

SUPPLEMENTAL WATERSHED WORK PLAN No. 3 AND ENVIRONMENTAL EVALUATION

FOR

MILL CREEK WATERSHED

BEECHWOOD DAM (PA-454)

(TIOGA COUNTY, PENNSYLVANIA)



PREPARED BY
USDA NATURAL RESOURCES CONSERVATION SERVICE

IN COOPERATION WITH
PENNSYLVANIA FISH AND BOAT COMMISSION

June 2018

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U.S. Department Agriculture Natural Resources Conservation Service Watershed Rehabilitation Worksheet Sponsoring Local Organization(s): Pennsylvania Fish & Boat Commission 450 Robinson Lane Bellefonte, PA 16823-9616	Watershed:	Mill Creek Watershed		
	County(s):	Tioga	State(s):	Pennsylvania
	Hydrologic Unit Code:		020501040803	
	Watershed Project Number:		422006	
	Watershed Site Number:		Beechwood Dam (PA-454)	
	NID Number:		PA00037	

A. Authority and Program Criteria

Original Program Authority:	Public Law 83-566					
Current Program Authority:	Section 14 of Public Law 83-566					
Current Hazard Classification:	High					
Design Hazard Classification:	High					
Status of Operation and Maintenance	There were no post construction changes to the structure that influence the safety of the dam. No road cuts, quarries or mining activities were observed in the vicinity of the dam or reservoir. At the time of the site walk, the dam and associated structures were found to be functional and operation and maintenance is current.					
Sedimentation (acre-feet/year) ^{1/}	Originally Planned	0.59	Actual	1.36	Future	0.63
Evaluation of Potential Rehabilitation Projects			Updated:	Yes		
Sponsor's Application Submission date		4/10/2014	NRCS acknowledges Valid Application:			4/15/2014
Will upstream land rights be obtained to top-of-dam elevation per NWPM 505.36G? ^{2/}						Yes
Are basic assumptions and decisions (Investigation and Analysis) included in the administrative record?						Yes
Is the Investigation and Analysis (I&A) attached to the Plan-EE?						Yes
Does planning and analyses comply with 1983 P&G?						Yes

^{1/} If future sediment storage is provided for less than 100 years, explain rationale in Section L Additional Notes and Comments.

^{2/} Provide rationale for selected land rights elevation if below top-of-dam in Section L Additional Notes and Comments.

B. Purpose and Need for Action

Purpose and Need The purpose of the project (Project Purpose) includes the following: - Comply with applicable design, performance, and safety criteria for Natural Resources Conservation Service (NRCS) and Pennsylvania Department of Environmental Protection (PADEP). - Maintain the recreational and habitat values of Beechwood Lake and adjacent riparian lands. - Maintain the current level of flood damage reduction provided by the Beechwood Dam (PA-454), designed with a 1% use auxiliary spillway, for public safety, bridges, roads, agricultural and other lands, buildings, structures, infrastructure, and other features. The need for this federal action and supplemental watershed plan (Project Need) arises from an analysis of the existing Beechwood Dam, based on current NRCS design and safety criteria, determined that the dam did not provide sufficient detention storage for the Principal Spillway Hydrograph, adequate erosion resistance in the auxiliary spillway for the Stability Design Hydrograph, and indicated that the dam would be overtopped during the Freeboard Hydrograph storm event. The dam was originally constructed in 1963 with a 50-year service life. The Beechwood Dam provides protection during the 100-year flood event for 21 residential and 4 commercial properties; no critical structures or facilities are located

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within the 500-year floodplain downstream from the dam. NRCS has classified Beechwood Dam as a High Hazard potential dam. PADEP has categorized Beechwood Dam as a Hazard Potential Category 1 dam. Both evaluations are based on the potential for loss of life due to the prevalence of bridges, roads, and buildings existing in the downstream dam breach inundation zone. The Project Need includes the following:

- Continue supporting the recreational uses and aquatic and terrestrial wildlife habitat directly dependent upon Beechwood Lake and its surrounding riparian lands.
- Continue providing flood damage reduction for the 100-year recurrence interval flood event downstream from the dam.
- Address applicable NRCS and Commonwealth of Pennsylvania standards and design criteria for public health and safety to reduce the risk of loss of human life.

C. Watershed Rehabilitation Alternatives with Rationale for Level of Analysis

Alternative	Alternative Description and Major Feature	Cost	Carried Through Analysis	Rationale
No Action/Future Without Federal Project	Minimum constructed breach of the embankment to remove the storage function of the dam and restore the stream to a free-flowing state through the impoundment area and the footprint area of the dam. • Excavate an opening through the dam. • Use the existing auxiliary spillway location for onsite disposal of excavated soil. • Remove the principal spillway inlet structure and conduit from the site. • Connect the old stream bed to the downstream channel. • Provide rock riprap slope protection. • Vegetate the accumulated sediment. • Resume normal stream flow.	\$1,706,000	Yes	No Action
Decommissioning	Dam Decommissioning: Federally-assisted removal of the entire embankment and restore the stream and 100-year floodplain to a free-flowing state through the impoundment area and the footprint area of the dam. • Excavate an opening through the dam. • Use the existing auxiliary spillway location for onsite disposal of excavated soil. • Remove the principal spillway inlet structure and conduit from the site. • Connect the old stream bed to the downstream channel. • Provide rock riprap slope protection. • Vegetate the accumulated sediment. • Resume normal stream flow.	\$4,329,000	No	Exorbitant Costs and Social Disruptions.
	Non-Structural Measures: Floodproof or relocate existing structures in the downstream 100-year	\$2,907,000		

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	floodplain. Replacement of recreation and habitat values provided by lake (not included with cost). • Floodproofing or relocating 4 Commercial and 21 Residential structures. • The affected municipalities are the Clymer Township, Westfield Township and the Borough of Westfield. Total Cost	\$7,236,000		
Rehabilitation	Federally-assisted rehabilitation of the dam to NRCS and Commonwealth of Pennsylvania High Hazard Class dam design criteria. • Maintain auxiliary spillway crest at Elevation 1795.5. • Armor auxiliary spillway crest and exit channel with roller compacted concrete and regrade to valley floor. • Retrofit drainage diaphragm around principal spillway conduit and install chimney drain at interface with embankment fill. • Extend principal spillway conduit and construct a concrete impact basin at the outlet. • Raise dam embankment crest 3.0 feet to Elevation 1804.2 feet. • Flatten downstream slope of dam to 3H:1V. • Repair and/or replace metal components on principal spillway inlet riser and add low flow augmentation works. • Any other additional items identified as being deficient.	\$4,067,700	Yes	NED Alternative
Nonstructural Measures (Acquisition Relocation of At-Risk Structures)	• Maintain dam at current configuration. • Acquire and/or relocate 230 residences and 115 commercial properties within the breach inundation zone. • The affected municipalities are Clymer Township, Westfield Township, Borough of Westfield, and the unincorporated community of Sabinsville. • Restrict development in breach inundation area.	\$73,371,000	No	Exorbitant Cost, Social Disruption, and Publicly Unacceptable
Nonstructural Measures (Floodproofing of At-Risk Structures)	• Maintain dam at current configuration. • Construct 22,100 linear feet of levees and/or floodwalls. • Protect 131 residences and 36 commercial properties by constructing a levee and/or floodwall. • Acquire and/or relocate 99 residences and 79 commercial properties not protected by the levees and/or floodwalls. • The affected municipalities are Clymer Township, Westfield Township, Borough of Westfield, and the unincorporated community of Sabinsville. • Prevent development in breach inundation area.	\$53,611,000	No	Exorbitant Cost, Social Disruption, and Publicly Unacceptable.

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				Choose an item.

D. National Economic Development (NED) Account

To open - RT click, select Worksheet Options, then Open to use this sheet	No Action	Rehabilitation
NED Benefits and Costs	Alt 1	Alt 2
Project Investment	\$1,705,600	\$4,067,700
NRCS		\$3,080,700
Sponsors	\$1,705,600	\$987,000
NED Plan ^{3/}		\$590,100
Beneficial Annual		\$124,300
Adverse Annual		\$465,800
Net Beneficial	\$0	
Benefit to Cost Ratio		4.7
Comparison of NED Benefits and Costs (Table 6) 4/	No Action	Rehabilitation
Agricultural Related		\$1,100
Non-Agricultural Related		\$155,200
Other - Cost Avoidance		\$50,000
Other Purpose - Recreation		\$383,800
Other Purpose -		\$0
Other Purpose -		\$0
Total Benefits	\$0	\$590,100
Average Annual NED Costs (Table 4)	No Action	Rehabilitation
Amortized Installation	\$50,000	\$119,100
Other Direct Costs-		\$0
Operation, Maintenance, and Replacement		\$5,200
Total Adverse 5/	\$50,000	\$124,300
Average Annual Flood Damage Reduction (Table 5)	No Action	Rehabilitation
Agricultural		
Floodwater - Crop and Pasture		
Floodwater - Other Ag	\$1,600	\$500
Sediment and Erosion - Sediment		
Sediment and Erosion - Channel		
Other		
Sub-total Ag Damages	\$1,600	\$500
Non-Agricultural		
Floodwater - Urban	\$137,200	\$5,000
Other		
Indirect - Damage reduction benefit	\$23,600	\$600
Sub-total Non-Ag Damages	\$160,800	\$5,600
Total Damages	\$162,400	\$6,100

ENTER ALL END NOTES (FOOTNOTES) FOR ABOVE TABLE IN SECTION L

3/ If NED plan is negative describe reasoning using NWPM 505.35B(1)(iv).

4/ Price Base 2018.

5/ Amortized over 103 years (100 years – service life and 3 years – implementation) at 2.75% discount rate.

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E. Regional Economic Development (RED) Account

The RED account was not evaluated in the plan since it was not identified as an issue during plan development.

F. Other Social Effects (OSE) Account

Record additional social effects of the alternatives to the human environment not covered in the P&G National Economic Development Account or in the NRCS-CPA-52.			
Resource Concerns (describe existing conditions)	No Action	Rehabilitation	
	Amount, Status, Description (Document both short and long term impacts)	Amount, Status, Description (Document both short and long term impacts)	Amount, Status, Description (Document both short and long term impacts)
Public Health and Safety	Choose an item.	Choose an item.	Choose an item.
See NRCS-CPA-52	See NRCS-CPA-52	See NRCS-CPA-52	
Floodplain Management	Choose an item.	Choose an item.	Choose an item.
See NRCS-CPA-52	See NRCS-CPA-52	See NRCS-CPA-52	
Parklands	Choose an item.	Choose an item.	Choose an item.
See NRCS-CPA-52	See NRCS-CPA-52	See NRCS-CPA-52	
Regional water resource plans	Choose an item.	Choose an item.	Choose an item.
See NRCS-CPA-52	See NRCS-CPA-52	See NRCS-CPA-52	
Recreation	May Effect	May Effect	Choose an item.
Beechwood Lake, where Beechwood Dam is located, provides recreational opportunities including fishing (stocked with Trout and Walleye) and boating.	Water-based recreational opportunities would be lost. Average annual recreation benefit of \$376,400 would be lost.	Water-based recreational opportunities would be maintained. Average annual recreation benefit of \$376,400 would be maintained.	
Land Values	May Effect	No Effect	Choose an item.
- Some alternatives have the potential to effect land use. - Beechwood Dam was designed and constructed to prevent flood damage to the downstream areas. - Loss of the dam would adversely impact land use in downstream benefited area.	A controlled breach of Beechwood Dam would result in reduced land values in downstream benefited area.	Rehabilitation of Beechwood Dam would result in maintained land values in downstream benefited area.	
Groundwater/Sole Source Aquifer	Choose an item.	Choose an item.	Choose an item.
See NRCS-CPA-52	See NRCS-CPA-52	See NRCS-CPA-52	
	Choose an item.	Choose an item.	Choose an item.

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Potential Modes, Parameters and Consequences of Failure

Modes of Dam Failure	Nonstorm Breach Reservoir Elev. (ft-NAVD88)	Peak Breach Discharge -cfs	Population at Risk	Potential
Stability	1801.0	101,000	1,296	Medium
Hydrologic	1801.0	113,000	1,620	Medium
Seismic	1795.5	80,000	810	Low
Seepage	-	-	-	Low
Material Deterioration	-	-	-	Medium
Other:				Choose an item.

Source: NRCS Dam Rehabilitation Assessment Report, April 1, 2010.

Consequences and Other Notes:

CONSEQUENCES OF DAM FAILURE

Inundation due to dam failure potentially has the following consequences.

Loss of Life. The breach inundation study indicates that a dam failure may result in inundation of residential structures and transportation facilities. The estimated Population at Risk is 1,620 and the associated Risk Index is 4,588.

Release of Harmful Materials. Large volumes of sediment and eroded embankment material released to the stream would harm water quality, degrade aquatic habitat, and reduce downstream channel capacity. Further, the inundation area includes agricultural land uses that may store hazardous materials.

Infrastructure Destruction. Residential dwellings, fences, roads, bridges, public utilities, and farm equipment may be damaged or destroyed.

BREACH ASSUMPTIONS

The breach inundation maps used in this plan were provided by the Pennsylvania Fish and Boat Commission. The breach analysis met all of the PADEP, Division of Dam Safety's criteria and, provides an incremental breach analysis based on modeling of storage capacity and reservoir surface area for normal pool and maximum storage elevations. The peak breach discharge used for developing the inundation maps was 139,852 cfs based on an incremental analysis process to determine the highest runoff event during which the threat downstream from a breach exceeds the threat from that same runoff event with no dam failure. The incremental analysis begins with the Probable Maximum Flood event runoff and reduces from there to determine the runoff event used for the breach discharge. This peak breach discharge exceeds the TR-60 upper bound condition of 109,611 cfs minimum peak breach discharge considering dam embankments less than 103 feet in height. The hydrologic and hydraulic analyses were also approved by the PADEP. The results of the breach were used to generate the flood inundation maps for the current Beechwood Dam Emergency Action Plan. New breach maps will be prepared as part of the final rehabilitation design. The NRCS Pennsylvania State Conservation Engineer concurs that the dam was originally built as and still is a High Hazard Dam.

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G. Consultation, Coordination and Public Participation

Agency/Public Participation	Meeting/Contact	Date Complete	Site Visit	Date Complete
USFWS - ESA Sec 7/ Sec 12 PL -566	Letter	1/20/2017	No Invite	N/A
USACE District – <i>Baltimore District</i>	Other-Explain	N/A	No Invite	N/A
PA Department of Conservation and Natural Resources	Other-Explain	4/25/2016	No Invite	N/A
PA Game Commission	Other-Explain	4/25/2016	No Invite	N/A
PA Fish and Boat Commission	Other-Explain	4/25/2016	No Invite	N/A
PA Department of Environmental Protection, Division of Dam Safety	Other-Explain	12/14/2016	No Invite	N/A
PA Fish and Boat Commission	Public Meeting	3/2/2016	Yes	3/2/2016
Tioga County Conservation District	Public Meeting	3/2/2016	Yes	3/2/2016
Monthly Conservation District Meetings starting 4/2016	Public Meeting	Monthly	No	N/A
Public Participation	Public Meeting	3/2/2016	Yes	3/2/2016
Public Participation	Public Meeting	2/16/2017	No	N/A
Susquehanna River Basin Commission	E-Mail	2/23/2017	No	N/A

Explanations:

Participants from NRCS, Pennsylvania Fish & Boat Commission (PFBC), Tioga County Conservation District and the Project Team conducted a project kickoff meeting at the Tioga State Forest Office, One Nessmuk Lane, Wellsboro, PA, on March 2, 2016 after a walk of the project site. Shortly after this meeting, a Public Participation Plan was prepared to serve as a guide for carrying out the activities related to consultation, coordination and public participation. The planning effort was conducted in close coordination with the PADEP's Bureau of Waterways Engineering Division of Dam Safety.

Public scoping open forums were conducted by PFBC at regular meetings of the Tioga County Conservation District. PFBC received input, discussed problems and opportunities, and issued updates on progress. All Conservation District meetings are open forums conducted in compliance with the Commonwealth of Pennsylvania Sunshine Act which requires public agencies to hold certain meetings and hearings open to the public.

NRCS met with PADEP Division of Dam Safety on December 14, 2016, at the Rachael Carson State Office Building in Harrisburg, PA. This meeting reviewed the proposed rehabilitation alternatives and provided guidance as to acceptability through PADEP.

The Project Team and NRCS presented to PFBC at the regularly scheduled Tioga County Conservation District Meeting at the Tioga County Conservation District Office, 1867 Shumway Hill Road, Wellsboro, PA, on February 16, 2017. This meeting provided instruction and guidance on the project scope and the extent of activities required for developing the Supplemental Watershed Plan and Environmental Evaluation. The following topics were discussed:

- Problems and opportunities identified
- Sponsor objectives
- Alternatives considered
- Alternatives evaluated and comparison of effects

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The Sponsor allowed public input at all meetings prior to and during the planning process. The Draft Supplemental Watershed Work Plan No. 3 and Environmental Evaluation for Mill Creek Watershed, Beechwood Dam (PA-454) was available upon request. Social media was used by PFBC and Tioga County Conservation District to advertise the February 16, 2017 meeting and post project information.

The following agencies and elected officials will receive the Draft Supplemental Watershed Plan No. 3 and Environmental Evaluation Abstract and Summary Sheet for Mill Creek Watershed, Beechwood Dam (PA-454):

- Appalachian Regional Commission
- Association of State Dam Safety Officials
- Susquehanna River Basin Commission
- Tioga County Commissioners
- Tioga County Conservation District
- Tioga County Department of Emergency Services
- Tioga County Planning Commission
- Division of Dam Safety, Bureau of Waterways, Engineering & Wetlands
- Pennsylvania Department of Environmental Protection North-central Office
- Pennsylvania Emergency Management Agency
- Pennsylvania Fish & Boat Commission
- Pennsylvania Association of Floodplain Managers
- Pennsylvania Governor's Policy Office
- Pennsylvania Association of Soil Resource Conservation & Development Councils
- The Honorable Matthew Baker
- The Honorable Joseph Scarnati III
- The Honorable Glenn Thompson
- The Honorable Tom Marino
- The Honorable Patrick Toomey
- The Honorable Robert B. Casey, Jr.
- USDA NRCS, Tioga County Field Office
- U.S. Fish & Wildlife Service, PA Ecological Services Field Office
- West Mead Township Supervisors

The Pennsylvania Natural Diversity Inventory (PNDI) online database queried Pennsylvania Fish and Boat Commission (PFBC), Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Game Commission, and U.S. Fish and Wildlife Service (USFWS) to determine if protected species or species proposed for protection ranged within the watershed. As documented in the NRCS-CPA-52 form, this review of the natural heritage data indicates that none of the project alternatives pose a risk of adverse impact to individuals, populations, or threatened flora or fauna.

No impacts to federally-listed species were identified within the Project study area based on the PNDI review. Consultation with USFWS, as required by Section 12 of Public Law 83-566, was conducted and documented with correspondence dated January 20, 2017. USFWS responded in writing February 15, 2017. The correspondence stated, "No federally listed species under our jurisdiction is known or likely to occur in the project area. This determination is valid for two years. Should project plans change, or if additional information on listed species become available, this determination may be reconsidered."

PADEP was delegated authority by the U.S. Army Corps of Engineers (ACOE) for Section 404 activities under 0.5 acres and 250 linear feet of stream. Consultation with Corps therefore was completed by the consultation with PADEP. According to correspondence received from Mr. John J. Kraeuter, Chief, Environmental and Geological Services Section, PADEP, dated July 13, 2017, the Project is considered a Non-Reporting Activity provided the impacts to "waters" at the site fall below the

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impact thresholds of the permit: less than one-half acre of impacts to waters and less than 250 linear feet of stream impacts; therefore, no further Section 404 permit coordination with the Corp is required at this time.

As per the Pennsylvania State Programmatic General Permit (PASPGP-5) issued by the ACOE, the PADEP has been given the authority to review projects such as the Beechwood Dam (PA-454) for the Section 404 Clean Water Act requirements. PFBC will be responsible for obtaining the necessary permits from the PADEP.

Correspondence from John Balay of the Susquehanna River Basin Commission, dated March 29, 2017, provided comments based on the Commission's "Comprehensive Plan for the Water Resources of the Susquehanna River Basin." For Beechwood Dam, it was requested that prospects for low flow augmentation be explored for conservation releases to prevent water quality degradation and adverse lowering of streamflow levels downstream of the impoundment.

Cultural Resources

Cultural Resources ^{7/}

Date

Literature Review conducted	Click here to enter a date.
Pedestrian Survey conducted	Click here to enter a date.
Consultation with State Historic Preservation Office	1/18/2017
Consultation with State Tribal Historic Preservation Office	Click here to enter a date.
Consultation with Tribes	Click here to enter a date.
Tribes Contacted: There are currently no federally recognized tribes in Pennsylvania.	
Cultural Resources Identified: On January 18, 2017, the Pennsylvania Historical and Museum Commission stated in a letter that it anticipates no effect on archaeological resources from the proposed activities and no downstream cultural resources have been identified as effected for any of the alternatives.	

^{7/} Consultation correspondence and agency letters reside in the administrative record file.

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H. Land Use in Drainage Area Above the Dam

Land Use/Resource Types	Existing Condition	No Action	Rehabilitation	
To use Rt click, select Worksheet Object, then Open to enter data in Excel	Affect Area - acres			
Cropland	367.5	436.1	436.1	
Pasture and Rangeland	775.8	711.8	711.8	
Forest	814.9	826.4	746.7	
Farmstead				
Residential	46.6	110.3	110.3	
Commercial				
Transportation				
Stream/channel *	1.7	2.0	1.7	
Lake/open water	71.2		71.3	
Wetlands-herbaceous/fringe	9.9	1.3	9.9	
Wetlands-scrub/shrub				
Wetland - forested				
Other: Shrub/Scrub	92.8	92.9	92.9	
Other: _____				
Totals (Acres)**	2180.6	2180.6	2180.6	
* Also indicate lengths (feet) in notes below. ** Totals will be red color until sum equals existing condition total.				
Notes: Stream length for Existing Condition and Rehabilitation - 12,585 feet Stream length for No Action - 14,835 feet Land use areas were measured using GIS software from the National Land Use Database 2011 and may vary slightly for areas measured during field studies.				

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I. Risk and Uncertainty

Project risk and uncertainty primarily exist in the engineering and economics analyses of the Project alternatives. The Project Team based all preliminary designs and cost estimates on an additional 100 years of functional life using data from the as-built plans, available GIS data, recent topographic surveys, and bathymetry. Abbreviated geotechnical explorations were conducted, and the designs relied on minimal soil mechanics data from the original dam design, as-built plans, field observations and experience. Hydrologic data was measured using available GIS data, and field observations. The data used and the design parameters developed are based on proven models, tools and standard engineering procedures. Accuracy of the data impacts uncertainty of the reservoir operation levels, discharge capacities, breach inundation areas, flood damage area, design life, and structure function. Failure of the existing dam would most likely occur as a result of (1) breach of the embankment due to extreme storm events, (2) a seismic event, or (3) deterioration and failure of the principal spillway conduit.

The Project Team used the Economics and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies to account for flood control benefits associated with the alternatives. Uncertainty in the economics is due to the abbreviated method used in the economic analysis. The economic analysis used an indexing approach to predict benefits. The associated uncertainty is based on using older data and indexing the benefits from that timeframe to present. The uncertainty is due to the effect of land use change and additional urbanization on the level of flood protection benefits. Uncertainty in the prices paid by consumers will vary in the future. Consequently, the change in consumer price is the index that is most likely to reflect the value of preventing flood damage.

The original benefits for the Project were indexed to current dollars using applicable indexes. The scope of the study did not include re-evaluation or reconsideration of the original benefits. The estimated average annual flood damage reduction benefits and intensification benefits may vary from those displayed.

Uncertainties with the analysis of environmental impacts lie with the identification of wetland areas, riparian habitat, and streams. Trained specialists identified environmentally-significant areas using standard, well-accepted protocols. Within the context of this study, all alternatives were considered on a comparable basis. There does not appear to be any area that would have resulted in a different decision by using different procedures or conducting more intensive studies.

