verdantas

# Columbia County West End Flood Mitigation Study

## ADDENDUM NO. 2

### 2-Dimensional Hydraulic Analysis Final Recommendations

**Prepared for:**
Columbia County
35 West Main Street
Bloomsburg, PA 17815

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**Verdantas Project No: 031.0000019265**

**November 2025**

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# COLUMBIA COUNTY
# WEST END FLOOD MITIGATION STUDY
## ADDENDUM NO. 2

## 2-DIMENSIONAL HYDRAULIC MODELING ANALYSIS
## FINAL RECOMMENDATIONS

### TABLE OF CONTENTS

## LIST OF FIGURES



## APPENDICES

# EXECUTIVE SUMMARY

The floodway of Fishing Creek in the West End study area is situated such that a proposed levee system would be constructed entirely within the regulatory floodway along the left descending bank downstream of Railroad Street. Results of the 2D proposed conditions modeling performed in the Amendment No. 1 work indicated that the water surface elevation (WSEL) of the base flood increases by as much as 2.1 feet when a levee is constructed along the bank of Fishing Creek without mitigation features. Without mitigation of the induced flooding, the residential areas in Hemlock Township adjacent to and upstream of the proposed levee would experience a greater risk of flooding because these areas would not be protected by the proposed levee.

The Addendum No. 2 engineering analysis refined the alternatives proposed in the previous work and developed a new alternative to eliminate the series of culverts beneath Route 11 previously proposed with a lowering of the roadway profile by one foot over a 450 foot length of Sr 0011. The mitigation system chosen in this Addendum No. 2 work includes the following components

- A four foot deep benched floodplain to increase conveyance capacity from the Railroad Street bridge for a distance of 3,300 feet downstream where two islands exist in the stream.

- A lowering of State Route US Route 11 is proposed to facilitate high flood flows to cross Route 0011 The intent of this mitigation alternative is to accommodate higher (Greater than 10 year flood) Fishing Creek flows within the area where twelve (12) homes were acquired and demolished after the Storm Lee flooding of 2011.

- A variable depth swale through the Fairgrounds parking lots, eventually emptying into Fishing Creek approximately 4,000 feet downstream. The swale will accommodate the out of bank flows from Fishing Creek that cross the lowered stretch of Route 11.

The recommended mitigation project will reduce the 2.1 feet of induced flooding predicted in the original West End Flood Mitigation Study to a zero increase for the base flood conditions.

The estimated cost for construction of the project in 2027 is $5,455,000.

Acquisition and/or demolition will be required for several homes that will be impacted by the alignment of the proposed floodwall and levees.

# 1. INTRODUCTION

## 1.1 Purpose and Goals

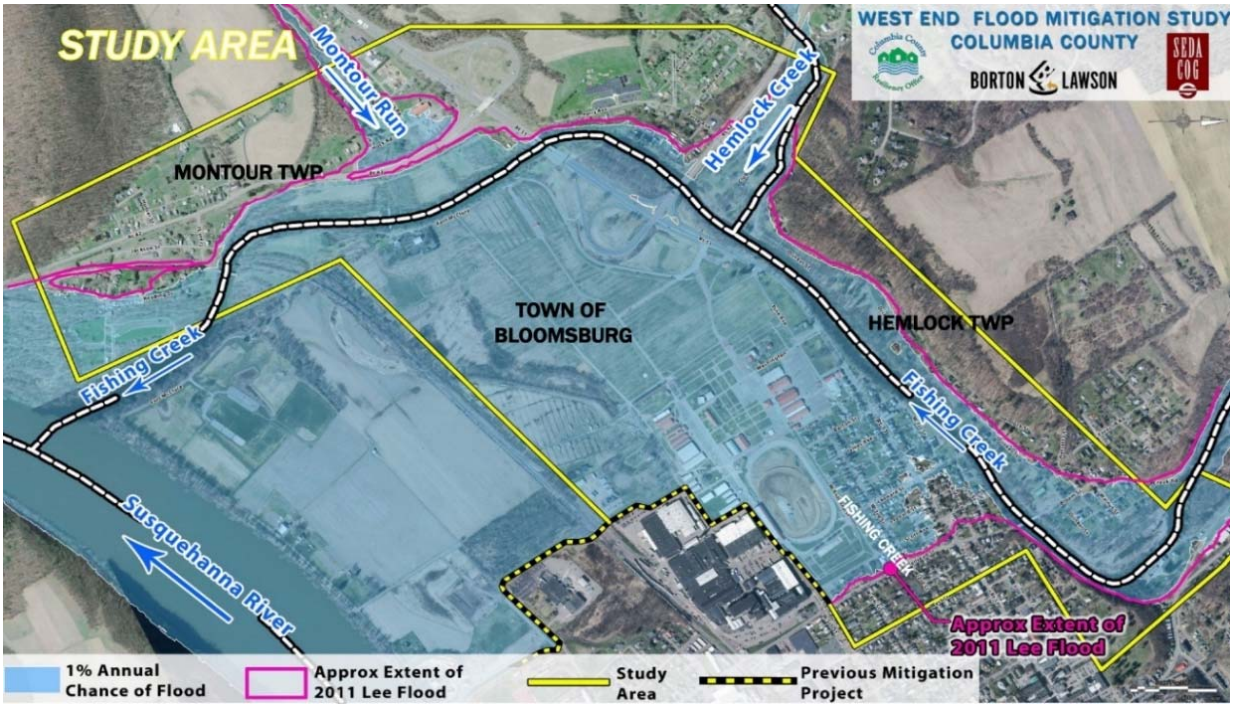
The previously completed Columbia County West End Flood Mitigation Study Final Study Report (Verdantas [fka Borton-Lawson], 2022 and subsequent Addendum #1 – 2-Dimensional Hydraulic Modeling Analysis (Verdantas [fka Borton-Lawson], 2023) determined that the construction of a levee along the left bank of Fishing Creek would result in up to 24 inches of induced flooding in Hemlock Township along the right descending bank of Fishing Creek. Mitigation features were developed in that study to address the induced flooding. These efforts lowered the induced flooding to four (4) inches on a few insurable structures located along Drinker Street in Hemlock Township. For a Conditional Letter of Map Revision (CLOMR) to be approved by FEMA, it must be demonstrated that the project does not increase base flood elevations on insurable structures.

This Addendum No. 2 scope of work included additional analysis to further refine the conceptual mitigation features from the Addendum No. 1 analysis to ensure that the number of structures impacted by induced flooding is reduced to zero. The analysis included coordination with Columbia County, PennDOT, adjacent municipalities, and other project stakeholders to address potential regulatory and administrative issues and determine the scope, size, and extents of the final mitigation features. The overall objective of the study was to ensure that no potential fatal flaws or cost prohibitive conditions exist which could be an obstacle to the future design and construction of the project.

## 1.2 Project Area & Description

The project area, shown in Figure 1.1, is comprised of approximately five hundred (500) parcels and three hundred fifty (350) structures.

Figure 1.1 – Study Area Map



# 2. Two Dimensional (2D) Hydraulic Analysis

Verdantas utilized the 2D hydraulic model created in the Amendment No. 1 phase of the engineering study to further develop mitigation alternatives aimed at eliminating induced flooding on insurable structures within the Fishing Creek floodplain. Various modifications to the mitigation features established in Amendment No. 1 were tested in the model and adopted into the final recommendations for eliminating induced flooding. Alterations were made to the proposed geometry of the benched floodplain, island removal and channel alignment, mechanisms of conveyance across State Route 0011, and the geometry of the conveyance swale through the fairgrounds parking lots.

Another goal of this amendment was to determine whether the proposed water surface elevation could be sufficiently lowered by maximizing flow across US Route 11 to effectively negate the need for a benched floodplain and reduce construction costs.

The analysis was coordinated with agencies including PennDOT to ensure a permittable, coordinated approach which will eliminate induced flooding expected from the proposed levee system.

The following tasks were completed for the hydraulics 2D Analysis of Fishing Creek within the limits of the project:

- A refined geometric mesh to establish additional detail in the model to the render appropriate detail for the detailed 2D model runs.
- Boundary condition assignments were corrected.
- Corrected coding of hydraulic structures and controls within the model domain.
- Refined inlet coefficients for the proposed Route 11 culverts.

This second addendum to the Columbia County West End Flood Mitigation Study Final Report expands on the 2D hydraulic modeling analysis of Addendum No. 1. Efforts in Addendum No. 2 primarily focused on further development of mitigation alternatives to minimize induced flooding caused by the base flood on insurable structures along Drinker Street in Hemlock Township. 2D hydraulic models developed for Addendum No. 1 were used as a starting point for the work in Addendum No. 2. In addition to the induced flooding and channel hydraulics analyzed in Addendum No. 1, the work performed in Addendum No. 2 also included sediment transport analyses to determine if excessive deposition or erosion might occur under various mitigation alternatives.

While developing mitigation alternatives, a change was made to the existing conditions model described in Addendum No. 1. The normal depth downstream boundary condition on the Susquehanna River was moved approximately 1,330 ft upstream away from a flow split to a location where the normal depth assumption is more appropriate and the model is more stable (Figure 2.1). This relocated boundary condition was used in 2D hydraulic models of both existing conditions and mitigation alternatives for Addendum No. 2.

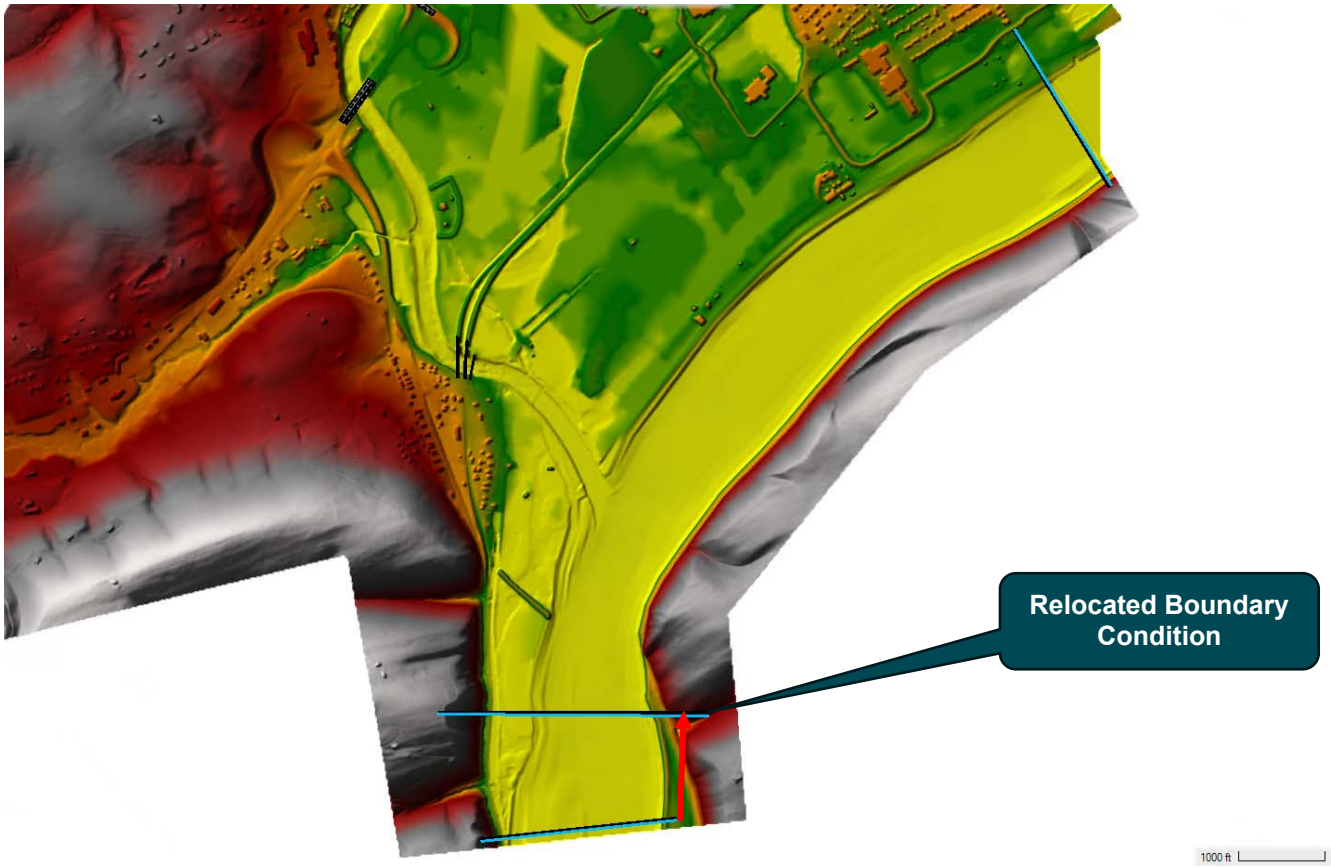



Figure 2.1 – Relocated Boundary Condition

After analyzing numerous mitigation alternatives, a combination of several features was found to be capable of eliminating induced flooding, caused by the base flood, of structures on Drinker Street. This combination of features is addressed in the following sections.

## 2.1 Summary of Mitigation Alternatives

Preferred Alternative No. 7 from the previous study phase was carried over to this study to be refined with the goal of eliminating the residual induced flooding at several properties in Hemlock Township. The mitigation features presented in Alternative No. 7 were reevaluated for effectiveness, resiliency, cost, and favorability by stakeholders. A brief summary of the mitigation features and corresponding modifications to the Alternative No. 7 conditions is provided on the following page. Each feature is discussed in greater detail in the subsequent sections of this report.

- Benched Floodplain

  **Description:** Graded bench approximately 3,000 linear feet in length along the right bank of Fishing Creek extending from the Railroad Street bridge downstream to approximately the lower extent of the existing islands
  **Change from Previous Study Phase:** Bench elevation raised above 2-year flood elevations to avoid severe deposition and impairment of function over time.

- Existing Island Removal/Channel Narrowing

  **Description:** Removal of the existing islands and the addition of an attached gravel bar on the right bank of Fishing Creek eliminates flow obstruction and maintains velocities and sediment bearing capacity through the reach.
  **Change from Previous Study Phase:** NEW

- Elimination of Relief Culverts

  **Description:** Series of concrete box or arch culvert situated under US Route 11 to facilitate floodplain connection while maintaining existing roadway grade.
  **Change from Previous Study Phase:** Culverts were eliminated due to concerns surrounding effectiveness, cost, operation, and maintenance.

- Lowering of US Route 11

  **Description:** Highway lowered by approximately 1-foot at a fraction of the cost of the relief culverts and allows a far greater volume of water to reach the floodplain.
  **Change from Previous Study Phase:** NEW

- Broad-Based Swale:

  **Description**: Swale conveys flow from Fishing Creek into the floodplain where flows and velocities are dispersed and ultimately returned back to the Fishing Creek channel downstream.
  **Change from Previous Study Phase**: Grading downstream of US Route 11 modified to draw a greater volume of flow over the highway and into the floodplain.

- Diversion Berm

  **Description:** Earthen berm graded, as necessary, to divert flow around the Barn at Boone's Dam and prevent induced flooding resulting from the increased flow through the fairgrounds parking lot
  **Change from Previous Study Phase:** NEW

The combination of these mitigation feature refinements constitutes Alternative No. 8 as the final proposed design alternative completed under this study. It builds upon the concepts developed in the prior phase of the study and presents a working alternative capable of achieving the stated goal of zero induced flooding on insurable structures outside of the flood mitigation system. Figure 2.7 depicts the conceptual levee alignment and mitigation features.

Figure 2.2 displays a profile of Fishing Creek that shows how these mitigation alternatives lower the water surface elevation of Fishing Creek below existing conditions on insurable structures. Figure 2.3 depicts 2D induced flooding elevations along Drinker St and shows no induced flooding on insurable structures.

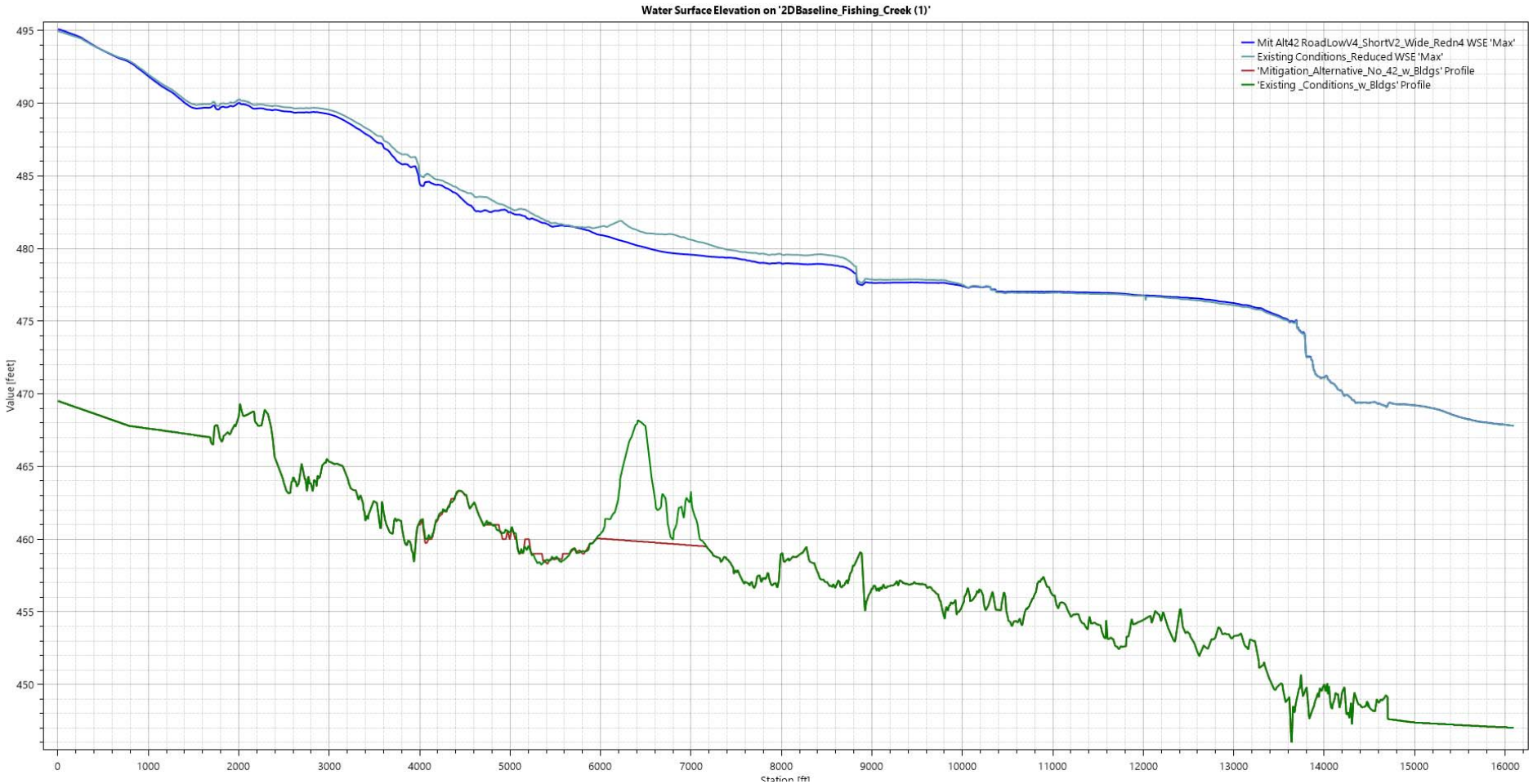



Figure 2.2 – Profile Depicting Mitigated Induced Flooding for the Base Flood

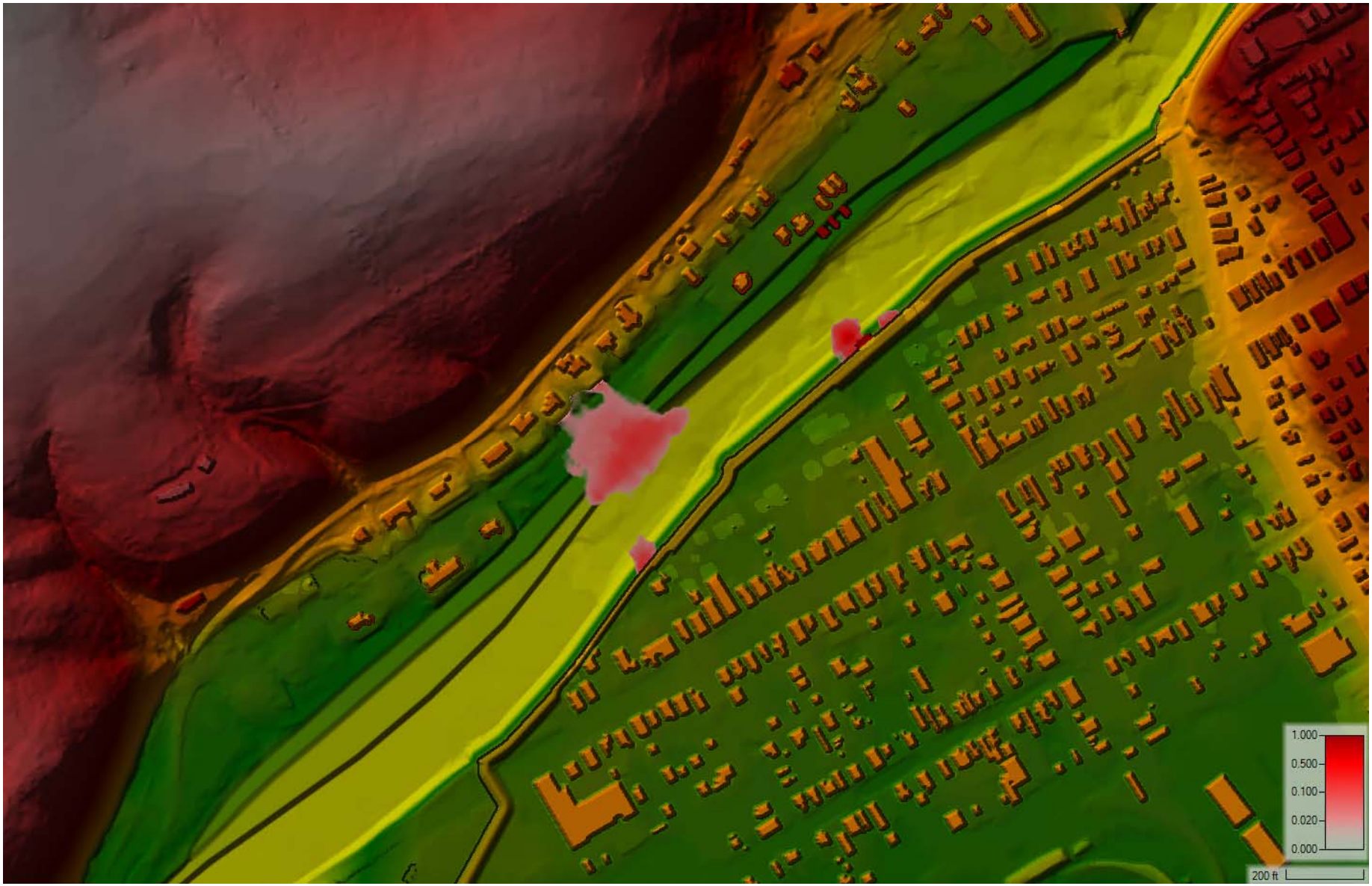



Figure 2.3 – Induced Flooding Mitigated on Insurable Structures

## 2.2 Benched Floodplain

Development of these mitigation alternatives began with Mitigation Alternative 7 from Addendum No. 1 as the baseline condition. While Mitigation Alternative 7 nearly eliminates induced flooding along Drinker Street, the low elevation of the proposed benched floodplain is a concern for sediment deposition within the channel. Sediment deposition over time would reduce the conveyance capacity of Fishing Creek and impact the long-term resiliency of the project. For the Addendum No. 2 analysis, bedload samples were collected and an effective discharge analysis was performed to determine an appropriate benched floodplain elevation to reduce the potential for deposition either on the bench or within the channel. The benched floodplain was modified to slope downstream at an elevation just above that of the effective discharge, which roughly corresponds to the 2-year flood. This approach substantially raises the elevation of the benched floodplain compared to Mitigation Alternative 7, a 4 foot depth versus 11 foot previously. Additional mitigation measures are still required to eliminate all of the induced flooding. The benched floodplain was also narrowed in certain areas compared to the Mitigation Alternative 7 approach to increase conveyance and flood storage with the higher benched floodplain elevation. Figure 2.4 shows a cross-section of the current benched floodplain compared to existing conditions and the Mitigation Alternative 7 benched floodplain.

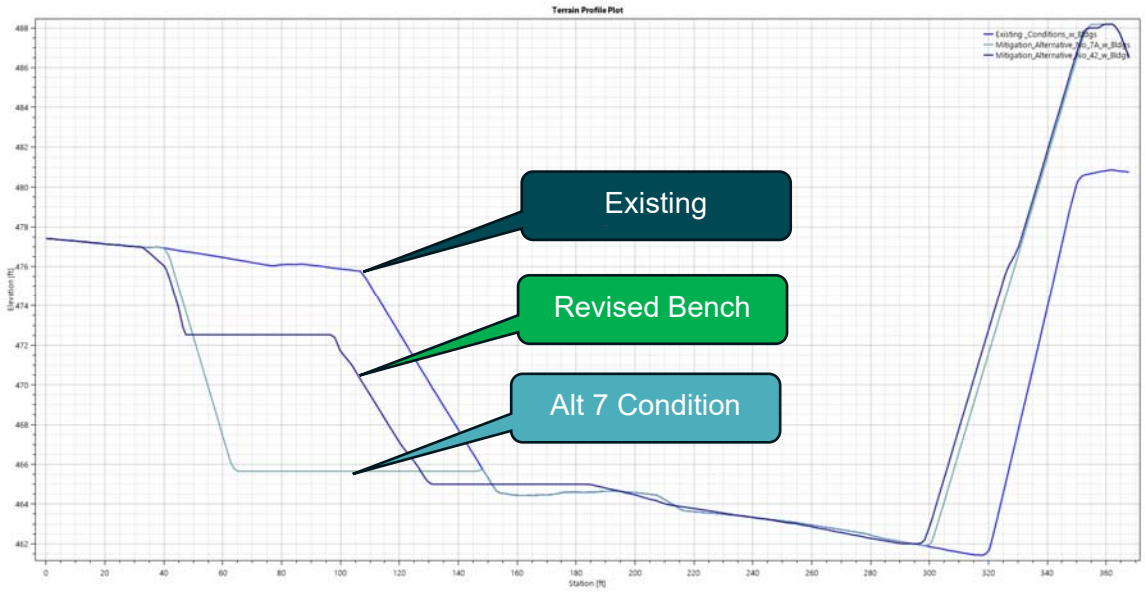



Figure 2.4 – Comparison of Benched Floodplain Geometry

## 2.3 Island Removal

Induced flooding upstream of the existing islands in Fishing Creek persisted at the conclusion of the previous study phase and in Addendum No. 1. The existing islands occur at a location where Fishing Creek widens, resulting in the response of sediment deposition to effectively narrow the channel width. The presence of the islands contributes to induced flooding of insurable structures along Drinker Street, and removal of the islands was found to increase capacity in the channel and resolve much of the residual induced flooding identified in Addendum No.1.

Upon removing the islands, Fishing Creek must be intentionally narrowed in this location to maintain an adequate sediment transport capacity for long term resiliency of the project. Sediment transport

analyses found that a channel width of roughly 150–165 feet at the location of the existing islands should reduce the potential for severe aggradation and encourage bed load materials to move through the reach. This effective width was achieved by adding an attached bar to the right bank of Fishing Creek in the vicinity of the islands at an elevation reflective of the existing island elevation. Additionally, channel banks were modified and the channel bed was regraded to slope downstream in the area where the islands are currently inducing an adverse slope. Figure 2.3 shows a plan view of Fishing Creek geometry with the islands removed, attached bar added, and regrading of the channel bed and banks. The profile in Figure 2.2 shows how the bed is to be regraded after removing the existing islands.

## 2.4 State Route 0011 Modifications

US Route 11 parallels Fishing Creek downstream of where the proposed levee along the left bank of Fishing Creek turns and crosses the roadway. For any flooding greater than the 10 year event, Fishing Creek overtops US Route 11 directly above the Bloomsburg Fairgrounds parking lot (See Figure 7).

In this analysis and the previous Addendum No. 1 analysis, many types and configurations of culverts were analyzed in an effort to increase conveyance from Fishing Creek to the floodplain on the southerly side of Route 11 while maintaining the existing roadway elevation. The location of the culverts was chosen based on the high velocities in this area predicted by the model and because of the historical damages to the homes at this location during Tropical Storm Lee which led to their demolition in 2012. The culverts were proposed to mitigate induced flooding between Railroad Street and the PA Route 42 Bridge by increasing the conveyance of higher flood flows from Fishing Creek to the downstream floodplain. See Figure 2.5 below.

The original analysis evaluated the benefit of constructing 7 low-profile concrete arch culverts oriented to the direction of overbank flow. However, a sensitivity analysis conducted in the latest phase of the study determined that upwards of 10 culverts would be required to achieve the necessary reduction in induced flooding. Figure 2.5 below depicts a typical series of reinforced concrete box culverts similar to what was modeled for this alternative.

