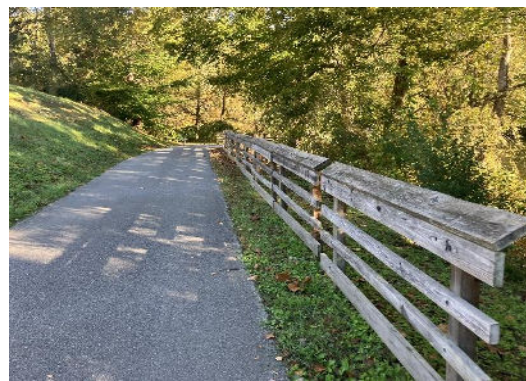


Pennington Gap, Virginia

Community Flood Preparedness

Scoping Plan

DRAFT: July 21, 2025



VIRGINIA DEPARTMENT OF CONSERVATION & RECREATION

COMMUNITY FLOOD PREPAREDNESS FUND



Pennington Gap, Virginia

Community Flood Preparedness Scoping Plan

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Pennington Gap – Community Flood Preparedness Scoping Plan

Executive Summary

The Town of Pennington Gap, with assistance from Appalachian Voices, applied for and received funding from Round 4 of the Virginia Community Flood Preparedness Fund (CFPF) in the “capacity building and planning” category. This grant program is administered by the Virginia Department of Conservation & Recreation (DCR). The Town received these funds in 2024.

Subsequent to the award, the Town retained the services of Hirschman Water & Environment, LLC and Ecosystem Services, LLC to assist with the plan.

The objectives of this plan are to:

1. Analyze the current situation with flooding and develop potential “nature-based solutions” and program opportunities.
2. Incorporate community input throughout the process, with special emphasis on valued local resources, such as parks and trails.
3. Include graphics and clear text to make the plan accessible to community members.
4. Provide a clear road-map for implementation, identifying priority projects.
5. Provide a platform for future grant applications for project funding.

The plan was developed through a process that included site visits by Town and the consulting team staff, two sets of community meetings to present concepts and receive feedback, outlining draft and revised concepts that included projects (practices and nature-based solutions that could be built to aid with flood preparedness) and program enhancements (codes, workforce programs, incentive programs, and other program elements), defining prioritization criteria for the draft concepts, and preparing priority concepts and other sections of this report.

The final list resulted in fourteen concepts, as outlined below. The concepts in **bold** are those that are priorities for the community.

1. **Cas Walker Building removal: build park on property**
2. Riverbend Shopping Center parking lot river buffer
1. **Kentucky St. Drainage Study and new drainage system**
4. **Town Property/Greenway: tree and river cane planting, gardens, and community spaces**
5. **Greenway/Frisbee Golf/ Floodplain below Town Hall tree and river cane planting, trails**
6. Stream Restoration: across North Fork Powell from Town Hall
7. **Leeman Park near Footbridge: tree planting, shelters**
8. **Leeman Park Wetland: constructed wetland with boardwalk**
9. Leeman Park Pond: add treatment wetlands, fishing access
10. Control Invasive Species
11. Private Property Incentives to build rain gardens and other practices

12. Update Floodplain Ordinance

13. Town Hall Weather-Related Disaster Hub

14. Workforce Program to assist with long-term maintenance of practices

The plan also includes potential funding sources, and how the concepts can be grouped for future potential grant applications.

Section 1. Introduction to the Plan

The Town of Pennington Gap, with assistance from Appalachian Voices, applied for and received funding from Round 4 of the Virginia Community Flood Preparedness Fund (CFPF) in the “capacity building and planning” category. This grant program is administered by the Virginia Department of Conservation & Recreation (DCR). The Town received these funds in 2024.

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5. Provide a platform for future grant applications for project funding.

The plan is guided by the following principles:

- Identifies specific projects that can be implemented by the Town, along with partners, with possible future grant funding.
- Incorporates solutions that work with natural processes to reduce flooding and flood risk exposure as well as other infrastructure and program strategies.
- Includes considerations for all parts of a locality where the community identified flood risks.
- Includes coordination with other local, interjurisdictional, and regional projects, plans, and activities and understands fiscal realities, focusing on the most cost-effective solutions for protection and adaptation of communities, businesses, and critical infrastructure.
- Based on the best available technical information with regard to weather-related incidents and the extent and frequency of flooding in the community.

The plan is divided into the following sections:

- 1.0. Introduction to the Plan: Background, purpose, and goals.
- 2.0. Community Profile: Demographics of the Town and its natural setting and watersheds.
- 3.0. Risk Assessment: Flood history and types, floodplain zones, structures within floodplains, other natural hazards that affect flooding.
- 4.0. Community Input: Description of how the community was engaged during preparation of the plan.

5.0. Strategic Projects & Policies: Specific projects and programs identified through the plan scoping and community input processes.

Appendices

Appendix A: Full List of 14 Concepts

Appendix B: Town Hall Wetlands report

Appendix C: Floodplain ordinance review

Appendix D: Selected River Level Cross-Sections For Priority Areas

Appendix E: VDOT culvert plans pertaining to Kentucky Street

Appendix F: Community Meeting Feedback

Section 2. Community Profile

Terms Used In This Section

Impervious Cover: Hardened land areas, such as pavement, rooftops, and roadways, that do not allow rainfall to infiltrate into the ground, and thus result in more runoff. Impervious cover is an important concept when analyzing stormwater runoff.

Floodplain: An area, generally adjacent to a waterbody, that was formed by and is subject to flooding. Certain floodplains are mapped and subject to federal, state, and local regulations in terms of fill and other land disturbance.

National Flood Insurance Program: Program administered by the Federal Emergency Management Agency (FEMA) that provides property owners with properties in designated floodplains with subsidized flood insurance. The maps produced through this program are known as Flood Insurance Rate Maps (FIRMs).

Nature-Based Solutions/Practices: An approach that reduces the impacts of flood and storm events through the use of environmental processes and natural systems. A nature-based solution may provide additional benefits beyond flood control, including recreational opportunities and improved water quality. Examples include tree and river cane planting, restoring stream banks, or constructing wetland basins to store flood waters.

Physiographic Province: Geographic regions with common landscape elements, such as geology, topography, and other features. Virginia is divided into five physiographic provinces: (1) Appalachian Plateau, (2) Valley & Ridge, (3) Blue Ridge, (4) Piedmont, and (5) Coastal Plain. Pennington Gap is located where the Appalachian Plateau meets the Ridge & Valley Province.

Watershed: An area of land that drains to a common point along a river or waterway. For instance, all the land that drains ultimately to the North Fork Powell River comprises its watershed. It is 75.5 square miles from the headwaters to the Town limits and 90 square miles to the point where the North Fork joins the main stem of the Powell River. Another term often used for watershed is drainage area.

Demographics & History

The following information is derived from the Town's Comprehensive Plan (2006, revised 2025) as well as the CFPF application materials.

The Town of Pennington Gap is located in extreme Southwestern Virginia. The town itself is situated in the Central portion of Lee County with the Kentucky state line approximately seven miles from the Town's corporate limits. Jonesville, the county seat of Lee County, is just six miles to the west. Big Stone Gap in adjacent Wise County is 16 miles to the east. U.S. Routes 58 and 421, as well as many secondary roads, provide access to the Town.

The Town population is approximately 1,600 and serves as a central retail trade center for Lee County. The primary employment bases are coal mining and service industries.

The Town of Pennington Gap came into existence with the extension of the Louisville and Nashville Railroad's Cumberland Valley Division in 1890. The Town is named for the mountain pass that is situated nearby. As far as can be ascertained, the name "Pennington" came from an early settler to the area.

Soon after the coming of the railroad, the Town was incorporated in 1892. The total land area of the Town is 1.44 square miles (922 acres)

Pennington Gap's history of mining and logging has left it uniquely vulnerable to natural disasters, including repeated flooding, especially along the North Fork of the Powell River, along its recreational areas, and near their town hall and police headquarters. Lee County has had 14 federally-declared disasters due to precipitation since 1977 in addition to numerous other flood events that did not qualify as federally-declared disasters.

Flood waters are well-known to be unsafe, and the additional pollution stemming from extractive activities make it a priority to contain any floodwaters threatening buildings and residents. As a low-income community affected by periodic flooding, Pennington Gap provides an ideal community for investing in flood mitigation, including nature-based practices.

Natural Setting & Watersheds

Pennington Gap is located near the dividing point between the Valley and Ridge physiographic province of Virginia, a region characterized by linear northeast-trending valleys and parallel mountain ridges, and the Cumberland Mountain section of the Appalachian Plateau. The Cumberland Mountain section is distinguished by its relief and altitude and is higher than the Cumberland Plateau farther to the west.

The Town itself is located in a valley formed by Poor Valley Ridge and Stone Mountain at the north and a series of smaller ridges to the south. Most of the topography surrounding the town is extreme with elevations that range between 1,300 feet and 1,600 feet above sea level.

Pennington Gap's local watershed is the North Fork Powell River. Within the Town limits, this includes the main stem of the North Fork Powell, which flows along the eastern and northeastern borders of the Town, as well as the smaller Cane Creek, which originates west of Town and flows east through the southern portion of Pennington Gap, meeting the North Fork Powell in the southeastern corner of Town. Water that flows from the Town's rooftops, streets, and paved areas (impervious cover) as well as open areas eventually reaches these systems.

Table 1 provides a summary of the watershed and impervious cover areas relevant to Pennington Gap.

Table 1. Watershed and Impervious Cover Areas for the Town's Watersheds		
Flooding Source	Watershed Area (square miles) to Downstream Town Limits	Impervious Cover (percent of Drainage Area)
North Fork Powell River	75.5	1.14
Cane Creek	8.51	4.54

The North Fork Powell is part of the larger Tennessee and Ohio River Basins. The Ohio joins the Mississippi at the Town of Cairo, Illinois.

Figures 1 and 2 portray these various watershed areas.

