

**STARRUCCA CREEK
SUSQUEHANNA COUNTY, PENNSYLVANIA
CONTINUING AUTHORITIES PROGRAM
SECTION 14, EMERGENCY STREAMBANK
STABILIZATION**

**DRAFT FEASIBILITY REPORT &
ENVIRONMENTAL ASSESSMENT**

NEPA ID: EAXX-202-00-E1P-1769681051

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U.S. Army Corps of Engineers
North Atlantic Division - Baltimore District
In partnership with the Pennsylvania Department of Transportation

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Executive Summary

This Integrated Feasibility Report and Environmental Assessment (IFR/EA) documents the U.S. Army Corps of Engineers (USACE) feasibility study planning process for Starrucca Creek, located in Thompson Township, Susquehanna County, Pennsylvania, conducted under the Continuing Authorities Program (CAP) Section 14, Emergency Streambank and Shoreline Protection, and demonstrates compliance with the National Environmental Policy Act (NEPA).

The streams located in Susquehanna County, Pennsylvania, are subject to flash flooding events that produce streambank instability and facilitate the deposition of sediment. Extreme depositional loads form gravel bars and woody debris dams, which can redirect the stream from its original channel. The relocation of streams can cause nuisance flooding, damage property in areas that historically were not impacted, and damage highways and other infrastructure. Currently, Starrucca Creek has shifted toward State Route (SR) 1005, causing erosion of the road's foundation. SR 1005 serves as the primary and fastest route for emergency services traveling to and from the Boroughs of Thompson and Starrucca. If the road was unavailable due to erosion of the road's foundation and surface, the required detour would increase travel time to Starrucca Borough by approximately five minutes.

In a letter dated December 27, 2021, Pennsylvania Department of Transportation (PennDOT) District Executive Richard Roman requested that USACE Baltimore District complete a formal study under the CAP Section 14 program authority to investigate emergency streambank stabilization affecting SR 1005 along Starrucca Creek. Upon completion of a Federal Interest Determination (FID) Report identifying federal interest in carrying out a study, a Feasibility Cost-Share Agreement (FCSA) was signed on September 26, 2024, to conduct a feasibility study.

The purpose of this feasibility study is to develop streambank and channel stabilization solutions to address erosion along SR 1005. USACE formulated three structural measures to address streambank erosion, along with a no-action alternative required by NEPA regulations. The array of alternatives was evaluated and compared for engineering feasibility, economic justification, and environmental acceptability, and screened using established USACE criteria and policies. As a result of this comparison, Alternative 2a, channel modification and streambank stabilization with riprap, was identified as the least-cost alternative and selected as the Recommended Plan. The Recommended Plan, Alternative 2a, is economically justified, as it is a less costly than the alternative of relocating the eligible facility, which would involve shifting the alignment of SR 1005.

The Recommended Plan consists of embankment stabilization including grading the streambank to a slope of 2-feet horizontal to 1-foot vertical and armoring the embankment with layers of riprap to stabilize and protect the bank and roadway shoulder against further erosion. To strengthen approximately 270 feet of the stream, a 10-foot-wide bench will be constructed at the base of the slope. This bench will have a

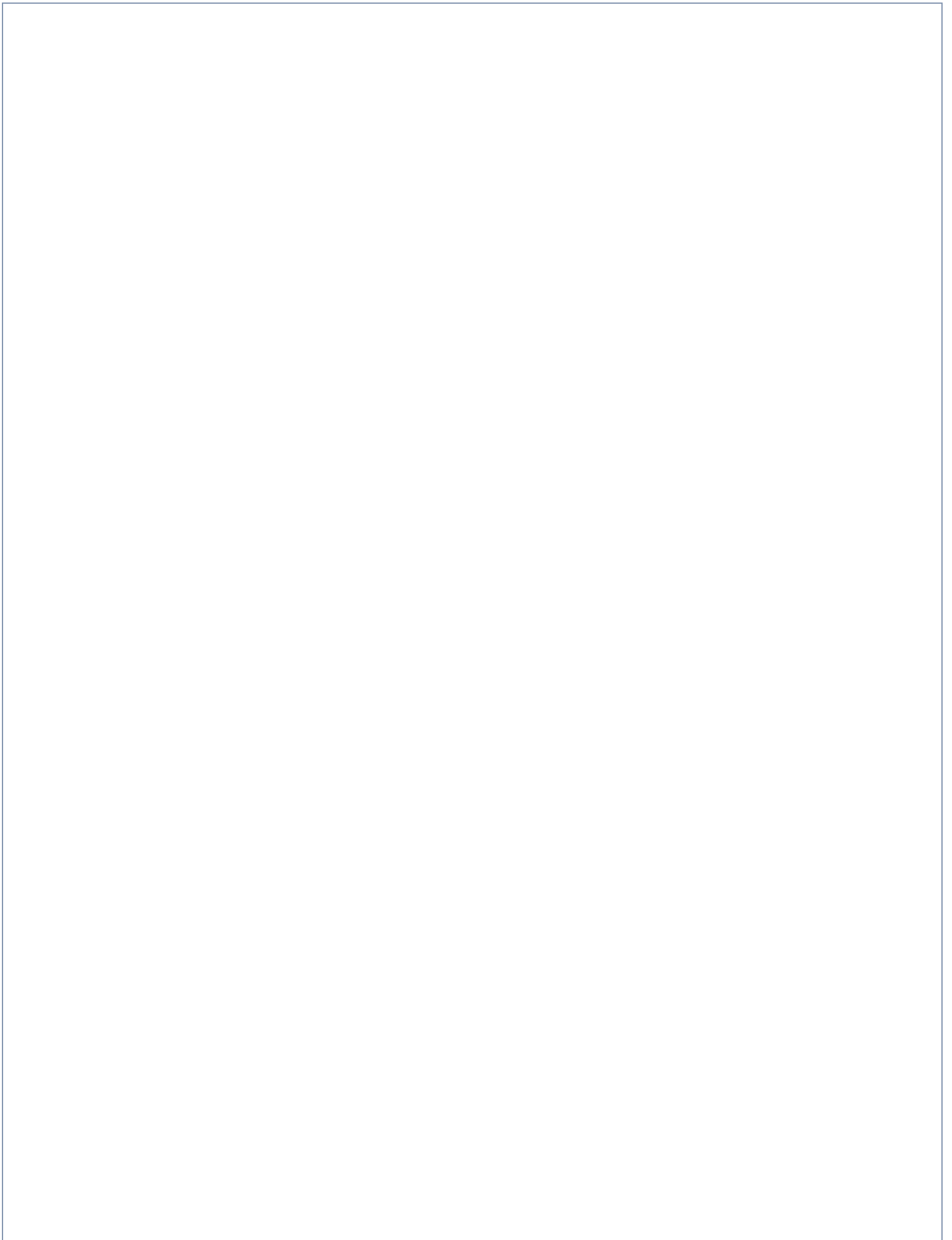


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Abbreviations

°F	Degrees Fahrenheit
AEP	Annual Exceedance Probability
APE	Area of Potential Effects
ARA	Abbreviated Risk Analysis
BCC	Bird of Conservation Regions
BCERE	Baseline Cost Estimate for Real Estate
BCR	Bird Conservation Regions
CAP	Continuing Authorities Program
CBRA	Costal Barrier Resources Act
CCI	Construction Cost Index
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFS	Cubic Feet per Second
CO2	Carbon Dioxide
CRM	Cultural Resource Management
CWCCIS	Civil Works Construction Cost Index System
CZMA	Coastal Zone Management Act
D&H	Delaware & Hudson
dBA	Decibels
EA	Environmental Assessment
EFH	Essential Fish Habitat
EMS	Emergency Medical Services
ENR	Engineering News Record
EO	Executive Orders
EP	Engineer Pamphlet
ER	Engineer Regulation
ESA	Endangered Species Act
FCSA	Feasibility Cost Share Agreement
FID	Federal Interest Determination
FWCA	Fish & Wildlife Coordination Act

FWOP	Future without Project
FY	Fiscal Year
HOOH	Home Office Overhead
HTRW	Hazardous, Toxic, and Radioactive Waste
HUC	Hydrologic Unit Code
IFR/EA	Integrated Feasibility Report and Environmental Assessment
IPAC	Information for Planning and Consultation
JOOH	Job Office Overhead
LERRD	Lands, Easements, Rights-of-way, Relocations, and Disposal areas
LERs	Lands, Easements, and Rights-of-Way
LOD	Limits of Disturbance
MBTA	Migratory Bird Treaty Act
MCACES	Micro-Computer Aided Cost Estimating System
MII	Micro-Computer Aided Cost Estimating System, Second Generation
MPI	Material Price Index
NAAQS	National Ambient Air Quality Standards
NBS	Nature-Based Solutions
NEPA	National Environmental Policy Act
NFS	Non-Federal Sponsor
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OMRR&R	Operation, Maintenance, Repair, Rehabilitation, and Replacement
PADEP	Pennsylvania Department of Environmental Protection
PA-Share	Pennsylvania Historic and Archaeological Resource Exchange
PCIE	Perpetual Channel Improvement Easement

PDCNR	Pennsylvania Department of Conservation and Natural Resources
PDT	Project Delivery Team
PennDOT	Pennsylvania Department of Transportation
PFBC	The Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
PHMC	Pennsylvania Historical and Museum Commission
PNDI	Pennsylvania Natural Diversity Index
PNHP	Pennsylvania Natural Heritage Program
PS&E	Plans, Specifications, and Estimate
RCRA	Resource Conservation and Recovery Act
SHPO	State Historic Preservation Office
SR	State Route
TOYR	Time-of-Year-Restriction
TPCS	Total Project Cost Summary
TRI	Toxic Release Inventory
TWAE	Temporary Work Area Easement
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WQC	Water Quality Certification

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1. Introduction

This Integrated Feasibility Report and Environmental Assessment (IFR/EA) documents the U.S. Army Corps of Engineers (USACE) feasibility study planning process for the Starrucca Creek Susquehanna County, Pennsylvania Continuing Authorities Program (CAP) Section 14, Emergency Streambank Stabilization project (“Starrucca Creek CAP Section 14”) and compliance with the National Environmental Policy Act (NEPA) and other environmental laws as integrated into the planning process. The EA is being completed pursuant to the *Department of Defense National Environmental Policy Act Implementing Procedures* (90 FR 27857), dated June 30, 2025. The project is being completed in partnership with the Pennsylvania Department of Transportation (PennDOT), the non-federal sponsor for this study.

CAP Section 14 provides USACE the authority to implement projects to protect public facilities, and facilities in imminent threat of damage or failure, from natural erosion processes in streambanks and shorelines. In a letter, dated December 27, 2021, PennDOT District Executive Richard Roman requested a USACE study to investigate emergency streambank stabilization for State Route (SR) 1005. The study, authorized under CAP Section 14, will address erosion along Starrucca Creek in Thompson Township, Susquehanna County, Pennsylvania. USACE completed a Federal Interest Determination (FID) Report in October 2023 that identified federal interest in carrying out this study and confirmed the project’s eligibility under the CAP Section 14 program. USACE signed a Feasibility Cost-Share Agreement (FCSA) with PennDOT to carry out this feasibility study on September 26, 2024.

1.1. USACE Planning Process

This IFR/EA was prepared in accordance with the Principles, Requirements, and Guidelines for federal water resources investments. It also adheres to policy guidance in Engineer Regulation (ER) 1105-2-103, Policy for Conducting Civil Works Planning Studies (November 7, 2023), and follows the Final Feasibility Report Format and Content Guide (March 2023). The USACE planning process follows a structured approach to problem solving that provides for a framework for sound decision making. The six-step process includes: (1) identifying problems and opportunities; (2) inventorying and forecasting existing and future without project (FWOP) conditions; (3) formulating alternative plans to alleviate the identified problem; (4) evaluating alternative plans; (5) comparing alternative plans; and (6) recommendation of a plan.

This IFR/EA documents the planning process in the following sections: Section 2 documents the existing conditions of the study area; Section 3 details the plan formulation process used to develop alternative plans, assumptions related to the FWOP conditions, and documents the alternative plans examined to alleviate the

problem; Section 4 summarizes Steps 4, 5 and 6 of the planning process inclusive of the evaluation and comparison of alternative plans and selection of the Recommended Plan; Section 5 analyzes the environmental effects of the alternatives; Section 6 details specific information related to the Recommended Plan and associated plan requirements; Section 7 details the status of compliance with NEPA and other relevant environmental laws and Executive Orders (EOs); and Section 8 includes the Baltimore District Engineer's recommendation for this feasibility study.

1.2. Study Authority

CAP is a group of nine legislative authorities under which the Secretary of the Army, acting through the USACE Chief of Engineers, is authorized to plan, design, and implement certain types of water resources projects without additional project specific congressional authorization. This CAP study was conducted under Section 14 of the 1946 Flood Control Act, as amended, which provides USACE the authority to develop and construct or repair streambank and shoreline protection projects to protect endangered roadways, bridge approaches, public works facilities such as water and sewer lines, public and private non-profit schools and hospitals, and other public facilities. Each project is limited to a federal cost of \$15,000,000, which includes study, project design, and construction costs. 30 USC §701r.

1.3. Study Area

The project is located in Thompson Township, Susquehanna County, Pennsylvania, along SR 1005 (Starrucca Creek Road) between the Boroughs of Thompson and Starrucca and north of the City of Scranton (Figure 1-1). The total population of the two boroughs is approximately 515 individuals, and the daily vehicle traffic of SR 1005 is approximately 174 vehicles (approximately 17 trucks). Starrucca Creek flows northeast toward the Borough of Starrucca and ultimately discharges into the Susquehanna River.

Starrucca Borough has a population of approximately 171 residents and is located about four miles northeast of Thompson Borough. The Borough of Thompson has a population of roughly 344 residents and provides emergency services, including paramedics and a fire company, to support the surrounding area including the Borough of Starrucca (USCB, 2026).

State Route 1005 serves as the primary and fastest route for emergency services traveling to and from the Boroughs of Thompson and Starrucca. If the road was unavailable due to erosion of the road's foundation and surface, the required detour would increase travel time between the boroughs by approximately five minutes.

The Pennsylvania Fish and Boat Commission (PFBC) has designated Starrucca Creek as a stream supporting natural trout reproduction. Trout species present along

this segment of Starrucca Creek include brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*).

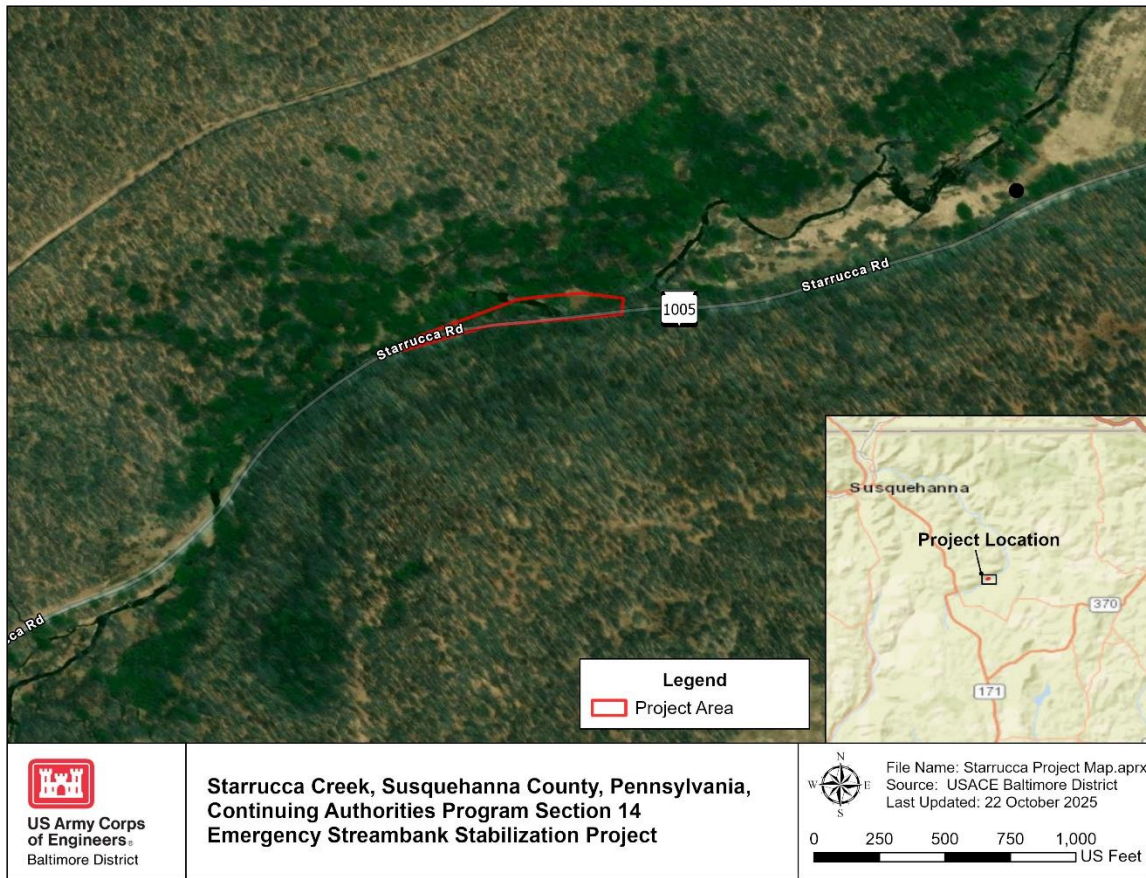


Figure 1-1: Study Area

1.4. Background and History

CAP Section 14 authorizes USACE to implement projects aimed at protecting public infrastructure and other facilities that are threatened by natural erosion along streambanks and shorelines. In a letter, dated December 27, 2021, PennDOT formally requested that the USACE Baltimore District conduct a study under CAP Section 14. The request focused on emergency streambank stabilization efforts to address erosion impacting SR 1005 along Starrucca Creek in Thompson Township, Susquehanna County, Pennsylvania (Appendix B). Due to sediment deposition and a previous log jam, Starrucca Creek has migrated from its original alignment and is encroaching on SR 1005, leading to erosion of the roadway's foundation and creating an urgent need for stabilization measures.