Figure 2.5 – Typical Concrete Box Culverts in Series

The length of the series of culverts under US Route 11 would necessitate reconstruction of the highway and adjacent land areas. Implementation of the culvert alternative would require extensive traffic control measures and significantly increase the frequency of flooding in the fairgrounds parking area without also including mechanical gates or automatic tipping buckets. The adoption of this alternative was deemed to be cost prohibitive and inefficient in that only one-quarter of the total flow crossing US Route 11 would be routed through the culverts during the base flood, whereas three-quarters continue to overtop the highway. This approach was excluded from further consideration in favor of a proposal to lower the elevation of the highway.

The most impactful parameter, in terms of quantifiable influence on induced flooding, is the elevation of the road surface of State Route 0011. Figure 2.5 displays the existing and proposed roadway embankment profiles for SR 0011 utilized in the 2D hydraulic modeling.

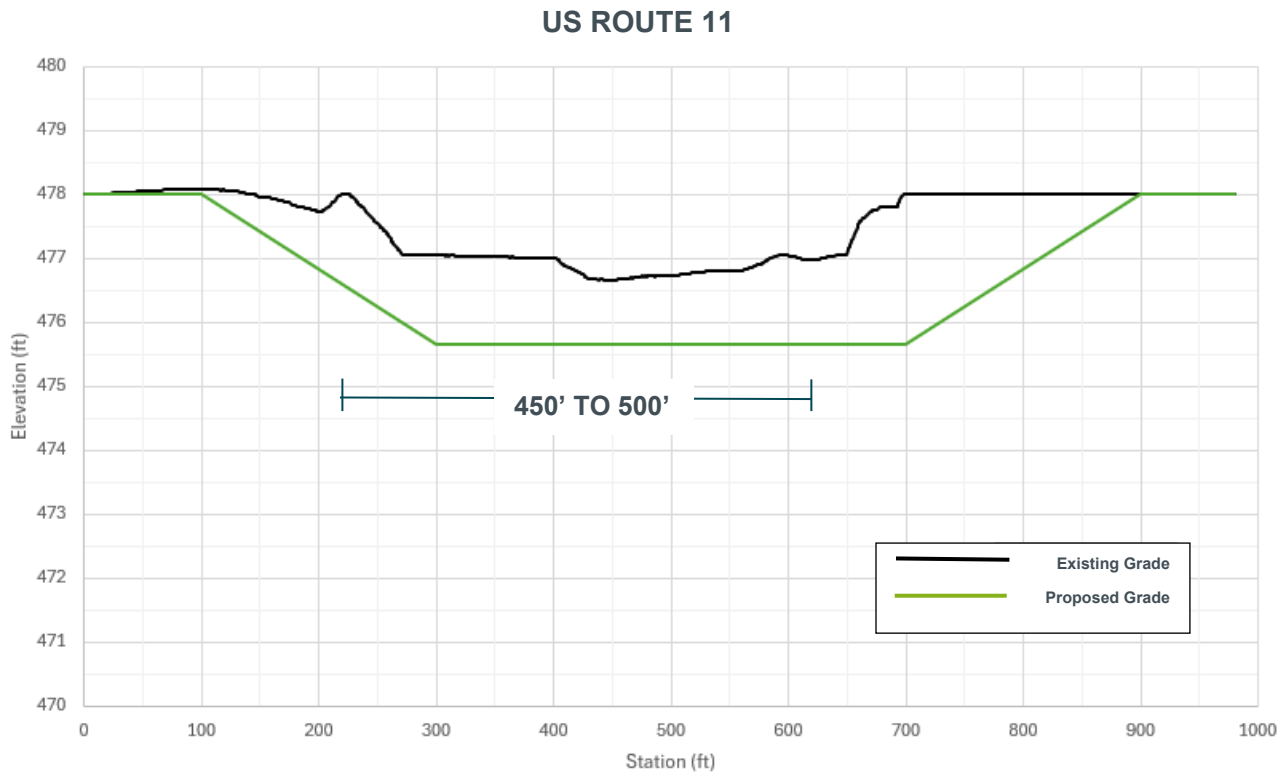



Figure 2.5 – US Route 11 Reprofiling

Lowering SR 0011 by approximately 1-foot accommodates more flow from Fishing Creek, helping to counteract the additional flow contained in Fishing Creek by the levee's presence along the left bank of the channel. For the base flood, lowering SR 0011 proves to be much more cost-effective and hydraulically-efficient than culverts under US Route 11. With the proposed lowering of the roadway, US Route 11 is predicted to overtop at flows near the 10-year flood events under both existing and proposed conditions. The reduction in water surface elevations resulting from the lowering of US Route 11 was not of a sufficient magnitude to permit elimination of the benched floodplain. Therefore, both mitigation features are required to achieve the 'zero rise' goal.

## 2.5 Broad-Based Swale

While the Bloomsburg Fairgrounds parking currently floods during events equal to and greater than the 10-year recurrence flood under existing conditions, the lowering of US Route 11 is expected to convey more flow through the fairgrounds parking lot under proposed conditions. A broad-based, shallow swale through the parking lot improves the hydraulics and serves as a final mitigation measure to accommodate the flooding through the fairgrounds parking lot and thus eliminate induced flooding in Hemlock Township along Drinker Street. Many swale concepts were tested as part of Addendum No. 2. Swale concepts were incrementally deepened and widened until induced flooding was eliminated on insurable Drinker Street structures. All swale concepts meet ADA side slope requirements within the fairgrounds parking area, maintaining suitability for parking vehicles and turf maintenance. Figure 2.6 displays a plan view of the swale concept.

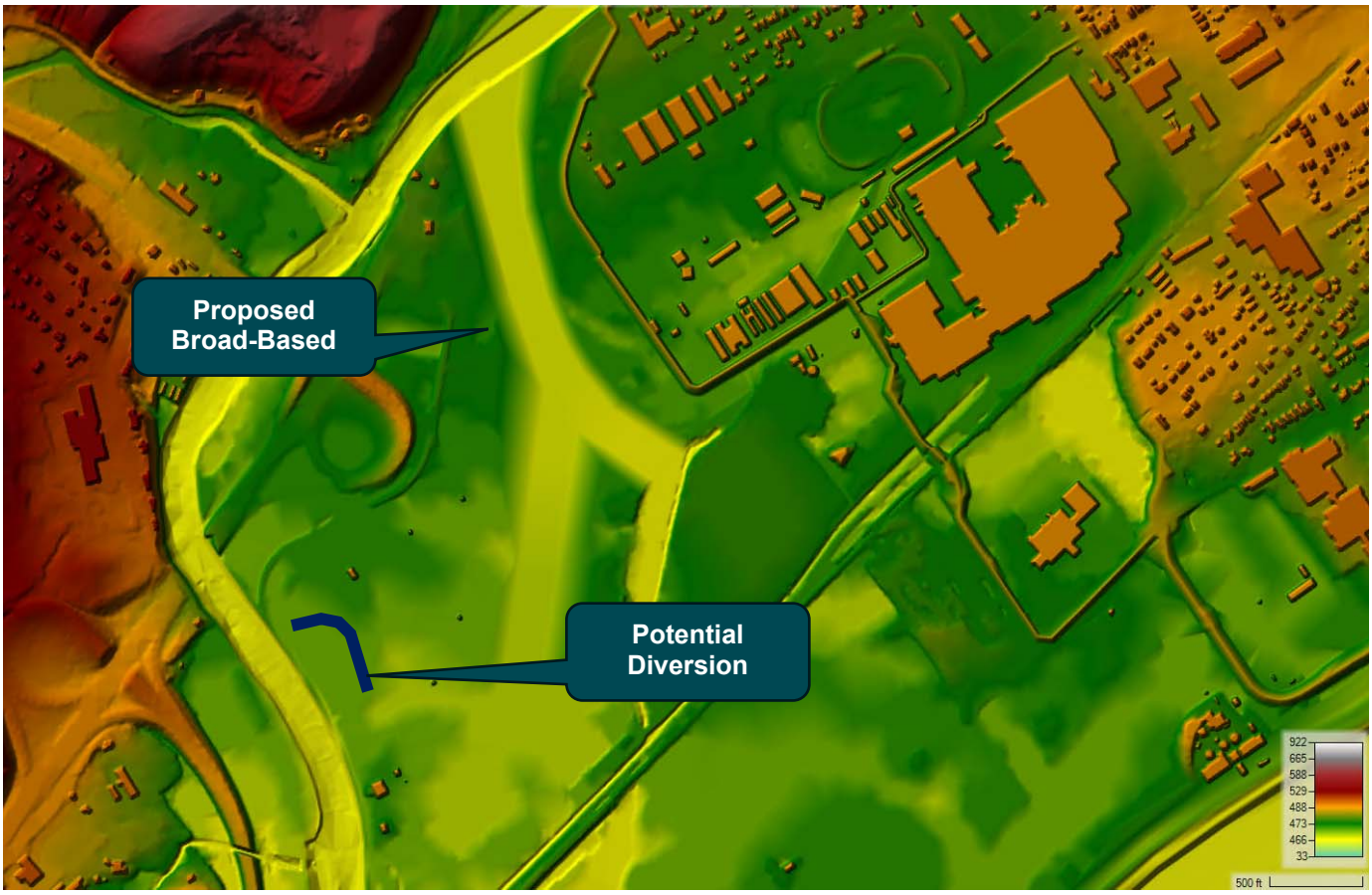


Figure 2.6 – Swale Concept Through Fairgrounds Parking Lot

## 2.6 Diversion Berm

Due to the additional flow through the fairground parking lot under mitigation project conditions, a minor amount of induced flooding was identified to impact the Barn at Boones Dam at the far downstream limits of the fairgrounds property adjacent to Fort McClure Boulevard. An earthen berm may be utilized here to divert flood flows originating from the overtopping of SR 0011 and eliminate induced flooding on this property. The necessary height and extents of this berm should be confirmed during the design phase of the project. The plan view in Figure 2.6 includes an example of this earthen diversion berm.

In summary, the proposed levee along Fishing Creek causes induced flooding during a recurrence of the base flood event along Drinker Street in Hemlock Township. Advanced 2D hydraulic modeling was used to analyze mitigation alternatives with the objective of eliminating induced flooding of structures in these areas. No single mitigation measure is able to eliminate induced flooding on its own; however, the combination of a benched floodplain, replacement of the existing islands with a bank-attached gravel bar, topographic adjustments to bank locations and channel widths, lowering of SR 0011, grading a swale through the Bloomsburg Fairgrounds parking lot, and potential construction of a berm on the Bloomsburg Fairgrounds property near the downstream extent of the swale are able to, in combination, eliminate induced flooding for the base flood while reducing the potential for severe sediment deposition and maximizing resiliency of the mitigation project.

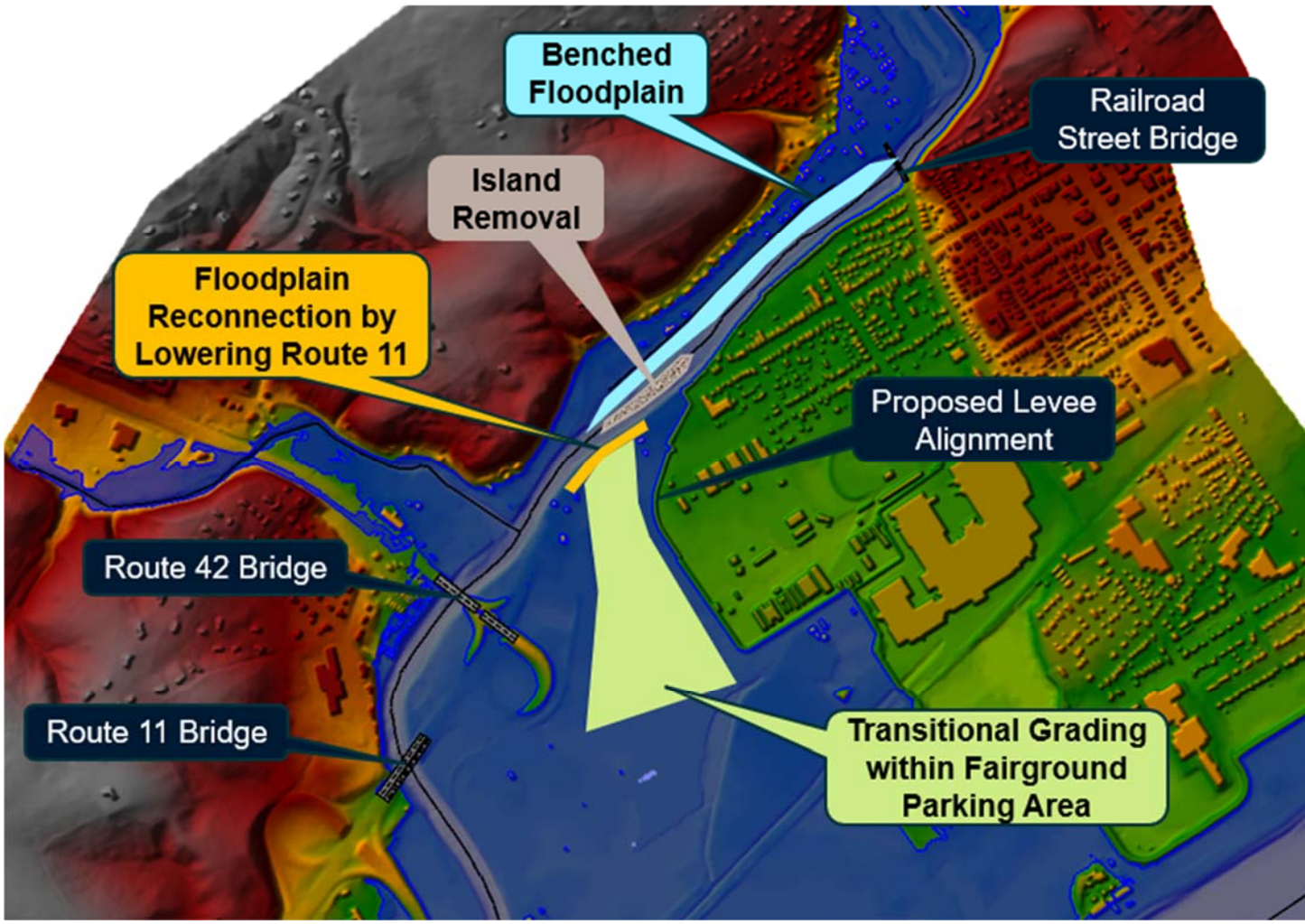



Figure 2.7 – Overview of Full Mitigation Build-Out and Conceptual Levee Alignment

# 3. Geotechnical Investigations / Exploratory Drilling

The proposed geotechnical investigations under the scope of work for this Amendment No. 2 work were based on the deep excavations which would be required for the culverts under Route 11 and the benched floodplain along Drinker Street on the Hemlock Township side of Fishing Creek.

The final recommendation for eliminating the culverts under Route 11 and instead, lowering Route 11 by approximately one foot, and the higher elevation for the benched floodplain along Drinker Street, four (4) feet below grade versus the previously recommendation of 7 to 9 feet, eliminated the need for subsurface explorations until the preliminary design stage. Therefore, no work was performed under this task.

# 4. Levee Alignment Refinement / Channel Plans / Sections

The proposed levee alignment and mitigation concepts were refined to eliminate ~4-inches of induced flooding impacting 2 homes on Drinker Street in Hemlock Twp. The work included typical sections for inclusion into the 2D model and adjustments to the alignment for successive model runs to mitigate the induced flooding to zero in combination with lowering of the Route 11 highway.

Sections were developed for the channel modification. This work was done concurrently with the 2D modelling to provide the input data for the model runs. Quantities were generated to develop cost estimates for the induced flooding mitigation portion of the proposed levee and floodwall project.

# 5. Stakeholder Outreach

Hemlock Township was consulted to verify their requirements for the entry onto parcels to perform general investigations. Also, discussions were held concerning the proposed mitigation system features, changes to parcels along Fishing Creek, permits required, possible changes to their floodplain ordinance to allow a levee project to proceed, and coordination on which homes may be mapped into the SFHA and other mitigation actions.

The Town of Bloomsburg will be consulted during the preliminary engineering phase to coordinate and solicit feedback on the proposed mitigation features within the Town.

# 6. FEMA Coordination

Coordination with FEMA was not considered necessary since the assumptions and approach developed in the Amendment No. 1 H&H analysis remained valid for this analysis.

FEMA coordination will be required during the project preliminary design phase to develop the conditional letter of map revision (CLOMR).

# 7. PennDOT Coordination

The proposed lowering of US Route 11 will require a highway occupancy permit (HOP) from PennDOT District 3-0. The proposed mitigation of flood flows will require a revision to the profile of the roadway and a traffic control run-around for the staged construction. The goal will be documentation of acceptance by PennDOT of the roadway revisions which will facilitate issuance of an HOP for construction during the design stage.

Several coordination meetings were facilitated between PennDOT District 3, Columbia County, Verdantas, and SEDA-COG to discuss the viability of the highway lowering concept. Columbia County is seeking a conditional letter of no objection from PennDOT regarding the highway lowering.

See Appendix A for correspondence with PennDOT regarding the conditions for the deign issues and the required HOP submission documents during the preliminary design stage.

# 8. Environmental Studies/Permitting Requirements

Verdantas performed initial coordination with all agencies responsible for the approval and permitting of the project during the previous phases of the West End study.

The environmental investigations conducted for this work included wetland investigations and field reconnaissance, the Pennsylvania Natural Diversity Index (PNDI) for review of species of special concern, and initial PHMC coordination through PASHARE application web site, all to determine potential environmental impacts for project regulatory authorizations. The wetland investigation report and initial PNDI response letters are provided in Appendix B to further studies in design/permitting phase. A Phase I ESA has not been conducted at this time.

The following potential impacts are noted for further study during the preliminary design phase.

## 8.1 Threatened and Endangered Species (PNDI/IPaC)

A PNDI receipt (PNDI-848938) was run for the revised footprint of the project on 9/19/2025, indicating a few updates from the previous studies. The PA Fish and Boat Commission (PFBC) produced a potential impact to the Triangle Floater, a special concern species. The PA Game Commission (PGC) resulted in a conservation measure to defer coordination with the U.S. Fish and Wildlife Service (USFWS), who determined that the project is in the range of the federally listed northern long-eared bat and the federally listed Indiana bat. The project was then directed to be entered into IPaC. After completing the Determination Keys in IPaC on 9/19/2025, it was determined that a result of Not Likely to Adversely Affect (NLAA) for the Northern Long-eared Bat and Indian Bat would occur from the project. However, a determination of ‘May Affect’ did result in the Green Floater, a proposed threatened mussel species, and the Northern Bulrush, an endangered wetland/watercourse plant species. Copies of the PNDI and IPaC technical assistance letters are included for reference.

## 8.2 Cultural/Archeological Resources

The project initiation portion of this task involved consultation with the Pennsylvania Historic and Museum Commission (PHMC)/State Historic Preservation Office (SHPO) by completing the PA-SHARE template for initiating a new environmental review project. ER Project #2021PR06578.001

and #2021PR06578.002 were issued letters (attached) by PHMC on 11/8/2021 that are still valid and requires the following:

A Phase 1A archeological investigation is recommended to assess the potential of the project area to contain archeological resources. If this research suggests that potentially significant archaeological resources may be present, PHMC will most likely request that a Phase I archaeological testing plan be developed to identify such resources. The Phase 1A investigation effort will involve desktop research, field reconnaissance, and a report.

PHMC requested a survey methodology be provided for above ground resources as well. At a minimum to begin consultation, a survey methodology for above ground resources must be provided to determine the known historic resources that are within the various direct/indirect APEs, the types of resources that may be found in said areas, and photo documentation with current and historic aerials to show the areas that may need survey, etc.

# 9. Rights-of-Way / Property Acquisition Requirements

A parcel map was developed to initiate discussions with the Town of Bloomsburg and Hemlock Township concerning property owners impacted by the proposed project. The project team reviewed possible acquisition requirements of several residential structures and several garages/sheds needed for the proposed levee footprint and mitigation features.

A residential structure in Bloomsburg located on US Route 11 (West Main Street) is situated west of the Bloomsburg University parcel, outside of the proposed line of protection. It will not be a required acquisition to accommodate the proposed levee footprint; however, the home is recommended for acquisition due to the high creek velocities during flood events that could impact this home. Early coordination with this property owner should be a priority during preliminary design.

Coordination with Hemlock Township will be required to investigate acquisition of easements along Fishing Creek for construction of a benched floodplain. No full acquisitions are contemplated in this area. The easements are on parcels previously purchased by Hemlock Township under the HDBG program. Several private properties still in private hands will require a strip easement adjacent to the creek to accommodate the proposed benched floodplain.

# 10. Public Involvement

A public information meeting was held on November 20, 2025 to inform the general public and elected officials of the recommended mitigation features and the proposed levee alignment. The project proposals related to property acquisitions or easements and implementation of the mitigation project were also discussed. A copy of the presentation is included in Appendix C.

# 11. Opinion of Probable Construction Cost

An opinion of probable construction costs for the mitigation features was developed utilizing cost data from recent levee construction projects in Bloomsburg, PA. The construction cost summary is shown below.

| | | |
|---|---|---|
| General | $ | 405,000 |
| Benched Floodplain | $ | 770,000 |
| Stream Channel Realignment | $ | 1,360,000 |
| Lowering US Route 11 | $ | 1,066,000 |
| Utilities | $ | 65,000 |
| Swale through Fairgrounds Parking Lot | $ | 947,000 |
| Sub-Total | $ | 4,613,000 |
| 15% Contingency | $ | 692,000 |
| Total Construction Costs (Yr. 2027) | **$** | **5,455,000** |

# 12. Analysis Summary

The floodway of Fishing Creek in the West End study area is situated such that a proposed levee system would be constructed entirely within the regulatory floodway along the left descending bank downstream of Railroad Street. Results of the 2D proposed conditions modeling performed in the Amendment No. 1 work indicated that the water surface elevation (WSEL) of the base flood increases by as much as 2.1 feet when a levee is constructed along the bank of Fishing Creek without mitigation features. Without mitigation of the induced flooding, the residential areas in Hemlock Township adjacent to and upstream of the proposed levee would experience a greater risk of flooding because these areas would not be protected by the proposed levee.

The Addendum No. 2 engineering analysis refined the alternatives proposed in the previous work and developed a new alternative to eliminate the series of culverts beneath US Route 11 previously proposed with a lowering of the roadway profile by approximately one foot over a 450 foot length of US Route 11. The mitigation system chosen in this Addendum No. 2 work includes the following components:

- A four foot deep benched floodplain to increase conveyance capacity from the Railroad Street bridge for a distance of 3,300 feet downstream where two islands exist in the stream.
- The removal of existing islands in fishing creek and modifications to the channel width in this area to prevent future aggradation and island reestablishment.
- A lowering of State Route US Route 11 is proposed to facilitate high flood flows to cross Route 0011 The intent of this mitigation alternative is to accommodate higher (Greater than 10 year flood) Fishing Creek flows within the area where twelve (12) homes were acquired and demolished after the Storm Lee flooding of 2011.

- A variable depth swale through the Fairgrounds parking lots, eventually emptying into Fishing Creek approximately 4,000 feet downstream. The swale will accommodate the out of bank flows from Fishing Creek that cross the lowered stretch of Route 11.

  The recommended mitigation project will reduce the 2.1 feet of induced flooding predicted in the original West End Flood Mitigation Study to a zero increase for the base flood condition.

  The estimated cost for construction of the project in 2027 is $5,455,000.

  Acquisition and/or demolition will be required for several homes that will be impacted by the alignment of the proposed floodwall and earthen levees.

# APPENDIX A

PennDOT District 3-0 Correspondence

verdantas

# Columbia County West End Flood Study Meeting Minutes

| | |
|---|---|
| **Meeting Date** | September 8, 2025 |
| **Meeting Location** | Microsoft Teams |
| **Subject** | Columbia County West End Flood Study_PennDOT D-3 Meeting |
| **Project Number** | 031.0000019265 |

## Attendees:

**Verdantas**
- Clint Sorber
- Tom Lawson
- Chad Morris
- Stephen Adams
- Josh Dolphin

**Columbia County**
- Chris Anderson

**SEDA COG**
- Angie Hunselman

**PennDOT**
- Michael Benson
- Cameron Crawford
- Michael Bender
- Justin Blakeney
- Gerald Wertz
- Michael Mausteller
- Aaron Crist
- Michael McWilliams
- Cory Kodish
- Gregory Dibble
- Mindy Foresman
- Lloyd Ayres
- Kenneth Bair
- Renee Hughes

## Discussion Points:

1. **Project Background and Overview:**
    - The project focuses on flood mitigation for the West End of Bloomsburg, particularly the impacts of flooding from the Susquehanna River and Fishing Creek.
    - The study began in 2021 and is now in its second phase, addressing flooding issues experienced since the record flood from Tropical Storm Lee in 2011 and most recently in 2018.
2. **Proposed Flood Mitigation Solutions:**
    - The proposed solution involves constructing a levee system along Fishing Creek, including a combination of earth levee and sheet pile flood wall.
    - The project also includes a closure structure across Route 11 to mitigate flash flooding from Fishing Creek.
    - Additional mitigation measures include creating a bench floodplain along the right bank of Fishing Creek, lowering SR 0011 by approximately 1 foot, and grading a Swale through the fairgrounds parking lot to increase flood conveyance capacity.
3. **Coordination with PennDOT:**
    - The team discussed the need to coordinate with PennDOT regarding the proposed reprofiling of Route 11 to increase the volume of flow over the highway during overtopping conditions.
    - The proposed solution involves lowering the low point of the roadway by up to 1 foot and extending the low point for approximately 450 feet to maximize the volume of water that can flow over the road during a high water event. SR 0011 can be expected to overtop approximately once every 8-10 years with the proposed profile compared to an overtopping frequency of 10-years (10% AEP) for the existing profile.
    - Flood flows were developed by Verdantas by analyzing the USGS stream gage located upstream of the project area. Statistical methods were used to determine flows corresponding to various recurrence intervals. (e.g. 2-yr, 10-yr, 50-yr, 100-yr flows)
    - Flood response and erection of the proposed closure structure would be required several feet in advance of flood waters reaching the sill elevation of the closure due to the flashy nature of Fishing Creek. For this reason, closure of Route 11 may be initiated due to activation of the levee system even before water begins to flow over the highway at the lowered elevation.

- The team also discussed the need for an emergency action plan to coordinate the closure of Route 11 during flooding events.

4. **Discussion on Roadway Profile and Drainage:**
    - PennDOT asked about drainage patterns with and without the proposed closure structure and what changes are proposed with the lowered profile.
    - The team highlighted the need to develop cross sections of the proposed roadway profile and drainage solutions before the next meeting. PennDOT also requested information on resiliency design of the roadway section.
    - The preferred cross section would consist of a flat longitudinal slope and a superelevated roadway where required. This section eliminates curbing and consists of a constant sloping grade towards the proposed fairgrounds parking lot swale.
    - An alternative cross section will be developed for the condition in which curbing and undulating longitudinal slopes are required along the curb for drainage.
    - A relocation of Fort McClure Blvd is under design by others. The conceptual plan shows the existing intersection with SR 0011 being shifted north by approximately 400 feet. Verdantas will coordinate with the designer and the county to ensure a seamless integration between the two projects.
5. **Schedule & Stakeholders**
    - A question regarding project schedule was asked. An RFP for design is currently being developed by SEDA-COG on behalf of the County. A determination of the feasibility of the proposed flooding mitigation is critical to advancing the schedule. The county hopes to have a consultant begin design by January 2026.
    - A question about the project's lead sponsor was asked. Columbia County is the lead sponsor, but there are many stakeholders including, PennDOT, the Bloomsburg Fair Association, the Town of Bloomsburg, Hemlock Township, and property owners.
    - USACE, FEMA, and DEP were all consulted during the original study phase. Agency coordination will continue through design, permitting, and CLOMR process.
6. **Next Steps:**
    - The team will develop and share draft roadway profiles and cross sections with PennDOT for review.
    - A follow-up meeting will be scheduled in three to four weeks to discuss further details and finalize the proposed solutions.

- The team will continue to refine the hydraulic and hydrologic modeling to ensure the proposed solutions effectively mitigate flooding impacts.

## Action Items

1. **Verdantas**
    - Develop and share draft roadway profiles and cross sections with PennDOT.
    - Provide a description of resiliency measures to be implemented in design.
    - Continue refining the hydraulic and hydrologic modeling.
2. **PennDOT**
    - Review the draft roadway profiles and cross sections once shared.
    - Schedule a follow-up meeting in three to four weeks.
    - Provide feedback on the proposed solutions.

***Minutes prepared from transcript by AI and reviewed/edited for accuracy***

Respectfully submitted by:

**Clint Sorber, PE, CFM**
Senior Project Manager, Verdantas
Email: csorber@verdantas.com
Office: 570.218.9362

verdantas

# Columbia County West End Flood Study Meeting Minutes

| | |
|---|---|
| **Meeting Date** | October 14, 2025 |
| **Meeting Location** | Microsoft Teams |
| **Subject** | Columbia County West End Flood Study_PennDOT D-3 Meeting |
| **Project Number** | 031.0000019265 |

## Attendees:

**Verdantas**
- Clint Sorber
- Tom Lawson
- Stephen Adams
- Melissa Luna

**Columbia County**
- Chris Anderson

**SEDA COG**
- Tyler Dombroskie
- Angie Hunselman

**PennDOT**
- Michael Benson
- Cameron Crawford
- Michael Bender
- Justin Blakeney
- Gerald Wertz
- Michael Mausteller
- Aaron Crist
- Michael McWilliams
- Cory Kodish
- Gregory Dibble
- Mindy Foresman
- Lloyd Ayres
- Kenneth Bair
- Renee Hughes
- Joseph Lyons
- Josephine Beaver

## Discussion Points:

### 1. Purpose & Context

- The meeting began with thanks for the collaboration and the useful bulleted list of review items provided by PennDOT, which will guide future submissions and design reviews. This bulleted list is attached to these meeting minutes.
- The project is currently in the **study phase**, aiming to identify any fatal flaws before moving into design. The goal is to avoid surprises and ensure feasibility before advancing with an RFP for design services.
- The area experienced record flooding in 2011, with floodwaters reaching six feet deep on Route 11.
- The approach is unique and requires careful coordination and input from all parties.

