not limited to):

- "Goal 2.1: Prevent or minimize flood-induced loss of life and property, and protect floodplain ecology. Identifying areas and structures within a community that are at risk from flooding is the single most important step in mitigating future flood damage and loss. Community planning to reduce flood damage is critical, and guidance is available from federal and state agencies to help communities in this effort. In addition, flood forecasting and warning, maintenance of flood control structures, and stormwater management are all essential elements of controlling future flood damage."
- "Goal 2.2: Enhance water-based recreation in the river and its tributaries. The Basin's National Wild and Scenic Rivers, the Appalachian Trail, and numerous game lands, parks and forests can be linked to optimize recreational experiences."

- “Goal 2.3: Protect, conserve and restore healthy and biologically diverse riparian and aquatic ecosystems. The health of plant and animal communities requires that flows in rivers and streams exhibit the natural range of variation in the flow regime, especially seasonally. Other physical and chemical parameters are also critical to the health of ecosystems. Understanding the range of needs for the diverse native aquatic and riparian populations within the Basin is a major challenge.”

3.3.3 Plant and Animal-Related Concerns

3.3.3.1 *Endangered and Threatened Species (Supporting Ecosystem Services)*

A review of endangered and threatened species within the Affected Environment of the PA-463 dam site was conducted using the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) database. The IPaC review identified the potential presence of several federally listed species within the broader Affected Environment, including the northern long-eared bat (*Myotis septentrionalis*) and the Indiana bat (*Myotis sodalis*), both listed as endangered; the tricolored bat (*Perimyotis subflavus*), proposed for listing as endangered; the monarch butterfly (*Danaus plexippus*), a candidate species; and the northeastern bulrush (*Scirpus ancistrochaetus*), a federally endangered plant (See Appendix A). The IPaC database did not identify any designated critical habitat within the Affected Environment of the project site.

Field investigations conducted in 2022 confirmed that there are no known occurrences or suitable habitat for these species within the immediate dam footprint, and no critical habitat is present at the PA-463 site. However, areas downstream of the dam within the breach inundation zone and expanded 100-year floodplain were not field-verified as part of this assessment. While no critical habitat has been mapped in these areas, downstream riparian corridors, floodplain wetlands, and forested areas may contain suitable habitats for some of the listed species during portions of their life cycles.

A Pennsylvania Natural Diversity Inventory (PNDI) review of the approximate Affected Environment was conducted on June 14, 2024. This was supplemented with a desktop review using the Pennsylvania Natural Heritage Program (PNHP) Conservation Explorer tool. Results from the PNDI review and desktop analysis are outlined below and contained in Appendix A.

- PA Game Commission: Reports no Threatened, Endangered Species, or Species of Special Concern within the project area.
- PA Fish & Boat Commission: Indicates no Threatened or Endangered Species in the vicinity. The PNDI search results note that the project may lie within the occupied range of the timber rattlesnake (*Crotalus horridus*) and include recommendations for avoiding disturbance of critical habitat and minimizing risks during construction. However, according to the PA Conservation Explorer, the timber rattlesnake’s Dutch Hill habitat is located west of the Affected Environment.
- PA DCNR: Identifies the presence of a threatened plant species, the white twisted-stalk

(*Streptopus amplexifolius*). However, the PA Conservation Explorer indicates that the plant is located outside the Affected Environment.

- USFWS: indicates no impacts (NLAA) to federally listed or proposed species are anticipated. Results of the USFWS IPaC and PNDI are included in Appendix A and summarized in Table 3-8 below.

Field surveys conducted in the area did not observe any rare, threatened, or endangered species or significant natural communities. No potential bat roost trees were identified, and the PA-463 site is not mapped as core habitat due to human influence, including regular mowing of the area.

Table 3-8: Species and Resources potentially impacted by activities in the Brodhead Creek watershed

Species/Habitat	Ranking		Present in Affected Environment/ Breach Area
State (DCNR) Species	State	Federal	
White twisted-stalk (<i>Streptopus amplexifolius</i>)	Critically Imperiled (S1)	N/A	No but present in watershed
USFWS Species			
Indiana bat (<i>Myotis sodalis</i>)	Endangered	Endangered	Potentially
Northern long-eared bat (<i>Myotis septentrionalis</i>)	Endangered	Endangered	Potentially
Tricolored bat (<i>Perimyotis subflavus</i>)	Endangered	Proposed Endangered	Potentially
Monarch butterfly (<i>Danaus plexippus</i>)	N/A	Candidate	Potentially
Northeastern bulrush (<i>Scirpus ancistrochaetus</i>)	Endangered	Endangered	Potentially

Final PNDI dated July 9, 2024 and USFWS IPaC dated 5/29/24. State ranks: 1=Critically Imperiled; 2=Imperiled; 3=Vulnerable; 4=Apparently Secure; 5=Secure.

3.3.3.2 *Migratory Birds (Cultural and Social Ecosystem Services)*

The Affected Environment contains valuable habitat for a diversity of wildlife species. Migratory birds likely utilize the diversity of upland and wetland habitats present in the watershed, including "birds of conservation concern" (BCC) identified in the IPaC report, such as wood thrush (*Hylocichla mustelina*), black-capped chickadee (*Poecile atricapillus*), bobolink (*Dolichonyx oryzivorus*), black-billed cuckoo (*Coccyzus erythrophthalmus*), Canada warbler (*Cardellina canadensis*), cerulean warbler (*Setophaga cerulea*), prairie warbler (*Setophaga discolor*), golden-winged warbler (*Vermivora chrysoptera*), northern saw-whet owl (*Aegolius acadicus*), rusty blackbird (*Euphagus carolinus*), chimney swift (*Chaetura pelagica*), and eastern whip-poor-will (*Antrostomus vociferous*). (Appendix A).

The forested and shrub-scrub wetlands throughout the Affected Environment provide cover and foraging habitat for migratory birds such as common yellowthroat (*Geothlypis trichas*), ruby-crowned kinglet (*Corthylio calendula*), and yellow warbler (*Setophaga petechia*) (Smith, 2005).

3.3.3.3 *Bald and Golden Eagles (Cultural and Social Ecosystem Services)*

A review of the USFWS IPaC database (Appendix A) identified the potential presence of the bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) within the Affected Environment. Both species are protected under the Bald and Golden Eagle Protection Act (BGEPA). According to the Pennsylvania Game Commission's Bald Eagle Nest Survey, no bald eagle or golden eagle nests are located within the project footprint, including the dam, reservoir, flood pool, or breach inundation area. The nearest known bald eagle nest is located approximately 1.8 miles downstream and outside of the breach inundation zone. No nests have been documented within the vicinity that would trigger seasonal restrictions for construction or tree clearing activities.

The Affected Environment includes fragmented forest and partially developed areas that may provide potential foraging or perching habitat, but the lack of nesting sites within or adjacent to the construction or breach impact zones indicates that no direct impacts to nesting eagles are anticipated. Therefore, time-of-year restrictions related to active eagle nests are not expected to apply.

3.3.3.4 *Invasive Species (Regulating Ecosystem Service)*

Based on observations during the wetlands and waterway site investigation on June 6 and 7, 2022, common non-native invasive species within the Leavitt Branch Dam project study area included European honeysuckle (*Lonicera spp.*), autumn olive, multiflora rose, Japanese barberry, and oriental bittersweet. Garlic mustard was common in the forested areas across the site. During stakeholder meetings, the Monroe County Conservation District noted that an excessive amount of autumn olive and Japanese barberry are present at PA-463, which they would like to see removed.

3.3.3.5 *Fish and Wildlife (Provisioning and Cultural and Social Ecosystem Services)*

The forested areas along Leavitt Branch and its tributaries serve as travel corridors for mammals such as bobcat (*Lynx rufus*), American black bear (*Ursus americanus*), and white-tailed deer

(*Odocoileus virginianus*). Wildlife habitats in the project area consist of open grasslands near PA-463, as well as shrublands and forested areas in the surrounding regions.

Aquatic habitats include the open water of the retarding pool and the streams flowing into and out of this pool. Common species that may inhabit these environments include beaver (*Castor canadensis*), eastern cottontail (*Sylvilagus floridanus*), coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), squirrels (*Sciuridae*), raccoon (*Procyon lotor*), North American porcupine (*Erethizon dorsatum*), weasels (*Mustelidae*), striped skunk (*Mephitis mephitis*), Virginia opossum (*Didelphis virginiana*), mice (*Muridae*), voles (*Cricetidae*), white-tailed deer, and various songbirds, raptors, fish (including native brook trout, *Salvelinus fontinalis*), turtles, and snakes.

Leavitt Branch supports a variety of fish species, including bluegill, chain pickerel, yellow perch, rock bass, striped bass, and redbreast sunfish. The stream is also recognized for its natural trout production. Tributaries of Brodhead Creek are classified as High-Quality Cold-Water Fisheries under Title 25, Chapter 93 of Pennsylvania's Water Quality Standards. This designation requires maintaining water quality levels sufficient to protect cold water fish species, including members of the family Salmonidae, such as brook trout, as well as other flora and fauna native to cold water habitats. While High Quality streams are afforded less regulatory protection in permit reviews than Exceptional Value Waters, their ecological integrity must still be preserved. According to the Pennsylvania Natural Heritage Program Conservation Explorer, Leavitt Branch supports natural trout reproduction, further emphasizing its ecological significance.

3.3.3.6 Riparian Areas (Regulating Ecosystem Service)

At PA-463 (Leavitt Branch Dam), riparian areas are present along the perimeter of the existing retarding pool and along the channels of Leavitt Branch both upstream and downstream of the dam. Upstream and around the pool, riparian zones are dominated by wetland vegetation and extend approximately 0.1 to 0.2 miles along the edge of the impoundment, varying in width from 25 to 100 feet depending on slope and vegetative cover.

Along the stream reaches entering and exiting the pool, riparian areas are located primarily along the immediate streambanks, where periodic flooding supports moisture-tolerant vegetation and promotes floodplain function. These riparian zones provide sediment filtration, nutrient uptake, and habitat connectivity.

A desktop GIS review of the downstream breach inundation area—based on topography, hydric soils, and land cover—indicates that riparian areas extend intermittently for approximately 2.3 miles along Leavitt Branch downstream of the dam, primarily within low-gradient floodplain areas.

3.3.3.7 Forest Resources (Provisioning, Regulating, Supporting, and Cultural and Social Ecosystem Services)

The forest resources observed at PA-463 during field investigations include a swath of woods dominated by white oak, chestnut oak, hemlock and white pine. West of the inlet to the dam, open water meets a steep, well-drained slope, dominated by American beech, red oak, red maple, and hemlock, with an understory of American beech saplings.

Forests within the Affected Environment provide firewood, habitat, and recreational

opportunities.

3.3.4 Human Use-Related Concerns

3.3.4.1 *Cultural Resources and Tribal Consultation (Cultural and Social Ecosystem Services)*

A Phase I Cultural Resources Investigation was conducted within the Area of Potential Effects (APE) in accordance with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR Part 800). The investigation included identification and evaluation of archaeological sites as well as above-ground historic resources, including buildings, structures, objects, and potential historic districts, consistent with the definition of historic properties provided in 36 CFR 800.16(l). Methods included background research, agency file review, and field survey to identify cultural resources within the APE.

NRCS evaluated all identified cultural resources within the APE for eligibility for listing in the National Register of Historic Places (NRHP) in consultation with the Pennsylvania State Historic Preservation Office (PA SHPO) and consulting Tribes, in accordance with 36 CFR 800.4(c). NRCS is the responsible Federal agency for making eligibility determinations. These determinations, and the basis for those determinations, are documented in the Phase I Cultural Resources Report (Appendix E) and supporting consultation correspondence (Appendix A), consistent with documentation requirements under 36 CFR 800.11.

Consulting Tribes, including the Absentee Shawnee Tribe of Indians of Oklahoma, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Seneca-Cayuga Nation, Shawnee Tribe, Onondaga Nation, and the Stockbridge-Munsee Community, Band of Mohican Indians, were engaged in the Section 106 process. Tribal consultation included review of identification efforts, NRHP eligibility evaluations, and subsequent determinations and findings, in accordance with 36 CFR 800.2(c), 36 CFR 800.4, and 36 CFR 800.5. Correspondence documenting this consultation is provided in Appendix A.

Archaeological investigations identified areas of high and moderate pre-contact sensitivity within the APE. However, these areas are located outside of the anticipated limits of disturbance (LOD) and portions of the APE have been previously disturbed by initial dam construction and subsequent floodwater inundation.

The Phase I investigation identified 13 above-ground historic resources within the APE. These resources were evaluated for NRHP eligibility using the criteria set forth in 36 CFR 60.4. In addition, 22 resources associated with the Skytop Resort were surveyed and evaluated as a potential historic district. Of these, a portion were identified as contributing elements to the district based on their architectural and historical significance.

The Leavitt Branch Dam (PA-463) was also evaluated for NRHP eligibility. Based on its design, materials, and lack of association with significant historical events or persons, NRCS determined that the dam is not eligible for listing in the NRHP. This determination was made in consultation with PA SHPO and documented in Appendix A.

3.3.4.2 Socioeconomics and Civil Rights (Cultural and Social Ecosystem Services)

Socioeconomics and civil rights source data is presented in Table 3-9.

Table 3-9: PA-463 Socioeconomics and Civil Rights Report

Selected Variables	Barrett Township	State	USA	
		Avg.	Avg.	% tile
Pollution and Sources				
Particulate Matter 2.5 (µg/m3)	6.9	2	8.08	18
Ozone (ppb)	57.2	14	61.6	19
2017 Diesel Particulate Matter (µg/m3)	0.0784	4	0.261	<50th
2017 Air Toxics Cancer Risk (lifetime risk per million)	20	1	25	<50th
2017 Air Toxics Respiratory HI	0.2	1	0.31	<50th
Toxic Releases to Air	17	4000	4600	11
Traffic Proximity (daily traffic count/distance to road)	0.65	200	210	2
Lead Paint (% Pre-1960 Housing)	0.27	.49	0.3	55
Superfund Proximity (site count/km distance)	0.064	.18	0.13	51
Risk Management Plan Facility Proximity (facility count/km distance)	0.076	.45	0.43	20
Hazardous Waste Proximity (facility count/km distance)	0.25	1.4	1.9	40
Underground Storage Tanks (count/km2)	0.032	3.6	3.9	24
Wastewater Discharge (toxicity-weighted concentration/m distance)	6.2E-06	1.7	22	15
Socioeconomic Indicators				
Demographic Index	18%	26%	35%	27
Supplemental Demographic Index	6%	13%	14%	11
People of Color Population	33%	24%	39%	52
Low Income Population	3%	28%	31%	5
Unemployment Rate	0%	6%	6%	0

Limited English Speaking Households	0%	2%	5%	0
Population with Less Than High School Education	9%	9%	12%	55
Population under Age 5	5%	5%	6%	49
Population over Age 64	17%	19%	17%	54
Health Indicators				
Heart Disease	7.9	6.7	6.1	83
Cancer	7.7	6.8	6.1	84

Source: Socioeconomics and Civil Rights Report (Version 2.2), 2024

Environmental Indicators

Of the indicators used to identify potential risks to socioeconomic and civil rights populations, within the Affected Environment, environmental risks are below national averages and well below the 80th percentile which is typically the threshold for further investigation. However, it is above the 50th percentile as it relates to Superfund and RMP facilities.

The nearest Superfund site is the Route 940 Drum Dump in Pocono Summit, PA. EPA signed a No Further Action Record of Decision in 1992 and the site was removed from the national priorities list in November, of 2000. Given its geographic location in relation to the Affected Environment, this site is not a concern.

Socioeconomic Indicators

The result of the socioeconomic analysis indicates that minority populations are limited (6% of the total population within the project area), and there are no known Native American tribes in the area. The Demographic Index, which is a combination of the percent low-income and percent minority, is below the 50th percentile in the Affected Area.

Thirty-three percent (33%) of the population in the Affected Area is represented as people of color. Nine percent (9%) of the population in this area has less than high school education. Seventeen percent (17%) of the population is over 64. None of these populations has a low-income and/or minority population greater than twice the statewide average, therefore it is not an area of concern.

Health Indicators

From a health perspective, there are health indicators in this area that are above the 80th percentile for heart disease and cancer. Additionally, within the Affected Environment ten percent (10%) lack adequate health insurance which is nearly in the 70th percentile.

Social Vulnerability

According to the CDC (Center for Disease Control)/ATSDR (Agency for Toxic Substances and Disease Registry) the Monroe County's overall social vulnerability – which refers to a community's capacity to prepare for and respond to the stress of hazardous events (including severe flooding) – is in the lower quartile (below 50%) of vulnerability. Within the Affected

Environment, socioeconomic status, household characteristics and housing types/transportation are all in the lower (below 50%) quartiles. However, for Monroe County, racial and ethnic minority status is in the highest quartile, which is consistent with the Race and Hispanic Origin data displayed in Table 3-10. Monroe County has a higher percentage of people of color than the statewide average.

3.3.4.3 Social Issues

The Proposed Action is located in Barrett Township, located in Monroe County, Pennsylvania, which had an estimated population of 4,062 as of July 2022 and a land area of approximately 53 square miles (US Census Gazetteer, 2023). Barrett Township includes the villages of Cresco, Mountain Home, Canadensis, Buck Hill Falls, and Skytop. While generally rural in nature, Buck Hill Falls and Skytop are well-known Pocono resort destinations. This project is largely located within and around Canadensis. Monroe County is not identified as a Limited Resource Area. This information is displayed in Table 3-10, below.

Table 3-10: PA-463 Social and Economic Profile

Social and Economic Profile				
Beneficiary	Barrett Township	Monroe County	Pennsylvania	U.S.
Population (2022)	4,062	168,128	12,989,208	331,097,593
Under 18 Years of Age	716	32,686	2,664,562	73,213,705
Over 65 Years of Age	738	30,720	2,434,405	54,737,648
Per Capita Income ^{1, 3}	-	\$37,107	\$41,489	\$41,804
Median Household Income ²	\$84,974	\$80,656	\$ 73,170	\$75,149
Households, 2018-2022	1,635	59,113	5,193,727	125,736,353
Median Value of Owner-Occupied Housing Units, 2018-2022	\$241,100	\$221,100	\$226,200	\$281,900
Percent of Persons Living in Poverty	12.5%	11.3%	11.8%	12.5%
Race and Hispanic Origin				
White alone	73.1%	69.4%	77.1%	65.9%
Black or African American	4.9%	14.7%	10.8%	12.5%
American Indian and Alaska Native	0.1%	0.2%	0.2%	0.8%

Native Hawaiian and Other Pacific Islander	0%	0%	0%	0.2%
Two or More Races	15.8%	7.9%	5.1%	8.8%
Hispanic or Latino	23.0%	17.8%	8.1%	18.7%
White alone, not Hispanic or Latino	66.0%	62.0%	74.5%	58.9%
Asian	7.3%	3.3%	4.4%	7.0%
<i>1 – Per capita median income in past 12 months (in 2022 dollars)</i> <i>2 – Median household income (in 2022 dollars), 2018-2022</i> <i>3 – No data available for towns under 5,000 people</i> <i>Source: U.S. Census Bureau 2022</i>				

3.3.4.4 Local, Regional and National Economy

Barrett Township, located near more populous areas of Monroe County, is known for its resort communities and tourist destinations. The predominant land uses in the township are forested land and public open space, followed by commercial areas, particularly resorts and hotels. A significant portion of the township falls within the resort district. Monroe County's economy is heavily reliant on recreation and tourism, though industries such as manufacturing, logistics, electronics, and pharmaceuticals also play a substantial role. Major employers in the county include Tobyhanna Army Depot, Sanofi, Lehigh Valley Hospital, and the Walmart distribution center.

According to the 2022 ACS 5-year estimates, Barrett Township's median household income is \$84,974 (in 2022 dollars), which is 5% higher than the median income for Monroe County. It also exceeds the median household income for Pennsylvania and the United States by 16% and 13%, respectively. The median value of owner-occupied housing in Barrett Township is \$241,100, which is higher than the state median of \$226,200 but lower than the national median of \$281,900. In comparison, Monroe County's median housing value is \$221,100.

Approximately 12.5% of Barrett Township residents live in poverty, slightly above the poverty rates for Monroe County (11.3%) and Pennsylvania (11.8%). The township's racial composition is 73.1% White alone, 4.9% African American, 0.1% American Indian and Alaska Native, 15.8% identifying as two or more races, 23% Hispanic, and 7.3% Asian. Barrett Township has higher percentages of Hispanic, multiracial, and Asian populations compared to both Pennsylvania and national averages.

3.3.4.5 Public Health and Safety (Regulating and Cultural and Social Ecosystem Services)

Construction of the PA-463 dam was constructed for the purposes of flood control; however, the reservoir and surrounding areas also provide recreational opportunities to local residents. PA-463 is classified as High Hazard dams under USDA NRCS standards.

The primary regulating services present are due to the presence of PA-463 which provides flood mitigation benefits for downstream areas. This mitigation prevents potential damage to human use, health or safety due to extreme flooding events. In addition, reduced flooding minimizes the potential for health impacts and disease, which can increase as a result of flood events – particularly among at-risk populations. Property values are impacted by flooding. Studies have shown that typically, the market value of a house within a floodplain can be as much as 3.5 to 12.2 percent less than houses outside of the floodplain. In addition, studies have also found that homes in a higher risk flood zone see a greater decrease in sale prices than homes in a less risky flood zone (Zhang & Leonard, 2019).¹

Flooding has been shown to impact human health. A study conducted in 1974-1977 following Hurricane Agnes (1972) determined that the difference in rates of Leukemia & Lymphoma between areas affected by significant flooding and those that were not flooded was significant (Janerich et al., 1981).² Disasters such as hurricanes and floods can have a significant effect on the mental health of those affected, including increasing stress, anxiety, and mental illnesses. In a study conducted in 2005, researchers found that 48% of adults in flooded households experienced moderate to severe psychological problems in the nine months following a flood, compared to only 12% of adults in non-flooded households (Reacher et al., 2004).³

Since PA-463 does not meet all the current federal and state dam safety design and performance standards, there is an increased risk of dam failure that would result in downstream flooding, which could greatly impact the lives, health, and essential public services such as infrastructure and emergency assistance.

3.3.4.6 Land Use

The land use and land cover of the Affected Environments for PA-463 is summarized in Table 3-11.

Table 3-11: Land Use/Land Cover in PA-463's Affected Environment

PA 463 Land Cover Type	Acres	%
Open Water	0.66	0.7%
Developed, Open Space	4.00	4.3%
Developed, Low Intensity	1.55	1.7%

¹ Zhang, L., Leonard, T. Flood Hazards Impact on Neighborhood House Prices. J Real Estate Finan Econ 58, 656–674 (2019). <https://doi.org/10.1007/s11146-018-9664-1>

² Janerich DT, AD Stark, P Greenwald, et al. 1981. Increased leukemia, lymphoma, and spontaneous abortion in Western New York following a flood disaster. Public Health Reports 96(4): 350-356.