In its October 2023 FID Report, USACE determined that SR 1005 is an eligible facility and established federal interest in moving forward with the feasibility phase under its CAP Section 14 authority. Various measures were considered during

preparation of the FID Report, including removal of the gravel bar, creek realignment, streambank reinforcement with riprap, and shifting SR 1005 away from Starrucca Creek. USACE and PennDOT signed an FCSA on September 26, 2024, to initiate this feasibility study under the CAP Section 14 authority.

1.5. Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to implement a permanent streambank stabilization solution to protect SR 1005 from catastrophic failure. The project is necessitated by the direct and imminent threat that ongoing streambank erosion poses to public safety by jeopardizing emergency service access to the Borough of Starrucca.

SR 1005 provides the most direct and rapid route for medical and fire services. The progressive erosion of the Starrucca Creek streambank is actively undermining the road's foundation, evidenced by advancing pavement cracks and guardrail failure (Figures 1-2 and 1-3). The eventual collapse of this roadway segment would force vehicle operators to use a detour that adds an estimated five minutes to emergency response times. In life-threatening situations, such as cardiac arrest or a structure fire, this delay is unacceptable and presents a significant risk to the health, safety, and welfare of the community. Therefore, this project is needed to preserve the integrity of SR 1005 and guarantee the continuous, unimpeded passage of emergency services.



Figure 1-2: Gravel Bar in Starrucca Creek and Unstable Guiderail Along North side of SR 1005



Figure 1-3: Unstable Guiderail and Road Stress Fractures on North bound side of SR 1005

1.6. Problems and Opportunities

1.6.1. Problems

The primary problem is Starrucca Creek has moved laterally towards SR 1005 which is causing erosion of the road embankment which is compromising the structural integrity of the roadway. Over time, the development of a gravel bar has caused the creek to shift laterally toward the roadway. This shift has accelerated the roadway's embankment erosion and is now threatening the stability of the road. Because this roadway serves as a key emergency access route, roadway failure will adversely affect emergency response times.

1.6.2. Opportunities

This project presents an opportunity to mitigate ongoing channel erosion through the implementation of streambank stabilization and gravel bar removal. These measures will enhance infrastructure resilience by increasing the safety and operational reliability of the adjacent roadway for both public and emergency vehicle access, thereby preserving the viability of a critical emergency route during high-flow events. Concurrently, the reduction of local sediment inputs will limit downstream sediment deposition, contributing to improved overall stream health.

1.7. Objectives and Constraints

1.7.1. Planning Objectives

Planning objectives were formulated for the USACE standard 50-year period of analysis from 2028 to 2077 to alleviate the identified problem. The planning objectives for this study are:

- To improve stream stability and conveyance along Starrucca Creek in areas where critical facilities are structurally compromised by lateral shift in the stream. The focus of this study is SR 1005, a state road connecting the rural boroughs of Thompson and Starrucca, Pennsylvania.
- To enhance public safety by addressing roadway embankment stability concerns, particularly given that SR 1005 serves as a critical route for emergency services.

1.7.2. Planning Constraints

No study-specific constraints were identified.

1.8. Study Scope

In accordance with Engineer Pamphlet (EP) 1105-2-58 (March 1, 2019), the scale of Section 14 projects is limited in geographic scope, scale, and cost due to the imminent threat to facilities from streambank or shoreline erosion. Therefore, the scope of this study is to identify the least cost alternative for addressing the problem. Under the Section 14 program, the least cost alternative plan is considered

economically justified if the total cost of the proposed alternative is less than the cost to relocate the threatened eligible critical facility, in this case SR 1005.

The scope of this study is focused on measures to reduce streambank erosion, stabilize the streambed, and prevent failure of the SR 1005 embankment in the identified location between Thompson and Starrucca Boroughs in Susquehanna, County Pennsylvania. Further, the Section 14 program requires that USACE evaluate alternative plans and identify the least-cost alternative in comparison to relocation of the eligible critical facility. Therefore, the scope of this study is focused on evaluating a limited number of measures and comparing them to the cost of relocating SR 1005.

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2. Existing Conditions

This section provides descriptions of the existing conditions of the physical and natural environment as well as the socioeconomic conditions within the proposed project area. The existing conditions serve as the affected environment for NEPA purposes. The existing conditions presented in this section reflect conditions in place at the time of completion of this IFR/EA in 2026.

2.1. General Setting

For the purposes of describing existing conditions, the proposed project area is defined as the proposed limit of disturbance (LOD), as well as the community setting of Thompson and Starrucca Boroughs. The proposed project area is located along a stretch of SR 1005 (Starrucca Road) in Susquehanna County, Pennsylvania, in a rural segment located between the Boroughs of Thompson and Starrucca. Starrucca Creek flows northeast out of Thompson Borough into Thompson Township, before turning to the north and passing through Starrucca Borough. Starrucca Road (Starrucca Creek Road in Wayne County) roughly follows this course. Certain topics in this section consider selected areas between the two boroughs and the boroughs proper, as well as the whole of Susquehanna and Wayne Counties, as appropriate.



Figure 2-1: Proposed Limit of Disturbance (LOD) at Starrucca Creek.

2.2. Physical Environment

2.2.1. Hydrologic Setting

The proposed project area is located along Starrucca Creek in the Upper Starrucca Creek watershed, 8-digit U.S. Geological Survey (USGS) Hydrologic Unit Code (HUC) 02050101. Starrucca Creek is an approximately 18.1-mile tributary to the Susquehanna River; its source is located in Ararat Township and the stream flows generally north, passing under the Starrucca Viaduct and discharging into the Susquehanna River near Lanesboro, Pennsylvania (SRBC, 2025). The stream segment near the proposed project area drains an area of approximately 9.38 square miles, and its average annual flow is 102.6 cubic feet per second (cfs) at the stream monitoring station located near Stevens Point, approximately 1 mile downstream of the project area (USGS, 2025).

The dimensions of the stream at the project location are approximately 26 feet in width and between 1 and 2 feet of water depth; narrower areas in the project area are constrained by sediment and gravel deposition that has caused a blockage immediately upstream of the project area. The formation of the gravel bar on the north bank of the stream has resulted in a lateral shift in the creek, exacerbating erosion on the south bank and threatening the stability of SR 1005.

2.2.1.1. Precipitation & Temperature

Susquehanna County is located in the northeast part of Pennsylvania and is characterized by a humid continental climate with warmer summers and colder, snowy winters. Average annual precipitation varies from 33.33 inches in drier years (1982) to 67.49 inches in wetter years (2011) (NOAA, 2025). There is abundant snowfall in the winter with an average of 20.6 inches of snowfall per year (Susquehanna County Hazard Mitigation Plan, 2023).

Based on accumulated temperature data from the past 50 years (1975-2025), average temperatures in Susquehanna County regularly range from around 22 degrees Fahrenheit (°F) in January to around 70 °F in July (NOAA, 2025).

2.2.1.2. Floodplains

The study area is largely undeveloped and forested with a broad floodplain on the north side of Starrucca Creek. Peak flow statistics range from 561 cfs for the 50 percent annual exceedance probability (AEP) flood event to 3,940 cfs for the 0.2 percent AEP flood event (USGS, 2025) (Figure 2-1). Flooding of Starrucca Creek would inundate a substantial portion of the adjacent floodplain. However, floodwaters are not expected to substantially inundate SR 1005 in the project area, and no nearby structures would be affected (FEMA, 2025; Penn State University, n.d.).

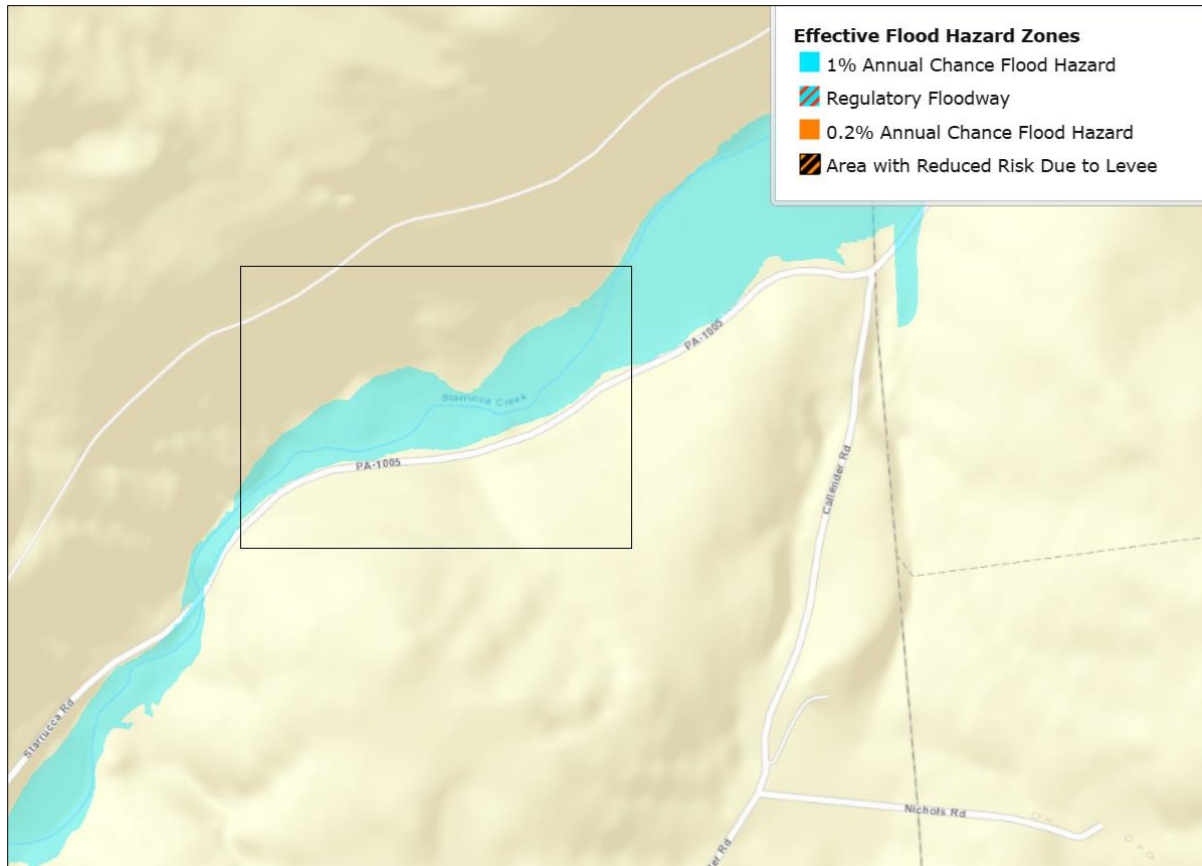


Figure 2-2: Flood Hazards at the Proposed Project Area (Penn State University, n.d.).

2.2.2. Land Use and Land Cover

The proposed project area is located in a primarily rural and undeveloped area of Susquehanna County between Thompson and Starrucca Boroughs. Approximately 73.1 percent of the Starrucca Creek watershed is forested. Other land uses in the watershed include agriculture (14.7 percent), development (5.5 percent), wetlands (3.8 percent), open water (streams and lakes – 1.7 percent), shrub scrub/grassland (1.2 percent), and barren land (<0.1 percent) (SRBC, 2025).

The Starrucca Creek watershed upstream of Thompson Borough is less developed than segments downstream of the proposed project area. It is approximately 83 percent forested and only 0.4 percent of the land is developed (USGS, 2025). The majority of the forested watershed does not fall within conservation areas; however, a small area located approximately 0.75 miles northwest of the proposed project area near one of Starrucca Creek’s smaller tributaries is designated as the Florence Shelly Wetlands Preserve.

There are no buildings or other enclosed structures located within the proposed project area, but it does include some utility infrastructure. A telecommunications line

owned by the Northeastern Pennsylvania Telephone Company crosses the site from east to west supported by eight utility poles within the Starrucca Creek floodplain. Additionally, a metal guardrail runs along the north side of SR 1005.

2.2.3. Geology & Topography

The study area is in the Appalachian Plateaus physiographic province. This region's geology is influenced by the presence of glaciers approximately 20,000 years ago (PADEP, 2009). Glaciers deposited large amounts of unconsolidated material in the stream valley as they receded and contributed to the formation of bogs and swamps. The underlying bedrock in this region is interbedded sedimentary rock consisting primarily of sandstone, formed from the compaction of sediment over millions of years. Limestone, a porous carbonate rock, is also present in many valleys, which comprises a majority of aquifers in the region. The topography along this region generally follows the underlying bedrock with steep hills and narrow valleys formed through fluvial erosion over thousands of years.

2.2.4. Soils

USACE consulted the National Resource Conservation Service's (NRCS) Soil Resource Report to identify soil types within the proposed project area. Soils identified are a combination of Lackawanna very stony silt loam, 30 to 50 percent slopes, very stony (LgF) along the banks of the stream and mixed alluvial land (Mn) within the streambed (NRCS, 2025). Lackawanna very stony silt loam is well-drained sediment derived from the weathering of sandstone, siltstone and shale and includes unconsolidated sediments such as gravel and cobbles. Mixed alluvial land is generally found in the floodplains and streambeds of the region and includes well-drained sandy loams also with unconsolidated sediments.