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### 2. Project Status and Recent Submissions

- Following the previous meeting, the team submitted a draft profile, possible cross section alternatives, and resiliency measures for PennDOT's review.
- PennDOT confirmed that, at this stage, there are no hard objections to the concept, but additional information is needed before a conditional "yes" can be given to the concept. The focus is on collaboration to resolve feasibility concerns.

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### 3. Flood Mitigation Alternatives

- The proposed mitigation involves lowering SR 0011 for 400–500 feet and creating a swale through the fairgrounds parking lot to allow floodwaters to traverse and re-enter Fishing Creek downstream.
- This alternative mitigates nearly 100% of the modeled two-foot rise in base flood elevation, with an estimated cost of $4–4.5 million, compared to $6–7 million for the culvert option.
- Additional features include a benched floodplain along Fishing Creek to increase channel capacity.

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### 4. Project Coordination and Ownership

- **Columbia County Water Mitigation Authority** (headed by Chris Anderson) will maintain the flood mitigation project.
- The Authority is independent of the county, governed by its own board, and has long-term obligations for maintaining flood control projects.

- Columbia County will be the applicant and permittee for the HOP (Highway Occupancy Permit), eventually transferring maintenance to the Water Mitigation Authority.

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**5. Funding Sources**

- Approximately $6.5 million in state and federal grants have been secured for mitigation efforts.
- Funding includes economic development grants (DCED) ($4.5 million), contributions from Luzerne County Flood Protection Authority, and a federal LPDM grant from FEMA ($1.75 million).
- The majority of funds are from the DCED grants. Grant line items are attached to the meeting minutes.

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**6. Permitting and Regulatory Agencies**

- Permitting will be through a Chapter 105 Joint Permit with DEP and the Army Corps of Engineers, plus an NPDES permit via the County Conservation District.
- A Conditional Letter of Map Revision (CLOMR) will be submitted to FEMA.
- The project is locally led, not agency-directed, with DEP and the Corps reviewing for compliance and environmental impact. This approach was utilized on the two successfully completed flood mitigation systems in the Town of Bloomsburg.

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**7. Design Criteria and Coordination**

- Previous Corps of Engineers flood studies and FEMA effective design flows are being referenced for Geotech and H&H data. The referenced USACE study does include a levee along the right bank of Fishing Creek in Fernville. *(The Town of Bloomsburg, Columbia County Pennsylvania Flood Damage Reduction Project Draft Integrated Feasibility Report and Environmental Impact Statement, April 2005)*
- Coordination is ongoing with the consultant for the proposed Fort McClure Blvd. intersection relocation to avoid project conflicts.
- Verdantas' preferred cross-section is a super-elevated roadway without a curb (Option 1 in previously provided typical sections). This section is preferred due to concerns of being able to direct surface runoff to inlets without creating a "roller coaster" condition. Also, the preferred hydraulic condition along Fishing Creek is to maintain a constant low point when the roadway is overtopped thus functioning as a weir.
- Design will follow PennDOT's 4R reconstruction criteria, as outlined in DM 2.

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### 8. Sidewalks and Pedestrian Considerations

- The requirement for sidewalks was discussed, given low pedestrian use and previous home buyouts.
- If retained, the sidewalk may be relocated and redesigned for ADA compliance and stormwater management.
- Final decision will involve coordination with Bloomsburg and a possible pedestrian study.

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### 9. Structures, Hydraulics, and Utilities

- Foundation investigations, design calculations, and utility impacts will be addressed during design.
- Utility locations will be confirmed in the SR 0011 reconstruction area, and special design will ensure sealing of utility lines at the closure structure for high water events.
- Overtopping frequency is estimated to be about once every nine to ten years. Study of past event hydrographs and sediment transport analysis for the stream is underway.

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### 10. Traffic Control and Right-of-Way

- Two lanes of traffic must be maintained during construction. Traffic control plans, right-of-way plans and easements plats will be required.
- Most parcels are owned by Bloomsburg due to previous buyouts. A few private parcels will require easements or buyout.
- Surveyors are currently verifying property boundaries.

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### 11. Emergency Action and Closure Plans

- No current written plan for closure of Route 11 due to flooding. A  standard detour is used.
- A written emergency action plan will be developed. It will include coordination with PennDOT, Columbia County, and the Town of Bloomsburg.
- Reference was made to Danville’s closure structure action plan as a possible template.

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## 12. Next Steps

- The project team will provide written responses to previous PennDOT's comments sent by email.
- Sediment transport analysis and H&H modeling are priorities to finalize the stream geometry and the final recommendations for the road weir concept.
- Public outreach meetings are planned, with the county aiming to hold an information session by the end of 2025. It is anticipated that the county will host additional public meetings during the design phase of the project.
- Verdantas will forward a letter to PennDOT requesting conditional approval of the concept, with full design approval to possibly follow in preliminary design. A conditional approval of the design concept will allow the county to proceed to design with greater confidence that a solution to induced flooding, and thereby the project in general, is feasible.
- Verdantas and the County understand that full approval would not be granted until such time during design when a Highway Occupancy Permit has been submitted and approved by the district.

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## 13. Closing

- The meeting concluded with appreciation for the feedback and collaboration.
- The project team will prioritize responding to PennDOT's comments and looks forward to continued coordination.

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## 14. Key Decisions & Agreements

- No fatal flaws identified at this stage; project remains feasible pending further analysis.
- Written responses to PennDOT's review items will be submitted.
- Emergency action and traffic control plans will be developed.
- Public outreach is a priority before moving to design.

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## 15. Summary Table of Key Action Items

| Action Item | Responsible Party |
|---|---|
| Provide written responses to PennDOT comments | Verdantas |
| Furnish grant line items to PennDOT | Verdantas |
| Request right-of-way plans for Route 11 | Verdantas |
| Coordinate with design consultant for Fort McClue Blvd. Relocation | Verdantas |
| Reach out to Danville to obtain closure structure operational plan | Columbia County |
| Develop emergency action plan for flood closure structure | Project Team/ County |
| Coordinate with Bloomsburg on necessity of sidewalks in project area | Project Team/County |
| Public outreach meeting | Project Team |
| Draft formal letter for PennDOT outlining criteria for conceptual approval | Verdantas |

***Minutes prepared from transcript by AI and reviewed/edited for accuracy***

Respectfully submitted by:

**Clint Sorber, PE, CFM**
Senior Project Manager, Verdantas
Email: csorber@verdantas.com
Office: 570.218.9362

# Bulleted Review Items

The intent of this list is to outline the Departments expectations for future submittals. We understand that some items not maybe ready for discussion at this stage, but these are some of the details that will ultimately be required for PennDOT's review and approval under the HOP process. This list may not be all-inclusive and could be updated as additional design information becomes available.

1. Project Coordination
   - Confirm the local sponsor for this project.
   - Identify the sponsor representative who will attend future meetings.
   - Confirm the lead agency for the overall flood project permitting – DEP or USACE.
   - Confirm funding sources.
   - Identify who will be the HOP applicant/permittee.

2. Plan View and Right-of-Way
   - Provide a plan view showing:
     - Full limits of S.R. 11 reconstruction and tie-ins to Fort McClure Boulevard.
       - Confirm where the limits of the Limited Access ROW are at the S.R. 42 Interchange.
     - Location of the closure structure.
     - Existing ROW lines, widths, and property ownership.
     - Any proposed ROW changes or dedications, and who will own these areas after construction.
       - Types of ROW anticipated (flowage easements, permanent ROW, TCE, others)
     - Any grading associated with the overflow across S.R. 11 (through the Bloomsburg Fair parking area)
     - Proposed drainage design for removal of stormwater
     - Location of existing and relocated underground/overhead utilities.
   - Verify if there is any potential impact to the overhead side structure near S.R. 42.

3. Design Criteria
   - Clarify whether any information from the previous Fernville Flood Study (approx. 20 years ago) is being referenced.
   - Confirm that the design follows applicable DM-2 and DM-4 reconstruction requirements.
   - Verify that all cross slopes, curb details, and drainage features are consistent with PennDOT design standards.
   - Identify how the proposed relocation of the intersection of Ft. McClure Blvd (entrance to the Fairgrounds) will impact this project (and coordination of the two has occurred).

4. Profile, Typical Sections, and Cross Sections
   - Add stationing to all cross sections.

- Explain the cut shown on the profile that is not represented in the typical sections.
- Identify limits of excavation near the closure structure and the distance from travel lanes.
- Confirm if temporary shoring or excavation support will be required to maintain S.R. 11 stability during construction.
- Clarify if the design will use curb or no-curb sections.
- Explain the purpose of the "Concrete Curb (No Reveal)" shown on the typical section (Sheet 2).
- Verify the low point elevations noted in the typical section and profile (475.6 vs 476.3).
- Note 2 on the typical section ("Vary shoulder low point for drainage") is not standard practice; please clarify intent.
- The flat profile will likely cause ponding along the curb line and does not align with design manual guidance.
- There is already ponding in this area under existing conditions. Confirm how this will be addressed in the proposed design.
- Evaluate whether the lowered section can be lengthened to achieve hydraulic relief without dropping the elevation further.
- Confirm whether the design would require S.R. 11 closure at times when the floodwall closure itself is not needed.
- Confirm how existing sidewalk and ADA accommodations are being handled.

5. Structures and Hydraulics
   - Provide a plan for the closure structure and include structural calculations.
   - A foundation report may be required depending on the structure type.
   - Sheet pile design information should be included.
     - Anticipated depth of retaining walls
     - Potential utility impacts
     - Need for housing and vibration monitoring potentially with the location being close to any homes.
   - All submissions must be signed and sealed by a Pennsylvania-licensed PE.
   - Identify the following using gage and hydraulic data:
     - The gage elevation where the existing roadway currently overtops.
     - The gage elevation where the proposed roadway would overtop.
     - How many times since 2010 the existing roadway overtopped.
     - How many times since 2010 the proposed roadway would have overtopped.
   - Present this data in the following summary format:
     "Existing roadway overtopped __ times since 2010 based on gage data. Proposed roadway would have overtopped __ times since 2010 based on gage data." Also include the depth of water across the roadway.
   - Confirm when the H&H report will be submitted for review.

- Identify if the USACE will perform a H&H review or if PennDOT should plan to conduct an internal review.
- Provide a copy of approved 105/404 permits once available.

6. Pavement, Traffic Control, and Maintenance
    - Provide the pavement and shoulder design, including how the section will be restored after overtopping events.
    - Include a Traffic Control Plan showing construction phases, detour routes, and any temporary pavement and signal needs.
    - Department will need to review/approve any closure detour plans.
    - Confirm that pedestrian and ADA access will be maintained during construction.
    - Identify who from the local governments will maintain the closure structure, drainage components, and slope protection after construction.
    - Confirm that the local municipality will be responsible for maintaining any armoring, articulated matting, or reinforced slope areas outside the pavement area.

| DISTRICT | COUNTY | ROUTE | SECTION | SHEET |
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| 3-O | COLUMBIA | | | 1 OF 8 |

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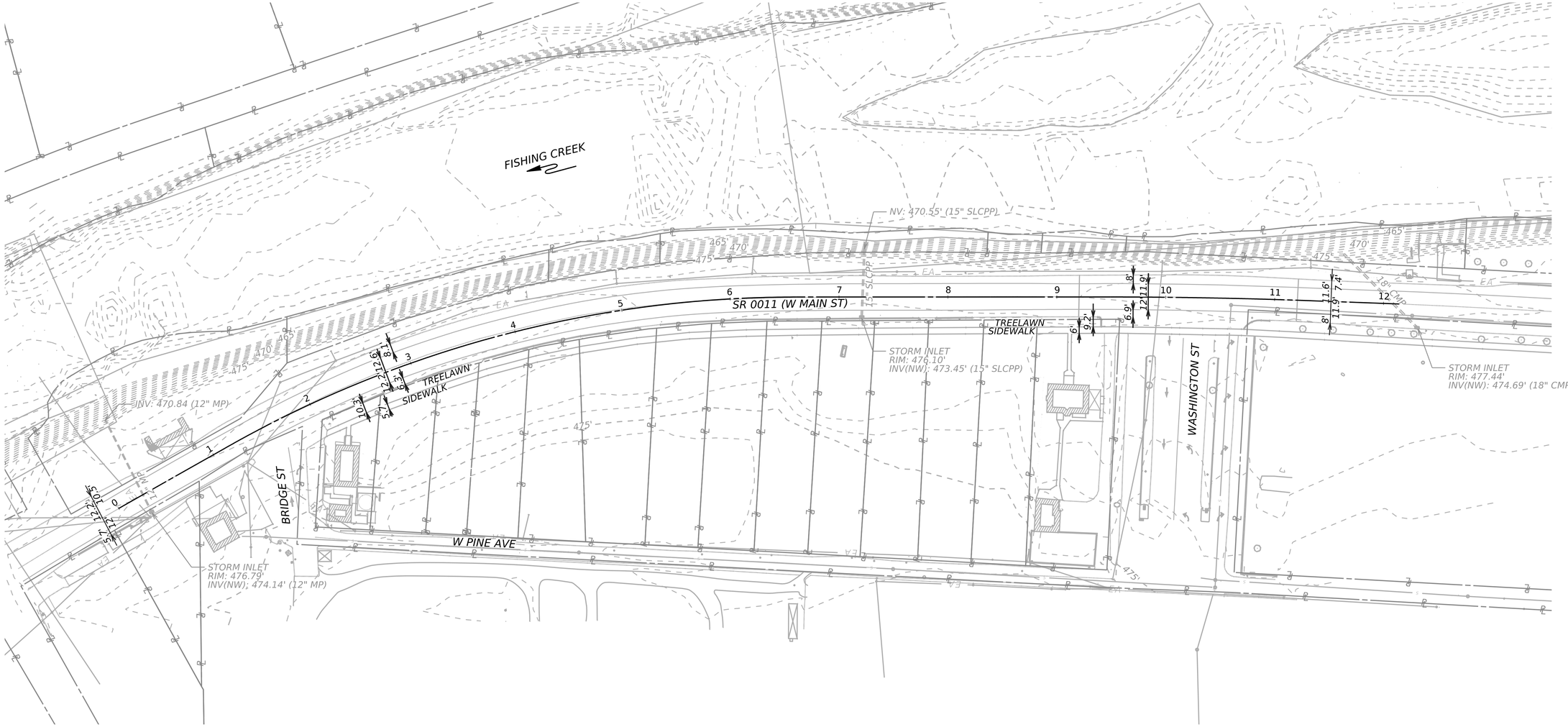


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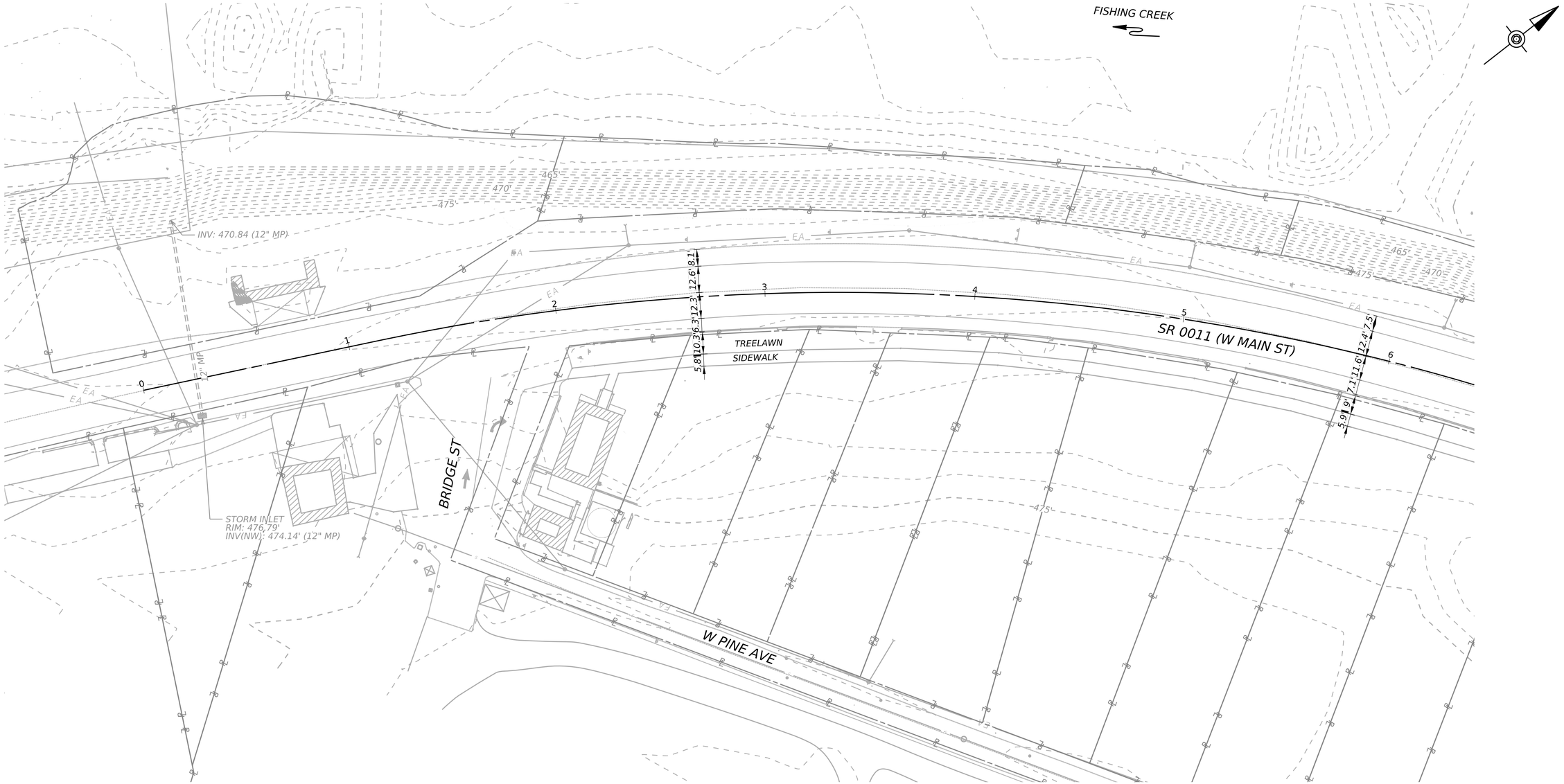


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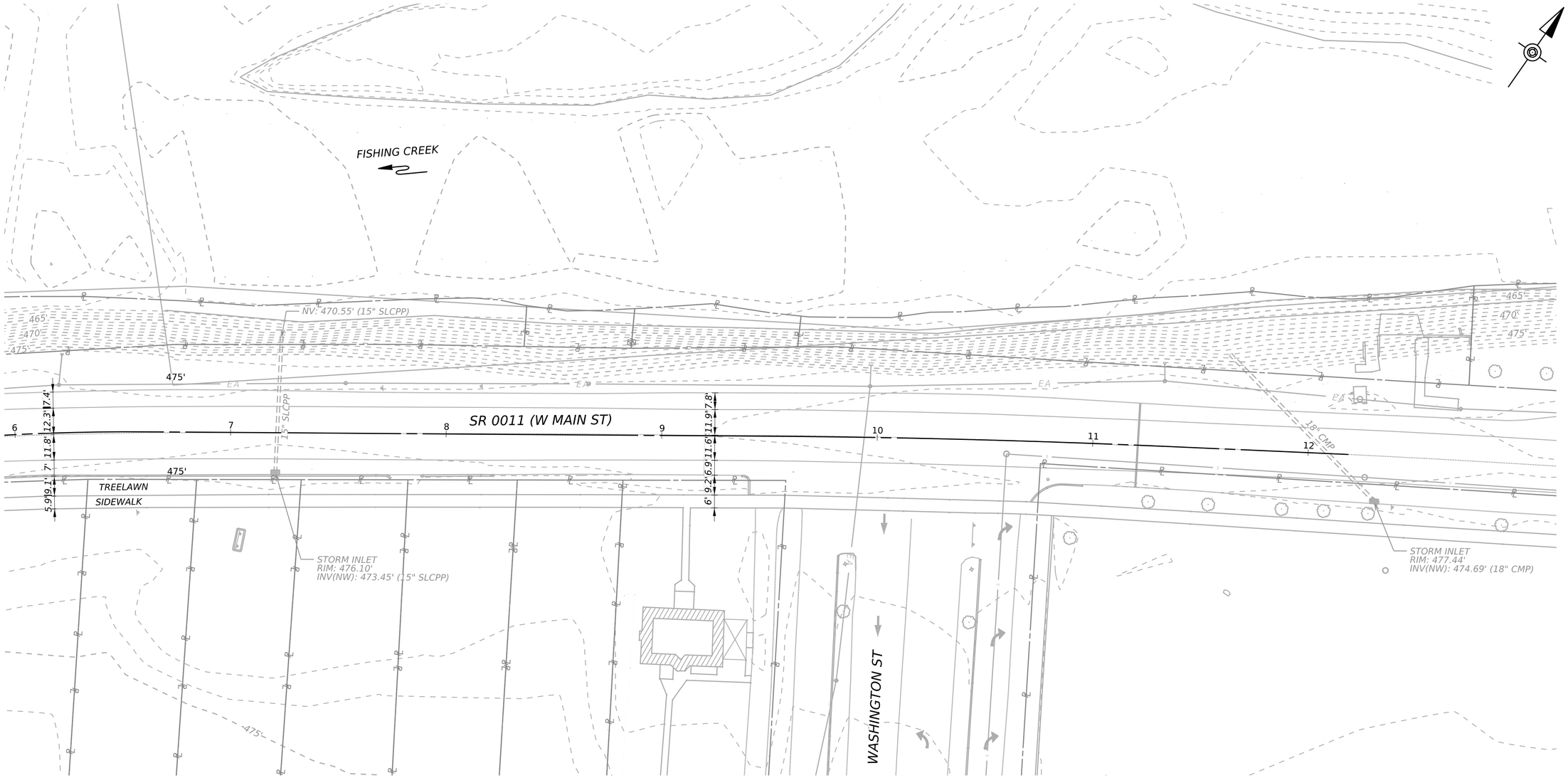


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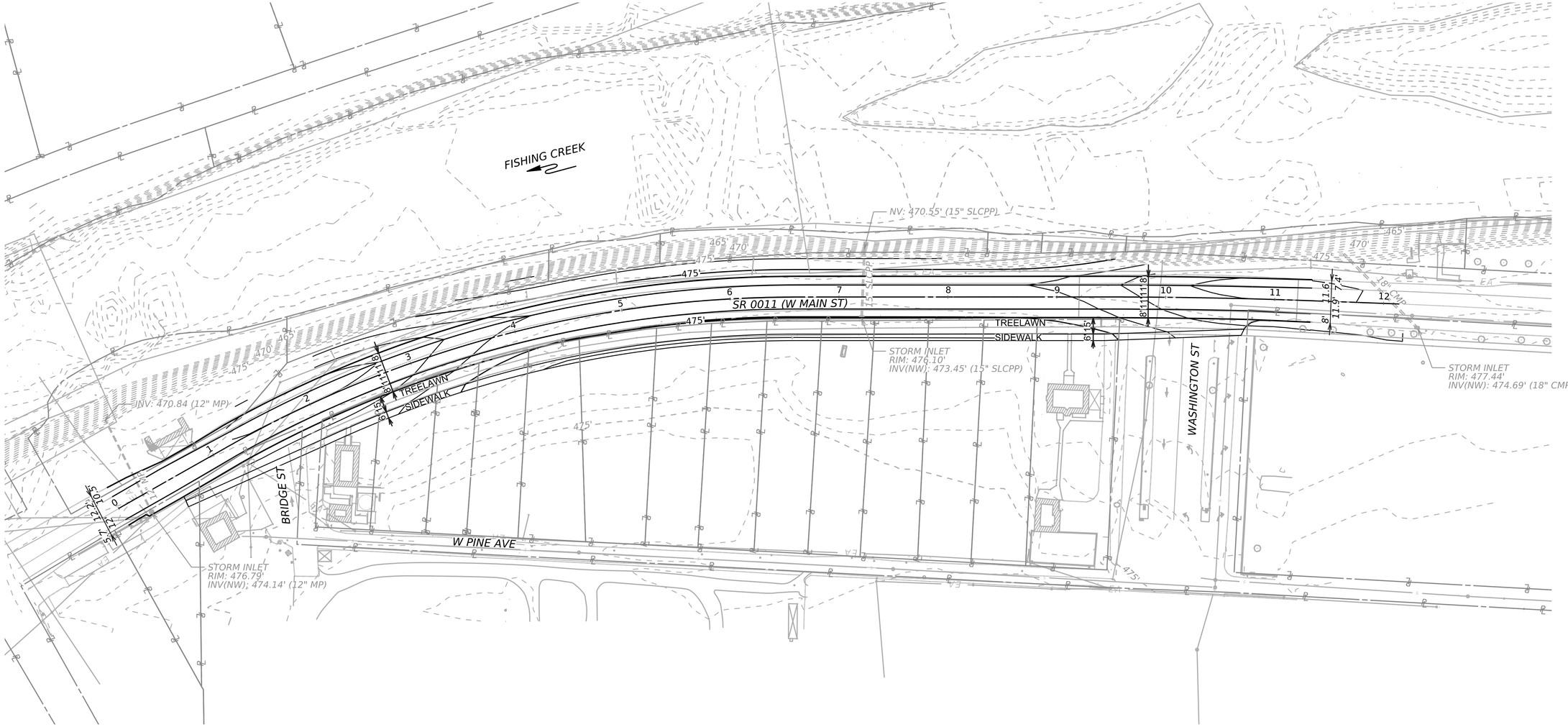


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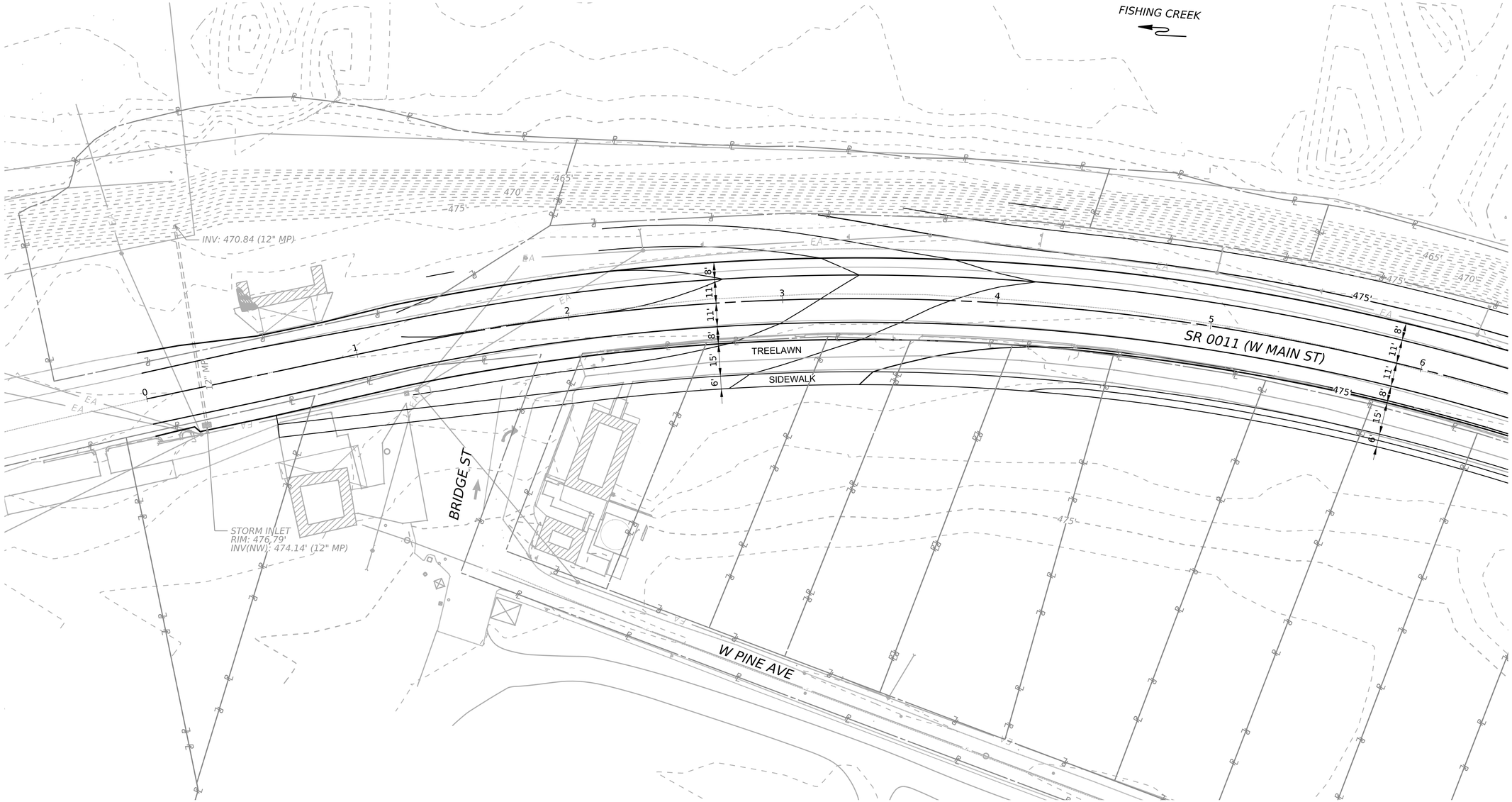


