



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE



DRAFT SUPPLEMENTAL WATERSHED PLAN #4

FOR REHABILITATION OF FLOODWATER RETARDING STRUCTURE PA-464 (GOOSE POND 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

July 2026

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**PRELIMINARY DRAFT Supplemental Watershed Plan No. 4
For the Rehabilitation of Floodwater Retarding Structure PA-464 Goose Pond 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-464 Goose Pond 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-464 (Goose Pond Dam) does not 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 high hazard potential dams. The dam was designed by NRCS in 1971 and constructed in 1975 as a high hazard potential flood retarding structure. Evaluations have determined that the dam lacks the capacity to safely store or pass the required design storm without overtopping and does not meet current TR-60 and PADEP design and performance criteria. 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, limited sediment removal associated with construction and restoration of localized flood pool capacity, vegetation clearing, access improvements, and implementation of best management practices (BMPs).

Sediment surveys conducted for PA-464 indicate that the reservoir retains adequate sediment storage capacity to meet the required design life for the rehabilitated structure; therefore, full sediment pool dredging is not required as part of the rehabilitation to achieve sediment storage design criteria. However, limited sediment removal is included as part of the Preferred Alternative to facilitate construction activities, restore localized flood pool storage capacity, and improve long-term operation and maintenance of the reservoir and principal spillway system. Sediment removal will be primarily limited to areas necessary for construction access, around the principal spillway intake structure, and within localized depositional areas that reduce hydraulic efficiency.

Accordingly, sediment removal associated with the rehabilitation is considered incidental to construction and reservoir function and does not represent full restoration of the sediment pool. This approach is consistent with NRCS rehabilitation guidance, which allows for removal of sediment where necessary to meet hydraulic performance, improve operation and maintenance, or facilitate

construction, even when total sediment storage capacity remains adequate for the required project design life.

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 the 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 \$17,186,800, of which \$5,148,600 will be incurred by the local Sponsor with \$12,038,200 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, Seneca-Cayuga Nation, the Onondaga Nation, the Shawnee Tribe, and the Stockbridge-Munsee Community. 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. 4
For the Rehabilitation of Floodwater Retarding Structure PA-464 Goose Pond 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-464 Dam Site 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-464 flood control structure.

Purpose and Need for Action: The purpose of the Brodhead Tributaries rehabilitation project is to relieve dam safety concerns resulting from a catastrophic breach of the high hazard dam PA-464 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 dam 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-464

Residential (#)	109
Commercial (#)	28
Institutional (#)	6
Bridges (#)	9
State Roads (mi)	11.12
Local Roads (mi)	3.4

Preferred Alternative: The Preferred Alternative involves structural rehabilitation of PA-464 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-464 Rehabilitation measures to be implemented consist of installation of new toe drain system; which requires extending the conduit and installing a new impact basin on the downstream embankment; installation of a stilling basin or apron with a cutoff wall to bedrock to address stability integrity concerns; raising 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-464

Latitude and Longitude:	41.206692N, -75.237179W
12-Digit Hydrologic Unit Code (HUC):	HUC 02040104(0901)
Brodhead Tributary Watershed Size:	4,441.6 acres

Source: NEPAassist, 2025, Environmental Protection Agency

Table S-3: Land uses in the watershed above Brodhead Creek PA-464 Goose Pond Dam

Land Cover in 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%
Total Acres	8611	100%

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

Table S-4: Land ownership in the watershed above Brodhead Creek PA-464 Goose Pond Dam

Land Ownership in the PA-464 Catchment	Acres	Percent
Federal	0	0%
State/ Local	59.8	69.5%
Commercial	9.1	10.6%
Private	17.1	19.9%
Total	86.1	100%

Source: Monroe County

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 west of Goose Pond and Mountain Lake while the flattest areas in the watershed are located along Goose Pond Run.

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-464 meets the dam. Goose Pond Run starts at an elevation of 1,496 MSL and flows into the PA-464 at 1,138 MSL. Slope and topographic maps are appended.

Population and Demographics:

Table S-5: Population & Demographics of Barrett Township

Beneficiary	Barrett Township	Monroe County	Pennsylvania	U.S.
Population (July 1, 2022)	4,053	167,198	12,972,008	333,287,557
Under 18 Years of Age	738	31,935	2,620,346	72,323,400
Over 65 Years of Age	666	32,771	2,542,514	57,658,747
Per Capita Income ^{1,3}	-	\$36,277	\$41,234	\$32,621
Median Household Income ²	\$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	12.5%	11.3%	11.8%	11.5%
1 – Per capita income in past 12 months (in 2018 dollars), 2018-2022 2 – Median household income (in 2018 dollars), 2018-2022 3 – No data available for towns under 5,000 people 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	Construction of Proposed Action will result in temporary soil disturbances of moderate length at dam locations, but appropriate mitigation strategies will be employed to avoid downstream impacts.

Erosion and Sedimentation	If the dam was removed erosion & sedimentation would potentially increase downstream as flooding would be less controlled.
Water-Related Concerns	
Water Resources	Goose Pond Run is classified as in attainment by the Pennsylvania Department of Environmental Protection (PADEP). The function of PA-464 is a contributing factor. Rehabilitation of this structure will continue to support the watershed's attainment status. The Brodhead Creek Watershed are designated High Quality Cold Water Fisheries Habitat, thus must be maintained at a water quality standards sufficient to protect cold water fishes.
Water Quality	PA-464 to a limited extent, allows for groundwater recharge, which wouldn't occur if dams were removed.
Floodplain Management	The Proposed Action will not change the current level of provided flood protection and is not expected to affect the currently mapped Flood Zones.
Waters of the U.S, Wetlands, & Special Aquatic Sites	Wetlands are present at and around the dam and retarding pools. Each evaluated alternative, including the Proposed Action, will have temporary and permanent impacts to wetlands within the Affected Environment.
Regional Water Resource Plans	The 2002 Brodhead Watershed Conservation Plan includes the tributaries of Brodhead Creek. Water quality is a core component of the plan. The reservoir at PA-464 is identified as one of the area's "important places."
Air-Related Concerns	Rationale
Air Quality	The Proposed Action will have no impacts on Air Quality.
Plant and Animal-Related Concerns	
Threatened & Endangered Species	Consultation with the USFWS, including review an official list of species from the USFWS, indicates there are two federally endangered mammals, the northern long-eared bat and the Indiana bat, as well as the proposed endangered species, tricolored bat, in the entire project area, including all downstream Affected Environments. It is assumed tree removal will occur outside of the bats active period of April 1 through October 31. A determination of "Not Likely to Adversely Affect" (NLAA) has been received from the USFWS (Appendix A).

Migratory Birds	The Brodhead Tributary Watershed and PA-464 dam site attract a variety of migratory bird species. Thirteen migratory bird species, including bald eagle, have been identified by USFWS as having potential to occur in the project area, and others are likely to be present as well. The dam is not located in any Audubon Important Bird Areas (IBA). Temporary impacts may be caused to migratory birds from construction activities, and permanent impacts to birds would result from tree cutting for staging areas and/or excess material disposal areas.
Bald and Golden Eagles	Temporary impacts may occur to eagle habitat from construction activities.
Invasive Species	The reconnaissance survey for the dam sites identified the presence of invasive species. Species included, but were not limited to, multiflora rose (<i>Rosa multiflora</i>), Japanese barberry (<i>Berberis thunbergii</i>), and garlic mustard (<i>Alliaria petiolata</i>). Construction activities have the potential to introduce or spread invasive species.
Fish & Wildlife	The forested tracts along Brodhead Creek and its tributaries provide travel corridors for wildlife. In addition, the watershed waters are notable for brook trout and other mixed species of trout, including at the dam site. Construction activities may cause temporary minor effects upon aquatic resources in the immediate area of the dam and downstream areas. Stream flows will be protected during construction with bypass piping.
Riparian Areas	Riparian areas are present in the vicinity of PA-464. These are located along the edge of the retarding pools as well as along the streams entering and exiting the pools and may be impacted. Each evaluated alternative, including the Proposed Action may or will have temporary and permanent impacts to riparian areas within the Affected Environment.
Forest Resources	Plant condition within the project area is healthy; no degraded plant conditions were observed. Herbaceous and woody plants within the Affected Environment, including staging areas and excess material disposal sites, will be disturbed.
Human, Economic & Social Conditions	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	Alternatives must be within the economic capacity of the Sponsor and address the needs of the community.
Public Health & Safety	The Brodhead Creek Watershed dam site provides flood risk reduction benefits for downstream residents, motorists, and public infrastructure. A breach of Floodwater Retarding Structure (FRS) PA-464 would result in a sudden and uncontrolled release of the reservoir, which would cause significant downstream flooding, potentially resulting in catastrophic property damage and possible loss of life. Although FRS PA-463 and PA-464 are not located directly in series, both structures are part of the Brodhead Creek Watershed flood control system and provide cumulative flood risk reduction benefits within the watershed. Rehabilitation of PA-464 to meet current NRCS high hazard dam safety criteria will reduce the probability of dam failure due to overtopping, internal erosion, structural instability, or spillway inadequacy. Reducing the probability of failure of PA-464 reduces overall downstream flood risk and potential loss of life and property within the Brodhead Creek watershed floodplain.
Scenic Beauty	Minor impacts to scenic beauty will occur at the PA-464 dam site through minor structural modifications, temporary land disturbance and select tree/vegetation removal.
Land Use & Land Cover	Some alternatives could potentially impact Land Uses and land cover types within the Affected Environment.

Ecosystems Services	
Provisioning	Some alternatives may have impacts on groundwater recharge.
Regulating	Some alternatives may have impacts on flood regulation & soil erosion within the Affected Environment which could affect public health and safety.
Supporting	Supporting services that relate to wildlife habitat may be impacted by proposed alternatives.
Cultural & Social	Some alternatives have impacts on downstream social stability.
Other Concerns	Rationale
Transportation	The PA-464 dam is accessible, but not visible, from state highway PA-390, which is considered a “Scenic Route”. Temporary adverse impacts may occur due to construction vehicle traffic, ingress and egress to the dam sites, which will be managed by requiring the contractor to implement a proper Traffic Control Plan.
Maintenance and Management	Some alternatives may encourage or discourage unauthorized recreational uses within the PA-464 dam site, which has documented damaged portions. Additionally, some alternatives may impact management requirements.

Alternative Plans Considered:

Rehabilitation (Preferred Alternative): The Rehabilitation Alternative involves structural improvements to the PA-464 (Goose Pond) 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 Alternative [National Environmental Policy Act (NEPA)], Future Without Project (FWOP) [Principles and Requirements for Federal Investments in Water Resources (PR&G)], Future Without Federal Investment (FWOFI), and Without-Plans Condition:

The No Action Alternative (NEPA), Future Without Project (FWOP) condition (PR&G), Future Without Federal Investment (FWOFI), and Without-Plans Condition represent the same baseline condition in which no federal rehabilitation project is implemented at the PA-464 dam. Under this condition, the dam would remain in place and continue to operate under its current operation and maintenance plan; however, no major rehabilitation would occur to address structural or hydraulic deficiencies beyond routine maintenance and minor repairs. Structural deterioration, particularly of the principal spillway, auxiliary spillway, and embankment, would continue over time, increasing the risk of breach during a

significant storm event. The dam is assumed to eventually fail due to structural deterioration, inadequate spillway capacity, or overtopping and would not be subsequently rebuilt.

A dam failure under such conditions would result in catastrophic downstream flooding, substantial property and infrastructure damage, and potential loss of life. This condition serves as the baseline against which all action alternatives are evaluated. PA-464 is classified as a High Hazard Potential dam. A breach is projected to affect approximately 109 residential structures, 28 commercial properties, and 6 institutional facilities, with a Population at Risk (PAR) of at least 618 residents. Additionally, nine bridges, over 11.12 miles of state roads, and nearly 3.4 miles of local roads fall within the predicted inundation zone.

Decommissioning with Non-Structural Alternative:

This alternative involves the removal of the flood detention capacity of PA-464 by breaching or removing portions of the embankment and restoring the natural stream channel and 100-year floodplain connectivity. This would eliminate the dam's ability to attenuate floodwaters. Costs associated with this alternative include approximately \$28.3 million for decommissioning construction activities and an estimated \$20.4 million for floodproofing or buyouts of affected downstream properties. Additional unquantified costs would likely be required to elevate or resize bridges and culverts to accommodate increased flow velocities and flood depths. Decommissioning would result in greater impacts on wetlands and waterways due to the extent of earthwork and alteration of the existing impoundment area. Based on technical and economic evaluation, this alternative was determined not to be cost-effective relative to other available options. The total construction cost of the decommissioning with nonstructural alternative is approximately \$48.7 million, compared to \$15.3 million for the rehabilitation alternative for PA-464.

Project Costs: The total project costs (Preferred Alternative) for PA-464 are shown in Table S-7 below:

Table S-7: Estimated Project Costs - Preferred Alternative for Rehabilitation of PA-464

Preferred Alternative	Source				Total Eligible Installation Costs
	PL 83-566 Funds		Other Funds		
	Cost	Percent	Cost	Percent	
Construction	\$9,538,200 ³	65%	\$5,060,900 ³	35%	\$14,599,100
Engineering	\$2,250,000	99.8%	\$5,000	0.2%	\$2,255,000
Project Administration	\$250,000	98%	\$5,000	2%	\$255,000
Real Property Rights	0	0%	\$65,000	100%	\$65,000
Permits	0	0%	\$12,700	100%	\$12,700

Total Costs	\$12,038,200	70%	\$5,148,600	30%	\$17,186,800
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

3. Includes \$65,000 of construction costs for mitigation

Project Benefits: Following the Principles, Requirements, and Guidelines (PR&G) planning policy, 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 and include both monetary and non-monetary effects, as well as quantified and unquantified measures. The Preferred Alternative was developed to address the identified dam safety and flood risk reduction needs while striving to maximize overall public benefits relative to costs, consistent with PR&G planning policy.

Number of Direct Beneficiaries/ Population at Risk (PAR): The Preferred Alternative, structural rehabilitation of the PA-464 (Goose Pond) dam, maximizes public benefits by reducing downstream flood risk, preserving critical infrastructure, and enhancing life safety for vulnerable populations. The project directly benefits approximately 109 residential structures, and 9 bridges located downstream of the dam. The PAR analysis identifies 618 residents across 101 single family residences, 7 apartment buildings, 26 commercial buildings, 1 school, 4 churches, and 1 post office that would be exposed to potentially catastrophic flood impacts exceeding 1 foot 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.

Benefits of the Preferred Alternative at PA-464 include:

1. Reduction in the potential for loss of life by reducing the possibility of dam failure.
2. Preservation of the constructed 100-year 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: 0.08

Net Beneficial Effects: **-\$512,297** (Net average annual equivalent benefits of \$44,665 - \$556,962 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.	Construction ²	Total	Real Property	Eng. Serv.	Proj. Admin.	Construction ²	Permits	Total
1	\$600,000	\$75,000	\$25,000		\$700,000		\$1,000	\$1,000			\$2,000
2	\$450,000		\$25,000		\$475,000	\$65,000	\$1,000	\$1,000			\$67,000
3	\$175,000		\$25,000	\$65,000	\$265,000		\$1,000	\$1,000	\$35,000	\$12,700	\$49,700
4	\$475,000		\$87,500	\$4,736,600	\$5,299,100		\$1,000	\$1,000	\$2,512,950		\$2,514,950
5	\$475,000		\$87,500	\$4,736,600	\$5,299,100		\$1,000	\$1,000	\$2,512,950		\$2,514,950
Total	\$2,175,000	\$75,000	\$250,000	\$9,538,200	\$12,038,200	\$65,000	\$5,000	\$5,000	\$5,060,900	\$12,700	\$5,148,600

1. Schedule shows when funds are expected to be expended

2. Includes \$65,000 of construction cost for mitigation.

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.

Evaluated (Project) Life: 100-years

Environmental Effects: Minor permanent and temporary impacts are expected at the PA-464 dam site to implement the preferred alternative. These impacts are elaborated below but generally include stream impacts at the immediate downstream toe of slope associated with the embankment and outlet works improvements and tree cutting to install erosion protection measures at the downstream end of the auxiliary spillway. There would 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 introduction of invasive plant species and reduce erosion and sedimentation into the outlet channels of the PA-464 dam site.