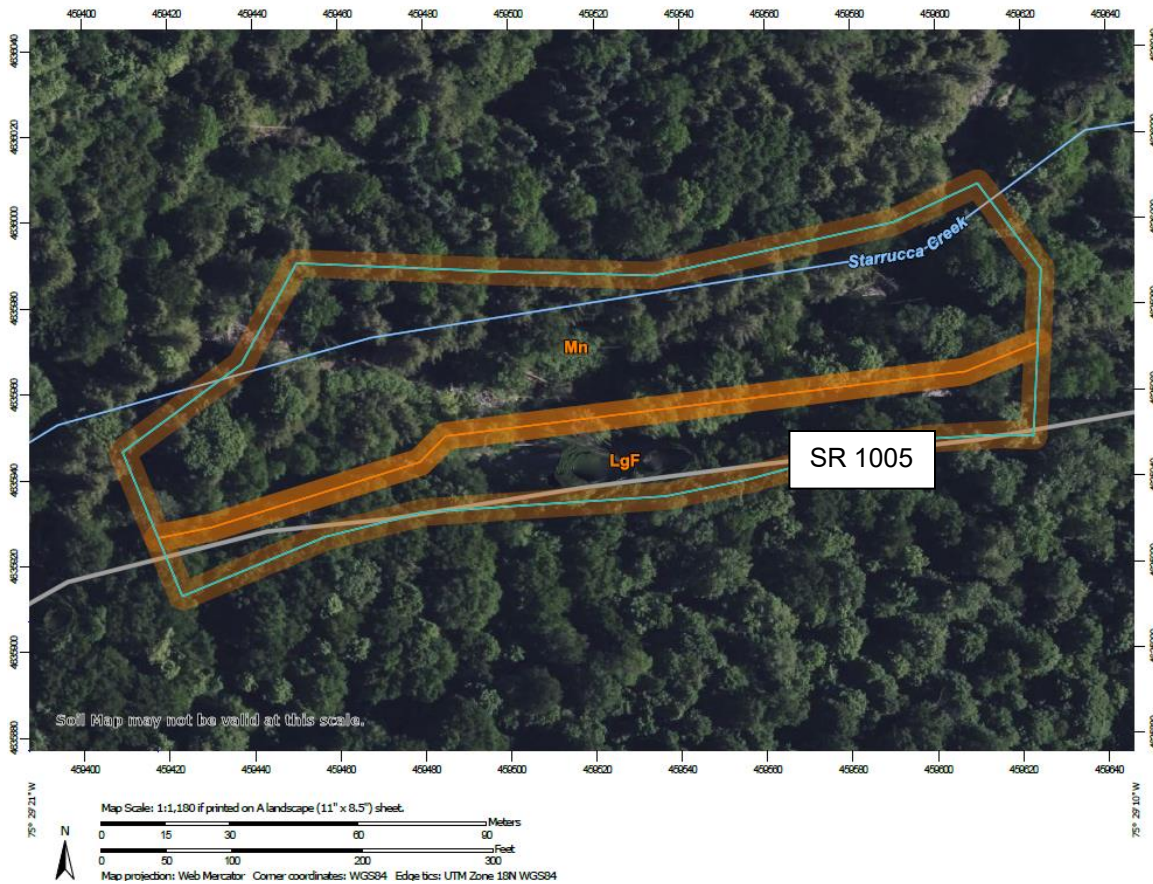


Figure 2-3: NRCS Soils Map (NRCS, 2025)

2.2.5. Prime Farmland

Prime farmland is defined by the NRCS as land that has the best combination of physical and chemical characteristics for growing food, feed, forage, fiber, and other crops and is available for these uses. Unique farmland is defined as land other than prime farmland that is used for the production of specific high-value food and fiber crops.

There are no prime or unique farmland soils located in the proposed project area, which is constrained to the stream, its adjacent floodplain and streambank, and SR 1005 (NRCS, 2025).

2.2.6. Air Quality

The Clean Air Act of 1970 requires the U.S. Environmental Protection Agency (USEPA) to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants including ground-level ozone, particulate matter, carbon monoxide, lead, sulfur dioxide, and nitrogen dioxide. The USEPA calls these “criteria air pollutants” because their levels in outdoor air need to be limited based on health criteria. These

pollutants are found all over the United States and may cause health problems, harm the environment, and cause property damage (USEPA, 2026a).

Susquehanna and Wayne Counties are currently in attainment with all NAAQS set by the USEPA. Both counties were classified as having incomplete data pertaining to the 1-hour ozone (1979 standard) until 2004, at which time they were marked in attainment (USEPA, 2026b). Attainment means that an area is meeting or is below a given safe standard set by the USEPA for the particular criteria pollutant.

2.2.7. Water Quality

The segment of Starrucca Creek which passes through the proposed project area is designated by the USEPA as 'remaining in good condition for swimming and boating, as well as aquatic life.' Segments of the stream both upstream and downstream of the proposed project area, closer to Thompson and Starrucca Boroughs, are designated as 'impaired waters for recreation' due to the presence of bacteria and other illness-causing pathogens in the waterbody. However, the entire Upper Starrucca Creek watershed is designated as 'remaining in good condition for aquatic life' (USEPA, 2026c).

The Pennsylvania Department of Environmental Protection (PADEP) designates Starrucca Creek as 'existing use for migratory fishes' and as 'a stream of exceptional value for aquatic life;' the stream's designated uses are for migratory fishes and cold-water fishes (PNHP, 2026). The PFBC has also designated Starrucca Creek as a stream supporting natural trout reproduction, which precludes construction activities at the site from October 1 through December 31 in any given year (PFBC, 2026).

2.2.8. Hazardous, Toxic and Radioactive Waste

USACE consulted the USEPA's EnviroMapper online tool to identify the presence of facilities regulated under the National Pollutant Discharge Elimination System (NPDES) in the vicinity of the proposed project area (USEPA, 2026d).

The Thompson Borough Wastewater Treatment Plant is a regulated facility located along Starrucca Creek approximately 1.2 miles southwest (upstream) of the proposed project area; the facility was last issued a NPDES permit in 2022. Four compliance violations have been recorded at the facility since issuance of its previous permit for illegal discharges to waters from a sanitary sewer overflow and for elevated levels of fecal coliform in its effluent waters (USEPA, 2026d). There are no other facilities regulated under NPDES near the proposed project area that pose a concern.

The USEPA's Toxic Release Inventory (TRI) program compiles information about chemical releases and pollution prevention activities reported by industrial facilities

(USEPA, 2026d). EnviroMapper maps no TRI facilities within the proposed project area.

Superfund sites are any lands in the United States that have been contaminated by hazardous waste and identified by the USEPA as a candidate for cleanup because of risk posed to human health and/or the environment. Neither EnviroMapper nor the HomeFacts online tool identify any Active Superfund or National Priorities List Superfund sites within the proposed project area or its immediate vicinity (USEPA, 2026d; HomeFacts, 2023).

Brownfields are defined as any properties in the United States that have been contaminated by hazardous waste and identified as a candidate for cleanup because they pose a risk to human health and/or the environment. EnviroMapper does not identify any Brownfield sites within the proposed project area. HomeFacts maps one leaking underground storage tank on the north side of Thompson Borough along SR 171. This unleaded gasoline leak site is situated less than 600 yards north of Starrucca Creek but approximately 1.4 miles southwest (upstream) of the proposed project area (HomeFacts, 2023).

2.3. Natural Environment

2.3.1. Wetlands

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands perform important water quality functions such as filtration and provide food and habitat for fish and other wildlife. Along with open water, they are breeding, spawning, feeding, cover and nursery areas for fish and are important nesting, migrating, and wintering areas for waterfowl and other wildlife.

In addition to the riverine segment of Starrucca Creek, the National Wetlands Inventory (NWI) maps one wetland feature within the stream system located approximately 50 yards east of the proposed project area (Table 2-1). However, the reliability of this data is uncertain, given that the NWI mapped this wetland by interpreting 1:80,000 scale (low resolution) black and white imagery from 1976 (USFWS, 2026a).

Table 2-1: Wetlands Mapped by NWI (USFWS, 2026a)

Name	Wetland Type	Code	Size (acres)	Location with Respect to Area of Interest
Starrucca Creek	Riverine	R3UBH	N/A	Starrucca Road from Thompson to Starrucca Boroughs
Starrucca Creek	Freshwater Forested/Shrub Wetland	PSS1E	4.5	Starrucca Road, southwest of project area

Three additional wetlands, located closer to the proposed project area, were delineated by PennDOT in a 2025 survey of the site. Two of the wetlands (Wetlands A & C) are located on the west side of the project area, while one (Wetland B) is located on the east side (Figure 2-3). All three are palustrine emergent wetlands and their hydrological source is surface water runoff and over-bank flooding from the stream system (PennDOT, 2025). The 2025 PennDOT wetland survey is located in Appendix B.

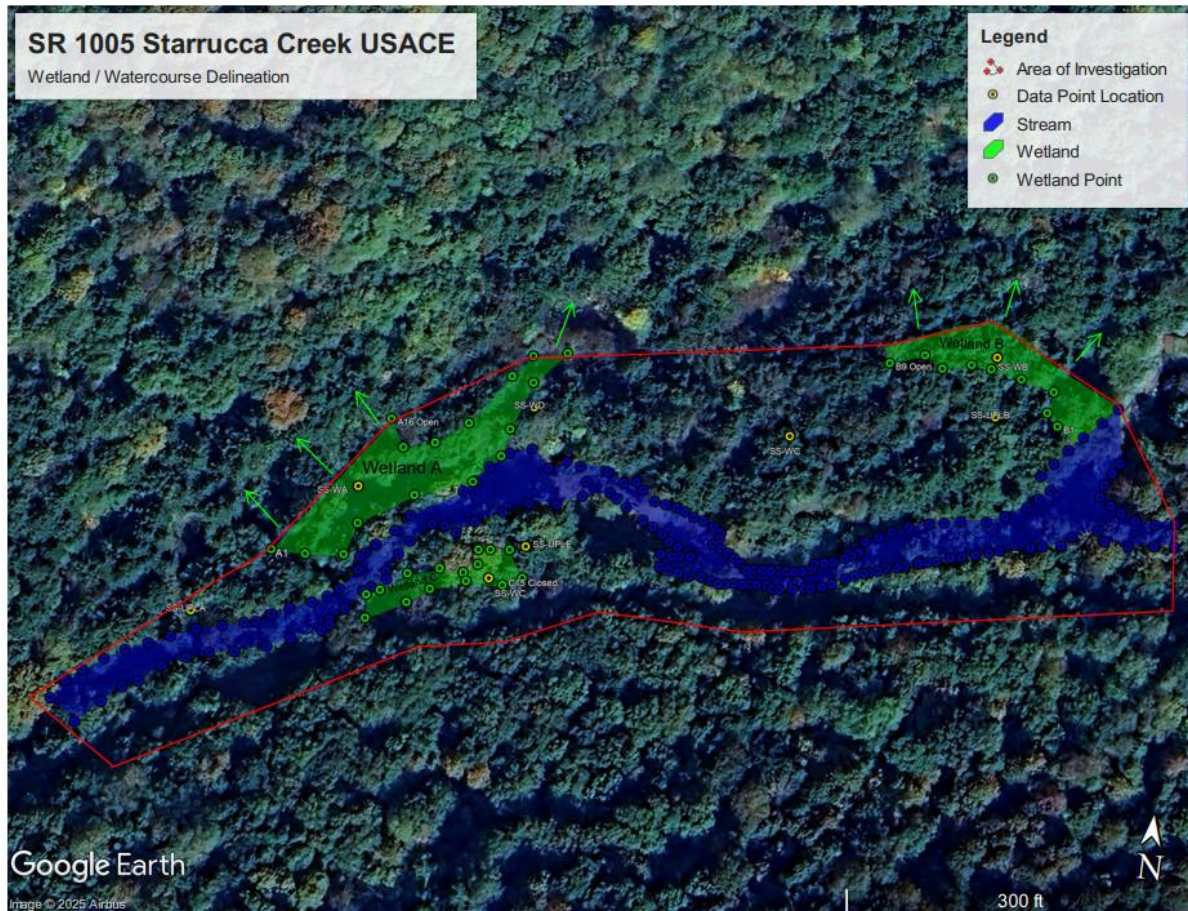


Figure 2-4: Wetlands Delineated Near Starrucca Creek at the Proposed Project Area (PennDOT, 2025)

2.3.2. Vegetation

The proposed project area is largely vegetated and contains riparian species consistent with the riverine valley systems that characterize Susquehanna County and northeastern Pennsylvania. Tree species identified in the project area include eastern hemlock (*Tsuga canadensis*), yellow birch (*Betula alleghaniensis*), and American basswood (*Tilia americana*). Other perennial vegetation identified includes false hellebore (*Veratrum californicum*), creeping jenny (*Lysimachia nummularia*), sensitive fern (*Onoclea sensibilis*), fox sedge (*Carex vulpinoidea*), creeping buttercup (*Ranunculus repens*), grass-leaved goldenrod (*Euthamia graminifolia*), jewelweed (*Impatiens capensis*), foam flower (*Tiarella cordifolia*), wood leak (*Allium tricoccum*), and meadow rues (*Thalictrum* spp.) (PennDOT, 2025).

2.3.3. Fish and Wildlife

Fish species identified in the Starrucca Creek watershed include brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), blacknose dace (*Rhinichthys atratulus*), longnose dace (*Rhinichthys cataractae*), creek chub (*Semotilus atromaculatus*), and various species of sculpin (Cottidae), among others (Susquehanna County Conservation District, 2023). The proposed project area likely hosts wildlife common to northeast Pennsylvania and the Susquehanna River watershed, including the white-tailed deer (*Odocoileus virginianus*), eastern coyote (*Canis latrans*), and raccoon (*Procyon lotor*).

2.3.4. Rare, Threatened, and Endangered Species

USACE consulted the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) online screening tool on February 3, 2026, to identify federally listed and candidate species designated under Section 7 of the Endangered Species Act (ESA) that could potentially occur in the proposed project area (USFWS, 2026b).

The IPaC Official Species List identified two proposed threatened species, the green floater (*Lasmigona subviridis*) and the monarch butterfly (*Danaus plexippus*), as potentially occurring in the proposed project area (Appendix B). Critical habitat has not been designated for either species.

The green floater is a small freshwater clam found in small to medium-sized streams throughout the eastern U.S. Favoring areas with low current and good water quality, these clams are typically found in small pools or calm areas of streams. They prefer sand or small gravel substrates where they can establish a foothold and bury themselves. The green floater has declined in number due to the cumulative impacts of land use change and degradation of water quality and stream conditions, which has led to habitat loss and fragmentation. Despite the presence of suitable habitat for this species within the proposed project area, sedimentation of the stream due to continued erosion of its south embankment likely precludes the green floater from inhabiting the segment, as it is highly sensitive to these disturbances.

Additionally, Starrucca Creek experiences variable flows due to the surrounding mountainous topography, that would not be suitable for green floater habitat.

Monarch butterflies have similarly declined due to habitat loss and fragmentation. The species has a specific host plant, milkweed, which provides the butterfly's larvae and caterpillars with food. Milkweed has not been documented at the site, although it could potentially occur within the proposed project area.

USACE also consulted the Pennsylvania Natural Heritage Program's (PNHP) Pennsylvania Conservation Explorer website on February 3, 2026, to further identify federal or state listed threatened and endangered species potentially occurring in the project area (PNHP, 2026). No species were identified in the Pennsylvania Natural Diversity Index (PNDI) project receipt (Appendix B).

2.3.5. Migratory Birds

The USFWS IPaC screening tool identified eight migratory birds of conservation concern that have the potential to occur within the proposed project area (USFWS, 2026b). The Migratory Bird Treaty Act (MBTA) (16 U.S. Code 703-712) prohibits the take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect), or attempt to engage in any such conduct, of any migratory bird without authorization from the USFWS. Unintentional take includes disturbance to species and nests during ground-clearing activities where unobserved nests of migratory birds could be located. The breeding seasons for the migratory bird species are listed in Table 2-2.

Bald eagles (*Haliaeetus leucocephalus*) were previously a federally listed endangered species but were removed from the federal list in August 2007. Although this species is not listed as an endangered or threatened species, it is protected along with the golden eagle (*Aquila chrysaetos*) under the Bald and Golden Eagle Protection Act. According to a desktop review, there are no known bald or golden eagle nests in the proposed project area or its vicinity (USFWS, 2024).

Table 2-2: List of Migratory Bird Species from USFWS that could potentially occur in the proposed project area.

Common Name	Scientific Name	Bird of Conservation Concern (BCC) Status	Breeding Season
Bald Eagle	<i>Haliaeetus leucocephalus</i>	No	Jan 1 – Jul 31
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	Yes	May 15 – Oct 10
Black-capped Chickadee	<i>Poecile atricapillus praticus</i>	Only in BCR* Regions; In project area, Yes	Apr 10 – Jul 31
Bobolink	<i>Dolichonyx oryzivorus</i>	Yes	May 20 – Jul 31
Canada Warbler	<i>Cardellina canadensis</i>	Yes	May 20 – Aug 10
Chimney Swift	<i>Chaetura pelagica</i>	Yes	Mar 15 – Aug 25
Prairie Warbler	<i>Setophaga discolor</i>	Yes	May 1 – Jul 31
Rusty Blackbird	<i>Euphagus carolinus</i>	Only in BCR* Regions; In project area, Yes	Breeds elsewhere
Wood Thrush	<i>Hylocichla mustelina</i>	Yes	May 10 – Aug 31

* BCR = Bird Conservation Regions

2.4. Community Setting

2.4.1. Population and Demographics

According to the U.S. Census Bureau (USCB), the population of the Boroughs of Thompson and Starrucca was estimated at 344 and 171 residents, respectively, in 2024. In Thompson Borough, approximately 13.1 percent of the population was under the age of 18, and 35.2 percent was aged 65 years or older; in Starrucca Borough, 20.5 percent was under the age of 18, and 17 percent was aged 65 years or older (USCB, 2026).