³ Reacher M, K McKenzie, C Lane, T Nichols, et al. 2004. Health impacts of flooding in Lewes: a comparison of reported gastrointestinal and other illness and mental health in flooded and non-flooded households. Communicable Disease and Public Health 7(1): 39 - 46.

Developed, Medium Intensity	0.44	0.5%
Deciduous Forest	28.40	30.6%
Evergreen Forest	4.00	4.3%
Mixed Forest	32.69	35.2%
Shrub/Scrub	0	0
Herbaceous	4.00	4.3%
Hay/Pasture	12.45	13.4%
Woody Wetlands	3.11	3.3%
Emergent Herbaceous Wetlands	1.55	1.7%
Totals	92.85	100.0%

Source: National Land Cover Database, 2021, United States Geological Survey

Land cover in the Affected Environment is dominated by tree canopy, hay/pasture and woody wetlands. The impervious surface is limited largely to buildings and roads. Only 6% of the Affected Environment is impervious, most of which is downstream of the dam structure.

Land development patterns in the Affected Environment are consistent with communities located in the Poconos, with diffuse residential development with higher density development clustered in villages and some adjacent resort development. Within the Affected Environment for PA-463, there are three zoning districts (Zoning Ordinance, Barrett Township, Monroe County, PA, 2013 – amended 2020) that define the type and allowed density of development.

- The **Conservation District**, which includes land around PA-463, is intended to protect sensitive environmental and natural areas while allowing for low-density residential development. Minimum lot sizes are 2 acres for single-family residential and 3 acres for all other types of development allowed within the district.
- The **Residential district** makes up the largest percentage of land regulated within the Affected Environment. Land within this district is intended to provide for residential neighborhood developments that provide a mix of housing types. Neighborhood-scale services are also allowed within this district. The minimum lot size in this area is 1.5 acres.
- The **Mixed-Use Village district** guides development in areas that are generally village-scale. The purpose of this district is to allow for a mix of retail and services that are compatible

with adjacent residential developments in a village setting. The minimum lot sizes are roughly 10,000-20,000 square feet.

- The **Commercial – Resort/Hotel district** provides regulation for the types of development that are appropriate for a resort destination. The minimum acreage allowed in this district is 1 acre.

Development in Barrett Township is relatively low compared to other parts of Monroe County. In 2022 there were 5 permits issued for new buildings and in 2023 there were 4.

3.3.4.7 *Other Concerns*

Maintenance and Management

Several maintenance concerns were noted, including the management of invasives and the removal of logs from dam inflows following significant storm events.

Transportation (Provisioning Ecosystem Service)

Transportation infrastructure within the study area includes PA-447 (Creek Road), which runs north-south, and is classified as a state highway, running adjacent to Brodhead Creek. Average daily traffic volume (PENNDOT, 2022) on PA-390 north of Canadensis is 1,500, and south of Canadensis is 3600. PA-463 is accessible from PA-390.

3.4 Future Forecast Conditions

The Future Without Project (FWOP), also referred to as the No Action condition, represents the continuation of existing conditions into the future without implementation of corrective measures to address identified dam safety deficiencies. This condition serves as the baseline against which all action alternatives are evaluated to determine their relative performance.

Consistent with NRCS guidance for watershed rehabilitation projects (NI 390-303), the FWOP condition assumes that PA-463 remains in place and continues to be operated and maintained in accordance with its current operation and maintenance plan; however, no major rehabilitation actions would be undertaken to correct existing hydraulic or structural deficiencies. Over time, these deficiencies are expected to persist or worsen.

Under the FWOP condition, it is assumed that the dam would ultimately fail under a most probable failure mode associated with a significant storm event. This failure scenario represents a sudden, catastrophic breach of the dam and is used as the basis for evaluating risks to downstream populations, infrastructure, and environmental resources. The potential consequences of such a failure include loss of life, damage to residential, commercial, and institutional structures, impacts to transportation infrastructure, and adverse effects on natural and cultural resources. These consequences are described in greater detail in subsequent sections of this Plan.

Future climatic conditions are also expected to influence the performance of the watershed

under the FWOP scenario. Climate projections indicate increasing variability in precipitation patterns, including more frequent periods of drought and an increase in the frequency and intensity of heavy rainfall events. By mid-century, the number of days with very heavy precipitation is projected to increase by approximately 15 percent, and by up to 33 percent by the end of the century. Similarly, extremely heavy precipitation events are projected to increase by approximately 36 percent by mid-century and up to 74 percent by the end of the century.

These projected increases in precipitation intensity are expected to increase the likelihood of high-flow events and place additional stress on existing dam infrastructure. Under the FWOP condition, where existing deficiencies are not corrected, these changing climatic conditions may increase the probability of dam failure and exacerbate the potential consequences associated with a breach event.

4. Formulation of Alternatives

4.1 Alternative Formulation Process

The Plan is formulated in accordance with the NEPA and NRCS guidance to address the identified watershed problems and opportunities with consideration of the effects of various alternative solutions on resource concerns. The inventory planning process identified the deficiencies of PA-463 Leavitt Branch Dam. The purpose for federal action is to provide flood damage reduction to the watershed, while minimizing environmental, economic, social, and cultural impacts.

Formulation of alternative rehabilitation concepts followed procedures outlined in the NRCS National Watershed Program Manual (NWPM), Part 501.42 and included those specified in Part 505.35. Other guidance incorporated into the alternative formulation process included the NRCS National Planning Procedures Handbook, National Instructions, and other applicable NRCS watershed planning guidance. Alternative plans were also developed based on the criteria of completeness, effectiveness, efficiency, and acceptability, in accordance with the Economic and Environmental Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies (PR&G), as well as the 2013 Principles and Requirements for Federal Investments in Water Resources and the Interagency Guidelines (IAG).

Although the Sponsor initially requested structural rehabilitation of the dam under the Watershed Rehabilitation Program, alternative plans were also developed in accordance with NRCS planning requirements. These alternatives were screened based on their ability to meet the project's Purpose, Need, and objectives. As planning progressed, each alternative was evaluated for cost, feasibility, and potential social and environmental impacts. Alternatives that were found to be unreasonable due to high construction costs, significant social or environmental effects, or impractical implementation were eliminated from further detailed study. Each principle and its respective alternative are evaluated in Table 4-4.

4.1.1 Guiding Principles

The PR&G Guiding Principles that were considered are healthy and resilient ecosystems, sustainable economic development, floodplains, public safety, and watershed approaches were considered when evaluating alternatives. The alternatives studied in detail evaluate each principle in Table 4-5.

4.1.2 Alternative Formulation Criteria

Alternatives were developed with consideration of the ecosystem services identified during the scoping process (Section 1.5.5). In addition, each alternative was evaluated for completeness, effectiveness, efficiency, acceptability, and alignment with the Guiding Principles outlined in the PR&G (May 10, 2018). Alternatives that met these criteria were carried forward for further evaluation based on the PR&G Alternatives Criteria and Guiding Principles.

4.1.3 Risk and Uncertainty

Uncertainty related to changes in long term weather forecasting, it is difficult to predict and directly attribute to the proposed action. While the freeboard hydrograph (FBH) event is not

anticipated to change significantly due to uncertain long-term weather patterns, an increase in the frequency and severity of storm events remains possible. This factor was addressed at a basic level during the evaluation of alternatives. Each structural alternative was treated similarly in this regard, for example, by proposing the use of drought and flood-tolerant grass species and plantings during site revegetation.

Limitations of future land use and environmental conditions introduce a degree of uncertainty, especially related to future hydrology and dam hydraulic performance. Future land use conditions have been estimated based on local comprehensive plan studies and incorporated into the hydrologic and hydraulic models. The majority of land within the dam's watersheds is privately held and not in the control of the Sponsor. However, while not anticipated to be an issue of concern based on the local comprehensive plan studies that were performed, additional urbanization and development in the next 100 years could cause increased runoff, sedimentation, and runoff pollution concerns within the Brodhead Creek watershed. Additionally, changes in land use and increases in impervious surface coverage within the watershed and downstream areas, may influence the extent of local floodplains and the severity of flood events. These risks and uncertainties can be mitigated through adaptive management strategies and the enforcement of local planning and development ordinances.

Additional geotechnical investigations during the design phase will likely be needed to reduce uncertainty about subsurface conditions for the preferred alternatives. Specifically, further exploration may be required for the proposed labyrinth spillway and auxiliary spillway discharge channel at PA-463 Leavitt Branch Dam. The existing borings only provide information at the specific locations and depths where they were taken. As a result, assumptions about the subsurface layers between borings may not accurately reflect actual variations in the soil or rock strata. Additionally, geotechnical parameters used in seepage and slope stability analyses are developed and estimated from the information collected from the borings. Potential variations between borings may not accurately reflect the geotechnical parameters, which may affect the results of the seepage and slope stability analyses

Each alternative carries inherent risks and uncertainties related to its potential and future effects. The H&H analyses are subject to uncertainty due to assumptions made about hydrologic conditions and input parameters for the upstream watersheds of PA-463 Leavitt Branch Dam.

To evaluate decommissioning scenarios, assumptions were required regarding watershed characteristics, including curve number and time of concentration. For example, aerial photography and hydrologic soil maps were interpreted to estimate the curve number, while assumptions about flow types were made to calculate time of concentration. Future land use changes also had to be estimated, introducing further uncertainty into curve number and time of concentration values.

Since PA-463 Leavitt Branch Dam's watershed includes three upstream dams, data pertaining to two of the upstream dams not being regulated by PADEP were estimated. One of the upstream dams, Lake Jamie, is regulated by PADEP and data was provided. However, available data for Lake Jamie's stage-storage relationship was inconsistent across reports, creating uncertainty in estimating the reservoir's storage volume. For upstream dams not regulated by PADEP and lacking detailed data, parameters were estimated using LiDAR and aerial imagery. These estimates were carried forward into breach analyses, including the assumption that all upstream

breaches would be triggered by overtopping during the FBH (Freeboard Hydrograph) storm. Such assumptions contribute to uncertainty regarding the influence of upstream dams on each alternative.

There are also limitations associated with the H&H modeling software and modeling inputs. The NRCS SITES program, used for evaluating PA-463 Leavitt Branch Dam, has limitations in assessing the presence of upstream dams. As a result, a separate modeling program was used for the upstream analysis, and its results were imported into SITES. Using two different software tools, each with distinct calculation methods, may introduce uncertainty or provide slightly different simulation results. Because of these uncertainties, the estimated downstream impacts for each alternative may vary from actual outcomes.

4.2 Alternatives Considered

4.2.1 No Action / Future without Project (FWOP) / Future without Federal Investment (FWOFI) Alternative

As a part of the planning process, reasonable alternatives studied in detail included the No Federal Action, the Future Without Project (FWOP), and the Future Without Federal Investment (FWOFI), which are synonymous for this project. The No Action alternative is a required alternative that must be evaluated, representing the current conditions, with the identified problems left unaddressed and projected into the future, serving as a baseline for comparing the benefits and impacts of other alternatives.

The Sponsor has indicated that in the absence of federal funding (FWOP), they would keep the dam in service indefinitely to maintain downstream flood control benefits and continue regular maintenance of PA-463. However, they do not plan to rehabilitate the dam unless required by the PADEP. Consultation with the PADEP Division of Dam Safety suggests that the agency would issue a Notice of Violation if an imminent dam safety concern would develop, requiring the Sponsor to rehabilitate the dam in order to comply with PADEP dam safety standards and Pennsylvania Code Title 25, Chapter 105 regulations. The sponsor would then be required to either address the dam safety concern or decommission the dam. Therefore, under the No Action Alternative, it is assumed that the dam will remain in operation but will ultimately fail due to a lack of significant rehabilitation. The probable mode of failure for the PA-463 Leavitt Branch Dam was determined to be a failure of the auxiliary spillway, during the 24-hour, 380-year storm event.

The breach of Leavitt Branch Dam impacts an estimated 112 properties with structures, including several residential structures, for approximately 10 miles south along Brodhead Creek, as per Table 4-1. The potential for significant loss of life under the dam breach is high and the PAR resulting in approximately 411 individuals. Similarly, damage from a breach flood wave to the built and natural environments from erosion, debris deposition and destruction of infrastructure is also high.

Table 4-1: Number of Structures Impacted by a Breach of PA-463 Leavitt Branch Dam

Structure Type	Number of Structures Impacted
Residential	84
Commercial	23
Institutional	5

4.2.2 Action Alternatives

Action Alternatives includes federally assisted modification of the existing dam or downstream floodplain to meet current applicable NRCS and PA Dam Safety criteria and standards.

4.2.2.1 Structural Rehabilitation Alternative

Multiple structural rehabilitation alternatives which addressed the identified dam safety deficiencies were identified and evaluated. The rehabilitation design options were compared side-by-side in Table 4-2 below. Alternatives that were preliminarily evaluated included raising the top of dam, changing the auxiliary spillway weir crest type, and widening the auxiliary spillway. The alternatives of the auxiliary spillway crest weir type evaluated the economic and environmental impacts of using a broad crested weir, ogee weir, piano key weir, labyrinth, and fuse gate for PA -463 Leavitt Branch Dam. PA-463 Leavitt Branch alternatives evaluated raising the auxiliary spillway crest elevation to contain the 50-year storm event. PA-463 Leavitt Branch dam was originally designed to provide flood protection for the 100-year storm event. However, the original design did not include the upstream dam watershed for Lake Jamie, making Leavitt Branch watershed 1.2 square miles smaller than currently being analyzed. Providing flood protection for the 100-year storm event would require the auxiliary spillway crest elevation to be raised higher than the current dam crest elevation to contain the storm, not being cost effective for the additional flood protection for approximately 6 structures. Therefore, raising the auxiliary spillway crest to contain the 50-year storm event was proposed for the rehabilitation alternatives. A map depicting the inundation boundary differences for the 50-year and 100-year proposed conditions and affected structures is shown in Appendix C. The alternatives are described below in Table 4-2.

A variety of structural rehabilitation design options for the dam site were considered to address the dam's deficiencies, but were not advanced to the preferred structural rehabilitation alternative. The rehabilitation options identified in Table 4-2 achieve the same performance as the preferred structural rehabilitation option, but were eliminated because the impacts on environmental resources and the construction costs were greater than the preferred design option that is retained for detailed study.

The preferred structural rehabilitation of PA-436 Leavitt Branch Dam addresses the primary concerns of the integrity of the auxiliary spillway and overtopping of the dam during the FBH storm event. The top of dam is proposed to be restored to the original design level at El. 1225.9. The rehabilitation includes raising the auxiliary spillway crest to contain the 50-year storm event and constructing a labyrinth weir to increase flow capacity to pass the flow from the freeboard hydrograph storm event. The approach channel is proposed to be deepened to provide

favorable approach conditions so that the labyrinth is hydraulically efficient. Due to the small reservoir area that limits retention storage, the dam is unable to meet containing the volume from the PSH event and is unable to dewater 80% of the PSH volume within 10 days; therefore, the proposed alternative includes a structural auxiliary spillway. The depth of bedrock is deep along the auxiliary spillway and the channel has high potential for head cutting; therefore, the proposed alternative proposes a protective lining for the length of the downstream channel from the labyrinth to the bottom of the stream valley. The location of the labyrinth weir is positioned downstream so that less channel lining is needed to reduce costs. The proposed auxiliary spillway channel is steep as it approaches the bottom of the stream valley. To dissipate energy and limit the amount of potential erosion from discharges leaving the auxiliary spillway channel, a stilling basin is proposed at the downstream before entering the stream. The total estimated cost for this preferred alternative is \$25.8 million.

Table 4-2: PA-463 Leavitt Branch Structural Rehabilitation Design Options

Leavitt Branch Dam Proposed Rehabilitation Design Options									
Design Option No.	Weir Type	TOD Elevation	Auxiliary Spillway Elevation	Weir Length (ft)	Approach channel El.	Approximate Peak Flow Rate during FBH (cfs) ¹	Flood Storage to TOD (ac-ft)	Storm Contained behind Aux.	Approximate Cost
Existing	Broad Crested	1224.9	1217	200	1210	-	1448.3	25 - year	-
1	Broad Crested	1224.9	1218.3	585	1204.0 to 1218.3	25,445.3	1448.3	50 - year	\$57.8 to \$171.8 Million
2	Broad Crested	1225.9 (Restored El.)	1218.3	475	1204.0 to 1218.3	25,408.3	1492.7	50 - year	
3	Broad Crested	1227.0	1218.3	390	1204.0 to 1218.3	25,352.2	1543.2	50 - year	
4	Broad Crested	1228.0	1218.3	330	1204.0 to 1218.3	25,293.7	1589.3	50 - year	
5	Ogee	1225.9	1218.3	385	1210	25,427.1	1492.7	50 - year	\$32.9 to \$93.5 Million
6	Ogee	1227.0	1218.3	305	1210	25,375.5	1543.2	50 - year	
7	Ogee	1228.0	1218.3	255	1210	25,325.3	1589.3	50 - year	
8	Ogee	1225.9	1218.3	385	1198	25,428.2	1492.7	50 - year	
9	Fuse Gate	1225.9	1213.5	200	1208	25,146.1	1492.7	50 - year	\$39.8 Million
10	Supplemental Broad crested	1225.9	1218.3	275	-	25,408.3	1492.7	50 - year	\$80.2 Million
11	Labyrinth	1225.9	1218.3	136.48	1208	25,250.5	1492.7	50 - year	\$29.3 Million
12	Labyrinth	1225.9	1218.3	101.82	1198	25,270.9	1492.7	50 - year	\$25.8 Million
13	Piano Key	1225.9	1218.3	113	1201	25,235.7	1492.7	50 - year	\$49.9 Million
14	Broad Crested	1232	1218.3	200	1204.0 to 1218.3	24,968.7	1780.3	50 - year	\$32.5 Million

*Highlighted design option is preferred option

Notes:

- 1. Approximate Peak Flows are not refined and are an estimate

4.2.2.2 Decommissioning with Nonstructural Alternative

This federally funded alternative includes addressing the Purpose and Need of the project through the removal of the dam and providing non-structural measures downstream which can include but are not limited to acquisition and demolition, relocation, and flood protection of existing structures. Flood protection of downstream properties could include structure elevation raising, flood barriers, flood proofing, or protection by some other method. Flood proofing and buyouts were the only nonstructural alternatives considered due to the lack of feasibility for the typical structure in the area and typical public resistance associated with structure relocation, flood barriers, levees, and downgrading the dam hazard.

The properties within the downstream floodplain are receiving existing incremental flood control benefits from the presence of PA-463 Leavitt Branch Dam despite not providing the designed flood protection. Since PA-463 Leavitt Branch Dam does not contain the 100-year storm under existing conditions, approximately 31 structures are impacted during such event, whereas decommissioning the dam would result in impacts to a total of 54 structures.

The cost of decommissioning is shown in Table 4-3. The cost includes removal of the dam embankment and establishing a channel through the existing dam area. At the dam site, decommissioning would involve the draining of the retarding pool and restoration of a free-flowing stream, with associated aquatic organism passage, though the project area. Some portions of the existing retarding pool waterbodies would likely revert to wetland. Some portions of wetlands surrounding the retarding pools may become drier in association with a lowering of the local water table or could revert to upland if the change in the local water table is pronounced.

The costs presented below conservatively do not include costs associated with non-structural measures such as modifications to public roads, bridges, and other impacted public facilities to prevent damages from routine inundation. Site specific non-structural measures were not evaluated in this alternative; however, roadway and bridge modifications will be required due to the increased downstream flooding without the dams. PA Route 447 follows along Broadhead Creek from PA-463 Leavitt branch Dam outflow to the limits of the analysis, requiring significant non-structural measures for this roadway since it is in the inundation limits. Multiple bridge crossings are along Broadhead Creek, and the total evaluated cost shown below conservatively does not include non-structural associated costs relating to modifications of bridges. Also, other costs not considered include repairs to damaged critical habitat for threatened and endangered species, wetland mitigation costs to replace wetlands taken during the dam decommissioning construction, damages to cultural resources, and costs related to sediment and debris removal from inundation areas.

Table 4-3: PA-463 Leavitt Branch Decommissioning with nonstructural and Building Floodproofing Costs

<u>Estimated Cost</u>	
Construction of Decommissioning	\$24.5 Million
Non-Structural Measures for Downstream Houses and Commercial Buildings	\$8.9 Million
Total Limited Evaluated Alternative Cost	\$33.4 Million

The floodproofing and/or removal of buildings and structures that are subject to new and/or increased flood depths during the 100-year 24-hour storm event because of decommissioning is estimated in Table 4-3. Providing less than the existing level of flood protection provided by the dam was not considered since it is undesirable by both the Sponsor and NRCS. While alternatives could be formulated that do so and may be the most economical alternative, the potential liability to both NRCS and the Sponsor make these alternatives unpalatable. Providing a lesser level of protection may be considered on future projects if the sponsor and STC are interested, or the dam does not have structures within the decommissioned 100-year flood plain.

The cost of non-structural measures for downstream houses and commercial buildings is estimated by comparing the additional floodproofing/buyout costs for the decommissioned scenario and with the current level of protection floodproofing/buyout costs for downstream structures. The impact of structures was quantified based on flood depths being less than or more than three (3) feet in depth. Flood proofing was used for under 3 feet in water depth while buy-outs were used for over 3 feet in water depth. The structure use was reflected in the floodproofing and buyout costs. A breakdown of costs and structure types can be located in Appendix E.

4.2.3 Locally Preferred Alternative

The locally preferred alternative is the most cost-effective alternative that provides the required safety standards. The Structural Rehabilitation Action Alternative is the Sponsor-preferred alternative because it limits the downstream impacts, reduces the overall cost and provides an increase in safety.

4.3 Alternatives Considered but Eliminated from Detailed Study

No alternatives were eliminated. Table 4-4 is a screening table that evaluates each alternative for meeting the Purpose and Need and the PR&G Federal Objectives.