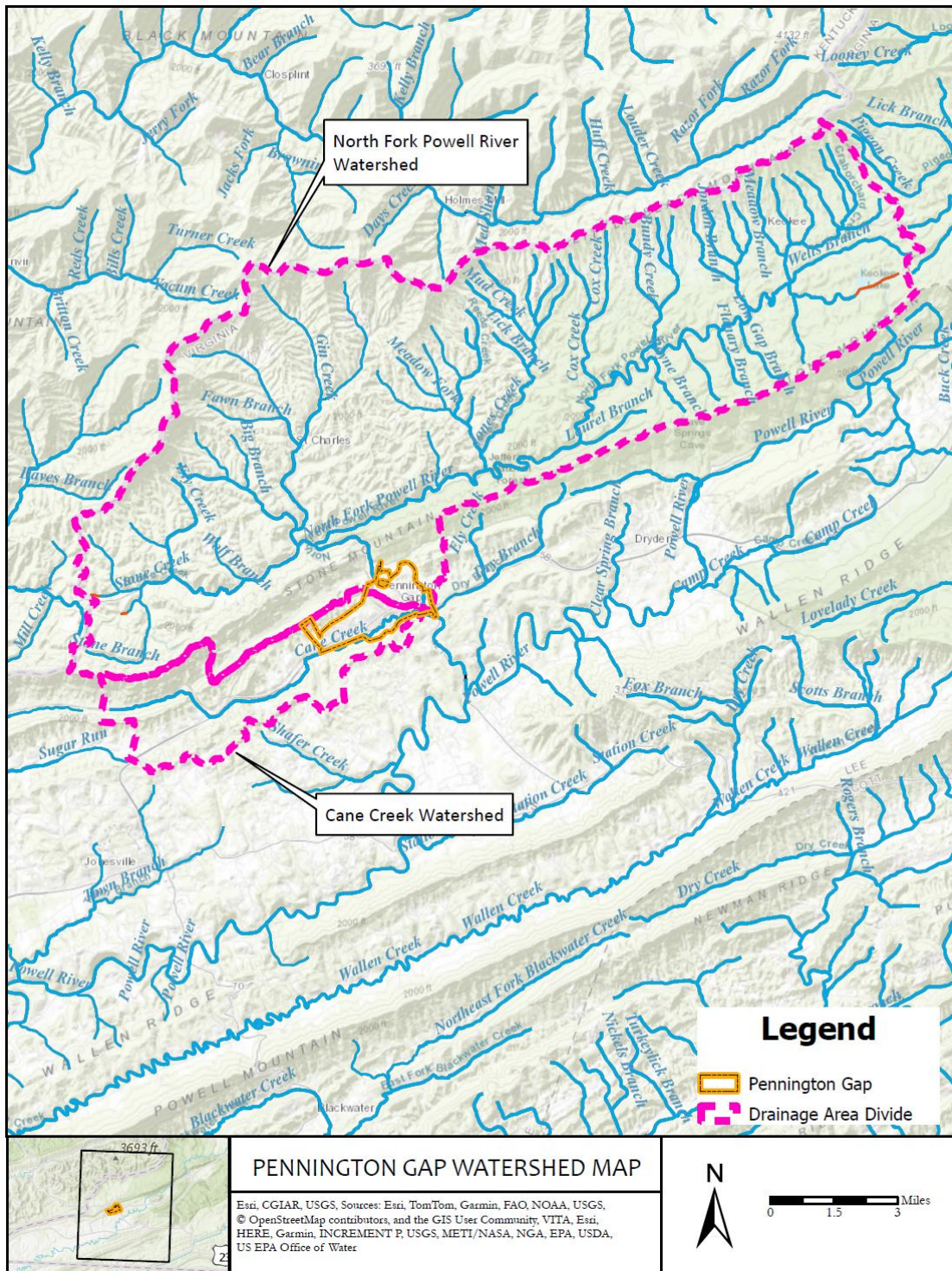


Figure 1. The Watershed of the North Fork Powell to the Downstream Town Limits of Pennington Gap. This watershed is 75.5 square miles in size. The North Fork Powell joins the main stem of the Powell River south of the Town. The smaller Cane Creek Watershed is 8.51 square miles.



Figure 2. The Upper Tennessee River Watersheds in Virginia – Powell, Clinch, and Holston. All of these watersheds drain to the Tennessee, Ohio, and Mississippi Rivers. The star represents the approximate location of Pennington Gap. Source: [Upper Tennessee River Roundtable](#).

Floodplains are normally dry land areas adjacent to a body of water that are subject to flooding. The extent of Pennington Gap's floodplains has been determined by the National Flood Insurance Program and the Federal Emergency Management Agency (FEMA). The National Flood Insurance Program offers property owners federally subsidized flood insurance. Flood insurance is required before obtaining federal financial assistance from various agencies and/or programs. Both the North Fork Powell and Cane Creek are accompanied by FEMA-designated floodplains. See **Section 3** for more details.

The Town's natural setting has allowed the Town to take advantage of these unique features through the construction of a popular greenway trail along the North Fork Powell from Riverbend Shopping Center to Leeman Field Recreation Park (with future planned greenway expansions). The Park itself is a regional recreation center with many sports and activities featured throughout the year, including a swimming pool, picnic pavilions, playground, sports fields, horse arena and stables, amphitheater, tennis courts, horseshoe pits, volleyball nets, pickleball courts, and tractor pull. When the baseball field was first constructed in 1933, it was the largest enclosed baseball field in the world and remained so for twenty-five years.

The floodplain area below Town Hall is also characterized by a mosaic of forest and shrub/scrub areas interspersed with wet areas and a frisbee golf course in the open part of the floodplain. See **Appendix B** for an assessment of potential wetlands in the floodplain below Town Hall.

Section 3. Risk Assessment

Terms Used In This Section

100-Year Floodplain: An area inundated by a flood event that has a 1 in 100 (or 1%) chance of happening on any given year. However, like throwing dice (where, for instance, one can get three 3s or 4s in a row), these flood events can occur much more or less frequently than once in a hundred years. The 100-year floodplain limits are used in flood risk assessment and for National Flood Insurance Program (NFIP) insurance purposes.

Annual Exceedance Probability (AEP): A statistical term that expresses the probability of a certain size storm occurring. The 100-year storm is an example, with this storm having a 1% chance of occurring in any given year, as explained above. Other commonly-used AEP's are as follows:

50% AEP = 2-year storm

10% AEP = 10-year storm

4% AEP = 25-year storm

0.2% AEP = 500-year storm

Discharge: A measure of the amount and rate of water flowing in a river. It is expressed as “cubic feet per second.” It is important for assessing flooding, as potential damage is related to both the amount of water and how fast it is moving.

Floodway: The Floodway is a sub-area of the 100-Year Floodplain. In common-language terms, it is the part of the floodplain that carries the fastest-moving water during a flood. In technical terms, it is the zone where placing a structure or fill would raise the elevation of the 100-year floodplain one foot higher. Floodplain (FIRM) maps depict the distinct floodway zone within the 100-year floodplain.

Permeable (or Pervious) Surface: Land cover that allows rainfall to be absorbed and soak into ground, which results in less runoff. These can be natural, such as forest or meadow, or constructed, such as permeable pavement. These surfaces are in contrast to impervious surfaces, such as pavement or rooftops, that do not allow water to soak in, and thus generate more runoff.

Repetitive Loss Properties: Buildings that have experienced repeated flood damage and insurance claims through the National Flood Insurance Program (NFIP). A subset of these, known as severe repetitive loss (SRL) properties, are those with even more frequent and costly flood damage.

Social Vulnerability Hazard Impact: Social vulnerability refers to the susceptibility of certain populations to the negative impacts of hazards, including natural disasters. These impacts can range from physical and mental health issues to property damage and economic hardship. Methodologies have been developed to assess risk and vulnerability of communities.

Types and History of Flooding

The following information is derived from the LENOWISCO Planning District Hazard Mitigation Plan Update (2021), with edits from the authors.

Flooding is defined by the National Weather Service (NWS) as the inundation of normally dry areas because of increased water levels in an established watercourse. Two types of flooding events are included in this plan:

- **Riverine or Stream Flooding:** Riverine flooding occurs when a channel receives more water than it can hold, and the excess water flows over its banks and inundates low-lying areas, causing a flood. Riverine flooding can occur due to rapid snowmelt or prolonged or heavy rainfall, which is also a cause of flash flooding. For Pennington Gap, the most severe riverine flooding takes place along the North Fork Powell, impacting bridges, Leeman Field Park, multiple structures, and other infrastructure.
- **Flash Flooding:** Flash floods result from a large amount of rain in a short period of time (NWS). This type of event is particularly hazardous in mountainous areas or other places with restricted floodplain storage. More urbanized areas may see flash flooding due to a lack of permeable surfaces as well as undersized and/or aging drainage infrastructure, such as inlets, pipes, and channels. Much of the damage from Hurricane Helene in Asheville, North Carolina was the result of this type of flash flooding, in addition to flooding from the river.

Flooding can be natural, human-caused, or a combination of both. Human-caused flooding includes dam failure, levee failure, and activities that increase the rate and amount of runoff, such as paving, reducing ground cover, clearing forested areas, and altering and reducing the capacity of floodplains.

Flooding can also threaten life, safety, and health and often results in substantial damage to infrastructure, homes, and other property. The extent of damage caused by a flood depends on the topography, soils, and vegetation in an area, the depth and duration of flooding, velocity of flow, rate of rising, the amount and type of development in the floodplain, the amount of sediment and debris carried and deposited, and the amount of erosion that takes place.

The LENOWISCO Hazard Plan contains more detail on recent flooding incidents in Virginia and within the Planning District's watersheds. The following information is an excerpt from that plan (with edits and additions by the authors) focusing on region-wide flood events:

March 4-5, 2015: An unusually deep snowpack across southwest Virginia underwent melting from warming temperatures and liquid rain falling upon it. Flooding in low-lying areas, streams, and rivers resulted and became widespread. Flooding closed numerous roads across all three counties in the District. Some homes and structures reported flooding in the City of Norton and Wise County. One mobile home was destroyed in the City of Norton due to a mudslide, but no injuries were reported. Across the LENOWISCO Planning District, this flooding event caused a reported \$59,500 in property damages.

February 10, 2018: A weather front brought unseasonably warm and humid conditions to the entirety of southwest Virginia, resulting in heavy rains across the District. Subsequent flooding led to multiple road closures across all three counties, as well as mudslides in Wise County. Some residents were evacuated in Big Stone Gap, and there was one water rescue in Powell Valley, with no injuries. The event resulted in a reported \$12,000 in property damage across the District.

February 6, 2020: A low-pressure system caused heavy rainfall of 5-6 inches across both Lee and Wise counties. Flooding closed several roadways and highways, with the most significant damage near Big Stone Gap causing a reported \$196,000 in property damage.

September 24-27, 2024: Hurricane Helene was a deadly and devastating [tropical cyclone](#) that caused widespread catastrophic damage and numerous fatalities across the [Southeastern United States](#) in late September 2024, including mountainous areas of North Carolina, Tennessee, and Southwest Virginia. Across its entire path from Florida up through the Appalachians, the storm resulted in 251 fatalities and at least \$78.7 billion in damages, making it one of the costliest hurricanes in U.S. history.

February 15-16, 2025: A winter storm with torrential rain and also snow brought widespread flooding across Southwest Virginia. Over 470 homes were affected in 11 counties, and Governor Youngkin asked for a Federal disaster declaration.

For the North Fork Powell, the largest river discharges occurred in 1963, 1977, and 2002, as depicted in Figure 3.

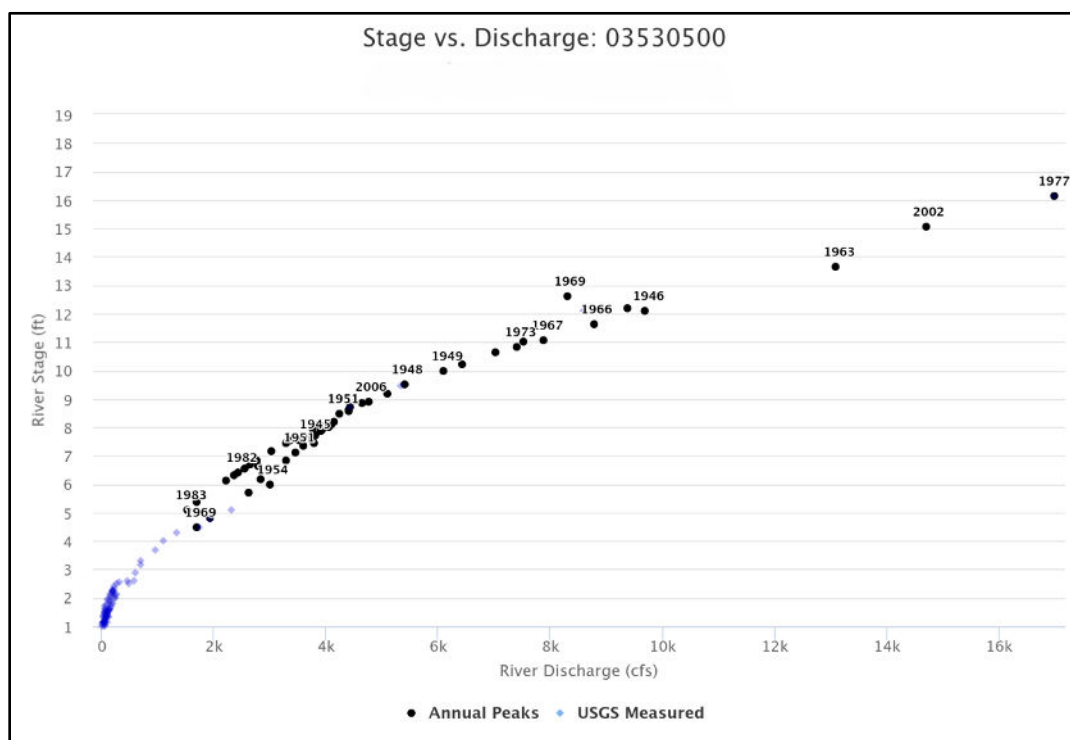


Figure 3: This graph shows the river stage (i.e., depth) and the associated discharge or river flow with dates showing the annual peak discharges for the North Fork Powell River.