U.S. Department Agriculture Natural Resources Conservation Service	May 2015	Watershed:	Mill Creek Watershed		
Watershed Rehabilitation Worksheet		County(s):	Tioga	State(s):	Pennsylvania
Sponsoring Local Organization(s):		Hydrologic Unit Code:	020501040803		
Pennsylvania Fish & Boat Commission 450 Robinson Lane Bellefonte, PA 16823-9616		Watershed Project Number:	422006		
		Watershed Site Number:	Beechwood Dam (PA-454)		
		NID Number:	PA00037		

J. List of Preparers

Name	Current Position - Years	Education	Experience (Years)	Applicable Certifications
NRCS				
Walter Hosea Latshaw, PE	State Conservation Engineer	BS Agricultural Engineering Pennsylvania State University	42 (retired effective 4/29/17)	
Heather L. Smeltz, PE	Civil Engineer/Cultural Resources Coordinator	BS Agricultural & Biological Engineering Pennsylvania State University MS Biological & Agricultural Engineering North Carolina State University	14	
Donald Murray	Agricultural Engineer	BS Agricultural Engineering Pennsylvania State University	38	
Tim Ridley, PE, PS	Dam Safety Engineer	BS Civil Engineering West Virginia University	38	
Jeff McClure, PG	Geologist	BA Biology, BA Geology, BS Geology West Virginia University	32	
Capital RC&D Council				
Jeffrey D. Mahood	Environmental Planning Specialist/Economist	BS Environmental Resource Management Pennsylvania State University	35	
KLA Environmental Services, Inc.				
Kevin L. Shamburg, PE	Project Administrator	BS Civil Engineering Kansas State University	38	
Frank C. Mercurio, PE	Senior Engineer	BS Environmental Resources Engineering Humboldt State University	39	
Elliott R. Harris, PE	Project Engineer	BS Fisheries and Wildlife Biology BS Agricultural Engineering Kansas State University	15	
Jarred D. Green, PE	Project Engineer	BS Civil Engineering Kansas State University	11	
Eldon R. Colson, Jr.	Project Technician	Natural Resources and CAD Classes Hutchinson Community College	23	
Ramona V. Newsom	Technical Information Specialist	BS Business Administration Brown Mackie College	37	
Amec Foster Wheeler				
Timothy Dean, PE	Project Manager/Dam Engineer	BS Geography Pennsylvania State University M. EPC Soil Physics Pennsylvania State University	31	

U.S. Department Agriculture Natural Resources Conservation Service May 2015 Watershed Rehabilitation Worksheet Sponsoring Local Organization(s): Pennsylvania Fish & Boat Commission 450 Robinson Lane Bellefonte, PA 16823-9616	Watershed:	Mill Creek Watershed		
	County(s):	Tioga	State(s):	Pennsylvania
	Hydrologic Unit Code:		020501040803	
	Watershed Project Number:		422006	
	Watershed Site Number:		Beechwood Dam (PA-454)	
		NID Number:	PA00037	

Mohamed Agnaou, PE	Dam Engineer	BS Civil and Environmental Engineering Temple University ME Water Resources Engineering Colorado State University	14	
James Barbis, PE, CFM	Senior Water Resource Engineer	BS, Sport Biology ME, Water Resources and Environmental Engineering Villanova University	9	
Douglas Tate, PE	Senior Geotechnical Engineer	BS Engineering, The University of Alabama in Birmingham	33	
Davide Motta, Ph.D.	H&H Modeler	Ph.D. Civil Engineering University of Illinois at Urbana-Champaign M.S. Civil Engineering University of Illinois at Urbana-Champaign Laurea (Equivalent to B.S. and M.S.) Environmental Engineering Politecnico di Milano, Italy	9	
Larry Sciple, PG	Project Geologist	BS Geology, The University of Tennessee MS Geology, Vanderbilt University	41	
Dan Bolender, PLS	Surveyor	B.Sc. Petroleum Engineering, University of Wyoming	29	
Todd Hunter, LIT	Surveyor	Associate of Applied Science, Architecture and Civil Engineering Technology Central Maine Technical College	25	
Steven Mazza	Engineering Technician	BA History Franciscan University of Steubenville	15	
Sarah Dickert	Engineering Technician / GIS Analyst	BS Civil Engineering, Bucknell University	2	
Ashley Husted	Environmental Scientist	BS Environmental Studies, Minor in Biology Ursinus College	8	
Ghazoll Motlagh, EIT, CFM	Engineering Technician	BS Civil Engineering –Water Resources Pennsylvania State University	9	
Brian Sariano	Environmental Scientist	BA in Geoenvironmental Science Shippensburg University	28	
Jennifer Poole, GIT	Project Geologist	BS-Environmental Science, University of North Carolina at Chapel Hill MS- Geological Sciences, University of Missouri-Columbia	7	
Nathan Long, PE, PG	Senior Geotechnical Engineer	BS Geological Engineering, The University of Mississippi	14	
Nathan Walker, AICP	Senior Water Resources Planner	BS-BS Earth and Environmental Sciences MS Community and Regional Planning - Temple University	19	

U.S. Department Agriculture Natural Resources Conservation Service May 2015 Watershed Rehabilitation Worksheet Sponsoring Local Organization(s): Pennsylvania Fish & Boat Commission 450 Robinson Lane Bellefonte, PA 16823-9616	Watershed:	Mill Creek Watershed		
	County(s):	Tioga	State(s):	Pennsylvania
	Hydrologic Unit Code:		020501040803	
	Watershed Project Number:		422006	
	Watershed Site Number:		Beechwood Dam (PA-454)	
	NID Number:		PA00037	

K. Additional Notes and Comments

Notes for Table A:

- The horizontal datum was based on the North American Datum of 1983 (NAD83) using the Pennsylvania State Plane coordinate system, North Zone. Survey data were collected in the North American Vertical Datum of 1988 (NAVD88) and a shift of 0.74 foot was applied to adjust the measured elevations to the as-built plans reference, which is a local datum.
- The beneficial use pool at Beechwood Dam is for Recreation purposes.
- The surface area shown for submerged sediment is within the recreation pool and assumes uniform deposition of the lowest pool elevations. Sedimentation rate was estimated using the SCS-ENG-309 worksheet based on current and future land uses in the drainage area. The current surveyed remaining storage volume at normal pool, from the 2016 bathymetric survey, is 1,117 acre-feet. Subtracting the 1,045 acre-feet allocated in the original design for fish and wildlife purpose leaves 72 acre-feet remaining volume for future sediment storage, which is equivalent to the surface area shown in parentheses.
- Time of concentration for Existing is computed to the upstream end of the reservoir, and travel time through the water body is ignored per TR-55 guidance. No Federal Action Alternative is computed to the upstream end of the reservoir, and travel time through the water body is treated as a channelized flow since stream restoration is considered after removing the dam.
- The rehabilitation alternative has a structural auxiliary spillway that is resistant to erosion, so the stability design hydrograph (SDH) was not evaluated.

Notes for Table 2:

- This project will not include updates or modifications to recreation use already in place with the dam and reservoir.

Notes for Section H:

- The anticipated future land use would have increase residential and cropland in the drainage area above the dam. The SCS-ENG-309 worksheet predicted an estimate of the future sedimentation which is lower than the historical sedimentation rate. Given the strict erosion sediment regulations for future developments and implementation of agricultural land conservation practices and resources protection, future soil loss rates will be lower than they currently are.

U.S. Department Agriculture Natural Resources Conservation Service Watershed Rehabilitation Worksheet Sponsoring Local Organization(s): Pennsylvania Fish & Boat Commission 450 Robinson Lane Bellefonte, PA 16823-9616	Watershed:	Mill Creek Watershed		
	County(s):	Tioga	State(s):	Pennsylvania
	Hydrologic Unit Code:		020501040803	
	Watershed Project Number:		422006	
	Watershed Site Number:		Beechwood Dam (PA-454)	
NID Number:		PA00037		

Table 2 - Estimated Cost Distribution															
Item Description	Installation Costs - Public Law 83-566 1/						Installation Costs - Other Funds 1/								Total Installation Cost
	Construction 3/	Engineering	Real Property Rights	Relocat. Payments	Project Admin.	Total Federal Cost	Construction 3/	Engineering	Real Property Rights 4/ 5/	Natural Resource Rights	Relocat. Payments	Required Permits	Project Admin. 2/	Total Non-Federal Cost	
Rehabilitation of dam	\$1,831,200	\$1,110,700	\$0	\$0	\$138,800	\$3,080,700	\$944,500	\$0	\$36,500	\$0	\$0	\$1,000	\$5,000	\$987,000	\$4,067,700
1/ Price Base:															Jul-2017
2/ Includes		\$0	for relocation assistance advisory service												
3/ Includes		\$0	of PL-566 funds and \$0 of non-federal funds for cultural resource protection and mitigation measures												
4/ Includes		\$0	for real property costs for mitigation												
5/ Includes		\$30,000	for surveys, legal fees, and other costs												

U.S. Department Agriculture Natural Resources Conservation Service Watershed Rehabilitation Worksheet Sponsoring Local Organization(s): Pennsylvania Fish & Boat Commission 450 Robinson Lane Bellefonte, PA 16823-9616	Watershed:	Mill Creek Watershed		
	County(s):	Tioga	State(s):	Pennsylvania
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	Watershed Project Number:		422006	
	Watershed Site Number:		Beechwood Dam (PA-454)	
NID Number:		PA00037		

Table A – Comparison of Structural Options							
Item	Unit	Existing	Alt 1 No Fed Action	Alt 2 Rehab Option A			
Preferred Alternative	-	-	☒	☒	☒	☒	☒
Class of structure	-	High	N/A	High			
Seismic zone	-	1	1	1			
Uncontrolled drainage area	mi ²	3.41	3.41	3.41			
Controlled drainage area	mi ²	0	0	0			
Total drainage area	mi ²	3.41	3.41	3.41			
Runoff curve No. (1-day) (AMC II)	number	80.5	80.5	80.5			
Time of concentration (Tc)	hrs.	1.96	2.15	1.96			
Elevation top of dam ^{1/}	ft.	1801.0	N/A	1804.2			
Elevation crest auxiliary spillway	ft.	1795.50	N/A	1795.5			
Elevation crest high stage inlet	ft.	1791.0	N/A	1791.0			
Elevation crest low stage inlet	ft.	1787.0	N/A	1787.0			
Assumed hydrologic breach elevation	ft.	1801.0	N/A	1804.2			
Assumed static breach elevation	ft.	1801.0	N/A	1804.2			
Assumed seismic breach elevation	ft.	1795.5	N/A	1795.5			
Auxiliary spillway type	type	Vegetated	N/A	RCC			
Auxiliary spillway bottom width	ft.	150	N/A	150			
Auxiliary spillway exit slope	percent	2.6	N/A	N/A			
Length of Dam	ft.	1000	N/A	1000			
Maximum height of dam	ft.	63	N/A	66.2			
Volume of fill	yd ³	122,500	N/A	158,000			
Total capacity ^{2/}	acre ft.	1864.7	N/A	1864.7			
Sediment submerged	acre ft.	72.5	N/A	72.5			
Sediment aerated	acre ft.	3.1	N/A	3.1			
Sediment life remaining	years	114	N/A	114			
Beneficial use (identify use)	acre ft.	1,045	N/A	1,045			
Floodwater retarding	acre ft.	744.1	N/A	744.1			
Between high and low stage	acre ft.	326.6	N/A	326.6			
Surface area							
Sediment pool ^{2/}	acres	(16.7)	N/A	(16.7)			
Beneficial use pool (identify use)	acres	75.9	N/A	75.9			
Floodwater retarding pool ^{3/}	acres	100.0	N/A	100.0			

U.S. Department Agriculture Natural Resources Conservation Service Watershed Rehabilitation Worksheet Sponsoring Local Organization(s): Pennsylvania Fish & Boat Commission 450 Robinson Lane Bellefonte, PA 16823-9616	Watershed:	Mill Creek Watershed		
	County(s):	Tioga	State(s):	Pennsylvania
	Hydrologic Unit Code:		020501040803	
	Watershed Project Number:		422006	
	Watershed Site Number:		Beechwood Dam (PA-454)	
NID Number:		PA00037		

Table A – Comparison Table of Structural Options (cont.)

Principal spillway design

Item	Unit	Existing	Alt 1 No Fed Action	Alt 2 Rehab Option A		
Rainfall volume (1-day)	in	5.87	N/A	5.87		
Rainfall volume (10-day)	in	8.96	N/A	8.96		
Runoff volume (10-day)	in	7.47	N/A	7.47		
Capacity of low stage (max.)	ft ³ /s	53.6	N/A	53.6		
Capacity of high stage (max.)	ft ³ /s	150.5	N/A	150.5		
Dimensions of conduit	in	30	N/A	30		
Type of conduit	-	RCP	N/A	RCP		
Frequency of operation of auxiliary spillway	%	<1	N/A	<1		

Auxiliary spillway hydrograph

Rainfall volume	in	9.45	N/A	See L		
Runoff volume	in	7.06	N/A	See L		
Storm duration	hrs.	6	N/A	See L		
Velocity of flow (Ve)	ft./s	6.71	N/A	See L		
Max. Reservoir water surface elev.	ft.	1797.90	N/A	See L		

Freeboard hydrograph

Rainfall volume	in	31.18	N/A	31.18		
Runoff volume	in	28.45	N/A	28.45		
Storm duration	hrs.	24	N/A	24		
Max. Reservoir water surface elev.	ft.	1804.32	N/A	1804.15		

Capacity equivalents (watershed inches)

Sediment volume	in	0.40	N/A	0.40		
Floodwater retarding volume	in	4.09	N/A	4.09		
Beneficial volume (identify use)	in	5.75	N/A	5.75		

^{1/} All elevations are to be recorded in North American Vertical Datum 1988 (NAVD88).

^{2/} If reservoir contains beneficial storage or if sediment capacity will not store water, show area in parenthesis and footnote accordingly in Section L.

^{3/} Crest of auxiliary spillway.

^{4/} All Elevations recorded in the as-built plans local vertical datum. Disregard Footnote 1, above. See Section L for explanation and conversion.

Appendix A

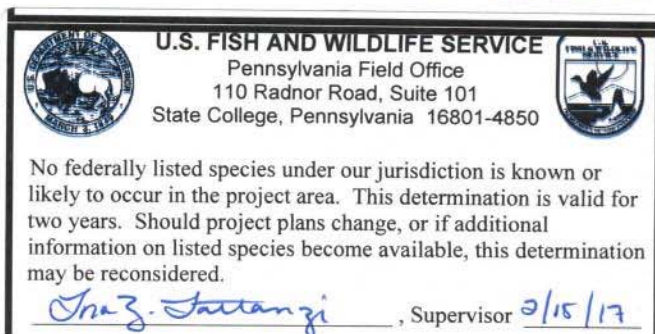
COMMENTS AND RESPONSES

This activity is Categorical Excluded under the provisions of NEPA. Public and interagency input was received during project planning as described in Consultation, Coordination, and Public Participation.



United States Department of Agriculture

Lora Zimmerman, Project Leader/Supervisor
U.S. Fish & Wildlife Service
Pennsylvania Field Office
110 Radnor Rd, Suite 101
State College, PA 16801



RE: Supplemental Watershed Project Plan Environmental Evaluation
Rehabilitation of Mill Creek Watershed, Beechwood Dam, PA-454
Tioga County, Pennsylvania

Dear Ms. Zimmerman:

The Pennsylvania Fish and Boat Commission (PA FBC) and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) are currently preparing a Supplemental Watershed Project Plan Environmental Evaluation (Plan-EE) for Beechwood Dam, PA-454, in the Mill Creek Watershed. This existing dam is located at 41.8547 N, -77.5138 E in Tioga County, Pennsylvania.

The Mill Creek Watershed Work Plan was originally prepared in March 1960 by the Tioga County Commissioners and the Tioga County Soil Conservation District, with assistance from the USDA Soil Conservation Service. The Pennsylvania Fish Commission and Tioga County Soil Conservation District were original sponsors of the dam. The main objective of the project was to reduce floodwater damages to the floodplain. Secondary objectives included fish and wildlife habitat.

Beechwood Dam, PA-454, constructed in 1963, is maintained by PA FBC. Beechwood Dam does not meet Federal safety standards for a High Hazard dam. Therefore, the PA FBC and NRCS are preparing this Plan-EE to evaluate alternatives to meet the current needs with respect to floodwater protection.

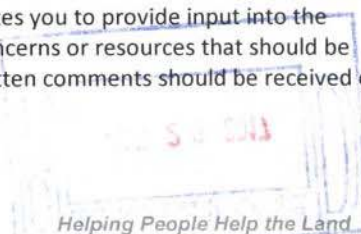
Specifically, the purpose of the project includes the following:

- Meet or exceed state and federal dam safety criteria.
- Maintain the current recreational values, and aquatic and terrestrial wildlife habitat values provided by Beechwood Lake and its adjoining riparian lands
- Maintain the current level of flood protection provided by Beechwood Dam.

The Plan-EE will consider alternatives for Beechwood Dam and may include: 1) No Action (future without Federal project), 2) Structural Rehabilitation (with and without non-structural measures), 3) Decommissioning (with and without non-structural measures), and 4) National Economic Development (NED) Alternative (generally rehabilitation). Specific alternatives are currently being developed.

Your agency may have an interest in this project. NRCS invites you to provide input into the development of the Plan-EE. Please identify any special concerns or resources that should be considered during the development of this document. Written comments should be received on or before February 28, 2017.

Natural Resources Conservation Service
359 East Park Drive, Suite 2
Harrisburg, Pa 17111
Voice: (717) 237-2214 Fax: (855) 813-2861



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SUSQUEHANNA RIVER
BASIN COMMISSION

4423 N. Front Street | Harrisburg, PA 17110-1788 | 717.238.0423 | srbc.net

NY ■ PA ■ MD ■ USA

March 29, 2017

Ms. Heather L. Smeltz, P.E.
Civil Engineer
United States Department of Agriculture
Natural Resources Conservation Service
359 East Park Drive, Suite 2
Harrisburg, PA 17111

Re: Proposed Rehabilitation Projects – Hamilton and Beechwood Dams

Dear Ms. Smeltz:

The Susquehanna River Basin Commission (Commission) appreciates the interagency coordination by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) regarding the proposed rehabilitation projects at Hamilton and Beechwood Dams, Tioga County, Pennsylvania. Per the Commission's *Comprehensive Plan for the Water Resources of the Susquehanna River Basin* (Comprehensive Plan), water supply, flooding, and ecosystems are identified as priority management areas. Related goals and actions identified in the Comprehensive Plan provide the framework for the following comments concerning the proposed evaluations.

It is noted that Hamilton Dam currently provides backup source water for public water supply for the Borough of Wellsboro. The Commission's Comprehensive Plan contains project guidance that outlines a sound basis for rational, well-considered decisions among alternatives or competing uses of basin water resources, and forms major considerations upon which the Commission evaluates project proposals of federal, state, local and private sectors. This guidance contains an item specifying that conjunctive use of multiple water sources to meet water supply needs should be encouraged to optimize water availability and minimize adverse impacts. Alternatives tailored to maintaining or enhancing the current level of backup source water supply at Hamilton Dam should be considered.

The Commission adopted consumptive water use regulations to minimize impacts to streamflows for public water supplies, industries, agriculture and recreation, and to protect aquatic life, habitat and water quality during times of critical low flows. All project sponsors whose consumptive use of water is subject to review and approval are required to mitigate such use. Mitigation may be provided by various methods including use of water storage to satisfy consumptive use, release of stored water to offset consumptive use, and discontinuance of consumptive use during low flow periods. Where physical mitigation is not feasible, monetary payment for consumptive use may be accepted. Consumptive use mitigation fee payments enable the Commission to build a source of funding to support large-scale mitigation projects. Many of these projects involve evaluating reservoir operations for opportunities to provide low flow augmentation during infrequent, critical low flow or drought events. While engineering attributes of Hamilton and Beechwood Dams may preclude this opportunity, the Commission is very much interested in exploring prospects for low flow augmentation at NRCS-sponsored water storage projects and has resources available to commit to such projects.



*A water resource agency serving
the Susquehanna River Watershed*

Ms. Heather L. Smeltz

- 2 -

March 29, 2017

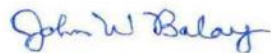
The desired result for the flooding priority management area identified in the Commission's Comprehensive Plan is to prevent loss of life and significantly reduce future damages from floods within the basin through an integrated system of structural and nonstructural flood damage reduction measures. As both Hamilton and Beechwood Dams have project purposes that include meeting or exceeding dam safety criteria and maintaining or enhancing current levels of flood protection, they are directly aligned with this objective. Beyond structural features, the Commission encourages consideration of nonstructural flood hazard mitigation measures in the Marsh and Mill Creek watersheds to provide citizens and communities with information and other tools to assist them in flood preparedness, response, and recovery, including public education and outreach, flood forecasting and warning, the National Flood Insurance Program, and local floodplain regulations.

The Commission's Low Flow Protection Policy contains specifications for determining passby flow and conservation release requirements associated with approved water withdrawal projects to avoid significant adverse impacts to the water resources of the basin. A conservation release is defined as a prescribed quantity of flow from an impoundment structure that must be continuously maintained downstream of the impoundment for low flow protection. Reservoirs and other large impoundments can capture low, seasonal, and high flows and completely alter the natural flow regime of a receiving stream. Conservation releases are intended to prevent water quality degradation and adverse lowering of streamflow levels downstream of the impoundment, thereby protecting aquatic resources and other water uses. As part of the Plan Environmental Evaluation for both Hamilton and Beechwood Dams, conservation releases should be assessed in order to avoid downstream impacts.

An extensive effort to reintroduce the American eel into the Susquehanna River Basin has been ongoing by the United States Fish and Wildlife Service (USFWS) since 2008. The Commission and its partner agencies are continuing to reintroduce eels and monitor the ecological response of receiving streams through time. Since 2010, a significant number of eels have been stocked in Pine and Marsh Creeks, both directly downstream of Hamilton Dam. A Commission fish survey completed in 2013 showed high densities of eels located immediately downstream of Hamilton Dam, which serves as a barrier to dispersal as eels distribute themselves throughout the watershed. Any rehabilitation actions considered should: (1) allow provisions for the Commission, the Pennsylvania Fish and Boat Commission (PFBC), and/or the Pennsylvania Department of Environmental Protection (PADEP) to conduct ecological and water quality monitoring on Wellsboro Municipal Authority property to facilitate reintroduction of the American eel in the basin; and (2) include protective measures to prevent instream sedimentation and preserve water quality if land/instream disturbance occurs on Charleston Creek or Hamilton Dam.

If you have any questions regarding the above information, please feel free to contact me at (717) 238-0423, extension 1217.

Sincerely,



John W. Balay
Manager, Planning & Operations

363594.1

Appendix B

PROJECT MAP

Figure B-1
Project Location Map
Beechwood Dam (PA-454)
Tioga County, PA

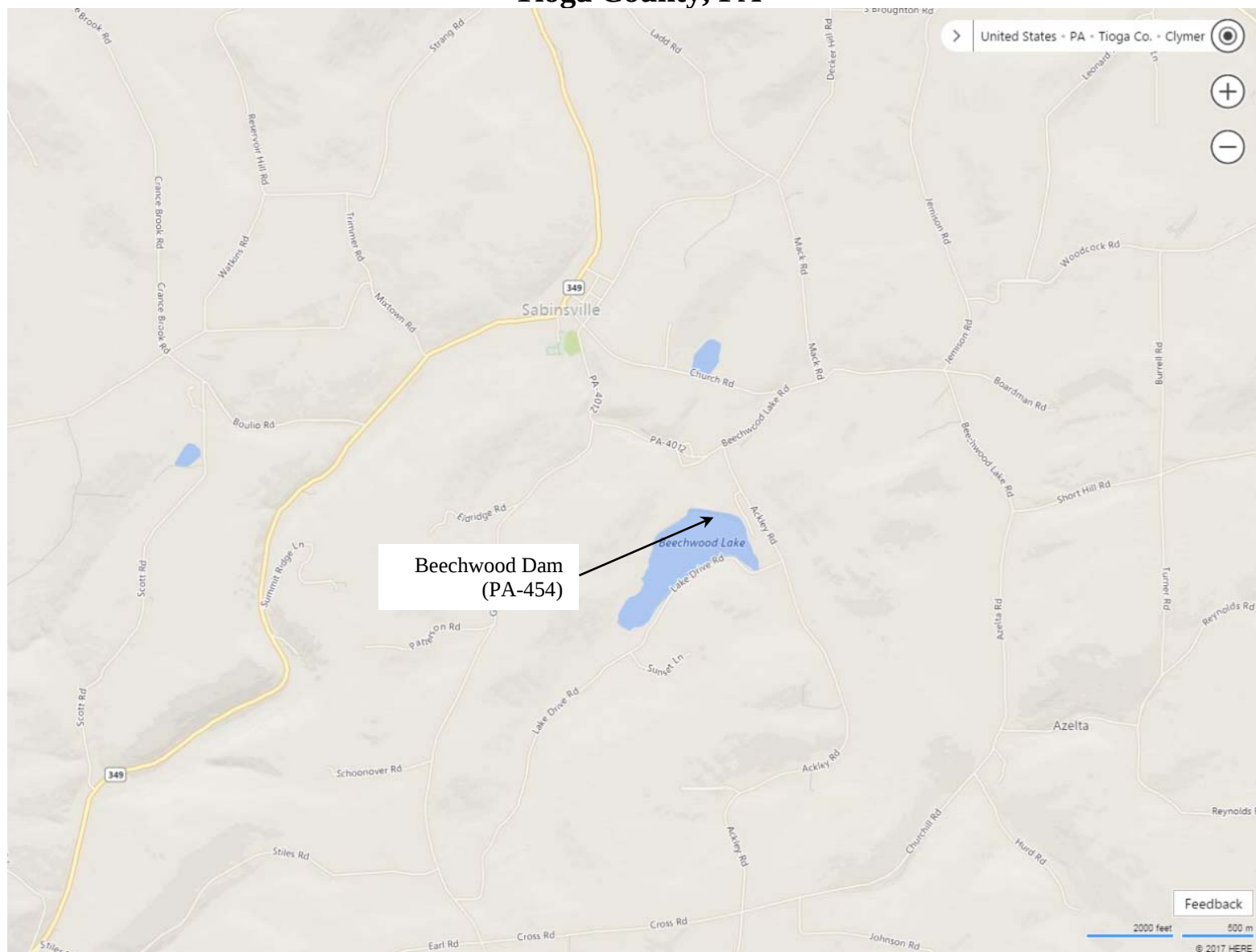
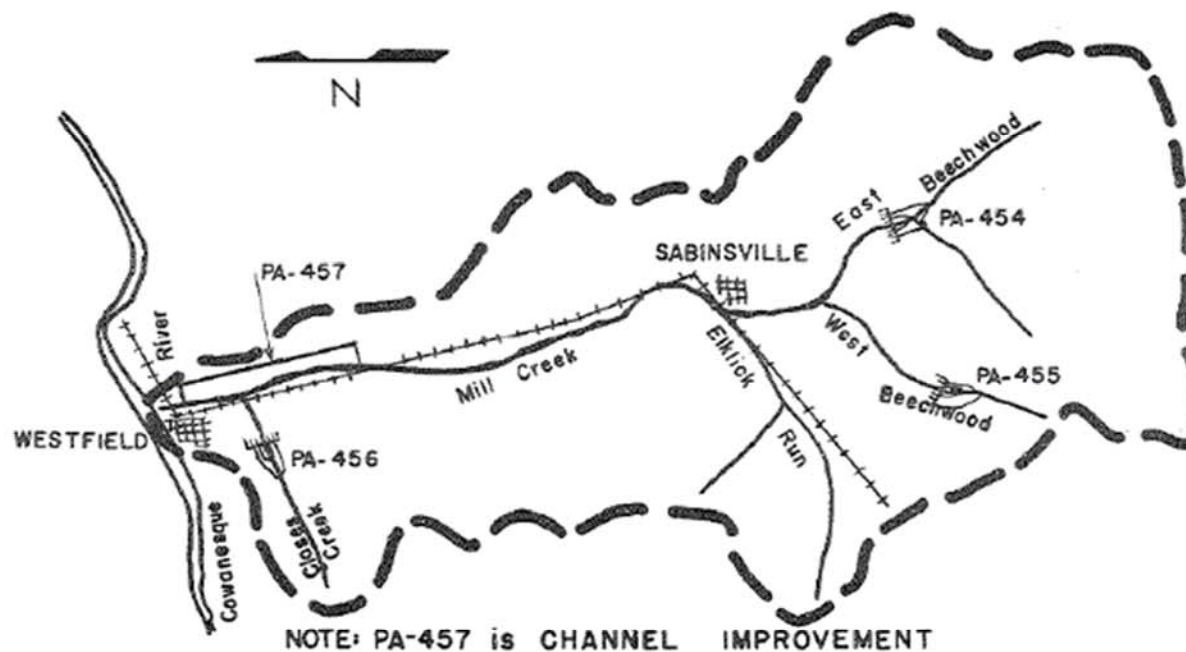