Table 4-4: Summary of Alternatives Preliminary Screening Evaluation at PA-463

Plan Description	Summary of Alternatives Preliminary Screen Evaluation		
	No Action / FWOFI	Action / Structural Rehabilitation	Decommissioning with Nonstructural
NEPA Purpose & Need	No; flood damage is not reduced, and impacts to the environment, economic, social, and cultural are not minimized.	Yes; the flood damages are reduced, and environmental, economic, social, and cultural impacts are minimized.	Yes – Reduces risk to life and property by eliminating dam failure risk and through the implementation of nonstructural measures downstream.
Contribution to Planning Objectives			
1) Relieve Dam Safety	No; does not relieve	Yes; the dam is	Yes, the dam is

Plan Description	Summary of Alternatives Preliminary Screen Evaluation		
	No Action / FWOFI	Action / Structural Rehabilitation	Decommissioning with Nonstructural
Concerns	dam safety concerns.	improved to meet dam safety criteria.	removed.
2) Continue Flood Damage Protection	No; while the current level of flood protection is continued, it does not provide flood damage protection from catastrophic breaching.	Yes; rehabilitated dam provides existing level or better flood damage protection and risk of catastrophic damage from breaching is reduced.	Yes; risk of catastrophic flood damages from breaching are eliminated.
3) Sustainable Economic Development	No; does not manage or minimize damage to the environment while reducing yearly costs.	Yes; manages and minimizes damage to the environment and reduces costs.	No; does not manage or minimize damage to the environment while reducing yearly costs.
4) Minimize Adverse Impacts to Floodplains	No; existing floodplains are adversely impacted during breach flow and impacts to the existing floodplains are not reduced until the dam breach.	Yes; reduces impacts to floodplains by moderating and/or reducing flooding by increasing the dam flood retardance and minimizing dam breach risk.	No; existing floodplains are expanded and adversely impacted with no flood retarding dams to regulate flow.
5) Protect/Restore Functions of Natural Systems	While the dam is in place, the existing natural systems below the dams are preserved; however, it is not protected after the dam fails.	Protects / preserves functions of existing natural systems below the dam by minimizing damage and losses.	Restores the functions of existing natural systems by removing the dam. However, an increase in erosion and sediment in downstream channels can occur as the materials are no longer trapped behind the dam.
Response to Planning Constraints			
Maintains current level of flood protection	Yes; the level of flood protection is the same until the dam fails.	Yes; the level of flood protection is greater for the more frequent	Yes; nonstructural measures will maintain the current level of

Plan Description	Summary of Alternatives Preliminary Screen Evaluation		
	No Action / FWOFI	Action / Structural Rehabilitation	Decommissioning with Nonstructural
		storms.	flood protection.
Response to Evaluation Criteria ¹			
Acceptability	Not acceptable; it does not address regulation issues.	Yes; alternative addresses regulation issues and meets the public's perspective of viability and appropriateness.	No; while it addresses regulation issues, it does not meet the public's perspective of viability and appropriateness.
Completeness	Not complete; the plan was not evaluated with the existing Emergency Action Plan and if there will need to be different actions downstream to address the potential breach failure.	Complete; the plan evaluates all costs, actions, and downstream effects.	Not complete; the plan was not fully evaluated for all necessary investments or actions downstream. Conservative low costs were used for floodproofing structures and did not consider additional costs associated with roads, bridges, legal fees, and etc..
Efficiency	Alternative is not efficient because it is not cost-effective, does not alleviate problems, and does not protect the environment.	Alternative is most efficient because it is most cost-effective, alleviates problems, and protects the environment.	Alternative is not efficient because it is not cost-effective, does not alleviate problems, and does not protect the environment.
Effectiveness	No; does not alleviate dam safety concerns, continues to provide flood damage protection up to the dam failure breach, and keeps the current level of damages. However, if the dam breaches, additional flood damages will	Yes; alleviates dam safety concerns, provides an increase in the level of flood damage protection, and minimizes damages.	Yes; dam safety concerns eliminate known deficiencies, provides the current level of flood damage protection, and provides the same level of existing damages. The damages are minimized when

Plan Description	Summary of Alternatives Preliminary Screen Evaluation		
	No Action / FWOFI	Action / Structural Rehabilitation	Decommissioning with Nonstructural
	occur and will not minimize damage.		comparing the dam to the dam failure breach.
Moved forward for Detailed Study?	Yes	Yes	Yes
¹ Evaluation Criteria Acceptability – the viability and appropriateness of an alternative from the perspective of the general public, and consistency with existing Federal laws, authorities, and public policies. It does not include local or regional preferences for particular solutions or political expediency. Completeness – the extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects, including any necessary actions by others. This may require relating the plan to other types of public or private plans if the other plans are crucial to realization of the contributions to the objective. Completeness does not automatically mean that alternative actions need to be large in scope or scale. . Efficiency – the extent to which an alternative plan is the alleviates the specified problems and realizes the specified opportunities at least cost Effectiveness – the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities.			

NWPM Figure 501D-4. Prepared: 07/2024

The Decommissioning with Non-Structural Alternative did not meet all the objectives as outlined in Table 4-5, but was not eliminated due to PR&G requiring a non-structural approach be fully considered and carried forward into the final array.

4.4 Final Array of Alternatives

Table 4-5 summarizes the alternatives studied in detail. Although the No Action/ FWOFI does not meet the project objectives and criteria, NRCS requires it to be studied in detail as a comparison for the preferred alternative.

Table 4-5: Final Array of Alternatives for Rehabilitation of PA-463

ALTERNATIVE	RATIONALE OVERVIEW
No Action/FWOFI	Alternative required under NEPA and PR&G. Does not achieve the NEPA Purpose and Need. Not effective at meeting NRCS and Pennsylvania safety and performance standards for a high hazard class dam.

ALTERNATIVE	RATIONALE OVERVIEW
	Highest probability of dam failure and major impacts to ecosystem services, potential socioeconomic impacts, and downstream communities and properties. Does not improve dam to meet safety standards and so the risk of a dam breach continues. Alternative keeps current level of flood protection, but does not provide protection when breaching.
Structural Rehabilitation - Leavitt Alternative 12	Achieves the NEPA Purpose and Need. Achieves dam safety standards and criteria for rehabilitation. Most efficient and effective to minimize damage. Provides more than the current level of flood protection. Avoids potential socioeconomic impacts and protects downstream communities and properties. Improves dams to meet dam safety standards. More cost efficient than the other considered rehabilitation alternatives. Conservation Practice Standard 402 Dams
Decommissioning with Nonstructural	Achieves the NEPA Purpose and Need. Relieves dam safety concerns by removing the dam. Eliminates the risk of a breach wave. Provides the current level of flood protection through nonstructural means. Has negative impacts on environmental, social and cultural resources within the floodplain, but is required to be fully considered by PR&G.

5. Environmental Consequences: Evaluation of Alternatives

This section addresses the environmental impacts or effects that would result from implementation of progressed alternatives. The progressed alternatives include the No Action/ FWOP Alternative, the Structural Rehabilitation Alternative, and the Decommissioning with Nonstructural Alternative.

5.1 Summary and Comparison of Alternatives-Planning Process

A construction and implementation period of approximately 5 years is assumed for the structural rehabilitation alternative, consistent with planning-level estimates. The No Federal Action scenario assumes the dam will remain in its current condition with no additional funding until eventual failure. Table 5-1 illustrates the summary and comparison of various alternatives analyzed.

Table 5-1: Summary and Comparison of Alternatives – PA-463 Planning Process

Major Works of Improvement			
	No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
Flood Prevention			
Rehabilitation of PA-463	The no action alternative assumes that PA-463 would eventually breach, resulting in direct and indirect impacts to as many as 112 structures and 12 bridges suffering from flood damage.	Proposed rehabilitation improvements result in no net increase in potential flooding or flood damage.	Decommissioning with nonstructural measures would remove the flood-retarding function of PA-463 but provide flood protection up to the 100-year storm event for downstream structures. However, this alternative would not provide flood protection for land or undeveloped floodplain areas.
Watershed Protection			
Rehabilitation of PA-463	Dam failure would result in immediate flood damage (direct and indirect) and would increase the long-term potential (direct and indirect) for flooding and	Dams are included under Title 450 as Watershed Protection Measures.	Decommissioning the dam would remove a watershed protection structure. Nonstructural measures would reduce damages to downstream structures, but the

	flood risk downstream of PA-463.		downstream floodplain would increase because floodwater detention would no longer be provided by the dam.
Water Quality Management			
Rehabilitation of PA-463	Dam breach would result in temporary direct and indirect impacts to water quality.	Rehabilitation of the existing dam would maintain water quality.	Decommissioning would result in temporary direct and indirect impacts to water quality during construction and channel restoration, including potential erosion and sediment transport. Long-term water quality conditions may change as the impoundment is converted to a free-flowing stream condition.
Watershed Structure Rehabilitation			
Rehabilitation of PA-463	The No Action alternative will eventually result in the failure of existing watershed structures.	Rehabilitation PA-463 brings the dam into compliance with Pennsylvania Department of Environmental Protection (PADEP) dam safety, and engineering criteria and performance standards.	Decommissioning with nonstructural measures would remove PA-463 as a regulated watershed structure, eliminating the need for the dam to meet dam safety criteria.
Project Objectives			
1) Relieve Dam Safety Concerns	No action alternative assumes a dam breach. Does not relieve dam safety concerns.	Rehabilitation of the existing dam would greatly reduce breach concerns.	Decommissioning the existing dam would remove breach concerns and eliminate the potential for catastrophic dam failure.

2) Continue Flood Damage Protection	No action alternative assumes maintaining the current level of flood protection (between 25-year and 50-year storm event) until an eventual dam breach. A breach would result in a 266.6% increase in the number of structures located in the floodplain of the breach wave.	Rehabilitation of the dam would increase the current level of flood protection to the 50-year storm event.	Decommissioning with nonstructural measures would not maintain the same watershed-wide flood damage reduction benefits as the existing dam because the flood-retarding function would be removed. However, the downstream structures current level of protection will increase to the 100-year flood.
3) Sustainable Economic Development	No action alternative assumes an eventual dam breach. A breach would have substantial adverse effects on 23 commercial properties below the dam.	Rehabilitation of the dam would slightly increase the current level of flood protection, sustaining and encouraging economic development below the dam.	Decommissioning may discourage future development in flood-prone areas and could reduce risk to eligible treated structures; however, the expanded floodplain and loss of flood-retarding storage could adversely affect existing and future land use opportunities downstream.
4) Minimize Adverse Impacts to Floodplains	No action alternative assumes a dam breach. Changes in the floodplain areas following a breach wave would result in a 63% increase of floodplain area, resulting in an increase in erosion, sediment deposition, and flooding damages.	Rehabilitation of dams maintains existing floodplains.	Decommissioning the dam would increase the floodplain area because the dam would no longer attenuate flood flows, resulting in an increase in erosion and sediment deposition downstream. Removal of the dam would also increase sediment transport during and following construction.
5) Protect/restore Functions of	With a presumed dam breach there would be temporary impacts to	Proposed Action maintains current functions of natural	Decommissioning the dam would restore a more natural stream flow

Natural Systems	the functions of natural systems.	systems.	condition through the impoundment areas but would also cause temporary impacts to the functions of natural systems by the increase in sediment and erosion of the downstream stream.
Constraints			
1) Maintains current Level of flood protection	If the dam fails, the downstream 100-year flood hazard zone will increase in area by approximately 25%, putting additional homes and infrastructure at risk of regular flooding.	Rehabilitation of the dam increases the existing level of flood protection.	Decommissioning with nonstructural measures would increase the current level of flood protection for the downstream structures, but it would not maintain the same flood-retarding function or floodplain protection currently provided by PA-463.
Evaluation Criteria			
Acceptability	PA-463 does not meet current NRCS and PADEP dam safety, engineering criteria, and performance standards.	Rehabilitation of PA-463 brings the dam into compliance with NRCS and PADEP dam safety, engineering criteria, and performance standards. The alternative also meets the perspective of viability and appropriateness.	Decommissioning the dam with nonstructural measures addresses regulatory issues; However, it does not meet the public's perspective of viability and appropriateness.
Completeness	The no action alternative Was not evaluated with the existing Emergency Action Plan and if there will need to be different actions downstream to address the potential breach failure.	The rehabilitation alternative includes the necessary investments, actions, and downstream effects.	Decommissioning with nonstructural measures was not evaluated for all necessary investments or actions downstream. Conservative low costs were used for floodproofing downstream structures

			and did not consider additional costs associated with roads, bridges, legal fees, utilities, ect.
Efficiency	The no action alternative does not alleviate the specified problems and constraints or realize the specified opportunities.	The rehabilitation alternative alleviates the specified problems and constraints.	Decommissioning with nonstructural measures addresses dam safety concerns but is less efficient because it removes flood-retarding storage and requires treatment of numerous downstream structures while leaving broader floodplain impacts unresolved.
Effectiveness	The no action alternative does not alleviate dam safety concerns, continues to provide current flood damage protection up to the dam failure breach, and keeps the current level of damages. However, if the dam breaches, additional flood damages will occur and will not minimize damages.	The rehabilitation alternative alleviates dam safety concerns, provides an increase in the level of flood damage protection, and minimizes damages.	Decommissioning with nonstructural measures effectively eliminates dam breach risk and reduces damages to eligible treated structures, but it is less effective at maintaining watershed-wide flood protection and may increase erosion, sedimentation, and downstream floodplain impacts.

5.2 Summary and Comparison of Alternatives – Ecosystem Services

Ecosystem service flow impacts for the No Action (FWOP) were projected assuming that PA-463 would ultimately become structurally unsound and breaching would occur. A level 2 PR&G analysis was applied to the project because (1) the Federal investment would be greater than \$10,000,000 at \$18,959,400. Estimated damage resulting from a breach of PA-463 was calculated. Ecosystem service benefits were quantified to the extent possible using metrics representative of both the expected change in the respective service flow and its societal effect. However, for those services where the exact relationship between ecosystem service flows and their societal benefit are controversial or not easily defined within the watershed, only those

changes in service flows are quantified. This includes the ecosystem service benefits of water quality and flood protection.

Alternatives were similarly compared in terms of their contribution to the Federal Objective, its Guiding Principles, economic costs, and benefits, illustrated in Table 5-2.

Table 5-2: NWPM Figure 501D-6: Ecosystem Services Tradeoff Analysis Summary for PA-463

Criterion	No Action/ FWOP	Structural Rehabilitation	Decommissioning with Nonstructural
Locally Preferred	–	+	–
Environmentally Preferred	–	+	–
Maximized Net Monetized Benefits Plan	–	+	–
Socially Preferred	–	+	–
Healthy and Resilient Ecosystems (A primary objective of the analysis is identifying alternatives that will protect and restore the functions of ecosystems.)	Loss of ecosystem function due to dam failure and erosion; habitat degradation.	Maintains ecosystem function and downstream habitat; minimizes erosion and flood stress.	Decommissioning would support long-term ecosystem restoration by removing the impoundment and restoring more natural stream flow and sediment transport processes. However, short-term construction-related impacts would occur, including temporary disturbance to aquatic and riparian habitat, water quality, and sediment conditions until the restored channel and flow regime stabilize.
Sustainable Economic Development (Alternatives for	Loss of flood damage protection leads to higher repair and	Protects economic activity through continued infrastructure protection and resilience.	Eliminates the risk of catastrophic dam failure and reduces flood damages to eligible downstream structures

resolving water resources problems should improve the economic well-being of the Nation for current and future generations.)	economic disruption costs.		through floodproofing and buyouts. However, removal of the dam would eliminate flood-retarding storage, expand the downstream floodplain, and could adversely affect future development opportunities and property values in flood-prone areas.
Floodplains (alternatives should avoid investments that adversely affect self-sustaining floodplain function)	The breach of PA-463 would increase the steady-state 100-year floodplain area by approximately 25%, resulting in overbank flooding that would damage floodplain soil, erode streambanks, degrade wetland and riparian vegetation, and impair long-term floodplain function.	The rehabilitation alternative would maintain existing levels of floodplain protection.	The dam removal would increase the steady-state floodplain area and temporarily contribute to streambank erosion and increase in sedimentation in wetlands and riparian vegetation.
Public Safety (Alternatives should reduce risks to people, including life, injury, property, essential public services, and environmental threats concerning air and water quality)	The no action alternative assumes that the dam structure would breach, resulting in as many of 112 structures and 12 bridges suffering from flood damage. This alternative does not meet this principle.	The rehabilitation alternative maintains existing levels of flood protection, minimizing the potential for risk to people, property and essential public services. Water quality is maintained.	The decommissioning with nonstructural measures would eliminate the risk of catastrophic dam failure and would provide floodproofing or buyouts for structures impacted up to the 100-year storm event. However, PA-463 would no longer provide flood routing or flood-retarding benefits for storms under the 50-year storm event. Nonstructural measures would not apply to land

			or other non-building infrastructure. As a result, the downstream floodplain would increase and residual risks to people, property, essential public services, and water quality would remain.
Watershed Approach (A watershed approach recognizes that a water resources activity may have upstream and downstream impacts that are outside the applicable political or administrative boundaries)	The no action alternative has no up-stream impacts. Downstream impacts would occur in the event of a dam breach. Impacts would include temporary flooding (direct and indirect), erosion, damage to existing wildlife habitat (direct and indirect), and permanent long-term increased risk of future flooding.	The rehabilitation alternative has minimal up-stream impacts within the dam flood pool area. There are no downstream impacts from this alternative.	The decommissioning would have up-stream impacts by removing the existing dam flood pool and converting the impoundment area to a restored stream corridor. Downstream impacts would include an expanded floodplain, increased sediment transport from upstream sources, and temporary erosion and habitat disturbance during and following construction.
1)Fresh Water	Dam breach would result in the loss of flood water storage and retention provided by the dam.	The rehabilitation alternative maintains flood water storage and retention provided by the dam.	Decommissioning would result in the loss of floodwater storage, groundwater recharge, and retention functions currently provided by PA-463. Long-term freshwater conditions would shift from an impounded system to a more natural free-flowing stream condition.
1)Flood Damage Reduction	Under the no action alternative, PA-463	The rehabilitation alternative would	Decommissioning with nonstructural measures

(monetized)	would not be rehabilitated, and the dam's ability to provide flood mitigation benefits would continue to degrade over time. As the dam ages and structural conditions worsen, the risk of dam failure or reduced flood regulation capacity increases. This would likely result in increased flood damage to downstream properties during high-intensity storm events.	maintain and enhance the flood mitigation benefits currently provided by PA-463, ensuring continued protection of downstream properties and infrastructure. By increasing the dam's integrity, the rehabilitation alternative would reduce the risk of catastrophic failure and support the consistent management of stormwater and flood flows. Annual flood damage reduction benefits provide a total of \$134,506 when compared to the no action alternative.	would reduce flood damages to eligible downstream structures through floodproofing and buyouts and would eliminate the risk of catastrophic dam failure. However, this alternative would not maintain the existing watershed-wide flood damage reduction benefits provided by PA-463 because the dam's flood-retarding function would be removed.
Total Project investment	0	\$27,565,400	\$42,575,785
Annual Project Investment	0	\$898,524	\$1,347,382
Annual OM&R Costs	\$4,500	\$4,500	\$4,500
Total Annual Project Costs	\$4,500	\$903,024	\$1,351,882
Provisioning	Not Monetized	\$0	\$0
Regulating	Not Monetized; however, the dam continues to provide existing flood attenuation benefits under normal conditions. These benefits are lost under a breach scenario,	\$134,506 (Annual Flood Damage Reduction Benefits), including quantified reduction in risk to Population at Risk (PAR ~411 individuals) and protection of 84 residential structures, 23 commercial	\$126,892

	resulting in increased risk to downstream populations and infrastructure.	buildings, 5 institutional buildings, and 12 bridges.	
Cultural	Not Monetized	Not Monetized	Not Monetized
Supporting	Not Monetized	Not Monetized	Not Monetized
Total Annual Monetized Benefits	0	\$134,506	\$126,892
Total Annual Monetized Costs	0	\$898,524	\$1,347,382
Cost-Benefit Ratio	*	0.15	0.094
Annual Monetized Net Benefit	0	(\$764,018)	(\$1,220,489)
Regional Employment	A breach of PA-463 would cause widespread disruption to businesses, tourism, and public services in Barrett Township and downstream communities. Recovery efforts could generate short-term cleanup and emergency response jobs, but longer-term economic instability, loss of businesses, and transportation interruptions would reduce overall employment in the region.	Rehabilitation would sustain existing employment by protecting commercial centers, tourism activity, and public services from flood damage. In addition, the project would generate short-term construction employment and related support jobs, contributing positively to the regional labor market.	Decommissioning and stream restoration would generate short-term construction employment and related support jobs. Long-term employment effects are uncertain. While restoration could provide limited recreation or tourism benefits, the expanded downstream floodplain and loss of flood-retarding storage could adversely affect businesses, transportation access, and public services in flood-prone areas.
Regional Income	Flood damage to homes, businesses, and infrastructure would reduce household earnings, increase repair costs, and strain	Rehabilitation would preserve regional income by maintaining household earnings and business continuity. Construction wages and	Decommissioning with nonstructural measures may preserve income for occupants of treated structures and would generate short-term

	local tax revenues. Long-term disruptions to commerce, recreation, and tourism would diminish regional income and economic stability.	multiplier effects during project implementation would add short-term income, while long-term protection of residential, commercial, and transportation infrastructure would secure the economic base of Monroe County and adjacent jurisdictions.	construction wages during implementation. However, expansion of the downstream floodplain and the potential for reduced property values or increased flood-related disruptions could adversely affect long-term regional income and the economic base of Monroe County.
Regional Impacts (Other)	A breach of PA-463 would likely cause significant disruption to regional transportation networks, including damage to key roadways and bridges used for emergency response and daily commuting. Increased downstream flood frequency and severity could strain municipal resources across multiple jurisdictions. Interruption of regional water quality and sediment transport dynamics could also affect aquatic systems beyond the project area.	Rehabilitation would preserve inter-jurisdictional flood control and ensure continued reliability of transportation corridors that serve multiple municipalities. It would support long-term resilience planning efforts across Monroe County and maintain regional aquatic habitat connectivity by minimizing downstream sedimentation and erosion impacts.	Decommissioning with nonstructural measures would eliminate the risk of catastrophic dam failure, but it would not provide flood protection for non-building infrastructure. Expanded downstream floodplains, increased sediment transport, and temporary changes to water quality could affect transportation networks, municipal services, and aquatic systems beyond the immediate project area.

The No Action alternative serves as the baseline for incremental analysis. Because both incremental benefits and incremental costs equal zero, a benefit–cost ratio is not defined for the No Action alternative.

5.3 Effects of Individual Alternatives Relative to Resource Concerns

This watershed plan evaluates the environmental effects of the alternatives under consideration, including the No Action/Future Without Project (FWOP) condition and the Action alternatives. The analysis identifies and describes the reasonably foreseeable environmental

effects on the human and natural environment that may result from implementation of each alternative, consistent with the National Environmental Policy Act (NEPA) and NRCS guidance.

Environmental effects are evaluated in terms of direct and indirect effects, as defined by NEPA, and include those effects that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action. The analysis focuses on changes to existing conditions that would occur under each alternative, including effects associated with construction, operation, and long-term performance of the project.

Consistent with current CEQ guidance and NRCS National Bulletin 190-26-1, this analysis emphasizes the identification of reasonably foreseeable environmental effects rather than reliance on a standalone cumulative effects analysis. Where appropriate, the analysis considers the incremental effects of the proposed action in the context of other past, present, and reasonably foreseeable future actions to provide a comprehensive understanding of environmental outcomes.

The resource concerns identified during the scoping process (Table 3-3) and determined to be relevant to the proposed action were carried forward for detailed evaluation in this section. Resource concerns determined not to be relevant during scoping are not analyzed further, consistent with NEPA and NRCS planning guidance.