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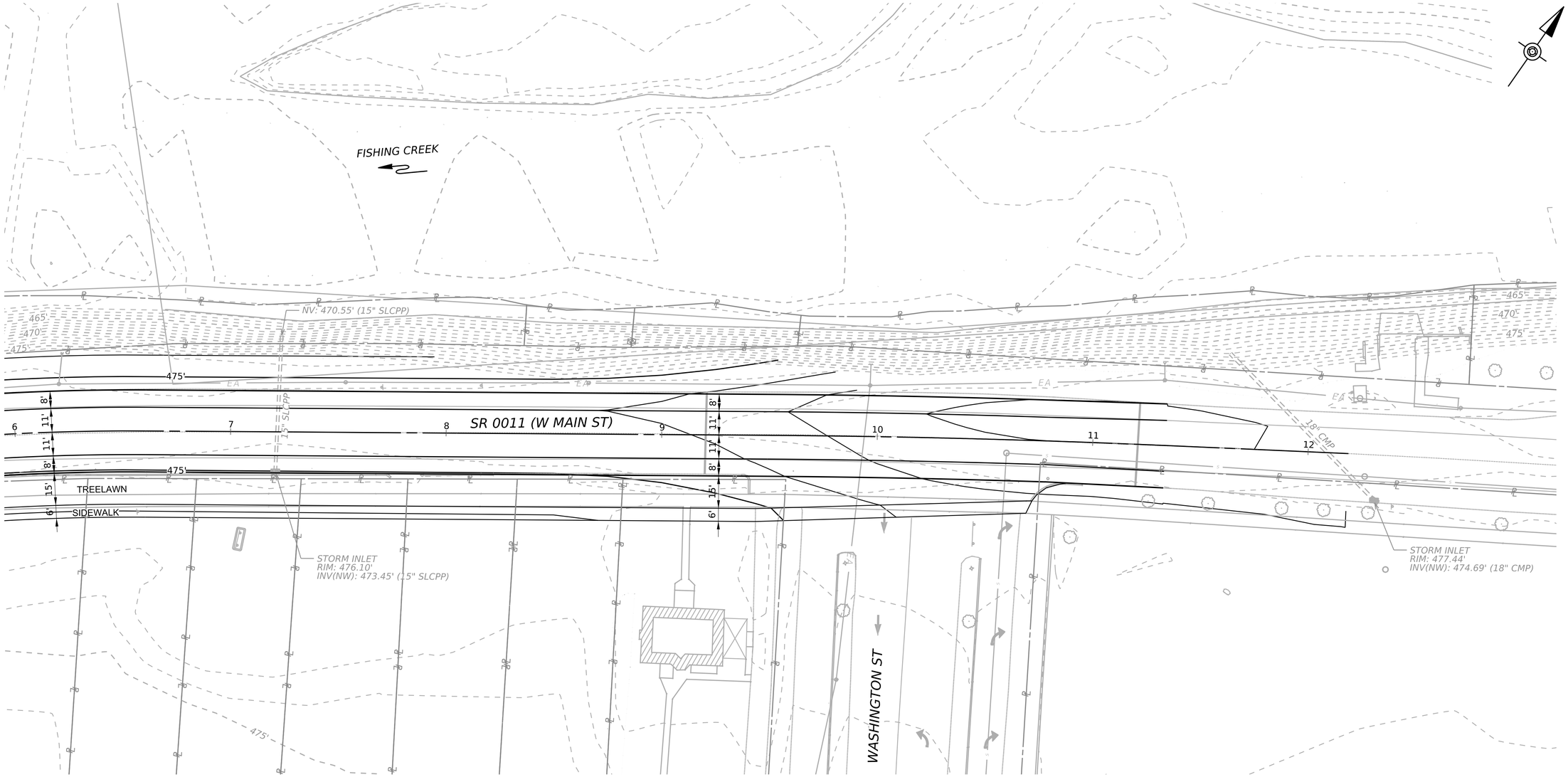


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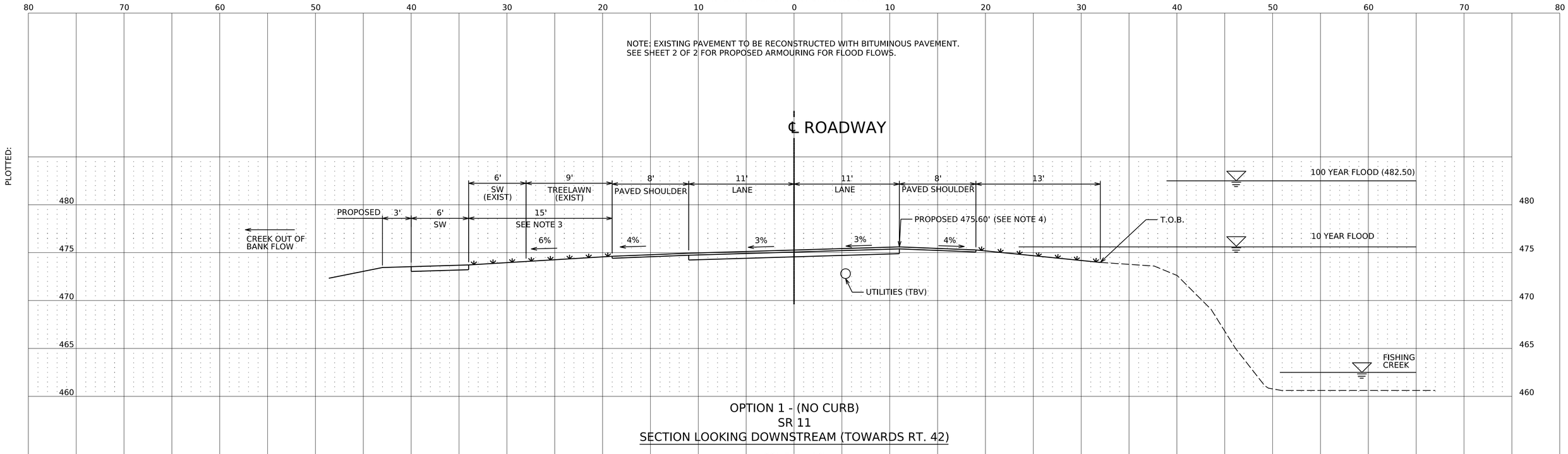
# COLUMBIA COUNTY - WEST END FLOOD MITIGATION PROJECT
# PROPOSED SR 0011 RECONSTRUCTION

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

| DIST. | COUNTY | ROUTE | SECT. | PRELIM. BK. NO. | FINAL BK. NO. | SHEET NO. |
|---|---|---|---|---|---|---|
| 3-0 | COLUMBIA | 0011 | | | | 7 OF 8 |

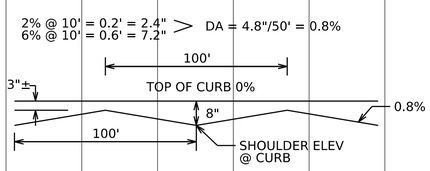
PLOTTED:

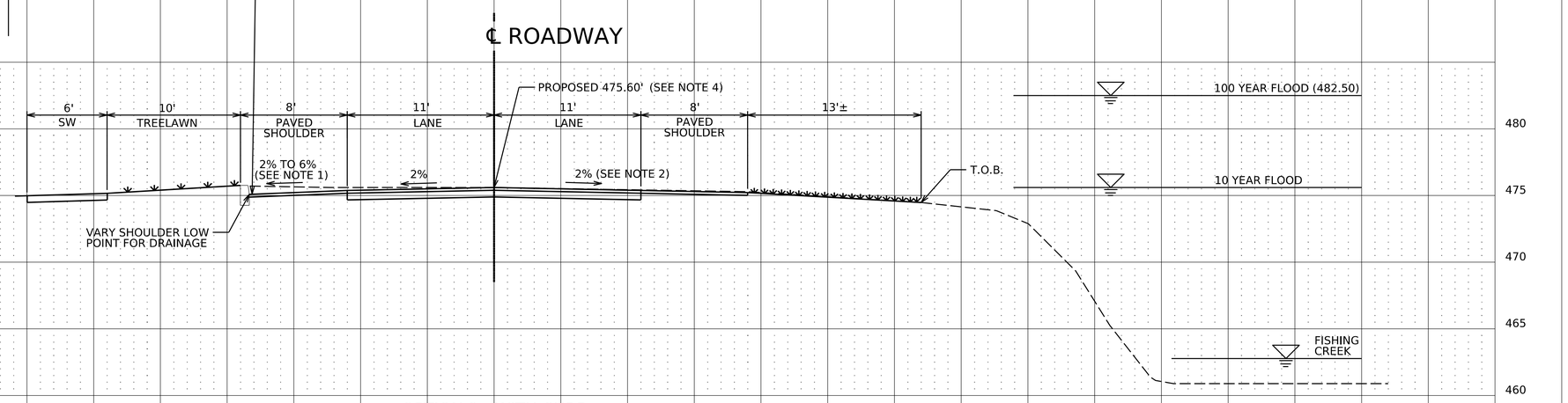
NOTE: EXISTING PAVEMENT TO BE RECONSTRUCTED WITH BITUMINOUS PAVEMENT.
SEE SHEET 2 OF 2 FOR PROPOSED ARMOURING FOR FLOOD FLOWS.




OPTION 1 - (NO CURB)
SR 11
SECTION LOOKING DOWNSTREAM (TOWARDS RT. 42)

SCALE 1" = 10'




OPTION 2 - WITH CURB
SR 11
SECTION LOOKING DOWNSTREAM (TOWARDS RT. 42)

SCALE 1" = 10'

NOTES:

1. SHOULDER SLOPE VARIES TO FACILITATE DRAINAGE.
2. CROWN SECTION SHOWN - SUPERELEVATE AS REQUIRED.
3. WIDER TREE LAWN FOR SIDEWALK SAFETY.
4. EXISTING LOW POINT IS 475.60 - USE AS CONTROL ELEVATION FOR ROADWAY PROFILE - SEE LONGITUDINAL GRADE/PROFILE.

# COLUMBIA COUNTY - WEST END FLOOD MITIGATION PROJECT
# PROPOSED SR 0011 RECONSTRUCTION

| DIST. | COUNTY | ROUTE | SECT. | PRELIM. BK. NO. | FINAL BK. NO. | SHEET NO. |
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| 3-0 | COLUMBIA | 0011 | | | | **8** OF **8** |

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

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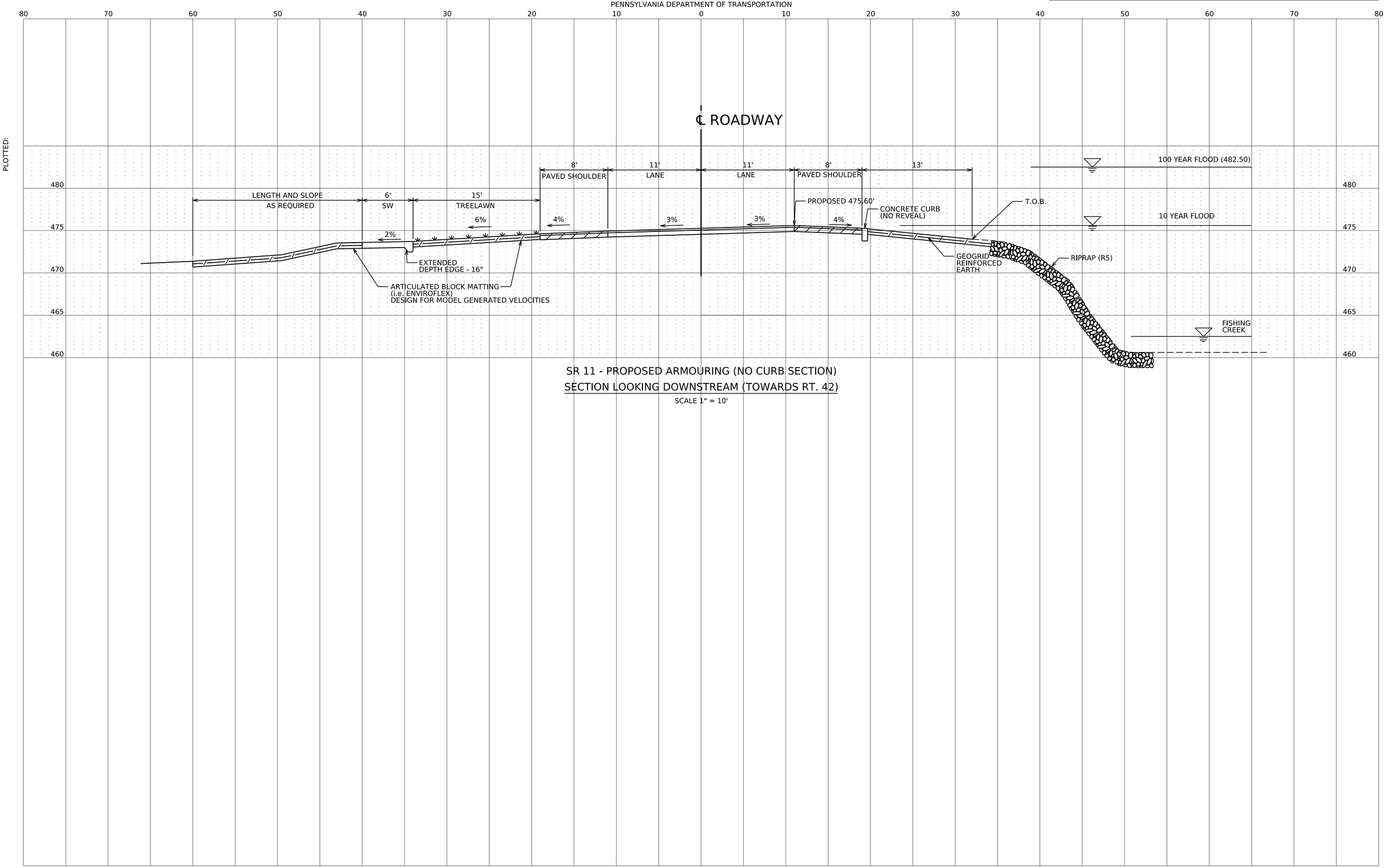


SR 11 - PROPOSED ARMOURING (NO CURB SECTION)

SECTION LOOKING DOWNSTREAM (TOWARDS RT. 42)

SCALE 1" = 10'

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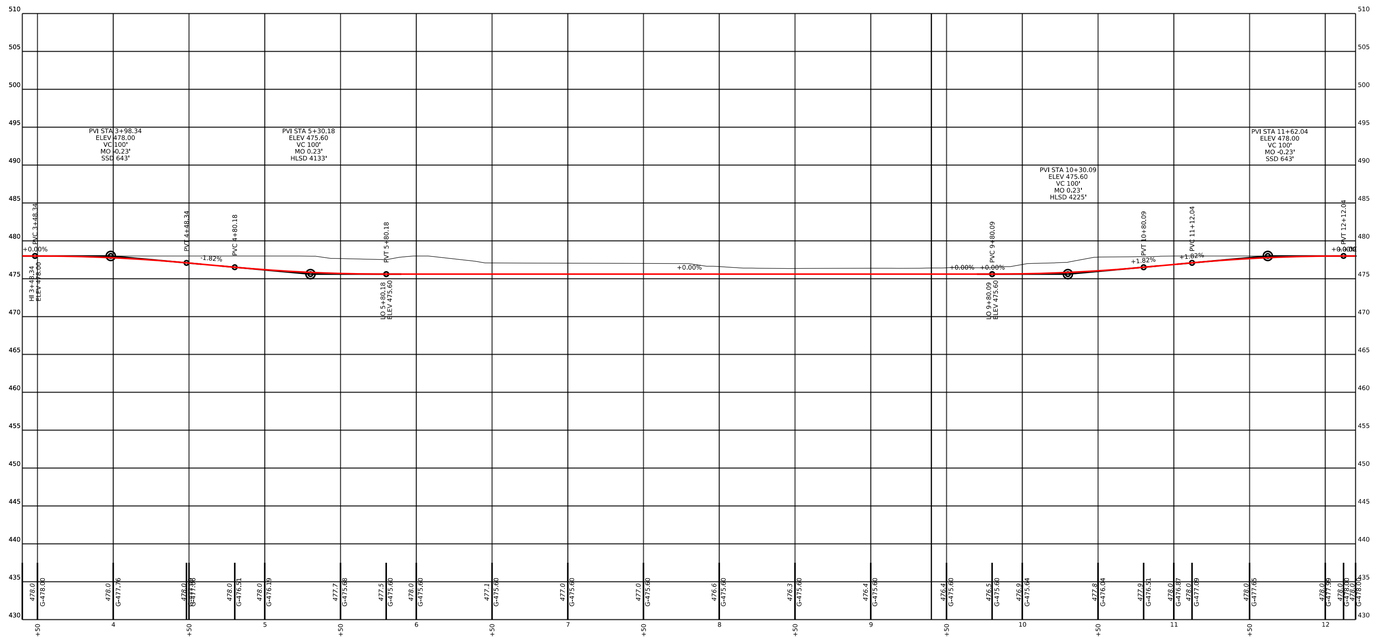


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# West End Flood Mitigation Project
# Bloomsburg, Pa
# Columbia County

Verdantas Response to PennDOT Comments
10.16.25

Note: Verdantas Response Comments in bold italicized font.

## 1. Project Coordination

- Confirm the local sponsor for this project.
  - ✓ ***Columbia County Water Mitigation Authority***
- Identify the sponsor representative who will attend future meetings.
  - ✓ ***Chris Anderson***
- Confirm the lead agency for the overall flood project permitting – DEP or USACE.
  - ✓ ***DEP for this non-federal project. FEMA and Corps of Engineers will review permit applications.***
- Confirm funding sources
  - ✓ ***State: Pa DCED $4 MM***
  - ✓ ***Federal: Wyoming Valley Flood Levee Project - Mitigation Funds for Downstream Communities $1.75 MM***
- Identify who will be the HOP applicant/permittee.
  - ✓ ***Columbia County***

# 2.Plan View and Right-of-Way

- Provide a plan view showing:
  - Full limits of S.R. 11 reconstruction and tie-ins to Fort McClure Boulevard.
    - Confirm where the limits of the Limited Access ROW are at the S.R. 42 Interchange.
  - Location of the closure structure.
  - Existing ROW lines, widths, and property ownership.
  - Any proposed ROW changes or dedications, and who will own these areas after construction.
    - Types of ROW anticipated (flowage easements, permanent ROW, TCE, others)
  - Any grading associated with the overflow across S.R. 11 (through the Bloomsburg Fair parking area)
  - Proposed drainage design for removal of stormwater
  - Location of existing and relocated underground/overhead utilities

  - ✓ ***The above list of required documents etc. will be prepared as design documents to be included in the design submissions for the HOP Permit.***

- Verify if there is any potential impact to the overhead side structure near S.R. 42.

  - ✓ ***Will verify during design.***

# 3.Design Criteria

- Clarify whether any information from the previous Fernville Flood Study (approx. 20 years ago) is being referenced.
-
  - ✓ ***The previous Corps of Engineers flood study has been reviewed. We are using the test boring and environmental investigations as a starting point for this project.***

- Confirm that the design follows applicable DM-2 and DM-4 reconstruction requirements.
- Verify that all cross slopes, curb details, and drainage features are consistent with PennDOT design standards.

  - ✓ ***DM2 and DM4 will be utilized for design requirements.***

- Identify how the proposed relocation of the intersection of Ft. McClure Blvd (entrance to the Fairgrounds) will impact this project (and coordination of the two has occurred)

    - ✓ ***We will coordinate the Fishing Creek flood mitigation design with the local design consultant for the proposed intersection design. Periodic meetings with the District would facilitate this aspect of the design process. A joint submission for the two projects is not likely due to the grant requirements and project schedules.***

## 4.Profile, Typical Sections, and Cross Sections

- Add stationing to all cross sections.
- Explain the cut shown on the profile that is not represented in the typical sections.

    - ✓ ***Future submissions will indicate the stationing and cut on the typical sections***

- Identify limits of excavation near the closure structure and the distance from travel lanes.
- Confirm if temporary shoring or excavation support will be required to maintain S.R. 11 stability during construction.
- Clarify if the design will use curb or no-curb sections.

    - ✓ ***To Be Determined based on safety and drainage issues and Department input.***

- Explain the purpose of the "Concrete Curb (No Reveal)" shown on the typical section (Sheet 2).

    - ✓ ***The no reveal curb is to protect the edge of shoulder during flood flows over the roadway. Other design options can and will be investigated***.

- Verify the low point elevations noted in the typical section and profile (475.6 vs 476.3).

    - ✓ ***The elevation 476.3 is the existing low point at the edge of shoulder on the Fairgrounds side of SR 0011.***

- ✓ ***The elevation 475.6 is the proposed low point shown on the typical sections.***

- Note 2 on the typical section ("Vary shoulder low point for drainage") is not standard practice; please clarify intent.
- The flat profile will likely cause ponding along the curb line and does not align with design manual guidance.
- There is already ponding in this area under existing conditions. Confirm how this will be addressed in the proposed design.

  - ✓ ***For the typical section "with curb" alternative, varying the profile at the edge of shoulder will facilitate drainage along the curb line to inlets space about 100 feet on center. The travel lane edge of shoulder will be the hinge point from which the shoulder will be sloped as required to meet the proposed profile along the curb line.***
  - ✓ ***This approach would not apply to the no curb option.***

- Evaluate whether the lowered section can be lengthened to achieve hydraulic relief without dropping the elevation further.

  - ✓ ***We are investigating extending the length of the roadway weir from 450 feet to 500 feet to minimize the lowering of the roadway.***

- Confirm whether the design would require S.R. 0011 closure at times when the floodwall closure itself is not needed.

  - ✓ ***The difference in road elevation at the closure ( 577.5) and the proposed low point for the lowered roadway (475.5) is 2 feet.***
  - ✓ ***It is currently 1 foot so there could be more frequent flooding of the road versus the closure but frequency for either is approximately once every nine (9) to ten (10) years.***
  - ✓ ***The closure design will minimize installation time and thus the need to close roadway at lower stream stages, however, about 3 hours will be required to mobilize and install the closure. Depending on the rate of rise of the stream and the forecast crest, the timing of the closure installation may coincide with the road surface flooding at the low point.***
  - ✓ ***Miter gates and roller gates are being considered to minimize installation time. Note: Roller gate requires a flat sill which requires specific grading and drainage analysis for the closure area.***

- Confirm how existing sidewalk and ADA accommodations are being handled.

    - ✓ ***Requirements for sidewalk reconstruction and provisions for handicap accessibility will be coordinated with the Town of Bloomsburg and the Fairgrounds and other property owners. A pedestrian study will be considered.***

# 5.Structures and Hydraulics

- Provide a plan for the closure structure and include structural calculations.
- A foundation report may be required depending on the structure type.
- Sheet pile design information should be included
    - ✓ Anticipated depth of retaining walls
    - ✓ Potential utility impacts
    - ✓ Need for housing and vibration monitoring potentially with the location being close to any homes
- All submissions must be signed and sealed by a Pennsylvania-licensed PE.

    - ✓ ***The foundation report and design calculations will be submitted for review and comment. The report will include recommendations for vibration monitoring during construction.***

- Identify the following using gage and hydraulic data:
    - ✓ The gage elevation where the existing roadway currently overtops.
    - ✓ The gage elevation where the proposed roadway would overtop.
    - ✓ How many times since 2010 the existing roadway overtopped.
    - ✓ How many times since 2010 the proposed roadway would have overtopped.
- Present this data in the following summary format:
  "Existing roadway overtopped times since 2010 based on gage data. Proposed roadway would have overtopped times since 2010 based on gage data." Also include the depth of water across the roadway.

    - ✓ ***Above data to be submitted with project plans and H&H report.***
    - ✓
- Confirm when the H&H report will be submitted for review
  .

    - ✓ ***During preliminary design, estimated to occur during 2026.***

- Identify if the USACE will perform a H&H review or if PennDOT should plan to conduct an internal review.

- ✓ ***A FEMA consultant will review the H&H analysis. The U.S. Army Corps of Engineers will review the joint permit submission. Courtesy submittals will be prepared for PennDOT.***

- Provide a copy of approved 105/404 permits once available.

  - ✓ ***Permits will be included in design submissions.***

# 6.Pavement, Traffic Control, and Maintenance

- Provide the pavement and shoulder design, including how the section will be restored after overtopping events.
- Include a Traffic Control Plan for the reconstruction of SR 11. With an ADT over 16,000, PennDOT has concerns with signalized control. Two lanes of traffic should be maintained during construction where feasible.
- Department will need to review/approve any closure detour plans
- Confirm that pedestrian and ADA access will be maintained during construction.
- Identify who from the local governments will maintain the closure structure, drainage components, and slope protection after construction.
- Confirm that the local municipality will be responsible for maintaining any armoring, articulated matting, or reinforced slope areas outside the pavement area.

  - ✓ ***The roadway had minimal damage in the 2011 Storm Lee Flood which was a record flood event about 6 feet in depth across SR 0011. Design will prioritize resiliency for the flood water flows.***
  - ✓ ***Restoration requirements will be to Department Standards and included in the HOP Permit as flood related damage restoration requirements.***

  - ✓ ***A detour plan for roadway closure during a flood event will be prepared for the HOP and adopted for the project by the Columbia County Water Mitigation Authority and Emergency Management.***

  - ✓ ***Traffic control during construction is assumed to be two lanes at all times except for tying into the existing roadway which will require flagging crews.***
    ***The Columbia County Water Mitigation Authority will be responsible for clean up and restoration of the roadway after flood events.***

# APPENDIX B

Wetland Investigation Report/PNDI Letters

# Wetland Report

Columbia County West End Flood Mitigation
Columbia County, PA

**Prepared for:**
Columbia County
11 West Main Street
Main Street County Annex
Bloomsburg, PA 17815

**Prepared by:**
Verdantas
613 Baltimore Drive, Suite 300
Wilkes-Barre, PA 18702

**Verdantas Project No: 19265**

**November 2025**

# Table of Contents



## Figures



## Appendices

# 1. Introduction

Verdantas, LLC (Verdantas) conducted a wetland investigation on September 24, 2025, on the proposed Columbia County West End Flood Mitigation "Project Area". The Project Area encompassed approximately 56.1 acres and consisted mostly of maintained agricultural fields and lawns in an urbanized area located in Hemlock Township and the Town of Bloomsburg, Columbia County, Pennsylvania.

# 2. Methods

Office and field investigations were completed in accordance with the U.S. Army Corps of Engineers *Wetland Delineation Manual* (U.S. Department of the Army, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region, Version 2.0* (U.S. Army Corps of Engineers, April 2012).

These guidance documents were used to provide the technical criteria, field indicators and recommended methods to identify any wetlands within the area of interest. Under normal conditions the routine method was utilized to identify the three criteria (hydrophytic vegetation, hydric soils, and hydrology) needed to determine a wetland. Areas that are identified as problem areas or disturbed wetlands allow for one or more of the wetland criteria to be absent. Upland test points or observation points were documented based on the dominance of upland and facultative upland vegetation, and/or confirmation of upland soils. The U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency jointly define wetlands as: *Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.*

Chapter 105, Dam Safety and Waterway Management, of the PA Code defines a Watercourse as: *A channel or conveyance of surface water having defined bed and banks, whether natural or artificial, with perennial or intermittent flow*. If a stream and/or channel exist on the site, their boundaries were flagged at the ordinary highwater mark (OHWM). The OHWM is "the line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (33 CFR Part 328: Definition of Waters of the United States).

All field data was recorded using an Arrow Submeter GNSS Receiver and spatially documented utilizing ArcGIS Pro software.

# 3. Results

Verdantas' investigation identified a total of three (3) watercourse features within the boundary of the Project Area. This included one (1) perennial and two (2) ephemeral (EPH) watercourses. The remainder of the Project Area was indicative of upland conditions.

The Project Area resides in the Fishing Creek and Susquehanna River watersheds. The watersheds are considered by 25 PA Code, Chapter 93, Water Quality Standards, to have a designated use as a warm-water fishery, migratory fishes (WWF, MF). There was no existing use or special trout designations identified for these watersheds.

# 4. Conclusions

Verdantas conducted a wetland investigation on September 24, 2025, on the Project Area. Three (3) watercourse features were identified within the boundary of the Project Area.

A topographic Location Map (Figure 1), Soils Map and descriptions (Figure 2/2A), Wetland Delineation Map (Figure 3), photographs and wetland determination data forms documenting the results of the field investigation are provided as attachments to this letter report.

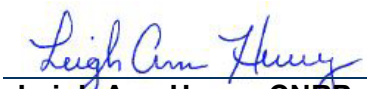
Regulatory guidance requires that impacts to wetlands and watercourses be avoided or minimized and that development activity affecting them will require permitting from the U.S. Army Corps of Engineers (USACE) and the Pennsylvania Department of Environmental Protection (PADEP) under Sections 401 and 404 of the Clean Water Act and Chapter 105 of the Pennsylvania Code respectively. No filling, excavation, draining or flooding of wetland areas can occur without appropriate permits.