Figure B-2
Original Project Watershed Map
Mill Creek Watershed



LEGEND

-  detention pool
-  sediment pool
- PA-456** site designation
-  railroad

FIGURE 2
STRUCTURAL LOCATION MAP
MILL CREEK WATERSHED
 Tioga County
 Pennsylvania

Figure B-3
Site Watershed Map
Beechwood Dam (PA-454)

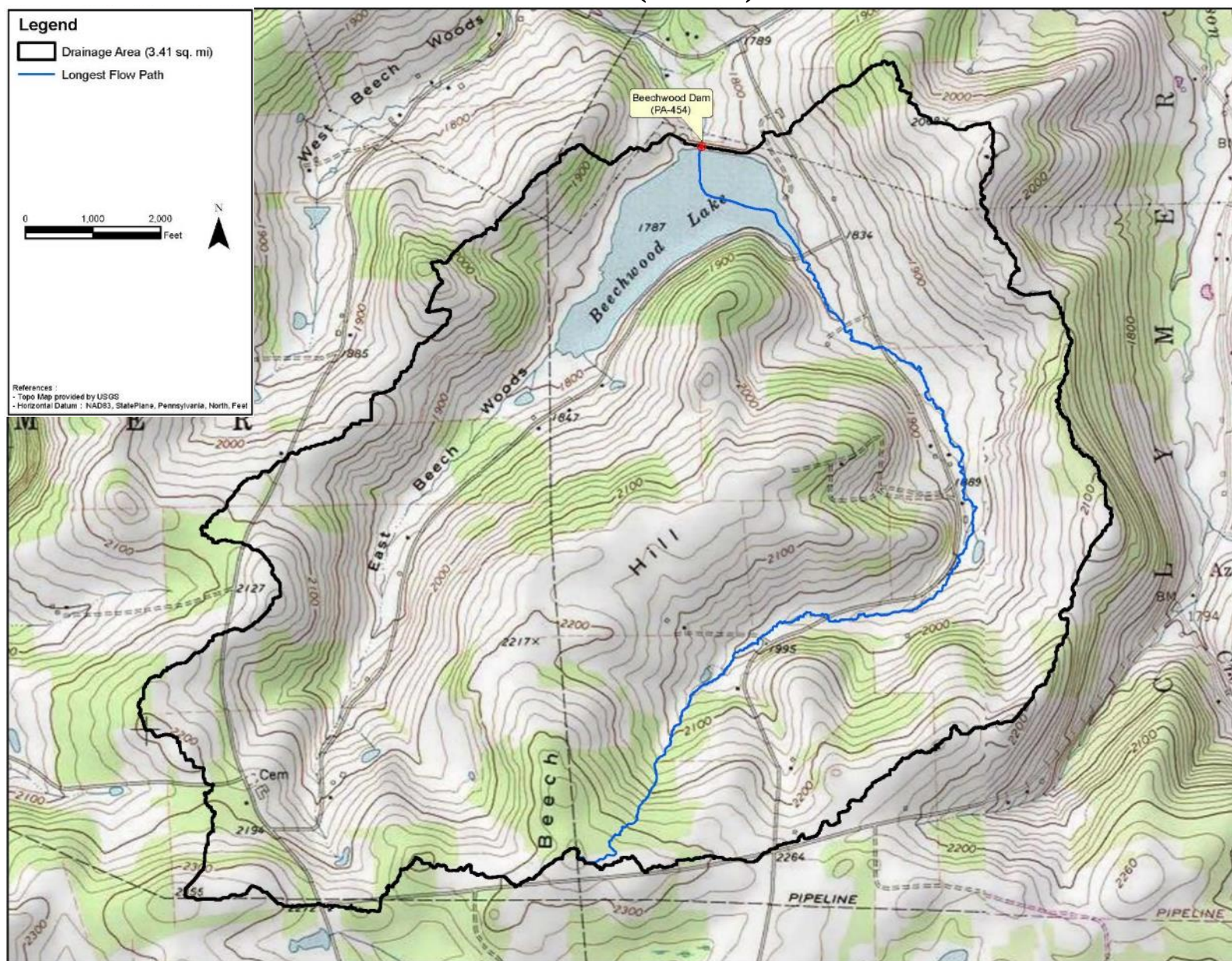
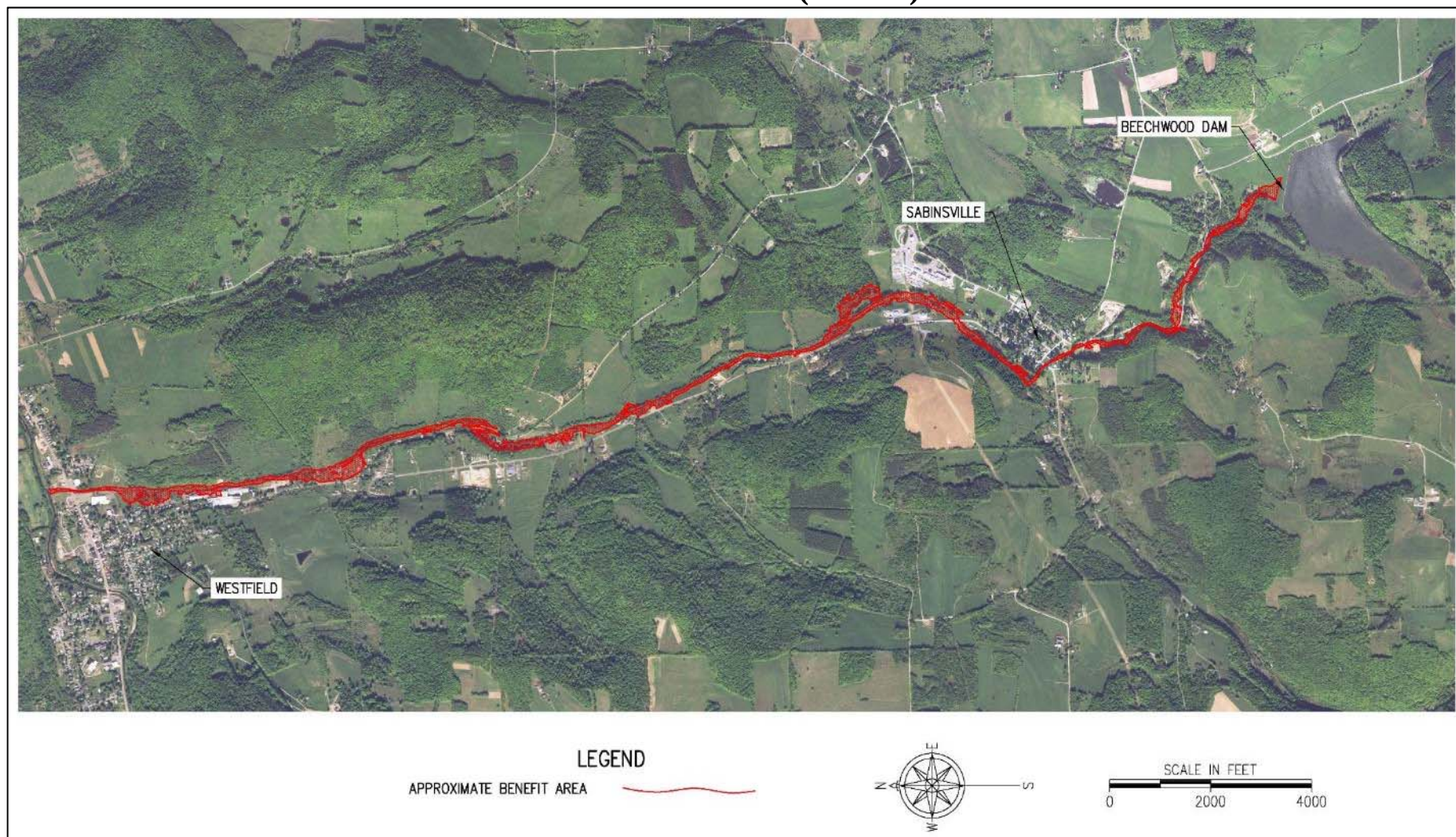


Figure B-4
Project Benefit Area Map
Beechwood Dam (PA-454)



Appendix C

SUPPORT MAPS

Figure C-1
Beechwood Dam (PA-454) Rehabilitation Alternative Aerial Photo

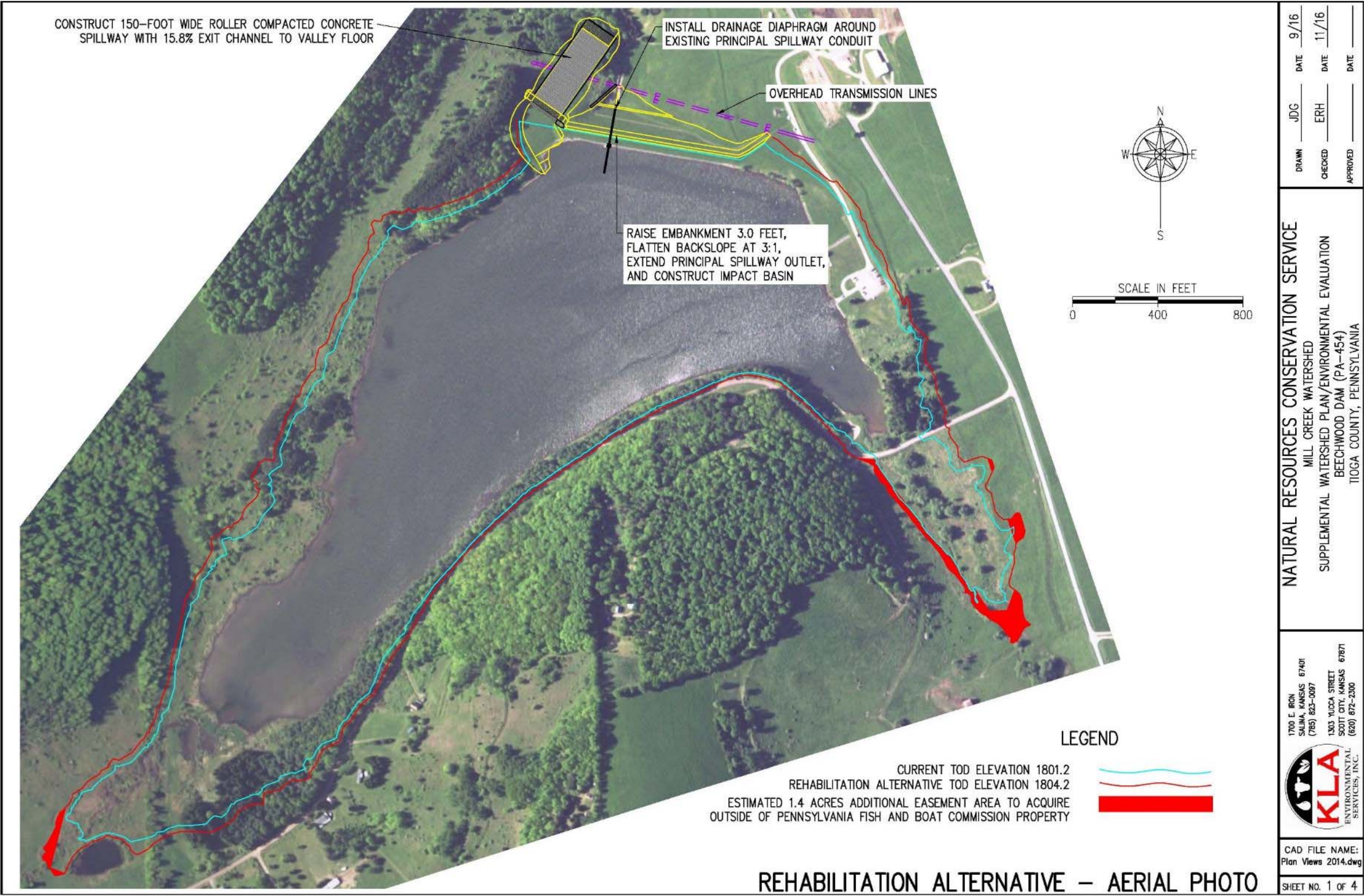


Figure C-2
Beechwood Dam (PA-454) Rehabilitation Alternative Plan View

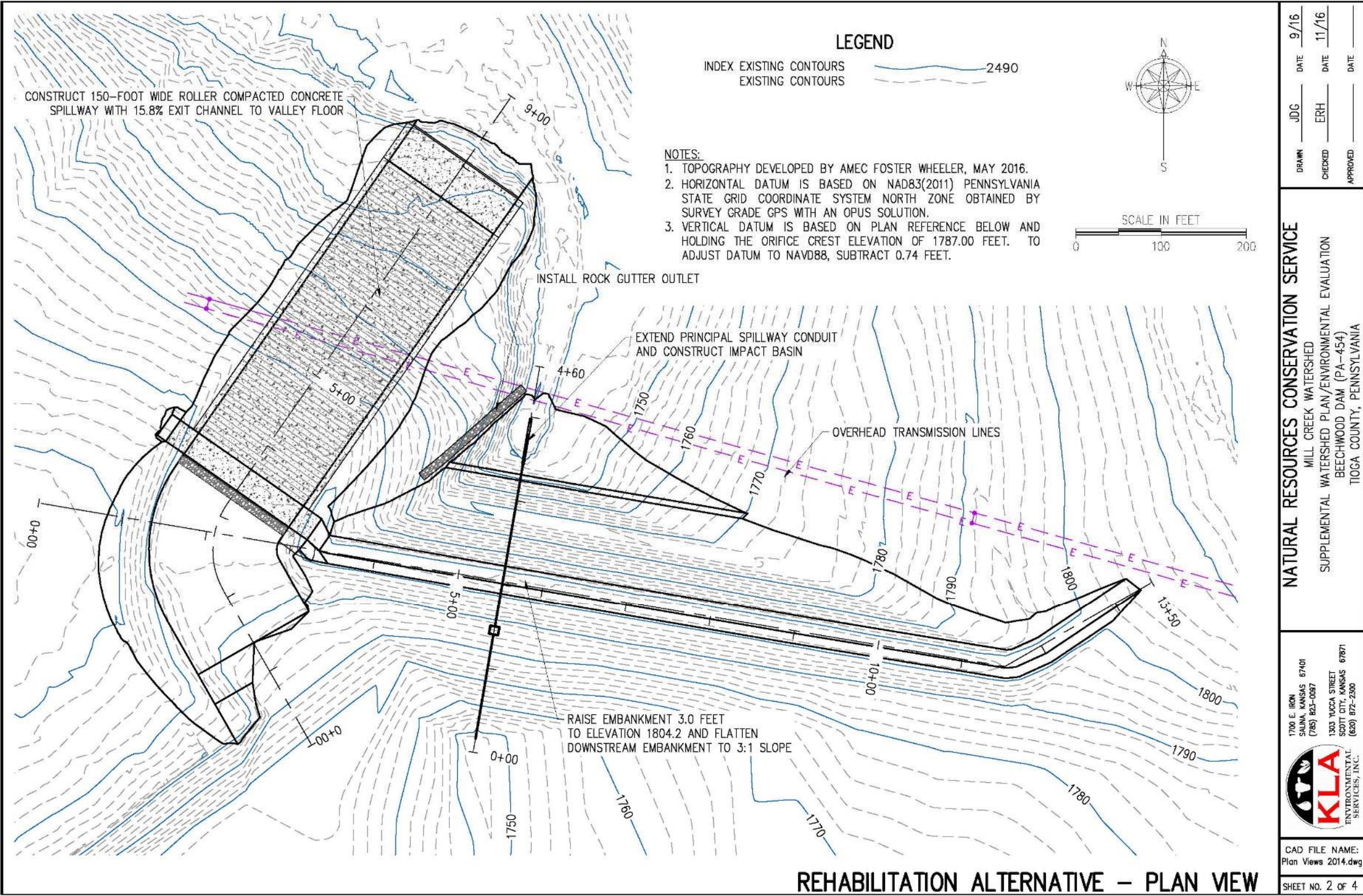


Figure C-3
Beechwood Dam (PA-454) Rehabilitation Alternative Profile View

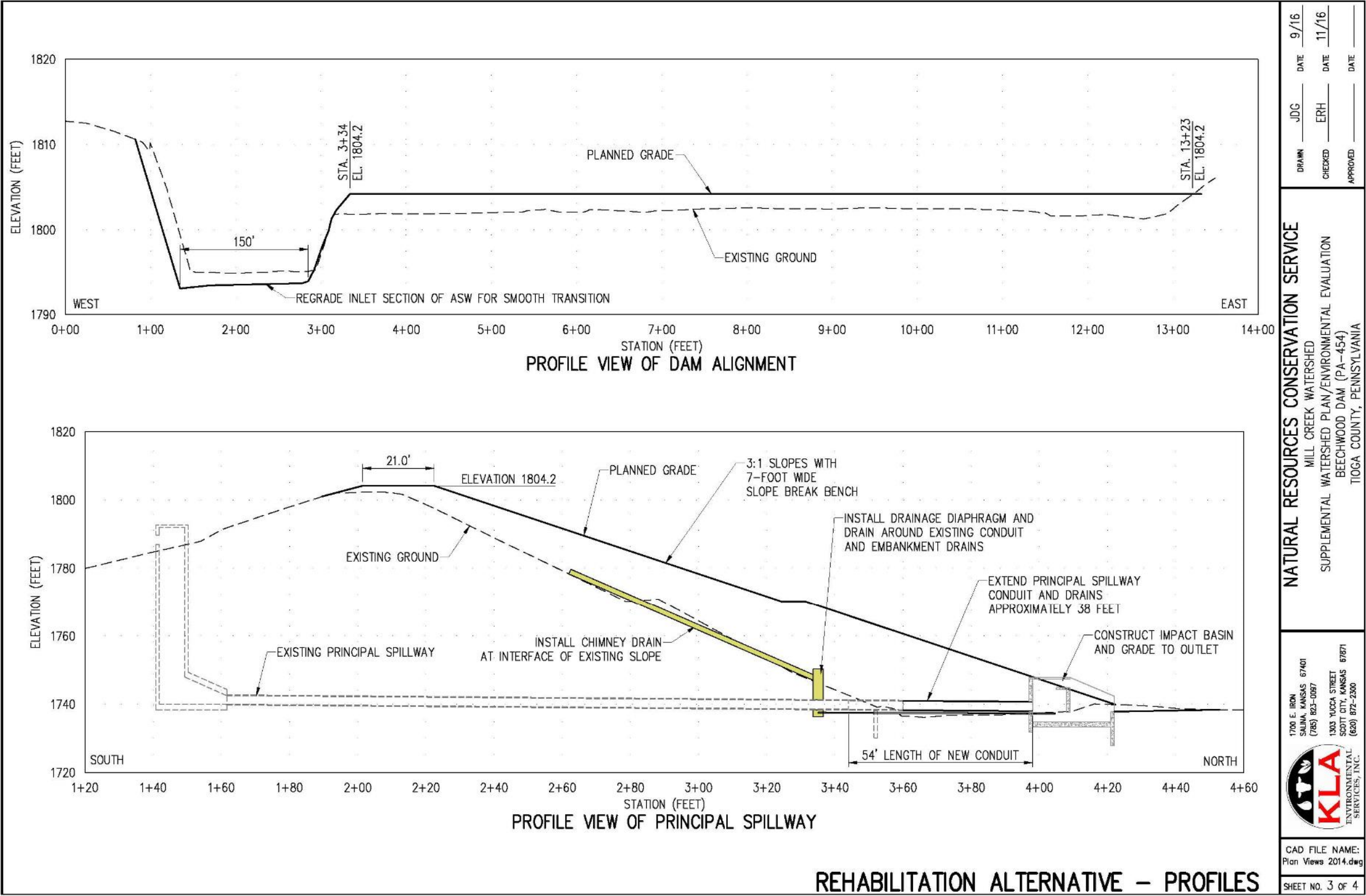


Figure C-4
Beechwood Dam (PA-454) Rehabilitation Alternative Profile View

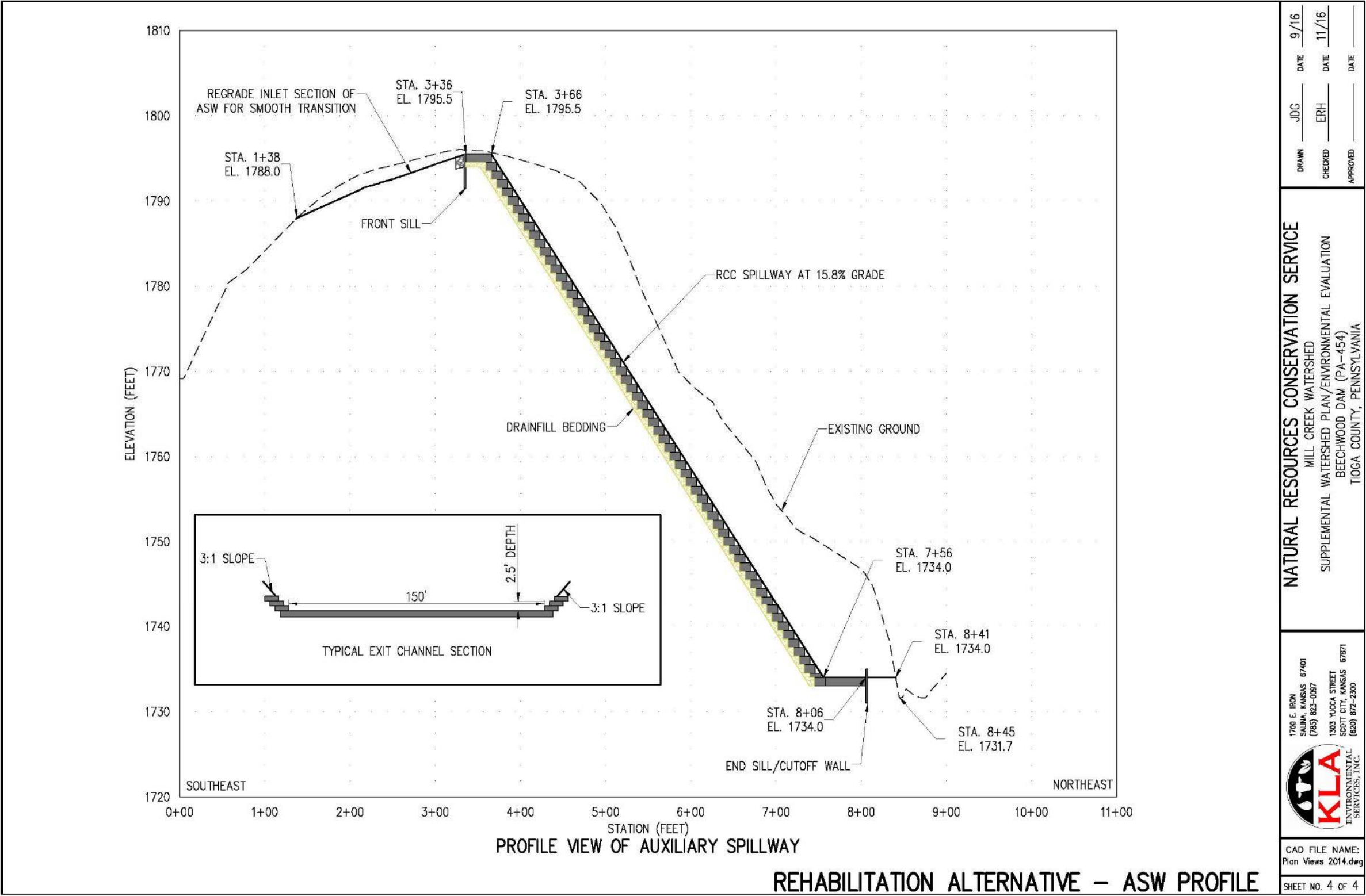


Figure C-5
Beechwood Dam (PA-454) Future Without Federal Project Alternative Plan View