5.3.1 Soil-Related Concerns

5.3.1.1 *Soil Resources (Regulating and Supporting Ecosystem Services)*

No Action/FWOP –Under the Future Without Project (FWOP) scenario, the dam would remain in operation without rehabilitation, and minor soil disturbances may continue to occur over time due to localized erosion at the auxiliary spillway and sediment deposition within the flood pool. These effects are expected to be limited in scope but may worsen if the dam’s structural deficiencies remain unaddressed. However, the eventual dam breach would trigger substantial scour and mass waste of soils within the flood pool, surrounding soils, and downstream stream banks contributing to increased flooding and water quality degradation. A breach would cause downstream aggradation of the displaced sediment. Although these impacts would be pronounced in the short term, natural river processes would eventually restore a new equilibrium over time.

Determination: There would be negligible effects on soil resources from continued dam operation; however, a dam breach would lead to direct, adverse short-term impacts on soil stability and quality.

Structural Rehabilitation Alternative – Rehabilitation construction activities would cause temporary soil disturbances through excavation, compaction, and removal of soil horizons. Best Management Practices (BMPs) in line with NRCS standards would be implemented to mitigate erosion, and all disturbed areas would be revegetated to stabilized soils post-construction.

Determination: The alternative would have soil disturbance from construction at the dam site associated with the described rehabilitation activity and subsequent dam operations. In the short-term, effects would be direct, adverse, minor, and localized. In the long-term, effects would be direct, adverse, negligible, and localized.

Decommissioning with Nonstructural Alternative –Decommissioning construction activities would cause temporary soil disturbances through excavation, compaction, and removal of soil horizons. Best Management Practices (BMPs) in line with NRCS standards would be implemented to mitigate erosion, and all disturbed areas would be revegetated to stabilize the soils post-construction. Removal of PA-463 would eliminate the dam’s flood-retarding function and would allow sediment that is currently retained within the reservoir system to move downstream over time. Short-term downstream effects could include increased sediment transport, localized aggradation, streambank erosion, and temporary effects on soil stability within downstream floodplain and riparian areas. Over the long term, natural stream processes would be expected to establish a new channel and floodplain equilibrium.

Determination: The alternative would result in direct, adverse, minor to moderate, short-term impacts on soil resources associated with dam removal, channel restoration, and downstream sediment transport. Long-term effects would be direct and indirect, adverse, minor, and localized to the restored channel, former impoundment area, and downstream floodplain areas affected by increased sediment transport and expanded flooding.

5.3.1.2 Prime & Unique Farmland, Farmland of Statewide Importance (Provisioning Ecosystem Service)

No Action/FWOP – A dam breach would result in significant downstream flooding, which could lead to erosion, sediment deposition, and loss of soil function on floodplain soils in the inundation zone. These downstream soils, some of which include classified farmland, would be at greater risk of degradation under the No Action alternative.

Determination: Continued operation of the dam would have negligible effects on farmland soils. However, a dam breach would result in short-term adverse impacts to soils downstream, including increased erosion, soil displacement, soil compaction from floodwaters, and sediment deposition, all of which could reduce soil productivity and alter soil structure within the affected areas.

Structural Rehabilitation Alternative – The areas south of the PA-463 dam, which include soils classified as prime or of statewide importance, would remain unaffected in terms of land use conversion. The rehabilitation project does not include any permanent conversion of these soils to non-agricultural use, nor does it involve construction that would impair their agricultural function.

Determination: There would be no effect on prime or statewide important farmland as a result of the rehabilitation alternative.

Decommissioning with Nonstructural Alternative – Areas downstream of PA-463, including portions of the Leavitt Branch floodplain, contain soils classified as prime farmland and farmland of statewide importance. The Decommissioning with Nonstructural Alternative would not

convert these soils to agricultural, residential, commercial, or other developed land uses. However, removal of PA-463 would eliminate the dam's flood-retarding function and increase downstream floodplain extent and flood frequency.

As a result, downstream impacts could include increased erosion, sediment transport, and sediment deposition within floodplain soils. These processes could alter soil profiles, affect soil structure, and reduce the long-term capability of these soils to support agricultural use, native vegetation, or functional floodplain ecosystems. Although the affected soils are not currently in active agricultural production, their NRCS classification reflects their inherent productivity and land capability.

Determination: Decommissioning would not result in direct conversion of prime farmland or farmland of statewide importance to nonagricultural land use. However, the alternative may result in direct and indirect, adverse, short-term impacts to these soils due to increased flooding, erosion, and sediment deposition, with potential long-term degradation of soil quality and land capability within affected downstream floodplain areas.

5.3.2 Water-Related Concerns

5.3.2.1 Water Quantity (Regulating Resource Concern)

No Action/FWOP – Under the No Action (FWOP) alternative, the structural condition of PA-463 would continue to degrade, reducing its ability to regulate water quantity. A future breach would result in the loss of floodwater storage and retention capacity, leading to higher peak flows, increased downstream discharge volumes during storm events, and reduced flow moderation during low-flow periods. This change would diminish the watershed's ability to buffer hydrologic extremes, contributing to flashier hydrographs and elevated flood risk downstream.

Determination: The No Action alternative would have negligible long-term effects on water quantity under normal conditions. However, if a dam breach occurs, there would be direct, adverse, and significant short-term impacts due to the sudden loss of floodwater storage capacity, increased downstream peak flows, and reduced baseflow regulation.

Structural Rehabilitation Alternative – Under the Structural Rehabilitation Alternative, water quantity regulation would be maintained or improved. The rehabilitation would restore the dam's design function for flood attenuation, preserving the system's capacity to detain stormwater and release it in a controlled manner. This alternative would sustain flow regulation benefits for downstream ecosystems and communities, supporting floodplain health, reducing streambank erosion potential, and maintaining more stable hydrologic conditions in Leavitt Branch and its receiving waters.

Determination: The Structural Rehabilitation alternative would have beneficial long-term effects on water quantity by maintaining flood storage capacity, moderating downstream flows, and supporting consistent hydrologic conditions throughout the watershed.

Decommissioning with Nonstructural Alternative— Decommissioning PA-463 would remove the reservoir’s floodwater detention and flow regulation functions. As a result, downstream peak discharges during storm events would increase compared to conditions with the dam in place, and the watershed would no longer receive the same attenuation benefits provided by the reservoir. Streamflow in Leavitt Branch would become more directly responsive to storm events, which could increase flood frequency, channel instability, streambank erosion, and impacts to downstream infrastructure and aquatic habitat. Nonstructural measures would reduce flood damages to eligible downstream structures but would not replace the dam’s watershed-scale water quantity management function.

Determination: The Decommissioning with Nonstructural Alternative would result in direct and indirect, adverse, long-term impacts to water quantity due to the loss of floodwater storage and flow moderation. Short-term impacts would also occur during construction and channel restoration.

5.3.2.2 Water Quality, including Surface and Ground Water (Provisioning and Cultural and Social Ecosystem Services)

No Action/FWOP – Under the Future Without Project (FWOP) scenario, the continued presence of the dam has a minimal beneficial effect on downstream sedimentation by trapping deposition behind the dam during flood events. The existing dam does have an effect on water quality parameters, including temperature, dissolved oxygen, and Total Suspended Solids (TSS), relative to free-flowing stream conditions. A dam breach would likely lead to short-term, significant increases in TSS and turbidity, degrading water quality. With respect to groundwater, the dam does not serve as a significant recharge or discharge control structure. However, a breach could result in temporary alterations to shallow groundwater-surface water interactions, especially in low-lying riparian zones. These effects would be localized and temporary, with no long-term changes in regional groundwater levels anticipated.

Determination: The No Action alternative would have negligible long-term effects under normal conditions. However, if a dam breach occurs, there would be direct, adverse, and significant short-term impacts on surface water quality and localized, temporary impacts on groundwater-surface water interactions.

Structural Rehabilitation Alternative – Rehabilitation construction activities would cause temporary disturbances that would affect water quality by increasing turbidity and TSS. These impacts would be controlled using BMPs such as cofferdams, soil stabilization, and erosion control measures.

Post-construction, the rehabilitated structure is expected to continue functioning as a dry detention dam, with water impoundment occurring only during storm events. Under normal flow conditions, the dam allows most sediment and particulates to pass through. Sediment surveys indicate a historic average sediment trapping rate of just 0.032 acre-feet per year, confirming that the reservoir has a minimal influence on long-term sediment storage. Given this low trapping rate and the lack of observed downstream channel incision to date, significant alterations to sediment continuity or channel morphology are not anticipated. Therefore, long-term impacts to downstream sediment dynamics are expected to be negligible.

Hydraulic patterns and water circulation would be temporarily affected by the use of cofferdams, but normal flows would resume post-construction. No significant long-term changes are expected in circulation or pool elevation.

Determination: The rehabilitation alternative would result in minor, localized short-term water quality impacts during construction, primarily due to ground disturbance and potential sediment mobilization. However, long-term effects would be negligible or beneficial, as the rehabilitated structure would continue to regulate downstream flows and maintain sediment control consistent with existing conditions. PA-463 currently exhibits a low sediment trapping rate of approximately 0.032 acre-feet per year, and post-rehabilitation performance is expected to remain similar, minimizing any long-term disruption to downstream sediment transport.

Decommissioning with Nonstructural Alternative – Decommissioning PA-463 would result in short-term construction-related disturbances, including sediment mobilization, substrate disturbance, and temporary increases in total suspended solids (TSS) and turbidity downstream as the dam is removed and the channel is restored. Construction activities could also result in localized impacts to benthic macroinvertebrates and aquatic communities. These effects would be minimized through erosion and sediment control BMPs, sediment management measures, phased construction, and appropriate construction timing to avoid sensitive aquatic periods.

Removal of the dam would eliminate the reservoir's sediment trapping function. As a result, sediment and particulates from the upstream watershed that are currently retained within the impoundment would be transported downstream more readily. This could result in long-term changes to downstream sediment transport, substrate composition, turbidity, and channel adjustment until a new stream equilibrium is established. However, decommissioning would also restore a more natural free-flowing stream condition and may reduce impoundment-related water quality effects, such as elevated water temperatures and reduced dissolved oxygen associated with reservoir conditions.

Long-term changes in regional groundwater levels are not anticipated. Temporary localized changes in shallow groundwater-surface water interactions may occur during construction and channel restoration, particularly in low-lying riparian areas.

Determination: Construction and implementation of the Decommissioning with Nonstructural Alternative would result in direct, adverse, minor to moderate, short-term, and localized impacts to substrates, suspended particulates, turbidity, current patterns, circulation, and shallow groundwater-surface water interactions. Long-term effects would include indirect changes to downstream sediment transport and surface water quality due to the loss of the reservoir's sediment trapping function, as well as beneficial effects associated with restoration of a free-flowing stream condition.

5.3.2.3 Floodplain Management (Regulating Ecosystem Service)

No Action/FWOP – The No Action/FWOP alternative does not rehabilitate PA-463. Eventually the structure will deteriorate and breach, causing significant impacts to human development in the floodplain. Initially, the dam breach would likely result in damage to 84 residential structures, 23 commercial buildings, 5 institutional facilities, and 12 bridges. Following the initial breach event, the absence of flood storage capacity would permanently alter downstream hydrology. Modeling indicates that the extent of the 100-year floodplain would increase from 849 acres to 1,105 acres, representing a 30% increase in floodplain area. The more than 200%

increase in downstream flood risk to structures is based on a comparison of the number of buildings exposed within the 100-year floodplain under current conditions (with the dam) versus the “without-dam” scenario. This increase is attributed to both the expanded floodplain footprint and the more frequent and severe inundation of areas previously protected by PA-463.

Determination: In the event of a dam breach, there would be significant direct, indirect, adverse, major short-term impacts from this alternative on floodplain management. Long term indirect impacts would be adverse and major.

Structural Rehabilitation Alternative – Rehabilitation of PA-463 will maintain downstream flood protection, resulting in no change to the existing 100-year floodplain and no change in floodplain function.

Determination: There would be no impact from this alternative on floodplain management.

Decommissioning with Nonstructural Alternative – Decommissioning with nonstructural measures would remove PA-463 and eliminate the dam’s flood storage and flood attenuation functions. In the absence of the dam, higher peak discharges and greater overbank flooding would be expected during large storm events, resulting in an increase in downstream floodplain extent.

Nonstructural measures would provide floodproofing or acquisition/buyouts for eligible downstream structures impacted up to the 100-year storm event. However, these measures would not prevent expansion of the floodplain and would not provide flood protection for land, roads, bridges, utilities, or other non-building infrastructure.

Determination: The Decommissioning with Nonstructural Alternative would result in long-term direct and indirect adverse impacts on floodplain management due to the loss of flood storage, increased downstream floodplain extent, and increased residual flood risk outside of treated structures.

5.3.2.4 Waters of the U.S., Wetlands, & Special Aquatic Sites (Provisioning, Regulating, Supporting, and Cultural and Social Ecosystem Services)

No Action/FWOP – The No Action/FWOP alternative would have no new effects to Waters of the U.S. (WOTUS), wetlands, and special aquatic sites under continuing operation of the dam. Any impacts associated with the original placement of the dams would remain unchanged. However, in the event of a dam breach, significant downstream impacts to WOTUS and wetlands could occur. The sudden release of impounded water would likely cause streambank erosion, sediment scouring, and the physical disruption of wetland soils and vegetation within the breach inundation zone. These impacts could degrade aquatic habitat quality, alter stream morphology, and reduce the ecological function of connected wetland systems.

Determination: There would be negligible effects on WOTUS, wetlands, and special aquatic sites associated with continued operation of the dams. However, a dam breach would have short term adverse effects on WOTUS, wetlands, and special aquatic sites.

Structural Rehabilitation Alternative – Proposed improvements to PA-463 would temporarily disturb approximately 1022 linear feet and 0.46 acres of jurisdictional streams and wetlands during construction. Permanent fill for spillway and stilling basin construction would impact an additional 970 linear feet of stream and 2.27 acres of wetlands. Wetlands affected include a mix of palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO) systems.

Five wetlands (labeled A through E) were identified and flagged using sub-meter GPS equipment. The delineated wetlands include a mix of palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO) systems, illustrated in Table 3-7.

These wetlands provide a range of ecological functions. For example, Wetlands A and B (PEM/PSS) contribute primarily to sediment and nutrient retention; Wetlands C and D (PEM/PSS) provide wildlife habitat, including potential amphibian breeding habitat; and Wetland E (PFO) supports groundwater recharge and provides forested cover. Together, these systems enhance water quality, contribute to groundwater/surface water interactions, and provide habitat diversity within the dam site and downstream watershed.

A detailed summary of wetland classifications, acreages, and ecological functions is provided in Table 3-7 and in Appendix D.

These effects were reviewed and concurred with by the U.S. Army Corps of Engineers on 09/30/2024, as documented in Appendix A (USACE Correspondence) and mapped in "Support Maps" (Appendix C).

Determination: Construction of the Rehabilitation Alternative would result in minor, short-term disturbances to approximately 480 linear feet and 0.06 acres of jurisdictional streams and wetlands, primarily consisting of palustrine emergent (PEM) and palustrine scrub-shrub (PSS) wetlands within the construction footprint. In addition, permanent fill would affect approximately 192 linear feet of stream and 0.49 acres of jurisdictional wetlands, including PEM, PSS, and a small portion of palustrine forested (PFO) wetlands. These long-term impacts are expected to be minor in scale and will be addressed through appropriate mitigation measures in coordination with federal and state permitting agencies.

Decommissioning with Nonstructural Alternative – Decommissioning PA-463 would disturb WOTUS, wetlands, and special aquatic sites during dam removal, channel restoration, and stabilization of the former impoundment area. Short-term impacts could include streambank erosion, sediment scouring, increased turbidity, and disturbance to wetland soils and vegetation within and downstream of the project area. These impacts could temporarily degrade aquatic habitat quality, alter stream morphology, and reduce the ecological function of connected wetland systems.

Over the long term, decommissioning would restore a more natural stream condition through the former impoundment area. However, removal of the dam would also increase downstream floodplain extent and sediment transport, which could continue to affect downstream WOTUS, wetlands, and riparian areas until the channel and floodplain system stabilize.

Determination: Decommissioning would result in direct and indirect, adverse, short-term impacts to WOTUS, wetlands, and special aquatic sites during construction and channel restoration. Long-term effects would include beneficial restoration of a free-flowing stream condition in the former impoundment area but may also include indirect adverse effects associated with increased downstream floodplain extent and sediment transport.

5.3.2.5 Regional Water Resource Plans

No Action/FWOP – The No Action/FWOP alternative does not support the objectives outlined in the 2004 Water Resources Plan for the Delaware River Basin, particularly the prevention or minimization of flood-induced loss of life and property and the protection of floodplain ecology. It also fails to address the high hazard classification of the PA-463 dam as identified in the Monroe County Hazard Mitigation Plan (2021). Inaction increases long-term risk to downstream communities and contradicts regional flood resilience and ecological preservation goals.

Determination: The No Action/FWOP Alternative does not align with the goals of the 2004 Water Resources Plan for the Delaware River Basin or the Monroe County Hazard Mitigation Plan. It fails to address the dam's high hazard classification, increases downstream flood risk, and does not contribute to the protection of floodplain function or public safety. As a result, this alternative would not support the objectives of regional flood management, resilience, or ecological sustainability, and may be inconsistent with future plan updates.

Structural Rehabilitation Alternative – Rehabilitation of the dam would address the goals of the Water Resources Plan for the Delaware River Basin and Monroe County Hazard Mitigation Plan.

Determination: The rehabilitation alternative aligns with and advances the goals of both regional plans by reducing flood risk, maintaining floodplain function, and addressing the dam's high hazard status. These positive outcomes may support future updates or alignment with the Water Resources Plan and Monroe County Hazard Mitigation Plan.

Decommissioning with Nonstructural Alternative – Decommissioning PA-463 with nonstructural measures would address the dam's high hazard status by removing the dam and eliminating the potential for catastrophic dam failure. This would be consistent with regional goals related to public safety and hazard reduction. However, removal of the dam would also eliminate its flood-retarding function, increase downstream floodplain extent, and result in residual flood risks to land and other non-building infrastructure.

Nonstructural measures would reduce flood damages to eligible downstream structures but would not maintain the same watershed-wide flood protection benefits provided by PA-463. Therefore, this alternative would only partially support the goals of the 2004 Water Resources Plan for the Delaware River Basin and the Monroe County Hazard Mitigation Plan.

Determination: The Decommissioning with Nonstructural Alternative would partially align with regional water resource and hazard mitigation goals by eliminating catastrophic dam failure risk and reducing damages to eligible structures. However, it would also be less consistent with flood risk reduction and floodplain management goals because it would increase downstream floodplain extent and remove the dam's flood-retarding function.

5.3.3 Plant and Animal-Related Concerns

5.3.3.1 *Endangered and Threatened Species (Supporting Ecosystem Services)*

No Action/FWOP – Routine operation and maintenance of the dams under the No Action alternative would not affect federally listed species. However, in the event of a dam breach, there is potential for destruction of roosting habitat for bats (e.g., northern long-eared bat and Indiana bat) and disruption to habitat supporting the potentially present endangered northeastern bulrush (*Scirpus ancistrochaetus*) that may be located within the breach inundation area.

Determination: Continued dam operations would result in no effect. A dam breach, however, could cause adverse effects to listed species and habitats.

Structural Rehabilitation Alternative – Per consultation with the USFWS, the project is within the range of the endangered northern long-eared bat and Indiana bat, as well as the proposed endangered tricolored bat. The project includes removal of approximately 9.8 acres of trees during the bats' inactive season (November 1 to March 31), with approximately 3.76 acres allowed to regenerate. There were no communities identified during the site walk and based on the time-of-year construction restrictions the USFWS concurred with a "Not Likely to Adversely Affect" (NLAA) determination for the bats.

The project is also located within the broader range of the northeastern bulrush (*Scirpus ancistrochaetus*), a federally endangered plant species. Although this species is known to occur in peatlands and wetlands elsewhere in the Brodhead watershed, no records exist in the immediate vicinity of the PA-463 project area, and no individuals or suitable habitat were observed during the wetland and waterway site investigation conducted in June 2022. While the field survey was not a formal botanical inventory, it included qualitative screening for federally listed species, and no evidence of northeastern bulrush was found. Therefore, adverse effects to this species are unlikely.

Because the dam will remain in place and the proposed action does not modify downstream hydrology beyond current conditions, impacts to threatened or endangered species or their habitats in the downstream floodplain are not anticipated.

Determination: Based on avoidance measures, field observations, and agency consultation, the proposed action would result in no effect on federally listed threatened or endangered species or their habitats at or downstream of the dam.

Decommissioning with Nonstructural Alternative – Decommissioning the dam would require temporary tree clearing and construction activities associated with dam removal and channel restoration. All tree clearing would occur during the bat inactive season (November 1 through March 31), and disturbed areas would be allowed to naturally revegetate following construction. Therefore, adverse effects to federally listed bat species are not anticipated.

Removal of the dam would permanently alter aquatic, wetland, and floodplain habitats and would increase downstream floodplain extent. Although no suitable habitat for the federally endangered northeastern bulrush (*Scirpus ancistrochaetus*) has been identified within the

project area, increased flooding and changes to downstream hydrology could potentially affect suitable habitat if present within the expanded floodplain.

Determination: The Decommissioning with Nonstructural Alternative is not likely to adversely affect federally listed bat species. Effects to northeastern bulrush are uncertain but could result in minor adverse impacts if suitable habitat occurs within the expanded downstream floodplain.

5.3.3.2 Migratory Birds (Cultural and Social Ecosystem Services)

No Action/FWOP – The No Action/FWOP alternative would have no effect on migratory birds under continuing operation and maintenance of the dams. A breach of the dam may have adverse effects on habitat downstream of the dam that is used by migratory birds. However, the birds can relocate to other available habitat during this condition.

Determination: There may be minor effects on migratory birds during a breach of the dam.

Structural Rehabilitation Alternative – During construction, temporary disturbances such as noise, vegetation clearing, and human activity may affect migratory birds and their nesting or foraging behavior. However, these impacts are expected to be localized and short-term. Long-term habitat availability may be slightly altered but is not expected to significantly reduce the overall suitability of the area for migratory birds. USFWS suggested minimizing the risk of take to migratory birds by choosing to remove trees when birds are unlikely to be nesting (tree removal recommended between September 1 and March 31). A determination of NLAA has been received from the USFWS (Appendix A).

Determination: There would be minor short-term effects to migratory bird habitat.

Decommissioning with Nonstructural Alternative – Removal of the reservoir would eliminate existing open-water and associated wetland habitats that currently provide foraging, loafing, and potential nesting habitat for migratory birds that rely on lentic conditions. Over time, these habitats would transition to a free-flowing stream and riparian corridor supporting a different assemblage of bird species.

Determination: The alternative would result in moderate, long-term adverse impacts to migratory bird species dependent on reservoir and wetland habitats, while providing long-term benefits to species that utilize riverine and riparian habitats.

5.3.3.3 Bald and Golden Eagles (Cultural and Social Ecosystem Services)

No Action/FWOP – The No Action/FWOP alternative would have no effect on eagles under continuing operation of the dams.

Under the No Action alternative, continued operation and maintenance of PA-463 would not affect bald or golden eagles. The existing Leavitt Branch impoundment provides limited but potential foraging opportunities for bald eagles, which are known to utilize riparian corridors and open water features in northeastern Pennsylvania. There are no known eagle nests within the immediate project area, and no occurrences were identified during the PNDI environmental review or during field observations.