2.4.2. Employment and Income

In 2024, approximately 7.2 percent of the population in Susquehanna County aged 16 or older fell below the poverty level, while approximately 7.1 percent fell below the poverty level in Wayne County. The unemployment rate in Susquehanna County was estimated at 5.9 percent, and the median household income was \$68,487 that year, while the unemployment rate in Wayne County was estimated at 6 percent and the median household income was \$62,381 (USCB, 2026).

2.4.3. Parks and Recreation

The region surrounding the proposed project area contains municipal environments consistent with small, historic towns, as well as undeveloped, forested lands. Parcels along Starrucca Road and Shadigee Creek Road, in Thompson and Starrucca Boroughs, respectively, are occupied mostly by single-family dwelling units with lawns, while the lands between the two municipalities along the stream is wooded by various native Pennsylvania tree species.

Starrucca Park, located in Starrucca Borough, is a public green space and is the only public-access recreation space situated in the area of interest. The proposed project area contains no state-designated Natural Heritage Areas, abandoned mine locations, or important bird areas, though a Core Habitat area has been designated approximately one mile northwest of the site (Pennsylvania Natural Heritage Program, 2023b). Core Habitat areas are areas containing plant or animal species of concern at the state or federal levels, exemplary natural communities, or exceptional native diversity (PNHP, 2026).

The Delaware & Hudson Rail (D&H) Trail is a 38-mile multi-use rail trail between the Simpson Viaduct to the New York State border. Portions of the rail trail are paved while others are improved with smooth crushed stone. The D&H trail is parallel to Starrucca Creek approximately 500 to 700 feet to the north and west of the project location. The D&H trail has an estimated 10,800 non-motorized annual visitors based on a 2016-2017 User Survey & Economic Impact Analysis (Rails to Trails Conservancy, 2017).

2.4.4. Aesthetics and Noise

Noise levels are measured in decibels (dBA) for regulatory purposes. The threshold of human hearing is 60 dBA, with values above 85-90 dBA considered to be loud and potentially harmful to hearing if given sufficient exposure time. Noise levels above 140 dBA can cause damage to hearing after a single exposure.

The proposed project area contains a largely wooded and natural environment within the river valley that stretches northeast to southwest. Aside from occasional vehicle noise from SR 1005, there are no other noise-generating structures in the area. Traffic on this road is intermittent and generally light.

2.4.5. Cultural Resources

Cultural resources are locations of human activity, use, or occupation. They can be defined by expressions of human culture and history in the physical environment such as precontact or historic archaeological sites, buildings, structures, objects, districts, landscapes, and sacred sites, among others. Cultural resources may also include natural features, plants, and animals that are deemed important or significant to a group or community.

An area of potential effects (APE) was defined to identify any potential historic properties that could be affected by the proposed project. The APE includes those areas where direct impacts are proposed and areas within which the undertaking may directly or indirectly cause alterations in the character or use of historic properties, including visual effects. For this project the APE includes areas of proposed road realignment and channel stabilization and modification, as well as any access and staging areas.

The USACE assessed previously identified historic properties within the APE using the Pennsylvania Historic and Archaeological Resource Exchange (PA-SHARE), Pennsylvania Historical and Museum Commission's (PHMC) cultural resources information system. Information within PA-SHARE includes previously identified archaeological and above-ground resources and surveys within 0.5 miles of the APE.

A review of PA-SHARE indicated that one above-ground resource has been previously identified within 0.5 miles of the APE, the Carbondale to Lanesboro segment of the Delaware & Hudson Railroad. While the overall railroad has a long history spanning from 1829 to the present day, the Carbondale to Lanesboro segment was constructed in 1869 and was operational by 1870. The segment connected the Delaware & Hudson Railroad to the Erie Railroad, which allowed the transport of anthracite coal to western markets, such as the Buffalo and Great Lakes Basin region (Powell, 2016, p. 60). The railroad was determined eligible for the National Register of Historic Places (NRHP) under criterion A (association with important historical patterns and events) for its association as an early and important regional carrier of anthracite coal freight. The railroad is located along Starrucca Creek 0.25 miles north of the APE.

No archaeological resources have been previously identified within 0.5 miles of the APE. In 2016, Circa CRM investigated the APE as part of a separate Starrucca Creek stream and wetland restoration project. The survey methodology included archival research, pedestrian survey, and shovel testing. The investigation documented poorly drained soils and negative shovel tests within the APE and did not identify any resources eligible for the NRHP (Tyrer, 2016). Additionally, no National Historic Landmarks are located within the APE.

Section 106 of the National Historic Preservation Act (NHPA) requires consultation with the State Historic Preservation Office (SHPO), federally recognized Native American Indian Tribes, and other interested consulting parties for proposed federal actions that may affect historic properties. The PHMC is designated as the SHPO for Pennsylvania. Federally recognized tribes with ancestral interest in the area include the Cayuga Nation, Delaware Nation, Delaware Tribe of Indians, Onondaga Nation,

Seneca Cayuga Nation, Stockbridge-Munsee Community of Wisconsin, and Tuscarora Nation. Other consulting parties included the Susquehanna County Historical Society and the Endless Mountains Heritage Region. Consultation letters were sent to these parties on May 5, 2025. The PHMC stated that the proposed project will have no effect on historic properties via letter dated May 5, 2025.

Additionally, the Susquehanna County Historical Society stated that they were unaware of any historic preservation issues related to the APE. No other responses were received regarding the project. Consultation letters and responses are included in Appendix B.

2.4.6. Transportation

SR 1005 is a two-lane road maintained by PennDOT, and approximately 174 vehicles use the road per day, which includes approximately 17 trucks. No fixed route or intercity passenger bus services are known to regularly use the route, though vehicles participating in the state's Medical Assistance Transportation Program may use the road occasionally.

2.4.7. Utilities

The Thompson Borough Wastewater Treatment Plant, operated by Thompson Borough, serves residents near the proposed project area with a capacity to process 30,000 gallons per day (PADEP, 2023). This plant is located adjacent to Starrucca Creek on its south bank, at the eastern border of Thompson Borough, approximately 1.2 miles upstream from the proposed project area. The nearest downstream public water supply intake is at the Pennsylvania-New York state line, beyond Starrucca Borough near the confluence of Starrucca Creek with the Susquehanna River.

The Pennsylvania-American Water Company, a subsidiary of American Water Works Co., Inc., provides drinking water to the region from the Susquehanna River. Yearly water quality reports are provided in accordance with the USEPA and PADEP (Pennsylvania American Water, 2024). The Pennsylvania Electric Company supplies utilities to Thompson and Starrucca Boroughs and the surrounding region.

The Northeastern Pennsylvania Telephone Company owns a telecommunications line that crosses the project area from east to west. Eight utility poles carrying the telecommunications line are in the vicinity of the project area within the floodplain. Only one pole intersects with potential project activities; it is located at the western extent of the planned temporary construction ramp and access road.

3. Plan Formulation

This section presents the plan formulation leading to the development of alternatives for this project. USACE examined the problem site via field investigations with the PennDOT staff to identify problems, opportunities, objectives, and constraints to be addressed in this feasibility study. Using these objectives and constraints, USACE identified management measures, actionable elements that seek to alleviate the problem while accomplishing planning objectives and avoiding identified constraints. Measures were screened to determine the effectiveness of each action at addressing the identified problem and meeting planning objectives. Further, viable measures were combined into alternative plans presented in this report. Section 4 presents the evaluation and comparison of alternatives leading to plan development. Together these represent Steps 2 through 6 of the USACE six-step plan formulation process.

In accordance with EP 1105-2-58, plan formulation for Section 14 projects is limited in geographic scope, scale, and cost due to the imminent threat to facilities from streambank or shoreline erosion. Therefore, the focus of the formulation presented in this report is to identify the least-cost alternative solution in comparison to the cost of relocating the threatened facility.

3.1. Future Without Project Conditions

The FWOP condition also referred to as the No Action Alternative represents the most likely scenario in the absence of federal streambank stabilization efforts. It serves as the baseline against which all proposed stabilization alternatives are evaluated.

Under the FWOP condition, it is assumed that streambank erosion along Starrucca Creek will continue without mitigation measures, further threatening the structural integrity of SR 1005. If no action is taken, the ongoing erosion could ultimately compromise the road's foundation, leading to increased safety risks and potential disruption of emergency service access.

3.2. Management Measures to Achieve Planning Objectives

A limited number of management measures were identified to address the planning objectives in accordance with limited formulation under this program authority in EP 1105-2-58. The following structural and nonstructural measures, and nature-based solutions were identified to alleviate the problem and address the planning objectives and further evaluated using criteria in this section.

3.2.1. Structural Measures

Structural measures are constructed features that, in this case, reduce the probability of failure of critical facilities due to streambank erosion. The following measures were examined in this study:

Road relocation – this measure involves relocating SR 1005 to a location further from the stream reducing the potential impacts of erosion. The relocation of the critical facility is the basis for comparison for the Section 14 program.

Riprap – this measure involves placement of riprap, or loose rock with a foundation of gravel, that is used to stabilize underlying soil from erosion.

Gabion Baskets – this measure involves placement of rustproof metal meshes filled with rock along the streambank and serve a similar function as riprap. Gabion baskets are generally used when there are potential impacts to critical facilities such as roads or where there are steep slopes due to limited space.

Riparian Matting – this measure involves placement of industry-standard erosion control features such as coir mats, vegetated concrete blocks, or other similar features.

Channel Modification – this measure involves modification of the channel form and structure via dredging, grading, and placement of rock and other suitable materials.

Cambered Wall – is a structure built from large, carefully selected rock or other durable materials that are stacked or otherwise constructed to hold back soil on a slope, preventing erosion and maintaining slope stability.

3.2.2. Nonstructural Measures

Nonstructural measures are actions that reduce the consequences associated with a potential problem or risk. Typical nonstructural measures for streambank stabilization impacting critical facilities include emergency response or contingency plans, operational changes, and relocation of features. The following limited measures were examined in this study:

Road closure – this measure would involve the permanent closure of SR 1005 along the failing segment and rerouting traffic along a different route.

3.2.3. Nature Based Solutions

Nature-based solutions (NBS) are landscape features based on natural, physical, and biological processes that are used to provide an engineering function, such as flood risk management or riverbank stability. NBS can include features that are

naturally occurring in the landscape or can be engineered or constructed to mimic a natural feature. The following NBS were considered in this study:

Log Vanes – these grade control features involve the use of logs to protect the streambank by directing the flow away from the bank toward the channel’s center.

Mud Sills – this measure includes the use of log structures parallel to the streambank to provide bank stability and in-stream habitat and may involve placement of sediment and planting with vegetation.

3.2.4. Screening of Management Measures

An initial screening of management measures was completed using qualitative information and best available data to determine the extent to which each measure met study objectives, avoided planning constraints, and was technically feasible, environmentally acceptable, and cost effective. The measures were screened using these three primary criteria, along with additional planning considerations. Table 3-1 provides detailed information on the screening of streambank stabilization measures based on the established criteria. Table 3-2 outlines the rationale behind the screening decisions made during the initial evaluation.

Table 3-1: Screening of Management Measures

Measures	Does the Measure meet the Planning Objectives?		Is the Measure?			
	Objective 1: Reduce streambank erosion	Objective 2: Enhances public safety	Technically Feasible	Environmentally Acceptable	Cost Effective	Meets All Criteria
Rip Rap	Yes	Yes	Likely	Likely	Likely	Retained
Gabion Baskets	Yes	Yes	Likely	Likely	Unlikely	Screened ¹
Cambered Wall	Yes	Yes	Likely	Likely	Unlikely	Retained
Riparian Matting	Yes	Yes	Likely	Likely	Unlikely	Screened ²
Relocation of SR 1005	Yes	No	Unlikely	Unlikely	Unlikely	Retained ³
Channel Modification	Yes	No	Likely	Likely	Likely	Retained ⁴
Closure of SR 1005	No	No	Likely	Likely	Unlikely	Screened
Log Vanes	Yes	No	Likely	Likely	Unlikely	Screened
Mud Sills	Yes	No	Likely	Likely	Unlikely	Screened

¹Screened, as gabion baskets can degrade over time and require additional supporting measures such as tie backs to support gabion baskets. If baskets are not properly supported, it can result a more unstable road embankment and therefore not an effective long-term measure.

²Screened as riparian matting has a high cost of installation and maintenance makes it less feasible

³EP 1105-2-58 requires a comparison of alternative plans versus the cost of relocation of the critical facility for the Section 14 program; therefore, relocation of SR 1005 is retained for further evaluation.

⁴Channel modification when combined with streambank stabilization would enhance public safety and meet all established criteria in this table.

Table 3-2: Screening Decision Explanations for Management Measures

Measure	Measure Screening	Carry Forward to Alternatives?
Structural		
Rip Rap	Properly sized rip rap is used as a cost-effective measure to stabilize streambanks.	Retained
Gabion Baskets	While commonly used for streambank stabilization, gabion baskets are prone to failure over time as the metal mesh rusts, causing the rock to become displaced.	Screened
Cambered Wall	A cambered wall minimizes the construction footprint compared to riprap and provides a more durable, lower-maintenance solution than gabion baskets for a rural stream setting.	Retained
Riparian Matting	Riparian matting can help protect streambanks, but the high cost of installation and maintenance makes it less feasible.	Screened
Relocation of SR 1005	Relocating SR 1005 would offer a long-term solution.	Retained
Channel Modification	Altering the channel geometry can remove existing shoaling and reduce flow impact on streambank erosion.	Retained
Nonstructural		
Closure of SR 1005	The road closure would significantly hinder emergency services from reaching local residents.	Screened
Nature Based Solutions		
Log Vanes	Designed to slow water near the bank and redirect flow, log vanes are effective but degrade over time, potentially jeopardizing road foundations.	Screened
Mud Sills	Similar to log vanes, mud sills protect streambanks and offer fish habitat benefits but may degrade over time and require additional maintenance.	Screened

3.3. Formulation of Alternative Plans

Plan formulation is an iterative process involving the development, evaluation and comparison of alternatives. This process considers how each alternative aligns with the study's goals and objectives, as well as its engineering feasibility, economic justification, environmental impacts, and input from the public and relevant agencies. With each stage of analysis, the level of detail was increased to help reduce uncertainty and support more informed decision-making.

3.4. Array of Alternatives

Alternative plans were developed using the measures retained during the initial screening, which include riprap, channel modification, and road relocation. A no action alternative and two planning-level alternative plans were identified to for evaluation.

The **no action alternative** serves as a baseline to which all other alternative plans are compared and consists of no federal action associated with this project. If no road stabilization measures are implemented, Starrucca Creek will continue to erode, potentially causing a failure of the stream bank and closure of the adjacent road. Closure of SR 1005 would require emergency personnel and residents to use an approximate five-minute detour, delaying response times for fire, Emergency Medical Services (EMS), and law enforcement and increasing travel time and cost for local residents and service providers. Intense storm events would increase the rate of erosion thus furthering the likelihood of SR 1005 collapsing.

Alternative 1 Relocation of SR 1005 – this alternative consists of relocating the SR 1005 road alignment further southeast away from Starrucca Creek and stabilizing the bank of Starrucca Creek with riprap to prevent further degradation of the embankment.



Figure 3-1: Relocation of SR 1005

Alternative 2a Starrucca Creek channel modification and streambank stabilization utilizing rip-rap – this alternative consists of re-establishing Starrucca Creek’s original stream alignment and floodplain by removing shoaled material including gravel and sediment, relocating the stream, and reinforcing the streambank along SR 1005 with riprap (Figure 3-2).