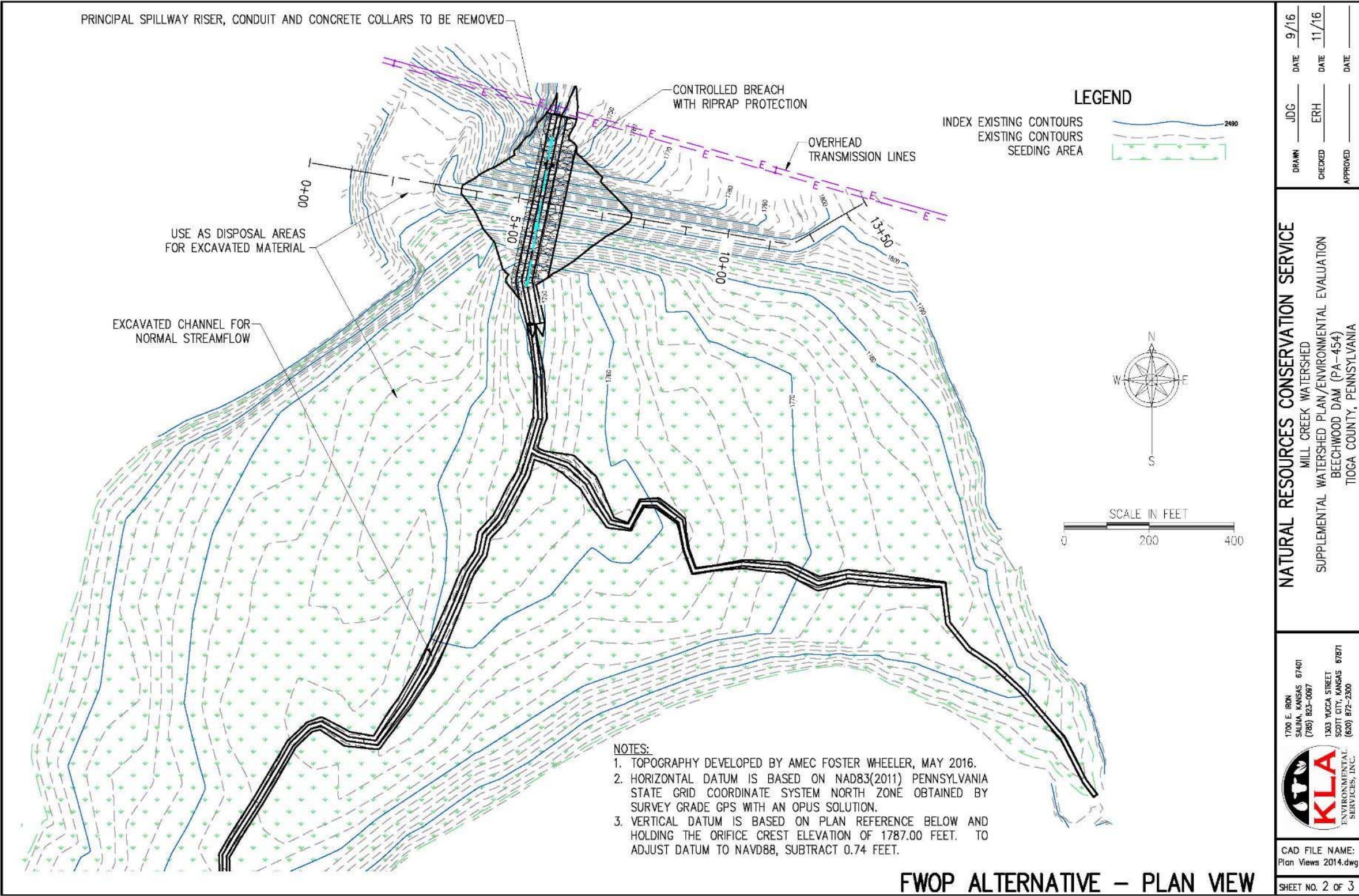


Figure C-6
Beechwood Dam (PA-454) Future Without Federal Project Alternative Profile View

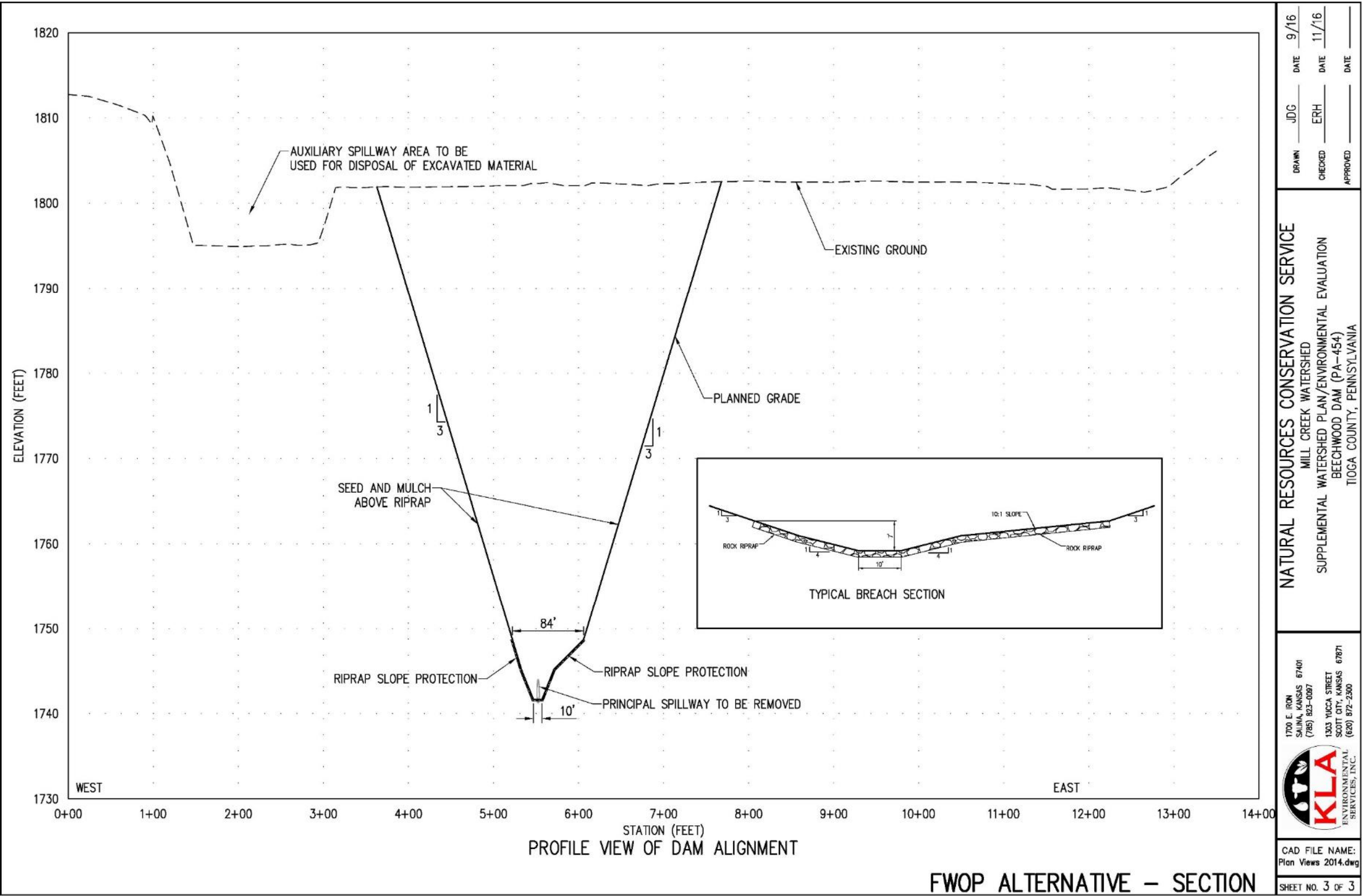
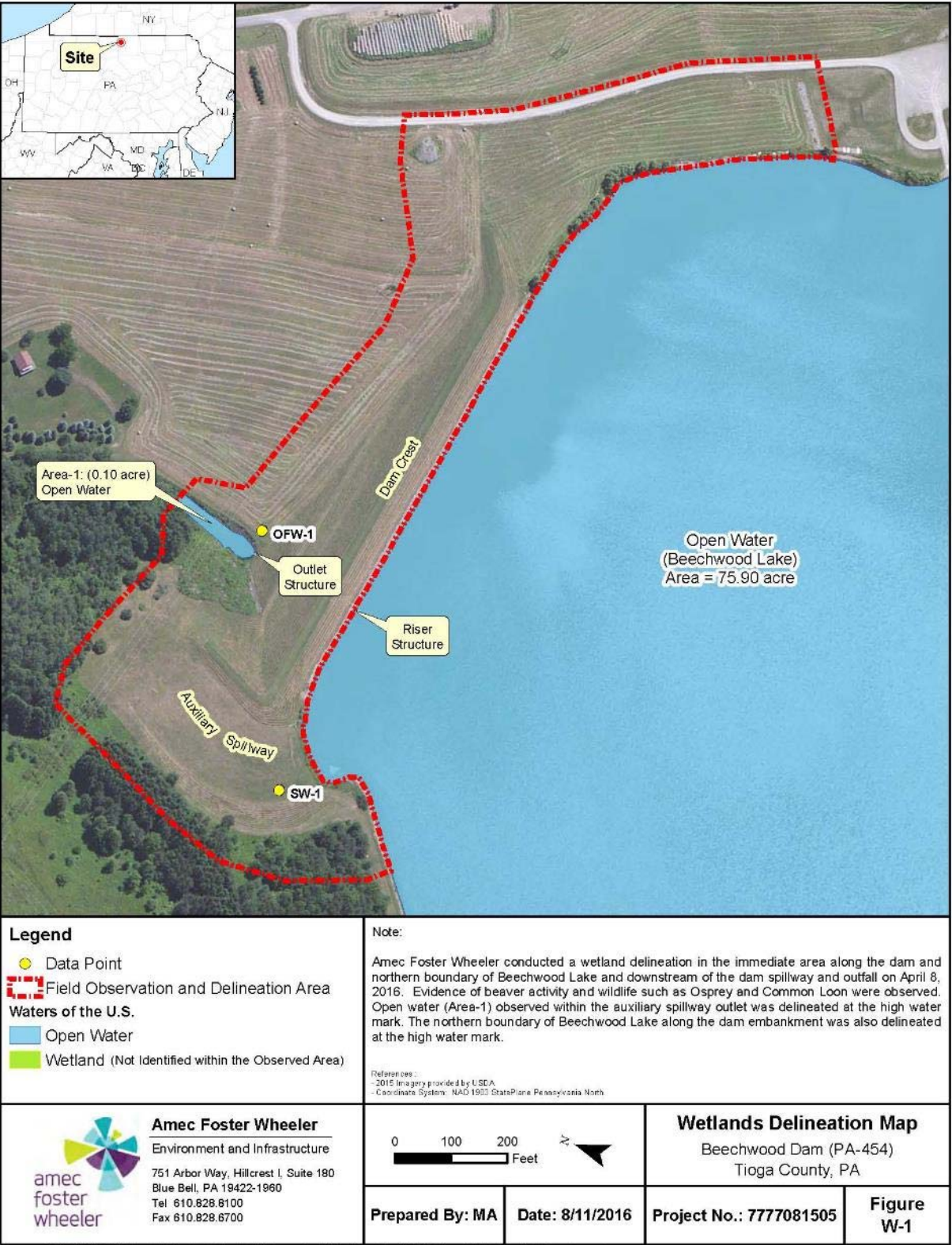


Figure C-7
Beechwood Dam (PA-454) Wetlands Map



Document Path: H:\NRCS National Planning Contract \KLA\Pennsylvania\Beechwood Dam\05 GIS\Item_1-2-8_Wetlands Delineation.mxd