The LENOWISCO Hazard Plan also used the Community Vulnerability Risk and Resilience (CVR2) process to rank the planning district across different categories. For the flooding hazard, the assessment ranked probability as “very probable,” social vulnerability hazard impact as “very vulnerable,” and capacity for mitigation as “minimally capable.” See that full report for more detail on the methods and findings of the assessment.

Floodplain Zones

Floodplain zones are defined by annual exceedance probabilities (AEPs). There are flood zone designations for the 0.2% Annual Exceedance Probability (AEP), commonly referred to as the 500-year floodplain, and the 1% AEP, referred to as the 100-year floodplain. Within the 1% AEP, a separate designation is made for the area within which any structure or fill is expected to cause a 1-foot elevation rise associated with the 1% AEP. This area is known as the Floodway.

These floodplain zones are mapped through the National Flood Insurance Program (NFIP) administrated by the Federal Emergency Management Agency. Pennington Gap is mapped on the Flood Insurance Rate Map (FIRM) panel 51105C0095C with a small southwest portion of the town mapped on panel 51105C0285C (see Figure 4). These panels have an effective date of February 18, 2011. There are no known planned updates to these maps at the time of this plan development.

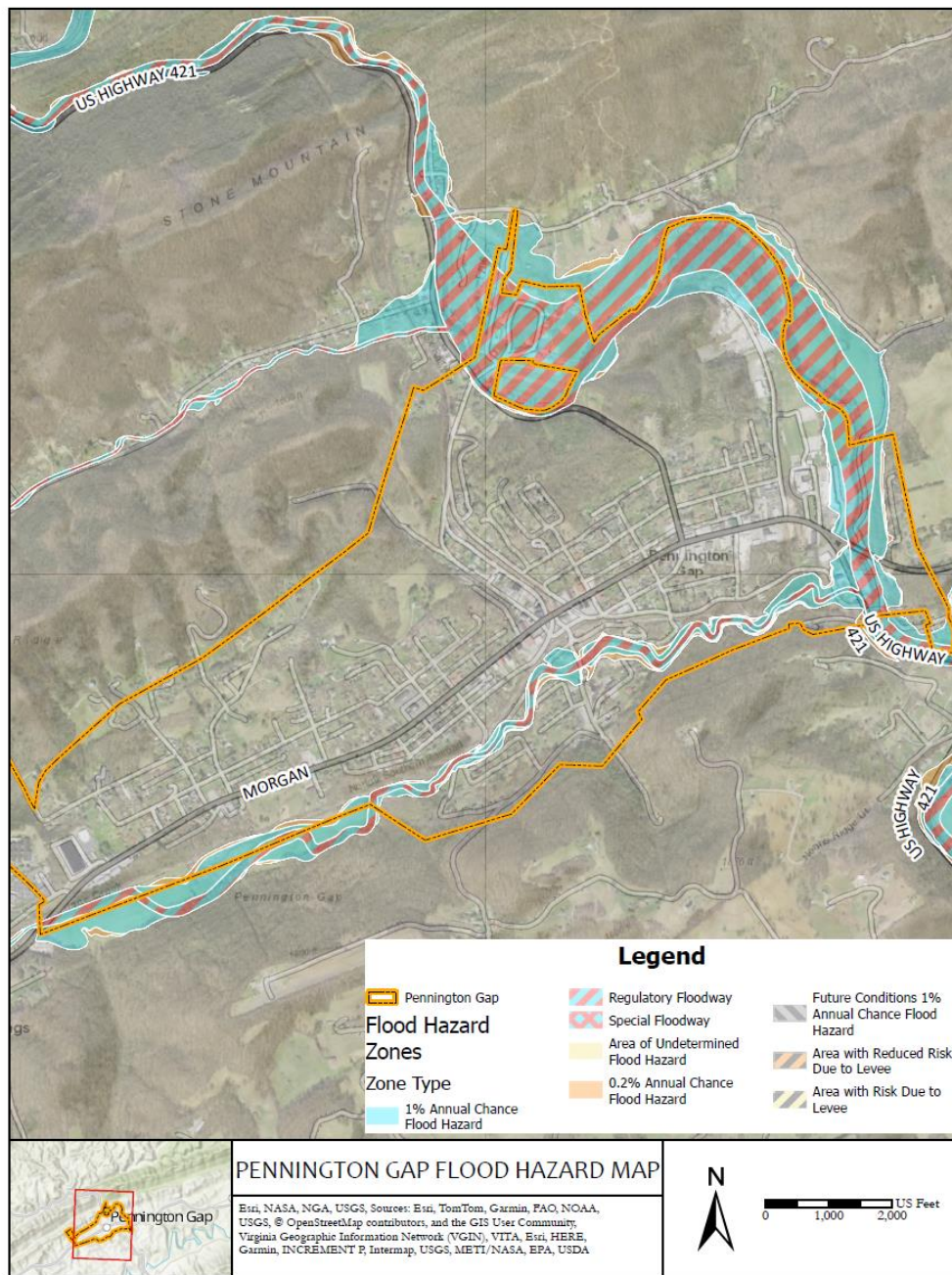


Figure 4. Depiction of the Flood Insurance Rate Map covering Pennington Gap. The map shows the Floodway, 100-year floodplain (1% AEP), 500-year floodplain (0.2% AEP), and the town limits.

Changes to Weather-Related Disasters

Rainfall and flooding patterns observed through historic record-keeping may not carry forward into the future. In fact, analysis has revealed that these patterns are already changing, and have the potential to affect storm intensities and frequencies. Figure 5 illustrates one such analysis conducted by the Mid-Atlantic Regional Integrated Sciences and Assessment (MARISA), a partnership under the banner of the National Oceanographic and Atmospheric Administration (NOAA). Note that the science for this type of analysis is evolving as the models become more sophisticated.

This information is important for understand the impacts from future flooding and stresses the value of flood planning, preparation, response, and recovery.

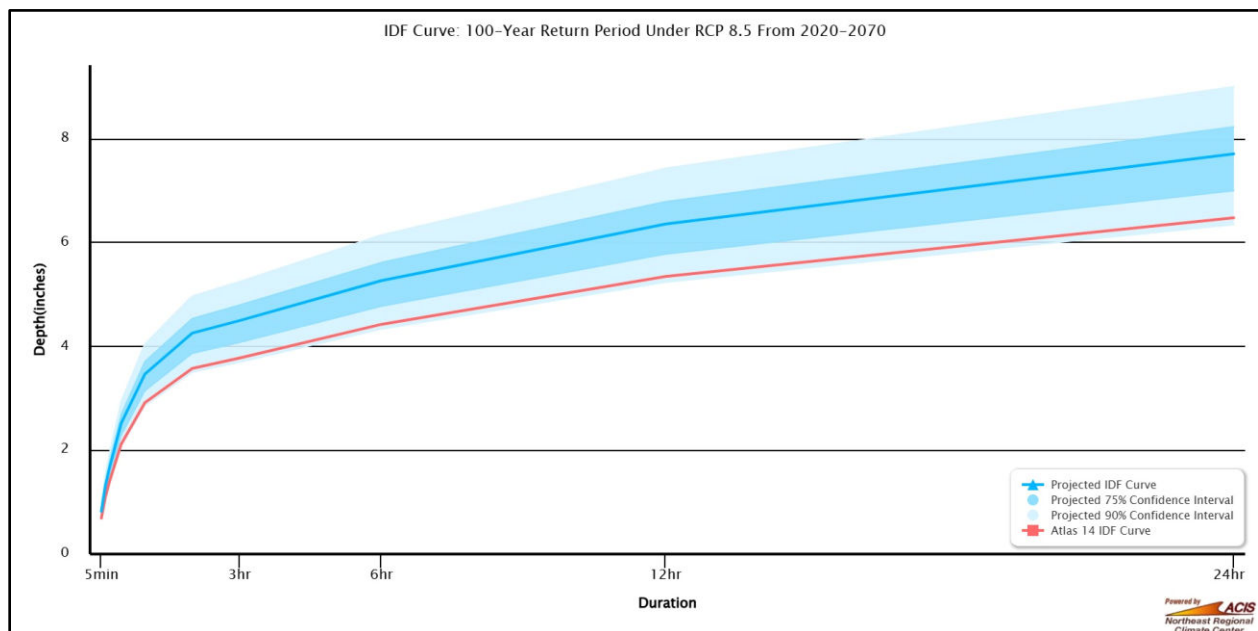


Figure 5: This figure shows the current prediction of the 100-year return period for rainfall depth on the y-axis for different storm event durations on the x-axis in red, and the predicted changes to that relationship from the high emissions climate scenario in blue. For a 24-hour storm duration, the 100-year rainfall depth may increase as much as 2.52". Available models result in a range of changes, as the science is still evolving, especially to assess local impacts. Source: MARISA

Flood Risk Assessment

The LENOWISCO Hazard Mitigation Plan analyzed historic flood losses, damages, flood insurance claims, essential facilities, and public services, among other data for Lee County and, in some instances, Pennington Gap. Table 2 is a distillation of that information as a baseline for a more detailed assessment included in this plan.

Table 2. Relevant Data From LENOWISCO Hazard Mitigation Plan (2021)		
Category	Jurisdiction	Values From Plan
Losses From Flooding: 1950-2016)	Lee County	\$1,103,000
Number of Properties in the Floodplain	Lee County	100-year floodplain = 40.01 500-year floodplain = 51.80
Repetitive Loss Buildings & Payments	Pennington Gap	2 buildings, 4 losses, \$196,918
NFIP Policy Claims	Pennington Gap	3 policies, 16 claims and 1 substantial damage claim since 1978, \$436,620 paid since 1978
Structures At Risk From Flooding	Lee County—Powell River Basin	690 structures, \$34 M estimated value, 64% single-family, 20% manufactured homes
Essential Facilities in the Floodplain	Lee County	100-year floodplain = 1 emergency operations center, 10 fire stations 500-year floodplain = 4 rescue squads, 1 hospital, 3 police stations, 11 schools
Public Services & Facilities	Pennington Gap & Lee County	• Leeman Field • Lonesome Pine Regional Library System, Lee County Branch • Pennington Gap Water Treatment Plant • Pennington Gap Wastewater Treatment Plant • Pennington Gap Police Department • Pennington Gap Volunteer Fire Department • Lee Regional Medical Center • Five elementary schools, two middle schools, and two high schools
Hazard Ranking Overall Score for Flooding	Lee County	High (Probability Ranking = 3)
Social Vulnerability Hazard Impact	LENOWISO PDC	Very Vulnerable

The LENOWISCO plan used the 100-year and 500-year floodplains for its analysis. It is also important for Pennington Gap to understand the probable impacts from more frequent storm events, and the structures and infrastructure that would be affected. Some additional high-level modeling was conducted to derive this information.

Table 3 shows different annual peak discharge probabilities for the North Fork Powell, Poor Valley Creek (enters the North Fork across from Leeman Field Park), and Cane Creek. Table 4 analyzes the number of Town structures affected in the Floodway, 100-year, and 500-year floodplains.