Controversial Issues: Public outreach conducted for the proposed project included a scoping meeting held on April 21, 2022 and a public alternatives meeting held on February 8, 2024. Verbal comments received during these meetings expressed support for the project and no opposition was identified. No written public comments were received. Therefore, no controversial issues have been identified.

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

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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-464, Goose Pond Dam was originally classified and designed to High Hazard (Class C) criteria applicable in the late 1960's. The USDA NRCS performed an assessment PA-464 (August 3, 2015) which concluded that the dam does not meet current NRCS and Pennsylvania Department of Environmental Protection (PADEP) Division of Dam Safety, and engineering criteria and performance standards (NRCS, 2015).

Subsequent planning-level hydrologic and hydraulic investigations confirmed that PA-464 is hydraulically inadequate to safely pass design storm flows for critical events, including the Principal Spillway Hydrograph (PSH), Stability Design Hydrograph (SDH), and Freeboard Hydrograph (FBH). The auxiliary spillway is at risk of erosive failure during high flow events, and the dam does not meet current stability and overtopping protection criteria under the TR-60 guidelines.

Additionally, the principal spillway outlet pipe contains seepage collars, which are now considered ineffective in controlling under-conduit seepage, and the existing internal drainage features (such as the chimney filter and toe drain system) do not meet current best practices for seepage management and piping prevention.

While no immediate structural failure has been reported, the dam's stability and internal drainage systems are considered outdated and vulnerable under current standards. These deficiencies, if unaddressed, could lead to progressive internal erosion or failure during extreme storm events. To reduce the risk of catastrophic failure and maintain the dam's role in downstream flood risk reduction, comprehensive rehabilitation is required.

1. Watershed Planning Background

1.1 Authority

Background: The Brodhead Creek Watershed PA-464 dam site is located in Monroe County, Pennsylvania. The project was originally planned and designed in 1961-1971 by the Soil Conservation Service (now Natural Resources Conservation Service – NRCS) in conjunction with the Monroe County Conservation District and the Pike County Conservation District. The original design life of the dam 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

Goose Pond Run is a headwater tributary to Brodhead Creek, which ultimately discharges into the Delaware River in Stroudsburg, Monroe County, Pennsylvania. The PA-464 (Goose Pond Dam) project site lies within the Upper Brodhead Creek watershed (Hydrologic Unit Code [HUC] 12: 020401040201), which is a subwatershed of the larger Middle Delaware-Mongaup-Brodhead HUC 8 basin (02040104). The contributing watershed area upstream of PA-464 encompasses approximately 4,441.6 acres. A watershed location map is provided in Appendix B.

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

Goose Pond Run is a headwater tributary to Brodhead Creek, which discharges directly into the Delaware River in Stroudsburg, Monroe County, PA. The hydrologic unit codes and watershed size at PA-464 are identified below. The watershed map is included in Appendix B.

1.4.2 Study Area

The Study Area includes PA-464, 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-464 is located in the north central section of Barrett Township, Monroe County, PA. As described herein, the watersheds are 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) for this project includes both direct and indirect effects to historic properties in accordance with 36 CFR 800.16(d). The direct effects APE includes all areas of ground disturbance associated with dam rehabilitation activities, including the dam embankment, spillways, staging areas, borrow areas, and access routes.

The indirect effects APE includes areas where historic properties may be affected by visual, hydrologic, or setting changes resulting from the project. Indirect effects considered for this project included changes to the viewshed, potential changes in upstream inundation limits due to a potential increase in embankment height, and potential changes in downstream floodplain conditions under dam breach and rehabilitation scenarios. The APE was modified from the standard 1-mile radius around the dam centroid to better reflect the actual area where indirect effects could occur due to the steep terrain and limited viewshed in the project area.

The APE for PA-464 extends downstream along Goose Pond Run, generally following the one percent (1%) annual chance flood limits under a decommissioned dam scenario for approximately one mile to the northern side of PA-447. Goose Pond Run generally parallels PA-390 and passes through the village of Canadensis. The APE also extends approximately 0.75 miles upstream of PA-464 to account for potential raising of the embankment and associated additional inundation limits.

The APE was developed in coordination with the Pennsylvania State Historic Preservation Office (PA SHPO) and consulting Tribes as part of the Section 106 consultation process. Consultation documentation is included in Appendix A. The Phase IA Cultural Resources Report, which includes maps and descriptions of the APE, is included in 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 Principles, Requirements, and Guidelines (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 PA464

✓	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 (NESCS) 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 catastrophe 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, Tribes, and other agencies were invited to identify and refine ecosystem services concerns during scoping and at other points of participation in the planning process.

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-464 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**

Goose Pond Run Dam is within the size limitations for their 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-464 Goose Pond Dam	4,441.6 acres	1,937.3 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 persons, and the general public.

A second public meeting, along with the invitation to Public and agency/tribal representatives 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 concern in the watershed. The scoping process for PA-464 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.

To further broaden outreach, 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 Rehabilitation Assessment Report for Site PA-464, dated August 3, 2015, prepared under the authority of the Small Watershed Rehabilitation Amendments (Public Law 106-472). In parallel with this Plan, a separate Supplemental Watershed Plan was developed for PA-463 (Leavitt Branch Dam), located in the same watershed. Information from the PA-463 planning effort has been 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-464 (Goose Pond 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-464 from meeting current NRCS and Pennsylvania Department of Environmental Protection (PADEP) dam safety and performance criteria.

The dam is classified as a High Hazard Potential structure, indicating that failure would likely result in loss of human life. Under current conditions, continued deterioration of the principal spillway, auxiliary spillway, and embankment, along with inadequate spillway capacity, increases the risk of failure during large storm events.

Without corrective action, the dam would remain at risk of failure, which could result in significant adverse effects to downstream populations, structures, infrastructure, and the surrounding community. Rehabilitation is needed to address these deficiencies, restore compliance with current standards, 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-464 does not meet current federal and state dam safety and performance standards. Hydraulic and structural deficiencies, including deterioration of the spillways and embankment and inadequate spillway capacity, increase the risk of dam failure during design storm events.

Risk to Downstream Population and Infrastructure

The problem is that failure of PA-464 would pose significant risk to downstream populations and infrastructure located within the dam breach inundation area. Based on current breach analyses, approximately 109 residential structures, 28 commercial structures, and 6 institutional structures are at risk, along with at least 9 bridges and approximately 14.52 miles of state and local roads. These conditions represent significant public safety concern.

Dependence on Existing Flood Attenuation Benefits

The problem is that downstream communities currently receive flood attenuation and flood damage reduction benefits from PA-464. Loss of dam functionality would increase downstream flood risk and associated damage.

Aging Infrastructure and Reliability Concerns

The problem is that the dam has experienced long-term deterioration, increased maintenance needs and reduced overall reliability, which contributes to elevated risk over time.

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-464 are to:

1. Reduce the risk of catastrophic dam failure at PA-464 throughout the project service life;
2. Reduce potential loss of life and damage to downstream populations, structures, roads, and bridges located within the breach inundation area;
3. Address identified hydraulic and structural deficiencies such that PA-464 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; and
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, hydrology, hydraulic capacity requirements, and infrastructure constraints.
3. Project alternatives must comply with applicable federal, state, and local permitting and regulatory requirements, including dam safety, environmental, and cultural resource protection laws.
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.
6. Rehabilitation represents a new Federal decision point; therefore, a full range of alternatives—including structural, nonstructural, and decommissioning options—must be considered and evaluated to identify the alternative that maximizes public benefits with appropriate consideration of costs, consistent with PR&G.

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 to provide protection from the 100-year storm event. For hydrologic and hydraulic analyses, upstream dams were conservatively assumed to breach during the 100-year storm event due to limited available information regarding their structural condition and performance. Under this assumption, the auxiliary spillway at PA-464 is activated. If upstream dams do not breach, the auxiliary spillway is not activated during the 100-year storm event.

In accordance with NRCS design guidance, including TR-210-60, the evaluation of dam performance and development of rehabilitation alternatives considers the potential for upstream dam failure, removal, or modification. Rehabilitation design elements are therefore developed to ensure that PA-464 can safely accommodate upstream dam breach scenarios and associated flow conditions without compromising dam safety or performance. This represents a conservative design approach, as breach scenarios produce higher peak flows and more extreme hydraulic conditions than those associated with upstream dam removal alone.

Evaluation of decommissioning scenarios indicates that removal of upstream dams would generally result in increased downstream flooding frequency and extent under more common storm events, as floodwater detention provided by those structures would be eliminated. However, based on coordination with PADEP and available planning information, widespread upstream dam decommissioning is considered unlikely due to regulatory, ownership, and functional constraints. As such, the breach assumption provides a reasonable and appropriately conservative basis for design and analysis while still bounding potential future watershed conditions.

This approach is consistent with NRCS watershed planning principles, which require evaluation of a range of reasonably foreseeable conditions and uncertainties to ensure long-term project performance, public safety, and resilience under changing watershed conditions.

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-464 would occur within the existing dam footprint and adjacent maintained areas. No offsite staging areas are anticipated or required.

3.1 Current Condition of PA-464 Goose Pond 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 erosion, signs of animal burrowing, and slope instability. Minor corrective measures, such as vegetation control and small-scale erosion repair, are implemented as needed.

3.1.2 Sedimentation Rate

A very low volume of accumulated sediment exists in the PA-464 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.

Table 3-1: Brodhead Creek Watershed PA-464 Goose Pond Dam Reservoir Sediment Summary

	Submerged Sediment	Aerated Sediment
Original design sediment deposition volume (ac-ft) ¹	23.6	8.6
Actual sediment deposition volume (ac-ft)	3.26	0.63
Annual deposition rate (ac-ft/yr)	0.064	0.0124
Remaining storage volume capacity (ac-ft)	17.3	119.3
Remaining storage life (years)	271	9621

1. Original Design Documents were prepared in 1969.

3.1.3 Breach Analysis & Hazard Classification

PA-464 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-464 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-464 evaluated four potential modes of dam failure including the hydrologic event, seismic event, and static conditions, and no action failure. The most detrimental downstream inundation limits were attributed to the FBH hydrologic breach of PA-464. The FBH breach was modeled as an overtopping event with the breach beginning when the dam was overtopped by 0.1ft. The FBH breach demonstrates that the PA-464 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 no-action breach evaluated the storm event that would contribute to PA-464 to overtop. The 58%FBH event is the storm level where overtopping failure would begin. This mode of failure is the most likely breach scenario if the dam is left in the current conditions. Material deterioration of the auxiliary spillway is not likely since the dam overtops before the auxiliary spillway breaches.

The NRCS standards are not met for PA-464 since the auxiliary spillway cannot safely pass the FBH design storm without overtopping.

PA-463 and PA-464 are not located in series with one another; however, each dam has separate non-NRCS upstream impoundments that were considered in the hydrologic and hydraulic analyses. PA-463 has upstream dams located in series within the Leavitt Branch watershed, while PA-464 has upstream impoundments within the Goose Pond Run watershed. Because limited information was available regarding the structural condition and performance of these upstream dams, the analyses conservatively evaluated upstream dam breach scenarios during significant storm events.

For PA-464, the breach analysis considered the potential effects of upstream dam failures within the Goose Pond Run watershed, including the resulting inflows to the PA-464 reservoir and their potential to contribute to auxiliary spillway activation, overtopping, or failure under extreme conditions. PA-463 was not modeled as an upstream cascading failure source for PA-464 because the two NRCS dams are located on separate tributaries and are not hydraulically in series. However, the downstream inundation areas associated with PA-463 and PA-464 overlap near Canadensis, and this overlap was considered when evaluating downstream flood risk and public safety consequences.

This modeling approach provides a conservative assessment of potential upstream-dam failure effects while accurately reflecting the watershed configuration and the separate tributary systems associated with PA-463 and PA-464.

The 58% FBH 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 Goose Pond Run, along Brodhead Creek, and ends after the Pine Mountain Run confluence.

3.1.4 Consequences of Dam Failure

It was determined that PA-464 will overtop at the 58% FBH event. The mapping results are shown in Appendix C. The updated dam breach analysis prepared for this Plan, in Table 3-2, indicates that failure of PA-464 would result in inundation of approximately 109 residential structures, and 34 commercial or community structures, along with at least 9 bridges and approximately 14.5 miles of state and local roadways. Based on standard U.S. household occupancy rates, the Population at Risk (PAR) is estimated at approximately 618 individuals. Population estimates were developed using standard residential occupancy assumptions applied to structures located within the breach inundation area; actual exposure could be higher during daytime hours due to the presence of employees, visitors, and service users within commercial and institutional buildings. Affected infrastructure includes key transportation routes and community facilities. Inundation mapping and structure-specific risk areas are provided in Appendix C.

The breach inundation limits resulting from the no action dam failure of Goose Pond have a total of 143 buildings were subject to flooding. This is significantly larger than the amount in the 100-year floodplain. The additional properties with structures subject to flooding from the no action breach are indicated in Table 3-2. Inundation mapping and structure-specific risk areas are included in Appendix C.

Table 3-2: Property and Infrastructure at Risk from Potential Breach - PA-464

Residential (#)	109
Commercial (#)	28
Institutional (#)	6
Bridges (#)	9
State Roads (mi)	11.12
Local Roads (mi)	3.4
*Structure data for PA-464 assumes that if it fails, PA-463 has already failed and is therefore cumulative.	

3.2 Resource Categories and Ecosystem Services of Concern

A summary of the resources concerns, and ecosystem services identified as relevant to the project during the scoping meeting for the Brodhead Creek Watershed dam site PA-464 is presented in Table 3-33. Those resource items and ecosystem services marked “Yes” fall under one of the following categories:

- a) Likely to be impacted by the alternatives evaluated in this plan.
- b) NRCS policy requires evaluation.
- c) Executive Order or Environmental Law requires evaluation.

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	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.
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 soil. Additionally, if fill for rehabilitation is required, it will be necessary to identify impacts, if any, to these soils.