# 5. Report Limitations

The conclusions presented herein are based on the level of effort and investigative techniques defined under the Scope of Work between Verdantas, LLC (Verdantas) and the Client. Verdantas has conducted this investigation in a manner consistent with published guidance, sound ecological practices, and best professional judgment. No other warranty or guarantee, expressed or implied, is made. This report does not attempt to evaluate past or present compliance with Federal, State, and Local environmental or land use laws and regulations. Furthermore, Verdantas makes no guarantees regarding the completeness or accuracy of any information obtained in review of public or private files or previous investigations at the Project Area not conducted by Verdantas. The results of the surface water delineation and the surface water evaluation are subject to verification by the USACE and PADEP, respectively.

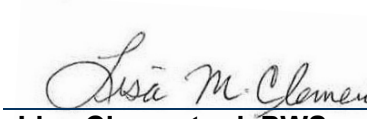
If you should have any questions or comments concerning the findings of this report, please feel free to contact me in our office at (570) 221-4818 or lhenry@verdantas.com.

Prepared by:



**Leigh Ann Henry, CNRP, ENV SP**
Environmental Scientist III

Reviewed by:



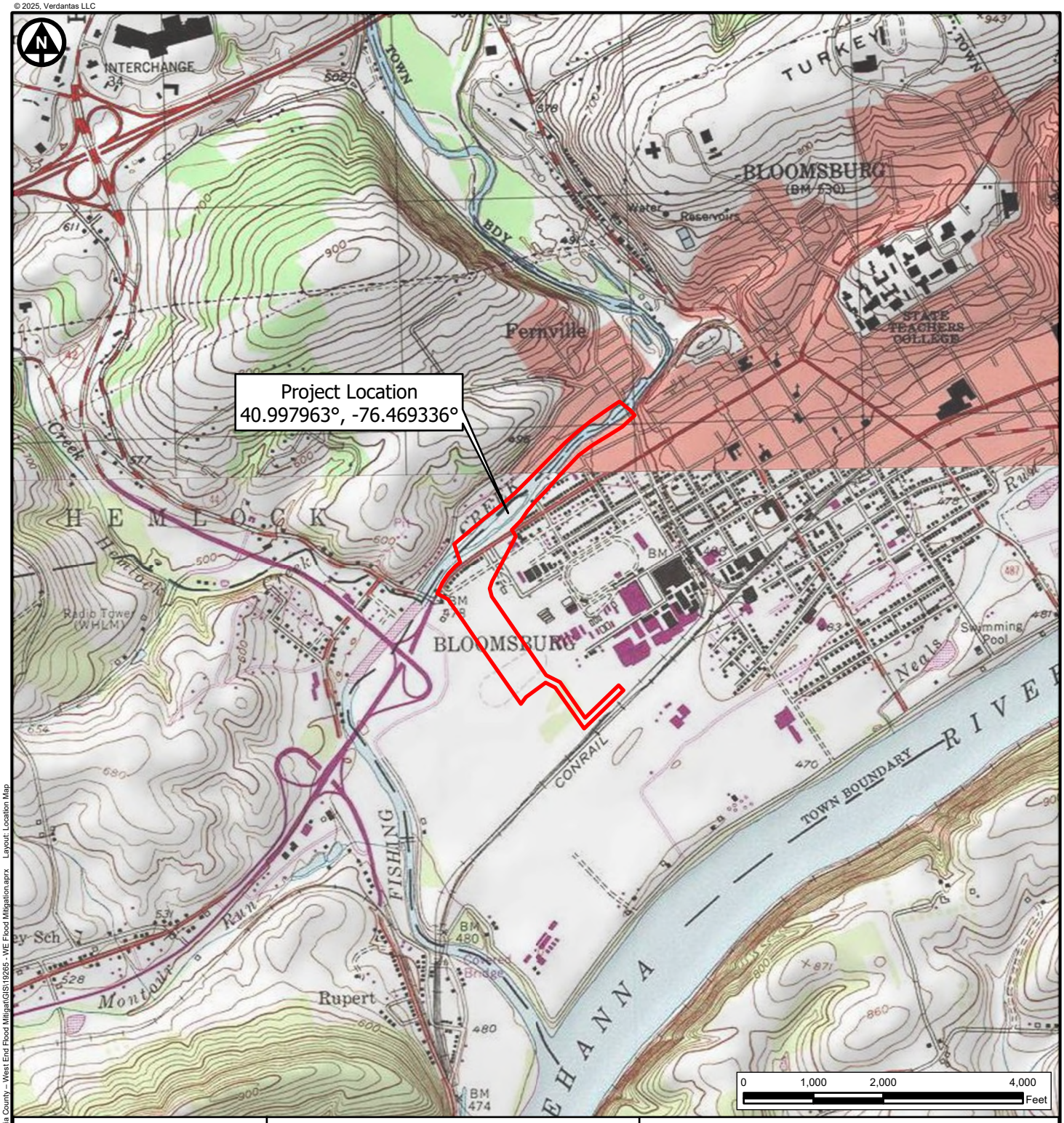
**Lisa Clementoni, PWS**
Project Manager

Date: November 7, 2025

# Figure 1

Project Location Map

© 2025, Verdantas LLC




Survey Area



DISCLAIMER: Verdantas LLC has furnished this map to the Client for its sole and exclusive use as a preliminary planning and screening tool. This map is reproduced from geospatial information compiled from third-party sources which may change over time and are not accurate as to mapping, surveying or engineering standards. Verdantas LLC makes no representation or warranty as to the content, accuracy, timeliness or completeness of any information. In no event will Verdantas LLC, its owners, officers, employees or agents, be liable for damages of any kind arising out of the use of this map by Client or any other party.

verdantas

**Sources:**
Aerial Imagery: Esri Imagery Web Service dated 2021.

Topographic Map: National Geographic Society Web Service.

Quadrangle: Bloomsburg & Catawissa

Town of Bloomsburg & Hemlock Township
Columbia County, PA

# Project Location Map

Wetland Delineation Report
Columbia County West End Flood Mitigation

| | |
|---|---|
| Project Number | 19265 |
| Date | 11/2025 |
| Author | LHenry |
| Scale | 1 in = 2,000 ft |
| Figure | 1 |

Edited: 11/6/2025 File Location: Z:\Project Files\CA-DZ\COLO\19265 - Columbia County – West End Flood Mitigation\GIS\19265 - WE Flood Mitigation.aprx Layout: Location Map

Produced Using Esri's ArcGIS Software

# Figure 2/2A

Soils Map & Soils Report

United States Department of Agriculture

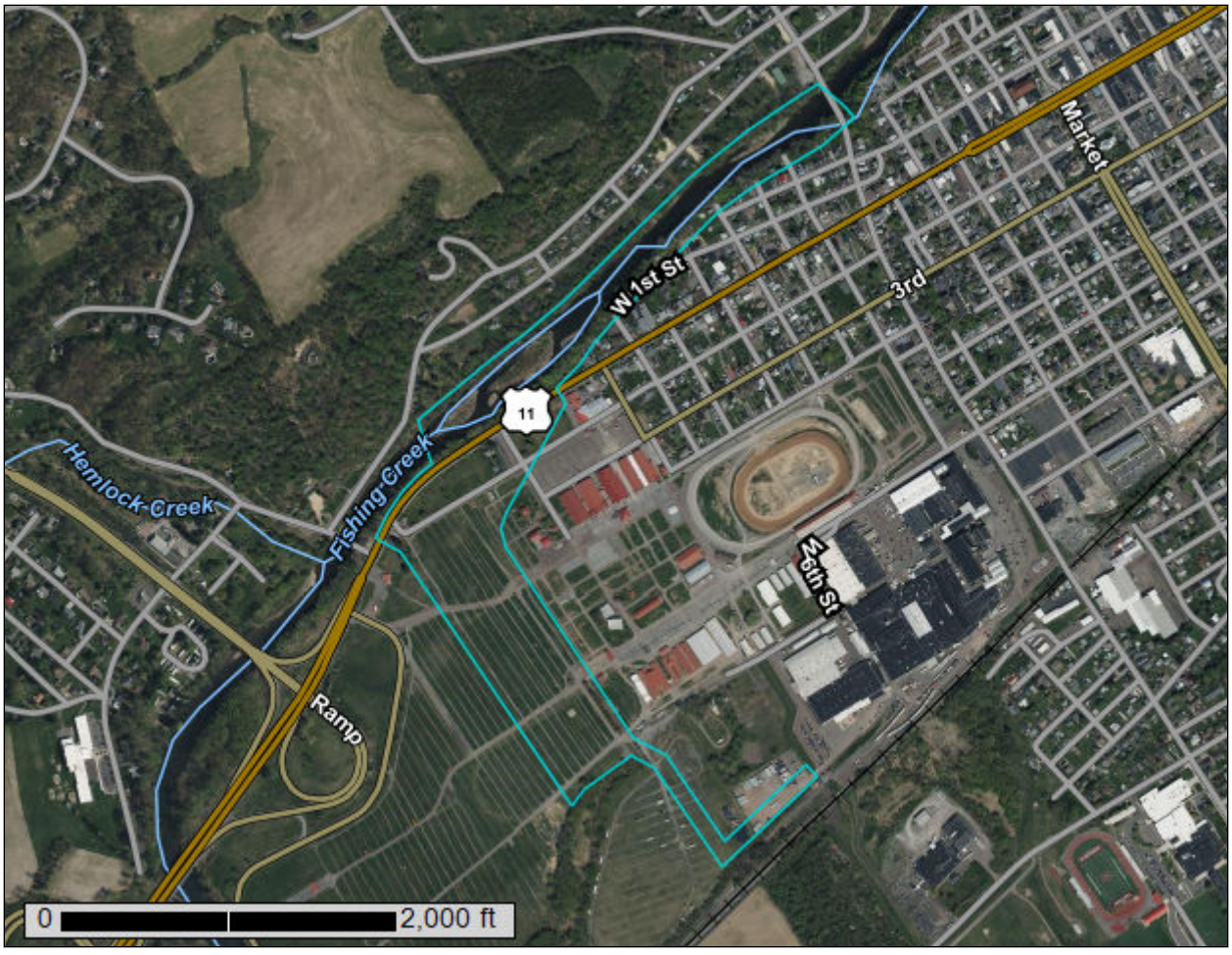
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

# Custom Soil Resource Report for Columbia County, Pennsylvania

## Bloomsburg West End Flood Mitigation




November 6, 2025

# Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# Contents

# Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

# Custom Soil Resource Report
## Soil Map


Map Scale: 1:8,330 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Columbia County, Pennsylvania
Survey Area Data: Version 20, Sep 5, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 19, 2023—May 14, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| BrA | Braceville loam, 0 to 3 percent slopes | 8.3 | 14.4% |
| BrB | Braceville loam, 3 to 8 percent slopes | 0.1 | 0.2% |
| CgA | Chenango gravelly sandy loam, 0 to 3 percent slopes | 2.3 | 3.9% |
| ChA | Chenango silt loam, 0 to 3 percent slopes | 29.5 | 51.0% |
| ChB2 | Chenango silt loam, 3 to 12 percent slopes, moderately eroded | 1.8 | 3.2% |
| Hs | Holly silt loam | 0.0 | 0.0% |
| Ma | Made land | 3.6 | 6.3% |
| W | Water | 12.1 | 21.0% |
| **Totals for Area of Interest** | | **57.8** | **100.0%** |

# Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit

descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

# Columbia County, Pennsylvania

## BrA—Braceville loam, 0 to 3 percent slopes

### Map Unit Setting

*National map unit symbol:* l3bs
*Elevation:* 50 to 1,970 feet
*Mean annual precipitation:* 30 to 56 inches
*Mean annual air temperature:* 45 to 54 degrees F
*Frost-free period:* 110 to 180 days
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Braceville and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Braceville

#### Setting

*Landform:* Outwash terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Convex, linear
*Across-slope shape:* Concave, linear
*Parent material:* Coarse-loamy outwash

#### Typical profile

*H1 - 0 to 8 inches:* loam
*H2 - 8 to 22 inches:* gravelly sandy loam
*H3 - 22 to 34 inches:* gravelly sandy loam
*H4 - 34 to 60 inches:* stratified sand and gravel

#### Properties and qualities

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Moderately well drained
*Runoff class:* Low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.60 in/hr)
*Depth to water table:* About 6 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 4.6 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2w
*Hydrologic Soil Group:* C/D
*Ecological site:* F140XY020NY - Dense Outwash
*Hydric soil rating:* No

### Minor Components

#### Chenango

*Percent of map unit:* 10 percent

*Hydric soil rating:* No

**Atherton**

*Percent of map unit:* 5 percent
*Landform:* Flood plains
*Hydric soil rating:* Yes

## BrB—Braceville loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* l3bt
*Elevation:* 50 to 1,970 feet
*Mean annual precipitation:* 30 to 56 inches
*Mean annual air temperature:* 45 to 54 degrees F
*Frost-free period:* 110 to 180 days
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Braceville and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Braceville

#### Setting

*Landform:* Outwash terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Convex, linear
*Across-slope shape:* Concave, linear
*Parent material:* Coarse-loamy outwash

#### Typical profile

*H1 - 0 to 8 inches:* loam
*H2 - 8 to 22 inches:* gravelly sandy loam
*H3 - 22 to 34 inches:* gravelly sandy loam
*H4 - 34 to 60 inches:* stratified sand and gravel

#### Properties and qualities

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Moderately well drained
*Runoff class:* Medium
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.60 in/hr)
*Depth to water table:* About 6 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 4.6 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* C/D
*Ecological site:* F140XY020NY - Dense Outwash
*Hydric soil rating:* No

**Minor Components**

**Chenango**

*Percent of map unit:* 10 percent
*Hydric soil rating:* No

**Atherton**

*Percent of map unit:* 5 percent
*Landform:* Flood plains
*Hydric soil rating:* Yes

## CgA—Chenango gravelly sandy loam, 0 to 3 percent slopes

**Map Unit Setting**

*National map unit symbol:* l3c2
*Elevation:* 600 to 1,800 feet
*Mean annual precipitation:* 30 to 56 inches
*Mean annual air temperature:* 45 to 54 degrees F
*Frost-free period:* 110 to 180 days
*Farmland classification:* All areas are prime farmland

**Map Unit Composition**

*Chenango and similar soils:* 90 percent
*Minor components:* 9 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Chenango**

**Setting**

*Landform:* Outwash terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Convex, linear
*Across-slope shape:* Linear, convex
*Parent material:* Gravelly outwash

**Typical profile**

*H1 - 0 to 10 inches:* gravelly sandy loam
*H2 - 10 to 21 inches:* gravelly fine sandy loam
*H3 - 21 to 48 inches:* very gravelly loamy coarse sand

**Properties and qualities**

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained

*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 6.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 3.2 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2s
*Hydrologic Soil Group:* A
*Hydric soil rating:* No

**Minor Components**

**Braceville**

*Percent of map unit:* 9 percent
*Hydric soil rating:* No

## ChA—Chenango silt loam, 0 to 3 percent slopes

**Map Unit Setting**

*National map unit symbol:* l3c6
*Elevation:* 600 to 1,800 feet
*Mean annual precipitation:* 30 to 56 inches
*Mean annual air temperature:* 45 to 54 degrees F
*Frost-free period:* 110 to 180 days
*Farmland classification:* All areas are prime farmland

**Map Unit Composition**

*Chenango and similar soils:* 90 percent
*Minor components:* 9 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Chenango**

**Setting**

*Landform:* Outwash terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Convex, linear
*Across-slope shape:* Linear, convex
*Parent material:* Gravelly outwash

**Typical profile**

*H1 - 0 to 10 inches:* silt loam
*H2 - 10 to 21 inches:* gravelly fine sandy loam
*H3 - 21 to 48 inches:* very gravelly loamy coarse sand

**Properties and qualities**

*Slope:* 0 to 3 percent

*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 6.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 3.5 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 1
*Hydrologic Soil Group:* A
*Hydric soil rating:* No

**Minor Components**

**Braceville**

*Percent of map unit:* 9 percent
*Hydric soil rating:* No

## ChB2—Chenango silt loam, 3 to 12 percent slopes, moderately eroded

**Map Unit Setting**

*National map unit symbol:* l3c7
*Elevation:* 600 to 1,800 feet
*Mean annual precipitation:* 30 to 56 inches
*Mean annual air temperature:* 45 to 54 degrees F
*Frost-free period:* 110 to 180 days
*Farmland classification:* All areas are prime farmland

**Map Unit Composition**

*Chenango and similar soils:* 90 percent
*Minor components:* 9 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Chenango**

**Setting**

*Landform:* Outwash terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Convex, linear
*Across-slope shape:* Linear, convex
*Parent material:* Gravelly outwash

**Typical profile**

*H1 - 0 to 10 inches:* silt loam
*H2 - 10 to 21 inches:* gravelly fine sandy loam
*H3 - 21 to 48 inches:* very gravelly loamy coarse sand

**Properties and qualities**

*Slope:* 3 to 12 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Runoff class:* Low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 6.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 3.5 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* A
*Hydric soil rating:* No

**Minor Components**

**Braceville**

*Percent of map unit:* 9 percent
*Landform:* Outwash terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## Hs—Holly silt loam

**Map Unit Setting**

*National map unit symbol:* l3cr
*Elevation:* 400 to 1,170 feet
*Mean annual precipitation:* 30 to 45 inches
*Mean annual air temperature:* 45 to 54 degrees F
*Frost-free period:* 120 to 187 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**

*Holly and similar soils:* 90 percent
*Minor components:* 10 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Holly**

**Setting**

*Landform:* Depressions on flood plains, backswamps
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope

*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Parent material:* Loamy alluvium derived from sandstone and shale

**Typical profile**
*H1 - 0 to 11 inches:* silt loam
*H2 - 11 to 42 inches:* silty clay loam
*H3 - 42 to 60 inches:* stratified very gravelly loamy sand

**Properties and qualities**
*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Poorly drained
*Runoff class:* Very high
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.20 to 2.00 in/hr)
*Depth to water table:* About 0 to 12 inches
*Frequency of flooding:* Frequent
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* High (about 11.0 inches)

**Interpretive groups**
*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* B/D
*Ecological site:* F147XY011PA - Poorly Drained Fine Mixed Floodplain
*Hydric soil rating:* Yes

**Minor Components**

**Basher**
*Percent of map unit:* 5 percent
*Hydric soil rating:* No

**Holly, ponded**
*Percent of map unit:* 5 percent
*Landform:* Flood plains
*Hydric soil rating:* Yes

## Ma—Made land

**Map Unit Setting**
*National map unit symbol:* l3fb
*Elevation:* 800 to 1,500 feet
*Mean annual precipitation:* 36 to 46 inches
*Mean annual air temperature:* 41 to 62 degrees F
*Frost-free period:* 130 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**
*Udorthents, unstable fill, and similar soils:* 90 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Udorthents, Unstable Fill**

**Setting**

*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Acid loamy human transported material derived from interbedded sedimentary rock

**Typical profile**

*C - 0 to 65 inches:* extremely channery silt loam

**Properties and qualities**

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Runoff class:* Medium
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 4.2 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 6s
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

## W—Water

**Map Unit Setting**

*National map unit symbol:* 1hfsf
*Mean annual precipitation:* 34 to 51 inches
*Mean annual air temperature:* 40 to 50 degrees F
*Frost-free period:* 100 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Water:* 100 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

# Soil Information for All Uses

## Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

## AOI Inventory

This folder contains a collection of tabular reports that present a variety of soil information. Included are various map unit description reports, special soil interpretation reports, and data summary reports.

### Map Unit Description (Brief, Generated) (Bloomsburg West End Flood Mitigation)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, provide information on the composition of map units and properties of their components.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous

areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

## Report—Map Unit Description (Brief, Generated) (Bloomsburg West End Flood Mitigation)

**Columbia County, Pennsylvania**

**Map Unit:** BrA—Braceville loam, 0 to 3 percent slopes

**Component:** Braceville (85%)

The Braceville component makes up 85 percent of the map unit. Slopes are 0 to 3 percent. This component is on outwash terraces. The parent material consists of coarse-loamy outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during January, February, March, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F140XY020NY Dense Outwash ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

**Component:** Chenango (10%)

Generated brief soil descriptions are created for major soil components. The Chenango soil is a minor component.

**Component:** Atherton (5%)

Generated brief soil descriptions are created for major soil components. The Atherton soil is a minor component.

**Map Unit:** BrB—Braceville loam, 3 to 8 percent slopes

**Component:** Braceville (85%)

The Braceville component makes up 85 percent of the map unit. Slopes are 3 to 8 percent. This component is on outwash terraces. The parent material consists of coarse-loamy outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or

restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during January, February, March, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F140XY020NY Dense Outwash ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

**Component:** Chenango (10%)

Generated brief soil descriptions are created for major soil components. The Chenango soil is a minor component.

**Component:** Atherton (5%)

Generated brief soil descriptions are created for major soil components. The Atherton soil is a minor component.

**Map Unit:** CgA—Chenango gravelly sandy loam, 0 to 3 percent slopes

**Component:** Chenango (90%)

The Chenango component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on glacial outwash terraces. The parent material consists of gravelly outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria.

**Component:** Braceville (9%)

Generated brief soil descriptions are created for major soil components. The Braceville soil is a minor component.

**Map Unit:** ChA—Chenango silt loam, 0 to 3 percent slopes

**Component:** Chenango (90%)

The Chenango component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on glacial outwash terraces. The parent material consists of gravelly outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 1. This soil does not meet hydric criteria.

**Component:** Braceville (9%)

Generated brief soil descriptions are created for major soil components. The Braceville soil is a minor component.

**Map Unit:** ChB2—Chenango silt loam, 3 to 12 percent slopes, moderately eroded

**Component:** Chenango (90%)

The Chenango component makes up 90 percent of the map unit. Slopes are 3 to 12 percent. This component is on glacial outwash terraces. The parent material consists of gravelly outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

**Component:** Braceville (9%)

Generated brief soil descriptions are created for major soil components. The Braceville soil is a minor component.

**Map Unit:** Hs—Holly silt loam

**Component:** Holly (90%)

The Holly component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on backswamps, depressions on flood plains. The parent material consists of loamy alluvium derived from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, December. Organic matter content in the surface horizon is about 4 percent. This component is in the F147XY011PA Poorly Drained Fine Mixed Floodplain ecological site. Nonirrigated land capability classification is 4w. This soil meets hydric criteria.

**Component:** Basher (5%)

Generated brief soil descriptions are created for major soil components. The Basher soil is a minor component.

**Component:** Holly, ponded (5%)

Generated brief soil descriptions are created for major soil components. The Holly, ponded soil is a minor component.

**Map Unit:** Ma—Made land

**Component:** Udorthents, unstable fill (90%)

The Udorthents, unstable fill component makes up 90 percent of the map unit. Slopes are 0 to 8 percent. This component is on fills. The parent material consists of acid loamy human transported material derived from interbedded sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

**Map Unit:** W—Water

**Component:** Water (100%)

Generated brief soil descriptions are created for major soil components. The Water is a miscellaneous area.

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# Figure 3

Wetland Delineation Map

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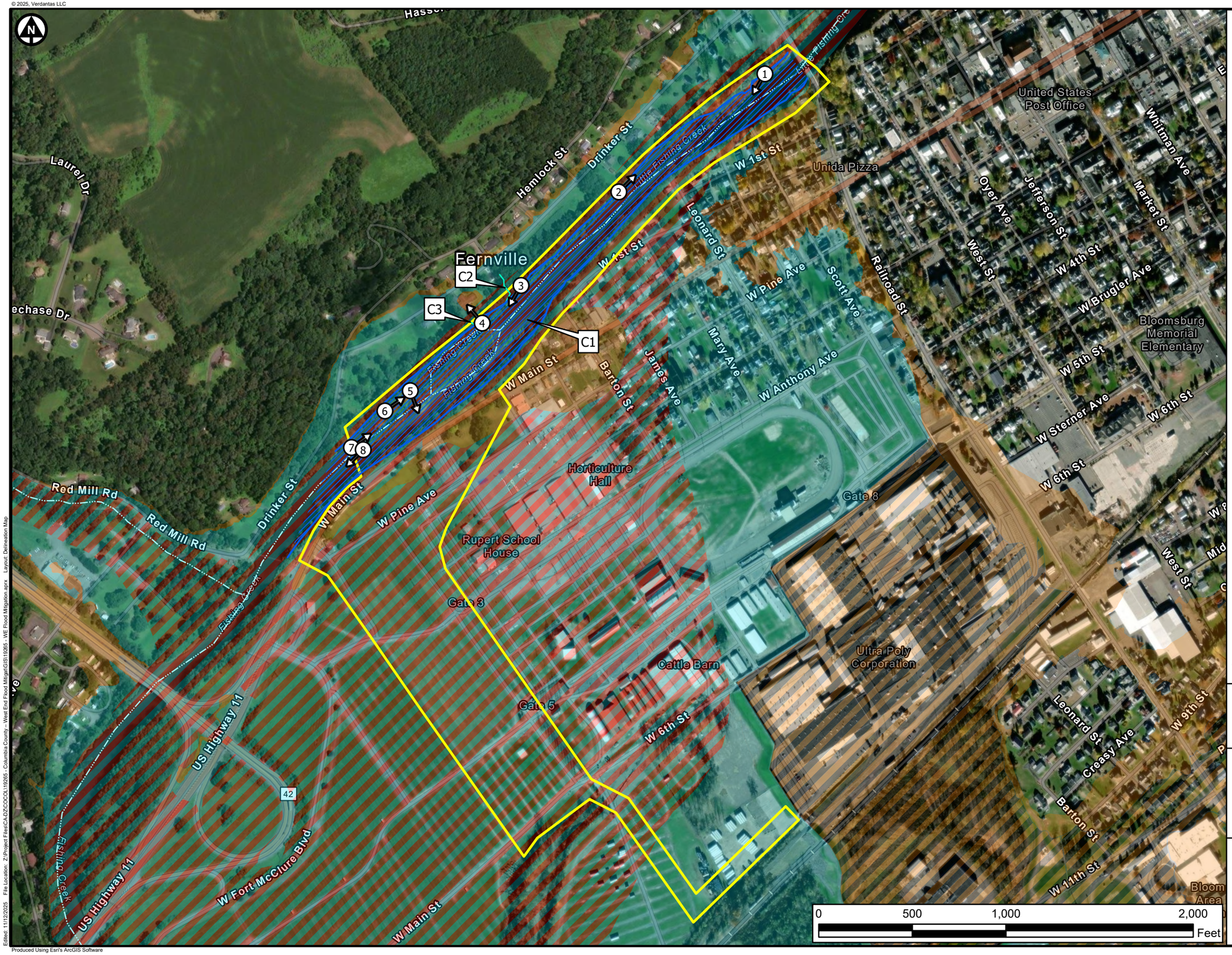


## Legend

- Survey Area
- Photo Location
- PADEP Stream

**Watercourse Boundary**

- EPH
- PER

**Watercourse Hatch**

- PER

**Flood Hazard Zones**

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- 0.2% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee

**Note:** The aerial photo was acquired through the Esri Imagery Web Service. Aerial photography dated 2021.

DISCLAIMER: Verdantas LLC has furnished this map to the Client for its sole and exclusive use as a preliminary planning and screening tool. This map is reproduced from geospatial information compiled from third-party sources which may change over time and are not accurate as to mapping, surveying or engineering standards. Verdantas LLC makes no representation or warranty as to the content, accuracy, timeliness or completeness of any information. In no event will Verdantas LLC, its owners, officers, employees or agents, be liable for damages of any kind arising out of the use of this map by Client or any other party.

verdantas

Town of Bloomsburg & Hemlock Township
Columbia County, PA

# Wetland Delineation Map

Wetland Delineation Report
Columbia County West End Flood Mitigation

| | |
|---|---|
| Project Number | 19265 |
| Date | 11/2025 |
| Author | ETwining |
| Scale | 1 in = 500 ft |
| Figure | 3 |

Edited: 11/12/2025 File Location: Z:\Project Files\CA-DZ\CCOC\119265 - Columbia County – West End Flood Mitigat\GIS\19265 - WE Flood Mitigation.aprx Layout: Delineation Map

Produced Using Esri's ArcGIS Software

# Appendix A

Photolog

1. View of watercourse C1 looking southwest. Photo taken September 2025.

2. View of watercourse C1 looking northeast. Photo taken September 2025.

3. View of watercourse C2 looking southwest. Photo taken September 2025

4. View of watercourse C3 looking northwest. Photo taken September 2025.

5. View of watercourse C1 looking southeast. Photo taken September 2025.

6. View of island within watercourse C1. Photo taken September 2025.

7. View of island within watercourse C1 looking upstream. Photo taken September 2025.

8. View of watercourse C1 looking downstream. Photo taken September 2025.

# Appendix B

Wetland Determination Data Forms

## Watercourses Data Sheet

**Project:** West End Flood Mitigation

**Applicant/Owner:** Columbia County

**Date:** 9/24/2025 **Crew:** LTH/LMC

**State:** PA **Township/Borough:** Bloomsburg/Hemlock **County:** Columbia

**Feature ID:** C1 (Fishing Creek)

**Flag Numbers:** C1-01 thru C1-37

**Feature Hydrologic Class: (check one)**

*Tidal* _____ *Perennial* ✓ *Intermittent* _____ *Ephemeral* _____

**Feature Description: (check all that apply)**

*Natural Channel Shape* ✓ *Straightened* _____ *Created/Excavated* _____

*Man-made Roadside ditch* _____ *Agricultural ditch* _____ *SWM channel* _____

*SWM pond: wet* _____ *dry* _____ *Beaver pond* _____

*Other* _____

**Average width** 150-250 **(ft)** **Average depth** 3-15 **(ft)**

**Average water depth** 1-5 **(ft)**

**Bottom substrate:**

cobble, boulder bottom

### Adjacent landcover/vegetation left bank:

Norway Maple, Silver Maple, Sycamore, Japanese Knotweed, Japanese Stiltgrass, Privet, Oriental Bittersweet, Poison Ivy

### Adjacent landcover/vegetation right bank:

Norway Maple, Silver Maples, Sycamore, Japanese Knotweed, Japanese Stiltgrass, Privet, Oriental Bittersweet, Poison Ivy

### Additional Observations/Notes:

Island in middle.
Riparian buffer intact.
Islands - Sycamore (3'-5') sapling and mature, deer sign. No mussel shells in walkable area of island.