In addition to these tables, Figures 6 through 8 show enlarged maps for the following high-priority areas: (1) Cas Walker building and vicinity, (2) Town Hall and vicinity along Greenway, and (3) Leeman Field Park. These maps are important in that they show the approximate limits of smaller storm events (2-year and 10-year storms) as well as building footprints known to be within the 100-year floodplain. As shown in the figures, some areas that are mapped within the 100-year floodplain may also have flooding impacts during the 10-year storm.

These maps were generated from a preliminary hydraulic model completed for this project. A 2-dimensional hydraulic model, using HEC-RAS version 6.4.1, was developed using 2016 LiDAR topography and the hydrology shown in Table 3. This modeling is considered preliminary because it does not take into consideration the effect of bridges, bathymetry, or other detail that would be collected with a more detailed survey and analysis. However, it does provide planning-level flood patterns and extents that generally align with FEMA hydraulic analyses developed through the NFIP. The impact of more frequent and smaller storms is relevant to mitigating flood damage and resiliency planning.

Table 3. Peak Flow (Discharge) Statistics			
	North Fork Powell River	Poor Valley Creek	Cane Creek
AEP	<i>Flow (cubic feet per second)</i>		
50% (2yr)	2690	212	543
10% (10yr)	6390	638	1500
4% (25yr)	8840	956	2180
1% (100yr)*	24700	1160	2700
<i>*Values are from FIS 51105CV000A . All other values are from USGS Streamstats regression equations.</i>			

Table 4. Building & Structure Accounting		
<i>Flood Source</i>	North Fork Powell River	Cane Creek
<i>Flood Zone</i>	<i>Number of Structures</i>	
Floodway	19	5
1% AEP (100-year floodplain)	5	14
0.2% AEP (500-year floodplain)	1	3
Total	25	22

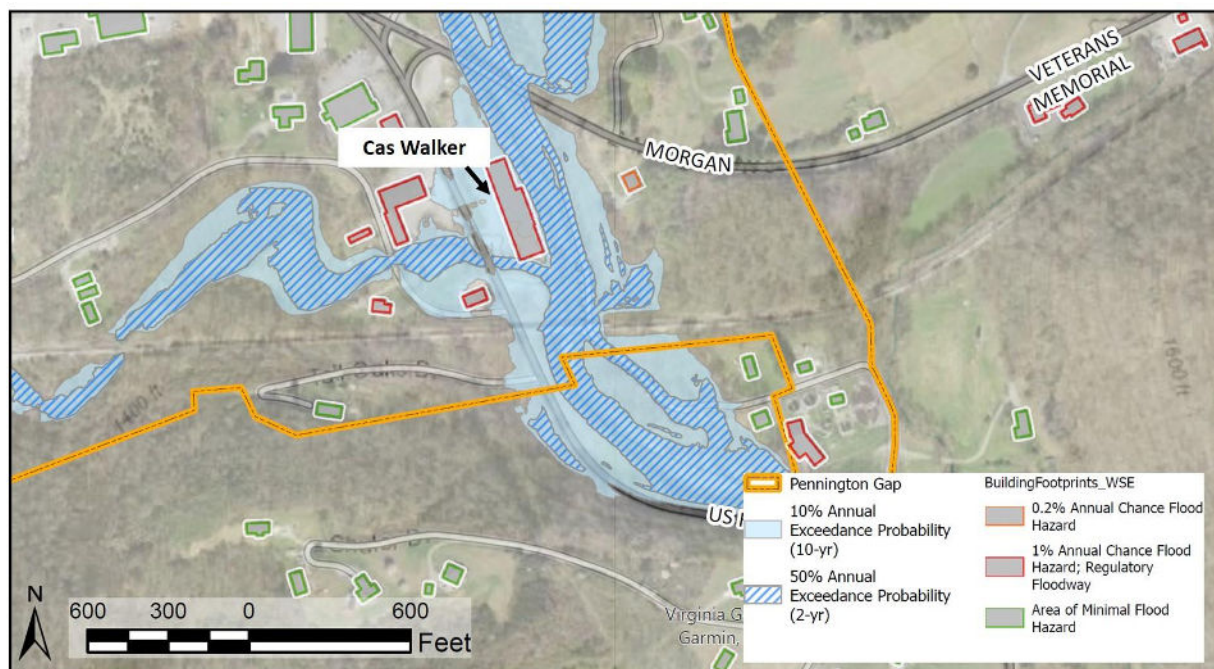


Figure 6. Cas Walker Building and Veterans Memorial Highway Vicinity: Approximate limits of the 2-year and 10-year storm inundation zones and building footprints in the 100-year and 500-year floodplains. As can be seen, some structures in the 100-year floodplain may also have flooding impacts during a 10-year storm, and thus flooded more frequently. In addition, there are smaller-storm flooding impacts to both Highways 58 and particularly 421 (Woodway Road), both important routes between Pennington Gap and neighboring communities.

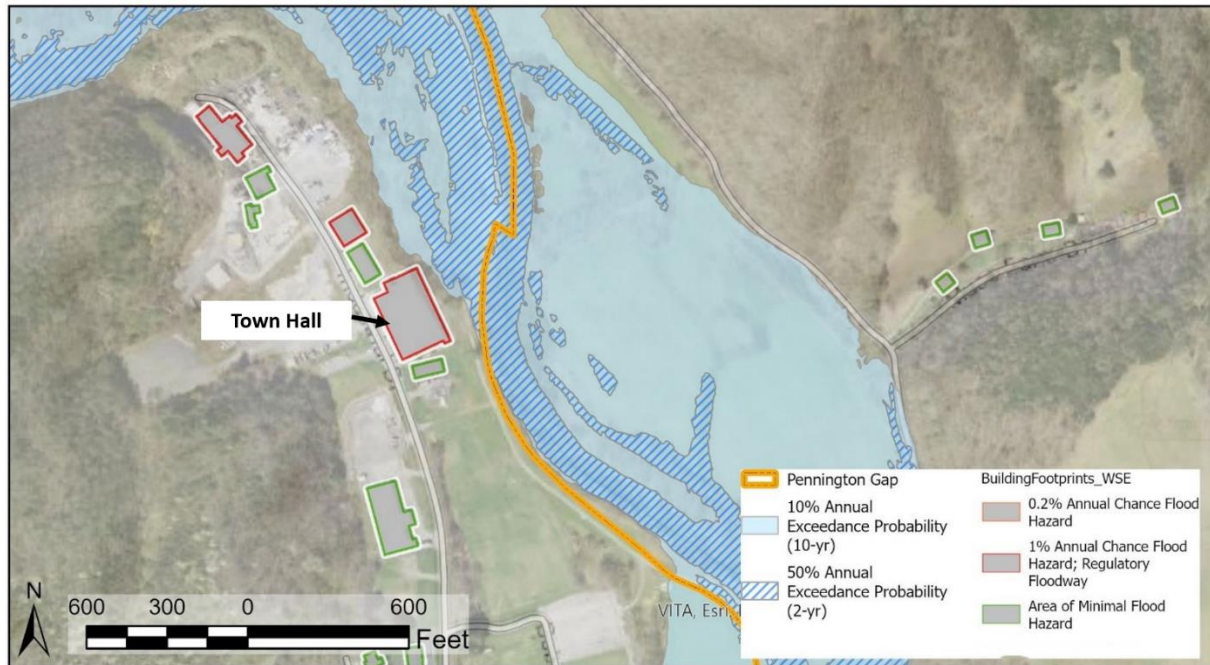


Figure 7. Town Hall & Greenway Vicinity: Approximate limits of the 2-year and 10-year storm inundation zones. Based on the analysis, the Town Hall building, a small corner of which is indicated to be within the 100-year floodplain, is outside the flooding limits of the 2-year and 10-year storm. Those flood limits do cover much of the bottomland and floodplain area along the Greenway.

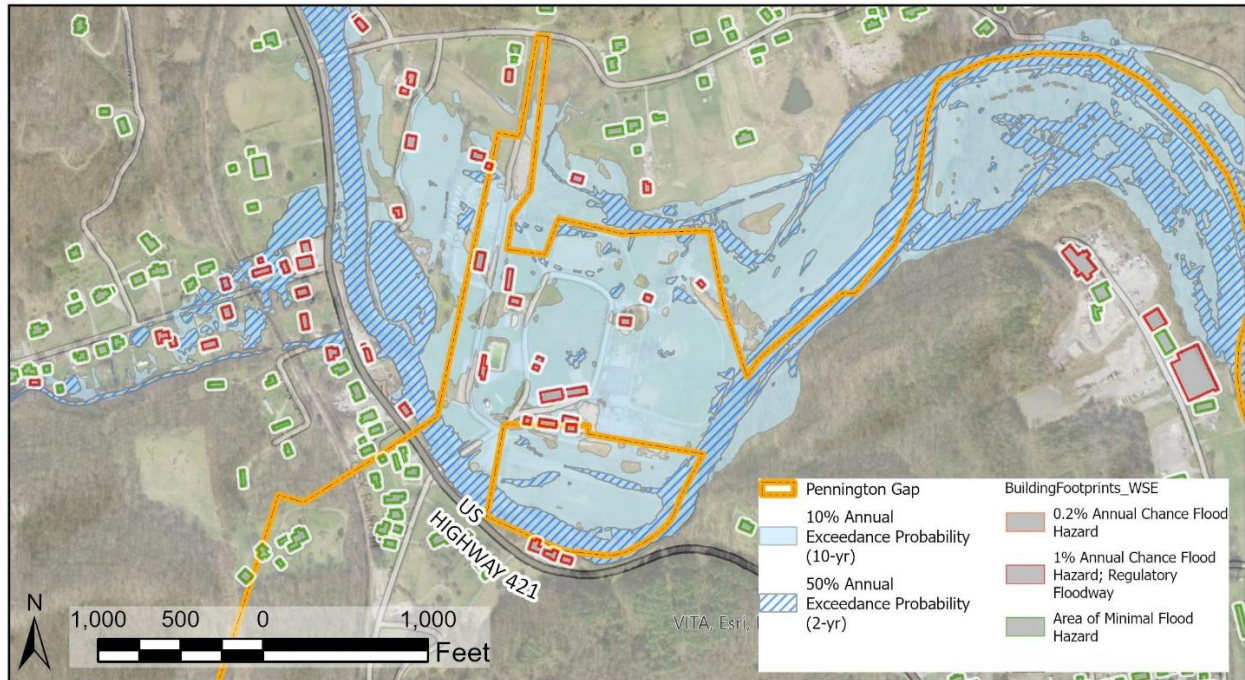


Figure 8. Leeman Field Park Vicinity: Approximate limits of the 2-year and 10-year storm inundation zones and building footprints in the 100-year and 500-year floodplains. Many park structures in the 100-year floodplain may also have flooding impacts during a 10-year storm, and thus flooded more frequently. It would be extremely difficult to raise structures here that are within the floodway due to FEMA regulations. In addition, there are smaller-storm (2-year and 10-year) flood impacts along and across Highway 421 (primary access to St. Charles) and along Route 621 (Left Poor Valley Road), including the roadway and various structures, including houses.

Other Natural Hazards That Influence Flooding*

The LENOWISCO Hazard Plan addresses a full range of hazards, some of which are linked to or that can exacerbate flooding impacts, as described below.

Landslides: Heavy rains that cause flooding can also trigger landslides or debris flows along steep slopes. According to the LENOWISCO Hazard Plan, several landslides have been documented east and north of the Town of Pennington Gap. The biggest risk from landslides is when roads are blocked or destroyed, which can affect the Town's access to the outside world, even if the slide itself is not within the Town limits.

Drought & Wildfire: Droughts, ironically, can increase the risk from flooding, especially if the health of trees and vegetation is compromised from drought impacts. This vegetation serves to hold soil in place and allows some rainfall to percolate into the ground. If these functions are degraded, then runoff can increase, leading to increased flood potential. Wildfires, often caused by drought conditions, can lead to even more severe loss of vegetation and forest duff, so that intense rainfall after such a fire can also worsen the impacts from flooding.