Erosion & Sedimentation	Yes	PA-464 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	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 & Ground Water Quality	Yes	The dam contributes to local groundwater recharge. Approximately 15 Public Water System groundwater wells were identified within a one-mile radius of the Affected Environment. There are no known contaminants to groundwater quality.
Floodplain Management	Yes	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 Environments. 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 biodiversity 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 Watershed. This plan prioritizes the prevention and minimization of flood-induced loss of life and property, and protects 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		
Endangered & Threatened Species	Yes	Consultation with the USFWS and review of the official IPaC species list identified three federally listed bat species, the endangered northern long-eared bat and 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	The Brodhead Creek Watershed and dam sites attract a variety of migratory bird species. Thirteen migratory bird species, including bald eagle, have been identified by USFWS as having potential to occur in the project area, and others are likely to be present as well. The dams Affected Environment area are not located in any Audubon Important Bird Areas (IBA). Temporary impacts may be caused on migratory birds from construction activities, and permanent impacts to birds may result from tree cutting for staging areas and/or excess material disposal areas.
Bald and Golden Eagles	Yes	A preliminary review of the USFWS IPaC database indicated the presence of the bald eagle and golden eagle in the watershed. Temporary impacts may occur to eagle habitat from construction activities.
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 no invasive species. However, the Town indicated the species observed include 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	The forested tracts along Brodhead Creek and its tributaries provide travel corridors for wildlife. The waters within the Affected Environment are notable for brook trout and other mixed species of trout, including each dam site. Construction activities may cause temporary minor effects upon aquatic resources.
Natural Areas	No	There are no natural areas within the Affected Environment area at the dam site.
Riparian Areas	Yes	Riparian areas are present in the vicinity of Affected Environment. These are located along the edge of the retarding pool of PA-464 dam as well as along the streams entering and exiting the pools and downstream of the dam.
Forest Resources	Yes	Plant condition within the project area is healthy; no degraded plant conditions were observed. Herbaceous and woody plants within the Affected Environment may be disturbed by construction activities.
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 with 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 Tribes contacted. 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	Project alternatives may impact the local, regional, and national economy. Local and regional economic effects may include changes in construction employment, local spending associated with construction activities, and avoided damages to residential, commercial, and public infrastructure. At the national level, the project has been evaluated in accordance with the Principles, Requirements, and Guidelines (PR&G) for water resources projects, which assess contributions to the National Economic Development (NED) account through avoided flood damage, infrastructure protection, and project costs. The economic analysis tables included in this document present the estimated costs and benefits associated with the alternatives and their contribution to the national economy.
Public Health & Safety	Yes	PA-464 provides flood protection for residents, motorists, and other people within the downstream breach zones. A breach of PA-464 would cause catastrophic property damage and loss of life in the downstream area.
Scenic Beauty	No	There are no formally designated areas of scenic beauty within the Affected Environment. PA-464 is not significantly visible outside of the Dam area. PA-464 is privately owned and not accessible to the public.
Parklands	No	The PA-464 dam has no adjacent public recreational facilities, nor would any impact be expected.
Significant Scientific Resources	No	Significant scientific resources include research natural areas, unique geologic or hydrologic features, ecological research sites, or other areas recognized as having scientific value as defined in 190 NCHP 601.70. A review of available resource mapping, agency coordination, and project scoping did not identify any designated research natural areas, unique geologic features, or recognized scientific study sites within the project area or Area

		of Potential Effects. Therefore, the proposed project is not expected to affect significant scientific resources.
Land Use & Land Cover	Yes	Some alternatives may impact land use or land cover types within the Affected Environment.
Scoped Ecosystem Services of Concern		
Provisioning	Yes	Goose Pond Run and the retention pond at PA-464 contribute to groundwater resources.
Regulating	Yes	Some alternatives may have impacts on flood regulation & soil erosion within the Affected Environment which could affect public health and safety.
Supporting	Yes	Alternatives have the potential to impact wildlife habitat.
Cultural and Social	Yes	Some alternatives have impacts on downstream social stability.
Other Concerns		
Transportation	Yes	Temporary impacts may occur due to construction vehicle ingress and egress to the dam sites, 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	Some alternatives may encourage or discourage unauthorized recreational uses within the Dam site. Additionally, some alternatives may impact management requirements.

3.3 Inventory of Existing Resources 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 Table 3-55, 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-464, Dam Site and Flood Pool

MUSYM	Map Unit Name	Acres	%
As	Alluvial land	17.5	17.10%
BP	Borrow pit	30.3	29.60%
LbC	Lackawanna channery loam, 8 to 25 percent slopes, rubbly	16.1	15.80%
LbE	Lackawanna and Bath soils, steep, rubbly	5.8	5.70%
LyE	Lordstown and Oquaga channery loams, 25 to 70 percent slopes, extremely stony	2.4	2.40%
MoB	Morris channery silt loam, 0 to 8 percent slopes, extremely stony	1.3	1.30%
OxC	Oquaga-Lackawanna complex, 8 to 25 percent slopes, extremely stony	3.5	3.40%
W	Water	3.9	3.80%
WpB	Wellsboro channery loam, 0 to 8 percent slopes, extremely stony	18	17.60%
WpC	Wellsboro channery loam, 8 to 25 percent slopes, extremely stony	3.5	3.40%
PA-464 Dam Site & Flood Pool Total		102.3	100.0%

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

Table 3-5: Soils in the Decommissioned PA-464 Downstream 100-Year Floodplain

MUSYM	Map Unit Name	Acres	%
As	Alluvial land	10.7	16.90%
BP	Borrow pit	0.7	1.10%
Hy	Holly silt loam	3.5	5.50%
LbC	Lackawanna channery loam, 8 to 25 percent slopes, rubbly	0.4	0.70%

LyE	Lordstown and Oquaga channery loams, 25 to 70 percent slopes, extremely stony	0.1	0.20%
MoB	Morris channery silt loam, 0 to 8 percent slopes, extremely stony	4.1	6.50%
OxC	Oquaga-Lackawanna complex, 8 to 25 percent slopes, extremely stony	1	1.60%
Ph	Philo silt loam	32.1	50.70%
Po	Pope silt loam	6.5	10.20%
Pp	Pope silt loam, high bottom	4	6.30%
W	Water	0.3	0.50%
PA-464 100-Year Decommissioned Floodplain Total		63.4	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 Farmland and Farmland of Statewide Importance that are present within the Affected Environment are summarized in Table 3-6. There are no soils classified as prime farmland or farmland of statewide importance in the PA-464 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-464 & Downstream 100-year Floodplain

Prime Farmland or Farmland of Statewide Importance in PA-464 Dam Site and Flood pool			
MUSYM	Map Unit Name	Farmland Class	Acres
BP	Borrow pit	Not prime farmland	30.3
WpB	Wellsboro channery loam, 0 to 8 percent slopes, extremely stony	Not prime farmland	18
As	Alluvial land	Not prime farmland	17.5
LbC	Lackawanna channery loam, 8 to 25 percent slopes, rubbly	Not prime farmland	16.1

LBE	Lackawanna and Bath soils, steep, rubbly	Not prime farmland	5.8
W	Water	Not prime farmland	3.9
OxC	Oquaga-Lackawanna complex, 8 to 25 percent slopes, extremely stony	Not prime farmland	3.5
WpC	Wellsboro channery loam, 8 to 25 percent slopes, extremely stony	Not prime farmland	3.5
LyE	Lordstown and Oquaga channery loams, 25 to 70 percent slopes, extremely stony	Not prime farmland	2.4
MoB	Morris channery silt loam, 0 to 8 percent slopes, extremely stony	Not prime farmland	1.3
PA-464 Dam Site & Flood Pool Total			102.3
Prime Farmland or Farmland of Statewide Importance in PA-464 Downstream 100-year Floodplain			
MUSYM	Map Unit Name	Farmland Class	Acres
As	Alluvial land	Not prime farmland	10.7
BP	Borrow pit	Not prime farmland	0.7
Hy	Holly silt loam	Farmland of statewide importance	3.5
LbC	Lackawanna channery loam, 8 to 25 percent slopes, rubbly	Not prime farmland	0.4
LyE	Lordstown and Oquaga channery loams, 25 to 70 percent slopes, extremely stony	Not prime farmland	0.1
MoB	Morris channery silt loam, 0 to 8 percent slopes, extremely stony	Not prime farmland	4.1
OxC	Oquaga-Lackawanna complex, 8 to 25 percent slopes, extremely stony	Not prime farmland	1
Ph	Philo silt loam	All areas are prime farmland	32.1

Po	Pope silt loam	All areas are prime farmland	6.5
Pp	Pope silt loam, high bottom	All areas are prime farmland	4
W	Water	Not prime farmland	0.3
PA-464 100-year Downstream Floodplain Total			63.4

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

3.3.1.3 *Erosion & Sedimentation (Regulating Ecosystem Service)*

Goose Pond Dam (PA-464) provides limited sediment retention due to the configuration of the outlet structure, which allows continuous baseflow discharge. Most sediment deposition occurs during high-flow events when a pool temporarily forms behind the dam. Based on the sedimentation survey conducted in 2022 and 2023, the historical rate of sediment deposition at PA-464 is estimated to be 0.042 acre-feet per year. This modest rate reflects both the hydrologic characteristics of the contributing watershed and the dam's limited capacity to trap sediment under normal flow conditions.

3.3.2 **Water-Related Concerns**

3.3.2.1 *Water Resources*

PA-464 is located along Goose Pond Run, approximately 1-mile upstream from the confluence with Brodhead Creek. The normal pool covers an area of approximately 3.6 acres and an average water depth of 6.4 feet with a drainage area of 6.85 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-464 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, Goose Pond Run 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-464. 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-464 and the majority of the downstream Affected Environment are designated as areas of minimal flooding, Zone X. Additionally, a relatively small portion of the project study area to the south of PA-464 is designated as Zone AE, referred to as high-risk areas (Appendix C).

Development within the 100-year floodplain is regulated under Section 265 of Barrett Township's Code of regulations (adopted in 2013). Within the Affected Environment only a portion of the floodplain is mapped, primarily in and around Canadensis. New development is allowed within the FEMA mapped floodplain provided that it is elevated to at least one foot above base flood elevation if elevations are available. In areas where no flood elevations are available, there are provisions for determining appropriate building heights. New construction is prohibited in the floodway.

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

Waters of the United States include the waters of intermittent and permanent streams, ponds and lakes, below their ordinary high-water elevations, as well as most wetlands. At PA-464, the retarding pool, all intermittent and permanent streams, and all wetlands, as shown on the Wetland and Waterbody Focus Area Maps (Appendix C), are considered Waters of the United States. These waters are subject to Section 10 and Section 404 of the Clean Water Act.

Wetlands (Regulating and Supporting Ecosystem Services)

A wetland and waterway site investigation were performed on June 6 and 7, 2022 at PA-464. A total of three 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. below and illustrated in Appendix C. Additional wetland descriptions, including dominant vegetation and primary functions are provided, following Table 3-7.

Table 3-7: PA-464 Wetland Classification

Wetland ID	NWI Classification	Acreage
PA-464 (Goose Pond Run Dam Site)		
A	PFO	0.58
B	PEM	2.14
C	PEM/PSS	0.4

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



Figure 1. PA-464 Wetlands Map

Three wetlands were identified within the Goose Pond Run Dam site. Much of the mowed area in the vicinity of the dam is dominated by sheep sorrel (*Rumex acetosella*), multiflora rose, autumn olive (*Eleagnus umbellata*), oriental bittersweet (*Celastrus orbiculatus*), Japanese barberry, milkweed (*Asclepias sp.*), tower mustard (*Turritis glabra*), bushy bluestem (*Andropogon glomeratus*), and bird's-foot trefoil (*Lotus corniculatus*). A brief summary of each wetland is as follows:

Wetland A is located northeast of the dam and consists of two areas separated by a grassy wood's road. The wetland is predominantly PFO and is dominated by red maple, jewelweed, forget-me-not (*Myosotis sp.*), sensitive fern, multiflora rose, and poison ivy (*Toxicodendron radicans*). It appears to be fed by a combination of groundwater seepage and surface water, and may be hydrologically connected to Wetland B. The wetland coalesces into an intermittent

stream channel that flows west into the reservoir. The principal function of this wetland is groundwater recharge.

Wetland B flows a narrow swale and is a PEM wetland dominated by cattails, drooping sedge, marsh fern (*Thelypteris palustris*), meadowsweet, and sensitive fern. In some areas, it extends east up the hillside, where groundwater seepage occurs. A ditch connects this area to the second portion of Wetland B, a rectangular emergent marsh located in the spillway, which is dominated by reed canary grass (*Phalaris arundinacea*), sedges, bulrushes, meadowsweet, and jewelweed. The principal function of this wetland is wildlife habitat.

Wetland C is a PEM/PSS wetland located along the edge of the reservoir. It is dominated by tussock sedge (*Carex stricta*), meadowsweet, bladder sedge (*Carex intumescens*), jewelweed, leatherleaf (*Chamaedaphne calyculata*), maleberry (*Lyonia ligustrina*), blue flag iris (*Iris versicolor*), and Sphagnum mosses (*Sphagnum sp.*). Groundwater seepage is apparent along the slope above the inlet. The principal function of this wetland is groundwater recharge and wildlife habitat.

In addition to the wetlands identified in the field, a desktop review identified wetlands and areas of open water downstream of the dams. The National Wetland Inventory includes a mapped pond at the southern end of the Goose Pond Run Affected Environment. In addition, there is the potential for wetlands to be located along the banks of Goose Pond Run.

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-464 dam (Goose Pond Dam) was identified and field-verified during the site investigation. Goose Pond Run is a second-order tributary to Brodhead Creek and flows for approximately 1.3 miles from the dam outlet before joining Brodhead Creek directly. This stream is part of the Delaware River Basin.

Downstream of the dam, Goose Pond Run and its associated 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 traditionally 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 Goose Pond; 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, Goose Pond 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, along with riparian buffers and adjacent wetlands, are jurisdictional and functionally connected to the broader Brodhead aquatic system. Potential impacts to these aquatic resources are further evaluated in Chapter 5 and mapped in Appendix C. 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, removing harmful contaminants, and improving 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. Goose Pond (PA-464) 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 biodiversity 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 potential endangered and threatened species within the PA-464 Affected Environment was conducted using the U.S. Fish and Wildlife Service (USFWS) IPaC system and the Pennsylvania Natural Diversity Inventory (PNDI). The IPaC review identified two federally endangered bat species northern long-eared bat (*Myotis septentrionalis*) and Indiana bat (*Myotis sodalis*) as well as the proposed endangered tricolored bat (*Perimyotis subflavus*). It also listed the monarch butterfly (*Danaus plexippus*) as a candidate species, and the northeastern bulrush (*Scirpus ancistrochaetus*) as a federally endangered plant species (See Appendix A). However, no critical habitat is mapped at the PA-464 dam site.

Importantly, no federally listed or proposed species or suitable habitats were observed during field surveys conducted at the dam site. The site is dominated by frequently mowed grass and non-forested land, and no identified bat roost trees or rare plants were identified within the immediate area of disturbance.

The downstream breach zone and associated floodplain were not included in field verification efforts. These areas extend through riparian corridors connected to Brodhead Creek and encompass a range of habitat types that may support federally or state-listed species. Due to the increased habitat diversity in these zones, the potential for species presence exists.

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 - lists no Threatened or Endangered Species or Species of Special Concern.

- PA Fish & Boat Commission - indicates no Threatened and Endangered Species. The PNDI search results indicate the project may be located in the occupied range of the timber rattlesnake (*Crotalus horridus*) and provides recommendations for avoiding disturbance of critical habitat and minimizing risks during construction. However, based on the PA Conservation Explorer, the timber rattlesnake Dutch Hill habitat is located west of the Affected Environment.
- PA DCNR - indicates the presence of a threatened plant, white twisted-stalk (*Streptopus amplexifolius*). However, based on the PA Conservation Explorer, it appears the plant is located outside of the Affected Environment.
- USFWS - Federally listed and proposed species identified through the USFWS IPaC system are documented in Appendix A – Consultations and summarized in Table 3-8 below.

No rare, threatened, or endangered species or significant natural communities were observed during field surveys. No potential bat roost trees were observed. PA-464 is not mapped as core habitat, dominated by frequently mowed land.

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	Federal	
State (DCNR) Species			
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
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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)

Non-native invasive species were not observed at the Goose Pond Dam project study area. However, during stakeholder meetings, the Monroe County Conservation District noted that an excessive amount of autumn olive and Japanese barberry are present at PA-464, which they would like to see removed.

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

The forested tracts along Goose Pond Run provide travel corridors for mammals such as bobcat (*Lynx rufus*), American black bear (*Ursus americanus*), and white-tailed deer (*Odocoileus virginianus*).

Wildlife habitat at the sites generally includes open grassland associated with the dam, the auxiliary spillway, and varying amounts of shrub and forestland on the remainders of the areas. Aquatic habitat includes the open water of the retarding pool as well as streams entering and exiting the pool. Common species likely to occur in these habitats include beaver (*Castor canadensis*), black bear, 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*), white-tailed deer, mice (*Muridae*), voles (*Cricetidae*), and a variety of songbirds, raptors, fish including native brook trout (*Salvelinus fontinalis*), turtles and snakes.

Goose Pond Run 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, Goose Pond Run supports natural trout reproduction, further emphasizing its ecological significance.

3.3.3.6 *Riparian Areas (Regulating Ecosystem Service)*

At PA-464 (Goose Pond Dam), riparian areas are present along the margins of the existing impoundment and along the tributaries that enter from the north and northeast, as well as along Goose Pond Run downstream of the dam. Upstream and around the impoundment, riparian zones are predominantly associated with forested and emergent wetlands. These areas extend approximately 0.15 to 0.25 miles along the northern and northeastern arms of the reservoir, with widths ranging from 30 to 120 feet depending on slope position, vegetation, and surface water influence.

Along the tributaries entering and exiting the reservoir, riparian areas are concentrated along the streambanks, where periodic flooding and shallow groundwater conditions support hydrophytic vegetation and maintain floodplain function. These zones provide key regulating services including sediment retention, nutrient uptake, and thermal buffering.