In the event of a dam breach, the sudden loss of the Leavitt Branch impoundment would alter aquatic and riparian habitat conditions within the project area. The elimination of a still-water foraging area and a potential reduction in prey availability (e.g., fish and amphibians) could reduce local habitat suitability for foraging bald eagles. These effects would be indirect and moderate in scale, given the relatively small size of the reservoir and absence of confirmed nest sites in the action area. Golden eagles are unlikely to be affected, as they are primarily observed in Pennsylvania during migration and are not known to nest or forage in the project vicinity.

Determination: Continued dam operation would have no effect on bald or golden eagles. However, a dam breach could result in minor to moderate, long-term adverse effects on foraging habitat for bald eagles due to the loss of the impounded waterbody and associated prey base.

Structural Rehabilitation Alternative – Given the habitat conditions, it is unlikely that bald or golden eagles would be present in the immediate project area during construction. However, if an eagle nest is discovered during construction and within nesting season, all activities will be halted immediately, and consultation with the USFWS and appropriate wildlife biologists will be initiated to ensure compliance with protection measures.

Determination: There would be no long-term effect on bald eagles.

Decommissioning with Nonstructural Alternative – Decommissioning of the dam would permanently alter aquatic and riparian habitat conditions by eliminating the existing impoundment and associated foraging opportunities for bald eagles. Given the relatively small size of the reservoir and absence of known nest sites within the action area, these effects are expected to be minor. Golden eagles are unlikely to be affected because they are not known to nest or forage within the project vicinity.

Determination: This alternative has potential to result in minor to moderate, long-term adverse effects on foraging habitat for bald eagles due to the loss of the impounded waterbody and associated prey base.

5.3.3.4 Invasive Species (Regulating Ecosystem Service)

No Action/FWOP – The No Action/FWOP alternative would have no effect on invasive species under continuing operation and maintenance of the dams. However, a dam breach would potentially spread existing invasive species to areas downstream and outside of their existing locations.

Determination: There would be minor long-term effects on invasive species.

Structural Rehabilitation Alternative – The incorporation of BMPs into the construction documents for compliance by the contractor will provide for the control of spread of invasive species. BMPs would include: 1) use of equipment and construction / timber mats that are thoroughly cleaned prior to mobilization to the site and prior to demobilization, 2) cleaning construction equipment before moving to a new site to minimize the risk of transporting seeds or propagules, 3) proper disposal of excavated or dredged material, 4) disposal of excavated and dredged material in pre-approved, non-wetland areas, 5) provide training or personnel with

knowledge of identification of invasive species; 6) applying control treatments prior to construction and monitoring during and after construction.

Determination: There would be no long-term adverse effects on invasive species.

Decommissioning with Nonstructural Alternative – Construction documents for dam removal would incorporate BMPs to minimize the introduction and spread of invasive species. However, increased downstream flooding and sediment transport associated with dam removal could facilitate the spread of existing invasive species into newly inundated or disturbed areas.

Determination: There would be minor, long-term adverse effects associated with the potential spread of invasive species despite implementation of BMPs.

5.3.3.5 Fish, Wildlife & Aquatic Resources (Provisioning and Cultural and Social Ecosystem Services)

No Action/FWOP – The alternative would have no effect on fish and wildlife under continuing operation of the dam. Terrestrial and aquatic habitats would remain relatively undisturbed. Existing fish and wildlife in these areas would likely continue to be present under current conditions. However, if a dam breach were to occur, fish and wildlife would be affected by short term negative changes to habitat from erosion, sedimentation, and turbidity within the streams.

Determination: There would be negligible effects from ongoing operation of the dam. If a dam breach were to occur, there would be long-term and uncertain effects on fish and wildlife.

Structural Rehabilitation Alternative – Construction activities related to rehabilitation of the dam could potentially result in the displacement of wildlife species in the immediate vicinity of the project site. Construction activities could affect normal fish and wildlife behaviors, such as feeding, breeding, resting, and movement throughout their habitat. In addition, noise can stress individuals, disrupt communications and other natural sounds, or displace individuals from their habitat. During and immediately after construction, terrestrial and aquatic habitats would be disturbed from construction equipment modifications to the topography within the construction sites. Construction equipment would cause little or no direct mortality to wildlife, which can generally disperse into neighboring habitat. Construction work would last 1-2 years or longer, depending on the scope of the project. Construction crews would implement BMPs, such as restricting ground-moving activities during nesting or hibernation periods of certain species, using qualified biological construction monitors to avoid vehicle strikes to the greatest extent possible, and replanting native vegetation in disturbed areas to the greatest extent possible.

Rehabilitation of the dam would result in the clearing and mowing of forested habitat. This area would be removed from forested habitat and maintained as a mowed, early successional habitat area. This would reduce the availability of upland habitat for terrestrial wildlife species for the duration of the project life. However, the removal of small amounts of forest is not expected to noticeably increase resource competition or decrease habitat availability for terrestrial species outside of the normal range of habitat variation.

Determination: There would be short term minor effects from construction activities and long term minor impacts from the removal of forested habitat due to rehabilitation of PA-463.

Rehabilitation of PA-463 would result in negligible long-term impacts as the natural flow regime is restored, and riparian habitat is re-established.

Decommissioning with Nonstructural Alternative – Construction activities would temporarily disturb wildlife and aquatic habitats near the dam site. Removal of the reservoir would permanently convert lentic habitat to a free-flowing stream and riparian corridor, resulting in the loss of reservoir-dependent habitat while restoring riverine ecosystem functions and connectivity.

Increased downstream flows and sediment transport could result in short-term adverse impacts to aquatic habitat due to erosion, turbidity, and sedimentation until a new channel equilibrium is established.

Determination: There would be short-term minor adverse effects from construction activities and downstream habitat disturbance. Long-term impacts would include the permanent loss of reservoir habitat and the restoration of riverine habitat and natural stream processes.

5.3.3.6 Riparian Areas (Regulating Ecosystem Service)

No Action/FWOP – The No Action/FWOP alternative would have no new effects on riparian areas under continued operation of the dam. However, in the event of a dam breach, riparian areas—including adjacent wetlands, streambanks, and floodplains would be subject to significant short-term impacts such as erosion, sediment deposition, and destruction of established vegetation from the sudden release of impounded water. In the long term, the absence of regulated flows currently provided by the dam could lead to more frequent and intense flood pulses, increased streambank instability, reduced sediment retention, and shifts in vegetation structure and composition. These changes could degrade riparian habitat quality and reduce the ecological function of riparian corridors over time.

Determination: Continued operation of the dam under the No Action/FWOP alternative would result in negligible effects on riparian areas. However, if a dam breach were to occur, it could cause both immediate and long-term degradation of riparian systems due to uncontrolled flooding, erosion, and unregulated flow conditions. While the full extent of long-term impacts is uncertain, they may include streambank instability, vegetation loss, and reduced ecological function within affected riparian corridors.

Structural Rehabilitation Alternative – Construction activities associated with the rehabilitation of PA-463 would result in temporary impacts to approximately 0.35 acres of riparian areas, and permanent impacts to approximately 0.30 acres of riparian vegetation. The affected area is located below the existing dam embankment and consists of a mix of forested, wetland, and floodplain riparian vegetation, including areas where these features overlap (e.g., forested wetlands within the floodplain). These areas would be permanently altered through incorporation into the enlarged dam embankment, spillway, and associated maintained grassy surfaces. Restoration and replanting of native vegetation will be implemented in temporarily disturbed riparian zones where practicable, following construction.

Determination: The rehabilitation alternative would result in minor short-term effects from construction-related disturbance to riparian vegetation, and long-term minor impacts due to the

permanent conversion of approximately 0.30 acres of overlapping forested, wetland, and floodplain riparian habitat to maintained structural features.

Decommissioning with Nonstructural Alternative – Removal of the dam and reservoir would permanently alter riparian and wetland communities located around the existing impoundment. Construction activities would temporarily disturb riparian vegetation, wetlands, and streambanks, but disturbed areas would be restored and allowed to revegetate naturally.

The increase in downstream floodplain extent could result in short-term erosion, sediment deposition, and vegetation disturbance until the stream and floodplain system stabilizes.

Determination: The alternative would result in short-term adverse impacts to riparian vegetation and wetlands due to construction and channel adjustment. Long-term impacts would include permanent conversion of reservoir-edge habitats to riverine and riparian communities.

5.3.3.7 Forest Resources (Provisioning, Regulating, Supporting, and Cultural and Social Ecosystem Services)

No Action/FWOP – This alternative would have no immediate effects on forest resources during continued operation of the dam. However, in the event of a dam breach, downstream forested areas—particularly riparian woodlands and floodplain forests—could experience adverse effects from rapid inundation, erosion, sediment deposition, and debris flow. These impacts could lead to tree mortality, root exposure, and long-term degradation of vegetative structure within the breach inundation zone.

Determination: There would be no effects to forest resources from routine operation and maintenance. However, if a breach were to occur, adverse short-term and potentially long-term effects to downstream riparian and floodplain forest resources could result.

Structural Rehabilitation Alternative - Construction activities related to rehabilitation of the dam would result in temporary and permanent impacts of forested areas. Construction would remove approximately 9.8 acres of forested land. This effect would begin during construction and persist as the area would be incorporated into the enlarged dam, spillway, and maintained grassy areas. Replanting native vegetation and allowed natural regrowth will occur in approximately 3.76 acres in disturbed areas outside of the dam maintenance areas.

Determination: There would be minor short-term effects from construction activities at PA-463. The rehabilitation of the dam would result in long term minor impacts from the removal of a total of 9.8 acres of forested vegetation.

Decommissioning with Nonstructural Alternative – Dam removal and channel restoration would require temporary clearing of forested vegetation. Disturbed areas would be allowed to naturally revegetate following construction. Increased downstream flooding and sediment deposition could adversely affect some riparian and floodplain forest communities within the expanded floodplain.

Determination: Short-term adverse effects from construction activities would occur. Long-term adverse effects to some downstream floodplain forests may occur due to increased flooding, while natural revegetation would restore forest cover in temporarily disturbed areas.

5.3.4 Human-Use Related Concerns

5.3.4.1 *Cultural Resources (Historic Properties under Section 106 of the NHPA)*

This section evaluates the environmental effects of each alternative on cultural resources in accordance with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR Part 800). Under Section 106, effects are assessed only for historic properties, defined as cultural resources listed in or eligible for listing in the National Register of Historic Places (NRHP) (36 CFR 800.16(l)).

NRCS identified and evaluated historic properties within the Area of Potential Effects (APE) as described in Chapter 3 and illustrated in Appendix E. In consultation with the Pennsylvania State Historic Preservation Office (PA SHPO) and consulting Tribes, NRCS made determinations of eligibility and assessed effects for each alternative in accordance with 36 CFR 800.4 and 36 CFR 800.5. Documentation supporting these determinations and findings is provided in Appendix A and Appendix E in accordance with 36 CFR 800.11.

No Action/FWOP - Under the No Action/FWOP condition, PA-463 would remain in place without rehabilitation, and existing deficiencies would persist. As described in Chapter 3, this condition assumes an eventual catastrophic dam failure under a most probable failure mode.

No historic properties were identified within the dam embankment or upstream flood pool due to prior disturbance from original construction and subsequent inundation. Therefore, no direct effects to historic properties are anticipated within these areas under the FWOP condition.

However, under a dam breach scenario, flood inundation has the potential to result in direct and indirect adverse effects to historic properties located downstream within the breach inundation area. Identified NRHP-eligible resources may be subject to physical damage, erosion, or deposition (direct effects), as well as changes to setting, feeling, and association (indirect effects), consistent with the criteria of adverse effect defined in 36 CFR 800.5(a)(1).

Accordingly, the FWOP condition has the potential to result in adverse effects to historic properties.

Determination: No historic properties, as defined under 36 CFR 800.16(l), were identified within the PA-463 dam embankment or upstream flood pool due to prior disturbance associated with dam construction and ongoing inundation.

Under the No Action/Future Without Project (FWOP) condition, an eventual catastrophic dam failure has the potential to result in direct and indirect adverse effects to historic properties located downstream within the breach inundation area. These effects may include physical damage from floodwaters (direct effects) as well as alteration of setting, feeling, and association (indirect effects), consistent with the criteria of adverse effect defined in 36 CFR 800.5(a)(1).

NRCS made determinations of eligibility and findings of effect in consultation with the Pennsylvania State Historic Preservation Office (PA SHPO) and consulting Tribes in accordance with 36 CFR 800.4 and 36 CFR 800.5. Consulting Tribes—including the Absentee Shawnee Tribe

of Indians of Oklahoma, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Seneca-Cayuga Nation, Shawnee Tribe, Onondaga Nation, and the Stockbridge-Munsee Community, Band of Mohican Indians—were provided the opportunity to review and comment on identification efforts, eligibility determinations, and findings of effect.

Documentation of tribal consultation, including correspondence and responses, is included in Appendix A and has been prepared in accordance with 36 CFR 800.11. Where no response was received, NRCS followed the procedures outlined in 36 CFR 800.3(c)(4).

Structural Rehabilitation Alternative - Under the Structural Rehabilitation Alternative, project activities would be largely confined to previously disturbed areas associated with the existing dam and auxiliary spillway. No expansion of the Top of Dam (TOD) elevation or upstream flood pool is proposed, and no ground disturbance is anticipated in previously undisturbed areas identified as having archaeological sensitivity.

Because no historic properties were identified within the limits of disturbance, the undertaking would not directly affect any known historic properties. In addition, the rehabilitation activities would not alter the setting or visual characteristics of nearby historic properties in a manner that would diminish their integrity.

NRCS determined that the Structural Rehabilitation Alternative would result in No Effect to Historic Properties, consistent with 36 CFR 800.5(a)(1). This determination was made by NRCS in consultation with PA SHPO and consulting Tribes.

PA SHPO concurred with the NRCS determination in May 2025. Consulting Tribes, including the Absentee Shawnee Tribe of Indians of Oklahoma, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Seneca-Cayuga Nation, Shawnee Tribe, Onondaga Nation, and the Stockbridge-Munsee Community, Band of Mohican Indians, were engaged throughout the Section 106 process. Tribal consultation included review of identification efforts, eligibility determinations, and findings of effect in accordance with 36 CFR 800.2(c), 36 CFR 800.4, and 36 CFR 800.5.

Several Tribes provided responses concurring with the determination or indicating no objection to the project. In cases where no response was received, NRCS followed the procedures outlined in 36 CFR 800.3(c)(4). Documentation of all consultation efforts and responses is provided in Appendix A in accordance with 36 CFR 800.11.

Determination: No historic properties, as defined under 36 CFR 800.16(l), were identified within the PA-463 dam embankment or upstream flood pool due to prior disturbance associated with dam construction and ongoing inundation.

The Structural Rehabilitation Alternative would be confined to previously disturbed areas and would not involve ground disturbance in areas where historic properties have been identified or are likely to be present.

Accordingly, NRCS determined that the undertaking would result in No Effect to Historic Properties, consistent with 36 CFR 800.5(a)(1). This determination was made by NRCS in consultation with the Pennsylvania State Historic Preservation Office (PA SHPO) and consulting Tribes.

Documentation of this determination, including consultation correspondence and responses from PA SHPO and Tribal Historic Preservation Offices, is provided in Appendix A in accordance with 36 CFR 800.11.

Decommissioning with Nonstructural Alternative – Decommissioning of the dam would increase downstream floodplain extent and could require nonstructural measures, including floodproofing and potential property acquisitions for certain structures. If buyouts involve properties that are listed in or eligible for listing in the National Register of Historic Places, adverse effects to cultural resources could occur and would require further evaluation under Section 106.

Determination: The alternative may result in adverse effects to downstream cultural resources due to increased floodplain extent and potential property acquisitions involving historic properties.

5.3.4.2 *Local, Regional and National Economy (Regulating, Cultural, Supporting, and Provisioning Ecosystem Services)*

No Action/FWOP - Under the No Action or Future Without Project (FWOP) alternative, PA-463 would continue to degrade and ultimately breach during a major flood event. Breach modeling predicts inundation of 84 residential structures, 23 commercial buildings, 5 institutional facilities, and approximately 12.99 miles of public roads. This includes both local and state-owned corridors that serve daily transportation, emergency response, and tourism access throughout Monroe County. Damage to these assets would result in widespread disruption to businesses, government services, and community life.

The economic effects of a breach would be particularly severe in Barrett Township and the greater Pocono Mountain region, where the economy is closely tied to tourism, outdoor recreation, and small business enterprises. Dam failure could cut off access to popular destinations such as Skytop Lodge and nearby recreational areas, reduce visitor traffic, and result in job losses and long-term income reductions. Downstream communities would face recovery costs related to infrastructure repair, property loss, and business interruptions.

At the regional and national levels, a dam breach could trigger costly federal emergency response and recovery efforts, including road and bridge repairs, flood debris removal, and public assistance. These financial burdens would be borne not only by local agencies but also by state and federal programs. Additionally, the sudden loss of ecosystem functions such as sediment retention and regulated flow would lead to downstream water quality degradation, further impacting economic uses such as fishing, recreation, and downstream property values.

Determination: The No Action alternative would result in significant direct, adverse, and major short-term impacts on the local and regional economy. Long-term effects would also be adverse, including reduced economic activity, increased public expenditure, and long-term disruption to critical services and infrastructure. These consequences extend to national interests through elevated disaster response and recovery costs.

Structural Rehabilitation Alternative - The Preferred Alternative involves rehabilitating PA-463

to restore dam safety and performance consistent with current NRCS and Pennsylvania Department of Environmental Protection standards. Structural improvements include repairs of the principal spillway intake riser, modification of the auxiliary spillway, embankment reconstruction, and other measures to ensure the dam's long-term function as a floodwater retarding structure. These actions will protect 112 structures downstream—including homes, businesses, and public facilities—while safeguarding over 12 miles of essential transportation routes.

The total project cost is estimated at \$27.57 million, of which approximately \$18.96 million will be federally funded under PL 83-566. Although the formal benefit-cost ratio is 0.12, this figure does not capture the full range of economic value provided by flood risk reduction and preserved infrastructure function. Monetized annual benefits are estimated at \$100,205, primarily associated with avoided flood damage. However, unquantified benefits include the sustained operation of businesses, reduced recovery costs, maintained property values, and protection of the tourism economy. These benefits extend beyond local boundaries by reducing national disaster costs and reinforcing economic resilience in the Delaware River watershed.

The Preferred Alternative also preserves provisioning, supporting, and cultural ecosystem services essential to the regional economy, including recreational access, trout fisheries, wetland habitat, and community identity. These values are recognized under the Principles and Requirements for Federal Investments in Water Resources (PR&G), which support the advancement of watershed rehabilitation projects based on risk reduction, resilience, and sustainability even when conventional cost-effectiveness thresholds are not met.

Determination: The Preferred Alternative is expected to result in minor long-term beneficial effects on the local and regional economy. By preventing catastrophic infrastructure loss and economic disruption, the project supports continued community function and economic vitality. Though not cost-effective under strictly monetized criteria, the project is justified under PR&G and the NWPM as a necessary investment in economic resilience and public safety.

Decommissioning with Nonstructural Alternative – Decommissioning would eliminate the risk of catastrophic dam failure and could provide long-term ecological benefits associated with restoration of a free-flowing stream system. However, removal of the dam would increase downstream floodplain extent, alter water quality and sediment transport dynamics, and potentially discourage development within newly flood-prone areas. Nonstructural measures would reduce damages to eligible downstream structures but would not maintain the watershed-wide flood protection benefits currently provided by PA-463.

Determination – The alternative would result in adverse short-term economic effects associated with construction and changes to downstream conditions and could result in long-term adverse effects associated with expanded floodplain areas. Long-term beneficial effects would include elimination of catastrophic dam failure risk and restoration of riverine ecosystem functions.

5.3.4.3 *Public Health and Safety (Regulating, Cultural, Provisioning, and Social Ecosystem Services)*

No Action/FWOP - The updated dam breach analysis prepared for this Plan indicates that failure of PA-463 would result in inundation of 84 residential structures, 23 commercial buildings, 5 institutional facilities, and 12 bridges, along with approximately 12.99 miles of roadways (9.79 miles of state and 3.21 miles of local roads). Based on standard U.S. household occupancy rates, the PAR is estimated at approximately 411 individuals. These estimates are conservative and reflect permanent residents only; daytime populations within commercial and institutional structures could increase actual exposure. Affected infrastructure includes critical transportation corridors and public service buildings, which could significantly impede emergency response and recovery. Inundation mapping and structure-specific risk areas are included in Appendix C.

Key transportation routes in the study area include PA-447 (Creek Road), a state designated north to south highway that runs adjacent to Brodhead Creek and traverses the downstream inundation zone. Average daily traffic (ADT) data from PennDOT (2022) indicates that PA-390 north of Canadensis sees approximately 1,500 vehicles per day, while volumes increase to about 3,600 vehicles south of the village center. PA-463 is not directly connected to a major highway but is accessible via local roads from PA-390. Interruption or damage to these routes due to a dam failure would not only affect local access but also hamper emergency evacuation and service restoration during flood events.

Determination: In the event of a dam breach, there would be significant direct, adverse, major short-term impacts from this alternative on public health and safety. Long term impacts would be adverse and major.

Structural Rehabilitation Alternative –The Rehabilitation Alternative will address identified dam safety deficiencies and improve existing level of flood protection for the 50-year storm event provided by PA-463. Rehabilitation measures include modifications to the auxiliary spillway, which will be modified to safely convey the FBH and raised to contain the 50-year storm event. Although this does not elevate the dam to provide full protection against the 100-year storm event, the improvements will reduce the frequency of the auxiliary spillway activation and the likelihood of overtopping and structural failure during extreme storm events.

These changes result in a minor long-term positive effect on public safety by enhancing dam stability and reducing risk to downstream communities. However, some properties will remain within the 100-year floodplain. These residual flood risks are described in Section 3.2.5.5, and Appendix C contains a map identifying structures that remain within the 100-year floodplain under the Preferred Alternative.

Determination: The Preferred Alternative will have a minor long-term beneficial effect on public health and safety by reducing dam failure risk. Some flood risk remains, but the selected alternative substantially improves public safety relative to the No Action alternative.

Decommissioning with Nonstructural Alternative – Decommissioning the dam would eliminate the risk of catastrophic dam failure and would provide floodproofing or buyouts for eligible

downstream structures. However, nonstructural measures would not provide protection for land, roads, bridges, utilities, or other non-building infrastructure, and the downstream floodplain would increase.

Determination: The alternative would provide long-term beneficial effects by eliminating dam failure risk but would result in residual flood risks associated with expanded floodplain conditions and unprotected downstream infrastructure.

5.3.4.4 Land Use

No Action/FWOP - Under the No Action/ FWOP alternative, failure to rehabilitate PA-463 could ultimately lead to a dam breach. A breach scenario would expand the current 100-year floodplain from 849 acres to approximately 1,105 acres. This increase in inundation would elevate the downstream flood risk by more than 200%, potentially threatening existing infrastructure and altering land use patterns. Development within newly impacted areas would likely be constrained by Monroe County's Flood Hazard regulations and land use bylaws.