Winter Storms: Winter storms are frequent occurrences in Southwest Virginia. When accumulated snowfall melts rapidly, flooding can ensue, such as with the March 2015 storm.

Dam Failure: Heavy rainfall can cause dams to breach or overtop, leading to downstream flooding. While this is not an immediate threat in the Town, small dams in Lee County and across the LENOWISCO area are susceptible.

See the full Hazard Plan for more information on each of these hazards.

Section 4. Community Input

Two sets of community meetings were held in conjunction with the preparation of this plan.

October 9, 2024: This was the first community meeting to introduce the planning process to the community. Eight community members were in attendance. Personnel from the Town and from Appalachian Voices assisted with the meeting. The purpose of the meeting was to introduce background information, such as watersheds, the origins of the CFPF grant, existing efforts and programs by the Town as well as other regional organizations, and the concept of nature-based solutions to address flood preparedness. After a presentation, the community was invited to place sticky notes on large-format maps to indicate areas of drainage and flooding issues and also wrote comments on flipcharts.

All of this input as well as field visits conducted with Town staff on that same day were used to develop draft concepts for nature-based solutions and programs that could aid in flood preparedness.

March 25, 2025: The purposes of the March sessions were to introduce the draft concepts and receive feedback. Afternoon and evening meetings were offered to attract community members and regional agencies based on schedule availability. The evening meeting also included Appalachian Voices giving updates on related efforts, such as Community Strong and the SOLVE-IT energy project. Between the two meetings, there were twenty-two people in attendance. Most were community members, and there was also representation from UVA Wise, the Town of Pennington Gap, the Lonesome Pine Soil and Water Conservation District, and Lee County Emergency Management

The evening meeting allowed participants to receive a presentation on the draft concepts and then rotate between three break-out groups, each focusing on several draft concepts for more in-depth discussion. Many sticky notes were added to posters showing the concepts, and notes were taken from the discussions, representing a wealth of constructive feedback and community thoughts on the highest priority concepts.

The draft concepts were then revised based on the feedback received. The priority concepts are shown in **Section 5** along with a summary of community feedback for each. **Appendix A** provides more detailed analysis of all of the concepts developed through the entire project period, and **Appendix F** outlines the community feedback on the concepts collected on sticky notes and verbal discussion.

Section 5. Strategic Projects & Policies

Strategic projects and policies for this plan were distilled and refined through the following steps:

- Site visits with the project team and Town staff, including discussions of existing conditions, programs, and operations and potential flood preparedness projects.
- Defining specific projects based on the field assessment.
- Outlining proposed ranking and prioritizing criteria for the concepts and projects.
- Revising concepts and criteria based on feedback from Town and Appalachian voices personnel.
- Vetting the projects at community input meetings; collecting community ideas on each of the concepts.
- Revising concepts based on this feedback and selecting the ones of most importance to the community.

The prioritizing criteria as shown graphically below (Figures 9 through 12), and include the following:

1. Capacity for flood reduction
2. Cost
3. Community benefits in addition to flood reduction (co-benefits)
4. Degree of long-term maintenance needed to sustain the practice

The tables outline parameters by which each project is scored in relative terms compared to all of the potential projects.

The top priority concepts are illustrated and outlined in the section below. These concept profile pages provide a photograph, a description of the concept, and how the project scores for each of the four prioritizing criteria noted above. Below each figure is a text box summarizing community feedback and ideas for that particular project.

Note that the projects presented below are a priority subset of all the identified projects (all of which are included in **Appendix A**). For that reason, the project numbers are not sequential, as they appear in the Appendix.

In addition to the priority concepts in the figures, Table 5 includes more complete descriptions of flood preparedness programs that the Town could consider adopting. These programmatic elements would be complementary to the actual constructed projects depicted in the concepts. The table outlines program opportunities and specific recommendations for adoption.

Benefits Key: Flood Reduction

Flood Reduction	
	Project does not substantially provide storage for floodwaters, but can reduce flood risk by allowing more space for floodwaters and/or vegetation that can slow down and absorb floodwaters.
	Project provides some storage for floodwaters and has other environmental benefits, as noted above.
	Compared to other projects, project provides substantial storage for floodwaters and/or reduces flood risk as well as providing other environmental benefits.

Figure 9. Flood Reduction Criterion

Cost	
\$	Project has limited cost in terms of equipment, staff and/or community volunteer time, training, and operations. In general terms, design, capital, and operational costs would be in the \$40K to \$80K range.
\$ \$	Project requires investment of equipment, staff time, training, and operations that may require securing additional revenue through modest grants or loans. In general terms, design, capital, and operational costs would be in the \$80K to \$250K range.
\$ \$ \$	Project requires more investment of equipment, staff time, training, and operations that likely require outside sources of funding, such as larger grants or loans. In general terms, design, capital, and operational costs would be in the \$250K to \$1M range.

Figure 10. Cost Criterion

Benefits Key: Community Benefits

Community Benefits	
	Project does not have substantial benefits in terms of recreation, facilities for the enjoyment of the public, aesthetic improvements, or features that lead to a more resilient community.
	Project has some benefits in terms of recreation, facilities for the enjoyment of the public, aesthetic improvements, or features that lead to a more resilient community, such as increased tree canopy.
	Project has substantial benefits in terms of recreation, facilities for the enjoyment of the public, aesthetic improvements, or features that lead to a more resilient community.

Figure 11. Community Benefits Criterion

Benefits Key: Maintenance

Maintenance*	
	Project does not have heavy operation and maintenance (O&M) burden for staff or volunteers. It may require occasional or annual interventions of some sort.
	Project may require O&M interventions on a quarterly basis for vegetation and facility management, diminishing to semi-annually as the project matures, with each intervention requiring several hours up to a half-day. Requires mostly hand tools or small equipment.
	Project may require O&M interventions on a monthly basis or after storm events for vegetation and facility management, diminishing to seasonally as the project matures, with each intervention requiring up to a full day to several days. May require some heavy equipment for tasks like sediment removal in addition to hand tools and small equipment.

*Note that maintenance for proposed projects does not consider maintenance that is currently conducted, but that would not be necessary with the new project. For example, if an area that is currently mowed is planted with native vegetation, much of the mowing would no longer be needed. In that example, maintenance would shift from mowing to weeding, pruning, etc., requiring a different skill set and budget.

Figure 12. Maintenance Criterion

Priority Concept Profile Pages

Concept 1. Cas Walker Building



Flood Reduction	Cost	Community Benefits	Maintenance
 	\$ \$ \$	   	 

Concept 1: The Towns' long-term interest has been to tear down this chronically-flooded building. Appalachian Voices has received funding through EJCPS to accomplish this. The property and adjacent old gas station parcel could subsequently be redeveloped for a park, extension of Greenbelt, and/or possible solar array – depending on community input. Any such plan could build in storage for floodwaters to alleviate road and bridge flooding.

COMMUNITY INPUT

- Basketball or tennis court
- Covered picnic area; picnic area (multiple mentions)
- Truck parking
- Playground; also concerns about safety with playground
- Pollinator garden & picnic table
- Continuation of Greenway
- Small greenhouse
- Park
- Splash pad, handicap accessible
- Pavilion
- Outdoor gym/exercise
- Hammock area
- Site is a top priority, heat sink, great place for river cane
- Playground/park also mentioned as afternoon mtg.
- Cas Walker is a priority

Concept 3. Kentucky Street Drainage



Flood Reduction	Cost	Community Benefits	Maintenance
			

Concept 3: This drainage issue was noted at the community meeting. The ditch on the northeast side of the road has limited capacity and flooding occurs when the system backs up, especially since the downstream system leaves the right-of-way, goes under several buildings on private property, and is not well-understood south of East Morgan Ave. The Virginia Department of Transportation (VDOT) maintains a 76-foot long, 6 ft x 6 ft concrete box culvert under East Morgan. This culvert has been in place since at least 1932 and has been added to and built on top of for years since that time. VDOT is only responsible for maintaining the original 76 ft long culvert, and inspects it every other year (next inspection is scheduled for November 2026).

Enhancing flood control will require characterizing the existing system (mostly above and below the VDOT section) and developing a re-worked drainage system and easements that can successfully convey the water based on system modelling and available property.

COMMUNITY INPUT

- Flooding along sidewalk from Morgan Ave. to Leeman Field along Kentucky St.
- 4-5 houses, apartments flood once/year, regularly (multiple mentions)
- Floods even with small rain
- Drain pipe on main, downtown, losing water
- Catastrophic if blocked up, Miles Holler
- VDOT has good maps for KY St.; already started model for re-dragging ditches; make sure they know about this site
- Not enough land for private rain gardens
- Concerns about responsibilities falling on dilapidated building owners
- Residences with long-term flooding; runs under several structures, pharmacy, etc.
- Where will the water go? Threatens first responder station
- TOP PRIORITY

Concept 4. Town Property Next to Shopping Center/Greenbelt



Flood Reduction	Cost	Community Benefits	Maintenance
	\$ \$		

Concept 4: Big field is currently mowed grass, with some existing recreational uses. Many opportunities here for outdoor classroom (next to Elementary School), active recreation, pollinator gardens, daffodil maze, other planting areas, bee and bug boxes, community classes, master gardeners meeting area, school programs (e.g., kids in creek, trout in classroom), and tree planting adjacent to river.

COMMUNITY INPUT

- Larger outdoor classroom amphitheater (Steele Creek Park in Bristol, TN as an example)
- Shelters (Steele Creek Park in Bristol, TN as an example)
- Need shade trees (particularly around outdoor classroom area)
- Need additional seating
- Interest in pollinator gardens
- Potential recreational use near Food City that can be compatible with flooding conditions (tennis or basketball court(s))

Concept 5. Greenbelt/Frisbee Golf Area



Flood Reduction	Cost	Community Benefits	Maintenance*
	\$		

* For all tree and native plant zones, maintenance is most rigorous during the first 2 to 3 growing seasons to control invasives and ensure that plants are watered and get established. After that early phase, maintenance burdens can drop off significantly.

Concept 5: This is a beautiful and popular section of the Greenbelt. Some areas close to the streambank could use more vegetation to help hold the banks in place. This could include native plants—including [river cane](#)--that customarily grow on the banks and trees on top of the bank. There are other areas of mowed grass that could be planted with trees. In addition, the Town has been interested in developing a trail system in the wooded area below Town Hall, where there is a variety of forest and habitat types.

COMMUNITY INPUT

- Greenway/Frisbee golf: more vegetation, especially along riverbank, Laura and her rivercane, more for co-benefits than floodwater absorption
- Interest in picnic shelters
- Grill or pavilion area
- Recreational use is impacted by flooding
- Interest in pollinator gardens
- Interest in hiking trails (possibly in wooded area)
- More planting (preference by some to not have tall growing trees specifically within frisbee golf area)
- Streambank planting desired
- Showy planting desired (interest in different blooms)

Concept 7. Leeman Park Across Footbridge



Flood Reduction	Cost	Community Benefits	Maintenance*
			

* Since this area is already mowed on a regular basis, the incremental level of maintenance may not be that high, and would include maintenance of planted trees. Maintenance would be similar to Concept 4.

Concept 7: This grassy streamside area is a popular gathering spot for the community, so the open areas are a community asset. Some tree planting, especially along the riverbank could help with bank stability and also provide shade in the summertime. The immediate bank area could be another place for River Cane, although some water access paths should be maintained.