A desktop GIS analysis of the Goose Pond Run downstream floodplain incorporating topographic data, mapped wetlands, and hydric soils indicates that riparian areas occur intermittently for approximately 1.8 miles downstream of the dam. These riparian segments are concentrated within broader low-lying areas and coincide with mapped wetlands and flood-prone terrain identified during field assessments.

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

The forest resources observed at PA-464 during field investigations on June 6 and 7, 2022 include a swath of woods dominated by white oak, chestnut oak, hemlock and white pine. An access road runs east from Route 390 through upland forest dominated by white oak, chestnut oak, Norway spruce, basswood, bit-toothed aspen, and black locust, with an understory of witch hazel.

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)*

Archaeological investigation revealed areas with high and moderate pre-contact probability within the PA-464 APE, but not within the anticipated boundaries of ground disturbance. The LOD was heavily disturbed during initial dam construction efforts, and the upstream/downstream areas by floodwater inundation. If rehabilitation efforts result in the increase the top of dam (TOD) pool area, previously undisturbed areas with high archaeological potential are at risk of becoming inundated and impacted by floodwater inundation.

During the Phase 1 archaeological survey, conducted in July 2024, a total of 13 newly identified above ground National Register Eligible (NRE) resources are within the APE. The majority of these resources are potentially eligible for inclusion in the National Register of Historic Places under Criterion C. The resources are representative examples of several 20th century architectural styles including American Four Square, Craftsmen, Bungalow, Arts & Crafts, Tudor Revival, and Split-Level styles. Due to steep canyon/hill landforms and distances from the LOD, there will be no direct or indirect effect. PASHPO has concurred with this analysis. See Appendix A, E and Tabler 7-1 for greater detail.

Twenty-two resources associated with Skytop Resort were surveyed. These resources constitute a potential historic district eligible for listing on the NRHP under Criteria A and C. Of the 22 resources, seven are non-contributing. The remaining 15 resources within the potential historic district may contribute to its eligibility under Criteria A and C. Due to the nature of the topography and obstructed viewshed, none of these resources will suffer direct, indirect or transitory effects.

Excluding age, the Goose Pond Dam does not meet the criteria for listing in the National Register. The dam is constructed of unremarkable material and design, has no known associations with any people/events of local or national significance, and is unlikely to provide any substantive historic data in the future.

See Appendix A for correspondence between NRCS, PA SHPO, and consulting Tribes regarding the Area of Potential Effects (APE), identification of historic properties, evaluation of National Register eligibility, and determinations of effect. Appendix E includes the Phase IA Cultural Resource Report.

In accordance with 36 CFR § 800.4, NRCS consulted with PA SHPO and federally recognized Tribes throughout the Section 106 process, including consultation on the identification of historic properties within the APE, evaluation of historic significance and National Register eligibility, and NRCS' determination of effect. Consulting parties were provided with cultural resource investigation reports and supporting documentation and were afforded the opportunity to review and comment. Correspondence documenting this consultation is included in Appendix A.

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

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

Table 3-9: PA-464 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

Definitions:

Demographic Index: The Demographic Index represents the average of the percent minority population and the percent low-income population within the study area. This index is used to help identify communities that may be more sensitive to changes in environmental, economic, and social conditions.

Supplemental Demographic Index: The Supplemental Demographic Index includes additional population characteristics and represents the average of percent minority population, percent low-income population, percent of the population with less than a high school education, percent linguistically isolated, percent under age 5, and percent over age 64. This index provides additional context for identifying potentially more sensitive or vulnerable populations.

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 demographic terms used in this analysis are derived from U.S. Census data and EPA EJScreen demographic indicators, which use slightly different definitions. The term “minority population” as used in the Demographic Index refers to all persons except those identifying as non-Hispanic White alone. The term “people of color” is based on Census race categories and may include individuals who identify as Hispanic or Latino regardless of race. The category “White alone, not Hispanic or Latino” is a specific Census classification. Because these categories are defined differently and ethnicity and race are reported separately in Census data, percentages reported for these categories do not sum directly and may appear inconsistent. These values are presented to provide context regarding community demographics using standard federal data sources.

The result of the socioeconomic analysis indicates that minority populations, as defined by federal demographic datasets, represent approximately 6 percent of the population within the project area. The Demographic Index, which is a combination of percent low-income and percent minority populations, is below the 50th percentile in the affected environment.

Census data also indicate that approximately 33 percent of the population in the affected environment identifies as a person of color, while approximately 66 percent identifies as White alone, not Hispanic or Latino. Differences between these values reflect differences in how race and ethnicity are categorized and reported in federal datasets. Nine percent of the population has less than a high school education, and approximately 17 percent of the population is over the age of 64. None of these populations exceed thresholds commonly used to identify populations that may be more sensitive to changes in environmental, economic, or social conditions; therefore, the project area is not considered an area of concern for these indicators.

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

PA-464 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: Social and Economic Profile for PA-464

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%
1 – Per capita median income in past 12 months (in 2022 dollars) 2 – Median household income (in 2022 dollars), 2018-2022 3 – No data available for towns under 5,000 people Source: U.S. Census Bureau 2022				

PA-464 and Goose Pond Run are not considered a substantial recreational resource within the watershed due to a lack of public access. Beneficiaries of this service include homeowners,

commercial property owners, commercial businesses (real estate, rental and leasing services, etc.) and the government.

3.3.4.4 *Local, Regional and National Economy*

Barrett Township is located close to more populous areas of Monroe County. The township is home to resort communities and tourist destinations. The most prominent land uses for Barrett Township are forest land and public open space, followed by commercial (Resort/Hotel). The largest portion of the township is within the resort district. A large part of the industry base for Monroe County is in recreation and tourism, but manufacturing, logistics, electronics, and pharmaceuticals also have a significant presence. Some of the large employers in the county include Tobyhanna Army Depot, Sanofi, Lehigh Valley Hospital and Walmart distribution center

The median household income in Barrett Township as per the 2022 ACS 5-year estimate is \$84,974 (\$2022) which is 5% higher than the median household income for Monroe County. When compared to the respective state and national median household income for the same period, the median household income in Barrett Township is 16% and 13% higher than the respective figures for the Commonwealth of Pennsylvania and the United States. The median value of owner-occupied housing for Barrett Township and Monroe County is \$241,100, and \$221,100 respectively. The median value of owner-occupied housing for Barrett Township is higher than that for the Commonwealth of Pennsylvania (\$226,200) but lower than that for the United States (\$281,900).

Barrett Township has 12.5% of people living in poverty, a number slightly higher than the average for Monroe County as well as Pennsylvania (11.3% and 11.8% respectively). The racial composition of the township is 73.1% White alone, 4.9% African American, 0.1% American Indian and Alaska native, 15.8% two or more races, 23% Hispanic and 7.3% Asian. The percentages of Hispanic, multiracial, and Asian population for Barrett Township are higher than the average respective percentages for the Commonwealth of Pennsylvania as well as for the United States.

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

Construction of the PA-464 dam was completed between 1975-1976 with federal assistance provided by the NRCS. The dam was constructed for the purposes of flood control; however, the reservoir and surrounding areas also provide recreational opportunities to local residents. PA-464 is classified as High Hazard dams under USDA NRCS standards.

The primary regulating services present are due to the presence of PA-464 which provide 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-464 does not meet all of 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-464 is summarized in Table 3-11.

Table 3-11: Land Use/Land Cover in PA-464's Affected Environment

PA 464 Land Cover Type	Acres	%
Open Water	1.77	1.05%
Developed, Open Space	7.56	4.49%
Developed, Low Intensity	6.90	4.10%
Developed, Medium Intensity	2.90	1.72%
Deciduous Forest	65.16	38.71%

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.

Evergreen Forest	1.78	1.06%
Mixed Forest	27.80	16.52%
Shrub/Scrub	2.44	1.45%
Herbaceous	3.11	1.85%
Hay/Pasture	22.90	13.60%
Woody Wetlands	24.46	14.53%
Emergent Herbaceous Wetlands	1.55	0.92%
Totals	168.33	100.00%

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. Within the Affected Environment 10.6% of total land area is impervious, all of which is related to village development 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 Affected Environment for PA-464, there are four 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 lands around PA-464, 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-scaled. 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 (although none were documented during the field survey) 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. PA-390 (Krummel Hill Road) is also classified as a state highway, running north-south along Goose Pond Run, which is the outlet to PA-464, Goose Pond Run Dam. This intersection is noted as a “Problem Intersection” (Barrett Township Comprehensive Plan Update 2008). Average daily traffic volume (PENNDOT, 2022) on PA-390 north of Canadensis is 1,500, and south of Canadensis is 3600. Both dam sites are accessible from PA-390.

3.4 **Future Forecast Conditions**

Future precipitation trends are projected to shift toward increased variability, including more frequent periods of drought as well as a rise in the number and intensity of heavy rainfall events. By mid-century, the number of days with “very heavy” precipitation is expected to increase by approximately 15%, and by 33% by the end of the century, relative to historical baselines. Likewise, the number of “extremely heavy” precipitation days is projected to rise by 36% by mid-century and 74% by century’s end.

These projected increases in intense rainfall are likely to raise the probability of localized and regional flooding. Some project alternatives that reduce or remove flood attenuation structures (e.g., decommissioning) would expand the downstream floodplain area, potentially increasing risk to life and property under future precipitation scenarios.

4. Formulation of Alternatives

4.1 Alternative Formulation Process

The Plan is formulated in accordance with 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-464 Goose Pond Dam. The purpose (NEPA) 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 in consideration of completeness, effectiveness, efficiency, and acceptability, in accordance with the Economic and Environmental Principles, Requirements, and Guidelines for Water and Land Related Resource Implementation Studies (PR&G), as well as the 2013 Principles and Requirements for Federal Investments in Water Resources and 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 then screened based on the 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 4-5.

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. Consistent with NRCS National Bulletin 190-25-8 and applicable Executive Orders, community demographic information was considered as part of the overall socioeconomic analysis presented in this Plan. This information was used to inform the analysis but was not used as a decision-making factor in the selection of the preferred alternative.

4.1.2 Alternative Formulation Criteria

Alternatives were developed with consideration of the ecosystem services identified during the scoping process (Section 1.5.4). 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 is difficult to predict and directly attribute to the proposed actions. 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 basin 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 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 preformed, 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 foundation of the concrete cutoff wall at PA-464 Goose Pond Dam. The existing borings only provide information at the specific locations and depths where they were taken. As a result, assumptions about subsurface layers between the borings may not accurately reflect the 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-464 Goose Pond Dam.

To evaluate decommissioning scenarios, assumptions were required regarding watershed characteristics, including that 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 estimate, introducing further uncertainty into curve number and time of concentration values.

The parameters for dams within the upstream watershed that are not regulated by PADEP where there is a lack of information were estimated based on LiDAR Data and aerial imagery. The limited information available required assumptions that were carried through for the breach parameters. Other assumptions included assuming all upstream breaches were initiated

by overtopping during the Freeboard Hydrograph (FBH) storm. These assumptions introduce uncertainty for the upstream dams' effects on each alternative

There are also limitations associated with the H&H software and modeling inputs. The NRCS SITES program, used for evaluating PA-464 Goose Pond 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 with 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, serves 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 and continue regular maintenance of PA-464 to maintain downstream flood benefits. However, they do not plan to rehabilitate the structure. Consultation with the PADEP Division of Dam Safety suggests that the agency would eventually 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 PA-463 Goose Pond Dam was determined to be a failure from an overtopping event of the embankment, per Table 4-1. Although PA-463 Leavitt Branch Dam and PA-464 Goose Pond Dam are not in series, both dams share the same downstream inundation area. PA-463 Leavitt Branch Dam does not provide the same level of flood protection as 464 Goose Pond Dam, and breaches at a lower storm frequency than 464 Goose Pond Dam. Therefore, the two breaches were evaluated together for no action alternative to acknowledge the existence of PA-463 Leavitt Branch Dam in this evaluation.

Table 4-1: No Action Alternative Failure Modes of Brodhead Creek Watershed Dams

	Leavitt Branch Dam	Goose Pond Dam
Failure Mode	Auxiliary Spillway Breach	Overtopping
Storm Event	24-hour, 380-year	58% FBH 6-hour, 9,285-year

The breach of both dams result in impacts an estimated 143 properties with structures, including several residential structures, approximately 10 miles south along Brodhead Creek, as per Table 4-2. The potential for significant loss of life under the dam breaches. Similarly, the damages from a breach flood wave to the built and natural environments from erosion, debris deposition and destruction of infrastructure is also high.

Table 4-2: Number of Structures Impacted by a Breach of PA-464 Goose Pond Dam

Structure Type	Number of Structures Impacted
Residential	109
Commercial	28
Institutional	6

4.2.2 Action Alternative(s)

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 4-3 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-464 Goose Pond Dam. The alternatives included raising the auxiliary spillway crest elevation to contain either the 100-year storm event or the Principal Spillway Hydrograph (PSH) event for the different types of weir crests. As discussed in the H&H report in Appendix D, the 100-year storm was refined in later rehabilitation options which conservatively included both upstream dams breaching into PA-464, creating a conservatively high 100-year storm level. Most structural rehabilitation design options for the dam site were considered but eliminated from detailed study. These options achieve the same performance as the option highlighted in Table 4-3 but were eliminated because the impacts on environmental resources and the construction costs were greater than the one that is retained for detailed study.

Table 4-3: PA-464 Goose Pond Structural Rehabilitation Design Options

Goose Pond Dam Proposed Rehabilitation Design Options									
Design Option No.	Weir Type	TOD Elevation	Auxiliary Spillway Elevation	Weir Length (ft)	Approach channel El.	Peak Flow Rate during FBH (cfs) ¹	Flood Storage to TOD (ac-ft)	Storm Contained behind Aux.	Approximate Cost
Existing	Broad Crested	1203.7	1196.5	175	1190 to 1197.4	-	2478.4	50-year	-
1	Broad Crested	1203.7	1197.4	475	1190 to 1198.2	19,356.5	2478.4	100 - year	\$16.2 – \$43.8 Million
2	Broad Crested	1203.7	1198.2	620	1190 to 1197.4	19,574.8	2478.4	PSH	
3	Broad Crested	1204.7	1197.4	370	1190 to 1197.4	19,001.7	2562.1	100 - year	
4	Broad Crested	1204.7	1198.2	470	1190 to 1198.2	19,217.6	2562.1	PSH	
5	Ogee	1203.7	1197.4	415	1192.0	19,441.1	2478.4	100 - year	\$26.0 - \$44.5 Million
6	Ogee	1203.7	1197.4	410	1188.0	19,440.7	2478.4	100 - year	
7	Ogee	1203.7	1198.2	530	1192.0	19,587.7	2478.4	PSH	
8	Ogee	1204.7	1198.2	380	1192.0	19,225.4	2562.1	PSH	
9	Fuse Gate	1203.7	1191.5	175	1186.0	18,826.4	2478.4	PSH	\$16.7 Million
10	Labyrinth	1203.7	1198.2	176	1184.0	19,490.2	2478.4	PSH	\$15.8 - \$17.1 Million
11	Labyrinth	1204.7	1198.2	166.9	1188.0	19,097.2	2562.1	PSH	
12	Labyrinth	1203.7	1198.2	191.4	1188.0	19,391.1	2478.4	PSH	
13	Labyrinth	1203.7	1197.4	181	1188.0	19,254.3	2562.1	100 - year	
14	Labyrinth	1204.7	1197.4	148.8	1186.0	19,009.3	2562.1	100 - year	
15	Piano Key	1203.7	1198.2	134	1182.0	19,429.4	2478.4	PSH	\$22.2- \$23.2 Million
16	Piano Key	1203.7	1197.4	113	1182.0	19,264.8	2478.4	100 - year	
17	Broad Crested	1210	1199.3	195	1190 to 1199.3	17,557.4	3026.6	100-year ²	\$16.2 Million
18	Broad Crested	1210	1198.2	175	1190 to 1198.2	17,491.0	3026.6	PSH	\$15.3 Million

*Highlighted design option is preferred option

Notes:

- 1. Approximate Peak Flows are not refined and are an estimate
- 2. The 100-year storm pool level elevation was refined for the preferred weir type

The preferred structural rehabilitation of PA-464 Goose Pond Dam addresses the deficiencies of the embankment and associated internal drainage system, the concerns of integrity of the auxiliary spillway during the freeboard hydrograph (FBH) storm event and overtopping of the dam during the FBH storm event. PA-464's existing crest width is less than the required minimum dam embankment crest width per TR-210-60. The preferred alternative includes widening of the dam's embankment to 16 ft per the requirements of TR-210-60. A new internal drainage system is also proposed to meet current dam safety criteria to address the presence of seepage collars around the principal spillway outlet pipe and new aggregate filter criteria for internal drains.