## Watercourses Data Sheet

**Project:** West End Flood Mitigation

**Applicant/Owner:** Columbia County

**Date:** 9/24/2025 **Crew:** LTH/LMC

**State:** PA **Township/Borough:** Bloomsburg/Hemlock **County:** Columbia

**Feature ID:** C2

**Flag Numbers:** C2-01 thru C2-06; CL only

**Feature Hydrologic Class: (check one)**

*Tidal* _____ *Perennial* _____ *Intermittent* _____ *Ephemeral* ✓

**Feature Description: (check all that apply)**

*Natural Channel Shape* ✓ *Straightened* _____ *Created/Excavated* _____

*Man-made Roadside ditch* _____ *Agricultural ditch* _____ *SWM channel* _____

*SWM pond: wet* _____ *dry* _____ *Beaver pond* _____

*Other* _____

**Average width** 1-3 **(ft)** **Average depth** 1-3 **(ft)**

**Average water depth** 0 **(ft)**

**Bottom substrate:**

gravel, mud bottom

**Adjacent landcover/vegetation left bank:**

Japanese Knotweed

**Adjacent landcover/vegetation right bank:**

Japanese Knotweed

**Additional Observations/Notes:**

Flows from culvert

## Watercourses Data Sheet

**Project:** West End Flood Mitigation

**Applicant/Owner:** Columbia County

**Date:** 9/24/2025 **Crew:** LTH/LMC

**State:** PA **Township/Borough:** Bloomsburg/Hemlock **County:** Columbia

**Feature ID:** C3

**Flag Numbers:** C3-01 thru C3-03; CL only

**Feature Hydrologic Class: (check one)**

*Tidal* _____ *Perennial* _____ *Intermittent* _____ *Ephemeral* ✓

**Feature Description: (check all that apply)**

*Natural Channel Shape* _____ *Straightened* _____ *Created/Excavated* ✓

*Man-made Roadside ditch* _____ *Agricultural ditch* _____ *SWM channel* ✓

*SWM pond: wet* _____ *dry* _____ *Beaver pond* _____

*Other* _____

**Average width** 1-3 **(ft)** **Average depth** 1-3 **(ft)**

**Average water depth** 0 **(ft)**

**Bottom substrate:**

gravel mud bottom

**Adjacent landcover/vegetation left bank:**

Japanese Knotweed

**Adjacent landcover/vegetation right bank:**

Japanese Knotweed

**Additional Observations/Notes:**

Flows from culvert.

**USACOE Nationwide Permit Definitions:**

**Tidal Wetland:** A tidal wetland is a wetland (i.e., water of the US) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line (i.e., spring high tide line) and are inundated by tidal waters two times per lunar month, during spring high tides.

**Perennial Stream:** A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

**Intermittent Stream:** An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow

**Ephemeral Stream:** An ephemeral stream has flowing water only during and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

# Appendix C

Professional Qualifications

# Leigh Ann Henry, CNRP, ENV SP

Environmental Scientist III

### Firm

Verdantas

### Office Location

Wilkes-Barre, PA

### Education

B.S., Environmental Science, King's College

### Licenses/Certifications

Certified Natural Resources Professional (9592026025220822)

PA DCNR Wild Plant Management Permit (22-830)

Phase I Bog Turtle Habitat Surveyor

ISI Envision Sustainability Professional

### Qualifications

- Wetland & Other Waters Delineations
- Water Obstruction & Encroachment Permitting
- T&E Species Surveys & Coordination

### Years of Experience

15 Years of Industry Experience

13 Years at Verdantas

Leigh Ann Henry is an Environmental Scientist within Verdantas' Natural Resources Discipline. In 15 years, Ms. Henry has worked for government, non-profit and private industries in various areas related to the environment. Client understanding ranges from small, local non-profits, to nationwide companies to federal agencies. She has considerable knowledge and experience in conducting wetland delineations, environmental permitting, T&E Species surveys, agency coordination report preparation and GIS mapping. Ms. Henry also has experience in aquatic resource surveys, abandoned mine issues, environmental due diligence and environmental sampling. Ms. Henry has obtained relevant experience on the following projects:

## Project Experience

### Natural Resources & Environmental Permitting

**PPL Electric Utilities Corporation, Transmission & Distribution Projects, Various Counties, PA:** Conducted screening and delineation services of wetlands and watercourses along PPL's transmission and distribution line rights-of-way and access roads in order to identify potential wetlands and waters of the United States which may be impacted by construction and maintenance activities. Responsibilities included the identification, classification and mapping of wetlands and stream features in the field through the utilization of a global positioning system (GPS), preparation and submission of Chapter 105/404 permits for the Pennsylvania Department of Environmental Protection and U.S. Army Corps of Engineers, Submerged Land License Agreements (SLLA) for utility line stream crossing activities, and T&E species surveys and clearance.

Additionally responsible for the identification and mapping of potential environmental constraints in association with utility line projects. Work included identification of wetlands and watercourses, stream classifications, potential HOP permit areas, access limitations, PA Historical and Museum Commission (PHMC) and PA Natural Heritage Program (PNHP) areas, and possible railroad crossings along rights-of-way. The information was incorporated into GIS mapping of constraints and the determination of appropriate Chapter 105/Section 404 Encroachment permits.

**Oil and Gas Upstream & Midstream Projects, Various Counties, PA**: Conducted delineation services of wetlands and watercourses along proposed natural gas well pad and pipeline projects and associated access roads in order to identify potential wetlands and waters of the United States which may be impacted by the pipeline and access road crossings. Responsibilities included the identification, classification and mapping of wetlands and stream features in the field through the utilization of a global positioning system (GPS), preparation and

submission of Chapter 105/404 permits for the Pennsylvania Department of Environmental Protection and U.S. Army Corps of Engineers, T&E species surveys and clearance.

**PennDOT Improvement Projects, Various Counties, PA:** Conducted with the wetland delineations along stretches of state-owned roadways. Responsibilities included the identification, classification and mapping of wetlands and stream features in the field through the utilization of a global positioning system (GPS), preparation and submission of Chapter 105/404 permits for the Pennsylvania Department of Environmental Protection and U.S. Army Corps of Engineers, T&E species surveys and clearance.

**SEDA/COG - Columbia County, Bloomsburg Flood Protection Project, Bloomsburg, PA:** Environmental Scientist who conducted wetland and other waters delineations in accordance The work was in support of a major flood protection system. Used GPS to survey hydrologic features, utilized GPS field data in GIS and AutoCAD software to create data layers and drawings to be incorporated into the engineering design. Prepared the Wetland Delineation Report and Water Obstruction and Encroachment Permits for approval by PA DEP and ACOE.

Additionally, assisted with wetland mitigation monitoring and coordination with the ACOE as part of permit requirements.

**Shoener Environmental, Inc., Wind Farm Projects, Various, PA & NY:** Environmental Scientist who performed wetland and other waters delineations in accordance with US Army Corps of Engineers (USACE) technical guidelines and completed wetlands and other waters delineation reports. Used GPS to survey hydrologic features, utilized GPS field data to create data layers and GIS maps to be utilized in engineering design. Conducted surveys for rare/threatened plant and animal species occurrences following PA DCNR and USDA-FWS guidelines. Completed Water Obstruction and Encroachment Permits for approval by PADEP and ACOE, prepared NPDES/Erosion and Sediment (E&S) Control permit narrative and application forms for approval by county conservation districts and PADEP. The work supported the Wind Energy

## Additional Relevant Experience

**Electric, Gas and Water Utilities, Oil & Gas Industry, Wind Farm Development, Land Development, Transportation Projects** | **Various Counties, PA**

Assisted with annual monitoring and reporting requirements of wetland mitigation sites and coordination with regulatory agencies.

Prepared NPDES/Erosion and Sediment Control permit narratives, application forms and mapping.

Conducted groundwater quality monitoring for preconstruction, during and post construction activities with annual reporting to state and federal agencies.

Conducted watershed monitoring and assessment activities throughout the Susquehanna River Basin, and in some cases contributed to development of Total Maximum Daily Loads (TMDLs). Utilized state and federal protocols for the collection of hydrology, water quality, biology, and habitat data. Gained experience working on pollution issues associated with agriculture, abandoned mine drainage, stormwater, and atmospheric deposition.

Collected water samples for submission to PADEP Lab, Field water chemistry (Temperature, pH, Dissolved Oxygen, Conductivity, Acidity and Alkalinity titrations), flow measurement, benthic macroinvertebrate collection, and conducted habitat assessment surveys

Participated in weir installation, site preparation and sampling of coal mine discharges while working with a local nonprofit.

## T&S Specific Experience

**Electric, Gas and Water Utilities, Oil & Gas Industry, Wind Farm Development, Land Development, Transportation Projects | Various Counties, PA**

Coordination with PGC, DCNR and USFWS regarding protocols, and project resolutions.

Completed a comprehensive bat training that included species identification, passive and active survey techniques such as acoustic, thermal imaging, mist netting, harp trapping, as well as individual assessment and banding.

Assisted PGC with trapping, assessing and banding bats at the Ice Caves in Newport Township, Luzerne County, PA.

Conducted presence/absence and emergence surveys.

Conducted bat habitat assessments for natural gas, utility and land development projects.

Used harp trap method to capture bats and attached radio tag on bats and used radio telemetry to determine location of day roosts.

Performed botanical surveys for Species of Special Concern following PA DCNR protocols.

# Lisa Clementoni, PWS

Senior Environmental Scientist

### Firm

Verdantas

### Office Location

Wilkes-Barre, PA

### Education

B.S., Environmental Science, Susquehanna University

### Licenses/Certifications

Professional Wetland Scientist (#2680)

### Qualifications

- Project Management
- Natural Resources
- Environmental Planning
- Wild Plant Management
- Wetland Delineation

### Years of Experience

24 Years of Industry Experience

24 Years at Verdantas

As a Senior Project Manager, Lisa currently holds over 24 years of experience in the environmental consulting field. She completes environmental evaluations for land developments, highway projects, master plans, and ecological restoration projects. Lisa conducts wetland delineations on various sites for planned development and natural resource planning and prepares and secures State and Federal water obstruction and encroachments permits, such as Joint Permits, General Permits, Waivers, and Environmental Assessments. Her strong relationships with regulatory agencies have proven to move the permit review process along efficiently. She is responsible for the design of wetland mitigation/restoration projects, threatened and endangered species coordination and botanical/habitat assessment studies, permit acquisition, and historic and archaeological coordination.

## Project Experience

### Columbia County Flood Mitigation Project

**Town of Bloomsburg, PA**
Natural Resources Lead responsible for wetland delineation, mitigation design, and securing Joint Permit Application as part of the $30 million flood mitigation system located in Bloomsburg, Columbia County, Pennsylvania. Lisa's work involved rigorous coordination with the Baltimore District Army Corps of Engineers in resolving conservation easement and deed restriction issues in the protection of wetlands in perpetuity. Construction related impacts also resulted in the execution of a wetland mitigation design plan and monitoring program, which included piezometer installation throughout the site, during a 5-year post-construction period to assess wetland function and value of the constructed wetland and existing large wetland complex on the interior side of the levee.

### Wyoming Valley Sanitary Authority MS4 Program Management

**Luzerne County, PA**
Lisa managed the MS4 Program / Chesapeake Bay Regional Pollutant Reduction Plan projects for WVSA, which included nature-based solutions and other green stormwater infrastructure projects such as stream restoration, rain gardens, stormwater basin retrofits, wet ponds, and stormwater parks. The 5-year permit cycle program credits removal of 2.5M pounds of TSS per year from the Bay through implementation of these projects. Lisa performed the ecological restoration design on all stream projects in this program, while managing other MS4 consultants, reviewing and preparing bid packages, and servicing client through construction inspection to project close out.

## Due Diligence for Proposed Gas Processing Facility

**Newport Township, PA**
Senior environmental scientist responsible to coordinate preliminary due diligence review of existing mine scarred land to determine viability for development. Coordinated preliminary pre-application meeting with the PA Department of Environmental Protection to advise client on required environmental permitting required for the proposed development.

## Solomon Creek Brook Street Stormwater/Flood Control Pump Station

**City of Wilkes-Barre, PA**
Environmental Lead for a 45,000 gallon per minute stormwater/flood control pump station located along Solomon Creek (a major tributary to the Susquehanna River) on Brook Street in South Wilkes-Barre, Luzerne County. The pump station is required to eliminate localized flooding, due to interior stormwater drainage issues, that occurs in a large residential and commercial area of South Wilkes-Barre adjacent to Solomon Creek. Permitting for the project included a PADEP GP-11 to address construction within the FEMA defined floodway. Construction was completed in November 2020. Total project costs approximately $1.6 million.

## Flood Risk Management Expansion Project

**Town of Bloomsburg & Bloomsburg Area School District, PA**
Environmental Lead responsible for wetland delineation, and mitigation design for a new earthen levee flood risk management system. The flood risk management system included 4,400-feet of earthen levee, three (3) roadway stop-log closure structures, two (2) storm water pump stations rated at 30,000 GPM each, two (2) sanitary pump stations including a 10 MGD station and a 55,000 GPD packaged duplex grinder station, 2,600 lineal feet of 48-inch storm water SLCPP, storm water control manholes including sluice gates, sanitary sewer line work, and public utility coordination/relocations. The project required the approval of a Conditional Letter of Map Revision (CLOMR) from FEMA which was approved on December 18, 2018. A letter of map revision (LOMR) application is under preparation by Borton Lawson and will be secured to formally revise the 100-year flood plain on the Flood Insurance Rate Map (FIRM) for the levee protected area. A comprehensive Operation & Maintenance Manual (O&M) was developed for the overall flood risk management system. Construction was successfully completed, within budget, in December 2020. Borton Lawson is preparing the data certification package and application to FEMA to obtain full Accreditation of this levee system. Total project costs approximately $18 million.

## Wetland Delineation/Environmental Permitting Services, Various PPL Transmission & Distribution Projects

**PPL Electric Utilities Various Counties, PA**
Conducted screening and delineation services of wetlands and watercourses along over 200+ miles of PPL's transmission and distribution line rights-of-way and access roads in order to identify potential wetlands and waters of the United States which may be impacted by accessing poles. Responsibilities included the identification, classification and mapping of wetlands and stream features in the field through the utilization of a global positioning system (GPS), preparation and submission of Chapter 105/404 permits for the Pennsylvania Department of Environmental Protection and U.S. Army Corps of Engineers, Submerged Land License Agreements (SLLA) for utility line stream crossing activities, and T&E species surveys and clearance.

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Ecological Services Field Office
110 Radnor Road Suite 101
State College, PA 16801-7987
Phone: (814) 234-4090 Fax: (814) 234-0748

In Reply Refer To: 09/19/2025 19:23:05 UTC
Project code: 2025-0152208
Project Name: Columbia County West End Flood Mitigation

Federal Nexus: yes
Federal Action Agency (if applicable):

Subject: Technical assistance for 'Columbia County West End Flood Mitigation'

Dear Lisa Clementoni:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on September 19, 2025, for “Columbia County West End Flood Mitigation” (here forward, Project). This project has been assigned Project Code 2025-0152208 and all future correspondence should clearly reference this number.

The Service developed the IPaC system and associated species’ determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into the IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC or the Northeast Determination Key (Dkey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative effect(s)), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (See § 402.17). Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no further consultation with, or concurrence from, the Service is required (ESA §7). If a proposed Federal action may affect a listed species or designated critical

habitat, formal consultation is required (except when the Service concurs, in writing, that a proposed action "is not likely to adversely affect (NLAA)" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13]).

The IPaC results indicated the following species is (are) potentially present in your project area and, based on your responses to the Service's Northeast DKey, you determined the proposed Project will have the following effect determinations:

| Species | Listing Status | Determination |
|---|---|---|
| Green Floater (*Lasmigona subviridis*) | Proposed Threatened | May affect |
| Indiana Bat (*Myotis sodalis*) | Endangered | NLAA |
| Northeastern Bulrush (*Scirpus ancistrochaetus*) | Endangered | May affect |

**Consultation with the Service is not complete.** Further consultation or coordination with the Service is necessary for those species or designated critical habitats with a determination of "May Affect". Please contact our Pennsylvania Ecological Services Field Office to discuss methods to avoid or minimize potential adverse effects to those species or designated critical habitats.

**Other Species and Critical Habitat that May be Present in the Action Area**

In addition to the species listed above, the following species and/or critical habitats may also occur in your project area and are not covered by this conclusion:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Northern Long-eared Bat *Myotis septentrionalis* Endangered

Please Note: If the Action may impact bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d) by the prospective permittee may be required. Please contact the Migratory Birds Permit Office, (413) 253-8643, or PermitsR5MB@fws.gov, with any questions regarding potential impacts to Eagles.

If you have any questions regarding this letter or need further assistance, please contact the Pennsylvania Ecological Services Field Office and reference the Project Code associated with this Project.

**Action Description**
You provided to IPaC the following name and description for the subject Action.

**1. Name**

Columbia County West End Flood Mitigation

**2. Description**

The following description was provided for the project 'Columbia County West End Flood Mitigation':

> Construct Flood Control Levee and create floodplain bench along Fishing Creek as Flood Mitigation

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@40.9963784,-76.47074647265553,14z

# QUALIFICATION INTERVIEW

1. As a representative of this project, do you agree that all items submitted represent the complete scope of the project details and you will answer questions truthfully?

   *Yes*

2. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed species?

   **Note:** This question could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered, or proposed species.

   *No*

3. Is the action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   **Note:** for projects in Pennsylvania: Projects requiring authorization under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act would be considered as having a federal nexus. Since the U.S. Army Corps of Engineers (Corps) has issued the Pennsylvania State Programmatic General Permit (PASPGP), which may be verified by the PA Department of Environmental Protection or certain Conservation Districts, the need to receive a Corps authorization to perform the work under the PASPGP serves as a federal nexus. As such, if proposing to use the PASPGP, you would answer ‘yes’ to this question.

   *Yes*

4. Are you including in this analysis all impacts to federally listed species that may result from the entirety of the project (not just the activities under federal jurisdiction)?

   **Note:** If there are project activities that will impact listed species that are considered to be outside of the jurisdiction of the federal action agency submitting this key, contact your local Ecological Services Field Office to determine whether it is appropriate to use this key. If your Ecological Services Field Office agrees that impacts to listed species that are outside the federal action agency's jurisdiction will be addressed through a separate process, you can answer yes to this question and continue through the key.

   *Yes*

5. Are you the lead federal action agency or designated non-federal representative requesting concurrence on behalf of the lead Federal Action Agency?

   *No*

6. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)?

   *No*

7. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

   *No*

8. Is the lead federal action agency the Natural Resources Conservation Service?

   *No*

9. Will the proposed project involve the use or storage of herbicide?

   *No*

10. Will the proposed project involve herbaceous native vegetation removal (including prescribed fire that would result in burning of plants) or mowing?

    *Yes*

11. Will all activities occur within an area that is currently paved, graveled, routinely maintained lawn, and/or inside a structure?

    *No*

12. Will the proposed project involve demolition, rehabilitation, property elevation, renovation, and/or rebuilding of one or more existing buildings (e.g., residential, commercial and industrial buildings, or utilities)? Note: if project activities include modification of bridges and/or culverts, answer this question "No".

    *Yes*

13. Is the entire project footprint, including staging areas, currently developed or hard surfaced (i.e., the site consists entirely of existing roads, sidewalks, buildings, driveways, routinely mown grass etc.) and does not contain any undeveloped and/or previously undisturbed vegetated areas?

    *No*

14. Does your project involve excessive noise (e.g. jackhammer or other equipment use outside a building that requires hearing protection for the operator), new hydrological impacts (e.g., changes to stormwater discharge), or impacts to structures that are being used by any federally endangered or threatened species (e.g., roosting Indiana bats, nesting piping plover or roseate tern using gravel or paved surfaces, etc.) or are there known reports of species using areas within the project footprint? Note: If unsure, answer no or conduct a site survey to ensure that listed species are not present.

    *Yes*

15. Will completion of this project require clearing or land disturbance of any areas that were not already developed and/or disturbed prior to the start of the proposed project?
    Note: Examples of land disturbance may include, but are not limited to, grading, tree or vegetation removal, excavation, etc.

    *Yes*

16. Does the project area intersect the boundary of VAFO?

    **Automatically answered**
    *No*

17. Does any component of the project associated with this action include activities or structures that may pose a collision risk to **birds** (e.g., plane-based surveys, land-based or offshore wind turbines, new or enlarged communication towers or broadcast towers, high voltage transmission lines, any type of towers with or without guy wires)?

    *No*

18. Are federally listed freshwater mussels known to be present in the action area?

    **Note:** If unsure, contact the appropriate Ecological Services Field Office for additional information or answer "NO" and continue through the key.

    *Yes*

19. Will the proposed project result in **permanent** changes to surface water or groundwater quantity, retention, quality or timing?

    **Note**: Projects may affect stream flow, surface water, or groundwater through various activities such as; water withdrawal, water recharge, well drilling, infiltration impacts, stormwater outlets, hydropower production, water impoundments, intake structures, stream diversion, mining operations, dams, surface water drainage, or hydroelectric turbines.

    If a project only involves temporary and limited reductions in water that will not displace listed species or significantly alter their water availability (meaning there are no changes to their feeding, breeding, or sheltering), you can answer "No" to this question.

    This question specifically addresses the quantity of water in a stream. Other water quality issues, such as sedimentation and turbidity, will be covered in subsequent questions.

    *Yes*

20. Does the project include activity in or within 300 feet of a freshwater wetland?

    **Note:** This encompasses various project activities related to wetlands, including activities taking place within wetlands, activities occurring within 300 feet of wetlands that could impact them, and water withdrawals and/or discharge of contaminants, even if covered by a National Pollutant Discharge Elimination System (NPDES) permit

    Examples of such activities include, but are not limited to; wetland draining, ditching, tilling, filling, excavation, stream diversion, impoundments, mowing, grazing vegetation, construction of access roads, creation of detention basins, installation of water or sewer lines, irrigation, increase of impervious surfaces, and application of pesticides, deicing agents, or fertilizers.

    *Yes*

21. Will the proposed project directly affect a streambed (below ordinary high water mark (OHWM)) of the stream?

    *Yes*

22. Will the proposed project bore underneath (directional bore or horizontal directional drill) a stream where listed species may be present?

    *No*

23. Will the proposed project involve a new point source discharge into a stream or change an existing point source discharge (e.g., outfalls; leachate ponds, fracking fluid) including changes to pH, temperature and/or chemical composition (e.g., choloride, nickel,etc.)?

    *No*

24. Will the proposed project involve the removal of sediment or debris, dredging or in-stream gravel mining where listed species may be present?

    *Yes*

25. Will the proposed project involve the creation of a new water-borne contaminant source where listed species may be present?

    **Note:** New water-borne contaminant sources occur through improper storage, usage, or creation of chemicals. For example: leachate ponds and pits containing chemicals that are not NSF/ANSI 60 compliant have contaminated waterways. Sedimentation will be addressed in a separate question.

    *No*

26. Will the proposed project involve perennial stream loss, in a stream of tributary of a stream where listed species may be present, that would require an individual permit under 404 of the Clean Water Act?

    *No*

27. Will the proposed project involve pesticide use or storage within 200 feet of a karst feature or

    perennial stream bank where aquatic listed species may be present?

    *No*

28. Will the proposed project include activities that could negatively affect fish movement temporarily or permanently (including fish stocking, harvesting, or creation of barriers to fish passage).

    *Yes*

29. Will the proposed project involve earth moving or other ground disturbance that could cause erosion and sedimentation, and/or contamination within 300 feet of a freshwater wetland or along a stream?

    **Note**: Answer "Yes" to this question if erosion and sediment control measures will be used.

    *Yes*

30. Will the proposed project impact streams or tributaries of streams where listed species may be present through activities such as, but not limited to, valley fills, large-scale vegetation removal that could result in ground destabilization, and/or change in site topography?

    *Yes*

31. Will the proposed project involve vegetation removal within 300 feet of a perennial stream bank where aquatic listed species may be present?

    *Yes*

32. Will erosion and sedimentation control Best Management Practices (BMPs) associated with applicable state and/or Federal permits, be applied to the project?

    **Note:** If BMPs have been provided by and/or coordinated with and approved by the appropriate Ecological Services Field Office, answer "Yes" to this question.

    *Yes*

33. Is the project being funded, lead, or managed in whole or in part by U.S Fish and Wildlife Restoration and Recovery Program (e.g., Partners, Coastal, Fisheries, Wildlife and Sport Fish Restoration, Refuges)?

    *No*

34. Does the proposed project involve construction or installation of a non-commercial boat dock on a stream?

    *No*

35. Does any component of the project associated with this action include activities or structures that may pose a collision risk to **bats** (e.g., plane-based surveys, land-based or offshore wind)?

    *No*

36. Will the proposed project affect wetlands in areas where **bats** may be present?

    *Yes*

37. Will the proposed project involve blasting where bats may be present?

    *No*

38. Does the project intersect the Indiana bat species list area?

    **Automatically answered**
    *Yes*

39. Are there any caves, mines, or mine features that are suitable for hibernating Indiana bats within the area expected to be impacted by the project?

    *No*

40. Are trees present within the action area?

    **Note:** If there are trees within the action area that are of a sufficient size to be potential roosts for bats (i.e., live trees and/or snags ≥5 inches dbh (12.7 centimeter), answer "Yes". If you are unsure, answer “Yes.” Or refer to Appendix A of the Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines for definitions and an assessment form that will assist you in determining if suitable habitat is present within your project's action area. Suitable summer habitat for Indiana bat consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches dbh (12.7 centimeter) that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat.

    *Yes*

41. Has a presence/probable absence bat survey following the Service’s Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines been conducted within the action area?

    *No*

42. Does the project involve removal or modification of a human-made structure (barn, house, or other building) known or suspected to contain roosting bats? **Note:** Most maintenance and general human disturbance in and around structures will not affect Indiana bats as bats roosting in human structures are adjusted to a certain level of routine noise and are generally expected to roost away from areas with excessive disturbance. Answer 'no' if the proposed action will not include disturbance to human structures known or suspected to contain roosting bats or if the structure does not offer suitable roosting habitat for northern long-eared bats. If unsure, answer 'yes.'

    *No*

43. Does the project include removal/modification of an existing culvert?

    *No*

44. Does the project include removal/modification of an existing bridge?

    *No*

45. Will the project include tree cutting, other means of knocking down or bringing down trees, or tree trimming?

    *Yes*

46. Is the project related to the production of coal, including projects that support the mining of coal, as well as the production and/or distribution of energy produced from coal?

    *No*

47. Does the project include emergency cutting or trimming of hazard trees in order to remove an imminent threat to human safety or property?

    *No*

48. Does the project intersect with the 0- 9.9% forest density category?

    **Automatically answered**
    *No*

49. Does the project intersect with the 10.0- 19.9% forest density category map?

    **Automatically answered**
    *No*

50. Does the project intersect with the 20.0- 29.9% forest density category map?

    **Automatically answered**
    *Yes*

51. Will the action cause trees to be cut, knocked down, or otherwise brought down across an area greater than 40 acres in total extent?

    *No*

52. Will any tree cutting/trimming or other knocking or bringing down of trees occur during the **Pup Season** for Indiana bats in the action area?

    Note: Bat activity periods for your state can be found in Appendix L of the Service's Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines.

    *No*

53. Will the project be associated with a timber harvest or timber sale for management or thinning purposes (not including clear cut), including skid trails, roads, landings and/or stream crossings?

    *No*

54. Will the project result in the use of prescribed fire?

    *No*

55. Does the project include temporary or permanent lighting of roadway(s), facility(ies), and/or parking lot(s)?

    *No*

56. Does the project area intersect the Species List Area of the Green Floater Mussel?

    **Automatically answered**
    *Yes*

57. Does the project intersect the northeastern bulrush species list area?

    **Automatically answered**
    *Yes*

58. Do you have any other documents that you want to include with this submission?

    *No*

# PROJECT QUESTIONNAIRE

1. Approximately how many acres of trees would the proposed project remove?

   *10*

2. Approximately how many total acres of disturbance are within the disturbance/ construction limits of the proposed project?