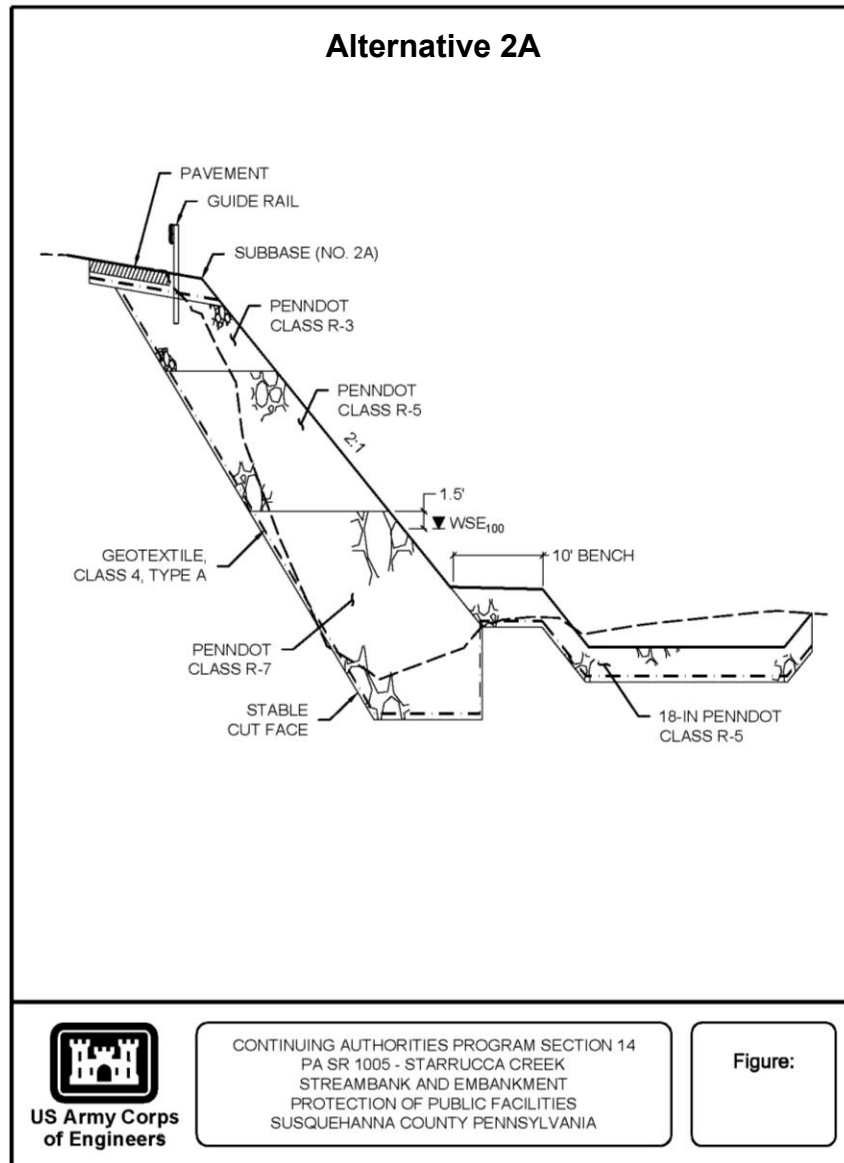


Figure 3-2 Alternative 2a Starrucca Creek channel modification and streambank stabilization utilizing rip-rap

Alternative 2b Starrucca Creek channel modification and streambank stabilization utilizing rip-rap and retaining wall – This alternative consists of reestablishing Starrucca Creek’s original stream alignment and floodplain by removing shoaled material, including gravel and sediment, relocating the stream, and reinforcing the streambank along SR 1005 with riprap and a rock retaining wall. The retaining wall would be constructed of selected rock that is properly stacked to stabilize the streambank and reduce the amount of riprap required (Figure 3-3).

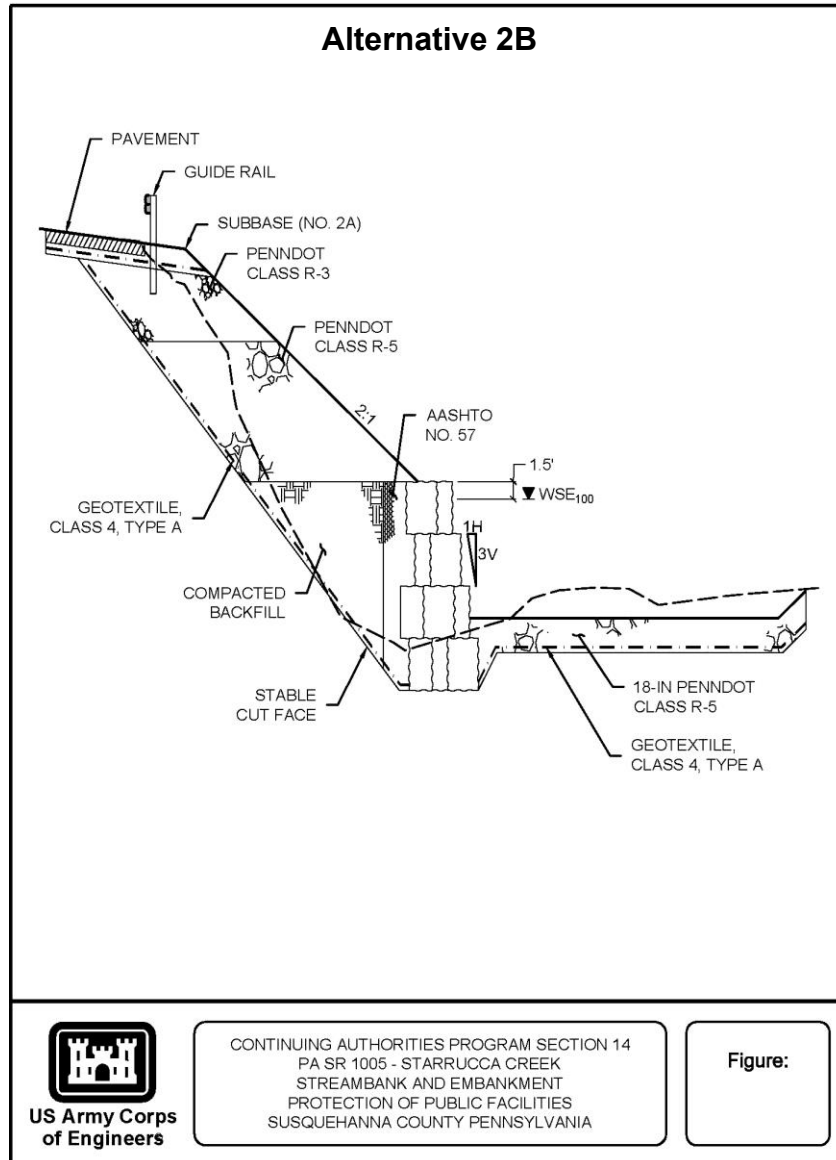


Figure 3-3 Alternative 2b Starrucca Creek channel modification and streambank stabilization utilizing rip-rap and retaining wall

3.5. Cost Estimation for Alternative Plans

The class 3 cost estimates were developed using preliminary design data for each alternative and are based on current conditions, assumptions, and information provided by the PDT. For each project alternative detailed estimates were built in the Micro-Computer Aided Cost Estimating System (MCACES), Second Generation (MII 4.4.4.1). These estimates were based on the 2025 RSMeans Cost book, a local labor market analysis, and the 2024 MII Equipment Library for Region 01.

A uniform sales tax rate of 6% was applied for all alternatives. A global productivity rate of 85% was used to account for anticipated reductions in contractor productivity.

Material costs were escalated to current pricing using the Engineering News Record (ENR) Material Price Index (MPI). The 2025 RSMMeans Cost Book reflects data as of January 1, 2025. These costs were escalated to present day using the January 1, 2026, ENR MPI, resulting in a calculated material escalation of 3.13%.

Equipment costs were escalated using the ENR Construction Cost Index (CCI). The 2024 Region 01 equipment library reflects data as of September 30, 2024. Costs were escalated to January 1, 2026, producing an escalation rate of 3.57%.

The Prime and Sub Job Office Overhead (JOOH), Home Office Overhead (HOOH), profit, bond markups, and estimated construction schedule are shown in Table 3-3.

Table 3-3: MII Estimate Summary

	Alternative		
	1	2a	2b
Cost book	2025 MII English Cost Book		
Labor Library	PA Montrose Labor Analysis 2026		
Equipment Library	MII Equipment 2024 Region 01		
Estimate Class	3		
Sales Tax	6%		
Cost book Material Escalation	3.13%		
Equipment Escalation	3.57%		
Global Productivity	85%		
Prime JOOH (Itemized Calculation)	17.84%	22.01%	17.13%
Prime HOOH	10%		
Prime Profit	10%		
Prime Bond	1.50%		
Sub JOOH	10%		
Sub HOOH	10%		
Sub Profit	10%		
Construction Start	2/18/2028		
Construction Midpoint	4/28/2028		
Construction Completion	7/7/2028		

3.5.1. Alternative 1 – Roadway Relocation:

The cost was originally estimated in 2023. A detailed cost estimate was built in MII and referenced the length of the proposed relocated road and depth of cut required. Items included in the estimate for Alternative 1 were based on recent similar projects. As the preliminary design, items, and quantities have not changed for Alternative 1 since the 2023 estimate, the MII file was repriced with the 2025 RSMMeans Cost book, 2024 Region 01 Equipment Library, local labor rates, and escalated to the new midpoint of construction based on dates provided by the PDT.

The previous 2023 estimate included a 40 percent contingency in MII as opposed to calculating through an Abbreviated Risk Analysis (ARA). As the project is in early

stages, this contingency methodology and level was deemed acceptable based on estimator judgement and is in line with recent similar projects. The MII estimate included a 4 percent Design and Engineering fee, another typical rate according to past projects.

The costs were escalated to the midpoint of construction using the latest Civil Works Construction Cost Index System (CWCCIS) data. Based on an estimate price level of Quarter 1 2026, and midpoint of construction of Quarter 3 2028, the midpoint escalation was calculated as 6.72%. This rate was entered into MII.

It should be noted that an ARA and Total Project Cost Summary (TPCS) were not developed for Alternative 1. However, this omission is not expected to affect the comparative analysis as the PDT has identified Alternative 1 will incur significantly higher engineering and real estate costs than Alternatives 2a and 2b. These factors are anticipated to result in a total project cost exceeding costs of the other identified alternatives.

3.5.2. Alternatives 2a & 2b:

The PDT developed quantities for the alternatives in Microsoft Excel based on initial concept designs. These quantity spreadsheets were used to build MII cost estimate files using the 2025 RSMeans Cost book. Local labor and equipment rates were used in the estimates, as explained above. An ARA was completed for both Alternative 2a & Alternative 2b to calculate appropriate contingencies for each account. To determine the risks and risk levels for the project, an engineering team meeting was held, which included discussions on the Impact and Likelihoods of each risk. The major risks were identified as scope growth due to the preliminary design level, potential for inflated design phase budgets, and risk of Sole Source/8A contract acquisition given the low project cost. Based on the risks and risk levels determined by the PDT in the ARA meeting, contingencies for all accounts were determined. Real Estate (Account 01) cost will be incurred for Alternatives 2a & 2b. The costs and contingencies were provided by the PDT and are shown in the ARA and TPCS. Once the MII files and ARAs were completed for each alternative, the information was placed into the TPCS spreadsheet.

3.5.3. Utility Relocation:

The project requires relocation of one (1) wood telephone utility pole for Alternative 2a & 2b. The relocation will include a real estate acquisition, and this RE cost was provided by the PDT. The PDT also provided a budgetary cost to include in the estimates for the pole relocation by the utility company. These costs were included in the TPCS for Alternatives 2a & 2b. As the project progresses and more information becomes available, the utility relocation cost will be refined.

The below Table 3-4 summarizes the total cost for each alternative as calculated in the TPCS.

Table 3-4: Total First Cost for Alternative Plans

Alternative	Total Costs
No Action Alternative	-
Alternative 1 Relocation of SR 1005	\$4,057,000
Alternative 2a Starrucca Creek channel modification and streambank stabilization with riprap	\$3,288,000
Alternative 2b Starrucca Creek channel modification and streambank stabilization utilizing riprap and cambered stone wall	\$4,008,000

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4. Alternative Plan Evaluation, Comparison, and Selection

EP 1105-2-58 states that given the limited scope, scale low cost, and imminent threat to facilities associated with Section 14 projects, evaluation of projects will focus on identifying the least-cost alternative solution. Further, the least-cost alternative plan is considered to be economically justified if the total cost of the proposed alternative is less than the cost to relocate the threatened facility. Therefore, the evaluation presented in this report represents a limited analysis to identify the least-cost alternative and compare alternative plans with the cost of facility relocation for SR 1005.

4.1. Plan Evaluation and Comparison

The no action alternative and two alternative plans were evaluated using the four evaluation criteria established in the Principles & Requirements (2013) in accordance with ER 1105-2-103 and whether they meet planning objectives presented in this study. The four evaluation criteria are:

- **Completeness:** the extent to which an alternative account for all actions and investments needed to realize the planned benefits, including any necessary actions by others.
- **Effectiveness:** the extent to which an alternative contributes to planning objectives, alleviates identified problems and achieves specified opportunities.
- **Efficiency:** the extent to which an alternative alleviates the specified problem and realizes the specified opportunities at the least cost.
- **Acceptability:** The viability and appropriateness of an alternative from the perspective of the Nation's general public and consistency with existing federal laws, authorities, and public policies.

Table 4-1 details the results of this analysis and further discussed in this section.

Table 4-1: Principles and Guidelines evaluation of Alternative Plans

Alternative	Meets Planning Objectives	Completeness	Effectiveness	Efficiency	Acceptability
No Action Alternative	No	No	No	No	Yes
Alternative 1 Relocation of SR 1005	No	Yes	Low	Low	Yes
Alternative 2a Starrucca Creek channel modification and streambank stabilization with riprap	Yes	Yes	High	High	Yes
Alternative 2b Starrucca Creek channel modification and streambank stabilization with riprap and cambered wall	Yes	Yes	High	Med	Yes

The no action alternative and Alternative 1 were determined not to meet the project objectives to address the imminent threat of road failure due to erosion of the streambank. Alternative 1 Relocation of SR 1002 away from Starrucca Creek associated schedule and cost burden would be disproportionate to the focused nature of the documented instability at the project reach, and it would not provide the timely risk reduction needed given the active erosion condition.

Alternative 2 was determined to be efficient and effective at meeting planning objectives because it achieved equivalent benefits (i.e. stabilization of the road embankment) at the least cost.

4.2. Identification of the Least Cost Alternative

The purpose of this evaluation is to determine whether the identified least-cost alternative is economically justified by comparing the total cost of each alternative to the cost of mitigating the existing threat to SR 1005, which would otherwise require relocation and reconstruction of the roadway following failure. For this analysis, it was initially assumed that Alternative 1, relocation of SR 1005 prior to failure, would be less costly and more effective than reconstructing the facility after a failure event.

Based on the total costs presented in Table 4-2, Alternative 2a, Starrucca Creek channel modification and streambank stabilization with riprap, has been identified as the least-cost alternative. Alternative 2a consists of realigning Starrucca Creek to its original channel and stabilizing the eroded streambank with riprap, at an estimated implementation cost of approximately \$3.3 million. If no project is implemented and existing erosion processes continue, SR 1005 is expected to continue to deteriorate and may ultimately experience structural failure.

The estimated cost of Alternative 1, relocation of SR 1005 away from Starrucca Creek, is approximately \$4.1 million while Alternative 2b, Starrucca Creek channel modification with riprap and a cambered wall, is estimated at approximately \$4.0 million. Alternative 2b is similar in functional intent to Alternative 2a; however, it is less efficient because it requires the sourcing, transport, and precise placement of large boulders for the cambered wall, which extends the construction duration and increases total project cost relative to Alternative 2a (Table 4-2).

Because the total cost to implement Alternative 2a is substantially lower than Alternative 1 the cost of relocating SR 1005 or Alternative 2b implementing channel modification with riprap and a cambered wall, Alternative 2a is identified as the least-cost alternative. Therefore, the proposed project is considered economically justified in accordance with the evaluation procedures set forth in EP 1105-2-58.

Table 4-2 Estimated First Costs, Investment Costs, Average Annual OMRR&R, and Average Annual First Costs

Investment	Alternative 1	Alternative 2a	Alternative 2b
Estimated First Cost	\$4,057,000	\$3,288,000	\$4,008,000
Annual Interest Rate	3.25%	3.25%	3.25%
Period of Analysis	50	50	50
Interest During Construction	\$127,000	\$101,000	\$124,000
Investment Costs	\$4,184,000	\$3,340,000	\$4,086,000
Annual Costs			
Interest and Amortization of Initial Investment	\$165,000	\$134,000	\$163,000
OMRR&R	\$0	\$11,000	\$11,000
Average Annual Costs	\$165,000	\$145,000	\$174,000

4.2.1. Identification of the Recommended Plan

The recommended plan is the least cost alternative, Alternative 2a Starrucca Creek channel modification and streambank stabilization. The selection of the least cost alternative as the recommended plan is consistent with established policy in EP 1105-2-58.

5. Environmental Effects and Consequences

This section describes the environmental effects and consequences that are expected to result within the project area and community setting from Alternatives 2a (Proposed Action) and 2b, as well as under future-without-project conditions. Alternative 1 was evaluated as a cost comparison to the other alternatives and was screened out on the same basis; therefore, it is not evaluated in this section. The period of analysis for these effects starts in baseline year 2028 and ends in 2077.