The preferred rehabilitation alternative also proposes raising the top of dam to El. 1210.0 to provide additional reservoir storage capacity and increase efficiency of the broad crested weir to pass the freeboard hydrograph without overtopping of the dam. The broad crested weir is proposed to be raised to El. 1198.2 to contain the PSH storm event. The alignment of the weir is positioned to where bedrock is relatively shallower so that a reinforced concrete cutoff extended into bedrock can be installed to prevent upstream head cutting of the auxiliary spillway. Raising and widening of the dam's crest results in the footprint of the dam's embankment to be extended downstream. This downstream extension of the dam's embankment will accommodate the proposed internal drainage system. The total estimated cost for this preferred rehabilitation alternative is \$15.3 Million.

4.2.3 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-464 Goose Pond Dam. If PA-464 Goose Pond Dam were to be decommissioned, a total of 71 structures would be impacted during the 100-year frequency storm compared to the existing conditions of approximately 36 structures being impacted.

The cost of decommissioning is shown in Table 4-4. 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, through 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-464 Goose Pond 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 4-4: PA-464 Goose Pond Decommissioning with Nonstructural Building Floodproofing Costs

<u>Estimated Cost</u>	
Construction of Decommissioning	\$28.3 Million
Non-Structural Measures for Downstream Houses and Commercial Buildings	\$20.4 Million
Total Limited Evaluated Alternative Cost	\$48.7 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 4-4. 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 is estimated by comparing the additional floodproofing/buyouts costs for the decommissioned scenario and with the current level of protection floodproofing/buyout costs for downstream structures. The impact on 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.

The decommissioning with nonstructural alternative has significant impacts on environmental, social and cultural resources. For example, the disruption to the social setting by the removal of residential properties (and associated tax base), public and institutional areas, multi-year construction impacts associated with flood proofing the transportation system (raising roads and bridges) would be significant to the population as a whole compared to the isolated construction improvements at each dam site.

4.2.4 **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, reducing the overall cost and providing an increase in safety.

4.3 Alternatives Considered but Eliminated from Detailed Study

No alternatives were eliminated. Table 4-5 is a screening table that evaluates each alternative for meeting the Purpose and Need and the PR&G Federal Objectives.

Table 4-5: Summary of Alternatives Preliminary Screening Evaluation at PA-464

Plan Description	Summary of Alternatives Preliminary Screen Evaluation		
	No Action / FWOFI	Action / Structural Rehabilitation	Decommissioning with Nonstructural
NEPA Purpose & Need	No; breach flood damages are not reduced, and impacts on 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, with tradeoffs: Breach-related flood risk and potential loss of life are eliminated through dam removal. Non-structural measures (floodproofing and buyouts) reduce risks to downstream structures under the non-breach flood condition; however, the loss of floodwater attenuation provided by the dam results in increased frequency and extent of non-breach flooding, affecting a greater number of properties. As a result, environmental, economic, social, and cultural impacts are not minimized to the same extent as the structural rehabilitation alternative.
Contribution to Planning Objectives			
1) Relieve Dam Safety Concerns	No; does not relieve dam safety concerns.	Yes; the dam is improved to meet dam	Yes, the dam is removed.

Plan Description	Summary of Alternatives Preliminary Screen Evaluation		
	No Action / FWOFI	Action / Structural Rehabilitation	Decommissioning with Nonstructural
		safety criteria.	
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 provide 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 support sustainable economic development. Continued dam deterioration increases the risk of catastrophic failure, resulting in substantial economic damages to residential, commercial, and public infrastructure and increasing long-term costs. Serves as the baseline condition for comparison (see Efficiency discussion).	Yes: Supports sustainable economic development by reducing flood damages, protecting infrastructure and property, and maintaining long-term economic stability. This alternative minimizes future economic losses and provides the greatest relative economic benefit among the alternatives (see Efficiency discussion).	No (limited): While non-structural measures (e.g., floodproofing and buyouts) reduce risk to specific structures and may lower long-term maintenance costs, the removal of floodwater attenuation increases the extent and frequency of downstream flooding. This results in greater overall economic impacts compared to structural rehabilitation (see Efficiency discussion).
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.

Plan Description	Summary of Alternatives Preliminary Screen Evaluation		
	No Action / FWOFI	Action / Structural Rehabilitation	Decommissioning with Nonstructural
5) Protect/Restore Functions of Natural Systems	While dam is in place, the natural existing systems below the dams are preserved; however, it is not protected after the dams fail.	Protects / preserves functions of existing natural systems below the dam by minimizing damages and loses.	Restores 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; level of flood protection is the same until the dam fails.	Yes; level of flood protection is greater for the more frequent storms.	Yes; nonstructural measures will maintain current level of flood protection.
Response to Evaluation Criteria¹			
Acceptability	Yes (conditionally acceptable): The alternative is acceptable from a regulatory standpoint because it does not require immediate action and the dam may remain in operation under current conditions. However, it does not address known dam safety deficiencies or meet current design standards and therefore is not a viable long-term solution from a public	Yes; alternative addresses regulation issues and meets the public's perspective of viability and appropriateness.	No; while it addresses regulatory issues, it does not meet the public's perspective of viability and appropriateness. .

Plan Description	Summary of Alternatives Preliminary Screen Evaluation		
	No Action / FWOFI	Action / Structural Rehabilitation	Decommissioning with Nonstructural
	safety or programmatic perspective.		
Completeness	Not complete; 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; plan evaluates all costs, actions, and downstream effects.	Not complete; plan was not fully evaluated for all necessary investments or actions downstream. Conservative low costs were used for floodproofing and did not consider additional costs associated with roads, bridges, legal fees, etc.
Efficiency	Baseline condition with net benefits of \$0. Does not improve conditions or generate additional benefits.	Provides incremental net benefits relative to the No Action alternative, but overall net benefits remain negative (BCR = 0.08), indicating the alternative does not maximize net economic benefits.	Provides lower incremental net benefits relative to the No Action alternative and, with an evaluated cost estimate of 48.7 million, does not maximize net economic benefits compared to other alternatives.
Effectiveness	No; 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.	Yes; alleviates dam safety concerns, provides an increase in the level of flood damage protection, and minimizes damages.	Yes; alleviates dam safety concerns, provides the current level of flood damage protection, and provides the same level of existing damages. The damages are minimized when comparing the dam to the dam failure breach.
Moved forward for	Yes	Yes	Yes

Plan Description	Summary of Alternatives Preliminary Screen Evaluation		
	No Action / FWOFI	Action / Structural Rehabilitation	Decommissioning with Nonstructural
Detailed Study?			
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 4-6 summarizes the alternatives studied in detail. Although the No Action/ FWOP does not meet the project objectives and criteria, NRCS requires it to be studied in detail as a comparison for the preferred alternative.

Table 4-6: Final Array of Alternatives for Rehabilitation of PA-464

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. Highest probability of dam failure and major impacts to ecosystem services, potential socioeconomic impacts, and downstream communities and properties.

ALTERNATIVE	RATIONALE OVERVIEW
	Does not improve dam to meet safety standards so the risk of a dam breach continues. Alternative keeps current level of flood protection, but does not provide protection when breaching.
Structural Rehabilitation - Goose Design Option 18	Achieves the NEPA Purpose and Need. Achieves dam safety standards and criteria for rehabilitation. Provides more than the current level of flood protection. Limits potential socioeconomic impacts and protects downstream communities and properties. Improves dams to meet dam safety standards. More cost efficient than other considered rehabilitation alternatives. Follows 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: Evaluate of Alternatives

This section addresses the environmental impacts or effects that would result from implementation of alternatives. The 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.

Decommission with nonstructural assumes a construction and implementation period of approximately 5 years. Under this alternative, PA-464 would be decommissioned by removing the dam's flood-retarding function and restoring a stable channel through the former embankment and reservoir area. Nonstructural measures would be implemented for eligible downstream structures subject to increased flooding. The term eligible structures refers to downstream structures identified based on modeled flood depth. Floodproofing may be considered for structures with inundation depths of three feet or less, while acquisition/buyouts may be considered for structures with inundation depths greater than three feet. This alternative would not provide floodproofing or other flood protection for undeveloped land.

Under the No Action/Future Without Project (FWOP) condition, the dam would continue to operate under current conditions and operation and maintenance practices but would not be rehabilitated to address existing dam safety deficiencies. Consistent with NRCS rehabilitation policy, the dam is assumed to eventually fail due to overtopping or structural failure during the planning period, and the dam would not be rebuilt following failure. For purposes of economic and environmental analysis, dam failure under the FWOP condition is assumed to occur at the midpoint of the 50-year planning period. This assumption is applied consistently throughout the economic and environmental analyses.

Table 5-1 summarizes and compares the performance of the alternatives evaluated.

Table 5-1: Summary and Comparison of Alternatives – PA-464 Planning Process

Major Works of Improvement	No Action/ FWOP	Structural Rehabilitation	Decommissioning with Nonstructural
Flood Prevention			
Rehabilitation of PA-464	The no action alternative assumes that PA-464 would eventually breach, resulting in direct and indirect impacts to many of 143 structures and 9 bridges	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-464 but provide flood protection

	suffering from flood damages.		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-464	Dam failure would result in immediate flood damage (direct and indirect) and would increase the long-term potential (direct and indirect) for flooding and flood risk downstream of PA-464.	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 downstream floodplain would increase because floodwater detention would no longer be provided by the dam.
Water Quality Management			
Rehabilitation of PA-464	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-464	The No Action alternative will eventually result in the failure of existing watershed structures.	Rehabilitation of PA-464 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-464 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 PA-464 breaches. 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	The no action alternative assumes PA-464 breaches. A breach would result in a 38% 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, protecting approximately 102 structures from the 100-year flood.	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 will keep the current level of protection only for the 100-year flood.
3) Sustainable Economic Development	No action alternative assumes a dam breach. A breach would have substantial adverse effects on 28 commercial properties below the dam.	Rehabilitation of the dam would 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 that PA-464 breaches. Changes in the floodplain following a breach wave would result in an 83% increase of floodplain area, resulting in an increase in erosion, sediment deposition, and flooding damages.	Rehabilitation of the dam 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 Natural Systems	With a presumed dam breach there would be temporary impacts to the functions of natural systems.	Proposed Action maintains current functions of natural systems.	Decommissioning the dam would restore a more natural stream flow 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 26%, 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 maintain 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-464.
Evaluation Criteria			
Acceptability	PA-464 does address state regulations since it cannot pass the PMF. Despite not	Rehabilitation of PA-464 brings the dam into compliance with NRCS and	Decommissioning the dam with nonstructural measures addresses regulatory issues;

	violating state regulations, this is not preferred. PA-464 also does not meet current NRCS and PADEP dam safety, engineering criteria, and performance standards.	PADEP dam safety, engineering criteria, and performance standards. The alternative also meets the perspective of viability and appropriateness.	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 damage will occur and will not minimize	The rehabilitation alternative alleviates dam safety concerns, provides an increase in the level of flood damage protection, and minimizes damage.	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

	damages.		downstream floodplain impacts.
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5.2 Summary and Comparison of Alternatives – Ecosystem Services

Ecosystem service flow impacts for the No Action (FWOP) were projected assuming that PA-464 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 is assumed to be greater than \$10,000,000. The calculated federal investment of \$9,538,200 is assumed to escalate by the time construction occurs. Estimated damage resulting from a breach of PA-464 was calculated producing a damage cost of \$27,333,668 for structures and vehicles. 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-464

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	Breach event will contribute to the loss of ecosystem function due to dam failure and erosion; habitat degradation. A non-breach event will	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

protect and restore the functions of ecosystems.)	maintain ecosystem function and downstream habitat.		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 resolving water resources problems should improve the economic well-being of the Nation for current and future generations.)	Until a breach event, economic activity maintains the current level. During a breach event, loss of flood damage protection leads to higher repair and economic disruption costs.	Protects economic activity through continued infrastructure protection and resilience due to the dam not breaching.	Eliminates the risk of catastrophic dam failure and reduces flood damages to eligible downstream structures 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-464 would increase the steady-state floodplain extent downstream by approximately 26%, resulting in overbank flow that could alter floodplain soil structure, contribute to streambank erosion, and affect wetland and riparian vegetation. These	The Rehabilitation alternative would increase existing levels of flood 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.

	changes have the potential to disrupt the natural hydrologic and ecological functions of the floodplain system. The non-breach event would maintain existing levels of flood protection.		
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 both dam structures would breach, resulting in as many as 143 structures and 9 bridges suffering from flood damage. This alternative does not meet this principle.	The rehabilitation alternative increases 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-464 would no longer provide flood routing or flood-retarding benefits beyond the 100-year storm. 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	The rehabilitation alternative has minimal up-stream impacts within the dam flood pool area. There are no downstream impacts from this alternative. Since PA-464 provides downstream protection with PA-463, the downstream	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

	permanent long-term increased risk of future flooding. Since PA-464 provides downstream protection with PA-463, in the No-action breach event, both dams fail and do not provide downstream protection.	inundation limits show PA-463 still failing during the FBH, but at a less inundation depth due to the increase in flood protection from PA-464.	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, groundwater storage recharge, and retention provided by the dams. The non-breach event would maintain existing levels.	The Rehabilitation alternative maintains flood water storage, groundwater storage recharge, and retention provided by the dams.	Decommissioning would result in the loss of floodwater storage, groundwater recharge, and retention functions currently provided by PA-464. Long-term freshwater conditions would shift from an impounded system to a more natural free-flowing stream condition.
1)Flood Damage Reduction (monetized)	Under the no action alternative, PA-464 would not be rehabilitated, and the dam's current flood mitigation benefits would continue until a dam breach.	The rehabilitation alternative would maintain and enhance the flood mitigation benefits currently provided by PA-464, ensuring continued protection of downstream properties and infrastructure. By improving 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 \$44,665 when compared	Decommissioning with nonstructural measures 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-464 because the dam's flood-retarding function would be removed.

		to the no action alternative.	
Total Project investment	0	\$17,186,800	\$59,276,898
Annual Project Investment	0	\$556,962	\$1,875,916
Annual OM&R Costs	\$4,500	\$4,500	\$4,500
Total Annual Project Costs	\$4,500	\$561,462	\$1,880,416
Provisioning	Not Monetized	\$0	\$0
Regulating	Not Monetized	\$44,665	\$33,180
Cultural	Not Monetized	Not Monetized	Not Monetized
Supporting	Not Monetized	Not Monetized	Not Monetized
Total Annual Monetized Benefits	0	\$44,665	\$33,180
Total Annual Monetized Costs	0	\$556,962	\$1,875,916
Benefit-Cost Ratio	*	0.08	0.018
Annual Monetized Net Benefit	0	(\$512,297)	(\$1,842,736)
Regional Employment	A breach of PA-464 would cause widespread disruption to businesses, tourism, and public services in Barrett Township and downstream	Rehabilitation would sustain existing employment by protecting commercial centers, tourism activity, and public services from flood damage. In addition, the	Decommissioning and stream restoration would generate short-term construction employment and related support jobs. Long-term employment effects are uncertain. While restoration could

	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. A non-breach event would maintain existing conditions.	project would generate short-term construction employment and related support jobs, contributing positively to the regional labor market.	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	During a breach event, flood damage to homes, businesses, and infrastructure would reduce household earnings, increase repair costs, and strain local tax revenues. Long-term disruptions to commerce, recreation, and tourism would diminish regional income and economic stability. A non-breach event would maintain existing conditions.	Rehabilitation would preserve regional income by maintaining household earnings and business continuity. Construction wages and 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.	Decommissioning with nonstructural measures may preserve income for occupants of treated structures and would generate short-term 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	Rehabilitation would preserve inter-jurisdictional flood control and ensure continued reliability of transportation corridors that serve multiple municipalities. It would	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

	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. A non-breach event would maintain existing conditions.	support long-term resilience planning efforts across Monroe County and maintain regional aquatic habitat connectivity by minimizing downstream sedimentation and erosion impacts.	sediment transport, and temporary changes to water quality could affect transportation networks, municipal services, and aquatic systems beyond the immediate project area.
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*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

The watershed plan is a planning process that identifies and analyzes the effects on the human and natural environment that may occur as a result of the alternative plans. These alternatives include the No Action/FWOP, Structural Rehabilitation, and Decommission with Nonstructural. Each alternative assesses direct effects, indirect effects, and cumulative effects.