Figure C-8
Beechwood Dam (PA-454) Breach Inundation Map

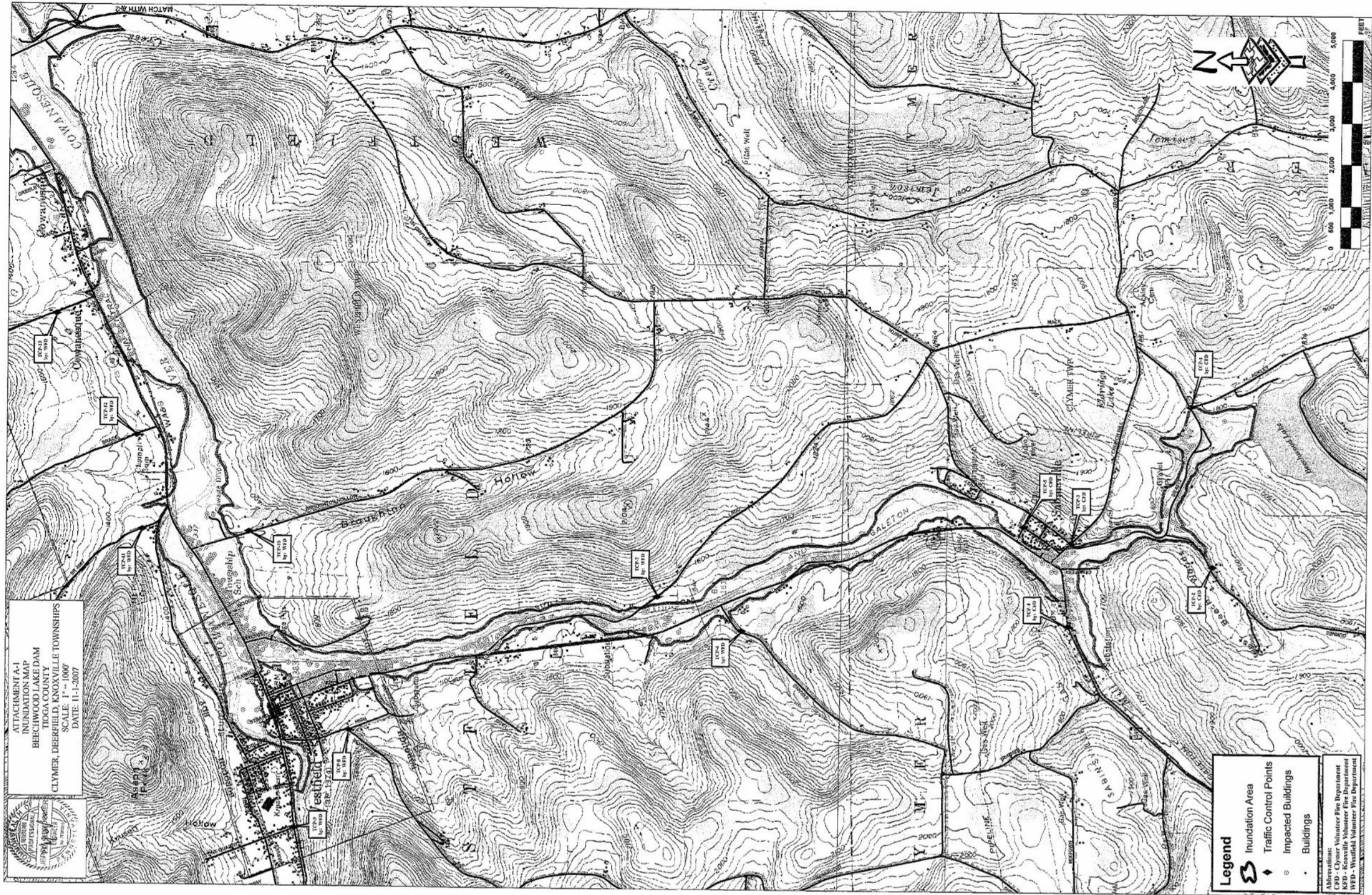


Figure C-9
Beechwood Dam (PA-454) Breach Inundation Map

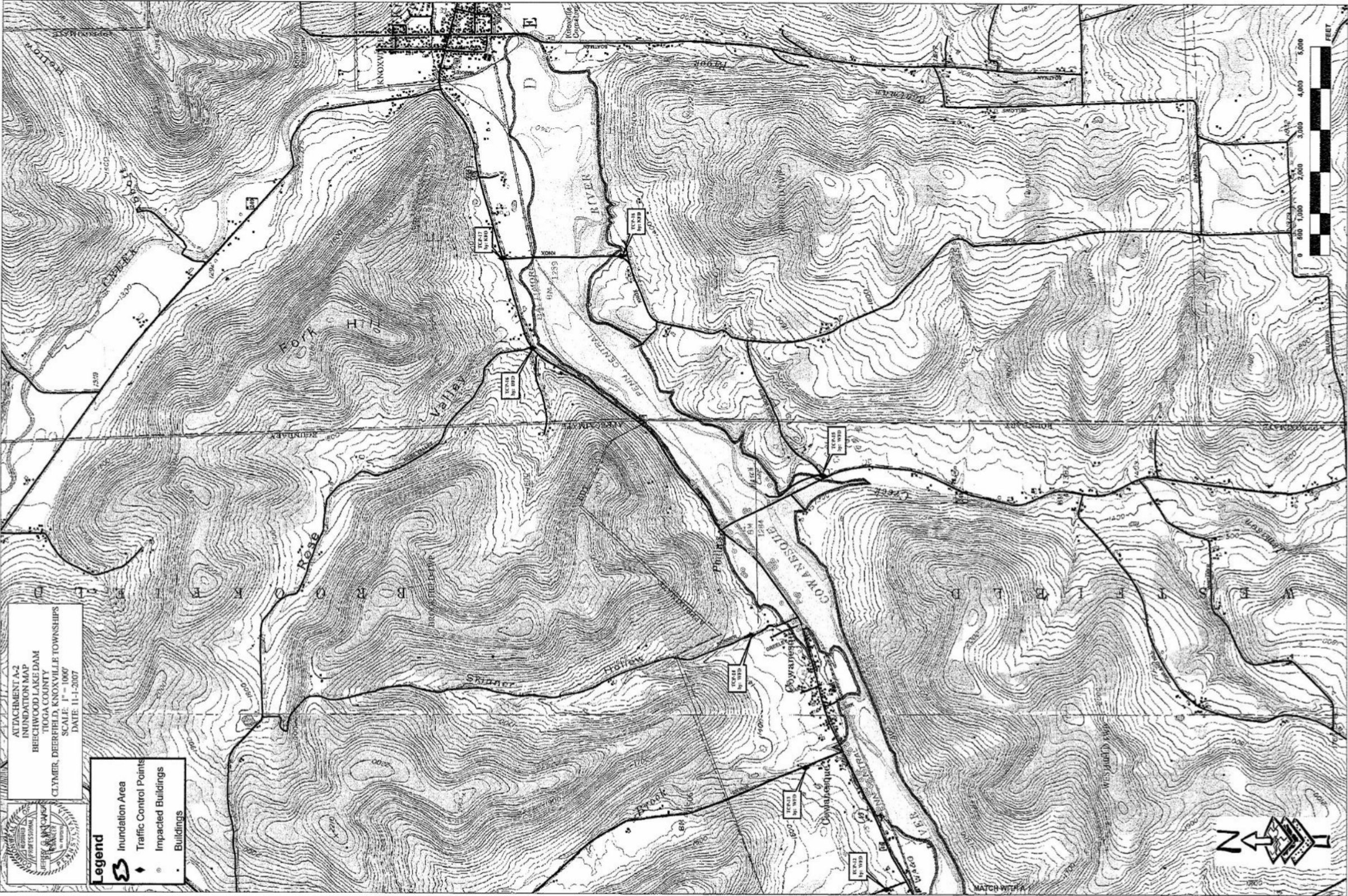


Figure C-10
Beechwood Dam (PA-454) FEMA Map

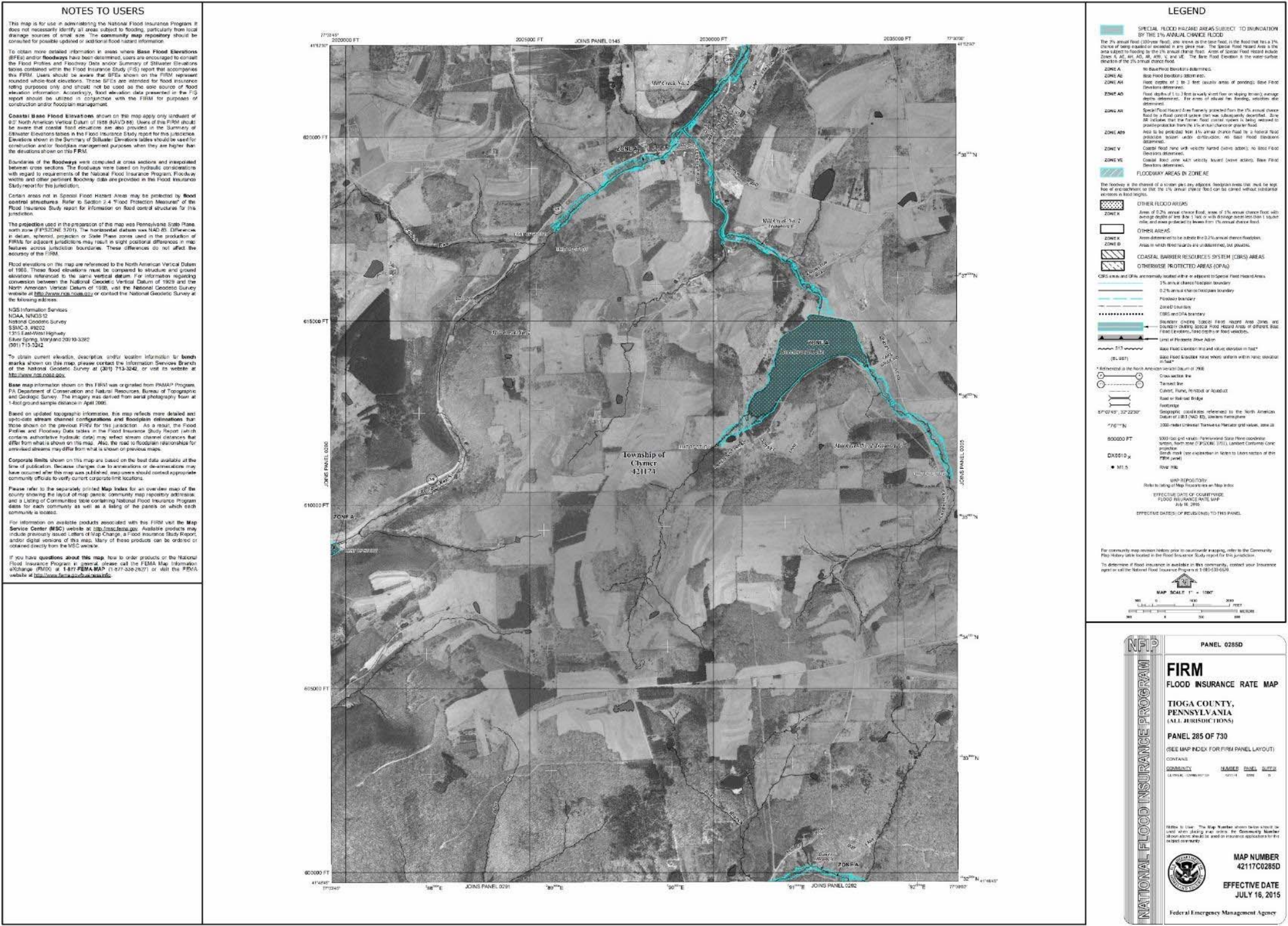


Figure C-11
Beechwood Dam (PA-454) FEMA Map



Figure C-12
Beechwood Dam (PA-454) Existing and FWOP Frequency Flood – 100-Year

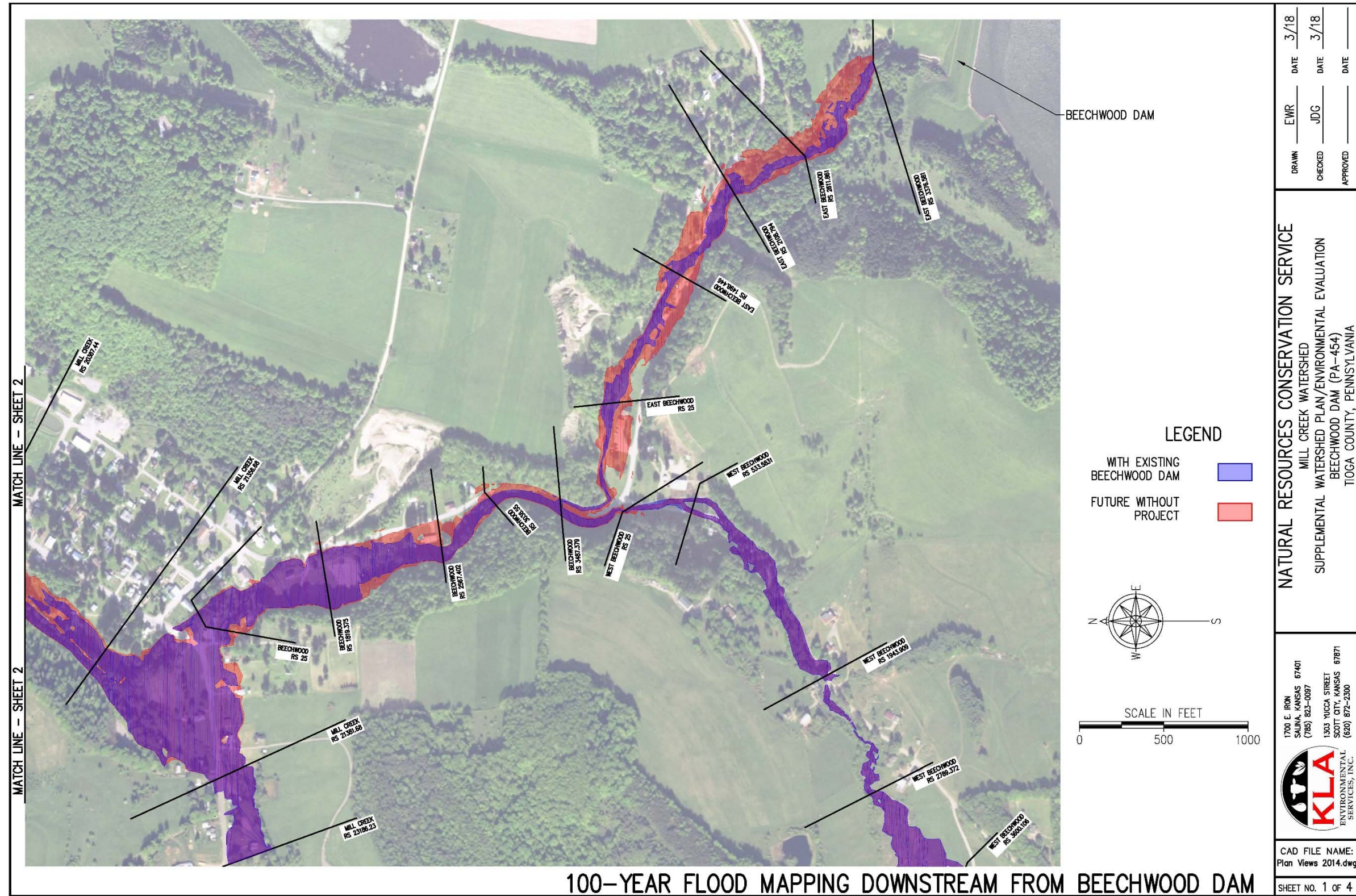


Figure C-13
Beechwood Dam (PA-454) Existing and FWOP Frequency Flood – 100-Year

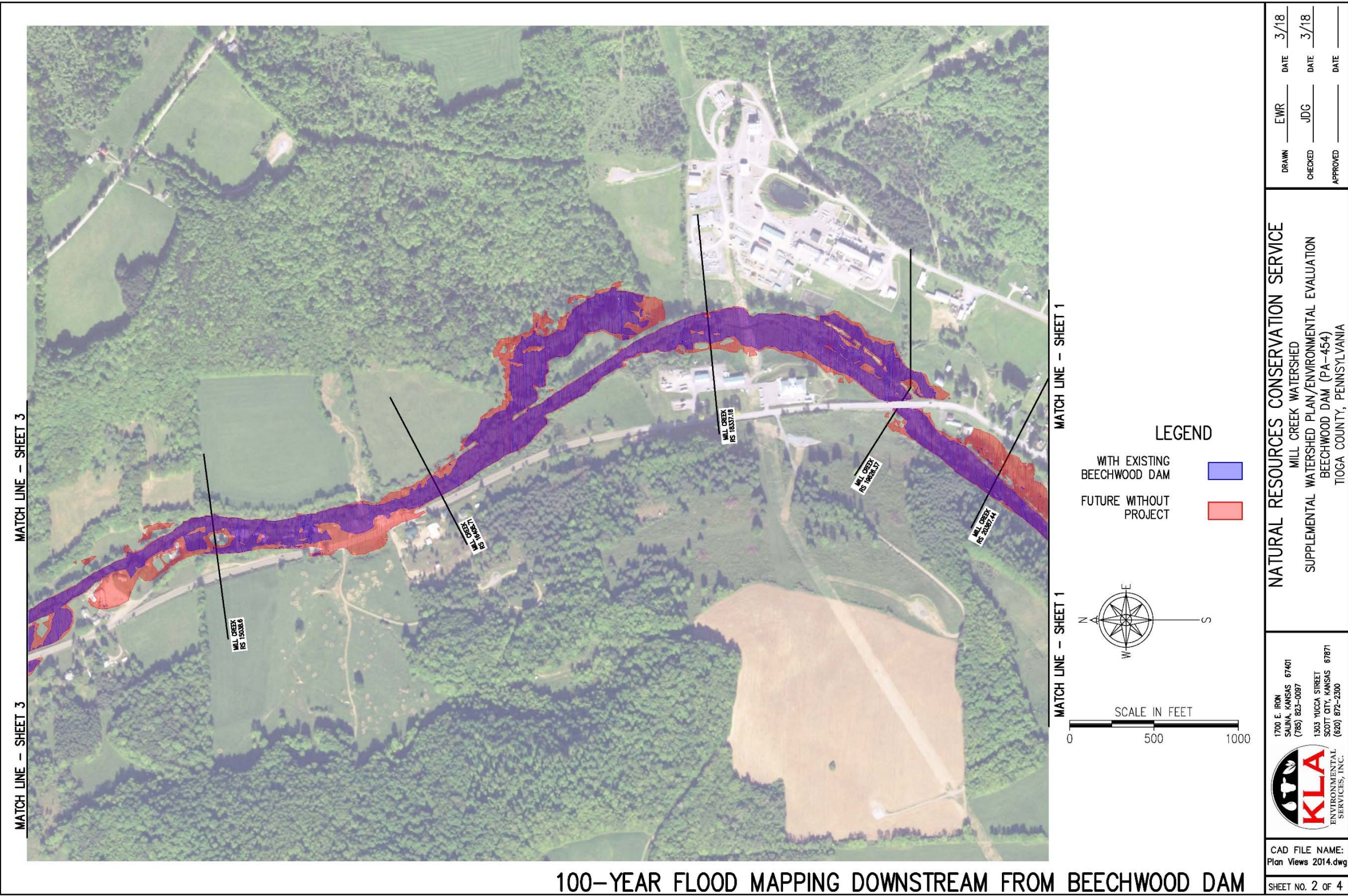


Figure C-14
Beechwood Dam (PA-454) Existing and FWOP Frequency Flood – 100-Year

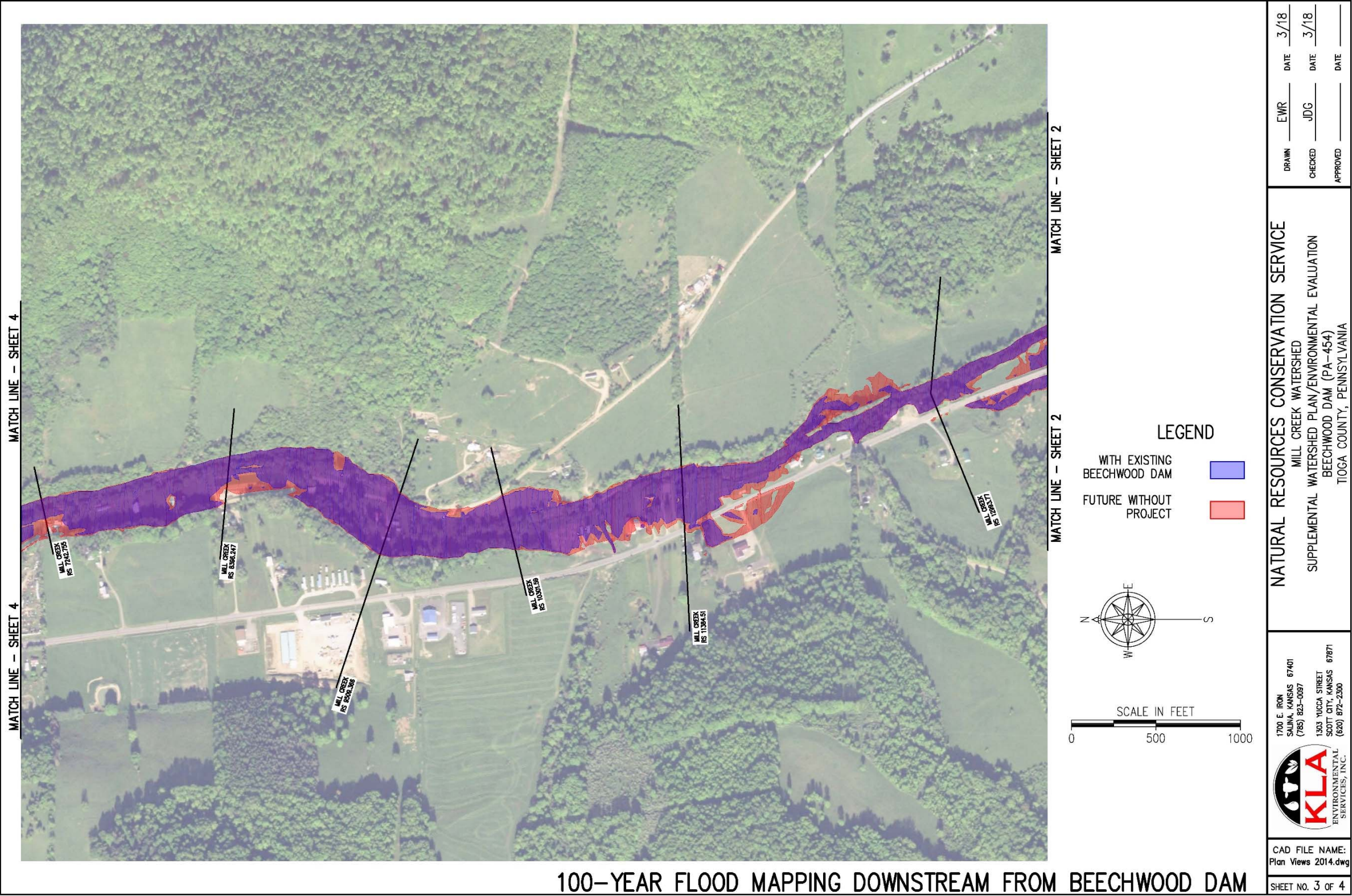


Figure C-15
Beechwood Dam (PA-454) Existing and FWOP Frequency Flood – 100-Year

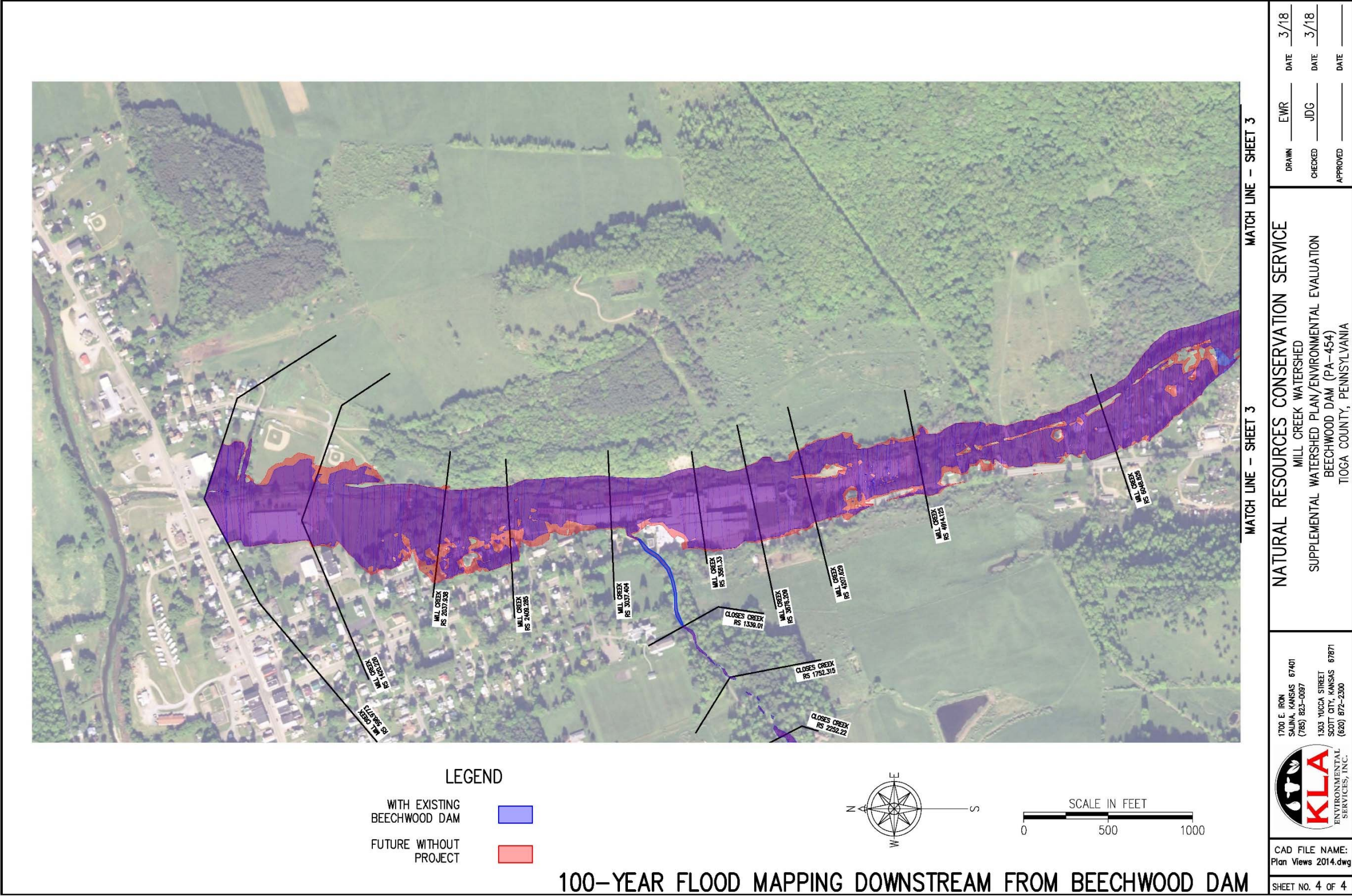


Figure C-16
Beechwood Dam (PA-454) Existing and FWOP Frequency Flood – 500-Year

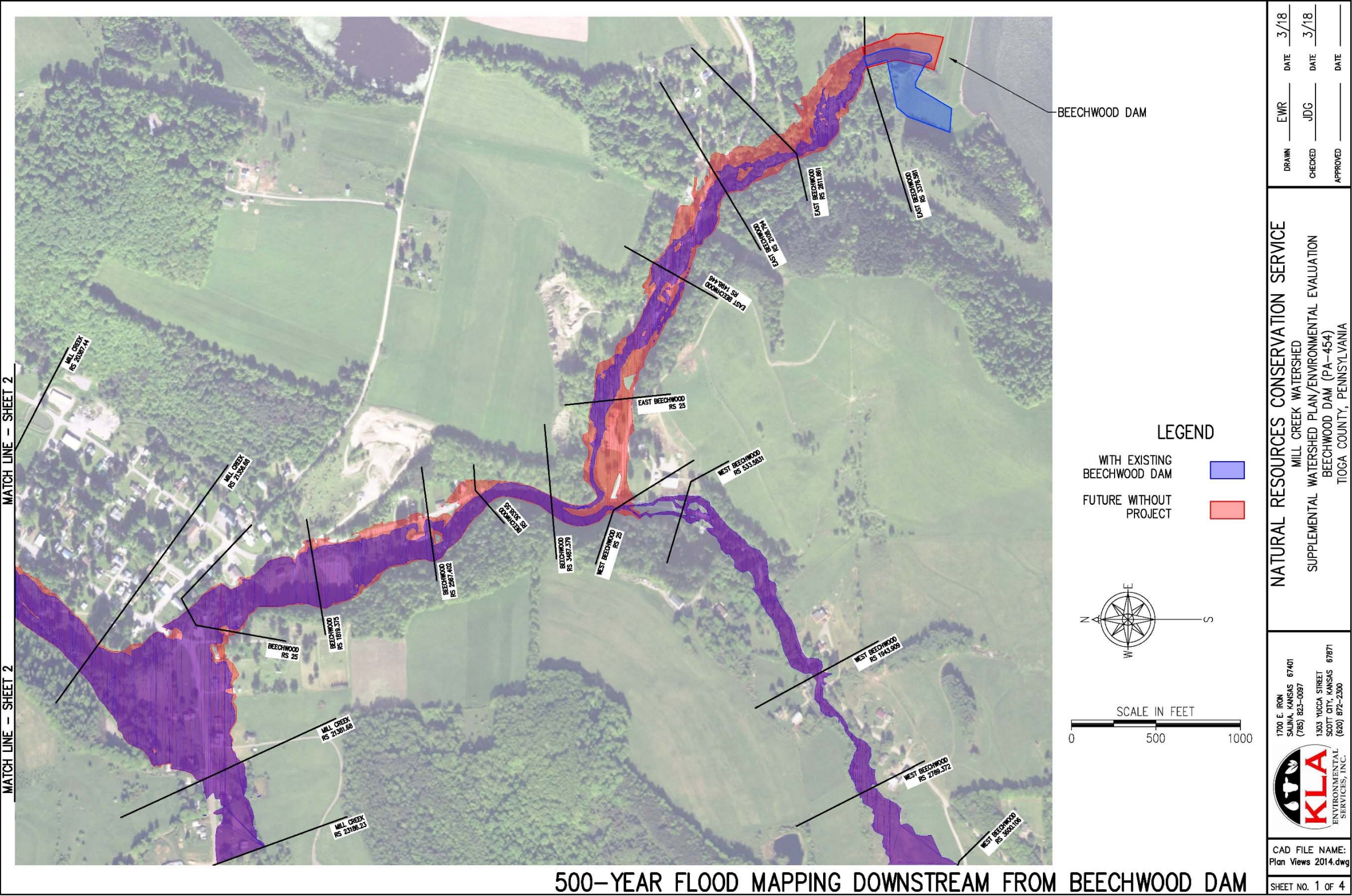


Figure C-17
Beechwood Dam (PA-454) Existing and FWOP Frequency Flood – 500-Year

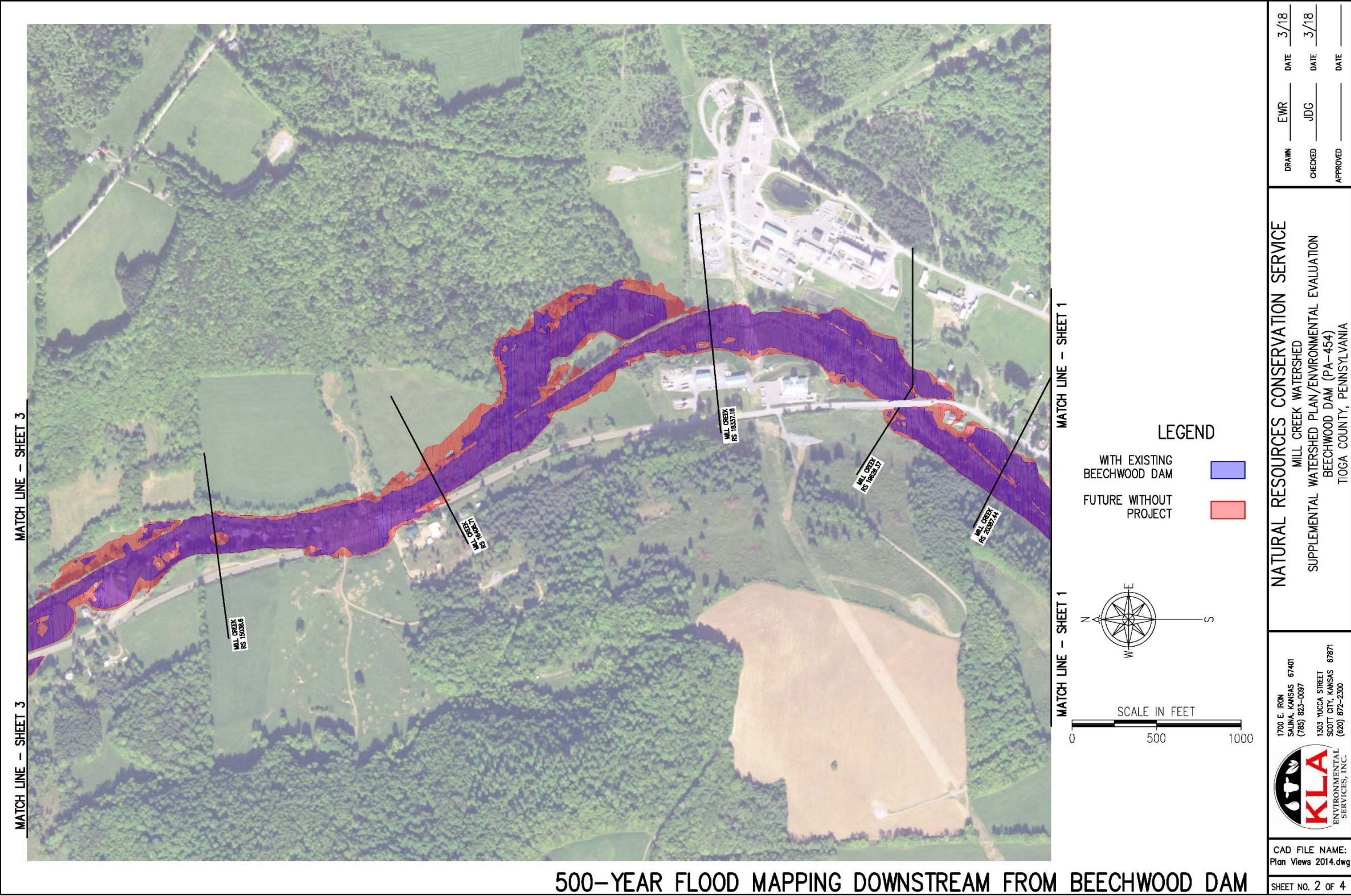


Figure C-18
Beechwood Dam (PA-454) Existing and FWOP Frequency Flood – 500-Year

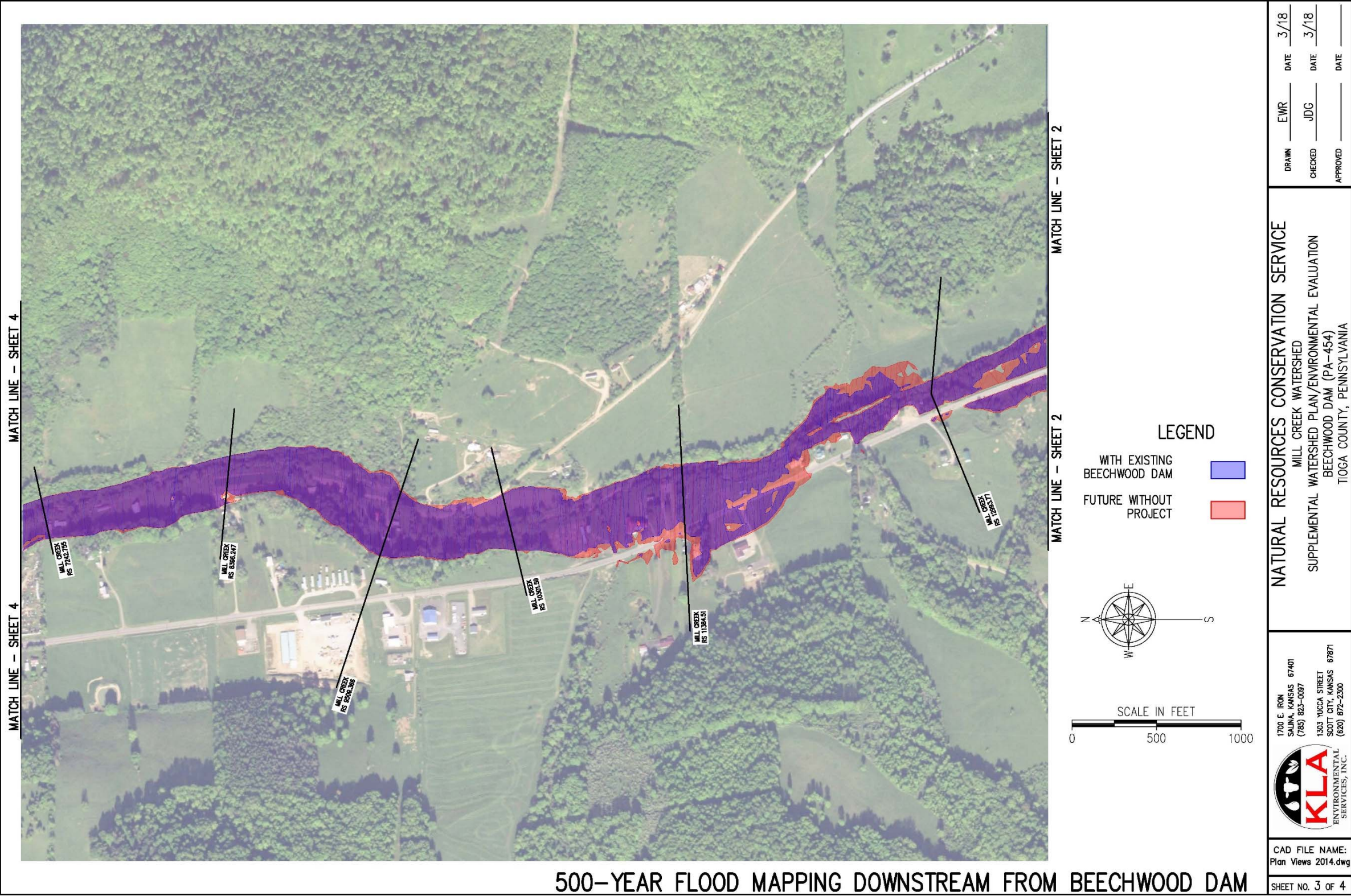
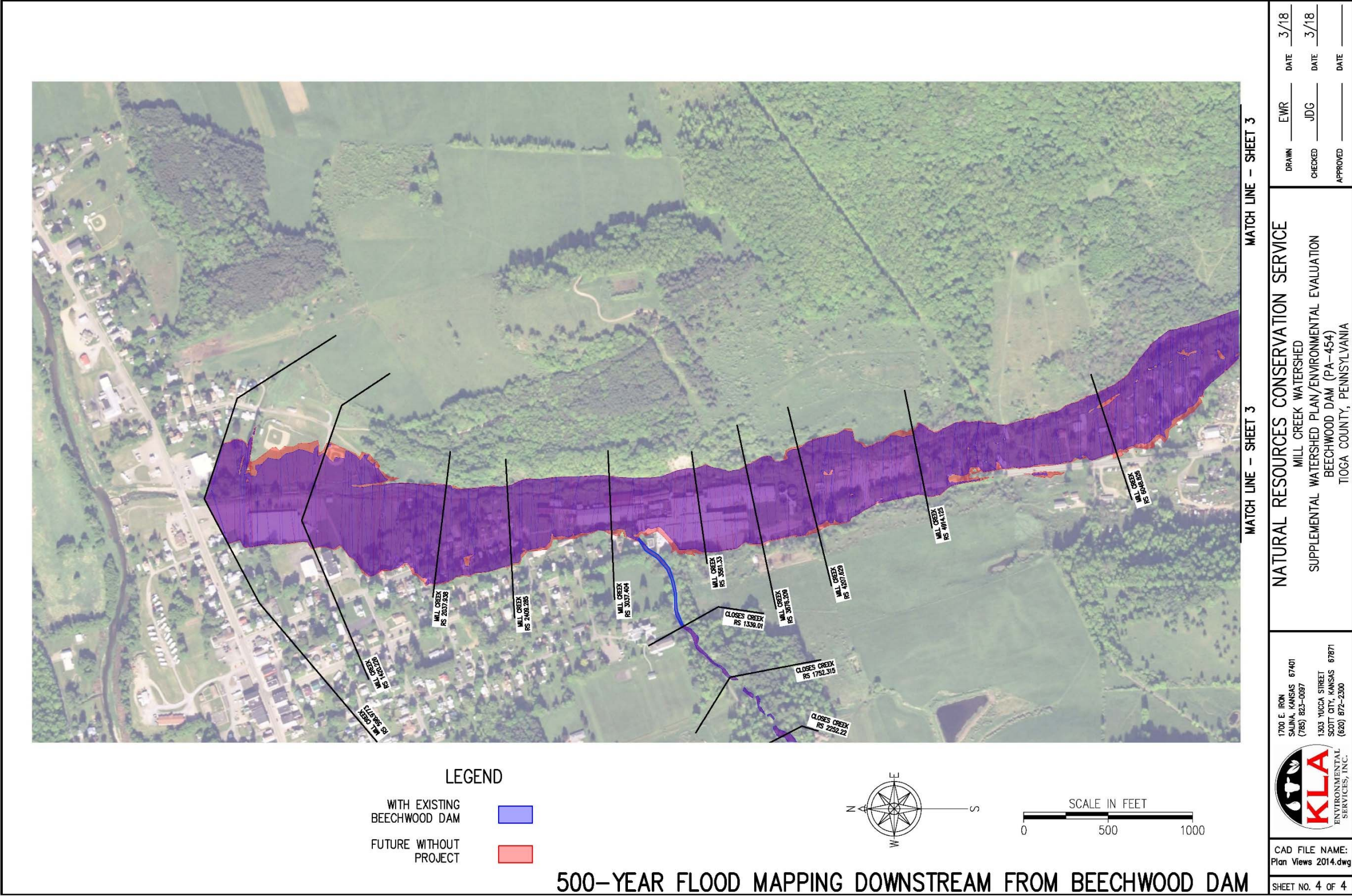


Figure C-19
Beechwood Dam (PA-454) Existing and FWOP Frequency Flood – 500-Year



Appendix D

INVESTIGATIONS AND ANALYSES REPORT

D.1 INTRODUCTION

This Appendix provides supplementary information regarding the investigations and analyses conducted for the project. The administrative record contains additional information relevant to each of the sections in this Appendix.