5.1. Physical Environment

5.1.1. Land Use and Land Cover

5.1.1.1. *No Action Alternative/FWOP*

If no intervention is carried out at the project area to relocate the stream or stabilize the south bank, existing conditions would prevail and there would be no effect or change to land uses at the site.

5.1.1.2. *Alternatives 2a (Proposed Action) and 2b*

The relocation of Starrucca Creek to its previous course further north would involve the construction of an access road and staging area near the stream, but all such areas would be returned to pre-construction conditions following the completion of the project. A small area on the stream's south bank would be stabilized with riprap (under Alternative 2a) and possibly other measures (under Alternative 2b). Existing vegetation cleared on the south streambank would not be replanted, but this area represents a small portion of the overall 2.76-acre project area, which is otherwise vegetated. Therefore, effects to land use within the project area would be negligible to none.

5.1.2. Geology, Topography and Soils

5.1.2.1. *No Action Alternative/FWOP*

Geological, topographical, and soil characteristics within the project area would remain unchanged under the No Action Alternative, as no intervention to stabilize the streambank or relocate the channel would occur.

5.1.2.2. *Alternatives 2a (Proposed Action) and 2b*

The relocation of the stream to its previous course would occur in the same mixed alluvial land that characterizes the larger floodplain. Portions of the south bank abutting SR 1005, which would be stabilized and armored, have been previously disturbed by road construction. While the slope of the stream's south bank would be altered under Alternatives 2a or 2b, the modification would not significantly alter the

topographical characteristics of the project area, which are defined by the region's typical landscape of steep hills and narrow valleys. The Proposed Action would therefore have minor permanent effects on the project area's topography, and no effect to geology or soils characteristic.

5.1.3. Prime Farmland

5.1.3.1. No Action Alternative/FWOP

There are no prime or unique farmland soils within the project area; therefore, the No Action Alternative would have no effect on these absent resources.

5.1.3.2. Alternatives 2a (Proposed Action) and 2b

The Proposed Action would have no effect on prime or unique farmland soils, which are not present within the project area.

5.1.4. Hydrologic Setting

5.1.4.1. No Action Alternative/FWOP

If no action is carried out within the project area, there would be no effect to the site's hydrologic setting in the near future, although there could be long-term adverse effects if the erosion of the stream's south bank continues without intervention. Long-term erosion of the south bank could eventually cause the collapse of earth or roadway material into the stream, which could impede the waterway's flow or otherwise adversely modify the stream's floodplain.

5.1.4.2. Alternatives 2a (Proposed Action) and 2b

The Proposed Action would relocate the stream to the north of its current course; however, these effects would not adversely modify the floodplain as the action would return the waterway to its previous course. The stream's floodplain would remain unchanged; the valley's walls would not be modified apart from the stabilization of the stream's south bank, and there are no buildings or structures located within the floodplain that could be damaged as a result of activities under the Proposed Action.

5.1.5. Air Quality

5.1.5.1. No Action Alternative/FWOP

Under the No Action Alternative, no emissions-generating equipment would be used to carry out stream relocation or streambank stabilization measures at the site. There would be no effect on air quality.

5.1.5.2. Alternatives 2a (Proposed Action) and 2b

The Proposed Action would have minor, short term, localized adverse effects on air quality due to the use of emissions-generating equipment. Construction equipment that would be used to shift the stream and stabilize the streambank would likely

include excavators, trucks, and other heavy equipment which could generate exhaust emissions and fugitive dust. Table 5-1 estimates the likely emissions from the project, assuming average equipment use and an eight-hour window of construction work per day for a control project length of one year (South Coast Air Quality Management District, n.d.).

Table 5-1: Estimated Project CO₂ Emissions

Equipment	Average CO ₂ Emitted per Hour (lbs.)	CO ₂ Emissions Across Project Duration (metric tons)
Excavator	120	158.94
Off-Highway Truck	160	211.92
Other Construction Equipment (Composite)	123	162.91

While it is unlikely that all equipment would be used continuously for eight hours every day, an aggressive estimate of total direct emissions from construction activities amounts to approximately 534 metric tons of CO₂, based on the table above. By comparison, the largest emitter of CO₂ in Susquehanna County emitted 44,650 metric tons in 2023 (USEPA, 2026a). Emissions from the preferred alternative would cease once construction is complete and no new stationary emission sources would be created; therefore, air quality effects are expected to be temporary and minimal and are not expected to pose a significant risk to the environment or the health of workers or the public. Because the project area is in attainment and no new stationary emissions sources will be created as part of the Proposed Action, no air quality conformity analysis is required.

5.1.6. Water Quality

5.1.6.1. No Action Alternative/FWOP

Under the No Action Alternative, no activities to stabilize the streambank would occur and no in-stream work would be carried out, meaning erosion of the stream's south bank would continue without intervention. Continued erosion could increase

turbidity and sedimentation in the waterway over time and degrade water quality within the project area. Thus, while water quality would remain unaffected in the near future, the No Action Alternative could carry long-term adverse effects to water quality.

5.1.6.2. Alternatives 2a (Proposed Action) and 2b

Relocation of Starrucca Creek to its previous course would likely introduce elevated levels of turbidity to the waterway associated with the excavation of the new channel. This adverse effect is expected to be short in duration and minor in scale. USACE will obtain a Chapter 105 Water Obstruction and Encroachment Permit for the removal of gravel bars within the stream and channel relocation, as well as a Clean Water Act Section 401 Water Quality Certification (WQC) from PADEP prior to construction of the Proposed Action. USACE will follow all of the terms and conditions of the permit and WQC to minimize effects to water quality in Starrucca Creek.

Starrucca Creek's designation as 'Wild Trout Waters for Natural Reproduction' confers a time-of-year restriction (TOYR) on in-stream activities from October 1 to December 31 in any given year. Therefore, any in-stream work under the Proposed Action associated with channel relocation or streambank stabilization would be carried out between January 1 and September 30.

5.1.7. Contamination and Hazardous, Toxic, and Radioactive Wastes

5.1.7.1. No Action Alternative/FWOP

According to USACE's desktop review described in Section 2.2.8, there are no known sources of Hazardous, Toxic, and Radioactive Wastes (HTRW) within 1.2 miles of the project area. The No Action Alternative would therefore have no effect on site contamination.

5.1.7.2. Alternatives 2a (Proposed Action) and 2b

According to USACE's desktop review described in Section 2.2.8, there are no known sources of HTRW within 1.2 miles of the project area. Therefore, it is unlikely that contaminated soils or groundwater will be encountered during construction.

5.2. Natural Environment

5.2.1. Wetlands

5.2.1.1. No Action Alternative/FWOP

Under the No Action Alternative, there would be no effect to wetlands within or near the project area. No action to stabilize the streambank would occur and the wetlands fed by runoff and overbank flooding of the stream would likely remain unaffected by the continued erosion of the stream's south bank.

5.2.1.2. Alternatives 2a (Proposed Action) and 2b

Starrucca Creek's relocation to its previous footprint and the stabilization of its south bank under the Proposed Action would not affect or encroach upon wetland areas. No project activities would occur within the wetlands proximal to the project area; the construction and use of an access road leading from SR 1005 to the equipment staging area will be sited approximately 20 feet east of delineated Wetland C. Delineated Wetlands A and B are located beyond the extent of project activities to the northwest and northeast, respectively (Figure 5-1).



Figure 5-1: Maps of Project Area with Delineated Wetlands, Access Road, and Staging Area.

5.2.2. Vegetation

5.2.2.1. No Action Alternative/FWOP

Vegetation within the project area would remain unaffected by continued erosion of Starrucca Creek's south bank in the near future, if no intervention is carried out at the site. Over the long term, however, continued erosion could potentially uproot the vegetation located on the south bank and abutting SR 1005. The loss of this vegetation would occur within a small area of an otherwise wooded river valley;

therefore, any long-term effects to vegetation under the No Action Alternative would be minor.

5.2.2.2. Alternatives 2a (Proposed Action) and 2b

The Proposed Action would have minor short-term and permanent adverse effects to vegetation within the project area. The shifting of the stream north and the stabilization of the south bank would require the removal of vegetation located between the stream and SR 1005. Construction of the access road and staging area required to execute the stabilization project may require additional removal of vegetation proximate to the stream, and approximately 0.18 acres of vegetation would need to be cleared in order to relocate one utility pole approximately 15 feet to the north. However, vegetation removal is expected to be minor relative to the larger wooded landscape surrounding the site, and vegetation would regrow near the stream and on its north bank. The segment of the stream's south bank that will be stabilized and armored with riprap (Alternative 2a) and possibly other measures (Alternative 2b), as well as the new location of the removed utility pole, are the only locations within the project area that would remain without vegetation.

5.2.3. Fish and Wildlife

5.2.3.1. No Action Alternative/FWOP

Under the No Action Alternative, there would be no effect on terrestrial wildlife. No action to stabilize the streambank or relocate the stream channel would occur and terrestrial wildlife would continue to use the project area unimpeded. Fish species transiting the project area would also remain unaffected in the near future. However, there could be long term adverse effects to fish species transiting or residing in the relevant segment of Starrucca Creek if the erosion of the stream's south bank continues unimpeded and the road embankment collapses. A temporary fish blockage by material falling into the stream channel may inhibit the proper migration or feeding of fish species within the channel or natural trout reproduction cycles.

5.2.3.2. Alternatives 2a (Proposed Action) and 2b

The Proposed Action would have minor and temporary effects on fish and wildlife in the project area. The construction and use of the access road and staging area will obstruct wildlife from using only a small portion of a long, wooded valley, and the relocation of the stream further north will not affect fish, which will be unimpeded from traversing the project area during and after construction activities. While there may be short-term elevation of turbidity within the small stream segment due to construction activities, mobile fish species could use other segments of the watershed until turbidity abates. Instream project activities will occur between January 1 and September 30 in any given year to comply with the PFBC-mandated

TOYR due to the stream's designation as Wild Trout Waters for Natural Reproduction and mitigate potential effects to trout.

5.2.4. Rare, Threatened, and Endangered Species

5.2.4.1. No Action Alternative/FWOP

The green floater (*Lasmigona subviridis*) is a proposed threatened species that could potentially occur within the project area, according to the USFWS IPaC Official Species List (Appendix B). Under the No Action Alternative, relocation of the stream and stabilization of the south bank would not occur. The lack of intervention would likely cause ongoing adverse effects to the green floater within the project area. Green floaters are particularly susceptible to sedimentation caused by bank erosion that decreases substrate stability; eroded sediment fills interstitial spaces in streambeds where green floaters would otherwise bury (50 CFR Part 17, 2023). Therefore, continued erosion of the stream's south bank would cause further degradation to the green floater's habitat within the project area if no intervention is carried out.

The monarch butterfly (*Danaus plexippus*) is another proposed threatened species identified by the USFWS IPaC Official Species List as potentially occurring in the project area (Appendix B). Under the No Action Alternative, there would be no effect to the species, which would use the site unimpeded and remain unaffected by the eroding streambank.

5.2.4.2. Alternatives 2a (Proposed Action) and 2b

The green floater's habitat range in northeast Pennsylvania extends across the entire Starrucca Creek watershed and other tributaries of the Susquehanna River throughout the region. It is unlikely that green floaters are buried in the short segment of Starrucca Creek that passes through the project area, due to ongoing sedimentation of the stream segment caused by the long-term erosion of the waterway's south bank that has likely degraded the species' potential local habitat. Relocation of the stream to its previous course further north would replace any potential habitat loss caused by the streambank stabilization project. USACE completed the IPaC *Northeast Species Determination Key* for the green floater and received a determination of "no effect" in a technical assistance letter generated on February 25, 2026 (Appendix B).

The monarch butterfly is a highly mobile species capable of avoiding the small area of disturbance associated with stream relocation or streambank stabilization project activities. While it is possible that the project area provides suitable habitat for the species' host plant, milkweed, its small area relative to the much larger wooded valley landscape carries little risk that project activities would disturb monarch

butterflies. USACE has therefore determined that the Proposed Action would have no effect on the monarch butterfly.

5.2.5. Migratory Birds

5.2.5.1. No Action Alternative/FWOP

Under the No Action Alternative, there would be no effect to migratory birds. No Action to stabilize the streambank or relocate the stream channel would occur and no vegetation would be removed.

5.2.5.2. Alternatives 2a (Proposed Action) and 2b

The Proposed Action would likely have no effect on migratory birds as it is unlikely that the species potentially occurring within the project area would use trees on the south stream bank that would be removed. SR 1005 is a linear feature fragmenting the project area and subject to regular vehicle traffic, and the stream's south bank is a narrow slope situated between the roadway and the waterway. This portion of the project area which would undergo tree removal would serve as poor habitat for migratory bird species relative to the rest of the wooded river valley given the fragmentation caused by the roadway and the passing of traffic on SR 1005. According to USFWS state-level surveys, there are no bald eagle nests within the project area or its vicinity, and the golden eagle does not breed in the region (USFWS, 2024).

5.3. Community Setting

5.3.1. Population and Demographics

5.3.1.1. No Action Alternative/FWOP

There would be no effect on population or demographics in the communities surrounding the project area if no action to stabilize the streambank or relocate the stream channel is undertaken. While the continued erosion of the stream's south bank could cause the eventual closure of SR 1005 if the road's foundation continues to degrade, such a development would not likely affect the region's population and demographics.

5.3.1.2. Alternatives 2a (Proposed Action) and 2b

The Proposed Action would have no effect on population and demographics. The project area is a 2.76-acre site on a rural stretch of SR 1005; the relocation of the stream and stabilization of its south bank will not affect residential patterns.

5.3.2. Employment and Income

5.3.2.1. No Action Alternative/FWOP

Under the No Action Alternative, there would be no effect to employment and income in the near future. However, there could be long-term adverse effects if the erosion of Starrucca Creek's south bank continues to affect the SR 1005 roadway and ultimately closes the route to vehicular traffic. Although other routes exist between the Boroughs of Thompson and Starrucca, losing this roadway would disrupt daily commutes and could hinder access to employment centers for residents throughout the region.

5.3.2.2. Alternatives 2a (Proposed Action) and 2b

The Proposed Action would have no effect on employment and income for the communities in the vicinity of the project area. The stream relocation and streambank stabilization activities would maintain the roadway as a useable long-term route for regular commuters and other users.

5.3.3. Parks and Recreation

5.3.3.1. No Action Alternative/FWOP

The only recreational resource near the project area, other than the stream itself, is the D&H Trail, which is located north of the project area. Without intervention to relocate the stream and stabilize the stream bank, use of this recreational resource would continue unimpeded. Use of the stream for fishing or other recreational uses would also continue unimpeded; therefore, there would be no effect to parks or recreation.

5.3.3.2. Alternatives 2a (Proposed Action) and 2b

Activities associated with Proposed Action would not affect the use of the D&H Trail, which is located beyond the extent of the streambank stabilization and channel relocation work. While recreational use of the stream itself would be obstructed within the short segment that passes through the project area for the duration of project activities, potential users would be able to recreate in the stream both upstream and downstream of the project area.

5.3.4. Aesthetics and Noise

5.3.4.1. No Action Alternative/FWOP

Under the No Action Alternative, no noise-generating construction equipment would be deployed and no intervention at the site would disturb its existing landscape; therefore, there would be no effect to aesthetics or noise in the near future. However, if the stream's south bank continues to erode and the roadway ultimately

collapses into the stream, there could be long-term adverse effects to aesthetics within the project area.

5.3.4.2. Alternatives 2a (Proposed Action) and 2b

The Proposed Action would entail the use of noise-generating construction equipment to relocate the stream and stabilize its south bank; however, there are no residences or commercial or institutional properties within 2,500 feet of the site, so any temporary noise increases would have no effect on residents. Recreationists using the D&H Trail may be temporarily affected by increased noise levels. Wildlife within or proximate to the project area may also be affected by construction-related noise increases, but these effects would be similarly short-term in duration. Therefore, the Proposed Action will have temporary and minor effects on noise levels.

The Proposed Action will have minor temporary and permanent effects on aesthetics within the project area. The south bank of Starrucca Creek will be permanently de-vegetated to reconstruct the slope with riprap armoring. Any other areas from which vegetation is removed, for example, for the construction of the access road or staging area, will be returned to pre-construction conditions upon the completion of project activities and aesthetic effects in those areas would be temporary while the site remains bare and disturbed. Tree removal from the stream's south bank is not expected to be a significant permanent aesthetic effect based on its limited size relative to the surrounding wooded landscape and the adjacency of the bank to the roadway.