The primary resource concerns identified within the scoping effort (Table 3-3), as relevant to the Proposed Action, were carried forward for analysis in Section 0. Those that were identified as not relevant are not discussed in this section.

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 soils within the flood pool, surrounding soils, and downstream streambanks contributing to increased flooding and water quality degradation. A breach event 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 stabilize the 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-464 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 –Under the No Action alternative, eventual dam failure at PA-464 would result in downstream flooding, impacting an estimated 3.5 acres of farmland of statewide importance (Holly silt loam) and 42.6 acres of prime farmland (Philo silt loam, Pope silt loam, and Pope silt loam high bottom) within the 100-year floodplain. These soils are located along the lower elevation stream-adjacent corridor south of the dam and are mapped primarily within the Goose Pond Run floodplain.

Although the affected soils are currently not in agricultural production, their classification under the NRCS Land Capability Classification system as prime or of statewide importance reflects their inherent productivity potential. Conversion of these soils back into active farming use is unlikely due to current land use patterns and potential development pressures. However, their inundation and erosion during a breach event could lead to long-term degradation of soil structure, fertility, and function, reducing their future viability for agricultural or ecological use.

Downstream impacts could also include the displacement and deposition of sediment from the dam breach, contributing to the aggradation of floodplain soils and altering their profile. These changes would negatively affect the long-term potential of these soils to support agricultural activities, native vegetation, or serve as functional floodplain ecosystems.

These considerations are recognized in the "Monroe County Conservation District Letter of Support" (Appendix F), which emphasizes the importance of preserving agricultural soils and downstream floodplain stability through dam maintenance and rehabilitation.

Determination: Continued dam operation would have negligible effects on farmland; however, a breach scenario would result in direct, adverse, short-term impacts to prime and statewide important farmland, and may result in longer-term degradation of soil quality and land capability due to flooding and sediment deposition. These soils are primarily located along the floodplain corridor of Goose Pond Run, beginning approximately 800 feet downstream of PA-464 and extending to the confluence with Brodhead Creek near the community of Canadensis. NRCS-mapped soil units include Philo silt loam (prime farmland when drained) and Pope silt loam (high bottom), which occupy floodplain terraces along the east bank of Goose Pond Run.

Structural Rehabilitation Alternative – The areas immediately south of the PA-464 dam, including portions of the downstream floodplain along Goose Pond Run, contain soils classified as prime farmland (e.g., Philo and Pope silt loams) and farmland of statewide importance (e.g., Holly silt loam). Under the proposed rehabilitation alternative, these areas would not be subject to land use conversion. The project does not involve grading, excavation, or construction within these soils, nor will it result in any permanent impairment of their agricultural function. These soils lie within the lower elevation floodplain corridor but outside the construction footprint of the dam improvements.

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-464, including portions of the Goose Pond Run 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-464 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-464 would continue to degrade over time, reducing its ability to manage water quantity effectively. A future breach would result in the loss of the reservoir’s floodwater detention and flow regulation functions, leading to increased downstream peak discharges during storm events and reduced baseflow support during dry periods. This would contribute to more variable streamflow patterns in Goose Pond Run, increasing flood risk, channel instability, and potential impacts to downstream infrastructure and aquatic habitats.

Determination: The No Action alternative would have negligible long-term effects on water quantity under normal operating conditions. However, in the event of a dam breach, the watershed would experience direct, adverse, and significant short-term impacts due to loss of storage capacity, increased downstream flow velocities, and diminished capacity for flow moderation.

Structural Rehabilitation Alternative – Under the Structural Rehabilitation Alternative, the dam’s ability to regulate water quantity would be maintained or enhanced. Rehabilitation would restore or improve the structure’s flood attenuation function, preserving storage and controlled release of stormwater. This would sustain downstream flow regulation, reduce flood peak magnitudes, and support stable hydrologic conditions in Goose Pond Run. These benefits would extend to reduced streambank erosion, improved aquatic habitat stability, and protection of downstream land uses and infrastructure.

Determination: The Structural Rehabilitation alternative would have beneficial long-term effects on water quantity by ensuring continued flood storage capacity, moderating extreme flows, and promoting consistent hydrologic conditions within the Goose Pond Run watershed.

Decommissioning with Nonstructural Alternative – Decommissioning PA-464 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 Goose Pond Run 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 Scenario, the continued presence of the PA-464 dam provides a beneficial effect on downstream sedimentation by trapping an

estimated 175 cubic yards of sediment annually, based on sediment survey data from the Goose Pond reservoir. This accumulation prevents sediment from being transported into downstream reaches of Goose Pond Run and Brodhead Creek. However, the dam also contributes to adverse downstream water quality effects, including elevated temperatures and reduced dissolved oxygen levels, relative to free-flowing stream conditions. In the event of a dam breach, this stored sediment, particularly the fine-grained fraction would likely be mobilized, resulting in short-term, significant increases in total suspended solids (TSS) and turbidity, degrading downstream water quality and aquatic habitat integrity. 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 at PA-464 would cause short-term disturbances to the embankment and auxiliary spillway footprint, including temporary soil exposure, substrate disturbance, and localized increases in turbidity during earthwork and vegetation removal. Substrate displacement and construction-related sedimentation may temporarily affect benthic macroinvertebrates and aquatic habitats within the immediate project area. These effects would be mitigated by implementing erosion and sediment control best management practices (BMPs) and seasonal construction timing to avoid sensitive aquatic periods.

Post-construction, the rehabilitated structure is expected to continue trapping sediment and particulates, promoting long-term water quality stability downstream. The Goose Pond reservoir currently traps an estimated 175 cubic yards of sediment annually. This is consistent with current sedimentation dynamics and not a change from baseline conditions.

Although the dam regulates flows and sediment delivery, some degree of sediment starvation downstream may persist, particularly during lower flows. However, there is no documented evidence of active channel incision or downstream instability in the current watershed conditions. Therefore, the potential for future channel incision is considered low and would likely remain minor, especially with regulated releases and proposed downstream stabilization measures.

The rehabilitation design includes targeted streambank stabilization downstream of the dam outlet, which is expected to reduce total suspended solids (TSS) and turbidity over the long term by minimizing lateral erosion and improving bank vegetative cover.

Vegetative buffers may be temporarily removed during construction, increasing localized surface runoff and potentially elevating near-channel water temperatures. These effects are expected to be short-lived, as reestablishment of native riparian vegetation is included in the post-construction restoration plan. Over time, restored buffers will improve shading, filter surface runoff, and enhance instream habitat conditions.

Hydraulic modifications such as temporary dewatering using cofferdams may be employed

during riser or conduit work, but this would be confined to the reservoir basin and controlled within the construction limits. Normal downstream flows would be maintained using bypass pumps or controlled discharge, and no long-term changes to flow patterns, pool elevation, or circulation are anticipated following project completion.

Determination: Construction of the Rehabilitation Alternative would have direct, minor (short-term), and localized effects to substrates, suspended particulates and turbidity, current patterns and circulation. There would be no long-term effects to suspended particulates and turbidity, current patterns and water circulation, and normal water fluctuations.

Decommissioning with Nonstructural Alternative – Decommissioning PA-464 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 – No Action / FWOP – Under the No Action/FWOP alternative, PA-464 would not be rehabilitated and would continue to operate in its current condition until eventual failure due to overtopping or structural deterioration. In the event of a dam breach, breach modeling predicts inundation of more than 140 downstream structures, including residential homes, commercial buildings, and public infrastructure. These breach-related impacts would be acute and short-term but severe.

Under non-breach conditions, the dam currently provides flood attenuation and storage that reduces peak discharge and moderates downstream flood elevations and floodplain boundaries.

Following a dam breach, the loss of flood storage would result in a permanent change in downstream hydrology and floodplain conditions. The total acreage of mapped 100-year floodplain would increase from approximately 849 acres to approximately 1,105 acres. Based on GIS analysis of structures within the 100-year floodplain, the number of structures located within the 100-year floodplain would increase from approximately 36 structures under existing/FWOP non-breach conditions to approximately 71 structures under post-breach conditions. This represents an increase of approximately 97 percent in the number of structures located within the 100-year floodplain.

This increase reflects an expansion in the spatial extent of inundation during a 1-percent annual chance (100-year) flood event due to the loss of flood storage provided by the dam. The dam currently attenuates peak flows and reduces downstream flood elevations; without the structure, higher peak discharges and greater overbank flooding would be expected during large storm events, resulting in increased floodplain extent and increased flood risk to downstream development.

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-464 will increase 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-464 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 dams. Natural processes, including storm-flood events, could change these features over time. 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-464 would temporarily disturb approximately 833 linear feet and 0.40 acres of jurisdictional streams and wetlands during construction activities associated with drainage improvements and work in the existing borrow area. Permanent fill associated with the proposed broad-crested weir modification would impact an additional 493 linear feet of stream and 1.78 acres of wetlands.

Wetlands affected include a mix of palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO) systems, as delineated during the 2022 wetland field survey. These wetland systems provide important ecological functions such as sediment and nutrient retention, groundwater recharge, and wildlife habitat. A detailed summary of wetland classifications, acreages, and ecological functions is provided in Table 3-7 and 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: During construction there would be minor (short-term) disturbances to a total of 833 linear feet and 0.40 acres of jurisdictional streams and wetlands. Additionally, there would be minor (long-term) fill of 493 linear feet and 1.78 acres of jurisdictional streams and wetlands.

Decommissioning with Nonstructural Alternative – Decommissioning PA-464 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 address the goals of the 2004 Water Resources Plan for the Delaware River Basin, including the prevention or minimization of flood-induced loss of life and property, and protection of floodplain ecology. This alternative would not address the high hazard rating of the dam site per the Monroe County Hazard Mitigation Plan.

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 dams 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-464 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-464. 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 of the dam 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 endangered northeastern bulrush (*Scirpus ancistrochaetus*).

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 U.S. Fish and Wildlife Service (USFWS), the PA-464 project area is within the known range of the federally endangered northern long-eared bat (*Myotis septentrionalis*) and Indiana bat (*Myotis sodalis*), as well as the proposed endangered tricolored bat (*Perimyotis subflavus*). The project includes the removal of approximately 10.6 acres of trees to support dam safety improvements and spillway modifications. All tree clearing will occur during the bat inactive season (November 1 through March 31) to avoid impacts to roosting or maternity habitats. Approximately 9.84 acres of cleared forest will be allowed to naturally regenerate post-construction.

No roosting or hibernacula habitat was identified during the site walk, and there is no known bat occurrence data within the immediate project area. Based on the seasonal restrictions and scope of proposed vegetation removal, the USFWS concurred with a "May Affect, Not Likely to Adversely Affect" (NLAA) determination for the northern long-eared bat, as documented in the August 14, 2024 concurrence letter (Appendix A).

The project also falls within the broader range of the northeastern bulrush (*Scirpus ancistrochaetus*), a federally endangered plant species associated with specific wetland habitats. Although the species occurs elsewhere in the Brodhead watershed, no suitable habitat or individuals were observed in the vicinity of PA-464 during the June 2022 wetlands and waterways investigation. Field staff screened for potential occurrences during the delineation effort; however, this was not a formal botanical inventory. Based on these observations and the absence of suitable peatland or saturated meadow conditions within the project footprint, adverse effects to northeastern bulrush are unlikely.

As the dam will remain in place and the project will not alter downstream hydrology beyond existing conditions, impacts to listed species or habitats in the downstream floodplain are not anticipated.

Determination: Based on agency consultation, seasonal restrictions, and habitat conditions observed during field investigations, the proposed action would have no effect on federally listed threatened or endangered species or their habitats downstream of PA-464, and is not likely to adversely affect listed bat species within the project area.

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 – Under the No Action alternative, continued operation of PA-464 would maintain existing habitat conditions in the reservoir pool and surrounding riparian corridor, which currently support migratory bird use. The impoundment provides suitable foraging and nesting habitat for species that rely on open water, emergent wetlands, and forested edge habitat. According to the Pennsylvania Natural Diversity Inventory (PNDI) review, the action area is within the potential range of numerous migratory bird species protected under the Migratory Bird Treaty Act (MBTA), including riparian and wetland-associated species such as warblers, flycatchers, and waterfowl.

In the event of a dam breach, the sudden draining of the reservoir would eliminate this semi-permanent waterbody and the associated aquatic and wetland habitat. This would result in loss of foraging, loafing, and potential nesting habitat for migratory birds that depend on lentic (still-water) conditions. The shift from a ponded system to a more incised and flood-prone stream channel may also reduce vegetative cover and change plant community structure, further degrading habitat suitability. These impacts would be especially pronounced in spring or early summer if a breach coincided with peak migratory or breeding seasons.

Determination: While continued operation of the dam would maintain habitat values for migratory birds, a breach would likely result in moderate, long-term, adverse impacts on migratory bird habitat within the reservoir and adjacent riparian corridor. These impacts would be caused by the sudden loss of standing water and wetland habitat, which currently supports protected avian species identified through PNDI screening.

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 long-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 and maintenance of the dams.

Under the No Action alternative, continued operation and maintenance of PA-464 would not affect bald or golden eagles. The existing 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 field observations.

However, in the event of a dam breach, the sudden loss of the Goose Pond impoundment would alter the aquatic and riparian habitat structure in the area. The resulting elimination of a still-water foraging area and possible decline in prey availability (e.g., fish and amphibians) could reduce the 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 lack 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 or golden 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 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 minor effects on fish and wildlife.

Structural Rehabilitation Alternative – Construction activities related to rehabilitation of the dam could potentially result in the temporary 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 a year or two, 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.

Modifications to Goose Pond Run downstream of the dam would result in minor short-term effects to the stream habitat as a result of construction within the stream and removal of streambank vegetation. The project would enhance overall stream function and consequently improve in-stream fish habitat. Following construction, there would be negligible long-term effects due to the use of BMPs during construction and stream and streambank restoration.

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-464. Rehabilitation of PA-464 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 at PA-464 would temporarily disturb approximately 0.04 acres of emergent wetland and riparian vegetation along Goose Pond during repairs to the principal spillway intake riser. This vegetation is located at the pond edge and consists primarily of herbaceous and shrub-dominated species within the wetland fringe. While this disturbance would occur during construction, the affected area would be permanently incorporated into the maintained footprint of the enlarged dam embankment and associated spillway features. Replanting with native riparian and wetland vegetation is proposed as part of site restoration, so the effect is considered short-term in functional loss, but permanent in land cover change.

Additional impacts would occur to approximately 0.30 acres of riparian vegetation, which includes a mosaic of forested floodplain vegetation and adjacent upland buffer. This vegetation would be removed to accommodate embankment raising, grading, and drainage improvements

east of the dam. The area does not include forested wetland; rather, it consists of floodplain forest and upland transition zones adjacent to jurisdictional wetlands, as documented in the 2022 field survey.

Determination: The Rehabilitation Alternative would result in minor, short-term impacts to riparian vegetation during construction and minor, long-term impacts due to the permanent conversion of approximately 0.30 acres of forested floodplain and upland riparian vegetation to maintain dam infrastructure and open grass. These effects would be mitigated through native vegetation replanting and long-term stabilization measures.