   *55*

3. Briefly describe the habitat within the construction/disturbance limits of the project site.

   *Forested riparian buffer along a riverine system, mowed lawn, paved areas*

# IPAC USER CONTACT INFORMATION

Agency: County of Columbia
Name: Lisa Clementoni
Address: 613 Baltimore Drive, Suite 300
City: Wilkes-Barre
State: PA
Zip: 18702
Email lclementoni@verdantas.com
Phone: 5709540104

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Ecological Services Field Office
110 Radnor Road Suite 101
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Phone: (814) 234-4090 Fax: (814) 234-0748

In Reply Refer To: 09/19/2025 19:31:54 UTC
Project code: 2025-0152208
Project Name: Columbia County West End Flood Mitigation

Federal Nexus: yes
Federal Action Agency (if applicable):

**Subject:** Technical assistance for 'Columbia County West End Flood Mitigation'

Dear Lisa Clementoni:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on September 19, 2025, for 'Columbia County West End Flood Mitigation' (here forward, Project). This project has been assigned Project Code 2025-0152208 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements may not be complete.**

**Ensuring Accurate Determinations When Using IPaC**

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat and Tricolored Bat Range-wide Determination Key (Dkey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid. Note that conservation measures for northern long-eared bat and tricolored bat may differ. If both bat species are present in the action area and the key suggests more conservative measures for one of the species for your project, the Project may need to apply the most conservative measures in order to avoid adverse effects. If unsure which conservation measures should be applied, please contact the appropriate Ecological Services Field Office***

**Determination for the Northern Long-Eared Bat and Tricolored Bat**

Based upon your IPaC submission and a standing analysis completed by the Service, your project has reached the following effect determination(s):

| Species | Listing Status | Determination |
|---|---|---|
| Northern Long-eared Bat (*Myotis septentrionalis*) | Endangered | NLAA |

**Other Species and Critical Habitat that May be Present in the Action Area**

The IPaC-assisted determination key for the northern long-eared bat and tricolored bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Green Floater *Lasmigona subviridis* Proposed Threatened
- Indiana Bat *Myotis sodalis* Endangered
- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Northeastern Bulrush *Scirpus ancistrochaetus* Endangered

You may coordinate with our Office to determine whether the Action may cause prohibited take of the animal species listed above. Note that if a new species is listed that may be affected by the identified action before it is complete, additional review is recommended to ensure compliance with the Endangered Species Act.

**Next Steps**

Consultation with the Service is necessary. The project has a federal nexus (e.g., Federal funds, permit, etc.), but you are not the federal action agency or its designated (in writing) non-federal representative. Therefore, the ESA consultation status is incomplete and no project activities should occur until consultation between the Service and the Federal action agency (or designated non-federal representative), is completed.

As the federal agency or designated non-federal representative deems appropriate, they should submit their determination of effects to the Service by doing the following.

1. Log into IPaC using an agency email account and click on My Projects, click "Search by record locator" to find this Project using **609-170329388**. (Alternatively, the originator of the project in IPaC can add the agency representative to the project by using the Add Member button on the project home page.)
2. Review the answers to the Northern Long-eared Bat and Tricolored Bat Range-wide Determination Key to ensure that they are accurate.
3. Click on Review/ Finalize to convert the ‘not likely to adversely affect’ technical assistance letter to a concurrence letter. Download the concurrence letter for your files if needed.

If no changes occur with the Project or there are no updates on listed species, no further consultation/coordination for this project is required for the northern long-eared bat. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope,

timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional coordination with the Service should take place before project implements any changes which are final or commits additional resources.

If you have any questions regarding this letter or need further assistance, please contact the Pennsylvania Ecological Services Field Office and reference Project Code 2025-0152208 associated with this Project.

**Action Description**
You provided to IPaC the following name and description for the subject Action.

**1. Name**

Columbia County West End Flood Mitigation

**2. Description**

The following description was provided for the project 'Columbia County West End Flood Mitigation':

> Construct Flood Control Levee and create floodplain bench along Fishing Creek as Flood Mitigation

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@40.9963784,-76.47074647265553,14z

# DETERMINATION KEY RESULT

Based on the answers provided, the proposed Action is consistent with a determination of “may affect, but not likely to adversely affect” for a least one species covered by this determination key.

# QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed bats or any other listed species?

   **Note:** Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   *No*

2. Is the action area wholly within Zone 2 of the year-round active area for northern long-eared bat and/or tricolored bat?

   **Automatically answered**
   *No*

3. Does the action area intersect Zone 1 of the year-round active area for northern long-eared bat and/or tricolored bat?

   **Automatically answered**
   *No*

4. Does any component of the action involve leasing, construction or operation of wind turbines? Answer 'yes' if the activities considered are conducted with the intention of gathering survey information to inform the leasing, construction, or operation of wind turbines.

   *No*

5. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   **Note for projects in Pennsylvania**: Projects requiring authorization under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act would be considered as having a federal nexus. Since the U.S. Army Corps of Engineers (Corps) has issued the Pennsylvania State Programmatic General Permit (PASPGP), which may be verified by the PA Department of Environmental Protection or certain Conservation Districts, the need to receive a Corps authorization to perform the work under the PASPGP serves as a federal nexus. As such, if proposing to use the PASPGP, you would answer ‘yes’ to this question.

   *Yes*

6. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) funding or authorizing the proposed action, in whole or in part?

   *No*

7. Are you an employee of the federal action agency or have you been officially designated in writing by the agency as its designated non-federal representative for the purposes of Endangered Species Act Section 7 informal consultation per 50 CFR § 402.08?

   **Note:** This key may be used for federal actions and for non-federal actions to facilitate section 7 consultation and to help determine whether an incidental take permit may be needed, respectively. This question is for information purposes only.

   *No*

8. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)? Is the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC) funding or authorizing the proposed action, in whole or in part?

   *No*

9. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

   *No*

10. [Semantic] Is the action area located within 0.5 miles of a known bat hibernaculum or winter roost? Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your state wildlife agency.

    **Automatically answered**

    *No*

11. Does the action area contain any winter roosts or caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, or tunnels that could provide habitat for hibernating bats?

    *No*

12. Does the action area contain (1) talus or (2) anthropogenic or naturally formed rock shelters or crevices in rocky outcrops, rock faces or cliffs?

    *No*

13. Will the action cause effects to a bridge?

    **Note:** Covered bridges should be considered as bridges in this question.

    *No*

14. Will the action result in effects to a culvert or tunnel at any time of year?

    *No*

15. Are trees present within 1000 feet of the action area?

    **Note:** If there are trees within the action area that are of a sufficient size to be potential roosts for bats answer "Yes". If unsure, additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    *Yes*

16. Does the action include the intentional exclusion of bats from a building or building-like structure? **Note:** Exclusion is conducted to deny bats' entry or reentry into a building. To be effective and to avoid harming bats, it should be done according to established standards. If your action includes bat exclusion and you are unsure whether northern long-eared bats or tricolored bats are present, answer "Yes." Answer "No" if there are no signs of bat use in the building/structure. If unsure, contact your local Ecological Services Field Office to help assess whether northern long-eared bats or tricolored bats may be present. Contact a Nuisance Wildlife Control Operator (NWCO) for help in how to exclude bats from a structure safely without causing harm to the bats (to find a NWCO certified in bat standards, search the Internet using the search term "National Wildlife Control Operators Association bats"). Also see the White-Nose Syndrome Response Team's guide for bat control in structures.

    *No*

17. Does the action involve removal, modification, or maintenance of a human-made building-like structure (barn, house, or other building) **known or suspected to contain roosting bats?**

    *No*

18. Will the action cause construction of one or more new roads open to the public?

    For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    *No*

19. Will the action include or cause any construction or other activity that is reasonably certain to increase average night-time traffic permanently or temporarily on one or more existing roads? **Note:** For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.). .

    *No*

20. Will the action include or cause any construction or other activity that is reasonably certain to increase the number of travel lanes on an existing thoroughfare?

    For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    *No*

21. Will the proposed Action involve the creation of a new water-borne contaminant source (e.g., leachate pond, pits containing chemicals that are not NSF/ANSI 60 compliant)?

    **Note:** For information regarding NSF/ANSI 60 please visit https://www.nsf.org/knowledge-library/nsf-ansi-standard-60-drinking-water-treatment-chemicals-health-effects

    *No*

22. Will the proposed action involve the creation of a new point source discharge from a facility other than a water treatment plant or storm water system?

    *No*

23. Will the action include drilling or blasting?

    *No*

24. Will the action involve military training (e.g., smoke operations, obscurant operations, exploding munitions, artillery fire, range use, helicopter or fixed wing aircraft use at night)?

    *No*

25. Will the proposed action involve the use of herbicides or pesticides (e.g., fungicides, insecticides, or rodenticides)?

    *No*

26. Will the action include or cause activities that are reasonably certain to cause chronic or intense nighttime noise (above current levels of ambient noise in the area) in suitable summer habitat for the northern long-eared bat or tricolored bat during the active season?

    Chronic noise is noise that is continuous or occurs repeatedly again and again for a long time. Sources of chronic or intense noise that could cause adverse effects to bats may include, but are not limited to: road traffic; trains; aircraft; industrial activities; gas compressor stations; loud music; crowds; oil and gas extraction; construction; and mining.

    **Note:** Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    *No*

27. Does the action include, or is it reasonably certain to cause, the use of permanent or temporary artificial lighting within 1000 feet of suitable northern long-eared bat or tricolored bat roosting habitat?

    **Note:** Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    *No*

28. Will the action include tree cutting or other means of knocking down or bringing down trees, tree topping, or tree trimming?

    *Yes*

29. Is the project related to the production of coal, including projects that support the mining of coal, as well as the production and/or distribution of energy produced from coal?

    *No*

30. Will the proposed action occur exclusively in an already established and currently maintained utility right-of-way?

    *No*

31. Does the action include emergency cutting or trimming of hazard trees in order to remove an imminent threat to human safety or property? See hazard tree note at the bottom of the key for text that will be added to response letters

    **Note:** A "hazard tree" is a tree that is an immediate threat to lives, public health and safety, or improved property.

    *No*

32. Does the project intersect with the 0- 9.9% forest density category?

    **Automatically answered**
    *No*

33. Does the project intersect with the 10.0- 19.9% forest density category map?

    **Automatically answered**
    *No*

34. Does the project intersect with the 20.0- 29.9% forest density category map?

    **Automatically answered**
    *Yes*

35. Does the project intersect with the 30.0- 100% forest density category map?

    **Automatically answered**
    *Yes*

36. Will the action cause trees to be cut, knocked down, or otherwise brought down across an area greater than 40 acres in total extent?

    *No*

37. Will the proposed action result in the use of prescribed fire?

    **Note:** If the prescribed fire action includes other activities than application of fire (e.g., tree cutting, fire line preparation) please consider impacts from those activities within the previous representative questions in the key. This set of questions only considers impacts from flame and smoke.

    *No*

38. Does the action area intersect the northern long-eared bat species list area?

    **Automatically answered**
    *Yes*

39. [Semantic] Is the action area located within 0.5 miles of radius of an entrance/opening to any known NLEB hibernacula or winter roost? Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    **Automatically answered**
    *No*

40. [Semantic] Is the action area located within 0.25 miles of a culvert that is known to be occupied by northern long-eared or tricolored bats? **Note:** The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    **Automatically answered**
    *No*

41. [Semantic] Is the action area located within 150 feet of a documented northern long-eared bat roost site?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.Have you contacted the appropriate agency to determine if your action is within 150 feet of any documented northern long-eared bat roosts?

    Note: A document with links to Natural Heritage Inventory databases and other state-specific sources of information on the locations of northern long-eared bat roosts is available here. Location information for northern long-eared bat roosts is generally kept in state natural heritage inventory databases – the availability of this data varies by state. Many states provide online access to their data, either directly by providing maps or by providing the opportunity to make a data request. In some cases, to protect those resources, access to the information may be limited.

    **Automatically answered**
    *No*

42. Is suitable summer habitat for the northern long-eared bat present within 1000 feet of project activities?
    If unsure, answer "Yes."

    **Note:** Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    *Yes*

43. Has a presence/probable absence summer bat survey targeting the northern long-eared bat following the Service's Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines been conducted within the project area?

    *No*

44. Are any of the trees proposed for cutting or other means of knocking down, bringing down, topping, or trimming suitable for northern long-eared bat roosting (i.e., live trees and/or snags ≥3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities)?

    **Note:** Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    *Yes*

45. Will any tree cutting/trimming or other knocking or bringing down of trees occur during the **Summer Occupancy season** for northern long-eared bats in the action area? **Note:** Bat activity periods for your state can be found in Appendix 2 of the Service's Northern long-eared Bat and Tricolored Bat Voluntary Environmental Review Process for Development Projects.

    *No*

46. Do you have any documents that you want to include with this submission?

    *No*

# PROJECT QUESTIONNAIRE

Enter the extent of the action area (in acres) from which trees will be removed - round up to the nearest tenth of an acre. For this question, include the entire area where tree removal will take place, even if some live or dead trees will be left standing.

*10*

# IPAC USER CONTACT INFORMATION

Agency: County of Columbia
Name: Lisa Clementoni
Address: 613 Baltimore Drive, Suite 300
City: Wilkes-Barre
State: PA
Zip: 18702
Email lclementoni@verdantas.com
Phone: 5709540104

Pennsylvania State Historic Preservation Office
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

November 8, 2021

Lisa Clementoni
Borton Lawson
613 Baltimore Drive, Ste. 300
Wilkes-Barre PA 187020000

RE: ER Project # 2021PR06578.001, Columbia County - West End Flood Mitigation Study, Army Corps of Engineers, Hemlock Township, Columbia County

Dear Lisa Clementoni:

Thank you for submitting information concerning the above referenced project. The Pennsylvania State Historic Preservation Office (PA SHPO) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

**Above Ground Resources**
*More Information Requested - Survey Proposal*

The submitted proposed project scope suggests varying measures from a flood wall berm to relocating residences. At a minimum to begin consultation - please provide a survey methodology for above ground resources. Determine what known historic resources are within the various direct/indirect APEs, what types of resources may be found in said areas, photo documentation with current and historic aerials to show what areas may need survey, etc. The PA SHPO will review and comment upon that submission and provide further guidance for survey - if there is a potential for more than 10 newly identified resources, the PA-SHARE Surveyor app will be required. Please note, survey methodology will be different depending upon the preferred or alternatives - if demolishing houses - then survey of all resources that are over 50 years of age - versus putting in a berm along the riverbank - there may be less survey needed. Please submit the requested materials to the PA SHPO through PA-SHARE using the link under SHPO Requests More Information on the Response screen.

For questions concerning above ground resources, please contact Cheryl Nagle at chnagle@pa.gov.

**Archaeological Resources**

For questions concerning archaeological resources, please contact Justin McKeel at jusmckeel@pa.gov.

Sincerely,

Andrea MacDonald
Director, State Historic Preservation Office

Pennsylvania State Historic Preservation Office
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

November 8, 2021

Lisa Clementoni
Borton Lawson
613 Baltimore Drive, Ste. 300
Wilkes-Barre PA 187020000

RE: ER Project # 2021PR06578.002, Columbia County - West End Flood Mitigation Study, Army Corps of Engineers, Hemlock Township, Columbia County

Dear Lisa Clementoni:

Thank you for submitting information concerning the above referenced project. The Pennsylvania State Historic Preservation Office (PA SHPO) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

**Archaeological Resources**
*More Information Requested - Environmental Review - More Info Archaeological - High Prob*

As this project area is located wholly or partially within an urban area, it is our opinion that a Phase IA archaeological study should be undertaken to assess this property s potential for National Register significant archaeological resources. This study should consist of a thorough review of all available historic through recent maps and other documentary sources which may provide information on past land use within the project area. A geomorphological assessment of the project area is recommended at this stage as it will provide useful information on the total depth and overall integrity of potential archaeological deposits. If this research suggests that potentially significant archaeological resources may be present, it will be our opinion that a Phase I archaeological testing plan should be developed to identify such resources. Guidelines and instructions for conducting all phases of archaeological survey in Pennsylvania are available on our website http://www.phmc.pa.gov/Preservation/About/Documents/SHPO-Guidelines-Archaeological-Investigation.pdf

*More Information Requested - New Survey*

Please use this Request for More Information to enter survey and resource details and upload the survey report. Please submit the requested materials to the PA SHPO through PA-SHARE using the link under SHPO Requests More Information on the Response screen.

For questions concerning archaeological resources, please contact Casey Hanson at chanson@pa.gov.

Sincerely,

Andrea MacDonald
Director, State Historic Preservation Office

# 1. PROJECT INFORMATION

Project Name: **Columbia County West End Flood Mitigation**
Date of Review: **9/19/2025 02:24:22 PM**
Project Category: **In-stream / Riverine Activities and Projects, Levees and similar flood control structures (construction, modification, maintenance)**
Project Area: **55.37 acres**
County(s): **Columbia**
Township/Municipality(s): **Hemlock Township; Town Of Bloomsburg**
ZIP Code:
Quadrangle Name(s): **BLOOMSBURG; CATAWISSA**
Watersheds HUC 8: **Upper Susquehanna-Lackawanna**
Watersheds HUC 12: **Fishing Creek-Susquehanna River**
Decimal Degrees: **40.995555, -76.470332**
Degrees Minutes Seconds: **40° 59' 43.9980" N, 76° 28' 13.1958" W**

This is a draft receipt for information only. It has not been submitted to jurisdictional agencies for review.

# 2. SEARCH RESULTS

| Agency | Results | Response |
|---|---|---|
| PA Game Commission | **Conservation Measure** | **No Further Review Required, See Agency Comments** |
| PA Department of Conservation and Natural Resources | No Known Impact | No Further Review Required |
| PA Fish and Boat Commission | **Potential Impact** | **FURTHER REVIEW IS REQUIRED, See Agency Response** |
| U.S. Fish and Wildlife Service | **Potential Impact** | **MORE INFORMATION REQUIRED, See Agency Response** |

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

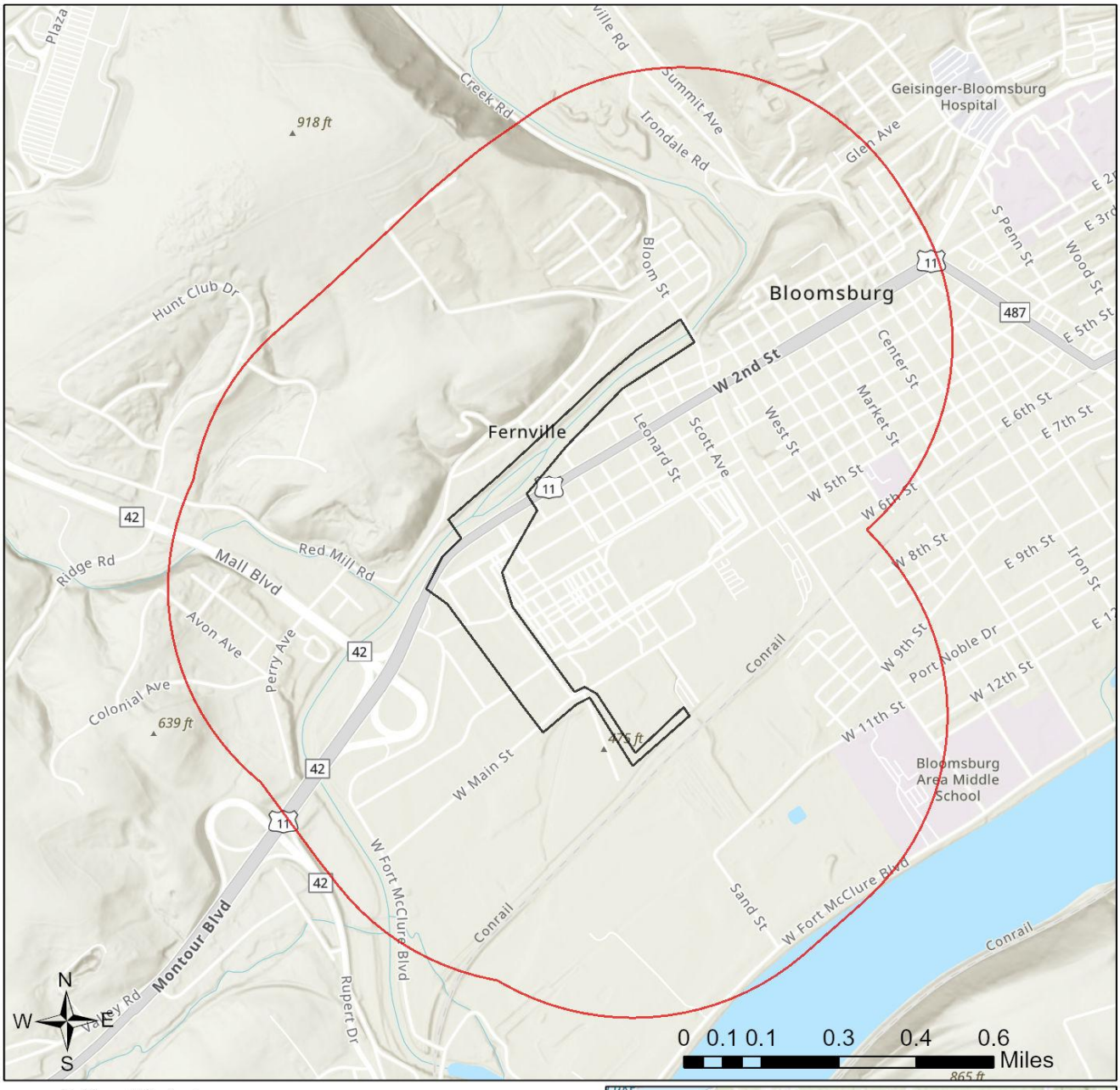
# Columbia County West End Flood Mitigation


Buffered Project Boundary

Project Boundary


Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

# Columbia County West End Flood Mitigation




Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, Maxar, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA,

# RESPONSE TO QUESTION(S) ASKED

**Q1:** Will the action include disturbance to trees such as tree cutting (or other means of knocking down, or bringing down trees, tree topping. or tree trimming), pesticide/herbicide application or prescribed fire?
**Your answer is:** Yes

**Q2:** Does the action area contain any caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, culverts, or tunnels that could provide habitat for hibernating bats?
**Your answer is:** Unknown

**Q3:** Will the action include disturbance to trees such as tree cutting (or other means of knocking down, or bringing down trees, tree topping. or tree trimming), pesticide/herbicide application or prescribed fire?
**Your answer is:** Yes

**Q4:** Does the action area contain any caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, culverts, or tunnels that could provide habitat for hibernating bats?
**Your answer is:** Unknown

## 3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

### PA Game Commission
### RESPONSE:

Conservation Measure: Potential impacts to state and federally listed species which are under the jurisdiction of both the Pennsylvania Game Commission (PGC) and the U.S. Fish and Wildlife Service may occur as a result of this project. As a result, the PGC defers comments on potential impacts to federally listed species to the U.S. Fish and Wildlife Service. No further coordination with the Pennsylvania Game Commission is required at this time.

### PA Department of Conservation and Natural Resources
### RESPONSE:

No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

### PA Fish and Boat Commission
### RESPONSE:

Further review of this project is necessary to resolve the potential impact(s). Please send project information to this agency for review (see WHAT TO SEND).

**PFBC Species:** (Note: The Pennsylvania Conservation Explorer tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)

| Scientific Name | Common Name | Current Status |
|---|---|---|
| Alasmidonta undulata | Triangle Floater | Special Concern Species* |

### U.S. Fish and Wildlife Service
### RESPONSE:

Information Request: Your project is within the range of the federally listed northern long-eared bat. Enter project information into IPaC (http://ecos.fws.gov/ipac/). Follow the step-by-step process to review this project's potential effect on federally listed species. For step-by-step instructions, please see our Project Review Page (https://www.fws.gov/office/pennsylvania-ecological-services/project-revi...)

Information Request: Your project is within the range of the federally listed Indiana bat. Enter project information into IPaC (http://ecos.fws.gov/ipac/). Follow the step-by-step process to review this project's potential effect on federally listed species. For step-by-step instructions, please see our Project Review Page (https://www.fws.gov/office/pennsylvania-ecological-services/project-revi...)

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictional agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

## WHAT TO SEND TO JURISDICTIONAL AGENCIES

**If project information was requested by one or more of the agencies above**, upload* or email the following information to the agency(s) (see AGENCY CONTACT INFORMATION). Instructions for uploading project materials can be found here. This option provides the applicant with the convenience of sending project materials to a single location accessible to all three state agencies (but not USFWS).
*If information was requested by USFWS, applicants must submit their project using IPaC, following the USFWS Project Submission Instructions. USFWS will not accept or review project materials uploaded via the Conservation Explorer.

**Check-list of Minimum Materials to be submitted:**
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____A map with the project boundary and/or a basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
**In addition to the materials listed above, USFWS REQUIRES the following**
____**SIGNED** copy of a Final Project Environmental Review Receipt

**The inclusion of the following information may expedite the review process.**
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams.

# 4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. Two review options are available to permit applicants for handling PNDI coordination in conjunction with DEP's permit review process involving either T&E Species or species of special concern. Under sequential review, the permit applicant performs a PNDI screening and completes all coordination with the appropriate jurisdictional agencies prior to submitting the permit application. The applicant will include with its application, both a PNDI receipt and/or a clearance letter from the jurisdictional agency if the PNDI Receipt shows a Potential Impact to a species or the applicant chooses to obtain letters directly from the jurisdictional agencies. Under concurrent review, DEP, where feasible, will allow technical review of the permit to occur concurrently with the T&E species consultation with the jurisdictional agency. The applicant must still supply a copy of the PNDI Receipt with its permit application. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. The applicant and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at https://conservationexplorer.dcnr.pa.gov/content/resources.

DRAFT
NOT FOR ACTUAL USE

## 5. ADDITIONAL INFORMATION

The PNDI environmental review website is a preliminary screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

# APPENDIX C

Public Presentation Slides


# West End Flood Mitigation Study

## Public Information Session

November 20, 2025

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SEDA COG

# Welcome and Introduction


# Project Study Team

Columbia County – Project Sponsor

SEDA-COG – Project Administrator

Verdantas - Project Engineering Consultant

# Welcome

## COLUMBIA COUNTY BOARD OF COMMISSIONERS

Dean Brewer, Chairman
Randy Karschner
David Kovach

## COLUMBIA COUNTY RESILIENCY OFFICE

Chris Anderson
Columbia County Resiliency Officer

## REAL ESTATE SPECIALIST

William Seigel

## SEDA-COUNCIL OF GOVERNMENTS

Alimara Cassidy
Angela Grieco
Angie Hunselman
Betsy Kramer
Tyler Dombroski

# Engineering Update

Clint Sorber, PE, CFM – Senior Project Manager

Tom Lawson, PE, PLS – Senior Technical Consultant

# West End System

- 6,200 LF of Levee
- 1 Pump Station
- 5 Closures
- ~300 Residential and Commercial Structures Protected
- Estimated Cost

  $30 million

  (2030 Dollars)