5.3.5. Cultural Resources

5.3.5.1. No Action Alternative/FWOP

Under the No Action Alternative, there would be no change in the current conditions along Starrucca Creek and State Route 1005; however, due to the results of previous cultural resources investigations and the lack of identified resources, cultural resources would not be impacted.

5.3.5.2. Alternatives 2a (Proposed Action) and 2b

The Proposed Action will not affect cultural resources. The APE was surveyed for cultural resources in 2016, which did not document any resources within the project area. The one resource within 0.5 miles of the APE, the Carbondale to Lanesboro segment of the D&H Railroad, is located approximately 0.25 miles to the north and will not be directly or indirectly affected. This determination was sent to the PHMC, Delaware Nation, Delaware Tribe of Indians, Onondaga Nation, Seneca-Cayuga Nation, Stockbridge Munsee Community, Tuscarora Nation, Cayuga Nation, Susquehanna County Historical Society, and the Endless Mountains Heritage Region via letter dated May 5, 2025. The PHMC and Susquehanna County

Historical Society concurred with this determination (Appendix B). No other responses were received.

5.4. Infrastructure

5.4.1. Traffic and Transportation

5.4.1.1. No Action Alternative/FWOP

Should the erosion of Starrucca Creek's south bank continue without intervention, traffic and transportation would likely remain unaffected in the near future, though continuing degradation of the roadway could cause long-term adverse effects. An average of 174 cars utilize the segment of SR 1005 that passes through the project area daily, and an eventual closure of the route could complicate regional transportation or increase congestion on other roadways. Closure of the roadway would delay emergency response times by approximately five minutes, presenting risks for public health and hazards.

5.4.1.2. Alternatives 2a (Proposed Action) and 2b

SR 1005 would likely be closed or operated at reduced capacity for the duration of project activities associated with the stabilization of Starrucca Creek's south bank but would fully reopen to daily traffic following completion of the project. Therefore, the project is expected to have short-term adverse effects to traffic and transportation. However, nearby secondary routes linking Thompson and Starrucca Boroughs could be used as alternatives for the duration of any traffic-related effects, so any such effects are not expected to be significant.

5.4.2. Utilities

5.4.2.1. No Action Alternative/FWOP

Under the No Action Alternative, there would be no effect to utilities within the project area. The utility pole located on the north side of Starrucca Creek would not be compromised by the continued erosion of the stream's south bank.

5.4.2.2. Alternatives 2a (Proposed Action) and 2b

If the Proposed Action is carried out, the utility pole located on the north side of Starrucca Creek would need to be relocated in order to shift the stream north to its previous location. The pole would be relocated within the project area, and no significant interruption of service would be expected; therefore, the Proposed Action would have no effect on utilities.

5.5. Summary of Effects

Based on USACE's evaluation of potential effects to the human environment from the alternatives proposed, the No Action Alternative would result in no immediate

changes to the project area's land use, environment, or infrastructure. However, it presents significant long-term adverse effects due to the continued erosion of Starrucca Creek's south bank under future-without-project conditions. This erosion would degrade water quality over time by increasing turbidity and sedimentation, which would also harm any habitat for the proposed threatened green floater.

Eventually, the erosion could undermine and collapse the SR 1005 roadway. The closure of this route would disrupt regional traffic patterns and could negatively impact local employment by hindering commutes, as well as delay emergency response times. A potential collapse of the roadway would also introduce a large amount of debris into the creek, which could block fish passage and further degrade the aquatic environment. While most vegetation and wildlife would be unaffected in the short term, a bank collapse could uproot vegetation on the south bank and adversely affect aesthetics.

The Proposed Action, by comparison, entails the relocation of Starrucca Creek to its previous channel and the stabilization of its south bank. This action involves minor, temporary disruptions during construction and minor permanent effects to vegetation and aesthetics. The project's short-term and localized adverse effects include temporary increases in air emissions and noise from heavy equipment, elevated water turbidity during instream work, and the temporary closure or reduction of traffic on SR 1005. Wildlife would likely avoid the immediate construction zone and be only temporarily affected.

The minor permanent effects to vegetation and aesthetics would result from the permanent armoring of a small section of the south bank with riprap and the relocation of one utility pole away from construction activities. Any other de-vegetated areas will be returned to pre-construction conditions. The Proposed Action would prevent the eventual collapse of SR 1005, thereby securing the transportation route and preventing long-term degradation of water quality and aquatic habitats. It would have no effect on cultural resources, prime farmland, or nearby wetlands. Effects on migratory birds and monarch butterflies are considered negligible due to the small project footprint.

Mitigation to avoid potential adverse effects includes the restriction of instream construction activities to a window spanning January 1 to September 30 in any given year, in compliance with the PFBC TOYR for Wild Trout Waters supporting Natural Reproduction. A Section 401 WQC will be obtained from PADEP prior to undertaking project activities at the site; all terms and conditions of the WQC will be followed.

6. The Recommended Plan

The recommended plan is Alternative 2a Starrucca Creek channel modification and streambank stabilization, which consists of realigning Starrucca Creek away from the road and reinforcing the streambank with riprap to reduce erosion and restabilize SR 1005. The recommended plan includes approximately 245 feet of channel realignment, mechanical removal of 1,160 cubic yards of sediment and material using a bucket excavator and placement on site for bank restoration, and placement of a layered riprap embankment for approximately 265 feet of the realigned stream along the segment adjacent to SR 1005. Upon project implementation, PennDOT will restore the failing railing and resurface the road per PennDOT guidance.

The recommended plan is the least cost alternative with an estimated total project costs of \$3.3 million. The recommended plan results in long-term stabilization of SR 1005 and reinforcement of the embankment with riprap reducing the risk of future streambank erosion and ensuring safe road access along SR 1005 between Thompson and Starrucca and minimal disruption to emergency services critical to these small, rural communities.

6.1. Recommended Plan Components

The initial design for this effort is further discussed in Appendix C. The Recommended Plan stabilizes the Starrucca Creek streambank and restores the SR 1005 roadway prism and roadside safety function at the erosion site. An existing overhead telecommunications line, owned by the Northeastern Pennsylvania Telephone Company, generally parallels SR 1005 along the left shoulder and crosses the property to the north near the project area. One pole located within the proposed realigned stream corridor will need to be relocated about 15 feet north. The design consists of excavating and cutting back the existing eroding slope to create a stable foundation and positive tie-in for a rockfill embankment, and removal of 1,160 cubic yards of sediment and material to realign the stream.

The proposed revetment will be constructed on a 2 horizontal to 1 vertical (2H:1V) slope to stabilize the streambank and protect the roadway embankment from erosion. The lower portion of the slope will consist of PennDOT Class R-7 riprap (large stone) placed over a Class 4, Type A geotextile filter fabric. The filter fabric prevents soil from washing out from beneath the stones while still allowing water to drain through. The R-7 riprap will extend from the toe (bottom) of the slope to approximately 1.5 feet above the water surface elevation associated with the 1-percent annual exceedance probability (AEP) flood event. This larger stone is used in the areas most exposed to strong stream flows to resist scour and erosion.

To further protect the revetment, a toe key will be installed at the base of the slope. The toe key will be 4 feet deep with a minimum width of 8 feet and is designed to

anchor the riprap in place and prevent undermining or movement of the stones during high flows.

Above the portion of the slope most affected by flood flows, smaller riprap will be used. The mid-slope will be constructed with PennDOT Class R-5 stone, and the upper slope beneath the roadway shoulder will use PennDOT Class R-3 stone. These layers will also be placed over geotextile filter fabric to maintain stability and prevent soil loss from the embankment.

The outside roadway shoulder and travel lane will be reconstructed using PennDOT No. 2A subbase, and a new guiderail system will be installed along the roadway edge to improve roadside safety.

At the point where the slope meets the stream, a 10-foot-wide bench will be constructed at the base flow elevation of the channel. This bench will include an 18-inch layer of PennDOT Class R-5 riprap to strengthen the streambed near the base of the slope and reduce the chance that erosion will occur directly next to the new revetment.

Together, these improvements will stabilize the streambank, protect the roadway embankment from erosion during large storm events, restore support at the edge of the pavement, and maintain the proper roadside geometry needed for safe guiderail performance (Figure 6-1).

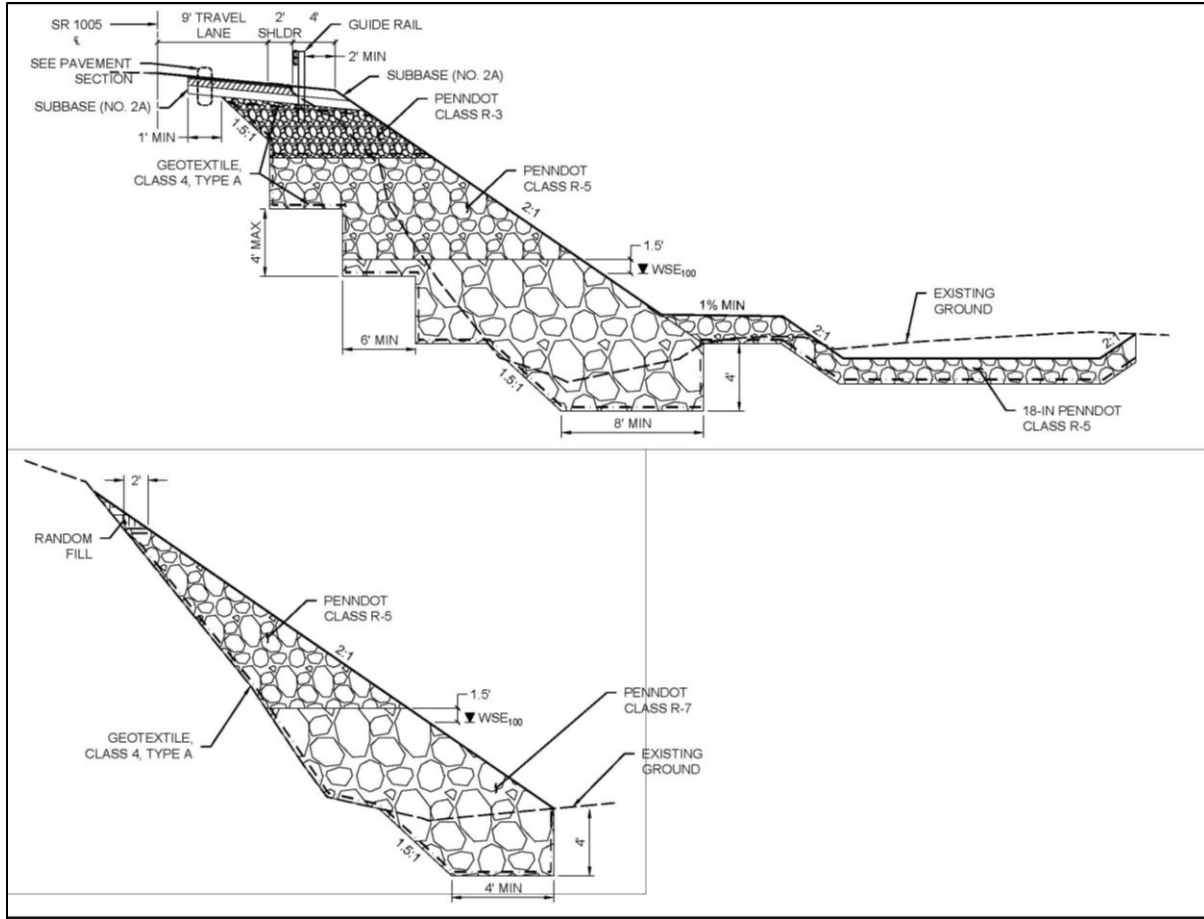


Figure 6-1: Detailed design of Alternative 2A Channel modification with streambank stabilization with riprap

6.2. Cost Estimate

Total project first costs for the recommended plan are summarized in Table 6-1.

Table 6-1: Project Cost Summary for the Recommended Plan

Construction Item	Cost
01 Lands and Damages	\$41,000
02 Relocation ¹	\$36,000
16 Bank Stabilization	\$2,325,000
30 Planning Engineering & Design	\$624,000
31 Construction Management	\$262,000
Total First Cost	\$3,288,000

¹ Relocation includes real estate costs and costs to the utility to relocate one communication utility pole.

6.3. Real Estate Requirements

The Real Estate required for this project is minimal. The non-Federal Sponsor (NFS) will be required to provide one parcel of privately owned land and one parcel that is currently owned by the NFS. Two types of Standard Estates are required for the project. A Perpetual Channel Improvement Easement (PCIE) in order to relocate Starrucca Creek to its original channel, and a Temporary Work Area Easement (TWAE) for access, staging, and laydown areas. The acreage required for each estate is described in Table 6-2 below. Under a CAP 14 project, the value of any Real Estate owned by the NFS required for the project will not be credited toward their share of the project costs.

Table 6-2: Standard Estates and Type of Ownership

Estate Type	Acres	Ownership Type	No. of Parcels
PCIE	1.19	Private	1
TWAE	1.57	Sponsor	1
Total Acres	2.76	Total Parcels	2

The estimated value of the privately owned Lands, Easements, and Rights-of-Way (LERs) required for the project is \$5,200. This estimate was prepared by a licensed USACE appraiser. A Baseline Cost Estimate for Real Estate (BCERE) is shown in Table 6-3 below. The cost estimate below includes the Real Estate costs for the relocation of a utility pole owned by the North-Eastern Pennsylvania Telephone Company. At this time the telephone company has not demonstrated a compensable interest for the relocation of the pole, so it is possible that the non-Federal Sponsor will not be responsible for the cost of the relocation.

Table 6-3: Baseline Cost Estimate for Real Estate

Project Cost Category	Federal	Non-Federal	Contingency	Total
Total 01-Lands and Damages	\$0	\$35,200	\$5,900	\$41,100
Total 02-Relocations (Utility/Facility)	\$0	\$30,000	\$6,000	\$36,000
Total 30-Planning, Engineering, and Design	\$24,000	\$0	\$3,600	\$27,600
Total Project BCERE	\$24,000	\$65,200	\$15,500	\$104,700

6.4. Operation, Maintenance, Repair, Rehabilitation, and Replacement

The non-Federal sponsor is responsible for ensuring the operation, maintenance, repair, rehabilitation, and replacement (OMRR&R) of the project. This includes de minimus activities including the inspection and verification that no keying/toe areas are undermined or experiencing progressive scour, monitoring of the SR 1005 embankment/shoulder for settlement or cracking, and removal of debris and undesirable vegetation that could redirect flow or displace riprap. The NFS shall conduct periodic inspections to ensure the project is being maintained and still performing as described in the OMRR&R Manual. OMRR&R costs are estimated at \$11,000 annually for these activities. USACE shall have the right, but not the obligation, to perform its own inspections of the project.

6.5. Project Risks & Consequences

State Route 1005 functions as a critical emergency service route for paramedic and fire response serving residents within the Borough of Starrucca. In accordance with EP 1105-2-58, project risk and consequences must be assessed for each CAP Section 14 Emergency Streambank and Shoreline Protection study, including Starrucca Creek.

For the Starrucca Creek CAP Section 14 effort, the project area has been assigned a risk Level A, indicating a very short (0–2 year) timeframe in which streambank failure could occur, and a Category B consequence rating, the second-highest category for severity, should failure occur (Table 6-4). This determination is based on both the current structural condition of the eroding streambank and the essential role SR 1005 plays in maintaining reliable emergency access for the community.

Table 6-4 CAP Section 14 Consequence and Risk Level Matrix

Priority Matrix		Consequences Category				
		Category A	Category B	Category C	Category D	Category E
Risk Level	Level A 0 to 2 Years	1	3	5	7	12
	Level B 2 to 4 Years	2	4	6	8	12
	Level C 4 to 6 Years	3	5	7	9	12
	Level D 6 to 8 Years	4	6	8	10	12
	Level E Over 8 Years	5	7	9	11	12

6.6. Utility Relocation

An existing overhead telecommunications line owned by the Northeastern Pennsylvania Telephone Company generally parallels SR 1005 along the left shoulder; however, at approximately Segment 0100, Offset 1075, the line diverges from the roadway and shifts north onto the adjacent tract. The PennDOT-provided topographic survey identified eight utility poles in the vicinity of the project, including the overhead utility crossing to the north side of Starrucca Creek with two poles located near the baseflow left bank. The easternmost surveyed pole is located within the Starrucca Creek baseflow channel. Consistent with the project’s objectives, the project was developed to avoid or minimize impacts to utility facilities and to limit the need for pole relocation by keeping proposed grading and stream work away from existing pole locations to the maximum extent practicable.