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 would remove approximately 10.6 acres of forested vegetation. This effect would begin in the short-term during construction and persist in the long-term as the area would be incorporated into the enlarged dam and maintained grassy areas. Replanting native vegetation and allowed natural regrowth will occur on approximately 9.84 acres in disturbed areas outside of that required for dam maintenance.

Determination: There would be minor short-term effects from construction activities at both dam sites. Approximately 10.6 acres of tree clearing area would be replanted with 9.84 acres of natural re-growth. The rehabilitation of the dams would result in long term minor impacts from the removal of a total of 10.6 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 and Tribal Resources (Cultural and Social Ecosystem Services)

No Action/FWOP - Under the No Action alternative, failure of the PA-464 dam would result in the uncontrolled release of water, with downstream inundation extending through portions of the historic village of Canadensis. Within this downstream breach zone, the Architectural Desktop Survey identified 10 individual properties potentially eligible for listing in the National Register of Historic Places (NRE). These include early 20th-century boarding houses, vernacular commercial buildings, and contributing resources near Skytop Lodge. A breach event would likely cause significant, short-term, adverse impacts to these resources due to floodwater erosion, sediment deposition, and structural destabilization. Over the long term, the expanded floodplain resulting from the loss of flood control could adversely alter the setting, integrity, and use of historic structures, constituting a major adverse effect on cultural resources.

There are no known cultural or tribal resources located within the immediate PA-464 dam footprint or its upstream flood pool. The area has been previously disturbed by dam construction, maintenance access roads, and borrow activities, and exhibits no indicators of intact archaeological potential.

Determination: While the dam site and flood pool do not contain any known or eligible cultural resources, the No Action alternative could result in major short- and long-term adverse effects to potentially eligible downstream historic properties, including direct damage and long-term impacts associated with changes in floodplain extent and frequency.

Structural Rehabilitation Alternative - The proposed rehabilitation of PA-464 will involve modifications to the dam and spillway and an increase in the Top of Dam (TOD) flood pool elevation. However, no architectural or archaeological resources have been identified within the area of potential effect (APE) associated with the expanded flood pool. This conclusion is supported by both the Phase I Archaeological Investigation and the Architectural Desktop Survey, which found the area to be previously disturbed and lacking in cultural resource sensitivity.

Downstream, the continued operation of PA-464 under the Rehabilitation Alternative will maintain existing flood protection, which in turn will help preserve historic properties in Canadensis by reducing the frequency and extent of damaging overbank flood events. The project will utilize existing roads and rights-of-way and will not result in significant alterations to the visual landscape or setting of historic resources.

NRCS initiated consultation with the Pennsylvania State Historic Preservation Office (PA SHPO) and multiple federally recognized Tribal Governments early in the environmental review process. NRCS submitted a Phase I Cultural Resources Report and requested concurrence on a “No Effect” determination for the Rehabilitation Alternative. PA SHPO formally concurred with this determination in May 2025.

Tribal consultation included outreach to eight Sovereign Tribal Governments with ancestral ties

to the region. Formal responses were received from several Tribal Governments. To date, the Eastern Shawnee Tribe, the Shawnee Tribe, and the Stockbridge-Munsee Community stated that “the project proposes No Adverse Effect or endangerment to known sites of interest” and requested notification of any inadvertent discoveries but requested continued consultation if inadvertent discoveries were found during construction. No other Tribal governments objected or responded to subsequent consultation requests, and final documentation was prepared per 36 CFR 800.3(c)(4).

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Determination: The Rehabilitation Alternative will have no effect on cultural or tribal resources at the PA-464 dam site or within the upstream flood pool. Downstream NRE resources will benefit from the preservation of flood control function and are not anticipated to experience any adverse effects. Based on the absence of identified resources, agency concurrence, and formal consultation responses from the PA SHPO and participating Tribal Historic Preservation Offices, the Rehabilitation Alternative will have no effect on upstream or downstream cultural or tribal resources.

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-464 (Goose Pond Dam) would continue to degrade, eventually breaching during a significant flood event. Modeling of a Freeboard Hydrograph breach indicates inundation of 109 residential buildings, 28 commercial structures, and 6 institutional facilities within the downstream floodplain. Critical infrastructure at risk includes 9 bridges, approximately 11.12 miles of state roads, and 3.4 miles of local roads, all of which provide essential access throughout Barrett Township and the greater Pocono region.

The economic effects of dam failure would be particularly severe due to the region’s reliance on tourism and seasonal recreation. A breach could sever access to high-profile destinations such as Skytop Lodge, the Flying Dollar Airport, and local campgrounds, disrupting hospitality services and resulting in reduced visitor spending, job losses, and diminished property values. Small businesses serving the resort corridor and Canadensis village would face extended recovery periods due to physical damage and loss of customer access. Moreover, community institutions and emergency services would be hindered by damaged infrastructure, increasing response times and operational costs.

At the regional and national scale, dam failure would likely trigger federally declared disaster response and recovery efforts, including debris removal, road and bridge reconstruction, and

public assistance funding. These costs would be borne by state and federal agencies in addition to local government resources. Furthermore, the loss of ecosystem services such as sediment retention and regulated streamflow would result in degraded water quality, potentially affecting downstream recreational fisheries and water-dependent economies in the Brodhead Creek and Delaware River watersheds.

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 tourism, suppressed economic activity, increased public expenditure, and prolonged disruption to transportation and emergency services. National interests would be affected due to elevated federal disaster response costs and losses in downstream watershed resilience.

Structural Rehabilitation Alternative – The Preferred Alternative involves rehabilitating PA-464 to restore dam safety and extend service life consistent with NRCS TR-60 and PADEP dam safety criteria. Major rehabilitation elements include repair of the principal spillway intake riser, embankment stabilization, auxiliary spillway modification, and sediment removal. These actions will protect 143 structures within the downstream floodplain, preserve over 14 miles of critical roadways, and ensure continued operation of tourism-related facilities within the region.

The total cost is estimated at \$17.2 million, of which approximately \$12.0 million would be federally funded through PL 83-566, with \$5.2 million in local sponsor costs. Although the formal benefit-cost ratio is less than 1.0 and net monetized benefits are negative when compared to the No Action baseline, the Preferred Alternative reduces the risk of catastrophic economic losses associated with a dam breach and preserves important non-monetized economic values. These include continued operation of tourism facilities, protection of transportation infrastructure, reduced disaster recovery costs, and preservation of ecosystem services such as sediment retention, water quality, and cold-water fisheries. These values align with the Principles and Requirements for Federal Investments in Water Resources (PR&G) and are supported under the National Watershed Program Manual (NWPM) criteria for high hazard dam rehabilitation.

Determination - The Preferred Alternative is expected to produce minor long-term beneficial effects on the local and regional economy by averting catastrophic loss of life and property, preserving essential services and transportation, and reinforcing the tourism-dependent economy. While not cost-effective in strict economic terms, the project is justified under PR&G and NWPM criteria as a necessary investment in public safety, economic resilience, and long-term watershed function.

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-464.

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 and Cultural and Social Ecosystem Services)*

No Action/FWOP - The updated dam breach analysis prepared for this Plan indicates that failure of Goose Pond Dam (PA-464) would result in inundation of 109 residential structures, 28 commercial buildings, 6 institutional facilities, and 9 bridges, as well as approximately 14.5 miles of roadway, 11.12 miles of state-maintained, and 3.4 miles of locally maintained roads. Based on U.S. Census average household size estimates, the population at risk (PAR) is approximately 618 individuals. These figures reflect permanent residential occupancy and assumed representation for commercial buildings. This value does not account for transient daytime populations within institutional buildings, which could substantially increase actual exposure during a flood event.

Critical infrastructure that would be affected includes transportation corridors, public safety facilities, and utilities essential for emergency response and post-disaster recovery. Of particular concern is PA-447 (Creek Road), a state-designated north-south highway that parallels Brodhead Creek and lies within the inundation area. According to PennDOT (2022) traffic volume data, PA-390 north of Canadensis experiences approximately 1,500 vehicles per day, with volumes increasing to about 3,600 vehicles south of the village. Although Goose Pond Dam (PA-464) is not directly connected to a major highway, it is accessible from PA-390 via a network of local roads that would be inundated during a dam breach scenario.

Interruption or damage to these roadways would severely restrict ingress and egress for residents and emergency responders, delaying evacuation and prolonging response and recovery operations. Inundation mapping and structure-specific flood risk data are provided in Appendix C.

Determination: In the event of dam failure, the No Action/FWOP Alternative would result in significant direct, adverse, and major short-term impacts on public health and safety. Long-term impacts would be adverse and major due to persistent risks to life, property, and community infrastructure.

Structural Rehabilitation Alternative – The Structural Rehabilitation Alternative for Goose Pond Dam (PA-464) would reduce the risk of dam failure and eliminate the associated threat to downstream life and infrastructure. With implementation, the risk of breach-induced inundation would be significantly minimized or eliminated under design storm events. As a result, approximately 109 residential structures, 28 commercial buildings, 6 institutional facilities, 9 bridges, and nearly 14.5 miles of roadway would be protected from catastrophic flooding. This alternative would preserve the integrity of key transportation routes including PA-447 and PA-390, ensuring that critical access for emergency services, residents, and commerce remain uninterrupted during flood events. Emergency response and evacuation routes would be maintained and impacts to public service buildings and utilities would be avoided. Rehabilitation would also reduce or eliminate sedimentation and debris-related blockages that could exacerbate roadway and bridge failures during overtopping events.

Determination: The Structural Rehabilitation Alternative would result in long-term, major beneficial impacts to public safety and infrastructure resiliency by mitigating the risk of dam

failure. No adverse short- or long-term impacts on public health and safety are anticipated under this 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-464 could ultimately lead to a dam breach. A breach scenario would expand the current 100-year floodplain from 849 acres to 1174 acres, increasing the downstream flood risk of structures by more than 26%. New development within this area would be limited by the Monroe County Flood Hazard bylaw.

Determination: In the event of a dam breach, there would be significant direct, adverse, and major impacts in the short-term 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-464 would preserve the dam’s existing flood attenuation capacity, thereby maintain the current configuration of the 100-year floodplain and avoid 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-464 (Goose Pond 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-464 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-464 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-464 Alternatives - Effects on Resource Concerns and Ecosystem Services

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation	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 sediment scour.	Construction would cause minor, short-term impacts to water quality from ground disturbance and in-stream work, with localized turbidity increases minimized by BMPs. Long-term effects would be negligible, as	Construction would cause minor, short-term impacts to water quality from ground disturbance and in-stream work, with localized turbidity increases minimized through BMPs. The dam removal may cause

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation	Decommissioning with Nonstructural
						the dam functions as a dry detention structure with a low sediment trap rate of approximately 0.032 acre-feet per year, indicating minimal sediment retention and limited influence on downstream sediment transport and water quality.	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-464. 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 833 linear feet and 0.40 acres of jurisdictional streams and wetlands. Long-term: Permanent fill impacts include 493 linear feet and 1.78 acres of wetlands (PEM, PSS, PFO).	Short-term adverse impacts to aquatic systems would occur from erosion and sedimentation, turbidity, and channel adjustment during and following dam removal.
Regional Water					Continued Operation: Does not address high hazard dam deficiencies	Advances goals of regional watershed and hazard mitigation plans	This alternative would address the dam's high hazard status and

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation	Decommissioning with Nonstructural
Resource Plans					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.	by reducing flood risk and addressing the dam's high hazard status.	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.	No effect on listed species or habitats downstream. NLAA determination based on seasonal tree clearing, habitat avoidance, and agency consultation.	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 downstream floodplain.
Migratory Bird Treaty Act				X	Continued Operation: No effect. Breach: Potential habitat loss with draining of the reservoir.	Minor short-term impacts due to temporary habitat removal during construction. Long-term, reservoir conditions maintained.	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: Indirect effects possible on foraging habitat due to reservoir loss.	No effect. No nests or high-quality foraging habitat present at the site. USFWS consultation has yielded a "May Affect, but not likely to	Minor long-term adverse effects may occur due to the loss of potential bald eagle foraging habitat associated with the reservoir. Golden eagles

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation	Decommissioning with Nonstructural
						adversely affect” determination.	are unlikely to be affected.
Invasive Species		X			Continued Operation: No effect. Breach: Potential for long-term spread due to vegetation disturbance and sediment transport.	No adverse long-term effects anticipated.	Potential long-term spread of invasive species may occur due to vegetation disturbance, sediment transport, and increased flooding within the expanded downstream floodplain.
Fish, Wildlife & Aquatic Resources	X			X	Continued Operation: Negligible effects. Breach: Short-term habitat disruption; long-term effects dependent on flood severity and recovery.	Minor short-term effects from displacement and construction noise. Long-term habitat impacts minimized through BMPs, replanting, and protection of streambanks.	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- and long-term effects from vegetation loss, erosion, and floodplain alteration.	Short-term impacts to 0.35 acres of riparian vegetation; permanent conversion of 0.30 acres. Mitigated through revegetation and BMPs.	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.
Forest Resources	X	X	X	X	Continued Operation: No effect.	Short-term impact to 10.6 acres of forest; 9.84 acres will regenerate.	Adverse short term and potentially long-term effects downstream

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation	Decommissioning with Nonstructural
					Breach: Short- and long-term effects from tree loss and altered forest structure in floodplain.	Long-term minor impact due to permanent conversion to grassed dam maintenance areas.	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. Breach: Major adverse effects to 10 NRE-eligible downstream resources due to flood damage and setting	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-Cayuga Nation; Shawnee Tribe; Onondaga Nation; and the Stockbridge-Munsee Community. Responses were received from several Tribal Nations,	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	Decommissioning with Nonstructural
						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 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.	Long-term economic benefits from flood protection and infrastructure stability. Annual flood protection benefits avoid flood damage equal to \$44,665.	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 effects may occur in newly flood-prone areas.
Public Health & Safety		X		X	Continued Operation: Risk to public health and	Maintains flood protection and dam	Long-term beneficial effects would result from

Resources	Provisioning	Regulating	Supporting	Cultural & Social	Alternatives		
					No Action/ FWOP	Structural Rehabilitation	Decommissioning with Nonstructural
					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.	safety. No new adverse effects anticipated.	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					Breach: Major short-term impacts from flooding, erosion, and infrastructure damage. Long-term effects include floodplain expansion, land abandonment, and habitat corridor fragmentation.	Short-term construction-related disturbance at dam site; long-term preservation of existing land use and prevention of floodplain expansion.	Permanent impacts to land use and land cover would occur due to 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 miles of state roads and 2.09	The Structural Rehabilitation Alternative would significantly reduce the risk of roadway and bridge damage by maintaining dam integrity and preventing uncontrolled releases during storm events. By preserving access to major transportation routes, this alternative would	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	Decommissioning with Nonstructural
					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.	ensure continued mobility and safety for the traveling public. No long-term adverse transportation impacts are anticipated under the proposed action.	

6. Preferred Alternative

6.1 Rational for the Preferred Alternative

The preferred alternative for PA-464 is the structural rehabilitation/rehabilitation alternative 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 project sponsor identified structural rehabilitation as the recommended plan, as it is the federally assisted alternative that most effectively addresses the project's goals.

6.2 Measures to be Installed

The following measures are to be installed at Goose Pond Dam site to rehabilitate the dam to achieve dam safety standards, as shown in Appendix C:

- Raise the top of dam to elevation 1210.0 and reduce the potential for a dam overtopping event.
- Relocate the control section upstream in the auxiliary spillway channel and install cutoff wall to bedrock.
- Raise auxiliary spillway crest to El. 1198.2 to contain the Principal Spillway Hydrograph (PSH) event. The existing width of the auxiliary spillway will be maintained, ensuring that the flow capacity remains consistent with current hydraulic design parameters.
- Install a new drainage system to the downstream embankment toe.
- Extend the existing principal spillway outlet pipes to a new impact basin.

6.3 Irreversible or Irretrievable Commitment of Resources

Implementation of the preferred alternative—structural rehabilitation of PA-464—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 (NECH § 610-A.5).

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 known areas of controversy have been identified regarding the proposed rehabilitation of PA-464 Goose Pond Dam. 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 Tribe, 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 was 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 \$12,700 and are included in the \$162,500.