# Overall Flood Mitigation System Configuration

**Phase I System constructed around Autoneum Automotive**

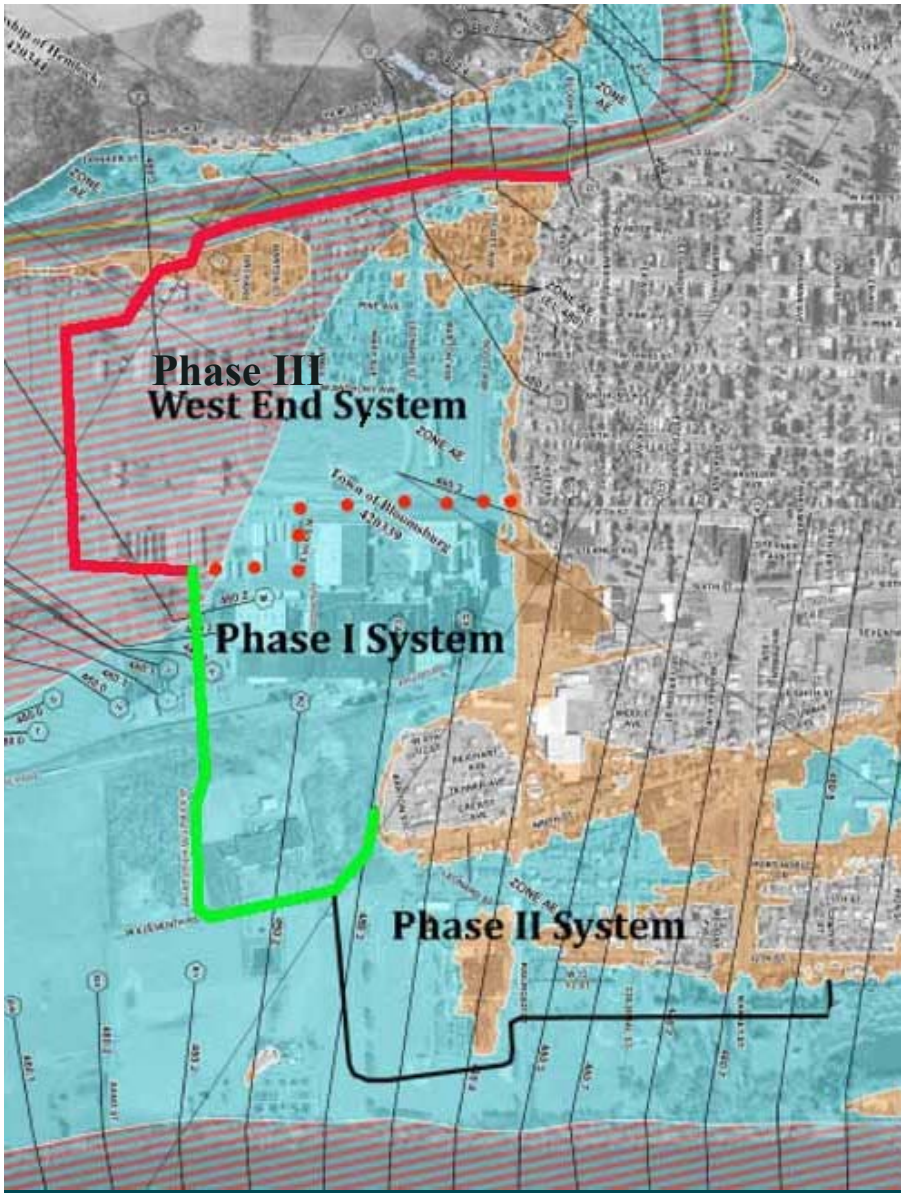
COMPLETION – 2015

**Phase II System constructed around High School**

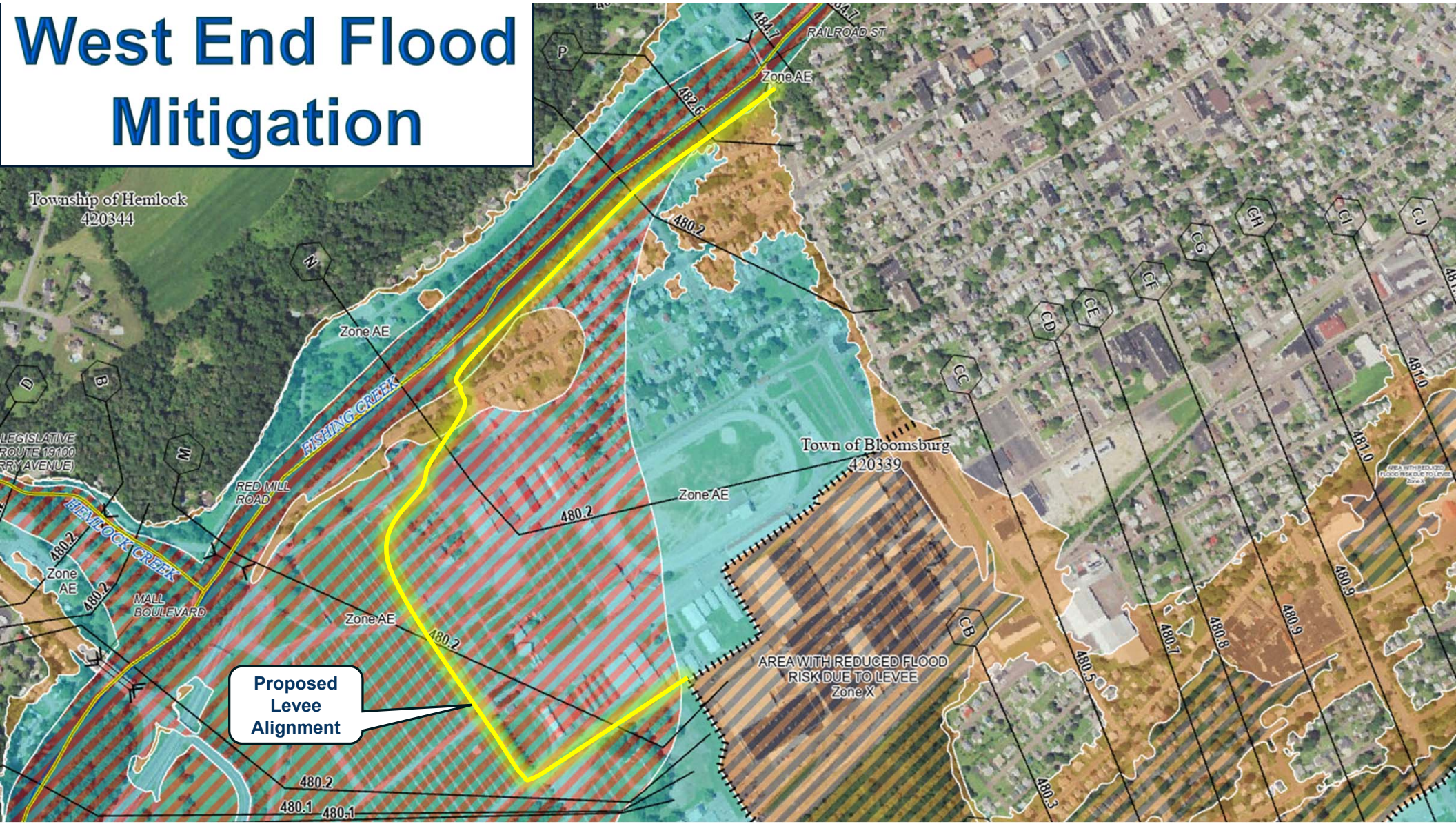
COMPLETION – 2018

**Phase III System constructed around West End & Fairgrounds**

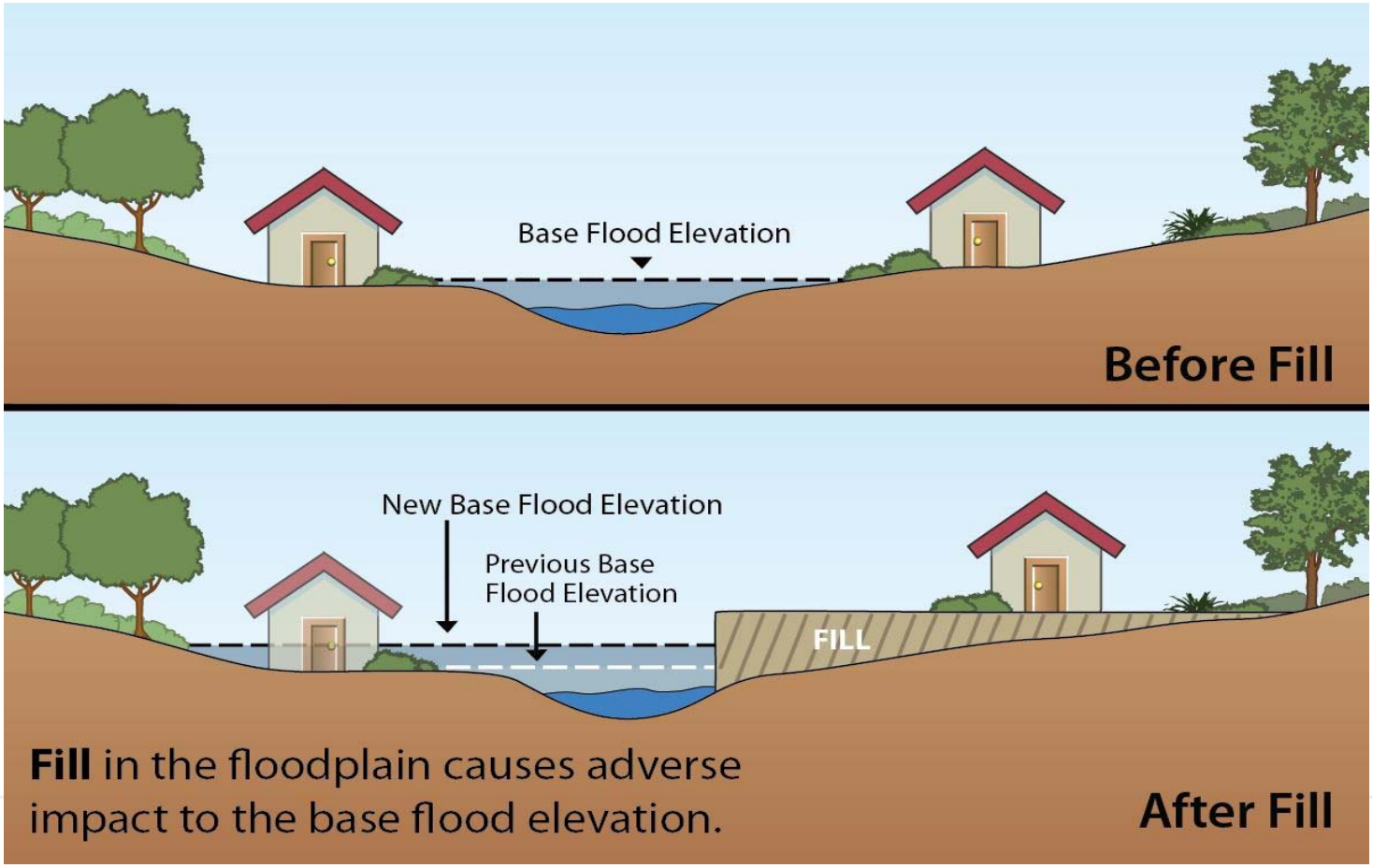
COMPLETION – TBD



# West End Flood Mitigation



# Induced Flooding

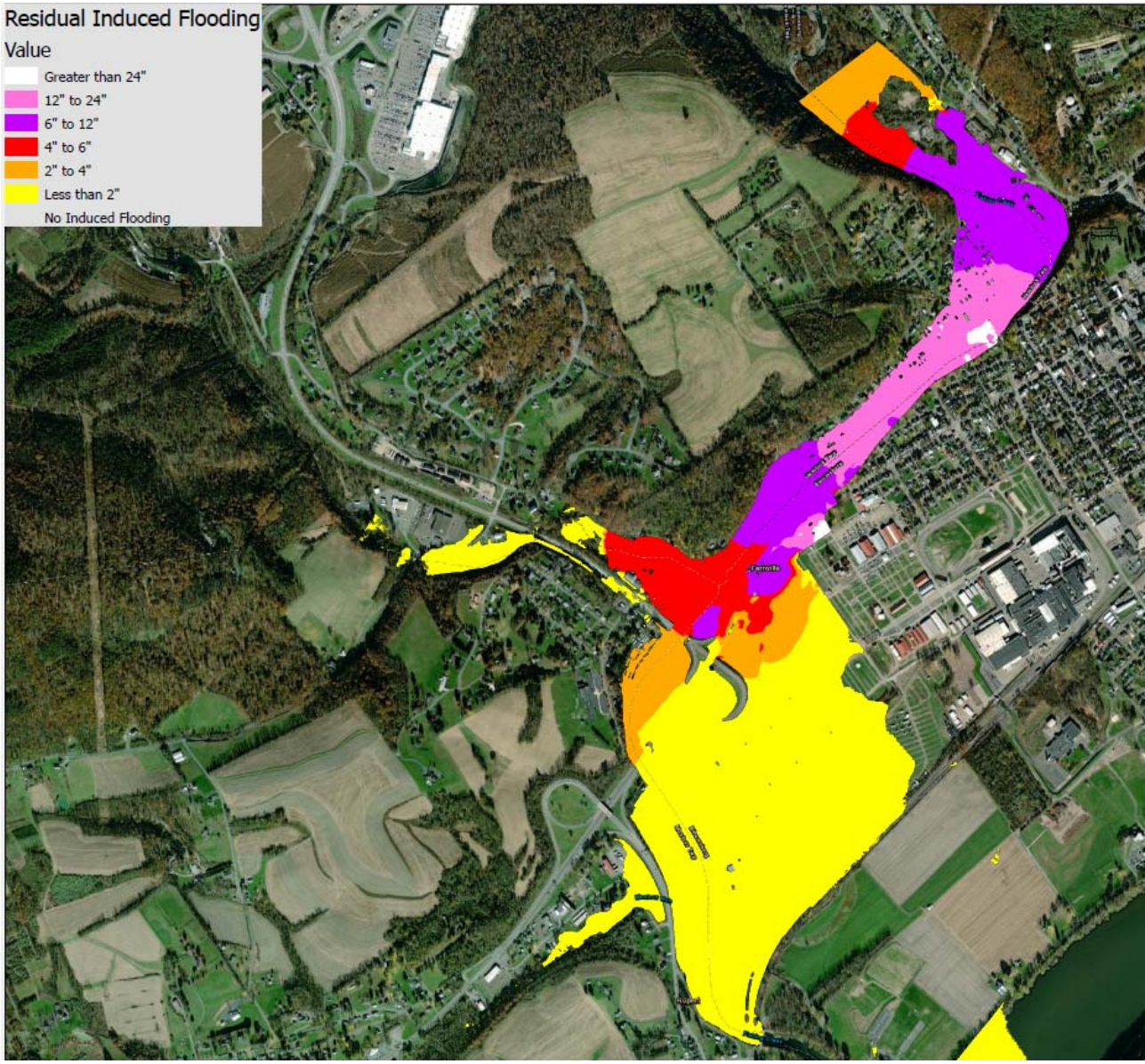


# Induced Flooding

2D Model Results
Proposed Levee
Base Flood Condition
(1% AEP Flood)

Results ➔
Induced Flooding
(Increases in Base Flood Elevation)

**Requires Mitigation to ZERO to Satisfy Federal Regulations**



# Induced Flooding Mitigation

1. Construct benched floodplain along right descending creek bank (Hemlock Twp side), from Railroad Street Bridge to 3,000 feet downstream.

2. Remove Islands from Fishing Creek and Realign/Narrow channel to prevent deposition.

3. Lower Route 11 by approximately one (1) foot in location where 12 homes were demolished after 2011 Tropical Storm Lee Flood – Length of Lowering ~900 Feet.

4. Construct drainage swale through Fairgrounds parking lot – Distance 2,000 feet.

- **Project Cost: $4.7 - $5.4 Million**
- **Construction Timeframe: 2027-2028**

# Benched Floodplain

- Bench to be approximately 4 feet deep and 45 feet wide.
- Compensates for lost conveyance in Bloomsburg floodway resulting from levee
- Provides additional conveyance capacity in high stage flood events.

# Island Removal

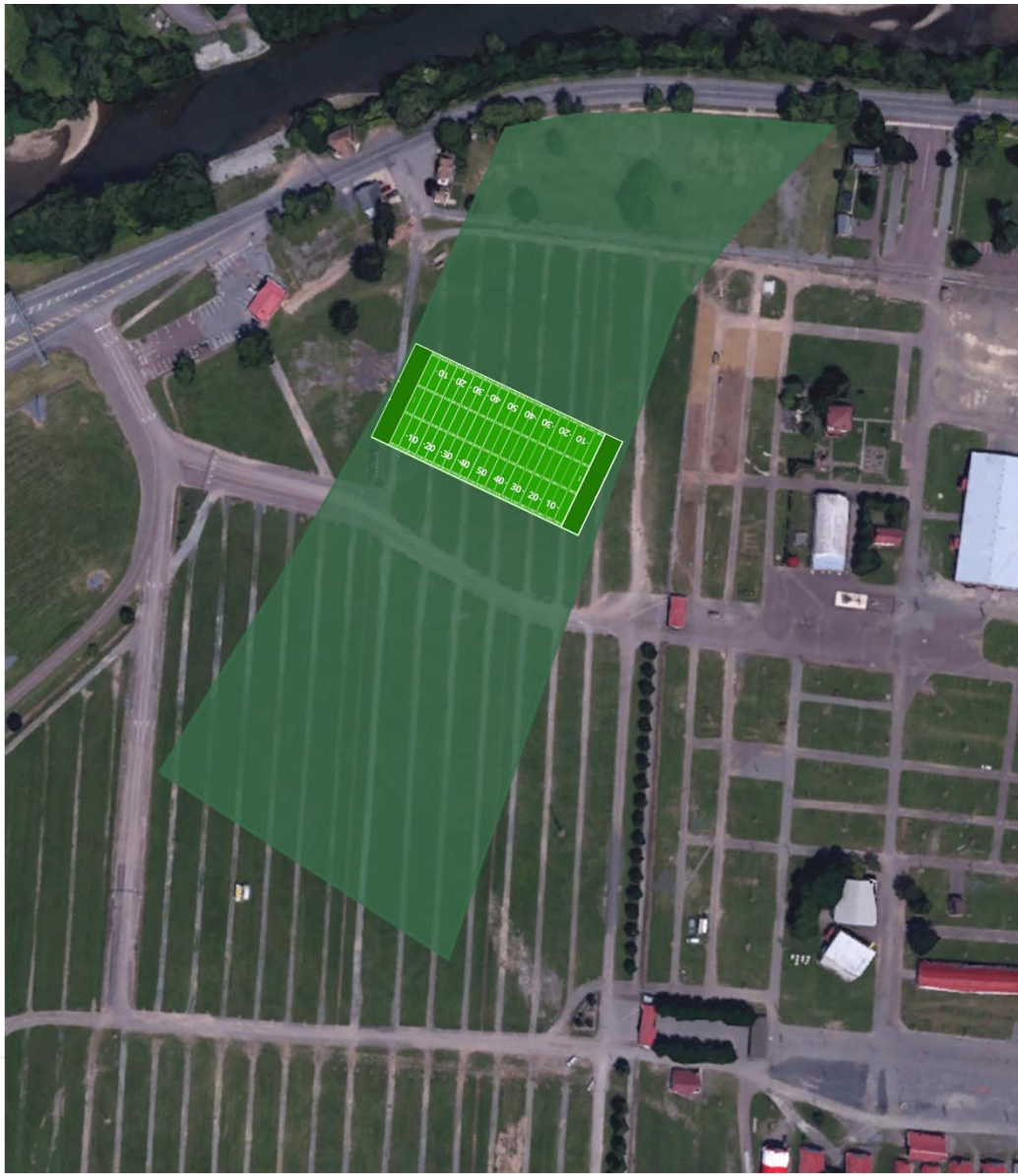
- Islands are an impediment to flow.
- A portion of the induced flooding remains as long as islands remain.
- Channel must be narrowed to prevent reestablishment. ~250’ vs ~150’ width

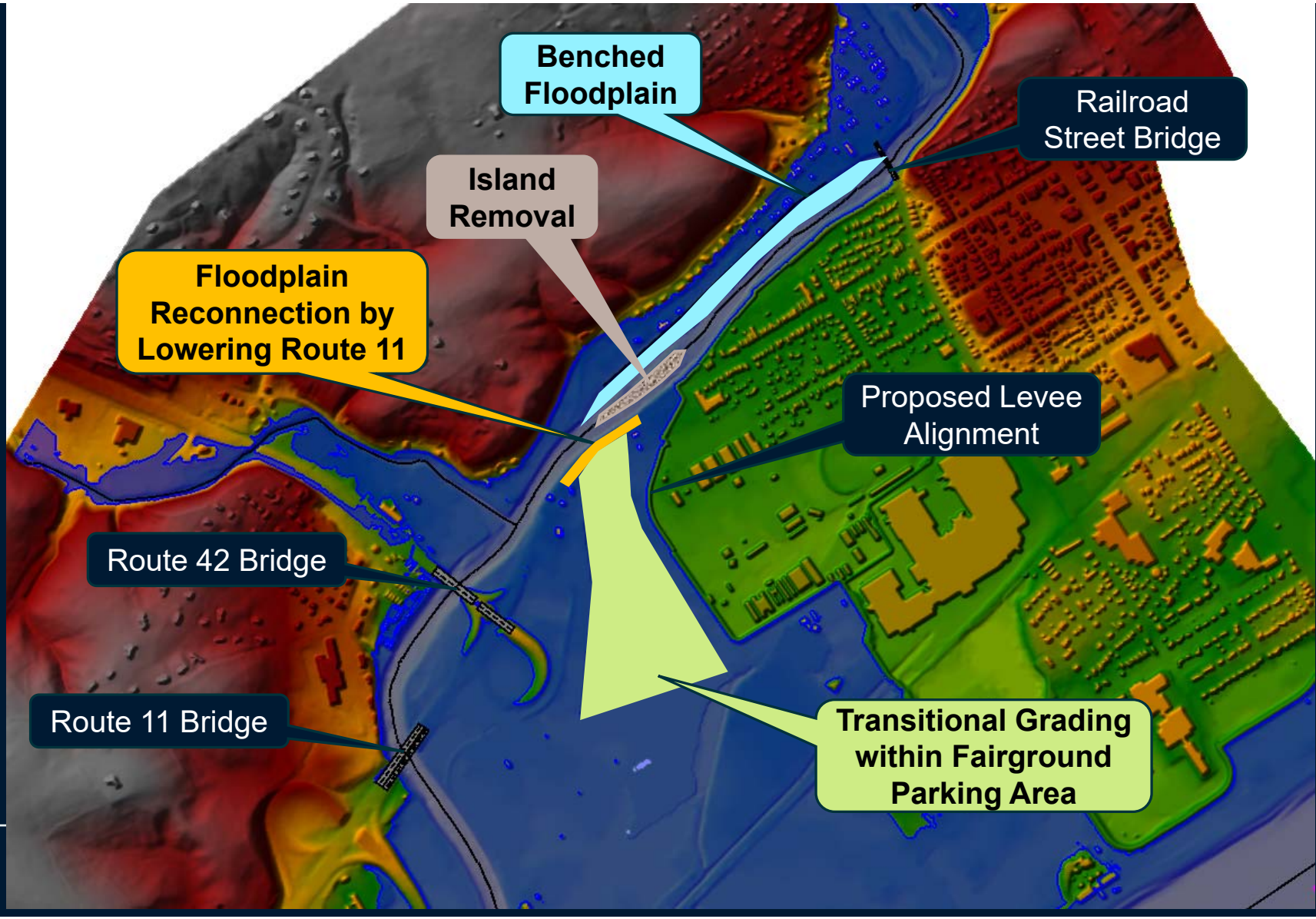
# Route 11 Lowering

- Lower SR 11 by approximately 1 foot relative to lowest existing point.
- Compensates for lost conveyance in Bloomsburg floodway resulting from levee
- Less Impacts – Lower Cost

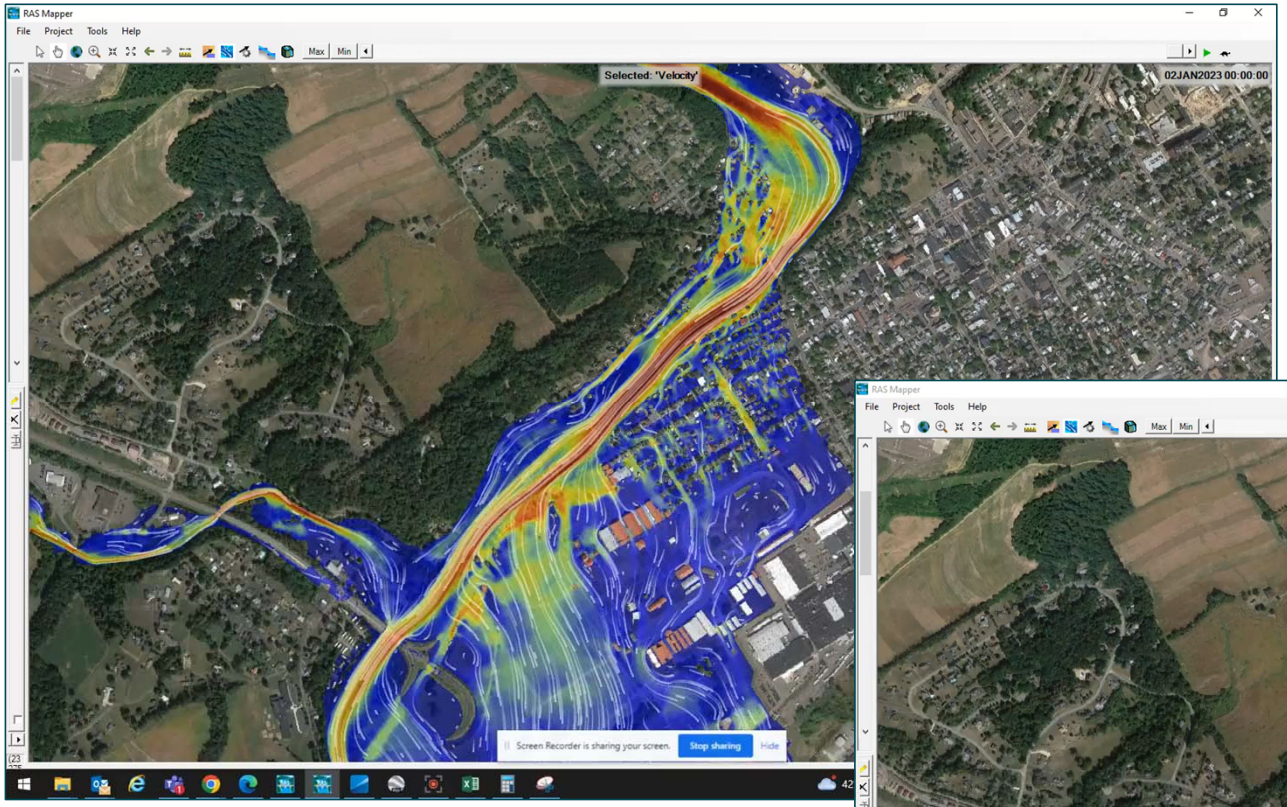
# Fairgrounds Swale Grading

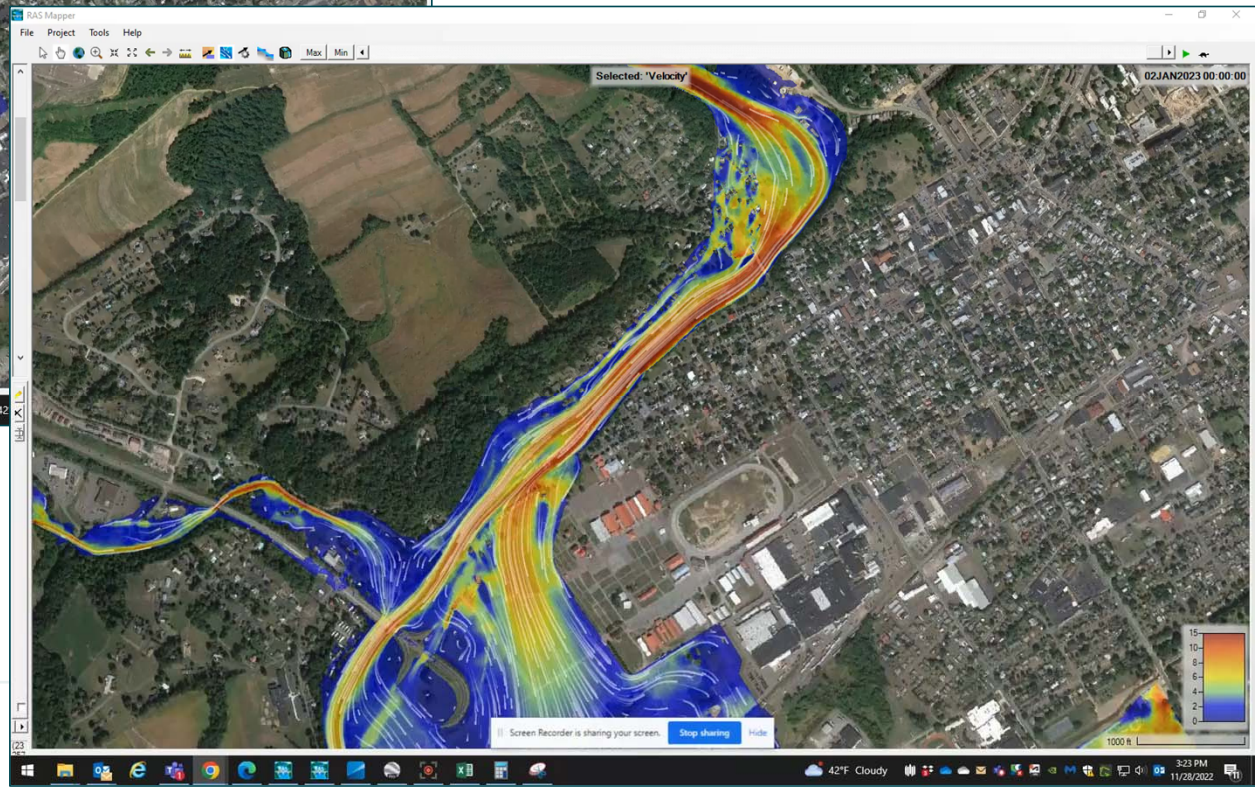
- Efficiently convey creek flows off Route 11 through the fairground parking area
- Utilize open space to dissipate velocities
- Balance fill required for channel realignment and levee construction




Benched Floodplain
Railroad Street Bridge
Island Removal
Floodplain Reconnection by Lowering Route 11
Proposed Levee Alignment
Route 42 Bridge
Route 11 Bridge
Transitional Grading within Fairground Parking Area

# 2D Modeled Velocities



# Funding Strategy

Betsy Kramer, Program Manager, Community Revitalization– SEDA-COG

# Funding Strategy

Phase I (Floodplain Modifications)

- $7 Million current funding portfolio
  - Mix of Federal and State sources
- Anticipated to be fully funded or close to fully funded
- Necessary for federal agencies to allow Phase II construction

Phase II (Levee/Floodwall System)

- Verdantas estimates that roughly **$34.5 million** is needed to fully finance
  - Construction estimate: $28.375 million
- Funds from Phase I may be able to be applied to Phase II, if available

# Timeline

Tyler Dombroski, Director, Community Development Department – SEDA-COG

# Timeline of Non-Construction Tasks

Phase I (Floodplain Modifications)

- County to retain engineer design services in early 2026
  - Design, permitting, and construction bidding preparation through mid-2027
- Real estate acquisition efforts
  - Real estate specialist retained
    - Introductions to property owners 2025/2026
      - Focus in Hemlock Township and Town of Bloomsburg parcels adjacent to US Route 11
  - Real estate evaluation effort in early-mid 2026
  - Easement acquisitions as necessary through 2026

# Timeline of Non-Construction Tasks

Phase II (Levee/Floodwall System)

- Will not be able to proceed with pre-construction development unless additional funds are obtained
  - Efforts include engineer design, permitting, and construction bidding preparation
  - Real estate acquisition efforts
    - Focus in the Town of Bloomsburg along Fishing Creek up to Railroad Street
  - Anticipate roughly 24 months of pre-construction development
    - Efforts are able to happen concurrently with Phase I, if funds are available
    - **$4.5 million estimated to be needed to get to shovel ready**

# West End Flood Mitigation Website

Scan the QR Code below to take you to the designated website for project description, timeline and FAQ.

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# Thank You

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Resiliency Officer
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**Tyler Dombroski**
Director, Community Development
tdombroski@seda-cog.org

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# Questions?