COMMUNITY INPUT

- Benches, Gazebo or shelter to get out of the sun (applies down the Greenway as well in terms of recommending shade structures—like bus stop structures--or trees)
- Picnic tables
- Whatever is built or planted, don't interfere with people casting for trout
- Fruit trees, blueberries
- Fishing (multiple mentions)
- *Priority area*
- Leeman across footbridge: Popular area so it still needs to be functional for community gatherings, more of a deliberate planting, popular area for fishing, could have defined river access points

Concept 8. Leeman Park Wetland



Flood Reduction	Cost	Community Benefits	Maintenance*

* Maintenance depends on the desired aesthetic between "neat and organized" vs. more natural-looking, and also on whether of amenities, such as trails, are included.

Concept 8: Leeman Park has several wet areas near the ballfields. Some are overgrown (left photo) and others mowed (right photo). Some of the areas are difficult to mow due to wetness, and these areas are generally not used by the public. A small, straight channel runs along this area. These interconnected wet areas could be designed and managed with control structures as wetlands that could provide more water/flood storage, habitat areas, and possibly boardwalk viewing areas. Only some of this property is owned by the Town, so property ownership issues would have to be worked out.

COMMUNITY INPUT

- Walkway/boardwalk, ADA accessible (multiple mentions at both meetings)
- Seen cranes, eagles in that area
- Small bridge
- Keep vegetation short
- Habitat for wildlife
- Wetlands Estonoa in St. Paul a good example (multiple mentions)
- Signage explaining what it is, educational
- Water lilies, cattails, watercress
- Goat grazing for difficult to mow areas
- Consider wildlife (bird, amphibian) habitat
- Outdoor classroom, education opportunities
- Leeman park wet areas: conversion to floodplain wetland, boardwalk for viewing, possible DWR interest for this one, pretty easy lift but would need maintenance plan. *Example: Estonoa!*
 - School groups with funding can help

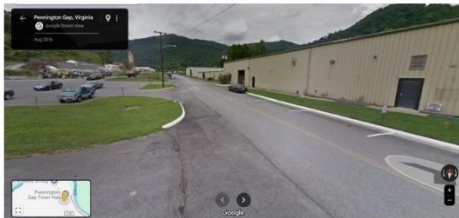
Concept 12. Local Floodplain Program & CRS



Flood Reduction	Cost	Community Benefits	Maintenance
	\$ \$		

Concept 12: The local floodplain program includes the Town's Flood Damage Prevention code (Chapter 99), the local floodplain administrator, and working with Lee County Building Inspection. For future planning, the Town can update its ordinance in accordance with the Virginia Department of Conservation & Recreation model ordinance (2017; additional update pending) and also receive training or community workshops on applicability of the Community Rating System (CRS), which has benefits for property owners paying for flood insurance.

Concept 13. Town Hall Resilience Hub



Flood Reduction	Cost	Community Benefits	Maintenance
	\$ \$		

Concept 13: The Town has been interested in using the facility as an evacuation and shelter-in-place center for major storms. To accomplish this, there would need to be investments in the facility for generators and other equipment and spaces for food, sleeping, and communications. Given the recent and historical catastrophic flooding the region, this is a timely and important concept.

Table 5. Opportunities & Recommendations For Flood Preparedness Programs	
Opportunities	Recommendations
Address flood preparedness in Comprehensive Plan and other planning documents	Work with LENOWISCO PDC and Lee County to update and coordinate Comprehensive Plan sections related to flood preparedness. This could be included in Environmental Goals & Objective and Public Facilities Goals & Objectives in the Town's plan. The County plan already has a section on Flood Prone Areas and addressed these areas in the Land Use Suitability and Land Use sections (Pennington Gap Comprehensive Plan, 2006; Lee County Comprehensive Plan (2020))
Update Floodplain Ordinances	• Work with Virginia DCR, LENOWISCO PDC, and Lee County to update the Town's Flood Damage Prevention Ordinance (Ch. 99), probably after DCR updates the state model floodplain ordinance. See preliminary recommendations in Appendix C. • Consider working with Lee County to coordinate the aforementioned updates with the County's flood plain ordinance. • Work with Virginia DCR Floodplain Management Program on any planned updates to FIRM maps. • If future conditions make the Community Rating System (CRS) more desirable, work with area partners to implement the program.
Flood Response: Town Hall Weather-Related Disaster Hub	The Town has been interested in using the facility as an evacuation and shelter-in-place center for major storms. To accomplish this, there would need to be investments in the facility for generators and other equipment and spaces for food, sleeping, and communications. Given the recent and historical catastrophic flooding the region, this is a timely and important concept.
Incentive Program for Property Owner stormwater and drainage practices, such as rain gardens	• The Virginia Conservation Assistance Program (VCAP) provides cost-share funds for homeowners, businesses, and government agencies to install small-scale practices that capture and treat runoff. This is similar to existing agricultural cost-share programs administered through the soil and water conservation districts. Currently, the program is not available in Lee County, but if there is interest, it could be made available. • Consult with program staff with the Virginia Association of Soil & Water Conservation Districts in conjunction with the Daniel Boone Soil & Water Conservation District to determine the steps needed to make VCAP available within the community. • Evaluate whether a non-profit community partner could assist in promoting and coordinating the VCAP program, similar to other programs in the Commonwealth.

Work with partners to develop workforce capacity to maintain flood preparedness projects, such as the ones included in this plan.	As indicated in the concepts, maintenance of nature-based practices is an important consideration, and this maintenance requires a workforce. The work requires particular skills, such as distinguishing native plants from non-native when weeding or planting, and knowing when to prune trees and shrubs. There are programs that can support the Town with workforce training (e.g., Chesapeake Bay Landscape Professional – Associate) and/or organizing actual crews (e.g., Appalachian Conservation Corps). UVA Wise is in the process of implementing a service learning requirements, and other local programs, such as youth workforce and 4H, may also be possibilities.
Regional debris removal after major storms	Post-storm clean-up is a significant task, and important for preventing further damage with subsequent storms. The task includes in-channel debris as well as blocked drainage structures, such as inlets, channels, and pipes. It is difficult for the Town to mount these efforts on its own, so regional partnering is a good approach. Work with Lee County, utility companies, surrounding communities (e.g., Big Stone Gap), and other entities to develop a proactive plan for debris management.
Invasive plant management	Many of the park and streamside areas are overrun with invasive plants that are choking out other (native) species, reducing streambank stability, diminishing pollinator value, and impacting tree health. The main culprits appear to be Japanese Knotweed and Kudzu. It would be impractical to control the invasives in all areas, so strategies would have to focus on priority areas, such as places where new natives are being planted or where valuable trees are being impacted. An education campaign can also educate property owners about not using invasives in their home landscapes. Organizations, such as PRISM , can provide training and guidance.
Community education & engagement	As with any program that involves community participation, it is important to communicate and provide accessible information about flooding and other hazards. In general, people want to know how to prepare, stay safe during an event, and assist as they are able with post-event response, such as assisting neighbors with critical needs. Fortunately, Pennington Gap is surrounded by excellent educational resources and that may be able to assist: Appalachian Voices, Mountain Empire Community College, UVA Wise, LENOWISCO PDC, the American Red Cross, and others.
Regional Floodplain Manager Position	Through the CFPF grant, the Town now has two certified floodplain managers through the Virginia Floodplain Management Association . However, these two already have full-time jobs with other duties. In addition, given the Town's relatively small size, it may not make sense to hire a floodplain manager on their own. The Town should consider working with the County and neighboring jurisdictions to share a position, perhaps through the LENOWISCO PDC. That would allow one person to provide consistent review of floodplain issues and model updates as well as assist with local ordinance updates.

In terms of implementation planning for the high-priority concepts, it is likely possible that various concepts could be clustered for the purposes of seeking implementation funding and constructing the projects. These clusters would include concepts that are similar in their solutions and/or lumped together geographically. **Table 6** summarizes some possible implementation clusters and potential funding sources that could be used for the clusters. See **Figure 10** for planning-level cost ranges for the high-priority concepts.

Table 6. Project “Clusters” & Potential Funding	
Projects	Potential Funding Sources
1. Cas Walker Building removal; build park on property 2. Riverbend Shopping Center 6. Kentucky St. Drainage Study and Implementation 4. Town Property/Greenway 5. Greenway/Frisbee Golf/ Floodplain below Town Hall 7. Leeman Park near Footbridge 8. Leeman Park Wetland 9. Leeman Park Pond 6. Stream Restoration 13. Town Hall Weather-Related Disaster Hub 10. Control Invasive Species 11. Private Property Incentives 12. Update Floodplain Ordinance 14. Workforce Program	• Pending application with Cumberland Forest Community Fund • CFPF Implementation grant, Round 6 and beyond • CFPF Funding to address repetitive loss properties & property acquisition • VDOT regional funds • VDOF Urban & Community Forestry Grants • Virginia Environmental Endowment: Virginia Program • Virginia Department of Environmental Quality, Stormwater Local Assistance Fund

References & Resources

[Blue Ridge PRISM](#) (invasive plant management).

Federal Emergency Management Agency (FEMA). [National Flood Insurance Program](#).

Federal Emergency Management Agency (FEMA). [Riverine Flooding](#)

Lee County, Virginia. [Comprehensive Plan](#). 2020.

LENOWISCO Planning District Commission. [Hazard Mitigation Plan Update](#). 2021.

[Mid-Atlantic Regional Integrated Sciences and Assessment](#)

National Weather Service (NWS). [Floods and Flash Floods](#).

Town of Pennington Gap. [Comprehensive Plan](#), 2006; revised 2025.

Virginia Association of Soil & Water Conservation Districts. [Virginia Conservation Assistance Program](#).

Virginia Department of Conservation & Recreation (DCR). [Community Flood Preparedness Fund Grants and Loans website](#).

Virginia Department of Environmental Quality (DEQ). [Stormwater Local Assistance Fund](#).

[Virginia Floodplain Management Association](#).

Appendices

Appendix A: Full List of 14 Concepts

Appendix B: Town Hall Wetlands report

Appendix C: Floodplain ordinance review

Appendix D: Selected River Level Cross-Sections For Priority Areas

Appendix E: VDOT culvert plans pertaining to Kentucky Street

Appendix F: Community Meeting Feedback

Appendix A

All Community Flood Preparedness Concepts:

- **Key to Concept Benefits: (1) Flood Reduction, (2) Cost, (3) Community Benefits, (4) Maintenance**
- **Concept Descriptions: Location, Examples, Benefits**

Benefits Key, Page 1

Flood Reduction



Project does not substantially provide storage for floodwaters, but can reduce flood risk by allowing more space for floodwaters and/or vegetation that can slow down and absorb floodwaters.



Project provides some storage for floodwaters and has other environmental benefits, as noted above.



Compared to other projects, project provides substantial storage for floodwaters and/or reduces flood risk as well as providing other environmental benefits.

Benefits Key, Page 2

Cost	
\$	Project has limited cost in terms of equipment, staff and/or community volunteer time, training, and operations. In general terms, design, capital, and operational costs would be in the \$40K to \$80K range.
\$ \$	Project requires investment of equipment, staff time, training, and operations that may require securing additional revenue through modest grants or loans. In general terms, design, capital, and operational costs would be in the \$80K to \$250K range.
\$ \$ \$	Project requires more investment of equipment, staff time, training, and operations that likely require outside sources of funding, such as larger grants or loans. In general terms, design, capital, and operational costs would be in the \$250K to \$1M range.

Benefits Key, Page 3

Community Benefits	
	Project does not have substantial benefits in terms of recreation, facilities for the enjoyment of the public, aesthetic improvements, or features that lead to a more resilient community.
	Project has some benefits in terms of recreation, facilities for the enjoyment of the public, aesthetic improvements, or features that lead to a more resilient community, such as increased tree canopy.
	Project has substantial benefits in terms of recreation, facilities for the enjoyment of the public, aesthetic improvements, or features that lead to a more resilient community.