PA-464 Goose Pond Dam resides within an existing Sponsor-held easement 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 \$65,000:

- Temporary Construction Easements - Needed for improved access to the dam, a staging area, and a borrow area.
- Permanent Flowage Easements - While required at the time of original construction, the current easement does not include flowage easements to the current top of dam. These,

and permanent flowage easements for the proposed raised top of dam are required to prevent construction activities within the flood pool.

- Permanent Operation & Maintenance Easement - The right abutment of the dam is not within the current operation and maintenance easement and is required 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 U.S. Army Corps of Engineers (USACE) indicates that mitigation requirements for jurisdictional wetlands and streams at PA-464 will be based on the extent of permanent impacts, including 1.78 acres of wetland fill and 493 linear feet of stream impacts associated with spillway modifications. These requirements will be determined during the individual permitting process. Due to the scope of disturbance, mitigation is expected to be limited and may be fulfilled through on-site enhancement or compensatory credit purchase through a Pennsylvania Department of Environmental Protection (PADEP)-approved mitigation bank.

Based on findings from the 2022 architectural survey and archaeological desktop review, no cultural resources are present within the PA-464 dam footprint or upstream flood pool. The Pennsylvania State Historic Preservation Office (PASHPO) concurred with a finding of “No Effect” on historic properties. In accordance with Section 106 of the National Historic Preservation Act (36 CFR Part 800), consultation was conducted with federally recognized Tribes that may have ancestral or cultural affiliation with the project area. Consultation letters, project information, and the Area of Potential Effects (APE) documentation were provided to the Absentee Shawnee, Delaware Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, Shawnee Tribe, Stockbridge-Munsee Community, Onondaga Nation, and the Seneca-Cayuga Nation.

Responses were received from the Eastern Shawnee Tribe, the Stockbridge-Munsee Community, and the Shawnee Tribe. These Tribes reviewed the project information and indicated no objections to the finding of No Effect to Historic Properties, provided that standard inadvertent discovery procedures are followed. No additional responses were received from the other consulted Tribes. The NRCS, in coordination with the Pennsylvania State Historic Preservation Office (PASHPO), has determined that the project will result in No Effect to Historic Properties. In the event that previously unidentified cultural resources or human remains are encountered during construction, work will cease immediately in the vicinity of the discovery and appropriate procedures outlined in the Unanticipated Discoveries Plan will be followed, including notification of PASHPO and consulting Tribes. These governments requested adherence to standard inadvertent discovery protocols, which will be implemented during ground disturbance and construction.

The U.S. Fish and Wildlife Service (USFWS) concurred with a “May Affect, Not Likely to Adversely Affect” (NLAA) determination for the northern long-eared bat and a “No Effect” determination for the northeastern bulrush, which is not present within the project area. The Information for Planning and Consultation (IPaC) system will be revisited during final design to confirm listed species status and consider the potential federal listing of the tricolored bat.

Prior to the start of construction using federal funds, the project Sponsor will be responsible for securing and complying with all applicable federal, state, and local permits, including those under the Clean Water Act, Pennsylvania Chapter 105 and 102 regulations, and the National Pollutant Discharge Elimination System (NPDES) program. Compliance with permit conditions, mitigation plans, and environmental protection measures will be required throughout construction.

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 agency is responsible for land rights.

6.8 Ecosystem Services Benefits

The Preferred Alternative—structural rehabilitation of PA-464 (Goose Pond Dam)—will preserve and enhance important ecosystem service benefits in the Brodhead Creek Watershed. This evaluation follows the Principles, Requirements, and Guidelines (PR&G) planning framework, and reflects a Level II ecosystem services analysis, as required for projects with Federal investments exceeding \$10 million. The Preferred Alternative aligns with NRCS policy goals to maximize public benefits, including environmental, economic, and social values that may be both monetized and non-monetized.

Regulating Services

The most significant regulating service benefit provided by PA-464 is flood damage reduction. Rehabilitation of the dam will preserve its ability to safely store and manage stormwater runoff from large storm events, including the Probable Standard Hydrologic (PSH) event. Continued operation of PA-464 will:

- Reduce the risk of catastrophic dam failure, protecting downstream communities from flood-related damage;
- Safeguard 109 residential properties, 28 commercial buildings, 6 institutional structures, and at least 9 bridges within the breach inundation zone;
- Preserve downstream aquatic ecosystem function, including maintaining stream stability and supporting High-Quality Cold-Water Fisheries (HQ-CWF) designated reaches of Goose Pond Run and Brodhead Creek;
- Reduce public health risks by avoiding the spread of contaminants and mold associated with flood-damaged buildings;
- Preserve the value of properties located within the without-dam 100-year floodplain.

Additionally, the project area's intact wetlands and riparian systems support regulating services by filtering pollutants, moderating runoff, and enhancing water quality. Vegetation within these

systems, including aquatic plants and bivalves, naturally absorbs and breaks down harmful contaminants.

Provisioning Services

While PA-464 does not supply water for drinking, irrigation, or industrial use, the dam plays a key role in retaining surface water and stabilizing baseflows in Goose Pond Run. By regulating the release of stormwater and maintaining a consistent flow regime, the dam helps sustain aquatic ecosystems downstream, especially during dry periods.

In addition, the permanent pool behind the dam may contribute to localized groundwater recharge. Standing water in the reservoir increases hydraulic residence time, allowing for slow percolation into adjacent alluvial soils and shallow aquifers. While this effect is limited in spatial extent and dependent on subsurface soil permeability, it may provide incremental support to near-channel groundwater levels, which in turn help sustain wetland hydrology and baseflow contributions to downstream cold-water streams.

Together, these functions support long-term watershed health by maintaining hydrologic balance and helping buffer the effects of seasonal drought and storm events.

Supporting Services

Forested and riparian habitats within the PA-464 project area support diverse wildlife, including migratory birds and aquatic species. Approximately 10.6 acres of tree removal will occur as part of the project, with 9.84 acres anticipated to be restored through natural regeneration and site stabilization. The project avoids sensitive wetland areas where feasible and will employ best management practices to minimize disturbance and control erosion.

Additionally, the dam structure helps regulate sediment transport, maintain downstream channel form, and support nutrient cycling, especially in conjunction with natural vegetation buffers in the watershed.

Cultural and Social Services

Public access to PA-464 and the Goose Pond reservoir is restricted because the dam and surrounding lands are privately owned; therefore, the site does not provide formal public recreational opportunities. However, the dam and reservoir contribute to the scenic rural character and visual landscape of the surrounding area and are part of the local community setting. The reservoir and forested surroundings provide aesthetic value and contribute to the visual quality and sense of place within Barrett Township.

By preventing property damage, loss of life, and public infrastructure disruption, the project also supports community resilience and equity, especially among vulnerable or lower-income households located in downstream flood zones.

6.9 Installation & Financing

6.9.1 Installation

The overall project implementation period is estimated to be five (5) years, which includes final design, permitting, land rights acquisition (if required), contracting, and construction. Construction of the dam rehabilitation measures is anticipated to occur over two construction seasons, with an estimated construction duration of approximately 24 months.

For purposes of economic analysis and cost scheduling, project costs are assumed to be distributed over the implementation period, with design and permitting occurring during the first three years and construction occurring during years four and five. This implementation schedule is consistent with the cost distribution and installation period assumptions used in the economic analysis and OMB fact sheet.

During construction, equipment would not be allowed to operate when conditions are such that soil erosion and water, air, and noise pollution cannot be satisfactorily controlled. If additional cultural resources, (beyond those identified as part of this study) are discovered during installation, work would cease and procedures discussed in General Manual 190-601.29, National Cultural Resources Procedures Handbook, would be implemented.

6.9.2 Responsibilities

The NRCS would provide technical and financial assistance to the Sponsors with the design and implementation of the dam site 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 following 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 rights-of-way.
9. The Sponsor currently holds some ownership or maintenance easements 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., embankment raise or auxiliary spillway configuration) extend beyond the original design footprint.

6.9.3 Contracting

The project will be constructed through 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 the 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 Public Law 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 annual costs of operations and maintenance of the dam sites are estimated to be \$4,500. The costs include inspections, repairs, unforeseen long term maintenance planning, and vegetation control.

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 Costs Structure PA-464 Brodhead Creek Watershed, PA, Dollars^{1/}

Works of Improvement	Unit	Number (Non-Federal Land)	Estimated Cost		
			Public Law 83-566 Funds	Other Funds	Total
Dam Rehabilitation	PA-464	1	\$12,038,200	\$5,148,600	\$17,186,800
Total Project			\$12,038,200	\$5,148,600	\$17,186,800
^{1/} Price base: 2025.					
Prepared: July 2025.					

Table 6-2: (Economics Table 2) Estimated Cost Distribution - Water Resource Project Measures, Structure PA-464 Brodhead Creek Watershed, PA, Dollars^{1/}

Works of Improve ment	Installation Cost -----Federal Funds-----				Installation Costs -----Other Funds-----						Total Installation cost
	Construction ² /	Engineering Services ^{3/}	Project Admin.	Total Public Law 566	Construction	Engineering Services ^{3/}	Real Property Rights	Required Permits	Project Admin.	Total Other Funds	
Rehabilit ation of PA-464	\$9,538,200	\$2,250,000	\$250,000	\$12,038,200	\$5,060,900	\$5,000	\$65,000	\$12,700	\$5,000	\$5,113,600	\$17,186,800
Total	\$9,538,200	\$2,250,000	\$250,000	\$12,038,200	\$5,060,900	\$5,000	\$65,000	\$12,700	\$5,000	\$5,113,600	\$17,186,800
^{1/} Price Base: 2025											
^{2/} Total construction cost of \$14,599,100 includes environmental mitigation costs of \$100,000.											
^{3/} Engineering services contract cost to be borne: \$2,250,000 by Public Law 83-566 funds and \$5,000 by other funds.											
Prepared: July 2025.											

Table 6-3: (Economics Table 3) Structural Data - Dams with Planned Storage Capacity, Structure PA-464 Brodhead Creek Watershed, PA

Item	Unit	Rehabilitated PA-464.
Class of Structure		High Hazard
Peak Ground Acceleration	g (10,000 year)	0.26
Uncontrolled Drainage Area	mi ²	2.60
Controlled Drainage Area	mi ²	4.25
Total Drainage Area	mi ²	6.85
Runoff Curve No, (1-day) (AMCII)		78.9
Time of Concentration (Tc)	hours	2.12
Elevation top of Dam	ft	1210.0
Elevation Crest High Stage Inlet	ft	1128.08
Elevation Crest Low Stage Inlet	ft	1105.5 (Reservoir Drain)
Auxiliary Spillway Type		Concrete or vegetated Broad Crested Weir
Auxiliary Spillway Bottom Width	ft	175
Auxiliary Spillway Exist Slope	Percent	9.8
Maximum Height of Dam	ft	106
Volume of Fill	yd ³	99,464 (additional Fill for Rehab)
Total Capacity	acre-ft	3043.9
Sediment Submerged	acre-ft	7.35
Sediment Aerated	acre-ft	1.47
Beneficial Use (Identify Use)	acre-ft	N/A
Floodwater Retarding	acre-ft	3,026.9
Between High and Low Stage	acre-ft	17.1
Surface Area		
Sediment Pool	acres	2.5
Beneficial Use Pool (identify Use)	acres	N/A
Floodwater Retarding	acres	91.6
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	43.3
Capacity of high stage (maximum)	cfs	165.4
Dimensions of Conduit	in	30
Type of Conduit		RCP
Frequency operation-auxiliary spillway	Percent change	1
Auxiliary spillway hydrograph		
Rainfall volume	in	9.47
Runoff Volume	in	6.88
Storm duration	hours	6
Velocity of Flow (V _e)	Ft/s	41
Max. reservoir water surface elevation	ft	1201.92
Freeboard Hydrograph		

Rainfall Volume	in	22.77
Runoff Volume	in	19.85
Storm Duration	hours	6
Max. Reservoir Water Surface Elevation	ft	1209.6
Capacity Equivalents		
Sediment Volume	in	0.02
Floodwater retarding Volume	in	8.29
Beneficial Volume (identify use)	in	N/A
Elevation Datum: NAVD88		
Prepared: September 2025		

Table 6-4: (Economics Table 4) Estimated Average Annual Costs, Structure PA-464 Brodhead Creek Watershed, PA, Dollars^{1/}

Works of Improvement	Amortization of Installation Cost	Operation, Maintenance and Replacement Cost	Total
Rehabilitation of Structure PA-464	\$556,962	\$0	\$556,962
TOTAL	\$556,962	\$0	\$556,962
Prepared: July 2025.			
^{1/} Price Base: 2025, amortized for 100 years at 3 percent discount rate			
^{2/} No difference in OM&R costs between the No-Action and the Preferred Alternative, thus there are no incremental OM&R costs			

Table 6-5: (Economics Table 5) Estimated Average Annual Flood Damage Reduction Benefits, Structure PA-464 Brodhead Creek Watershed, PA, Dollars^{1/}

Item	Estimated average annual damage		Damage Reduction Benefit ^{2/}
	Without Project (Agriculture Related) ^{2/}	With Project (Agriculture Related) ^{2/}	
Floodwater			
Structural Damage	\$86,936	\$63,642	\$23,294
Infrastructure	\$565,675	\$545,932	\$19,743
Insurance Administration Costs	\$7,326	\$5,698	\$1,628
TOTAL	\$659,937	\$615,272	\$44,665
^{1/} Price Base: 2025.			
^{2/} Agriculture-related damage includes damage to rural communities			
Prepared: July 2025.			

Table 6-6: (Economics Table 6) Comparison of Preferred Alternative Benefits and Costs, Structure PA-464 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-464	\$44,665	\$556,962	0.08
TOTAL	\$44,665	\$556,962	0.08
^{1/} Price Base: 2025.			
^{2/} Includes amortized installation costs from Economics Table 4.			
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.

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 Tribe, 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 and Shawnee Tribe. 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 Community THPO concurred with the determination of "No Effect to Historic Properties" for the PA-464 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 sent and received is included in Table 7-1 and in Appendix A. 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-464

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 Tribe, 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 Nation, Shawnee Tribe, Stockbridge-Munsee Community. Courtesy copy sent to germane THPO.

Date	Type	Purpose	Participants
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 Tribe, Stockbridge-Munsee Community. Courtesy copy sent to germane THPO. PASHPO was inadvertently omitted but 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 Tribe
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
April 18, 2025	Delivery Receipt	Verification of consultation attempt	Onondaga Nation
April 21, 2025	Delivery receipt	Verification of consultation attempt	Delaware Nation

Date	Type	Purpose	Participants
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, PASHPO, 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 Goose Pond 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 Goose Pond 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 Goose Pond 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-464 Goose Pond Dam rehabilitation project in Monroe County, the Pennsylvania 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.

Project Scoping Meetings:

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 tributary 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. Any comments received were used to inform the development and evaluation of alternatives.

Alternatives Presentation Meeting (February 8, 2024):

A second public informational meeting was conducted in a hybrid format on February 8, 2024, at 6:00pm, in person at the Barrett Township Building, Cresco, PA and via Microsoft Teams. Elected public officials, government agencies, Tribal representatives, organizations and watershed association representatives, including local, state and federal entities were invited in accordance with the approved Public Participation Plan (PPP). The attendees were presented with the alternatives developed for the project and provided with an opportunity to offer input.

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 Goose Pond Run (PA-464) 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 XXXXX 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, if applicable, 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 **Error! Reference source not found.** for the full distribution list.

Table 7-2: PA-464 Supplemental Watershed Work Plan No. 4 –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	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.

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9. List of Preparers

Table 9-1: PA-464 Supplemental Watershed Plan No. 4 - 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	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)				
Patrick Blanchard	NEPA Specialist / Environmental Planner	B.S., Natural Resource Management	16	

		Northland College M.S., Environmental Law and Policy Vermont Law and Graduate School		
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
Jeffrey Tucker	Senior Project Manager	B.S. Civil Engineering, University of Vermont	38	PE
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	26	PE

Andrew A. Antell	Project Engineer	B.S., University of Maine, Civil Engineering M.S., Missouri University of Science and Engineering, Civil Engineering	9	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

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