D.2 EXISTING DATA

NRCS provided the following existing data from its archived files to the Project Team:

- As-Built Plans
- Detailed Report of Geology Investigations
- Soil Mechanics Reports
- Breach Inundation Studies
- Stream Hydrology Studies
- Design Documentation
- General Work Plan & Supplements
- Watershed Work Plans
- Supporting Documentation
- Environmental Studies

D.3 EFFECTS ANALYSIS

Ecological, cultural, and socio-economic effects of alternatives were evaluated using the NRCS-CPA-52 – Environmental Evaluation form. This analysis was conducted with consideration to the public participation scoping requirements set forth in the National Watershed Program Manual (NWPM) by considering the potential occurrences of and/or project impacts/risks to the list of 31 natural resources and other issues of concern presented in Section 501.24 Part B of the NWPM. The information presented in the Plan-EE is an overview of the relevant watershed characteristics compiled from existing information. In addition, various websites, as referenced, were used to provide information on natural resource conditions at the site. On-site observations were made to confirm and supplement the compiled site information presented in this report.

On April 8, 2016, the Project Team conducted a field survey to determine the presence or absence of Waters of the U.S. (wetlands and open waters) around the vicinity of Beechwood Dam located in Clymer Township, Tioga County, Pennsylvania. A visual inspection of the existing plant community and surficial hydrology including an observation of a 500-foot radius around the dam was conducted. The land surrounding the dam consists primarily of residential properties and undeveloped land.

A search of the United States Fish and Wildlife Service National Wetlands Inventory did not reveal the presence of wetlands within the 500-foot radius around the dam. The inspection of the site did not reveal any additional wetlands. The north bank of Beechwood Lake along the dam and the outflow into Mill Creek were identified as open water and delineated during the site visit. The soils in the area consist primarily of Volusia Channery silt loam with 3 to 25 percent slopes. Examination of the soils in the two sample data points revealed the presence of silt loam and clayey silt.

Once alternatives were formulated, the Project Team evaluated the effect of each alternative on relevant resource concerns and special environmental concerns. The Rehabilitation alternative involves minimal changes to the existing features and functions of the dam and the construction will be confined to the existing dam, appurtenances, and auxiliary spillway.

Downstream effects from the operation of the dam during storm events for the Rehabilitation alternative will remain comparable to the existing conditions with maintaining the existing principal spillway configuration and auxiliary spillway crest elevation and width.

The Rehabilitation alternative meets the criteria under several NRCS categorical exclusions. These include Categorical Exclusion Numbers:

- (14) Repairing or maintaining principal spillways and appurtenances associated with existing serviceable dams, originally constructed to NRCS standards, in order to meet current safety standards. Work will be confined to the existing footprint of the dam, and no major change in reservoir or downstream operations will result;

- (15) Repairing or improving (deepening/widening/armoring) existing auxiliary/emergency spillways associated with dams, originally constructed to NRCS standards, in order to meet current safety standards. Work will be confined to the dam or abutment areas, and no major change in reservoir or downstream operation will result;
- (16) Repairing embankment slope failures on structures, originally built to NRCS standards, where the work is confined to the embankment or abutment areas; and
- (17) Increasing the freeboard (which is the height from the auxiliary (emergency) spillway crest to the top of embankment) of an existing dam or dike, originally built to NRCS standards, by raising the top elevation in order to meet current safety and performance standards. The purpose of the safety standard and associated work is to ensure that during extreme rainfall events, flows are confined to the auxiliary/emergency spillway so that the existing structure is not overtopped which may result in a catastrophic failure. Elevating the top of the dam will not result in an increase to lake or stream levels. Work will be confined to the existing dam and abutment areas, and no major change in reservoir operations will result. Examples of work may include the addition of fill material such as earth or gravel or placement of parapet walls.

The No Action/Future Without Federal Project (FWOP) alternative includes removal of a portion of the existing embankment to allow flood flows to pass unimpeded as explained in section D.5. The FWOP would impact the hydrology upstream and downstream from the dam resulting in transport of sediment downstream of the dam. The hydrologic changes would have some effect on wetlands located in the existing reservoir storage pool, by changing the depth and duration of floodwater. The change would also increase flood flow depth and duration downstream, including increased streambank erosion and increased flood damages. The portion of the dam removed with the FWOP has little or no habitat value, so the primary on-site effects will be small improvements in habitat value at the site of the embankment.

D.4 ECONOMIC AND SOCIAL EFFECTS

Service Life. The limiting factor for the anticipated service life of the rehabilitated structure is functional life of the principal spillway and auxiliary spillway structures. The anticipated life of the remaining sediment pool is approximately 114 years at the expected sedimentation rate. This supports a project service life of 100 years and allows up to 3 years for implementation.

Economic Analysis Summary. Changes to the land use composition of the benefit area since the last supplement were incorporated and evaluated by prorating the original benefits to the revised land use composition based on a ratio of areas for each land use. After updating based on land use changes, the original benefits for the project were indexed to current dollars and prorated for the Beechwood Dam (PA-454) based on the ratio of Average Annual Flood Prevention Benefits for the dam in the original Watershed Work Plan.

The Project Team observed the dam site and the flood impact zones below the dam. The predominant land uses in the benefit area were qualitatively inventoried and the changes observed from the original plan and supplements were noted. The previously formulated flood damage benefits were adjusted consistent with the increase in floodplain development observed since the original evaluation. After adjusting the flood damage reduction benefits based on the changes in land use, all benefits were indexed to reflect current values. Indexing was completed using procedures consistent with National Watershed Program Handbook 604.1 (B).

The results of this Project Benefit Analysis were used to determine the relative benefit/cost ratio for each project alternative by comparing the average annual benefit with the amortized rehabilitation costs.

The following is brief outline of the Project Benefit Analysis:

1. Inventory the previous Supplemental Watershed Plans and determine the most recently calculated benefits.
2. Allocate the Watershed Work Plan benefits to the appropriate project (Beechwood Dam).
3. Evaluate substantial changes in number of houses and businesses with reduced flood damages.
4. Determine the appropriate economic indices for each of the benefit items.
5. Calculate all economic indices for each price base.
6. Update the flood damage reduction benefits allocated to the Beechwood Dam to current values.

The original benefits in the Mill Creek Watershed Plan and supplements were assigned to each planned measure in the 1960 Watershed Plan based on a September 1957 Price Base. Supplemental Watershed Plans No. 1 and No. 2 made no revisions to the original benefits. Therefore, the original benefits for Beechwood Dam were based on Table 7 –

Monetary Benefits from Structural Measures and Land Treatment Measures for Watershed Protection, Table 8 – Benefits and Cost Analysis, and Table 8A – Benefits and Costs by Construction Units from the original Watershed Work Plan.

Although the benefit analysis described above results in a large amount of uncertainty in the potential National Economic Development (NED) benefits and costs of the respective alternatives, the potential variation did not affect the NED plan selection, thus an abbreviated analysis can be used per Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G) section 1.7.2(a)(4)(ii) and 2.1.1(b)(2).

Population-At-Risk. The population-at-risk was estimated based on the dam breach inundation zone and affected structures from the Emergency Action Plan (EAP) and the Evaluation of Potential Rehabilitation Projects worksheet included in the NRCS Dam Rehabilitation Assessment Report, April 1, 2010.

Land Use Change Analyses. Changes to the land use composition of the benefited area since the last supplement were incorporated and evaluated by prorating the original benefits based on a ratio of the areas for each land use experiencing notable changes.

A comprehensive review of the land use changes in the benefit area indicated that the only notable change since the original Watershed Work Plan was an increase in residential development. Consequently, the average annual residential flood damage benefits for Beechwood Dam (PA-454) noted in Table 4-7 are updated to account for development in the benefit area based on the ratio of the observed floodplain development in 2015 and 1959 (7.65 acres/2.91 acres = 2.6289). Since the corresponding reduction in undeveloped land uses are very small when compared to the area considered in the original Watershed Work Plan, no reductions in agricultural flood damage benefits were considered.

It is assumed that the land treatment measures accounted in the original Watershed Work Plan and Supplements have been implemented. Therefore, the estimated average annual damage values identified as “After Land Treatment” were carried forward as the estimated average annual damage without project. This results in the benefits directly related to the dam being evaluated in the study.

Economic Index. P&G section 1.7.2(a)(4)(ii) and 2.1.1(b)(2) allows abbreviated procedures to evaluate project benefits. Consequently, indexing will be used instead of hydrologic and economic evaluation for updating the benefits for those areas where no substantial land use changes have occurred. The original and supplemented project benefits were indexed to Price Base 2017 consistent with the tools provided at the NRCS Economics Web Site:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/econ/tools>

The project benefits were last updated in 1959 (Price Base 1957) in the original Watershed Work Plan for Mill Creek Watershed.

Recreation benefits for Beechwood Dam were not considered in the original Watershed Work Plan or subsequent supplemental plans. Beechwood Dam is owned and operated by the Pennsylvania Fish and Boat Commission (PFBC) with one of the primary purposes of providing recreational use at the lake. Information was provided by PFBC concerning the value of the recreation benefits at Beechwood Lake. A summary of the recreation benefits is provided in the table below.

¹ Estimate by PFBC Commission staff based on 2000 creel survey conducted at Little Pine State Park in Lycoming County, PA.

² Provided by PFBC staff based on information from "Investigation and Valuation of Fish Kills, AFS special publication 24, 1992" and indexed to 2018 dollar value.

Updated flood control benefits were calculated consistent with P&G and NREH Part 611. Benefits represent costs or damages that would occur in the absence of the Project. Indexing methods are described in P&G 2.1.1 (b)(2).

Benefit Item	Index	1957 Base	2017 Value	Index from 1957
Other Agricultural	Prices paid by farmers	25.86	213	8.24
Industrial	Consumer Price Index	28.10	242.839	8.64
Residential	Consumer Price Index	28.10	242.839	8.64
Highway and Bridge	ENR Construction Cost	724.00	10821.93	14.95
Railroad	ENR Construction Cost	724.00	10531.68	14.55
Indirect	Consumer Price Index	28.10	242.839	8.64

NED Analysis. The P&G was used to determine the NED Alternative. This alternative is defined as that which maximizes the net benefits consistent with protecting the Nation's environment. The economic evaluation was performed in accordance with Chapter 2, Section 4 of the P&G and the NRCS National Watershed Program Manual (Parts 501.11 A(2); 501.12 C; 505.35 B (1) (iii)-(1V); 505.35 E-F).

D.5 ENGINEERING

Surveys. To supplement data from available as-built drawings, the Project Team conducted a topographic field survey of the site May 2016. Survey ground spot elevations were collected along the centerline and edges of the dam crest, along the upstream and downstream faces of the dam embankment, along the auxiliary spillway, around the inlet/outlet structures, areas surrounding the normal pool, and the wetlands adjacent to the dam. Additional survey points were collected for the concrete structures including the principal spillway riser and downstream impact basin. Survey point elevations were obtained using a survey grade GPS receiver with an OPUS solution.

The horizontal datum was based on the North American Datum of 1983 (NAD83) using the Pennsylvania State Plane coordinate system, North Zone. Survey data were collected in the North American Vertical Datum of 1988 (NAVD88) and a shift of 0.74 feet was applied to adjust the measured elevations to the as-built plans reference based on the surveyed elevation of the inlet orifice invert set at 1787.00, which is a local datum.

The bathymetric and sediment surveys of the permanent pool area were performed in May 2016. The results of these surveys are provided in the separate sediment survey submittal.

Breach Inundation Study. The breach analysis used in this plan was provided by the PFBC. The breach analysis met all of the Pennsylvania Department of Environmental Protection (PADEP), Division of Dam Safety's criteria and, provides an incremental breach analysis based on modeling of storage capacity and reservoir surface area for normal pool and maximum storage elevations. The peak breach discharge used for developing the inundation maps was 139,852 cfs based on an incremental analysis process to determine the highest runoff event during which the threat downstream from a breach exceeds the threat from that same runoff event with no dam failure. The incremental analysis begins with the Probable Maximum Flood event runoff and reduces from there to determine the runoff event used for the breach discharge. This peak breach discharge exceeds the TR-60 upper bound condition of 109,611 cfs minimum peak breach discharge considering dam embankments less than 103 feet in height. The hydrologic and hydraulic analyses were also approved by the PADEP. The results of the breach were used to generate the flood inundation maps for the current Beechwood Dam Emergency Action Plan.

Flood Storage Capacity. The flood storage curve for existing conditions was developed using the ArcGIS Surface-Volume Tool. The floodwater retarding pool of Beechwood Dam was determined by evaluating the cumulative storage capacity below the auxiliary spillway crest and above the normal pool elevation.

Runoff Curve Number. The Runoff Curve Number (RCN) development for the Beechwood Dam watershed was carried out by following the methodology from NRCS TR-55. ArcHydro GIS tools and the USACE HEC-GeoHMS software were used to combine the 2011 NLCD Land use data provided by USDA with the corresponding NRCS Soil Survey Geographic Database soil types, to develop an area-weighted RCN for the watershed.

Time of Concentration. The Time of Concentration (Tc) of the Beechwood Dam watershed was developed using the segmental/velocity approach, described in NRCS TR-55, and the USACE HEC-GeoHMS software. An automated tool in HEC-GeoHMS uses the terrain to determine the paths with minimal slope for sheet flow, shallow concentrated flow, and open channel flow. The HEC-GeoHMS tool develops a preliminary longest flow path for the watershed using the DEM, which can be adjusted as needed. The adjustments include identifying the locations of flow-type transitions from sheet flow to shallow concentrated flow, and from shallow concentrated flow to channel flow.

Precipitation Data. Precipitation data for the Beechwood Dam watershed was derived from the following sources:

- Hydrometeorological Report 51 – Probable Maximum Precipitation (PMP) Estimates, United States East of the 105th Meridian, which provides PMP values for various storm durations; and
- NOAA Atlas 14, Volume 2 (Ohio River Basin and Surrounding States) – Provides rainfall depth-duration-frequency data for 13 Mid-Atlantic and central states. The data can be accessed online at <http://hdsc.nws.noaa.gov/hdsc/pfds/>

Rainfall depth from the above-mentioned sources was used to develop design hydrographs and evaluate the principal spillway capacity; stability and integrity of auxiliary spillway; and dam capacity (top of dam elevation). The initial routing elevation for the Principal Spillway Hydrograph (PSH) simulations is the highest between the lowest ungated principal spillway inlet, the anticipated elevation of the sediment storage, or the water surface elevation associated with significant baseflow.

Routing Design Hydrographs. Technical Release 60 (TR-60) design criteria require that the principal spillway capacity be evaluated by routing the PSH with a combined 1-day/10-day 100-year return period rainfall. Two methods for estimating runoff volumes was used: (1) the runoff curve number procedure and (2) the runoff volumes based on stream gage studies (TR-60, Figures 2-1(a) and 2 1(b)). The procedure that results in the higher auxiliary spillway crest elevation, when the PSH is routed through the structure, was used.

The initial routing elevation for the Stability Design Hydrograph (SDH) and Freeboard Hydrograph (FBH) simulations is the highest between the lowest ungated principal spillway inlet, the anticipated elevation of the sediment storage, the water surface elevation associated with significant baseflow, or the pool elevation after 10 days of drawdown from the maximum stage attained when routing the PSH.

The top of dam elevation and integrity of the auxiliary spillway (i.e., head-cutting and breaching) was evaluated by routing the FBH. For “High Hazard” dams, such as the Beechwood Dam, the FBH is generated by a PMP storm. A short duration (6-hour) and a long duration (24-hour) storms was analyzed and the most critical result used. The stability of the auxiliary spillway (i.e., erosion and scour along the exit channel) was evaluated by routing the SDH. The SDH was not evaluated for the rehabilitation alternative because the auxiliary spillway is structural and resistant to erosion.

The PADEP commonly requires the temporal distribution of the PMP to follow the HMR 51/52 critically stacked distribution or, for drainage areas less than 10 square miles, a distribution based on USACE EM 1110-2-1411. For Beechwood Dam, the Project Team developed a HEC-1 model using the hydrologic inputs also used for the SITES model (RCN and Tc) to apply the EM 1110-2-1411 distribution.

Sediment Volume. A sediment survey evaluation was conducted by the Project Team in May 2016. Sediment survey consisted of physical measurements of existing aerated and submerged sediment depth. Sampling occurred on an approximately 100-foot by 200-foot grid in the normal pool area. In the flood pool above the elevation of the permanent pool, evidence of aerated sediment was verified.

The sediment depths were measured at 193 locations. Due to the deep waters in the reservoir, the Project Team surveyors could not utilize their sediment push rod, so they developed a 2-inch diameter by 4-foot long coated steel spud bar that was attached to a rope. The spud bar equipment and procedure were developed in accordance with the USDA National Engineering Handbook (Section 3, Chapter 7). The spud bar was then dropped under the influence of the heavy steel density which was enough to drive the spud bar through the sediment layer. Thickness readings were then taken by measuring the loose sediments retained by the granular surface of the spud bar. The sediment thickness was determined by measuring the loose sediment on the outside of the spud bar, which was raised up through the water prior to each reading. The weight of the spud bar was sufficient enough to penetrate the submerged sediment, but not so much so that it penetrated the base. Location of each reading was collected by a GPS unit. Bottom of sediment elevations were collected by subtracting the wet rope length from the normal pool elevation at each location. Top of sediment elevations were calculated by adding the measured thickness to the bottom elevation at each location.

The areas surrounding the impoundment are vegetated and well maintained (mostly recreational grass areas except for the south, southeast, and northwest side of the impoundment where trees are present). No significant aerated sediment deposits were observed near the embankment.

2008 LiDAR survey data from the Pennsylvania Department of Conservation and Natural Resources obtained through the Pennsylvania Spatial Data Access (PASDA) was converted to the as-built plans reference vertical datum and was used to derive the storage values above elevation 1,787.00 feet (normal pool elevation). The available LiDAR in the vicinity of the Beechwood Dam reservoir is of high quality and has an acceptable accuracy according to the qualitative acceptance report published by PASDA for Tioga County. The Project Team considered the data as the best publicly available supplement to the field survey and can meet the need to calculate an accurate storage volume.

The Project Team developed a digital surface to reflect the reservoir floor elevations at the 193 field locations where sediment thickness was measured, and a second digital surface to reflect the elevation of refusal below the reservoir floor. Then, using the Autodesk Civil 3D Composite Volume tool, the volume between the two digital surfaces was calculated to provide the sediment volume. Based on the 193 sediment depth field measurements, the total submerged sediment volume was estimated to be 68.93 acre-feet.

In June 2016, the Project Team visited the site to look for aerated sediment deposits. Based on field observations, an estimated aerated sediment volume of 3.17 acre-feet was found within the flood pool above the elevation of the permanent pool. Most aerated sediment deposits were found near the mouth of the tributary upstream of Beechwood Lake (Mill Creek), and along the flood pool area adjacent to the lake.

The Project Team also developed a sediment map to provide the locations of submerged sediment thickness measurements and the interpolated sediment thickness surface. The ArcGIS Spatial Analyst tool was used to develop a depth chart created from the current top and bottom elevation of sediments. The interpolated sediment depths were then depicted as polygons with different colors representing a range of sediment depths. As mentioned, all sediment is submerged below the normal pool elevation of 1,787.00 feet.

The annual sedimentation rate based on the measured sediment volume was evaluated and compared to the design sedimentation rate, as well as the projected annual sedimentation rate. The projected sedimentation rate was computed using the existing and future (build-out) land use conditions within the drainage area of Beechwood Dam in accordance with NEH Section 3, Chapter 8, and SCS-ENG-309. The soil loss rates for the different land use conditions were based on the 1963 Design Report for Beechwood Dam.

The SCS-ENG-309 worksheet predicted an estimate of the future sedimentation of 34.87 acre-feet (equivalent to 0.63 acre-feet/year for the next 55 years), which is lower than the historical sedimentation rate. However, given the strict erosion sediment regulations for future developments and implementation of agricultural land conservation practices and resources protection, future soil loss rates will be lower than they currently are. Therefore, even though the original design was an underestimate of historical sedimentation rates, the watershed is expected to produce comparable sediments amounts in the future compared to what has been estimated using the SCS-ENG-309 worksheet.

The current surveyed remaining storage volume at normal pool, from the 2016 bathymetric survey, is 1,117 acre-feet. Subtracting the 1,045 acre-feet allocated in the original design for fish and wildlife purpose leaves 72 acre-feet

remaining volume for future sediment storage. At the estimated rate of 0.63 acre-feet/year for future sedimentation, the remaining sediment pool life is 114 years.

Site Visit. The Project Team conducted a site visit to document the current conditions of Beechwood Dam, located in Tioga County, on June 15, 2016. The site visit included a visual review and photographic documentation of the exposed areas of the dam and associated structures.

Principal Spillway Video Inspection. The Project Team conducted a robotic Televideo (TV) inspection of the principal spillway conduit and embankment drains, as part of the documentation of the current conditions of Beechwood Dam (PA-454), located near Sabinsville in Tioga County, Pennsylvania on July 19, 2016. The inspection report provided conduit joint and surficial observations to document the current conditions of the principal spillway. Additionally, the report provided video inspections of the accessible portions of the embankment drains.

Based on the visual inspection, in the Project Team's professional opinion, the riser structure appears to have sufficient structural and hydraulic integrity to perform its function. The principal spillway conduit appears to be in good condition, with no indications of movement, significant cracks, deterioration, settlement, or erosion observed. The conduit joint gaps appear to have been filled with sealant, or caulk. The sealant appears to be sound and intact.

Toe Drain Video Inspection. The Project Team performed a TV inspection of the Beechwood Dam toe drains on July 19, 2016. The objective of the inspection was to document the current condition and identify any potential issues of the embankment drains. The same crawler used for the principal spillway was fitted with smaller wheels in order to fit into the 8-inch diameter pipes, to perform the inspection. This equipment provided video inspection by remotely pushing camera through the 8-inch diameter CMP embankment drainpipe.

The Project Team obtained video observations for the full length of both toe drains, with no operational issues encountered. Both embankment drains (west and east) were flowing at the time of inspection with a depth of flow of approximately 1.5 inches (approximately 22 gpm). The discharge was constant and clear with no visible turbidity.

For the west seepage drain outlet pipe drain, some minor debris at the bottom of the pipe was observed. Other than the observed debris at the bottom of the pipe, no major blockages or pipe deformation was observed. During the manufacturing process, some of the bituminous coating of the pipe sagged or dripped into the flow area of the pipe. The east toe drain presented similar conditions – settled debris at the bottom of the pipe. Also observed was a rodent living in this pipe at the time of inspection. Other than the debris obstacles seen, no major structural defects were observed in this pipe.

Embankment and Foundation Geology. An abbreviated geologic investigation of the existing dam embankment was conducted. The geology investigation included borings on the dam embankment (3), borings in the auxiliary spillway (3), collection of samples, and testing. The geology of the dam and foundation are based on information acquired from the geology investigation and also the investigations and analyses conducted during the original design of the dam.

Seismic Evaluation. The Project Team obtained and evaluated existing geologic, geophysical, and available seismologic information; and prepared a seismotectonic evaluation of the area to determine that there are not "active" or "capable" faults at the site. The study included an assessment of the suitability of existing data to evaluate definitively the existence of faults at the site. Additionally, the Project Team obtained a probabilistic seismic hazard curve for the site from the USGS Earthquakes Hazard Program and based the earthquake loading on an annual exceedance probability of 1×10^{-4} which represents a return period of about 10,000 years or an approximate probability of exceedance in 50 years of 0.5%.

The Project Team found no M4+ earthquakes since 1700 within a 100-kilometer radius of the site. We found no mapped faults within the 100-kilometer radius; however, there is not enough data to evaluate definitively the existence of faults at the site. Using USGS web tools, we determined the 10,000-year return earthquake event to have a PGAM = 0.195g at Beechwood Dam. We conclude that the embankment soil is not liquefiable based upon its composition and consistency. Likewise, in our opinion, the original 1961 study indicates that the high gravel content, high fines content, and relatively strong (dense/stiff) foundation soil is not conducive to liquefaction.

Slope Stability. The Project Team estimated the slope stability of the existing dam by numerically modeling a two-dimensional section through the embankment and subgrade using Geo-Slope International's Geo-Studio 2012 software entitled SLOPE/W and SEEP/W. The soil strength and seepage properties were obtained from the 2016 explorations and tests, the 1961 design documents, and the 1962 study.

The Project Team considered four general Conditions to evaluate the stability of the dam:

- Condition 1 – The low pool stage at the invert of the inlet pipe to evaluate end-of-construction conditions (Not evaluated due to the age of the dam).
- Condition 2 – Sudden drawdown from the permanent pool to the lowest ungated stage. .
- Condition 3 – The flood stage pool at the crest of the auxiliary spillway.
- Condition 4 – Pseudo-Static Seismic analysis at permanent pool stage, downstream face using horizontal seismic acceleration of PGAM = 0.195g for the site.

It was noted that Condition 4 is modified from the 2005 TR-60 based upon the NRCS SOW requirements. The Seismic and Stability Report provides a summary of the TR-60 stability analysis results for the cases analyzed. Graphic outputs were provided for each stability case as well as the graphic output for the simplified seepage analysis.

Additionally, for the Pennsylvania Code, 25 PA Code § 105.97 criteria analyses, the Project Team analyzed the following four general cases to evaluate the stability of the dam.

- Case P1: Normal pool, Elevation 1787 feet, with steady-state seepage conditions
- Case P2: Maximum pool (crest of dam) (Elevation 1801 feet per as-built plans)
- Case P3: Sudden Drawdown from permanent pool to lowest ungated discharge, Elevation 1787 feet to Elevation 1743 feet (upstream slope).
- Case P4: Pseudo-static Seismic analysis at permanent pool stage, Elevation 1787 feet, downstream face using MCE horizontal seismic acceleration of PGAm = 0.083g for the site.