Benefits Key, Page 4

Maintenance*	
	Project does not have heavy operation and maintenance (O&M) burden for staff or volunteers. It may require occasional or annual interventions of some sort.
 	Project may require O&M interventions on a quarterly basis for vegetation and facility management, diminishing to semi-annually as the project matures, with each intervention requiring several hours up to a half-day. Requires mostly hand tools or small equipment.
  	Project may require O&M interventions on a monthly basis or after storm events for vegetation and facility management, diminishing to seasonally as the project matures, with each intervention requiring up to a full day to several days. May require some heavy equipment for tasks like sediment removal in addition to hand tools and small equipment.

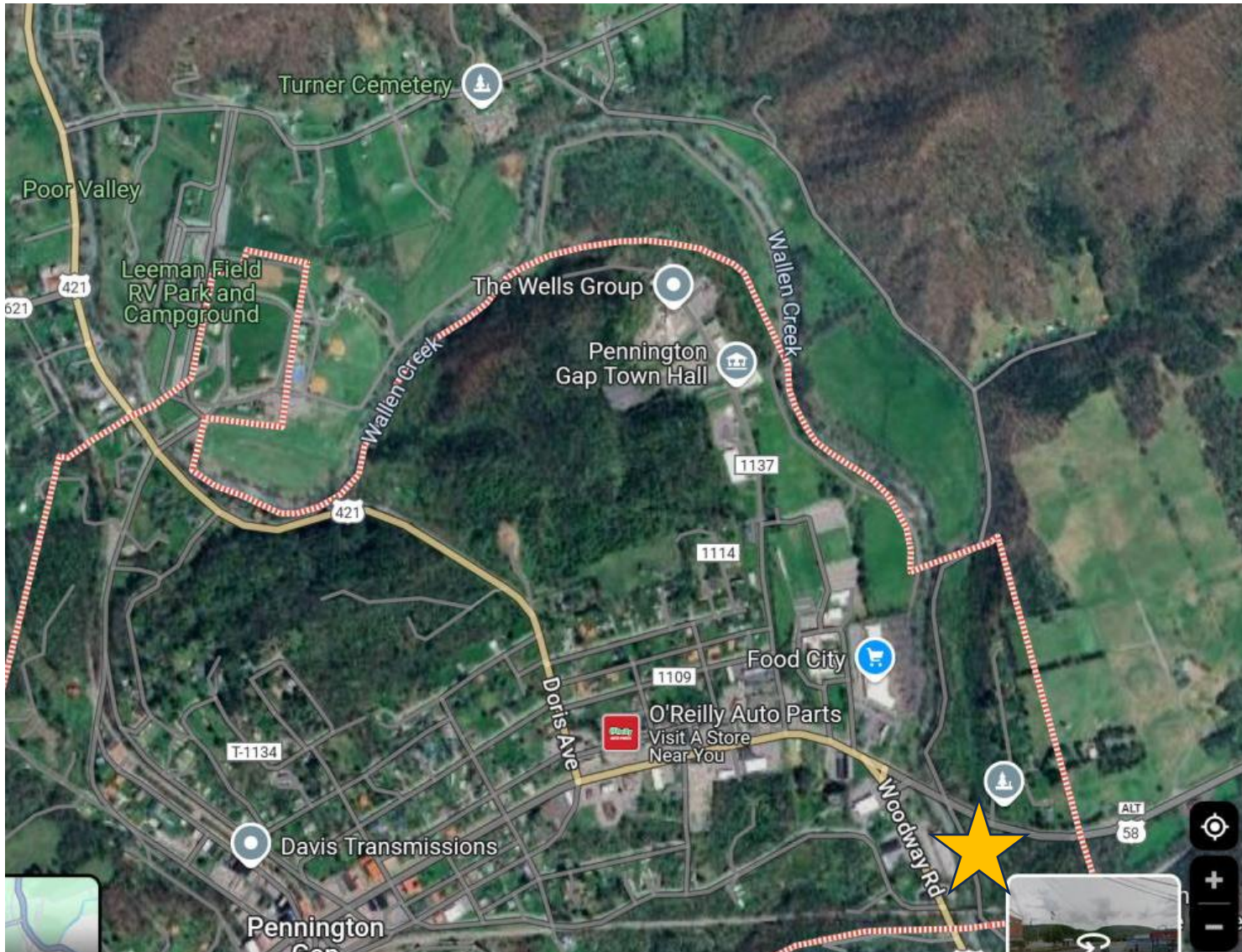
*Note that maintenance for proposed projects does not consider maintenance that is currently conducted, but that would not be necessary with the new project. For example, if an area that is currently mowed is planted with native vegetation, much of the mowing would no longer be needed. In that example, maintenance would shift from mowing to weeding, pruning, etc., requiring a different skill set and budget.

Concept 1. Cas Walker Building



Concept: The Towns' long-term interest has been to tear down this chronically-flooded building. Appalachian Voices has been seeking funding to accomplish this. The property and adjacent old gas station parcel could subsequently be redeveloped for a park, extension of Greenbelt, and/or possible solar array – depending on community input. Any such plan could build in storage for floodwaters to alleviate road and bridge flooding.

Concept 1. Cas Walker Building -- Location



Concept 1. Cas Walker Building -- Examples



Source: National Park Service

NOTE: The amenities of these parks is flexible, and can include canoe/kayak access, fishing, picnic tables, pollinator gardens, etc.

Concept 1. Cas Walker Building -- Benefits

Flood Reduction	Cost	Community Benefits	Maintenance
			

Concept 2. Riverbend Shopping Center



Concepts:

- (1) Re-purpose overgrown “basin” to provide runoff storage. Manage the kudzu and replace with native plants. Replace pipe system.
- (2) Remove unnecessary/unused asphalt (impervious cover), especially adjacent to river. Expand riparian buffer by amending soil and planting vegetation. Control the knotweed and other invasives.

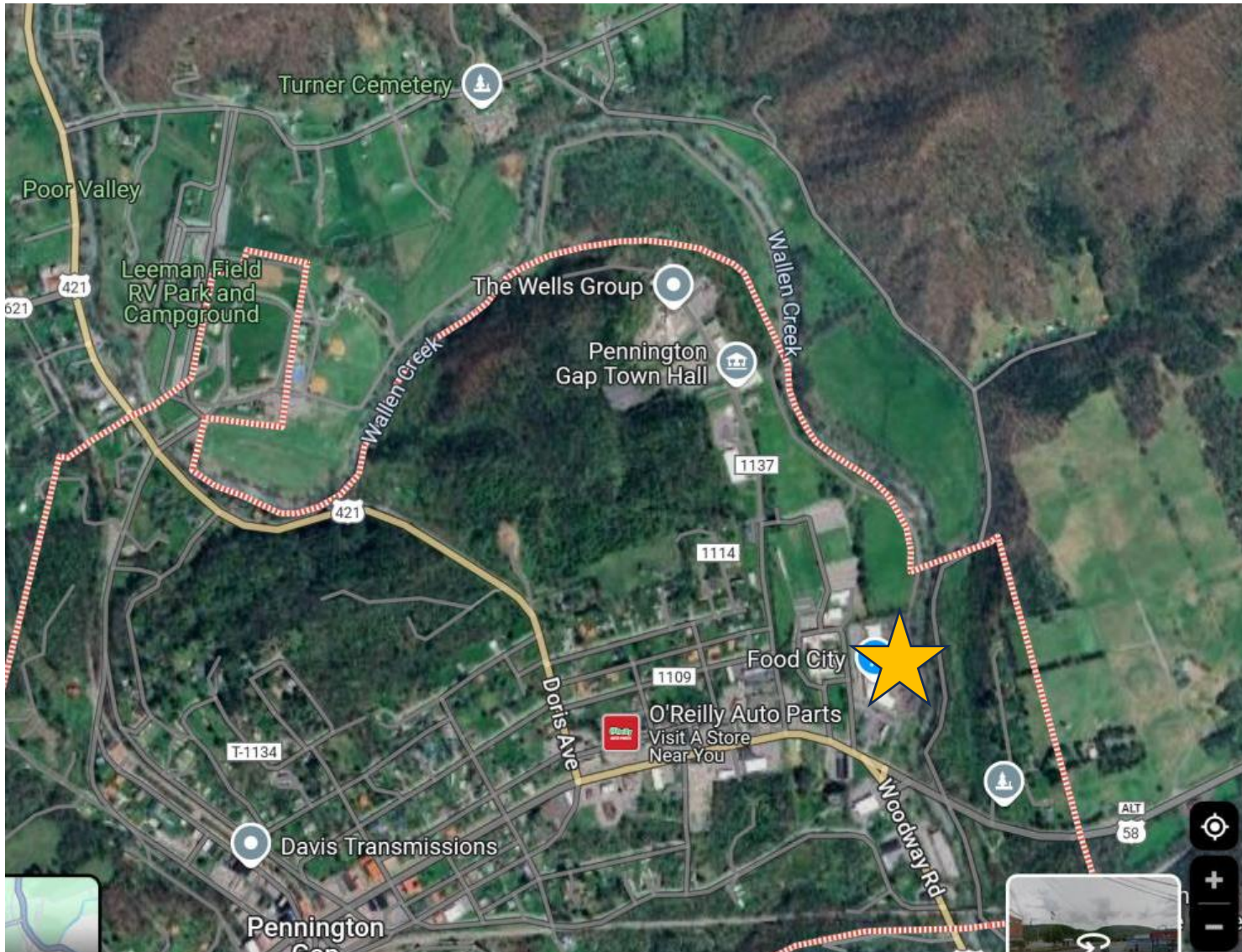
Concept 2. Riverbend Shopping Center (Feb. '25)



Concepts:

- (1) Re-purpose overgrown “basin” to provide runoff storage. Manage the kudzu and replace with native plants. Replace pipe system.
- (2) Remove unnecessary/unused asphalt (impervious cover), especially adjacent to river. Expand riparian buffer by amending soil and planting vegetation. Control the knotweed and other invasives.

Concept 2. Riverbend Shopping Center -- Location



Concept 2. Riverbend Shopping Center -- Examples

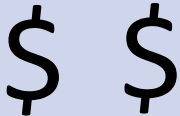


BEFORE: Runoff from Parking Causing Erosion on Streambank



AFTER: Removing asphalt and planting rain garden and riparian trees and shrubs alleviates the problem