Over the long term, a breach would result in significant changes in land cover from urban, residential, and agricultural uses to more flood-prone and disturbed land types. These changes would also degrade habitat continuity, particularly along riparian corridors, and may lead to informal abandonment of properties due to recurring flood impacts.

Determination: In the event of a dam breach, there would be significant direct, adverse, and major impacts in the short term on land use integrity. Long-term effects on land use and land cover would also be major and adverse due to increased flooding, infrastructure damage, and potential shifts in local development priorities.

Structural Rehabilitation Alternative – The rehabilitation of PA-463 would preserve the dam's existing flood attenuation capacity, thereby maintaining the current configuration of the 100-year floodplain and avoiding conversion of upland areas into flood-affected zones. Construction activities would temporarily alter land cover at the dam site, with vegetation clearing, soil disturbance, and equipment staging areas introducing short-term impacts. Revegetation of disturbed areas would be completed post-construction using native species to promote ecosystem resilience and visual compatibility with surrounding land uses. The rehabilitation action supports the continued use of adjacent lands for agriculture, residential purposes, and ecological functions without expanding the footprint of developed or disturbed lands.

Determination: Effects on land use and land cover under this alternative would be minor, localized, and temporary, limited to the dam construction footprint. Long-term effects would be negligible and would preserve existing land uses and floodplain function.

Decommissioning with Nonstructural Alternative – Decommissioning would expand the downstream 100-year floodplain and increase development constraints in newly inundated areas. Dam removal would permanently alter land cover at the project site by converting the existing reservoir to a free-flowing stream and riparian corridor, resulting in the establishment of different vegetation communities over time.

Determination: The alternative would result in permanent changes to land use and land cover due to the expansion of the downstream floodplain and conversion of the reservoir to a riverine system.

5.3.5 Summary of Effects

This section evaluates the reasonably foreseeable environmental effects of the Proposed Action in combination with past, present, and reasonably foreseeable future actions within the watershed, consistent with the National Environmental Policy Act (NEPA), CEQ guidance, and NRCS National Bulletin 190-26-1.

Geographic Scope

The cumulative effects analysis considers the Brodhead Creek watershed downstream of PA-463 (Leavitt Branch Dam), including developed areas within Barrett Township and downstream communities influenced by changes in hydrology, floodplain extent, water quality, ecological connectivity, and local infrastructure.

Past and Present Actions

Past and present actions that influence current environmental conditions include construction of PA-463 and other flood control dams in the watershed, development of transportation infrastructure (state and local roads and bridges), residential and commercial development within the floodplain, forestry and land clearing activities, and ongoing operation and maintenance of the existing dam and roadway infrastructure. These actions have altered natural hydrology, reduced floodplain connectivity, modified sediment transport, and enabled development within areas that would otherwise be subject to more frequent flooding.

Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions within the watershed include continued operation and maintenance of existing transportation infrastructure, ongoing residential and commercial development consistent with municipal zoning, bridge and roadway repair projects, FEMA floodplain map updates, and continued tourism-related economic activity in the Skytop and Canadensis areas. In addition, climate projections indicate the potential for increased storm intensity and precipitation in the region, which may increase peak flows and flood risks over time regardless of the alternative selected.

Under the No Action/FWOP Alternative, the dam would continue to deteriorate, and there would remain a risk of dam failure during a large storm event. Over time, sediment accumulation, structural deterioration, and increased hydrologic loading from larger storm events could increase the likelihood of dam failure and downstream impacts. This represents a reasonably foreseeable future condition under the No Action scenario.

Under the Structural Rehabilitation Alternative, the dam would be repaired and upgraded to meet current dam safety and performance standards, allowing the structure to continue providing flood attenuation, sediment retention, and flow regulation. This would maintain current floodplain conditions and reduce the risk of catastrophic downstream flooding associated with dam failure.

Under the Decommissioning with Nonstructural Alternative, PA-463 would be removed, resulting in permanent changes to downstream hydrology, including increased floodplain extent, restored sediment transport, improved aquatic organism passage, and conversion of the impoundment area to a riverine and wetland system. This would result in long-term ecological benefits but would also increase flood risk to some downstream structures. As part of this alternative, nonstructural measures, including floodproofing or acquisition/buyouts of inundated structures, would be required to reduce flood damages.

Cumulative Effects by Resource

Floodplain and Hydrology:

Past development within the floodplain combined with continued development and potential increases in storm intensity would increase flood risk over time. The No Action Alternative would contribute to cumulative flood risk due to the potential for dam failure. The Decommissioning Alternative would increase long-term floodplain extent. The Rehabilitation Alternative would maintain existing floodplain conditions and reduce cumulative flood risk associated with dam failure.

Water Quality and Sediment:

Past land use and dam construction have altered sediment transport and water temperature. The No Action Alternative could result in a large sediment release in the event of dam failure. The Decommissioning Alternative would restore natural sediment transport over time. The Rehabilitation Alternative would continue sediment retention and flow regulation.

Aquatic and Terrestrial Ecosystems:

Past dam construction fragmented aquatic habitat and altered wetlands upstream. The Decommissioning Alternative would provide long-term cumulative benefits to aquatic connectivity and riverine habitat. The Rehabilitation Alternative would maintain existing impoundment and wetland habitat conditions.

Local and Regional Economy:

Past infrastructure development and tourism-based economic growth have increased reliance on transportation networks and flood protection provided by the dam. The No Action Alternative would contribute to cumulative economic risk due to the potential for dam failure. The Rehabilitation Alternative would maintain economic stability and reduce long-term cumulative risk. The Decommissioning Alternative would shift economic risk from catastrophic breach risk to increased floodplain exposure during storm events.

Cumulative Effects Determination

The cumulative effects of the Proposed Action (Structural Rehabilitation Alternative), when added to past, present, and reasonably foreseeable future actions, would result in long-term beneficial effects related to public safety, flood risk reduction, infrastructure protection, and economic stability, while maintaining existing floodplain and hydrologic conditions. Adverse cumulative effects would be limited primarily to short-term construction-related disturbances.

Overall, the Proposed Action would reduce cumulative risk to the human environment compared to the No Action Alternative. Accordingly, a summary of cumulative effects regarding the Proposed Action is illustrated in Table-5-3 below.

Table 5-3: Summary and Comparison of PA-463 Alternatives - Effects on Resource Concerns and Ecosystems Services

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
Soil-Related Concerns							
Soil Resources		X	X		Continued Operation: Negligible effects. Breach: Short-term adverse effects from erosion and sedimentation.	Construction-related soil disturbance would have minor, localized short-term impacts; long-term effects would be negligible and localized.	Construction-related soil disturbance would have minor, localized short-term impacts. Short-term adverse effects from erosion and sedimentation may occur due to dam removal, channel restoration, and downstream floodplain expansion.
Prime & Unique Farmland, and Farmland of Statewide or Local Importance	X				Continued Operation: Negligible effects. Breach: Short-term adverse effects to downstream farmland soils from erosion and flood deposition.	There would be no effect on farmland.	Short-term adverse effects to downstream farmland soils may occur from increased flooding, erosion, and sediment deposition within the expanded downstream floodplain.
Water-Related Concerns							
Water Quality		X			Continued Operation: Negligible long-term effects. Breach: Significant short-term increases in turbidity and TSS due to erosion and	Construction would cause minor, short-term water quality impacts from ground disturbance and in-stream work, with localized turbidity increases minimized by BMPs and streambank	Construction would cause minor, short-term impacts to water quality from ground disturbance and in-stream work, with localized turbidity increases minimized through

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
					sediment scour.	stabilization. Long-term effects would be negligible, as the dam functions as a dry detention structure with a low sediment trap rate (0.032 acre-feet/year), indicating minimal impact on downstream sediment and water quality.	BMPs. The dam removal may cause temporary impacts to groundwater-surface water interactions, and include long term changes in downstream sediment transport due to the loss of the reservoir's sediment-trapping function.
Floodplain Management		X			Continued Operation: Maintains existing floodplain extent and function under current conditions. Breach: Significant short-term direct and indirect adverse impacts; long-term adverse effects from expanded floodplain and increased flood risk.	Maintains current flood protection. No impact on floodplain extent or function.	The downstream floodplain would increase due to the loss of flood storage and attenuation provided by PA-463. Nonstructural measures would reduce flood damages to eligible structures within the expanded inundation area but would not prevent floodplain expansion.
Waters of the U.S., Wetlands, & Special Aquatic Sites	X	X	X	X	Continued operation: negligible effects. Breach: adverse short-term impacts to aquatic systems from erosion and sedimentation.	Construction: Minor short-term disturbance to 1,022 linear feet and 0.46 acres of jurisdictional streams and wetlands. Long-term: Permanent fill impacts include 970 linear feet of stream and 2.27 acres of	Short-term adverse impacts to aquatic systems would occur from erosion and sedimentation, turbidity, and channel adjustment during and following dam removal.

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
						wetlands, consisting of a mix of palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO) wetlands.	
Regional Water Resource Plans					Continued Operation: Does not address high hazard dam deficiencies and is inconsistent with regional hazard mitigation goals. Breach: Inconsistent with regional watershed and hazard mitigation plans due to increased flood risk and loss of flood attenuation function.	Advances goals of regional watershed and hazard mitigation plans by reducing flood risk, maintaining floodplain function, and addressing the dam's high hazard status.	This alternative would address the dam's high hazard status and eliminate catastrophic dam failure risk. However, it would only partially align with regional watershed and hazard mitigation goals because it would remove the dam's flood-retarding function and increase the downstream floodplain.
Plant and Animal Related Concerns							
Endangered & Threatened Species			X		Continued Operation: No effect. Breach: Could result in adverse impacts to bat habitat and downstream areas potentially suitable for northeastern bulrush.	The dam will remain in place and the proposed action does not alter downstream hydrology beyond existing conditions, no impacts to federally listed threatened or endangered species or their habitats are anticipated. Based on avoidance measures, field observations, and agency consultation "May affect, not likely	The alternative is not expected to adversely affect listed bat species if seasonal tree-clearing restrictions are implemented, but potential adverse effects could occur to northeastern bulrush habitat if suitable habitat is present within the expanded

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
						to adversely affect” (NLAA), the proposed action would result in no effect on listed species or their habitats at or downstream of the dam.	downstream floodplain.
Migratory Bird Treaty Act				X	Continued Operation: No effect. Breach: Potential impact to migratory bird habitat.	There would be minor short-term effects to migratory bird habitat.	Long-term effects would occur from the removal of reservoir habitat and conversion of the impoundment to a free-flowing stream and riparian/wetland system.
Bald and Golden Eagles				X	Continued Operation: No effect. Breach: No known nests would be affected, but inundation of downstream habitat could indirectly affect foraging or transient individuals.	No effect. Although bald eagles have been observed within 2 miles of the site, no nests or active use were identified during field review. The site does not provide core eagle habitat. USFWS will be consulted if eagle nests are discovered prior to or during construction.	Minor long-term adverse effects may occur due to the loss of potential bald eagle foraging habitat associated with the reservoir. Golden eagles are unlikely to be affected.
Invasive Species		X			Continued Operation: No effect. Breach: Minor long-term effects from the spread of invasive species.	No adverse long-term effect.	Potential long-term spread of invasive species may occur due to vegetation disturbance, sediment transport, and increased flooding within the expanded downstream floodplain.

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
Fish, Wildlife & Aquatic Resources	X			X	Continued Operation: Negligible effects. Breach: Short-term adverse effects from erosion, sedimentation, and turbidity. Long-term impacts to habitat are uncertain and would vary based on the extent of flooding and recovery.	Minor short-term effects from displacement during construction. Long-term effects are minimized with BMPs and replanting. Short-term disturbance to terrestrial and aquatic wildlife from construction noise, habitat modification, and displacement. Long-term effects include minor habitat conversion due to tree clearing, but impacts are minimized through BMPs, construction timing, and native vegetation replanting.	Minor short-term effects from displacement and construction noise and sedimentation would occur. Long-term impacts would include the removal of reservoir habitat and conversion to riverine and riparian habitats, with short-term downstream habitat disturbance due to increased erosion and sediment transport.
Riparian Areas		X			Continued Operation: Negligible effects. Breach: Short-term adverse impacts to riparian areas, including wetlands, streambanks, and floodplains, from erosion, sedimentation, and vegetation loss. Long-term effects are uncertain and would depend on the extent of downstream disturbance.	Short-term impacts to approximately 0.35 acres of riparian areas during construction, including disturbance to forested and wetland vegetation. Long-term impacts include permanent conversion of 0.30 acres of riparian vegetation to maintained grassy areas. BMPs and replanting will be implemented where practicable to reduce impacts outside the dam maintenance footprint.	Short-term impacts to downstream riparian areas may occur due to increased flooding, erosion, and sediment deposition. Riparian vegetation disturbed within the construction area would be restored or allowed to reestablish following construction.

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
Forest Resources	X	X	X	X	Continued Operation: No effect. Breach: Could result in adverse short-term and potentially long-term effects to downstream riparian and floodplain forest resources due to inundation, erosion, sedimentation, and debris flow. Impacts may include tree mortality and loss of forest structure.	Short-term impacts from clearing and construction would affect approximately 9.8 acres of forested land, with 3.76 acres allowed to regenerate outside of the dam maintenance zone. Long-term minor impacts would result from the permanent conversion of forested areas to maintained open space. Replanting and natural regrowth will be implemented where practicable.	Adverse short term and potentially long-term effects downstream floodplain forest resources may occur due to increased flooding, erosion, sediment deposition, and tree loss. Short-term construction-related impacts to forested areas would occur, but disturbed areas would be restored or allowed to naturally revegetate following construction.
Human Use-related Concerns							
Cultural Resources and Tribal Consultation				X	Continued Operation: No effect; previously disturbed areas at the dam site are not eligible for protection. Breach: Could result in significant short- and long-term adverse effects to 13 identified downstream National Register-eligible (NRE) resources due to flood damage and	NRCS provided all consulting Tribal Nations with the opportunity to review and comment on the identification of historic properties and the determination of effect in accordance with 36 CFR 800.4 and 800.5. Consultation was conducted with the Absentee Shawnee Tribe of Indians of Oklahoma; Delaware Nation; Delaware Tribe of Indians; Eastern Shawnee Tribe of Oklahoma; Seneca-	Potential adverse effects may occur to National Register-listed or eligible downstream resources if property acquisitions or buyouts involve historic properties.

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
					alteration of setting and context.	Cayuga Nation; Shawnee Tribe; Onondaga Nation; and the Stockbridge-Munsee Community, Band of Mohican Indians. Responses were received from several Tribal Nations, and no objections to the determination were identified. No cultural or tribal resources are present at the dam site or flood pool, and construction is confined to previously disturbed areas. Additionally, the determination made by NRCS was in consultation with PA SHPO. Accordingly, all concurrence and consultation for the proposed action received and submitted in contained in Appendix A.	
Local, Regional & National Economy					Continued Operation: No change to existing economic conditions; however, economic risk persists due to unresolved dam safety deficiencies. Breach: Major adverse economic	Long-term economic benefits from flood protection and stability. Annual flood protection benefits avoid flood damage equal to \$578,229.	Short-term adverse economic effects may occur due to construction, increased erosion and sediment transport, and changes to downstream water quality. Long-term benefits would result from eliminating catastrophic dam failure risk, although long-term adverse

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
					impacts would occur due to damage to residential, commercial, and institutional properties, disruption of local and regional economic activity, and costs associated with recovery and infrastructure repair.		effects may occur in newly flood-prone areas.
Public Health & Safety		X		X	Continued Operation: Risk to public health and safety remains due to existing dam deficiencies and the potential for failure. Breach: Significant direct, adverse, short-term impacts to public health and safety would occur, including risk to human life and emergency response disruption. Long-term impacts would remain adverse due to increased flood risk and potential displacement.	The Rehabilitation alternative maintains existing flood protections. There are no new effects on public safety under this alternative.	Long-term beneficial effects would result from eliminating catastrophic dam failure risk. However, residual risks would remain because the downstream floodplain would increase and nonstructural measures would not protect land, utilities, or other non-building infrastructure.
Land Use & Land Cover					Continued Operation: No effect.	Construction would cause temporary, localized land cover	Permanent impacts to land use and land cover would occur due to

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
					Breach: Would expand the 100-year floodplain from 849 to 1,105 acres, increasing downstream flood risk by over 200%. Short-term impacts would be major and adverse, including infrastructure damage and land use disruption. Long-term effects would include conversion of residential, agricultural, and urban land to flood-prone areas, degradation of habitat corridors, and potential abandonment of vulnerable properties.	disturbance at the dam site from vegetation clearing and equipment staging. Post-construction revegetation with native species would restore visual and ecological continuity. Long-term, the alternative would preserve existing land uses and prevent expansion of the floodplain, supporting continued residential, agricultural, and ecological functions.	expansion of the downstream floodplain and conversion of the existing reservoir to a free-flowing stream and riparian/wetland system.
Transportation	X				Continued Operation: No effect on transportation infrastructure under normal operating conditions; however, risk of disruption persists due to potential dam failure. Breach: Approximately 9.67 miles of roadway, including 7.58	The Structural Rehabilitation Alternative would preserve access to existing transportation corridors and reduce the risk of road and bridge damage from flooding. No long-term adverse transportation impacts are anticipated.	This alternative would reduce the risk of roadway and bridge damage by installing nonstructural measures to protect the infrastructure.

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation Alternative	Decommissioning with Nonstructural
					miles of state roads and 2.09 miles of local roads, would be inundated, resulting in major disruption to local and regional travel. Key corridors such as PA-447 (Creek Road) and PA-390 would be directly affected. Bridge damage and roadway closures would significantly impair emergency response, evacuation, and recovery operations.		

6. Preferred Alternative

6.1 Rationale for the Preferred Alternative

The preferred alternative for the PA-463 Leavitt Branch Dam is the structural rehabilitation option, as it best meets the project's purpose and need while achieving key planning objectives. When compared to the No Action alternative, the structural rehabilitation option offers the greatest net public benefit relative to cost.

This alternative enhances downstream flood protection beyond what the existing dam provides, improves dam safety, reduces the risk of breach, and limits negative impacts on both human and natural resources. Overall, it significantly reduces threats to public health and safety.

The structural rehabilitation alternative was identified as the preferred alternative based on its ability to meet the project's purpose and need and achieve the planning objectives. This alternative reduces risk to life and property, maintains existing flood damage reduction benefits, and provides the greatest overall net public benefits when compared to other action alternatives evaluated in this Plan.

6.2 Measures to be Installed

The following measures are to be installed at Leavitt Branch Dam site to rehabilitate the dam to achieve dam safety standards:

- Fill in low points and level the top of the dam crest to the original top of dam elevation and

reduce the potential for a dam overtopping event.

- Relocate the auxiliary spillway control section approximately 100–150 feet downstream in the existing channel and install a labyrinth weir with a crest elevation of 1218.3 feet and a total weir length of 101.82 feet. Extend the dam embankment along the relocated spillway channel to tie into the new control section and extend the internal drainage system through the newly placed embankment to maintain filter continuity and drainage performance.
- Raise the auxiliary spillway channel crest elevation to El. 1218.3 to contain the 50-year storm.
- Deepen and narrow the auxiliary spillway approach channel: The channel bottom elevation will be lowered to 1198 feet (approach channel elevation), and the cross-sectional width will be reduced as needed to direct flow efficiently into the labyrinth weir. This modification ensures adequate conveyance of the Freeboard Hydrograph (~25,271 cfs) under post-rehabilitation conditions.
- Regrade the auxiliary spillway channel and provide reinforced channel lining to address spillway integrity concerns and reduce the potential for erosion and dam failure during storm events.
- Construct stilling basin at terminus of the auxiliary spillway downstream channel for energy dissipation.

6.3 Irreversible or Irretrievable Commitment of Resources

Implementation of the preferred alternative—structural rehabilitation of Leavitt Branch Dam—would result in the irreversible and irretrievable commitment of certain natural and financial resources.

Irreversible commitments include the permanent removal of trees and associated vegetation in the auxiliary spillway area downstream of the proposed labyrinth weir. These trees and habitat features cannot be restored to their original state in the short term, and the loss represents a permanent change to the ecological character of that area.

Irretrievable commitments primarily involve the use of construction materials, labor, and financial resources. Although these inputs cannot be recovered once used, they are necessary to reduce long-term risk, improve public safety, and meet dam safety standards. The short-term use of these resources is offset by long-term benefits, including reduced potential for dam failure and associated economic losses (NWPM § 501.43; NECH § 610-A.5; 7 CFR § 650.8(e)).

In accordance with NRCS planning policy and NEPA requirements, these commitments have been evaluated as part of the overall assessment of environmental consequences. Their inclusion supports a reasoned choice among alternatives and reflects full disclosure of long-term environmental and economic tradeoffs (NECH § 610.10(A)(3); NWPM § 501.0(D)).

6.4 Areas of Controversy

To date, no areas of controversy have been identified regarding the proposed rehabilitation of Leavitt Branch Dam (PA-463). The NRCS has conducted extensive agency coordination, public involvement, and tribal consultation in accordance with NEPA, the Watershed Rehabilitation Program, and Section 106 of the National Historic Preservation Act.

Three public meetings were held between 2022 and 2024 to present project information, alternatives, and the preferred alternative to the public, regulatory agencies, and Tribal governments. All public and agency comments received to date have expressed support or no opposition to the project. Formal “No Effect” determinations were issued by the Eastern Shawnee Tribe and the Shawnee Nation, and consultation letters were sent to additional Tribal governments.

No substantive opposition has been received from the public or consulted agencies, and no environmental or cultural concerns have been raised that would suggest controversy requiring resolution under NEPA. NRCS will continue to coordinate with stakeholders through the finalization and implementation of the project.

6.5 Permits and Compliance

Prior to construction, the Sponsors would be responsible for obtaining and complying with permits required by Federal, State, and/or local regulatory agencies as follows:

- PADEP Chapter 105 – Dam Safety and Waterway Management
- PADEP Chapter 102 - Erosion and Sedimentation Control Plan from Monroe County Conservation District
- PADEP and USACE Joint Permit for Section 404 of the CWA and Section 10 RHA
- PADEP 401 Water Quality Certification
- Barrett Township, PA Floodplain Management

The cost of the permits is estimated to be approximately \$162,500, which includes application fees and labor fee to generate the applications and an allowance of \$100,000 to purchase mitigation credits for wetland impacts. Application fees from PADEP Chapter 105 are waived for this project. Application and review fees for the Chapter 102 Erosion and Sedimentation control plan will be approximately \$12,500 and are included in the \$162,500.

PA-463 Leavitt Branch Dam resides within an existing Sponsor held property for the purpose of operating and maintaining the footprint of the dam. Easements to be obtained include additional temporary construction easements to perform rehabilitation construction, permanent additional easements for operation and maintenance, and permanent flowage easements associated with reservoir pool at the top of dam (TOD). Obtaining the following easements is estimated to be approximately \$39,100.