Because NRCS completed construction of the Beechwood Dam 51 years ago, the end-of-construction, Case P5 was not evaluated.

Based upon the original design soil parameters, current studies and conservative assumed conditions, it is the Project Team's opinion that the seepage/stability analyses indicate that the dam meets the current (2005) and draft (2016) NRCS TR-60 slope stability requirements. The dam also meets the current 25 PA Code § 105.97 standard for static and earthquake stability at normal pool as well as for the flood case and for sudden drawdown.

Downstream Effects. A hydrologic evaluation of the entire Mill Creek watershed was completed for three scenarios, the existing conditions (with the Beechwood Dam in-place), with Beechwood Dam rehabilitated and the FWOP scenario with Beechwood Dam removed. Hydrologic models of the watershed were developed to determine the peak discharges downstream of the dam for 100-year and 500-year, 24-hour storm events.

A HEC-HMS model was developed for the 9 uncontrolled subareas and the 3 subareas controlled by existing structures. The stage-storage-discharge relationships for the PA-455 and PA-456 dams were taken from the original design documentation for the dams. The stage-storage-discharge relationships for the Beechwood Dam were taken from either the SITES routing results of the existing dam or planned rehabilitated dam.

The peak discharges for the existing and rehabilitated Beechwood Dam scenarios were the same at all locations for the 100-year event and varied minimally (<30 cfs) at one location for the 500-year event. The discharge characteristics of the Beechwood Dam during these two storm events are essentially the same for mapping purposes, so only the existing and FWOP scenarios were run in the HEC-RAS analysis and mapped.

The USACE HEC-RAS version 5.03 hydraulic computer model was used to analyze the study reaches within Mill Creek Watershed, with specific interest in the reaches downstream from Beechwood Dam to the confluence of Mill Creek with the Cowasque River. The developed HEC-RAS model considered two scenarios for the 100-year and 500-year storm events: 1) Beechwood Dam as it exists today and, 2) a FWOP scenario with Beechwood Dam removed. Cross sections for the HEC-RAS models were developed in ESRI ArcMap using Pennsylvania 1-meter DEM LiDAR elevation data. Stream centerlines were digitized from the available aerial photography. Manning's n

values were estimated from aerial photography along with HEC-RAS User's Manual. Bank stations were set based on LiDAR data. HEC-RAS results for the 100-year and 500-year flood events were mapped based on the elevation data from the LiDAR 1-meter DEM.

The results of hydraulic study mapping show the increased flooding with the Beechwood Dam removed. Removal of the Beechwood Dam for decommissioning or FWOP would result in increased downstream flooding depths and damages. Without the Beechwood Dam, an additional 21 residential properties and 4 commercial properties would experience flooding during the 100-year event. The flood depths during the 100-year event would increase 3 to 4 feet along East Beechwood Creek, 1.5 to 3 feet along Beechwood Creek, and 0.6 to 1.4 feet along Mill Creek.

No critical structures and facilities (such as hospitals, nursing homes, public buildings, schools, etc.) were identified within the 500-year floodplain downstream from the existing Beechwood Dam.

Alternative Formulation. The Project Team completed an engineering analysis to determine the alternatives to be evaluated in detail. Alternative plans, including the NED plan, were formulated with consideration to completeness, effectiveness, efficiency, and acceptability. The alternatives considered included the following:

Future Without Federal Project (FWOP) (No Action) –

The FWOP (also known as the No Action Alternative) is based on the course of action that the Sponsor is most likely to take in the event that no federally-financed rehabilitation works were to be undertaken. The FWOP Alternative was identified in coordination with NRCS and the Sponsor and would be the course of action by the Sponsor should they be given a short-term legal mandate to meet State dam safety and performance criteria. The FWOP Alternative would be a minimum level Sponsor breach of the dam, as directed by PADEP. The FWOP Alternative would consist of removing a portion of the dam to essentially restore the stream to its natural, free-flowing state through the impoundment and dam footprint based on the approval requirements of PADEP for dam removals.

Mapping of the Beechwood Dam breach and 100-year flooding with and without the dam, as shown in Appendix C, show the downstream areas impacted by either potential dam failure or the removal of the dam. The constructed breach would reduce the downstream safety risks compared to a sudden, catastrophic dam failure and minimize the Sponsor's dam safety liability. This alternative would result in the following downstream impacts:

- The existing dam provides sediment storage capacity, flood protection and flood-damage reduction to landowners, residents, motorists, and others using the project benefit area. Without the dam, periodic flood events would result in increased flood damage, sedimentation damage, and other associated damage at or in excess of pre-project levels.

Decreased Flood Protection for the 21 existing residential and 4 existing downstream structures that are currently protected from damage resulting from the 100-year storm events because the presence of the dam regulates the release of water.

Rehabilitation to Current High Hazard Class Dam Standards – The preferred alternative for the Beechwood Dam would require construction and modification in three locations of the dam: the auxiliary spillway, the downstream toe, and the upstream face of the dam. This included the following:

- Armor auxiliary spillway crest and exit channel with roller compacted concrete and regrade to valley floor.
- Retrofit drainage diaphragm around principal spillway conduit and install chimney drain at interface with embankment fill.
- Extend principal spillway conduit and construct a concrete impact basin at the outlet.
- Raise dam embankment crest 3.0 feet to Elevation 1804.2 feet.
- Flatten downstream slope of dam to 3H:1V.
- Repair and/or replace metal components on principal spillway inlet riser and add low flow augmentation works.
- Any other additional items identified as being deficient.

Multiple rehabilitation options were considered during the engineering analysis and eliminated from detailed evaluation in consultation with the Sponsor. The rehabilitation options considered modifications to the auxiliary spillway, dam crest and/or principal spillway to upgrade the dam to current NRCS High Hazard Class criteria.

Changes included widening and raising the auxiliary spillway, raising the crest elevation, modifying the principal spillway, armoring the spillway and combinations thereof. All the rehabilitation options were formulated assuming an evaluated life of 100-years and upgrading the internal drainage controls in the dam. The preferred rehabilitation option, for detailed evaluation, was selected based on effectiveness, efficiency, constructability, and compatibility with the purpose and need for the project.

The Project Team formulated a matrix of dam features, deficiencies and potential solutions to explore options for dam rehabilitation. Options were evaluated in consultation with PFBC. Rehabilitation options considered but dismissed from further evaluation included the following:

1. Widen the existing 150-foot wide auxiliary spillway to 380 feet. Regrade and armor auxiliary spillway crest and exit channel with roller compacted concrete (RCC) to valley floor. Maintain auxiliary spillway crest at Elevation 1795.5. Maintain the settled dam crest at Elevation 1801.2 feet. Flatten downstream slope of dam to 3:1, extend principal spillway conduit and construct an impact basin at the outlet. The substantial increase in auxiliary spillway capacity would increase the downstream discharges for the 500-year event; no critical structures or facilities are located within the 500-year floodplain downstream from the dam. Dismissed from further evaluation due to higher cost.
3. Construct a new RCC armored spillway within the dam embankment with a 200-foot-wide crest at Elevation 1795.5. Raise dam crest 2.1 feet to Elevation 1803.3 feet and close existing auxiliary spillway. Flatten downstream slope of dam to 3:1, extend principal spillway conduit and construct an impact basin at the outlet. Dismissed from further evaluation due to higher cost and acceptability to Sponsor.
4. Construct new 230-foot-wide auxiliary spillway on right abutment armored with RCC. Regrade and armor auxiliary spillway crest and exit channel with RCC to valley floor. Maintain auxiliary spillway crest(s) at Elevation 1795.5. Maintain the settled dam crest at Elevation 1801.2 feet. Flatten downstream slope of dam to 3:1, extend principal spillway conduit and construct an impact basin at the outlet. The substantial increase in auxiliary spillway capacity would increase the downstream discharges for the 500-year event; no critical structures or facilities are located within the 500-year floodplain downstream from the dam. Dismissed from further evaluation due to higher cost.
5. Widen the existing 150-foot wide auxiliary spillway to 210 feet. Lower auxiliary spillway crest 1.9 feet to 100-year flood level at Elevation 1793.6. Grade exit channel to valley floor and armor auxiliary spillway crest and exit channel with RCC. Maintain the settled dam crest at Elevation 1801.2 feet. Flatten downstream slope of dam to 3:1, extend principal spillway conduit and construct an impact basin at the outlet. Dismissed from further evaluation due to higher cost and acceptability to Sponsor.

Dam Decommissioning– The Decommissioning Alternative was formulated to restore the stream by reconnecting the upstream and downstream channel in a non-erosive manner and restoring the stream/river. A large portion of the dam embankment would be excavated to allow normal flows and up to 100-year flood flows through the site in a non-erosive manner. Accumulated sediment would not be removed. The Decommission Alternative was developed in consideration of guidance in NRCS National Engineering Handbook, Part 653, Stream Corridor Restoration: Principles, Processes, and Practices.

The Decommissioning Alternative would eliminate flood storage and protection provided by the dam, which could possibly expose downstream properties to an increased risk of flooding, property damage, and loss of human life. As a result, the Decommissioning Alternative alone would not meet the objective to maintain the downstream flood damage reductions provided by the existing project. To meet this objective, the Decommissioning Alternative would have to be supplemented by other measures such as floodproofing or relocation of structures located within the 100-year floodplain. A total of 25 structures (4 commercial and 21 residential) are located within the 100-yr floodplain of the downstream benefit area. Relocation of the properties was chosen as the most likely and cost-effective choice.

There were no critical structures and facilities (such as hospitals, nursing homes, public buildings, schools, etc.) identified within the 500-year floodplain downstream of the dam, were it to be decommissioned.

Also, to meet the Sponsor's purpose and need, the recreation and wildlife aspects of Beechwood Lake would need to be relocated or replaced. This replacement could be accomplished through construction of a new lake or several smaller in-stream structures that fulfill the recreation and wildlife purpose. Estimated costs of the Nonstructural and

Other Measures consider relocation, property acquisition, demolition, and site stabilization/restoration along with decommissioning utilities, septic structures, wells and similar facilities.

Acquisition/Relocation of At-Risk Structures and Other Nonstructural Measures (Floodproofing in the Inundation Areas) – These alternatives were formulated to remove the downstream hazard and allows the Beechwood Dam to be reclassified as a Low Hazard Class dam. This would remove structures within the breach inundation. No consideration was made to lowering the embankment, so a new breach inundation area was not recalculated. Land use restrictions were considered to prevent future upgrades to High Hazard Class dam due to downstream development within the breach inundation area. The threat to human life from sudden dam failure would be reduced by relocating the residential and commercial structures and raising and/or relocating the roadways within the potential breach inundation.

Cost Estimates. The Project Team prepared predictions of probable costs for all alternatives. The predictions of probable costs are intended for comparing the alternatives. Unless otherwise noted predictions of probable costs were prepared using the RS Means method for engineering cost estimation. Comparison of costs to the rehabilitation option selected for detailed study is shown in the table below.

Feature	Existing Condition	Preferred Rehabilitation Alternative	Option 1	Option 3	Option 4	Option 5
Cost Relative to Lowest Cost Alternative	N/A	100%	200%	109%	159%	117%

Appendix E

OTHER SUPPORTING INFORMATION

Public Law 83-566 Project Information Mill Creek Watershed Supplemental Watershed Plan/EE Beechwood Dam (PA-454) Tioga County, PA	
Rehab General Description Data	
Project Number	422006
Hydrologic Unit Area:	02050104
Longitude (decimal format):	-77.513845
Latitude (decimal format):	41.854631
Area of Project (acres):	2,181
Project Evaluation Life:	103 Years
Project Discount Rate:	2.75%
Price Base:	2018
B/C Ratio:	4.7 to 1.0
Total Cost:	\$4,067,700
Total Public Law 83-566 Cost:	\$3,080,700
Dam Number	PA-454
National Inventory of Dams (NID):	PA00037
Congressional District of dam:	05-PA
FIPS Code of dam:	42117
# Single-Purpose Floodwater Retarding Structures Planned:	0
# Multi-Purpose Structures Planned:	1
Rehab Project Purposes:	Flood Damage Reduction

Public Law 83-566 Project Information Mill Creek Watershed Supplemental Watershed Plan/EE Beechwood Dam (PA-454) Tioga County, PA	
Sponsor Data	
Organization:	Pennsylvania Fish and Boat Commission
Sponsor Representative (optional):	Gerald Woomer, PE
Sponsor Title:	Project Manager
Sponsor Type:	State Agency
Address:	595 East Rolling Ridge Drive
City:	Bellefonte
State:	Pennsylvania
Zip:	16823
Phone:	814.359.5170
Email:	gwoomer@pa.gov
O&M Responsibility (Yes/No):	Yes

Public Law 83-566 Project Information Mill Creek Watershed Supplemental Watershed Plan/EE Beechwood Dam (PA-454) Tioga County, PA	
Rehab Budget Request Data	
Failure Index:	77
Population at Risk:	1,620
Price Base:	2018
Estimated Installation Cost (Watershed Agreement):	\$4,067,700
Priority - State Dam Safety Agency:	High
Number of Municipal Water Supply Users:	0

Public Law 83-566 Project Information Mill Creek Watershed Supplemental Watershed Plan/EE Beechwood Dam (PA-454) Tioga County, PA	
Rehab Subset of Benefits Data	
Price Base:	2018
Total Funds Needed (FA/TA) (Table 2): Public Law-83-566 NRCS	\$1,831,200/\$1,249,500
Funds Other Than Public Law-83-566:	\$987,000
Agricultural Related Flood Damage Reduction Benefits (Average Annual):	\$1,100
Non-Agricultural Related Flood Damage Reduction Benefits (Average Annual):	\$155,100
Other Benefits - Cost Avoidance (Average Annual):	\$50,000
Other Benefits - Recreation (Average Annual):	\$383,800
Beneficiaries (No.):	1,628
Visitor Days (Optional):	0
Farms and Ranches Benefited (No.):	Not Evaluated
Bridges Benefited (No.):	5
Public Facilities Benefited (No.):	0
Businesses Benefited (No.):	115
Homes Benefited (No.):	230
Reduced Erosion (Tons/Yr.):	0
Reduced Sedimentation (Tons/Yr.):	971
Streams/Corridors Enhanced/Protected (Miles):	5.4
Lakes/Reservoirs Enhanced/Projected (Surface Acres):	76
Domestic Water Supplies Benefited (No.):	0
Incidental Recreation Benefited (No. of Water Bodies/Stream Segments):	1
Groundwater Recharge (Acre-Feet):	0
Wetlands Created, Enhanced, or Restored (Acres):	0
Upland/Riparian Habitat Created/Enhanced (Acres):	0
Threatened and Endangered Species Benefited:	1
Population with Reduced Risk:	1,620

U.S. Department of Agriculture Natural Resources Conservation Service		NRCS-CPA-52 4/2013		A. Client Name: Pennsylvania Fish and Boat Commission (PFBC)																															
ENVIRONMENTAL EVALUATION WORKSHEET				B. Conservation Plan ID # (as applicable):																															
				Program Authority (optional): Section 14 Of PL 83-566, the Watershed Protection and Flood Prevention Act, as amended (16 U.S.C. Parts 1001-1008, 1010, 1012.)																															
D. Client's Objective(s) (purpose): • Comply with applicable design, performance, and safety criteria for Natural Resources Conservation Service (NRCS) High Hazard Class dams and Pennsylvania Department of Environmental Protection (PADEP), Division of Dam Safety Hazard Potential Category 1 dams. • Maintain the recreational and habitat values of Beechwood Lake and adjacent riparian lands. • Maintain the current level of flood damage reduction provided by the Beechwood Dam (PA-454), designed with a 1% use auxiliary spillway, for public safety, bridges, roads, agricultural and other lands, buildings, structures, infrastructure, and other features.				C. Identification # (farm, tract, field #, etc. as required): Beechwood Dam (NRCS PA-454) Clymer Township, Tioga County PA																															
E. Need for Action: 1- Continue supporting the recreational uses and aquatic and terrestrial wildlife habitat directly dependent upon Beechwood Lake and its surrounding riparian lands. 2- Continue providing flood damage reduction downstream from the dam to address applicable NRCS and Commonwealth of Pennsylvania standards and design criteria for public health and safety to reduce the risk of loss of human life.		H. Alternatives <table border="1"> <thead> <tr> <th>No Action</th> <th>✓ if RMS</th> <th>Alternative 1</th> <th>✓ if RMS</th> <th>Alternative 2</th> <th>✓ if RMS</th> </tr> </thead> <tbody> <tr> <td> Future Without Project (FWOP) - The FWOP is a Sponsor-controlled breach of the dam, such as the removal of a portion of the earthen embankment, as directed by the Pennsylvania Department of Environmental Protection (PADEP). </td> <td>☐</td> <td> The accepted rehabilitation alternative involves rehabilitating Beechwood Dam to Current High Hazard Class design criteria. The construction includes the following modifications: • Maintain auxiliary spillway crest at Elevation 1795.5. • Armor auxiliary spillway crest and exit channel with roller compacted concrete and regrade to valley floor. • Retrofit drainage diaphragm around principal spillway conduit and install chimney drain at interface with embankment fill. • Extend principal spillway conduit and construct a concrete impact basin at the outlet. • Raise dam embankment crest 3.0 feet to Elevation 1804.2 feet. • Flatten downstream slope of dam to 3H:1V. • Repair and/or replace metal components on principal spillway inlet riser and add low flow augmentation works. • Any other additional items identified as being deficient. </td> <td>☐</td> <td></td> <td>☐</td> </tr> </tbody> </table>				No Action	✓ if RMS	Alternative 1	✓ if RMS	Alternative 2	✓ if RMS	Future Without Project (FWOP) - The FWOP is a Sponsor-controlled breach of the dam, such as the removal of a portion of the earthen embankment, as directed by the Pennsylvania Department of Environmental Protection (PADEP).	☐	The accepted rehabilitation alternative involves rehabilitating Beechwood Dam to Current High Hazard Class design criteria. The construction includes the following modifications: • Maintain auxiliary spillway crest at Elevation 1795.5. • Armor auxiliary spillway crest and exit channel with roller compacted concrete and regrade to valley floor. • Retrofit drainage diaphragm around principal spillway conduit and install chimney drain at interface with embankment fill. • Extend principal spillway conduit and construct a concrete impact basin at the outlet. • Raise dam embankment crest 3.0 feet to Elevation 1804.2 feet. • Flatten downstream slope of dam to 3H:1V. • Repair and/or replace metal components on principal spillway inlet riser and add low flow augmentation works. • Any other additional items identified as being deficient.	☐		☐																		
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Resource Concerns																																			
In Section "F" below, analyze, record, and address concerns identified through the Resources Inventory process. (See FOTG Section III - Resource Planning Criteria for guidance).																																			
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	NOT meet PC		NOT meet PC		NOT meet PC																														

Concentrated flow	A controlled breach of the dam would result in the draining of Beechwood Lake and exposing what is currently lake bottom. These newly exposed soils could be subject to increased concentrated flow (gully) erosion if it is not vegetated and stabilized quickly.	☐	No effect.	☐		☐
Evidence of concentrated flow (gully erosion) was not observed in the project area, however, concentrated flow erosion upstream contributes to the sedimentation behind the dam.		NOT meet PC		NOT meet PC		NOT meet PC
Excessive bank erosion from streams, shorelines or water conveyance channels	Without the dam, there is a potential increase in downstream bank erosion with increased flood flows.	☐	No effect.	☐		☐
No current bank or shoreline erosion issues were identified.		NOT meet PC		NOT meet PC		NOT meet PC
SOIL: SOIL QUALITY DEGRADATION						
Compaction	N/A	☐	N/A	☐		☐
No issues concerning soil compactions were identified.		NOT meet PC		NOT meet PC		NOT meet PC
Organic matter depletion	N/A	☐	N/A	☐		☐
No issues concerning organic matter depletion of the soils were identified.		NOT meet PC		NOT meet PC		NOT meet PC
Other	N/A	☐	N/A	☐		☐
There were no soil degradation issues identified as a concern.		NOT meet PC		NOT meet PC		NOT meet PC
F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for	I. Effects of Alternatives					
	No Action		Alternative 1		Alternative 2	
	Amount, Status, Description	✓ if does NOT	Amount, Status, Description	✓ if does NOT	Amount, Status, Description	✓ if does NOT
WATER: EXCESS / INSUFFICIENT WATER						
Excess (Ponding, flooding, seasonal high water table, seeps, and drifted snow)	Beechwood Dam is a flood retarding dam. A controlled breach of the dam could result in major downstream flooding concerns. Residential, commercial, and transportation resources will be at a greater risk of flood damage. Average annual flood reduction benefits of \$156,200 will be lost. Removal of the dam may increase stream baseflow variability by allowing larger flows to travel downstream during storm events and by eliminating storage of runoff that could support baseflow by discharging over time during drier periods.	☐	Maintain flood damage reduction downstream from the dam with an average annual value estimated at \$156,200.	☐		☐
The dam controls runoff and mitigates flooding, reducing the risk of flooding from the 100-year recurrence interval storm event for 4 commercial and 21 residential structures. No evidence of excessive seepage that would affect the normal pool elevation and pose a risk to the downstream community. PADEP determined that the Unnamed Tributary to Mill Creek immediately downstream of the dam is impaired by the source cause Upstream Impoundment - Water/Flow Variability.		NOT meet PC	The low-flow augmentation may reduce impacts to downstream impairments caused by water/flow variability.	NOT meet PC		NOT meet PC
Other	N/A	☐	N/A	☐		☐
There were no other water concerns noted.		NOT meet PC		NOT meet PC		NOT meet PC

WATER: WATER QUALITY DEGRADATION						
Excess nutrients in surface and ground waters	A controlled breach of the dam will cause nutrients currently trapped by the dam to be delivered downstream. Nutrients originating from upstream land use will flow through the creek to downstream stream segments without settling out in the Beechwood Lake.	☐	A temporary increase in loading of nutrient-laden sediment may be observed downstream during construction and dam draw down events. Improvement of the dam would not permanently change the excess sediment and nutrients currently entering the Chesapeake Bay. Erosion and sediment controls will be utilized during construction to reduce the impact of excess nutrient-laden sediment downstream.	☐	☐	
There were no groundwater quality issues identified or observed at the project site. No known nutrient related surface water concerns were found for Beechwood Lake or Mill Creek. Beechwood Lake discharges to the Chesapeake Bay which is impaired by nutrients.		NOT meet PC		NOT meet PC	NOT meet PC	
Pesticides transported to surface and ground waters	N/A	☐	N/A	☐	☐	
There is currently no concerns regarding the transportation of pesticides to surface ground waters.		NOT meet PC		NOT meet PC	NOT meet PC	
Excess pathogens and chemicals from manure, bio-solids or compost applications	N/A	☐	N/A	☐	☐	
There were not an excess of pathogens and chemicals from manure, bio-solids or compost applications observed within the project area.		NOT meet PC		NOT meet PC	NOT meet PC	
F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for	I. Effects of Alternatives					
	No Action		Alternative 1		Alternative 2	
	Amount, Status, Description	✓ if does NOT	Amount, Status, Description	✓ if does NOT	Amount, Status, Description	✓ if does NOT
Excessive sediment in surface waters	A controlled breach of the dam will cause sediment currently trapped by the dam to be delivered downstream. Sediment originating from upstream land use will flow through the creek to downstream stream segments without settling out in the dam pool.	☐	No change upstream. A short-term increase in suspended sediment and turbidity downstream may occur during construction, but proper controls will minimize erosion. Sediment will continue to be trapped behind the dam at a rate of 0.63 acre-feet/year.	☐	☐	
There were sedimentation accumulations behind the impoundment observed at the site. The historical average sedimentation rate is 1.36 acre-feet/year and is projected to be 0.63 acre-ft/year into the future. Beechwood Lake discharges to Mill Creek/Cowanesque River which are impaired by siltation approximately 2 miles downstream toward Westfield; the Chesapeake Bay downstream is also impaired by sediment.		NOT meet PC		NOT meet PC	NOT meet PC	
Elevated water temperature	N/A	☐	N/A	☐	☐	
No issues concerning elevated water temperature were identified.		NOT meet PC		NOT meet PC	NOT meet PC	
Other	A controlled breach of the dam will cause pollutants currently trapped by the dam to be delivered downstream.	☐	Improvements to the dam will likely have no impacts on water quality in Beechwood Lake.	☐	☐	
PADEP determined that the Beechwood Lake is impaired by unspecified pollutants.				NOT meet PC	NOT meet PC	

AIR: AIR QUALITY IMPACTS						
Pennsylvania air quality non-attainment counties can be found at:						
PM 2.5: http://www.epa.gov/pmdesignations/2006standards/final/region3.htm Ozone: http://www.epa.gov/reg3arid/airquality/ozone8hrmaintareas_2.htm						
Emissions of Particulate Matter (PM) and PM Precursors Tioga County, PA is an attainment county.	There will be some temporary affects during construction including dust and exhaust. Control measures will be implemented during construction to minimize impacts.	☐ NOT meet PC	There will be some temporary affects during construction including dust and exhaust. Control measures will be implemented during construction to minimize impacts.	☐ NOT meet PC		☐ NOT meet PC
Emissions of Ozone Precursors There are no known air emission sources from Beechwood Dam. PADEP has recommended to USEPA that Tioga County should continue to be listed as meeting ozone attainment standards.	There will be some temporary affects during construction including dust and exhaust. Control measures will be implemented during construction to minimize impacts.	☐ NOT meet PC	There will be some temporary affects during construction including dust and exhaust. Control measures will be implemented during construction to minimize impacts.	☐ NOT meet PC		☐ NOT meet PC
Objectionable odors No objectionable odors or odor sources were noted within the project area.	N/A	☐ NOT meet PC	N/A	☐ NOT meet PC		☐ NOT meet PC
F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for	I. Effects of Alternatives					
	No Action		Alternative 1		Alternative 2	
	Amount, Status, Description	✓ if does NOT	Amount, Status, Description	✓ if does NOT	Amount, Status, Description	✓ if does NOT
Other The project does not pose any other significant impacts to air quality.	N/A	☐ NOT meet PC	N/A	☐ NOT meet PC		☐ NOT meet PC
PLANTS: DEGRADED PLANT CONDITION						
Undesirable plant productivity and health Vegetation across the project area is generally healthy and well maintained. It does not appear to be in a degraded condition.	Flooding in the area or super saturated conditions may impact the health of surrounding downstream vegetation.	☐ NOT meet PC	Vegetation will be disturbed during construction. Undesirable plants will be minimized with the replanting of native species and management of noxious plants.	☐ NOT meet PC		☐ NOT meet PC
Inadequate structure and composition There were no identified structural or compositional inadequacies noted in project area.	N/A	☐ NOT meet PC	N/A	☐ NOT meet PC		☐ NOT meet PC
Excessive plant pest pressure There were no excessive plant pest pressure observed or identified in project area.	N/A	☐ NOT meet PC	N/A	☐ NOT meet PC		☐ NOT meet PC
Other There were no other plant degradation concerns.	N/A	☐ NOT meet PC	N/A	☐ NOT meet PC		☐ NOT meet PC

ANIMALS: INADEQUATE HABITAT FOR FISH AND WILDLIFE						
Habitat degradation	A controlled breach of the dam would result in the draining of Beechwood Lake, thus changing the current habitat for aquatic species currently in the lake and around the lake periphery. A controlled breach could also result in increased sedimentation and nutrient loading downstream, eliminating stream obstruction for migratory fish passage, eliminating lake ecosystem, reducing habitat value for waterfowl, increasing wildlife habitat with removed embankment and impoundment, and increasing the riparian corridor.	☐ NOT meet PC	Fish and waterfowl habitat may be impacted during construction due to the temporary drawdown of Beechwood Lake. The fish and wildlife impacts will be managed in accordance with PA Fish and Boat Commission (PFBC) requirements. Low-flow augmentation may temporarily reduce pool size during dry periods, temporarily reducing habitat. Riverine habitat in Mill Creek, below the dam, will be maintained during infrequent, critical low flow or drought events.	☐ NOT meet PC		☐ NOT meet PC
ANIMALS: LIVESTOCK PRODUCTION LIMITATION						
Inadequate feed and forage	N/A	☐ NOT meet PC	N/A	☐ NOT meet PC		☐ NOT meet PC
Inadequate feed or forage is not a concern within the project area.						
Inadequate livestock water	N/A	☐ NOT meet PC	N/A	☐ NOT meet PC		☐ NOT meet PC
Inadequate livestock water is not a concern within the project area.						
F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for	I. Effects of Alternatives					
	No Action		Alternative 1		Alternative 2	
	Amount, Status, Description	✓ if does NOT	Amount, Status, Description	✓ if does NOT	Amount, Status, Description	✓ if does NOT
Other - Downstream aquatic and other water uses.	A controlled breach of the dam would restore natural stream flow to Mill Creek below the existing impoundment.	☐ NOT meet PC	Water quality and riverine uses, including habitat, in Mill Creek, below the dam, will be maintained during infrequent, critical low flow or drought events.	☐ NOT meet PC		☐ NOT meet PC
The Beechwood reservoir can capture low, seasonal, and high flows and completely alter the natural flow regime of Mill Creek below the dam, causing water quality degradation and adverse lowering of streamflow levels downstream of the impoundment during infrequent, critical low flow or drought events.						
ENERGY: INEFFICIENT ENERGY USE						
Equipment and facilities	During construction, an increase in equipment and facilities will be required. Mowing and maintenance routines for the dam will be discontinued.	☐ NOT meet PC	During construction an increase in equipment and facilities will be required. Normal mowing and maintenance routines will be reconvened following project completion.	☐ NOT meet PC		☐ NOT meet PC
Beechwood Dam is not used for energy production nor do operations there require consumption of energy except for the occasional mowing and general maintenance activities.						
Farming/ranching practices and field operations	N/A	☐ NOT meet PC	N/A	☐ NOT meet PC		☐ NOT meet PC
Beechwood Dam is not used for farming or ranching practices or their associated field operations.						