Despite avoidance efforts, minimal impacts are anticipated that will require temporary protection/support measures for existing poles and relocation of one pole to avoid leaving it within the proposed realigned stream corridor. One pole is located at the edge of the temporary construction ramp and near the limits of proposed fill grading; based on current design information, this pole is not expected to require relocation but will require coordination with the utility owner for temporary protection measures, such as temporary support/bracing. A second, currently unmarked pole is located within the alignment of the new realigned stream. In this area, the proposed grade cut is anticipated to be up to approximately 1.5 feet. Because the embedment depth of the pole is unknown and leaving the pole within the stream corridor is not

desirable, the pole would be relocated approximately 15 feet to the north, outside of the proposed channel alignment.

For the feasibility phase, planimetric pole-to-pole distances were reviewed to evaluate whether a 15-foot relocation would require new cable or whether the work could likely be completed as a pole adjustment. This review indicated that the proposed relocation would not increase the overhead span length and therefore may not require additional slack; however, if additional slack is needed, a slack loop observed near the SR 1005 bridge crossing of Starrucca Creek may provide flexibility. Utility relocation needs identified at the feasibility phase is preliminary; the final determination of necessary relocations and the associated responsibilities and compensability determinations will be made as design is completed, and the utility relocation plan is finalized.

6.7. Cost Sharing

Cost sharing for the Recommended Plan will be done in accordance with Section 14 of the Flood Control Act of 1946, as amended, and is summarized in Table 6-5. The Recommended Plan will be cost-shared 65 percent federal and 35 percent non-Federal up to the maximum federal cost for planning, design, and construction of \$15 million. The NFS for project implementation must cover all costs beyond the statutory limit of the CAP Section 14 program.

Table 6-5 Non-Federal Cost Sharing

CONSTRUCTION ITEM	FEDERAL COST	NON-FEDERAL COST	TOTAL	
Feasibility Phase (Sunk Costs)		\$331,000	\$331,000	\$662,000
Project Costs (Design and Implementation)				
Construction Item				
01 LANDS AND DAMAGES		\$0	\$41,000	\$41,000
02 RELOCATIONS		\$0	\$36,000	\$36,000
16 BANK STABILIZATION		\$1,561,300	\$763,700	\$2,325,000
Subtotal		\$1,561,300	\$840,700	\$2,402,000
30 PLANNING, ENGINEERING AND DESIGN		\$405,600	\$218,400	\$624,000
31 CONSTRUCTION MANAGEMENT		\$170,300	\$91,700	\$262,000
Total Project First Costs (Design and Implementation)		\$2,137,200	\$1,150,800	\$3,288,000
Total Project Costs (Feasibility, Design and Implementation)		\$2,468,200	\$1,481,800	\$3,950,000

6.8. Design and Construction

The Recommended Plan for the Starrucca Creek right-bank erosion adjacent to SR 1005 is a combined streambank protection and roadway-embankment restoration project intended to arrest active near-bank scour and embankment loss, reestablish a stable roadway at the outside pavement edge, and restore roadside safety performance by rebuilding the shoulder and guiderail. The feasibility-level design is developed to approximately 20 percent design maturity and will be advanced during design and implementation phase into a complete, biddable Plan Specifications and Estimates (PS&E) package. A more detailed description of the concept geometry and the design and implementation considerations is provided in the Engineering Appendix.

At a feasibility level, the plan rebuilds the outside edge of SR 1005 and protects the reconstructed embankment with an armored slope. The existing degraded embankment is benched to create a stable bonding interface for new fill and stone, and the restored slope is constructed with a zoned riprap revetment, with larger stone concentrated at the toe where hydraulic stresses and scour potential are greatest, transitioning to smaller stone upslope where it interfaces with the roadway prism. A geotextile separator/filter is included beneath the riprap to limit loss of embankment fines while allowing drainage through the armor. The concept also includes an embedded toe key and a stone-armored transition at the slope/stream interface to reduce the risk of toe undermining and progressive unraveling. To further reduce near-bank attack on the roadway side, the plan includes gravel bar removal/regrading to shift the active flow path away from the right bank and back toward a more stable alignment.

During the design and implementation phase, the priority is to convert the feasibility concept into buildable PennDOT-standard details and to close the technical gaps that most influence performance, permitting, and cost. USACE will confirm surveys, survey controls, and mapping needed to support final design and confirm all permanent features and temporary needs (access routes, stream crossings, staging areas, stockpile areas, and restoration limits) during the design and implementation phase. USACE will also confirm the hydraulic design basis by finalizing model inputs and geometry, confirming the 1 percent chance AEP water surface elevation at the revetment and tie-ins, and validating the riprap class zoning, freeboard, toe-key embedment, and end treatments so the revetment cannot be flanked or undermined by end scour or adverse channel adjustments during the design and implementation phase. Because the plan relies on benching into an existing roadway embankment and reconstructing the outside prism under flood drawdown and traffic loading, USACE will include exploration to characterize embankment and foundation materials, groundwater/seepage conditions, and toe excavation conditions, and to confirm constructible bench limits and stability assumptions in the design phase.

USACE will also detail the construction methods and requirements in the design and implementation phase. This includes selecting and detailing temporary access features and the stream crossing (type, approaches, maintenance, and removal), defining an in-channel isolation/flow management method (cofferdams and/or pump-around) with clear sequencing, and developing erosion and sediment controls consistent with anticipated disturbed limits and construction phasing. The sequencing will be refined to minimize time with exposed, unsupported cuts—typically by requiring short, sequential excavation/backfill increments with immediate placement of geotextile and stone—while coordinating roadway work, haul routes, and staging so the contractor can work efficiently within the constrained corridor. Finally, because construction occurs directly adjacent to SR 1005 and requires heavy equipment and hauling, USACE will finalize details to traffic control approach (anticipated closure/detour coordination, emergency access, signing, and work zone requirements) and will complete guiderail design details (offset, length-of-need, end treatments, and grading behind the rail) so the restored roadside section functions as intended at project completion during the design and implementation phase.

6.9. Views of the Non-Federal Sponsor

PennDOT acknowledges that the USACE will move forward with implementing the preferred alternative once Congress appropriates funds to the CAP 14 program and those funds are allocated to the Baltimore District. PennDOT fully supports the plan recommended in this IFR/EA and will serve as the non-federal sponsor for the project's design and implementation. A letter of support outlining PennDOT's commitment to the project and cost-sharing obligations was submitted on February 20, 2026.

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7. Environmental Compliance, Coordination & Public Involvement

7.1. Environmental Compliance

Table 7-1 provides an overview of the compliance status of this project with federal environmental laws, Executive Orders, and topics of concern.

Table 7-1: Compliance of the Proposed Action with potentially applicable Federal Environmental Laws and Executive Orders (EO)

Federal Law or Environmental Topic of Concern	Compliance Status	How Compliance Status Determined
Archeological Resources Protection Act	Full	Coordinated with PHMC and Native American Tribes on May 5, 2025 via letters to fulfill requirements.
Bald and Golden Eagle Protection Act	Full	The Proposed Action is not expected to adversely affect eagles; no known eagle nests in the project area or vicinity.
Clean Air Act Section 176(c) General Conformity Rule Review	Full	Minor and temporary effects to air quality during construction. Susquehanna County is in attainment for all NAAQS. No mitigation for effects to air quality is required for the Proposed Action.
Clean Water Act Section 401 Water Quality Certification	Partial	USACE will apply for a Section 401 WQC from PADEP for instream work before initiating construction activities.
Coastal Barrier Resources Act (CBRA)	Not Applicable	The project area is not located within a CBRA system.
Coastal Zone Management Act (CZMA)	Not Applicable	The project area is not located within PA's coastal zone.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	Not Applicable	No CERCLA sites will be disturbed by the Proposed Action.
Endangered Species Act, Section 7	Full	<p>Review of USFWS IPaC system and PNHP Pennsylvania Conservation Explorer systems identified two proposed threatened species, the green floater (<i>Lasmigona subviridis</i>) and monarch butterfly (<i>Danaus plexippus</i>), which could potentially occur in the project area. The project area does not intersect proposed critical habitat for either species.</p> <p>USACE determined that the Proposed Action will have no effect on the green floater due to its likely absence from deteriorated and sedimented habitat and no effect on the monarch butterfly, due to the mobile species' ability to avoid the small project area.</p>

Federal Law or Environmental Topic of Concern	Compliance Status	How Compliance Status Determined
Farmland Protection Act	Not Applicable	No prime or unique farmland or farmland of statewide importance is located within or near the project area.
Fish & Wildlife Coordination Act (FWCA)	Full, pending USFWS response	The Proposed Action would result in modification of a natural stream. Temporary and minor effects to wildlife are expected due to construction-related increases in noise levels. USACE coordinated with USFWS and state resource agencies via the IPaC and PNHP Pennsylvania Conservation Explorer systems and sent a letter to the USFWS Pennsylvania field office on March 18, 2026, to solicit comments on the project.
Magnuson-Stevens Fishery Conservation and Management Act	Not Applicable	No essential fish habitat (EFH) is located within the project area.
Migratory Bird Treaty Act	Full	The Proposed Action will remove vegetation on a narrow streambank situated between the SR 1005 roadway and Starrucca Creek. It is unlikely that migratory birds are using this portion of the project area due to the habitat fragmentation and disturbance caused by the roadway and regular vehicular traffic.
National Environmental Policy Act (NEPA)	Full	NEPA was conducted under the DoD NEPA Implementing Regulations issued June 30, 2025. USACE prepared an EA, which is the appropriate level of NEPA document for this project.
National Historic Preservation Act, Section 106	Full	USACE coordinated with PHMC on May 5, 2025; PHMC responded the same day and concurred with the finding that the Proposed Action would have no effect on historic properties.
National Invasive Species Act	Full	The Proposed Action would not introduce invasive species to the project area.
Noise Control Act	Full	Noise would temporarily increase in and surrounding the project area during construction. The completed project would not result in increased noise levels from traffic.
Resource Conservation and Recovery Act (RCRA)	Not Applicable	No RCRA sites will be disturbed by the Proposed Action.

Federal Law or Environmental Topic of Concern	Compliance Status	How Compliance Status Determined
Tribal Trust Responsibilities	Full	On May 5, 2025, USACE sent letters to the Delaware Nation, Delaware Tribe of Indians, Onondaga Nation, Seneca-Cayuga Nation, Stockbridge Munsee Community, Tuscarora Nation, and Cayuga Nation, notifying them of the Proposed Action. No responses were received.
Wild & Scenic Rivers Act	Not Applicable	USACE reviewed the National Wild and Scenic Rivers System. Starrucca Creek is not a state or federally designated wild or scenic river.
EO 11593, Protection and Enhancement of Cultural Environment	Full	USACE coordinated with PHMC via letter on May 5, 2025; PHMC responded the same day and concurred with the finding that the Proposed Action would have no effect on historic properties.
EO 11988, Floodplain Management	Full	The Proposed Action will cause no significant effects to floodplains. The relocation of Starrucca Creek to its previous course further north and stabilization of its south bank will not significantly alter the existing floodplain.
EO 11990, Protection of Wetlands	Full	Three wetlands are located in close proximity to the project area; none of the wetlands will be affected by the Proposed Action.
EO 13007, Indian Sacred Sites	Full	The project area does not contain any Indian sacred sites.
EO 13045, Protection of Children from Environmental Health Risks and Safety Risks	Full	The project area is located in a rural section of a river valley located at a distance of 2,500 feet from the nearest structures; the Proposed Action will not adversely affect children.
EO 13112, Invasive Species	Full	The Proposed Action will not introduce invasive species to the project area.

Federal Law or Environmental Topic of Concern	Compliance Status	How Compliance Status Determined
EO 13175, Consultation and Coordination with Indian Tribal Governments	Full	On May 5, 2025, USACE sent letters to the Delaware Nation, Delaware Tribe of Indians, Onondaga Nation, Seneca-Cayuga Nation, Stockbridge Munsee Community, Tuscarora Nation, and Cayuga Nation, notifying them of the Proposed Action. No responses were received.
EO 13186, Responsibility of Federal Agencies to Protect Migratory Birds	Full	The Proposed Action will remove vegetation on a narrow streambank situated between the SR 1005 roadway and Starrucca Creek. It is unlikely that migratory birds are using this portion of the project area due to the habitat fragmentation and disturbance caused by the roadway and regular vehicular traffic.
EO 13508, Chesapeake Bay Protection and Restoration	Full	The Proposed Action will not adversely affect the Chesapeake Bay watershed.
EO 13751, Safeguarding the Nation from the Impacts of Invasive Species	Full	The Proposed Action will not introduce invasive species to the project area.

***Level of Compliance:**

Full Compliance (Full): Having met all requirements of the statute, E.O., or other environmental requirements.

Not Applicable (NA): No requirements for the statute, E.O, or other environmental requirement for the current stage of planning.

7.2. Resource Agency Coordination

In compliance with NEPA of 1969, as amended, coordination was conducted with federal and state resource agencies (Appendix B).

USACE coordinated with PHMC on May 5, 2025, to ensure compliance with Section 106 of the National Historic Preservation Act. Consultation letters were also mailed on May 5, 2025, to tribal nations with potential interest in the project area (Appendix B). This coordination is discussed in further detail in Section 5.3.5.

USACE also used the USFWS IPaC online system on February 3, 2026, to identify federally listed species potentially occurring within the project area. USACE completed the *Northeast Species Determination Key* on February 25, 2026, and received a technical assistance letter determining “no effect” to the green floater; USACE determined that there would be no effect to the monarch butterfly. The IPaC Official Species List and technical assistance letter are located in Appendix B.

USACE further coordinated with USFWS, PCDNR, PFBC, and PGC via the PNHP Pennsylvania Conservation Explorer website on February 3, 2026. This coordination is documented in the Pennsylvania Natural Diversity Index Project Receipt located in Appendix B.

In coordination with PennDOT, USACE is applying for a Chapter 105 Water Obstruction and Encroachment Permit and Section 401 WQC from PADEP for in-stream work.

7.3. Public Coordination

[This section will be updated following the public review period].

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8. Final Recommendation

The recommended plan would provide streambank protection to arrest further erosion and protect at-risk public facilities and infrastructure. This report, together with the integrated Environmental Assessment (EA), documents the potential environmental and cultural resources impacts associated with the proposed emergency streambank stabilization project along Starrucca Creek in Susquehanna County, Pennsylvania.

The Baltimore District endorses the recommended plan consisting of stabilization of the stream bank adjacent to SR 1005 in Susquehanna County Pennsylvania. The identified recommended plan is Alternative 2A-channel modification combined with streambank stabilization using riprap. The alternative involves generating a sloped embankment armored with multiple layers of riprap to protect the bank and roadway shoulder against erosion. A ten (10) foot wide bench at bankfull elevation, topped with a riprap, would strengthen the channel banks and streambed over approximately 270 feet of stream. This alternative will stabilize streambank and allow SR 1005 to be utilized as an emergency service route. The total cost for the recommended plan is estimated at \$3.3 million and would be cost shared 65 percent (\$2,137,200) and 35 percent non-Federal (\$1,150,800) under the CAP Section 14 authority.

Under the recommended plan, Alternative 2A construction activities would cause only minimal, temporary impacts, primarily short-term effects to air and water quality during installation. Over the longer term, stabilization of the bank would reduce erosion and is expected to improve water quality by decreasing turbidity in Starrucca Creek. USACE, in coordination with PennDOT, is applying for a Chapter 105 Water Obstruction and Encroachment Permit and Section 401 WQC for in-stream construction to be completed during the design and implementation phase. Based on the analysis in the EA, implementation of the recommended plan (riprap stabilization and associated channel modification) would not constitute a major Federal action significantly affecting the quality of the human environment and therefore does not require preparation of an Environmental Impact Statement.

The Final Feasibility Report and Environmental Assessment considers the overall public interest, including environmental, social, and economic effects; engineering feasibility; and the ability and interest of the non-Federal sponsor, PennDOT, to support the project. The costs of the Recommended Plan are within Continuing Authorities Program funding limits and within an amount PennDOT has determined to be acceptable. In a letter dated February 20, 2026, PennDOT confirmed its

willingness to serve as the NFS sponsor for the design and implementation phases of the project.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program, and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to higher authority as proposals for authorization and implementation funding. However, prior to transmittal to higher authority, the sponsor, the states, interested federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

Date Signed

Francis Pera
Colonel, U.S. Army
Commander and District Engineer

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