- Temporary Construction Easements - Needed for constructing the auxiliary spillway downstream channel.
- Permanent Flowage Easements - While required at the time of original construction, there is no record of flow easements for PA-463. Most of the property where the reservoir level at the top of dam (TOD) is owned by the sponsor, but some areas within the reservoir and below the TOD elevation are not on the Sponsor’s property. The permanent flowage easement for the top of dam is required to prevent construction activities within the flood pool.
- Permanent Operation & Maintenance Easement - Currently, the downstream channel of the auxiliary spillway is situated on property not owned by the Sponsor and is not within the current operation and maintenance easement. The easement is to allow the Sponsor to

maintain this area after construction.

Refer to appendix C for the required easement map.

6.6 Mitigation of Potential Effects

Consultation with the USACE indicates that mitigation requirements for wetlands will be determined based on the extent of permanent wetland impacts resulting from construction activities.

Based on cultural resource investigations and Section 106 consultation, no mitigation for historic properties is anticipated. NRCS made a determination of No Effect to Historic Properties, and the Pennsylvania State Historic Preservation Office (PA SHPO) concurred with this determination.

NRCS conducted government-to-government consultation with federally recognized Tribal Nations, including the Absentee Shawnee Tribe of Indians of Oklahoma; Delaware Nation; Delaware Tribe of Indians; Eastern Shawnee Tribe of Oklahoma; Seneca-Cayuga Nation; Shawnee Tribe; Onondaga Nation; and the Stockbridge-Munsee Community, Band of Mohican Indians, in accordance with 36 CFR 800.4 through 800.5. All consulting Tribal Nations were provided the opportunity to review and comment on the identification of historic properties and NRCS' determination of effect. Responses were received from several Tribal Nations indicating no concerns with the undertaking and requesting notification in the event of inadvertent discoveries.

In addition, Tribal Historic Preservation Officers (THPOs) representing the Eastern Shawnee Tribe, the Stockbridge-Munsee Community, and the Shawnee Nation provided written responses confirming that the project would have no adverse effect on sites. These Governments requested standard inadvertent discovery protocols, which will be followed during construction.

To avoid potential impacts to federally protected bat species, tree clearing will occur only during the bats' inactive season (November 1 to March 31). The U.S. Fish and Wildlife Service (USFWS) issued a "may affect, not likely to adversely affect (NLAA)" determination for the northern long-eared bat, and no effect determination for the northeastern bulrush. The USFWS Information for Planning and Consultation (IPaC) tool will be revisited during final design and permitting to identify any new species listings or updates, such as the potential listing of the tricolored bat.

Prior to the commencement of federally funded construction, the Sponsor will be responsible for securing and complying with all applicable federal, state, and local permits. Due to the relatively minor environmental impacts associated with the Preferred Alternative, wetland mitigation is expected to be limited. The conceptual mitigation approach includes on-site wetland enhancement or creation, or a financial contribution to an approved Pennsylvania Department of Environmental Protection (PADEP) Compensatory Mitigation Bank, consistent with regulatory requirements and permit conditions.

6.7 Costs and Cost-Sharing

Costs are shown in Section 6.12 Economics Table 1; Economics Table 2 shows the costs by category. Total annual costs are shown in Economics Table 4 along with the estimated costs for operation and maintenance. Economics Table 5 displays the average annual flood damage

reduction benefits by flood damage categories, and Economics Table 6 displays a comparison of annual costs and benefits. A 2025 price base was used and amortized at 3 percent for the 100-year period of analysis. NRCS pays 65% of construction costs, the local sponsoring agency pays the remaining 35%. NRCS pays 100% of the design, not including permitting fees. The local sponsoring organization is responsible for land rights.

6.8 Ecosystem Services Benefits

The Preferred Alternative involves the structural rehabilitation of PA-463. This alternative provides long-term benefits consistent with the NRCS's application of the PR&G planning framework and National Watershed Program Manual guidance. A Level II Ecosystem Services Analysis was conducted, as required for Federal investments exceeding \$10 million. The analysis considered both monetized and non-monetized environmental, economic, and social effects and identified several key ecosystem service benefits that would be preserved or enhanced under the Preferred Alternative.

Regulating Services

The most significant regulating service benefit provided by PA-463 is flood damage reduction. Rehabilitation will maintain the dam's capacity to safely store and manage stormwater flows, thereby:

- Reducing the risk of catastrophic dam failure;
- Protecting 84 residential properties, PAR 441 individuals, 23 commercial buildings, 5 institutional buildings, and 12 bridges;
- Maintaining the function of High Quality Cold Water Fisheries (HQ-CWF) downstream of the dam;
- Reducing potential public health risks related to post-flood contamination and mold exposure, particularly in vulnerable populations;
- Indirectly supports community mental and physical health by limiting flood exposure.

In addition, intact stream systems within the project area, including wetlands and riparian buffers would continue to provide natural water filtration, erosion control, and flood attenuation. The project's design avoids or minimizes disturbance to these areas where possible and incorporates best management practices to restore affected riparian zones.

Provisioning Services

PA-463 is a dry dam and does not maintain a permanent pool or provide direct water supply services. Its primary function is to temporarily store stormwater during high-flow events, reducing downstream flood peaks and protecting infrastructure. While it does not regulate baseflows or sustain aquatic habitat during dry periods, its flood attenuation function indirectly supports the long-term stability of streambanks and aquatic ecosystems by reducing the frequency and intensity of destructive high-flow events.

Supporting Services

The surrounding forest and wetland habitats support natural vitality by providing travel corridors for wildlife, nesting areas for migratory birds, and habitat for cold-water fish species such as brook trout. Although approximately 9.8 acres of tree removal will occur at PA-463, 3.76

acres are expected to naturally regenerate. Disturbed areas will be stabilized, and invasive species will be managed to minimize ecological disruption.

Riparian areas and natural stream systems within the project area continue to support nutrient cycling, groundwater recharge, and sediment stabilization, especially when protected during construction. These supporting services are essential to long-term watershed health.

Cultural and Social Services

The site provides passive recreation, the protection of homes, infrastructure, and scenic rural character. This contributes to social stability and visual landscape quality. Maintaining dam functionality also reduces downstream liability and property value risk. Studies show that proximity to a flood zone can reduce home values by 3.5–12.2% (Zhang & Leonard, 2019). The Preferred Alternative mitigates this economic risk by preserving flood control services.

This alternative was identified as the Locally Preferred, Environmentally Preferred, and Socially Preferred Option in the EA's trade-off analysis (Table 5-2). It aligns with PR&G goals to avoid floodplain degradation, reduce public safety risk, and preserve watershed-scale functions.

6.9 Installation & Financing

6.9.1 Installation

The dam rehabilitation is anticipated to occur over two (2) construction seasons. The overall project implementation period, including final design, permitting, and construction, is expected to occur over approximately five (5) years. Project costs are expected to be expended primarily during the construction phase.

During construction, equipment will not be allowed to operate when conditions are such that soil erosion and water, air, and noise pollution cannot be satisfactorily controlled. If previously unidentified cultural resources are discovered during construction, all work in the immediate area will cease and NRCS will implement procedures consistent with the National Cultural Resources Procedures Handbook (GM 190-601.29).

In addition, in accordance with Section 106 consultation commitments and requests from consulting Tribes, NRCS and the Sponsor will implement Tribal Inadvertent Discovery Procedures. These procedures include immediate cessation of work in the vicinity of the discovery, protection of the find, and prompt notification of the Pennsylvania State Historic Preservation Office (PA SHPO) and all consulting Tribal Nations. No further ground-disturbing activities will occur in the discovery area until consultation has been completed and appropriate treatment measures have been developed in coordination with SHPO and Tribal representatives. These procedures are consistent with commitments documented in Section 5.3.4.1, Section 6.6, and Appendix A.

6.9.2 Responsibilities

The NRCS would provide technical and financial assistance to the Sponsors with the design and implementation of the dam rehabilitation project. NRCS would be responsible for the following:

1. Execute a project agreement with the Sponsors before either party initiates work

involving funds of the other party. Such agreements would set forth, in detail, the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

2. Execute a Memorandum of Understanding with the Sponsors to provide a framework for which cost-share funds are accredited.
3. Execute a new Operation and Maintenance (O&M) Agreement with the Sponsors for the dam.
4. Provide financial assistance equal to 65% of total eligible project costs, not to exceed 100% of actual construction costs.
5. Provide engineering support and technical assistance during the design and construction of the project.
6. Certify completion of all installed measures.

The Sponsors would be responsible for the following:

1. Secure all needed environmental permits and land rights for installation of the rehabilitation measures.
2. Prepare an updated Emergency Action Plan (EAP) for each dam prior to the initiation of construction.
3. Execute a new Operation and Maintenance Agreement with NRCS for each dam.
4. Execute a Memorandum of Understanding with NRCS to provide a framework within which cost-share funds are accredited.
5. Execute a project agreement with NRCS before either party initiates work involving funds of the other party. Such agreements would set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.
6. Provide nonfederal funds for cost-sharing of the project at a rate equal to, or greater than, 35% of the total eligible project costs.
7. Participate in and comply with applicable Federal floodplain management and flood insurance programs.
8. Enforce all associated project easements and right-of-ways.
9. The Sponsor currently holds some ownership for lands at the originally designed top-of-dam elevation for operation and maintenance purposes. However, the Sponsor acknowledges that some easement documentation may be incomplete or outdated. As part of project implementation, the Sponsor will review and confirm existing land rights

and, if needed, will obtain any additional easements or land rights required for construction and long-term maintenance—particularly where modifications (e.g., auxiliary spillway configuration) extend beyond the original design footprint.

6.9.3 Contracting

The project will be constructed by NRCS using federal contracting procedures.

6.9.4 Real Property Rights

The sponsor is responsible for acquiring the required real property rights and easements necessary to install and maintain the preferred alternative.

6.10 Operation, Maintenance & Replacement

Measures installed as part of this plan, along with any previously installed measures, will be operated and maintained by the Project Sponsor. Technical assistance may be provided by federal, state, or local agencies, as appropriate and consistent with their delegated responsibilities and statutory authority.

A new Operation and Maintenance (O&M) agreement will be developed for each dam site using guidance from the NRCS National Operation and Maintenance Manual. These agreements will be executed prior to the project agreement for construction and will remain in effect for the 100-year design life of the rehabilitation project.

The O&M agreement will outline the Sponsor's responsibilities and include provisions for the retention, use, and disposal of property improved or acquired with PL-106-472 cost-share funding. The agreement will also guarantee free access to the dam sites for NRCS, State, and local officials to inspect structural components and appurtenances at any time.

The estimated annual cost of operations and maintenance for the dam site is \$4,500. This cost includes routine inspections, vegetation control, minor repairs, and long-term maintenance planning.

Unauthorized all-terrain vehicle (ATV) use has been observed at the PA-463 dam and has resulted in localized erosion and degradation of embankment and spillway areas. The project sponsor will be responsible for implementing operation and maintenance measures to discourage unauthorized vehicle access, which may include installation of gates, barriers, signage, or coordination with local law enforcement. Continued inspection and maintenance activities will be conducted in accordance with the dam Operation and Maintenance Plan to ensure the integrity of the rehabilitated structure.

6.11 Emergency Action Plan

The existing emergency action plan will be updated and approved upon completion of the detailed design phase. The plan will outline procedures to minimize risks to downstream life and property when the integrity of the dam is in jeopardy.

6.12 Economic Tables and Structural Tables

Table 6-1: (Economics Table 1) Estimated Installation Cost Structure PA-463, Brodhead Creek Watershed, PA, Dollars^{1/}

Works of Improvement	Unit	Number (Non-Federal Land)	Estimated Cost ^{2/}		
			Public Law 83-566 Funds	Other Funds	Total
Dam Rehabilitation	PA-463	1	\$18,959,400	\$8,606,000	\$27,565,400
Total Project			\$18,959,400	\$8,606,000	\$27,565,400
1/ Price base: 2025.					
2/ Federal Funds include NRCS Engineering Services and Project Administration (\$3,000,000 of \$18,959,400 Public Law Funds), which are not included when calculating eligible federal cost-share. Permit and land rights acquisition costs (\$51,600 of the \$8,606,000 Other Funds) are also not included. Therefore, federal cost share is based on Total Installation Cost of \$24,565,400.					
Prepared: July 2025.					

Table 6-2: (Economics Table 2) Estimated Cost Distribution- Water Resource Project Measure, Structure PA-463 Brodhead Creek Watershed, PA, Dollars^{1/}

Works of Improvement	Installation Cost -----Federal Funds ^{2/} -----				Installation Costs -----Other Funds-----						Total Installation cost
	Construction ^{3/}	Engineering Services [/]	Project Admin.	Total Public Law 566	Construction	Engineering Services	Real Property Rights	Required Permits	Project Admin.	Total Other Funds	
Rehabilitation of PA-463	\$15,959,400	\$2,750,000	\$250,000	\$18,959,400	\$8,544,400	\$5,000	\$39,100	\$12,500	\$5,000	\$8,606,000	\$27,565,400
Total	\$15,959,400	\$2,750,000	\$250,000	\$18,959,400	\$8,544,400	\$5,000	\$39,100	\$12,500	\$5,000	\$8,606,000	\$27,565,400
^{1/} Price Base: 2025.											
^{2/} Federal cost share for total eligible dam rehabilitation costs is 65%. Federal engineering services and project administration costs, as well as permit and land rights acquisition costs, are not included when calculating eligible federal cost share. Therefore, the federal cost share for construction is based on total eligible project cost of \$24,552,900.											
^{3/} Total construction cost of \$25,503,800 includes environmental mitigation costs of \$100,000.											
Prepared: July 2025.											

Table 6-3: (Table 3) Structural Data – Dams with Planned Storage Capacity, Structure PA-463 Brodhead Creek Watershed, PA

Item	Unit	Rehabilitated PA-463
Class of Structure		High Hazard
Peak Ground Acceleration	g (10,000 year)	0.26
Uncontrolled Drainage Area	mi ²	0.77
Controlled Drainage Area	mi ²	5.74
Total Drainage Area	mi ²	6.51
Runoff Curve No, (1-day) (AMCII)		78.5
Time of Concentration (Tc)	hours	0.39
Elevation top of Dam	ft	1225.9
Elevation Crest High Stage Inlet	ft	1158.35
Elevation Crest Low Stage Inlet	ft	N/A
Auxiliary Spillway Type		Concrete Labyrinth Wier
Auxiliary Spillway Bottom Width	ft	101.82
Auxiliary Spillway Exit Slope	Percent	35
Maximum Height of Dam	ft	96
Volume of Fill	yd ³	115,016 (additional Fill for Rehab)
Total Capacity	acre-ft	1508.8
Sediment Submerged	acre-ft	3.68
Sediment Aerated	acre-ft	1.16
Beneficial Use (Identify Use)	acre-ft	N/A
Floodwater Retarding	acre-ft	1492.7
Between High and Low Stage	acre-ft	19.5
Surface Area		
Sediment Pool	acres	3.0 (PS High Stage Crest Elevation)
Beneficial Use Pool (identify Use)	acres	N/A (Low Stage Drain Open)
Floodwater Retarding	acres	45.1
Principal Spillway Design		
Rainfall volume (1-day)	in	7.55
Rainfall volume (10-day)	in	11.8
Runoff volume (10-day)	in	7.9
Capacity of low stage (maximum)	cfs	N/A
Capacity of high stage (maximum)	cfs	147.42
Dimensions of Conduit	in	30 (PS) / 18 (Res. Drain)
Type of Conduit		RCP
Frequency operation-auxiliary spillway	Percent change	2
Auxiliary spillway hydrograph		
Rainfall volume	in	9.47
Runoff Volume	in	6.88
Storm duration	hours	6
Velocity of Flow (V _e)	Ft/s	17.6
Max. reservoir water surface elevation	ft	1223.27

Freeboard Hydrograph		
Rainfall Volume	in	22.77
Runoff Volume	in	19.78
Storm Duration	hours	6
Max. Reservoir Water Surface Elevation	ft	1225.77
Capacity Equivalents		
Sediment Volume	in	0.01
Floodwater retarding Volume	in	4.30
Beneficial Volume (identify use)	in	N/A
Prepared: September 2025, Datum NAVD88		

Table 6-4: (Economics Table 4) Estimated Average Preferred Alternative Annual Costs, Structure PA-463, Brodhead Creek Watershed, PA, Dollars¹

Works of Improvement	Amortization of Installation Cost	Operation, Maintenance and Replacement Cost	Total
Rehabilitation of Structure PA-463	\$898,524	\$4,500	\$903,024
TOTAL	\$898,524	\$4,500	\$903,024
^{1/} Price Base: 2025, amortized for 100 years at 3 percent discount rate.			
Prepared: July 2025.			

Table 6-5: (Economics Table 5) - Estimated Average Annual Flood Damage Reduction Benefits, Structure PA-463 Brodhead Creek Watershed, PA, Dollars^{1/}

Item	Estimated average annual damage		Damage Reduction Benefit ^{2/}
	Without Project (Agriculture Related) ^{2/}	With Project (Agriculture Related)	
Floodwater			
Structural Damage	\$121,289	\$51,210	\$70,079
Infrastructure	\$591,446	\$527,019	\$64,427
Insurance Administration Costs	\$0	\$0	\$0
TOTAL	\$712,735	\$578,229	\$134,506
^{1/} Price Base: 2025.			
^{2/} Agriculture-related damage includes damage to rural communities			
Prepared: July 2025.			

Table 6-6: (Economic Table 6) Comparison of Preferred Alternative Benefits and Costs, Structure PA-463 Brodhead Creek Watershed, PA, Dollars^{1/}

Works of Improvement	Total Average Annual Equivalent Agricultural Related Benefits	Average Annual Equivalent Costs ^{2/}	Benefit-Cost Ratio
Rehabilitation of Structure PA-463	\$134,506	\$898,524	0.15
TOTAL	\$134,506	\$898,524	0.15
^{1/} Price Base: 2025.			
^{2/} Includes amortized installation cost from Economics Table 4. Incremental O&M cost equals 0			
Prepared: July 2025.			

* While the quantified economic benefits do not exceed costs, the plan provides substantial non-monetized benefits, particularly in terms of reduced exposure to flood risk for population in the study area. The emphasis on PAR reduction supports the plan's justification by highlighting its contribution to public safety and risk reduction

7. Consultation, Coordination & Public Participation

7.1 Consultation

7.1.1 Standard Requirements

Endangered Species Act consultation was completed with U.S. Fish and Wildlife Service. Early in the process, both the USFWS IPaC and the Pennsylvania National Diversity Inventory were consulted to identify potential threatened and endangered species which may be located within the Affected Environment. Once the preferred alternative was identified, NRCS entered into formal consultation with USFWS. The USFWS concurred that the minimal tree removal associated with the project is not likely to adversely affect the listed species.

NRCS also consulted with USFWS regarding Section 12 of Pub. L. 83-566. USFWS chose to not complete any additional surveys, investigations, or make any recommendations as to the project beyond site/project specific consultation according to Section 7 of the ESA.

The NRCS initiated consultation with the PASHPO and tribal governments based on all alternatives initially considered. The NRCS provided supplemental consultation information, including a Phase 1 Cultural Resources Report, once the alternatives carried forward for full evaluation were determined. The SHPO concurred that the preferred alternative would have no effect on historic properties. The No effect determination included agreeance that the Leavitt Branch Dam itself is not a NRHP

On multiple occasions, NRCS requested consultation with the following Sovereign Tribal Governments regarding ancestral lands, concerns during the scoping process, alternatives meeting, the preferred alternative, and determination of effect: Absentee Shawnee, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe, Onondaga Nation, Seneca-Cayuga Nation, Shawnee Nation, Stockbridge Munsee Community. A courtesy copy was sent to germane THPO. The only Tribes to respond to the invitations for consultation included the Eastern Shawnee Tribe, the Stockbridge Munsee Community, and the Shawnee Nation. None of the other Tribal Governments responded to the consultation requests.

The Eastern Shawnee Tribe stated in a November 1, 2024 letter that, "...the project proposes NO Adverse Effect or endangerment to known sites of interest to the Eastern Shawnee Tribe. Please continue project as planned". The Eastern Shawnee government requested that they be informed of any inadvertent discovery or an archaeological site or object(s) within 24 hours.

The Shawnee Tribe responded on November 30, 2024, via email, "confirming there is no known historic properties that will be negatively impacted by the project. If discoveries are made from now until the dams begin/complete rehabilitation construction activities, we will be sure to resume consultation immediately and pause any onsite activities."

On April 29, 2025, the Stockbridge-Munsee THPO concurred with the determination of “No Effect to Historic Properties” for the PA-463 project and indicated no objection to the project moving forward. As part of their concurrence, the THPO requested adherence to several standard stipulations to ensure protection of cultural resources. Specifically, if any previously undocumented archaeological resources are encountered during project activities, the project team is to promptly contact the THPO and follow the Stockbridge-Munsee Community’s Inadvertent Discovery Policy. The THPO also emphasized the importance of monitoring incidental or routine movement of heavy machinery, both within and outside of the defined Area of Potential Effects (APE), to avoid inadvertent impacts on cultural resources. Finally, the THPO requested notification if the proposed work is altered in a manner that expands beyond the current project scope or APE.

Additionally, in accordance with 36 CFR 800.2(d) and 36 CFR 800.3(e), NRCS coordinated public involvement in the Section 106 process through integration with the NEPA public participation process. Public involvement opportunities included scoping meetings, public meetings, and availability of the Plan for public review and comment. These activities provided the public with the opportunity to identify concerns regarding historic properties and to comment on NRCS’ findings and determinations. No substantive comments related to historic properties were received during the public involvement process. Documentation of public involvement activities is included in Appendix A and Section 7.2.

Correspondence documenting Section 106 consultation, including outreach to all consulting Tribal Nations, responses received, and NRCS’ determinations and findings, is summarized in Table 7-1 and provided in Appendix A. Appendix A includes representative correspondence sufficient to demonstrate compliance with 36 CFR 800.11.