HUMAN: ECONOMIC AND SOCIAL CONSIDERATIONS					
Labor Beechwood Dam is maintained by the Pennsylvania Fish and Boat Commission. The labor needed to maintain the dam and associated recreation facilities is estimated as the equivalent of 0.2 part time staff.	Following the completion of the transition period when the dam is removed, staff time required to maintain the site will no longer be needed.	☐ NOT meet PC	No change in staff time needed to maintain the dam. Annual O&M costs are \$5,200.	☐ NOT meet PC	
Management Level Beechwood Dam is maintained by the Pennsylvania Fish and Boat Commission. Management needed to maintain the dam and reservoir is estimated as the equivalent of 0.2 part time staff.	Following the completion of the transition period when the dam is removed, staff time required to manage the site will no longer be needed.	☐ NOT meet PC	No change in staff time needed to maintain the dam.	☐ NOT meet PC	
F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for	I. Effects of Alternatives				
	No Action		Alternative 1		Alternative 2
	Amount, Status, Description	☐ ✓ if does NOT	Amount, Status, Description	☐ ✓ if does NOT	Amount, Status, Description ☐ ✓ if does NOT
Public Health and Safety Beechwood Dam was designed and constructed to prevent flood damage downstream. It is classified as a High Hazard dam. There are approximately 600 homes and businesses located within the inundation zone. Flooding downstream has been reduced by the dam for high frequency events up to and including the 100 year storm.	Residential, commercial and transportation resources will be at a greater risk of flood damage. Average annual flood damage reduction benefits of \$153,100 will be lost. Eliminates breach inundation risk to downstream residents.	☐ NOT meet PC	Maintain flood damage reduction downstream from the dam with an average annual value estimated at \$153,100. Reduced breach inundation risk to downstream residents.	☐ NOT meet PC	
The PFBC has placed a fish consumption advisory related to Mercury on Beechwood Lake for largemouth bass.	Largemouth bass habitat will be reduced during removal of the dam pool and Mercury concentrations may be reduced in the area as sediment stored behind the dam disperses downstream.		No effect is anticipated on the fish consumption advisory.		
Special Environmental Concerns: Environmental Laws, Executive Orders, policies, etc.					
In Section "G" complete and attach Environmental Procedures Guide Sheets for documentation as applicable. Items with a "•" may require a federal permit or consultation/coordination between the lead agency and another government agency. In these cases, effects may need to be determined in consultation with another agency. Planning and practice implementation may proceed for practices not involved in consultation.					
G. Special Environmental Concerns (Document existing/ benchmark conditions)	J. Impacts to Special Environmental Concerns				
	No Action		Alternative 1		Alternative 2
	Document all impacts (Attach Guide Sheets as applicable)	☐ ✓ if needs further action	Document all impacts (Attach Guide Sheets as applicable)	☐ ✓ if needs further action	Document all impacts (Attach Guide Sheets as applicable) ☐ ✓ if needs further action
•Clean Air Act Guide Sheet FS1 FS-2 There are no specific emission sources associated with the dam and the dam itself is currently in full compliance with the Clean Air Act. PADEP has recommended to USEPA that Tioga County should continue to be listed as meeting ozone attainment standards.	May Effect There will be some temporary affects during construction including dust and exhaust. Control measures would be implemented during construction to minimize impacts.	☐	May Effect There will be some temporary affects during construction including dust and exhaust. Control measures would be implemented during construction to minimize impacts.	☐	☐

G. Special Environmental Concerns (Document existing/ benchmark)	J. Impacts to Special Environmental Concerns					
	No Action		Alternative 1		Alternative 2	
	Document all impacts	✓ if needs	Document all impacts	✓ if needs	Document all impacts	✓ if needs
• Clean Water Act / Waters of the U.S. <i>Guide Sheet Fact Sheet</i> Beechwood Lake is designated as a Trout Stocked Waters Open to Year Round Fishing and a Walleye Fingerling Fisheries Waterbody. Beechwood Lake is impaired for fish consumption and aquatic life. The lake meets its assessed use for recreation. A TMDL is required to be completed for the lake, including a study the atmospheric deposition of mercury. A WRAS has not been developed for the Cowanesque River watershed. The watershed the lake is part of is designated as a trout stocked fishery (TSF). Water quality meets the TSF designation within and upstream of Beechwood Lake. The stream does not meet the TSF designation downstream of the dam; impaired by Upstream Impoundment - Water/Flow Variability.	May Effect Sponsor will obtain the necessary permits and approvals from PADEP for earth disturbance and work near waterbodies. These will include Stream Obstruction and Encroachment Permits, the State Programmatic General Permit 5 (PASPGP-5), NPDES permit for earth disturbance greater than 1 acre, and erosion and sediment control plan approval. No TMDL wasteload allocations have been assigned for Beechwood Lake or Mill Creek downstream. Erosion and sedimentation controls consistent with an approved plan will be implemented to minimize discharge of sediment during temporary earth disturbance occurring during construction activities. Removal of the dam would not permanently change the excess sediment and nutrients currently entering Mill Creek.	☐	May Effect Sponsor will obtain the necessary permits and approvals from PADEP for earth disturbance and work near waterbodies. These will include Stream Obstruction and Encroachment Permits, the State Programmatic General Permit 5 (PASPGP-5), NPDES permit for earth disturbance greater than 1 acre, and erosion and sediment control plan approval. No TMDL wasteload allocations have been assigned for Beechwood Lake or Mill Creek downstream. Erosion and sedimentation controls consistent with an approved plan will be implemented to minimize discharge of sediment during temporary earth disturbance occurring during construction activities. The low flow orifice could reduce the impacts to downstream impairments caused by water/flow variability.	☐		☐
• Coastal Zone Management <i>Guide Sheet Fact Sheet</i> Beechwood Dam is not located within a Coastal Zone Management area.	No Effect N/A	☐	No Effect N/A	☐		☐
Coral Reefs <i>Guide Sheet Fact Sheet</i> The project area is not subject to coral reef regulations.	No Effect N/A	☐	No Effect N/A	☐		☐
• Cultural Resources / Historic Properties <i>Guide Sheet Fact Sheet</i> The Pennsylvania Historical and Museum Commission confirmed in a letter dated January 18, 2017 that the proposed activities will have no effect on historic properties that could be within the proposed project area.	May Effect No cultural resources listed on the National Register of Historic Places exist within the inundation area that would be created if the dam were removed.	☐	No Effect No effect.	☐		☐

G. Special Environmental Concerns (Document existing/ benchmark)	J. Impacts to Special Environmental Concerns					
	No Action		Alternative 1		Alternative 2	
	Document all impacts	Y if needs	Document all impacts	Y if needs	Document all impacts	Y if needs
•Endangered and Threatened Species <i>Guide Sheet Fact Sheet</i> The USFWS stated in a letter dated February 15, 2017 that no federally listed species under their jurisdiction is known or likely to occur in the project area.	May Effect A controlled breach of the dam would result in the draining of Beechwood Lake. Future without project may potentially remove the habitat for this species.	☐	May Effect Drawdown of Beechwood Lake to perform dam upgrades. Construction activities may temporarily impact the habitat for the osprey. Additional review from PFBC and USFWS may be required to evaluate the potential impacts of construction activities and add protection measures.	☐		☐
Environmental Justice <i>Guide Sheet Fact Sheet</i> The Beechwood Dam Inundation Zone minority population is 3% (21% in Pennsylvania); the low income population is 45% (31% in Pennsylvania).	May Effect Dam breach would result in loss of flood protection for downstream areas within the inundation zone, which has a higher percentage of low income residents than the statewide average. However, the effects would not be disproportionately focused on the socioeconomically disadvantaged groups.	☐	May Effect No disproportionate adverse effects are anticipated to any ethnic, racial, or socioeconomically disadvantaged families or groups downstream of the dam. Improvement of the dam would reduce the risk of flooding downstream including to those socioeconomically disadvantaged populations that reside downstream. However the effects would not be disproportionately focused on the socioeconomically disadvantaged groups.	☐		☐
•Essential Fish Habitat <i>Guide Sheet Fact Sheet</i> There are no essential fish habitats in the project area.	No Effect N/A	☐	No Effect N/A	☐		☐
Floodplain Management <i>Guide Sheet Fact Sheet</i> Beechwood Dam reduces flood elevations downstream and reduces average annual flood damages by \$156,200. The dam currently reduces the risk of flooding to 21 residential and 4 commercial structures from the 100-year recurrence interval storm event.	May Effect Residential, commercial and transportation resources will be at a greater risk of flood damage. Within the 100-year floodplain an additional 21 residential and 4 commercial structures would be flooded without the dam. No critical infrastructure within the 500-year. Average annual flood damage reduction benefits of \$156,200 will be lost.	☐	May Effect Maintain flood damage reduction downstream from the dam by continuing to reduce the flooding risk of 21 residential and 4 commercial structures that would be within the 100-year floodplain without the dam. No critical structures are within the 500-year floodplain of the dam. Maintain flood damage reduction benefits with an average annual value estimated at \$156,200.	☐		☐
Invasive Species <i>Guide Sheet Fact Sheet</i> Invasive Species are a concern to the PA natural environment. A few of the invasive species that may be problematic at this site include Multiflora rose, Japanese knotweed, Purple Loosestrife, and Japanese barberry.	May Effect A controlled breach of the dam would result in the exposure of bare soils that are presently lake bottom. Newly exposed bare soils may be subject to invasive plant growth. Will be minimized by planting adapted species.	☐	No Effect Construction activities may introduce invasive plant species but replanting with native or non-invasive species will minimize the impact.	☐		☐
•Migratory Birds/Bald and Golden Eagle Protection Act <i>Guide Sheet Fact Sheet</i> Beechwood Lake and Mill Creek Watershed attract a variety of migratory water fowl, including a state listed species (osprey). There is an Important Bird Area (Susquehanna Headwaters Forest Block) near Beechwood Lake.	May Effect A controlled breach of the dam would result in the draining of Beechwood Lake. Migratory birds and nesting activities could be temporarily disturbed during construction. Coordinate scheduling of construction activities with appropriate wildlife agency to avoid adverse impacts. Draining of the impoundment may affect the type of migratory bird species that frequent the location, including the osprey.	☐	May Effect The project alternative may temporarily impact migratory birds including the osprey, during construction. Coordination of construction activities and avoidance measures will be implemented. The scheduling of construction activities would be coordinated with the appropriate wildlife agencies to avoid adverse impacts.	☐		☐

G. Special Environmental Concerns (Document existing/ benchmark)	J. Impacts to Special Environmental Concerns					
	No Action		Alternative 1		Alternative 2	
	Document all impacts	✓ if needs	Document all impacts	✓ if needs	Document all impacts	✓ if needs
Natural Areas <i>Guide Sheet Fact Sheet</i> No designated natural areas exist within the project area.	No Effect N/A	☐	No Effect N/A	☐		☐
Prime and Unique Farmlands <i>Guide Sheet Fact Sheet</i> The project area is comprised of a majority of soil types designated as prime or unique farmlands and farmlands of statewide importance. However, no portion of the project area is located on lands that are or will be used for farming or agriculture.	May Effect Removal of the dam will result in increased flooding and inundation of prime or unique farmland soils downstream.	☐	No Effect	☐		☐
Riparian Area <i>Guide Sheet Fact Sheet</i> Riparian areas within 100 feet of the project area include wetlands, parkland, and forest. Riparian areas surrounding the lake consist of wetlands, forest, parkland, and residential roads. Riparian areas downstream of the impoundment consist of forest, the transportation network, and residential land use.	May Effect The naturalized areas downstream could be inundated with flood waters. Loss of shoreline riparian area and increase of up to 1,000 feet of stream riparian buffer upstream of the site of the dam could be achieved with removal of the dam.	☐	May Effect There could be temporary effects to the riparian and wetland areas during construction. Restorative actions will be implemented prior to project completion.	☐		☐
Scenic Beauty <i>Guide Sheet Fact Sheet</i> The Beechwood Dam project area is located within the predominately rural community within Tioga County. Tioga County contains the Pennsylvania Grand Canyon, rivers, and forest reserves. These areas contribute greatly to the economy through tourism.	May Effect Loss of aesthetic appeal of lake, replaced by stream and riparian scene. Negative views will regularly occur because of flood damages to downstream areas.	☐	May Effect The scenic quality of the landscape of Beechwood Lake may be temporarily impacted during construction while the lake is drawn down. Unsightly construction equipment will temporarily be stored and utilized onsite. Long-term scenic beauty will be maintained.	☐		☐
•Wetlands <i>Guide Sheet Fact Sheet</i> Wetlands are not present in the immediate vicinity of Beechwood Dam. Wetlands likely exist along the periphery of Beechwood Lake.	May Effect A controlled breach of the dam will adversely impact the wetlands around the periphery of Beechwood Lake. Flooding may alter the function and composition of the open water area downstream of the project area.	☐	May Effect Wetlands along the periphery of Beechwood Lake will be temporarily impacted during the lake drawdown period associated with construction at the dam.	☐		☐
•Wild and Scenic Rivers <i>Guide Sheet Fact Sheet</i> Mill Creek is not a Federally or State listed wild and scenic river.	No Effect N/A	☐	No Effect N/A	☐		☐

K. Other Agencies and Broad Public Concerns		No Action	Alternative 1	Alternative 2																											
Easements, Permissions, Public Review, or Permits Required and Agencies Consulted.		Sponsor will obtain necessary permits from PADEP. NPDES permit will be needed.	Sponsor will obtain the necessary permits and approvals from PADEP for earth disturbance and work near waterbodies. These will include Stream Obstruction and Encroachment Permits, the State Programmatic General Permit 5 (PASP-GP-5), NPDES permit for earth disturbance, and erosion and sediment control plan approval.																												
K. Other Agencies and Broad Public Concerns		No Action	Alternative 1	Alternative 2																											
Cumulative Effects Narrative (Describe the cumulative impacts considered, including past, present and known future actions regardless of who performed the actions)		Residential, commercial and transportation resources will be a greater risk of flood damage. Average annual flood damage reduction benefits of \$156,200 will be lost. Increased downstream delivery of sediment, loss of peripheral lake wetlands and open water lake habitats, change in riparian areas from shoreline to streamside, and other effects listed previously in CPA-52. Breach inundation threat would be eliminated.	There are no adverse cumulative environmental, socioeconomic, or infrastructural impacts anticipated for the dam rehabilitation project.																												
L. Mitigation (Record actions to avoid, minimize, and compensate)		E&S and dust control measures will be utilized to minimize temporary effects.	Erosion and sediment and dust control measures will be utilized to minimize temporary effects during construction. Erosion and sediment control measures would also be used to prevent sedimentation of adjacent and downstream wetlands and stream channel.																												
M. Preferred Alternative	✓ preferred alternative	☐	☒	☐																											
	Supporting reason		Rehabilitation Alternative will meet Purpose and Need for Project and maintain flood damage reduction downstream from the dam with an average annual value estimated at \$156,200, \$383,800 in recreation benefits, and \$50,000 in No-Action cost avoided. This is the National Economic Development (NED) Alternative with net benefits of \$465,700 and a B:C ratio of 4.7 to 1 (see May 8, 2018 Economic Analysis).																												
N. Context (Record context of alternatives analysis)		Ellick Run-Mill Creek	HUC 020501040803	Susquehanna River																											
The significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality.																															
O. Determination of Significance or Extraordinary Circumstances																															
Intensity: Refers to the severity of impact. Impacts may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts. If you answer ANY of the below questions "yes" then contact the State Environmental Liaison as there may be extraordinary circumstances and significance issues to consider and a site specific NEPA analysis may be required. <table border="0"> <tr> <td>Yes</td> <td>No</td> <td></td> </tr> <tr> <td>☐</td> <td>☒</td> <td>• Is the preferred alternative expected to cause significant effects on public health or safety?</td> </tr> <tr> <td>☐</td> <td>☒</td> <td>• Is the preferred alternative expected to significantly affect unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?</td> </tr> <tr> <td>☐</td> <td>☒</td> <td>• Are the effects of the preferred alternative on the quality of the human environment likely to be highly controversial?</td> </tr> <tr> <td>☐</td> <td>☒</td> <td>• Does the preferred alternative have highly uncertain effects or involve unique or unknown risks on the human environment?</td> </tr> <tr> <td>☐</td> <td>☒</td> <td>• Does the preferred alternative establish a precedent for future actions with significant impacts or represent a decision in principle about a future consideration?</td> </tr> <tr> <td>☐</td> <td>☒</td> <td>• Is the preferred alternative known or reasonably expected to have potentially significant environment impacts to the quality of the human environment either individually or cumulatively over time?</td> </tr> <tr> <td>☐</td> <td>☒</td> <td>• Will the preferred alternative likely have a significant adverse effect on ANY of the special environmental concerns? Use the Evaluation Procedure Guide Sheets to assist in this determination. This includes, but is not limited to, concerns such as cultural or historical resources, endangered and threatened species, environmental justice, wetlands, floodplains, coastal zones, coral reefs, essential fish habitat, wild and scenic rivers, clean air, riparian areas, natural areas, and invasive species.</td> </tr> <tr> <td>☐</td> <td>☒</td> <td>• Will the preferred alternative threaten a violation of Federal, State, or local law or requirements for the protection of the environment?</td> </tr> </table>					Yes	No		☐	☒	• Is the preferred alternative expected to cause significant effects on public health or safety?	☐	☒	• Is the preferred alternative expected to significantly affect unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?	☐	☒	• Are the effects of the preferred alternative on the quality of the human environment likely to be highly controversial?	☐	☒	• Does the preferred alternative have highly uncertain effects or involve unique or unknown risks on the human environment?	☐	☒	• Does the preferred alternative establish a precedent for future actions with significant impacts or represent a decision in principle about a future consideration?	☐	☒	• Is the preferred alternative known or reasonably expected to have potentially significant environment impacts to the quality of the human environment either individually or cumulatively over time?	☐	☒	• Will the preferred alternative likely have a significant adverse effect on ANY of the special environmental concerns? Use the Evaluation Procedure Guide Sheets to assist in this determination. This includes, but is not limited to, concerns such as cultural or historical resources, endangered and threatened species, environmental justice, wetlands, floodplains, coastal zones, coral reefs, essential fish habitat, wild and scenic rivers, clean air, riparian areas, natural areas, and invasive species.	☐	☒	• Will the preferred alternative threaten a violation of Federal, State, or local law or requirements for the protection of the environment?
Yes	No																														
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P. To the best of my knowledge, the data shown on this form is accurate and complete:																															
In the case where a non-NRCS person (e.g. a TSP) assists with planning they are to sign the first signature block and then NRCS is to sign the second block to verify the information's accuracy.																															
Signature (TSP if applicable)		Title		Date																											
Signature (NRCS)		Title		Date																											
If preferred alternative is not a federal action where NRCS has control or responsibility and this NRCS-CPA-52 is shared with someone other than the client then indicate to whom this is being provided.																															

The following sections are to be completed by the Responsible Federal Official (RFO)		
NRCS is the RFO if the action is subject to NRCS control and responsibility (e.g., actions financed, funded, assisted, conducted, regulated, or approved by NRCS). These actions do not include situations in which NRCS is only providing technical assistance because NRCS cannot control what the client ultimately does with that assistance and situations where NRCS is making a technical determination (such as Farm Bill HEL or wetland determinations) not associated with the planning process.		
Q. NEPA Compliance Finding (check one) The preferred alternative: Action required		
☐	1) is not a federal action where the agency has control or responsibility.	Document in "R.1" below. No additional analysis is required
☒	2) is a federal action ALL of which is categorically excluded from further environmental analysis AND there are no extraordinary circumstances as identified in Section "O" .	Document in "R.2" below. No additional analysis is required
☐	3) is a federal action that has been sufficiently analyzed in an existing Agency state, regional, or national NEPA document and there are no predicted <u>significant adverse environmental effects or extraordinary circumstances</u> .	Document in "R.1" below. No additional analysis is required.
☐	4) is a federal action that has been sufficiently analyzed in another Federal agency's NEPA document (EA or EIS) that addresses the proposed NRCS action and its' effects and has been formally adopted by NRCS . NRCS is required to prepare and publish its own Finding of No Significant Impact for an EA or Record of Decision for an EIS when adopting another agency's EA or EIS document. (Note: This box is not applicable to FSA)	Contact the State Environmental Liaison for list of NEPA documents formally adopted and available for tiering. Document in "R.1" below. No additional analysis is required
☐	5) is a federal action that has NOT been sufficiently analyzed or may involve predicted significant adverse environmental effects or extraordinary circumstances and may require an EA or EIS.	Contact the State Environmental Liaison. Further NEPA analysis required.
R. Rationale Supporting the Finding		
R.1		
Findings Documentation		
R.2 Applicable Categorical Exclusion(s) (more than one may apply) 7 CFR Part 650 <i>Compliance With NEPA</i> , subpart 650.6 <i>Categorical Exclusions</i> states prior to determining that a proposed action is categorically excluded under paragraph (d) of this section, the proposed action must meet six sidebar criteria. See NECH 610.116.	(14) Repairing or maintaining principal spillways and appurtenances associated with existing serviceable dams, originally constructed to NRCS standards, in order to meet current safety standards. Work will be confined to the existing footprint of the dam, and no major change in reservoir or downstream operations will result; (15) Repairing or improving (deepening/widening/armoring) existing auxiliary/emergency spillways associated with dams, originally constructed to NRCS standards, in order to meet current safety standards. Work will be confined to the dam or abutment areas, and no major change in reservoir or downstream operation will result; (16) Repairing embankment slope failures on structures, originally built to NRCS standards, where the work is confined to the embankment or abutment areas; (17) Increasing the freeboard (which is the height from the auxiliary (emergency) spillway crest to the top of embankment) of an existing dam or dike, originally built to NRCS standards, by raising the top elevation in order to meet current safety and performance standards. The purpose of the safety standard and associated work is to ensure that during extreme rainfall events, flows are confined to the auxiliary/emergency spillway so that the existing structure is not overtopped which may result in a catastrophic failure. Elevating the top of the dam will not result in an increase to lake or stream levels. Work will be confined to the existing dam and abutment areas, and no major change in reservoir operations will result. Examples of work may include the addition of fill material such as earth or gravel or placement of parapet walls;	
<i>I have considered the effects of the alternatives on the Resource Concerns, Economic and Social Considerations, Special Environmental Concerns, and Extraordinary Circumstances as defined by Agency regulation and policy and based on that made the finding indicated above.</i>		
S. Signature of Responsible Federal Official: Signature Title Date		
Additional notes		