Table 7-1: Consultations, Coordination, and Public Participation – PA-463

Date	Type	Purpose	Participants
March 14, 2022	Public Scoping	Invitation for participation	Absentee Shawnee, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe, Onondaga Nation, PASHPO, Seneca-Cayuga Nation, Shawnee Nation, Stockbridge Munsee Community. Courtesy copy sent to germane THPO.
December 22, 2023	Alternatives meeting	Request for participation and comment	Absentee Shawnee, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe, Onondaga Nation, PASHPO, Seneca-Cayuga

Date	Type	Purpose	Participants
			Nation, Shawnee Nation, Stockbridge Munsee Community. Courtesy copy sent to germane THPO.
August 26, 2024	Selected alternatives letter	Invite Sovereign Tribes, outside agencies for review and comment on selected alternatives	Absentee Shawnee, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe, Onondaga Nation, Seneca-Cayuga Nation, Shawnee Nation, Stockbridge Munsee Community. Courtesy copy sent to germane THPO. PASHPO was inadvertently omitted but has stated via a phone conversation that as we were not requesting a formal review and the Phase 1 was not yet complete, they were not concerned.
November 1, 2024	Response to Scoping Letter	No Effect determination	Eastern Shawnee Tribe
October 31, 2024	Response to Scoping Letter	No Effect determination	Shawnee Nation
April 10, 2025	Consultation on determination of effect. Included CR Report, design, as built, maps and descriptions.	Request for concurrence of determination of effect and SHPO determination of Eligibility for dam structure	Absentee Shawnee, Delaware Nation, Delaware Tribe of Indians, Onondaga Nation, PASHPO, Seneca-Cayuga Nation, Stockbridge Munsee Community.
April 17, 2025	PASHPO response.	Request for clarification on specific issues.	PASHPO
April 17, 2025	Response to PASHPO request	Deliver requested clarification(s).	PASHPO
April 18, 2025	Delivery receipt	Verification of consultation attempt	Absentee Shawnee

Date	Type	Purpose	Participants
April 18, 2025	Delivery Receipt	Verification of consultation attempt	Onondaga Nation
April 21, 2025	Delivery receipt	Verification of consultation attempt	Delaware Nation
April 21, 2025	Delivery receipt	Verification of consultation attempt	Delaware Tribe of Indians
April 21, 2025	Delivery receipt	Verification of consultation attempt	Seneca-Cayuga Nation
April 22, 2025	Delivery receipt	Verification of consultation attempt	Stockbridge Munsee Community
April 29, 2025	Response to Scoping Letter	No Effect determination	Stockbridge Munsee Community
May 19, 2025	PASHPO Response deadline.	Concurrence with determination of effect and issuance of eligibility determination	PASHPO
May 20, 2025	Final consultation attempts with tribal governments	Conform with 36CFR800.4(b)(1)	No Response
May 23, 2025	Determination of effect cutoff per 36CFR800.3(c)(4)	Documentation of no response	Absentee Shawnee, Delaware Nation, Delaware Tribe of Indians, Onondaga Nation, and Seneca-Cayuga Nation.
TBD	Interagency and public review	Review Draft Plan	Public, Agencies, Tribal Organizations, Sponsors, and Stakeholders
TBD	Public Notice	Inform public of FONSI	Public, agencies, tribal governments, sponsors, stakeholders
No definite date	Distribution and Posting of Final Plan to NRCS Website	Inform public of Final Plan	Sponsors mail out and post Final Plan for all agencies, Sovereign Tribes and Public Stakeholders

7.2 Coordination

The NRCS coordinated with the USACE Philadelphia District regarding potential jurisdictional wetlands and permitting requirements under Section 404 of the Clean Water Act. On September

30, 2024, the USACE issued correspondence advising that proposed work at the Leavitt Branch Dam may involve waters and/or wetlands under USACE jurisdiction and recommended a site-specific Jurisdictional Determination (JD) be conducted during the final design phase. This approach was agreed upon following coordination between NRCS and USACE, including a phone discussion with the USACE regulatory office in November 2024 and follow-up email confirmations in March and April 2025. On April 21, 2025, USACE confirmed via email that it had no additional comments at the planning stage and acknowledged NRCS's intention to initiate JD coordination during final design.

NRCS has also coordinated with the PADEP Division of Dam Safety to ensure that the proposed rehabilitation of Leavitt Branch Dam will meet applicable state dam safety standards. A meeting was held on April 13, 2023, to get concurrence from DEP on the procedures being used to model existing upstream dams that are within the Leavitt Branch Dam Watershed. While formal permitting will be required at the design phase, PADEP has not raised any concerns during early coordination and public meetings they attended. NRCS will continue to work closely with PADEP during detailed design and regulatory permitting, including compliance with Chapter 105 and Chapter 106 regulations.

Documentation of agency correspondence is provided in Appendix A.

7.3 Public Involvement

As part of the approved Public Participation Plan for the PA-463 Leavitt Branch rehabilitation project in Monroe County, Pennsylvania, the Department of Environmental Protection (PADEP), Tribal governments, and federal agencies such as the U.S. Army Corps of Engineers (USACE) and U.S. Fish and Wildlife Service (USFWS) were contacted and consulted at various stages of the planning process. Engagement efforts were not limited to formal consultation, public outreach was also conducted to keep stakeholders and community members informed.

Project updates were regularly posted to the Monroe County Planning Commission website and the NRCS Pennsylvania Watershed Program webpage, where public presentations and meeting summaries were made available for review. In addition, Monroe County Planning staff provided project updates during regularly scheduled County Commissioner meetings, offering transparency and continuity for local officials and residents. Public information sessions, including the virtual scoping meeting, provided additional opportunities for community engagement. These actions, as outlined in the project's Public Participation Plan and confirmed in NRCS and County records, ensured that stakeholders remained informed and had meaningful opportunities to provide input throughout the planning process. Opportunities for public involvement throughout the EA process are contained in Appendix A.

Scoping Meetings (April 21, 2022):

Two public scoping sessions were held on April 21, 2022, in a hybrid format, with in-person meetings hosted at the Monroe County Public Safety Center in Stroudsburg, PA, and a virtual option provided via Zoom. The Interagency Early Scoping Meeting began at 2:00 PM for agency and governmental stakeholders, while the General Public Scoping Meeting followed at 6:00 PM to accommodate broader public participation.

Invitations were distributed by mail and email to stakeholders identified in the approved Public Participation Plan, including local, state, federal, and Tribal entities. The public was notified via press releases, notices in local newspapers (e.g., Pocono Record, Tri County Independent, The Village View), and postings on the Barrett Township website, Monroe County Conservation District, and NRCS office locations. A sample invitation letter and the complete list of invitees are included in Appendix A.

Meeting materials, including a project overview and objectives of the Watershed Rehabilitation Program, were provided to participants in advance. Both sessions included presentations on the Brodhead Creek PA-463 and PA-464 sites, a review of potential resource concerns, and an open discussion to identify issues to be addressed in the Plan. Attendees were encouraged to share data, raise concerns, and suggest alternatives. A brief survey was distributed during the meetings to collect feedback on watershed priorities, community concerns, and perceived project outcomes. Comments received were used to inform the development and evaluation of alternatives.

Alternatives Presentation Meeting (February 8, 2024):

A second public meeting was held on February 8, 2024, at 6:00 PM, again in hybrid format. The in-person component took place at the Barrett Township Building in Cresco, PA, with remote participation available through Microsoft Teams. This meeting presented alternatives under consideration for rehabilitation of PA-463 and provided stakeholders with an opportunity to review and comment. The meeting was publicized through county and township websites, stakeholder email lists, and public postings per the PPP.

7.4 Plan Development and Review

This section outlines the process followed in the development, internal review, and public dissemination of the Supplemental Watershed Plan for the Leavitt Branch Dam (PA-463) rehabilitation project. In accordance with NWPM Part 502, Subparts B and C, the Plan underwent multiple levels of technical and policy review prior to public release.

The NRCS Pennsylvania State Office (PA-SO), in coordination with the State Conservationist, led the preparation of the draft document. Technical review was conducted by the NRCS State Office Technical Team, followed by a State-Level Office (SLO) review, and a policy and technical review by the National Watershed Management Center (NWMC). Final pre-release approval was granted by NRCS National Headquarters (NHQ). The outcomes of these reviews were incorporated into the draft Plan through a series of technical comment responses and editorial revisions, including updates to environmental resource impacts, engineering design assumptions, and alignment with NRCS policy guidance.

Because the impacts of the project are localized and do not rise to the level of national significance under NEPA, publication in the Federal Register was not required. The draft Plan was released for public review on XXXX XX, XXXX, and was made available through:

- The Monroe County website
- The Barrett Township website

- Public notices in local newspapers including the Pocono Record
- Physical copies at the Monroe County Planning Commission office
- Direct distribution to stakeholders and agencies listed in Section 7.5

Individual letters were sent to local, state, federal, and Tribal stakeholders, and a public informational meeting was held at the conclusion of the 30-day public comment period to receive final input. A sample notification letter and newspaper publication are included in Appendix A. All public and agency comments received were reviewed and are summarized with responses in the final Plan.

Upon close of the public review period, and in the absence of significant adverse environmental effects, NRCS intends to issue a Finding of No Significant Impact (FONSI), which will be publicly noticed and distributed along with the final Plan. The FONSI will confirm that the project complies with NEPA requirements and that no Environmental Impact Statement (EIS) is required. Final distribution will also include posting to the NRCS website and continued availability at the Sponsor's office.

7.5 Distribution List

As part of the approved Public Participation process, the following county, state, Tribal Governments, and federal agencies were contacted and invited to provide input and/or were consulted for the Draft and Final Plan – EA. See Table 7-2 for the full distribution list.

Table 7-2: PA-463 Supplemental Watershed Work Plan No. 3 –Distribution List

Entity	Association
Barrett Township	Local
Monroe County Commissioners	Local
Monroe County Planning Commission	Local
Monroe County Conservation District	Local
Monroe County Office of Emergency Management	Local
Pike County Commissioners	Local
Absentee Shawnee Tribe of Indians of Oklahoma	Tribal

Delaware Tribe of Indians	Tribal
Delaware Nation	Tribal
Eastern Shawnee Tribe of Oklahoma	Tribal
Onondaga Nation	Tribal
Seneca-Cayuga Nation	Tribal
Shawnee Tribe	Tribal
Stockbridge-Munsee Community, Band of Mohican Indians	Tribal
PA Department of Agriculture	State
PA Department of Environmental Protection (PADEP)	State
PADEP Division of Dam Safety	State
PADEP Federal Flood Protection Program	State
PA Department of Conservation and Natural Resources (DCNR)	State
DCNR Bureau of Forestry, District 19-Delaware	State
DCNR Bureau of Recreation and Conservation	State
PA State Conservation Commission	State
PA Department of Transportation	State
PA Emergency Management Agency	State
PA Fish and Boat Commission	State

PA Historical and Museum Commission (SHPO)	State
PA Game Commission	State
U.S. Department of Agriculture (USDA)	Federal
USDA Farm Service Agency	Federal
USDA Rural Development	Federal
U.S. Army Corps of Engineers – Philadelphia District	Federal
U.S. Fish and Wildlife Service	Federal
U.S. Environmental Protection Agency	Federal
U.S. Forest Service	Federal
U.S. Geological Survey	Federal
Federal Emergency Management Agency (FEMA)	Federal
National Oceanic and Atmospheric Administration (NOAA)	Federal
Federal Elected Officials	Federal
State Elected Officials	State

8. References

8.1 Previous Reports and References

The following is a list of reports that were located during the file review or were referenced in previous reports.

1. Dam Rehabilitation Assessment Report, Brodhead Creek Watershed Site PA-463, Monroe County, PA, December 27, 2016, NRCS.
2. Engineering Report, PA-463, August 7, 1984, Soil Conservation Service, USDA.
3. Brodhead Creek Watershed Project, Flood Retarding Dam, PA-463, As-Built Plans, SCS, December 7, 1976.
4. Brodhead Creek Watershed Project, Flood Retarding Dam, PA-463, Embankment Repair As-Built Plans, SCS, August 31, 1984.
5. Flood Insurance Rate Map, Monroe County, PA, Panels 109 and 128 of 535, Federal Emergency Management Agency, May 2, 2013.
6. Monroe County Hazard Mitigation Plan, 2021.

8.2 Literature Cited

1. Bureau of Economic Analysis (BEA). Implicit Price Deflators for Gross Domestic Product. Accessed October 2024.
https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=3&isuri=1&nipa_table_list=13
2. Census Bureau. Housing Units. Accessed January 2024.
<https://www.census.gov/quickfacts/fact/note/US/HSG010219>
3. COE. 1987. Corps of Engineers Wetlands Delineation Manual. Final Report, January 1987.
4. COE. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region. January 2012.
5. Comprehensive Plan, Barrett Township, Monroe County, updated 2008, prepared by Boucher & James, Inc. Consulting Engineers.
https://www.barretttownship.com/uploads/4/6/3/1/46310117/comp_plan_update.pdf
6. Comprehensive Plan Update, Monroe County, December 2014, Prepared by Monroe County Wide Task Force, Planning Commission Board and Staff.
https://www.monroecountypa.gov/getmedia/61f8a840-961c-42bd-be05-09df78f2d01a/20230119_ComprehensivePlan.pdf

7. Comprehensive Plan, Pike County, Final Plan November 2006, prepared by Pike County Comprehensive Plan Advisory Board, Planning Commission, Office of Community Planning and Planning Commission Ad-Hoc Members.
https://www.pikepa.org/Document%20Center/Living%20&%20Working/Community%20Planning/Downloadable%20Documents/Pike%20Comp%20Plan_Final%20Plan_Full.pdf
8. Council on Environmental Quality (CEQ). 2020. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. 40 CFR Parts 1500–1508 (2020).
9. Federal Emergency Management Agency (FEMA). National Flood Insurance Program Actuarial Rate Review. 2011. Accessed June 2020.
https://www.fema.gov/media-library-data/20130726-1809-25045-6893/actuarial_rate_review2011.pdf
10. Federal Emergency Management Agency (FEMA). HAZUS-MH MR3 Technical Manual. Accessed December 2024.
<https://www.fema.gov/hazus-mh-user-technical-manuals>
11. Gannett Fleming. Road Replacement Costs. 2024.
12. Kelley Blue Book. Average Transaction Price. August 2025. Accessed March 2025.
<https://www.kbb.com>
13. U.S. Department of Agriculture (USDA). 2025. National Environmental Policy Act Implementing Procedures, 7 CFR Part 1b (Interim Final Rule). Federal Register Vol. 90, No. 128, July 3, 2025.
14. Monroe and Pike Counties. 1961. Watershed Work Plan, Brodhead Creek Watershed.
15. Monroe and Pike Counties. 1971. Supplemental Watershed Work Plan, Brodhead Creek Watershed.
16. Monroe County Tax Assessors Office, 2023
17. National Oceanic and Atmospheric Administration (NOAA). 2023. Climate At A Glance: Monroe County, PA. Available at: <https://www.ncdc.noaa.gov/cag/>. Accessed December 2023.
18. NOAA. 2023. Essential Fish Habitat Mapper.
<https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>
19. National Wild and Scenic Rivers System (NWSRS). 2023. National Wild and Scenic Rivers System. <https://www.rivers.gov/>
20. Natural Resources Conservation Service (NRCS), U.S. Department of

- Agriculture (USDA). Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. 1983. Accessed May 2024. <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/econ/>
21. Natural Resources Conservation Service (NRCS). 2005. Technical Release No. 60: Earth Dams and Reservoirs (TR-60). USDA NRCS, October 2005 (Revised).
 22. NRCS. 2016. General Manual Title 190 – Ecological Sciences, Part 410 – Compliance with NEPA. USDA NRCS.
 23. Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture (USDA). General Manual Title 200. National Resource Economics Handbook Part 611 – Water Resources. 2015. Accessed May 2024. <https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=28583.wba>
 24. Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture (USDA). Interagency Guidelines. December 2014. Accessed May 2024. <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/econ/>
 25. Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture (USDA). National Watershed Program Handbook. 2024. Accessed March 2025. <https://www.nrcs.usda.gov/sites/default/files/2022-10/National%20Watershed%20Program%20Handbook.pdf>
 26. Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture (USDA). National Watershed Program Manual. 2024. Accessed March 2025. <https://www.nrcs.usda.gov/sites/default/files/2024-07/national-watershed-program-manual-june-2024.pdf>
 27. Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture (USDA). USACE Depth Damage factors. Accessed January 2018. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/nwmc/partners/?&cid=nrcs143_009725
 28. NRCS. 2020. Riparian Areas – Definition. Available online.
 29. NRCS. 2024. National Watershed Program Manual (NWPM). USDA NRCS, June 2024.
 30. NEHSTC. 2017. Field Indicators for Identifying Hydric Soils in New England, Version 4, May 2017.
 31. Penn State Institutes of Energy and the Environment. Interactive Watershed Map Viewer.

<https://maps.psiee.psu.edu/preview/map.ashx?layer=254>

32. Pennsylvania Natural Heritage Program. 1999. A Natural Areas Inventory of Monroe County, Pennsylvania.
https://www.naturalheritage.state.pa.us/cnai_pdfs/monroe%20county%20nai%201991_1999.pdf
33. Pennsylvania Natural Heritage Program. 2011. A Natural Areas Inventory of Pike County, Pennsylvania.
https://www.naturalheritage.state.pa.us/CNAI_PDFs/Pike%20CHNI%20Update%202011%20web.pdf
34. Smith, Robert. 2005. Use of Forested and Upland Scrub/Shrub Habitats by Spring Migrating Landbirds in Northeastern Pennsylvania. Department of Biology, University of Scranton.
35. Southern Windsor County Regional Planning Commission. 2018. Regional Plan, Volume 1. Effective July 30, 2018. <https://swcrpc.org/wp-content/uploads/2018/07/2018-Regional-Plan-Volume-1.pdf>
36. Townsley, George. National Flood Insurance Program Administration Costs. April 19, 2016. Accessed June 2024.
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/econ/references/?cid=nrcs143_009725
37. U.S. Census Bureau. 2022. Barrett Township, Monroe County, PA.
<https://data.census.gov>
38. U.S. Climate Data. 2020. Barrett Township.
<https://www.usclimatedata.com/climate/cresco/pennsylvania/>
39. U.S. Environmental Protection Agency (US EPA). 2023. Sole Source Aquifers. <https://www.epa.gov/dwssa/map-sole-source-aquifer-locations>
40. U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC). <https://ecos.fws.gov/ipac/>

9. List of Preparers

Table 9-1: PA-463 Supplemental Watershed Plan No. 3 - List of Preparers

List of Preparers				
Name	Title	Education	Years Experience	Other Qualifications
USDA-NRCS				
Mark Buckwalter	Project Manager / Civil Engineer	B.S. Agricultural & Biological Engineering, Penn State University	15	PE
Dayanna Barnes	Resource Conservationist	B.S. Agronomy, University of Puerto Rico, Mayagüez Campus	12	
Mary-Lynn Marks	Management Analyst	M.S. Agricultural Economics, University of Tennessee	3	Former Agricultural Economist
Erin O’Leary	Civil Engineer, H&H Engineer	M.S. Civil Engineering, West Virginia University B.S. Civil Engineering, West Virginia University	14	PE (TX)
Christopher Plount	NRCS State Archaeologist	M.A. CRM, B.A. Anthropology/Communication	10	
Harrold Russel	Geotechnical Civil Engineer	PhD Civil Engineering, West Virginia University	8	PE
Matt Sandefur	State Geologist	M.S. Earth & Environmental Science, Montclair State University B.S. Geology, Appalachian State University	10	PG, CPG
Heather Smeltz	Assistant State Conservationist for Water Resources	M.S. Biological & Agricultural Engineering, North Carolina State University B.S. Agricultural & Biological Engineering, Penn State University	23	PE
DDK Engineering-JV (DuBois & King)				
Jeffrey Tucker	Senior Project Manager	B.S. Civil Engineering, University of Vermont	38	PE

Charles K. Goodling	Project Engineer	B.S. Civil and Environmental Engineering, Utah State University	35	PE
Grace Glynn	Senior Field Naturalist	M.S., University of Vermont, Field Ecology	4	
Aimee Rutledge	Senior Environmental Specialist	B.S., Environmental Management University of Rhode Island	24	PWS, CPESC, CPSWO
Patrick Blanchard	NEPA Specialist / Environmental Planner	B.S., Natural Resource Management Northland College M.S., Environmental Law and Policy Vermont Law and Graduate School	16	
Chris Sargent	Senior Planner	M.S., Antioch University of New England, Resource Management and Administration	20	
Emily Lewis	Sr. Environmental Planner / Landscape Architect	B.LA., Landscape Architecture Pennsylvania State University M.S., Environmental Sciences and Policy, Johns Hopkins University,	13	PLA, LEED AP
Charles Johnston	Civil Engineer	B.S. Civil Engineering, University of Vermont	10	PE
Andrew Hoak	Professional Geologist, Project Engineer	B.A. Geology and Environmental Science Alfred University M.S. Hydrogeology Clemson University	33	PG, PE
DDK Engineering-JV (D'Appolonia)				
Robert Shusko	Project Manager / Principal Engineer	B.S. Civil Engineering, University of Pittsburgh B.S. Environmental Science, Allegheny College M.B.A., Temple University	31	PE

Andrew A. Antell	Senior Project Engineer	B.S., University of Maine, Civil Engineering M.S., Missouri University of Science and Engineering, Civil Engineering	14	PE
Michael J. Glumac	Project Engineer	B.S. Civil Engineering, Villanova University	6	PE
Michelle M. Schmidt	Project Engineer	B.S. Civil Engineering, University of Pittsburgh B.S. Mathematics, Waynesburg University	6	PE
Gannett Fleming				
Katherine Sharpe	Task Leader for Economics, QA/QC	B.A., Pennsylvania State University, English M.P.S., Cornell University, Environmental Management	25	AICP, ENV-SP
Kayla Briggs	GIS Analyst	B.S., Geoenvironmental Studies/GIS Certificate, Shippensburg University	17	
Kshama Harpankar	Economics	B. A. Economics, University of Mumbai, India M. A. Economics, University of Mumbai, India M.Phil Development and Planning, Indian Institute of Technology (IIT), Mumbai, India PhD Applied Economics, University of Minnesota	17	ENV-SP
Hartgen Archeological Associates Inc.				
Jesse Pagles	Senior Archaeologist	B.A., Hamilton College, Anthropology, PhD, The University of Albany, SUNY, Anthropology	26	
Walter Wheeler	Senior Architectural Historian	B.A., (B. Arch) Architecture Rensselaer Polytechnic Institute	23	

10. Appendices

Appendix A Consultations, Comments and Responses

- NHPA Consultation
 - o PASHPO
 - o Tribal
- Agency Consultation
 - o USFWS (Section 7 and Section 12)
 - o USACE
- State Consultation
- Invitation to Scoping Meeting
- Invitation to Alternatives Meeting

Appendix B Watershed Project Map

- Support Map
- Original Watershed Project Map

Appendix C Support Maps

Layout Maps

- USGS Location Map
- Aerial Location Map
- Affected Environment Map
- Existing Conditions Plan
- Preferred Alternative Plan

Flood Plain Maps

- Current Flood Insurance Rate Maps
- Breach Inundation and Study Area Map
- Floodplain Map
- Existing Conditions and Decommissioning 100-year Inundation map
- Existing Conditions and Decommissioning 500-year Inundation map
- Existing Conditions and Decommissioning FBH Inundation map
- No-Action Inundation Map
- Proposed Conditions Inundation Map
- 50-year Inundation Disclosure Map

Support Maps

- Soils
- Landcover
- Topography
- Slopes
- Wetlands and Waterways
- Required Easements

Appendix D Investigations and Analysis Report

- Project Formation
- Detailed Cost Estimate
- Cost Allocation by Purpose
- Engineering
- Biology
- Hydrology
- Geology
- Land Use
- Water Quality
- Economic Analysis
- Cultural Resources
- Property Rights
- Zoning

Appendix E Other Supporting Information

- Phase 1 Archaeological Investigation Report