Concept 2. Riverbend Shopping Center -- Benefits

Flood Reduction	Cost	Community Benefits	Maintenance
			

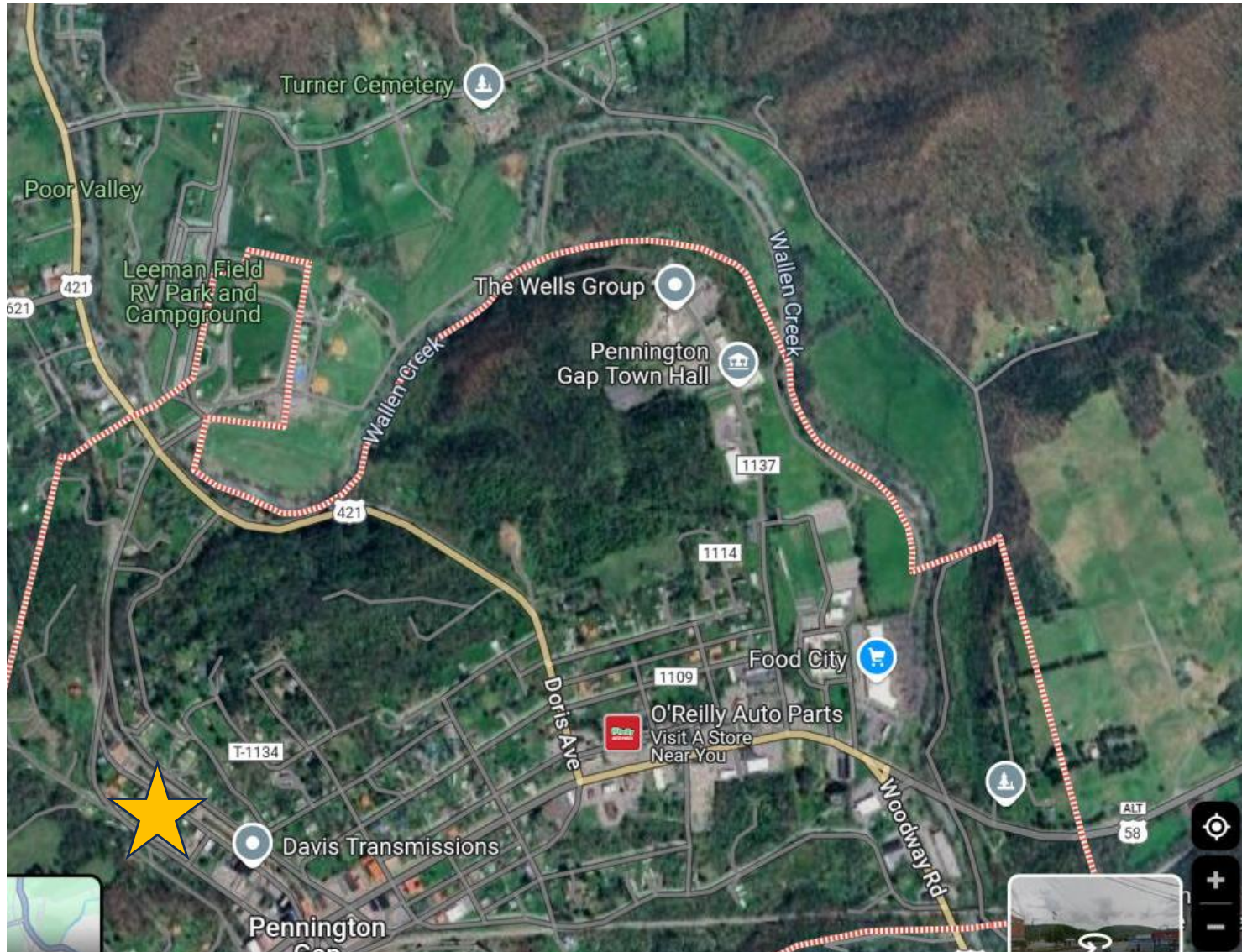
Concept 3. Kentucky Street Drainage



Concept: This drainage issue was noted at the community meeting. The ditch on the northeast side of the road has limited capacity and flooding occurs when the system backs up, especially since the downstream system leaves the right-of-way, goes under several buildings on private property, and is not well-understood south of East Morgan Ave. The Virginia Department of Transportation (VDOT) maintains a 76-foot long, 6 ft x 6 ft concrete box culvert under East Morgan. This culvert has been in place since at least 1932 and has been added to and built on top of for years since that time. VDOT is only responsible for maintaining the original 76 ft long culvert, and inspects it every other year (next inspection is scheduled for November 2026).

Enhancing flood control will require characterizing the existing system (mostly above and below the VDOT section) and developing a re-worked drainage system and easements that can successfully convey the water based on system modelling and available property.

Concept 3. Kentucky Street Drainage -- Location



Concept 3. Kentucky Street Drainage -- Example



Source: Drainage Improvement Project, City of Roanoke

Concept 3. Kentucky Street Drainage -- Benefits

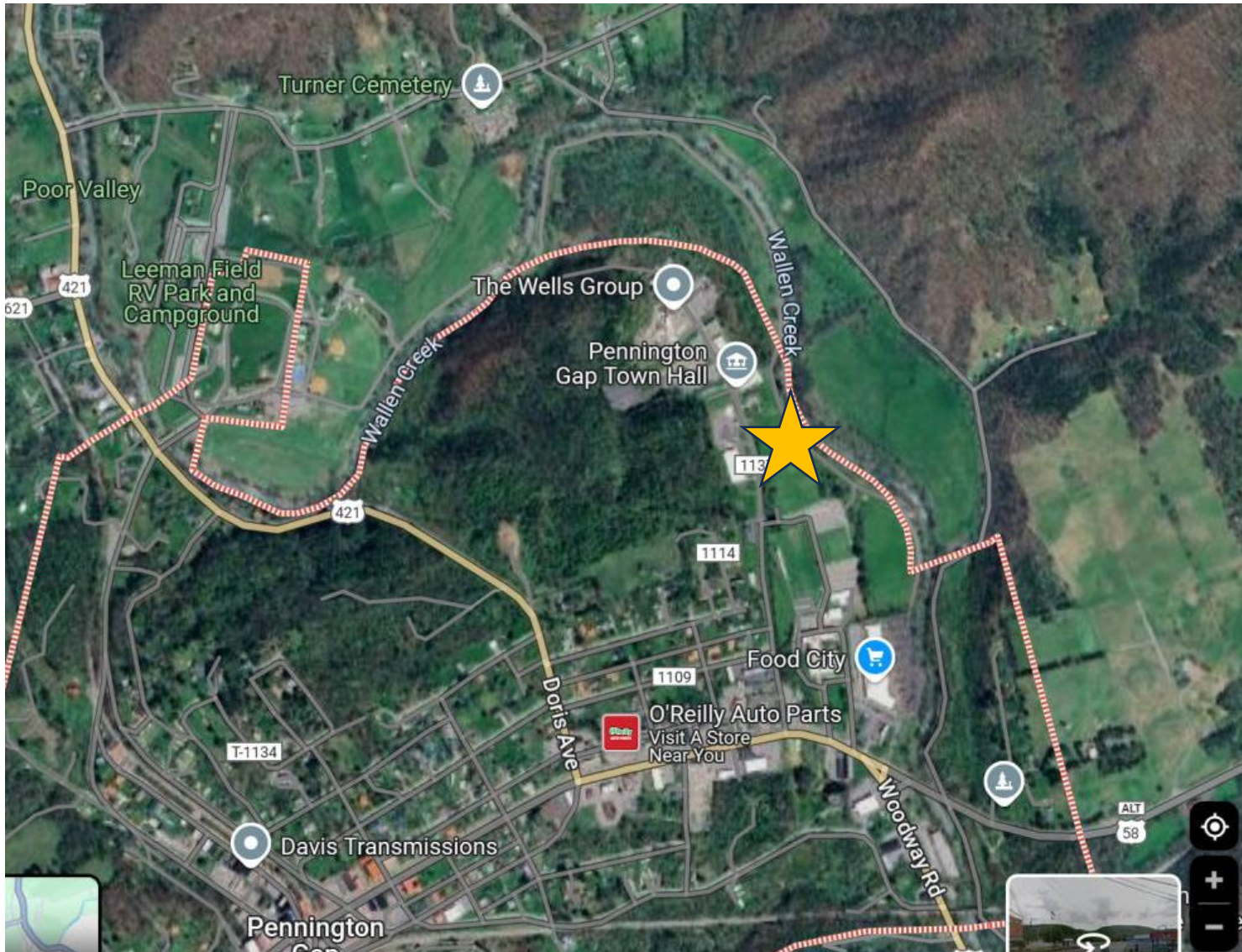
Flood Reduction	Cost	Community Benefits	Maintenance
			

Concept 4. Town Property Next to Shopping Center



Concept: Big field is currently mowed grass, with some existing recreational uses. Many opportunities here for outdoor classroom (next to Elementary School), active recreation, pollinator gardens, daffodil maze, other planting areas, bee and bug boxes, community classes, master gardeners meeting area, school programs (e.g., kids in creek, trout in classroom), and tree planting adjacent to river.

Concept 4. Town Property Next to Shopping Center -- Location

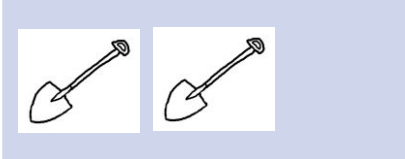


Concept 4. Town Property Next to Shopping Center -- Example



Source: Augusta Free Press, City of Waynesboro, VA

Concept 4. Town Property Next to Shopping Center -- Benefits

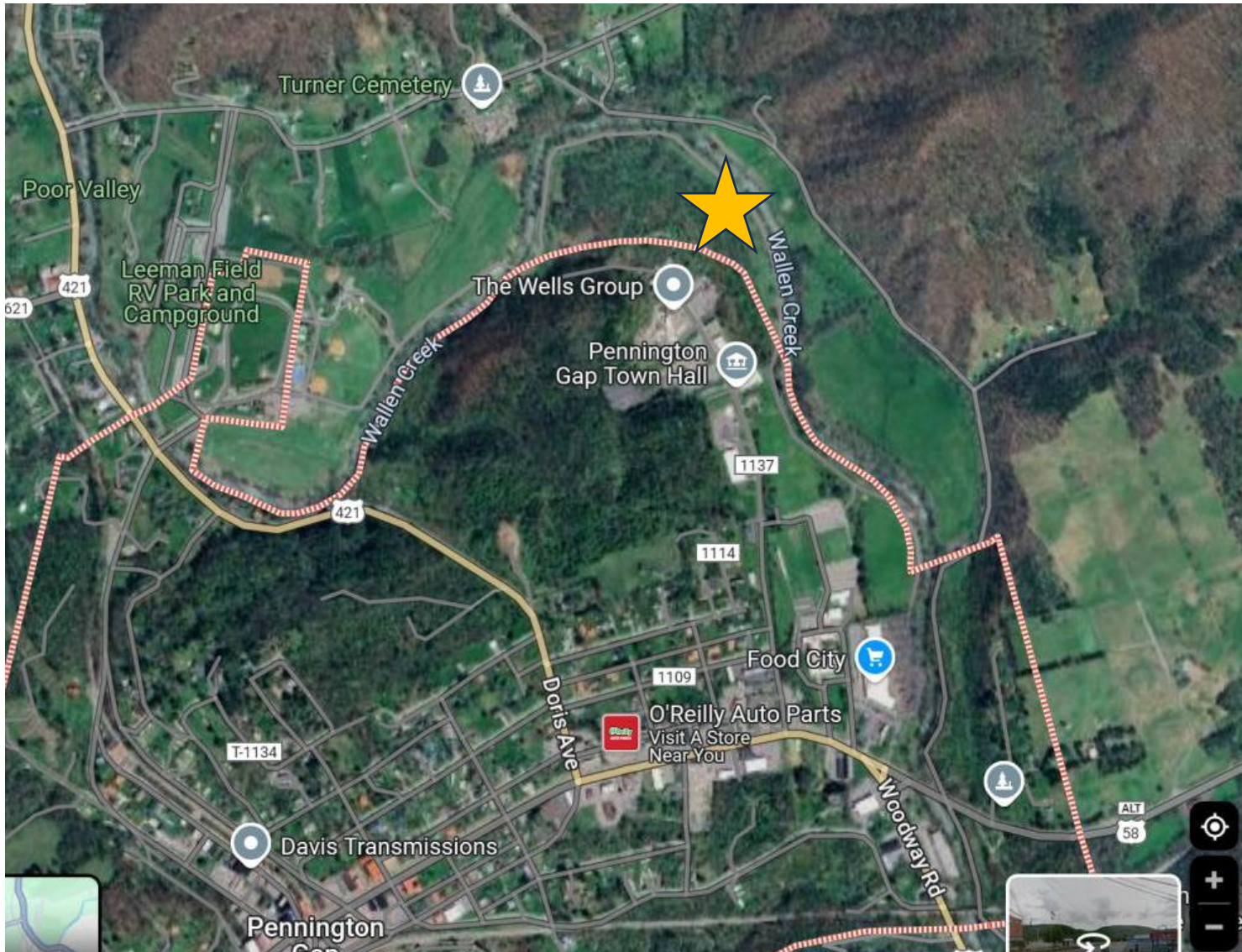
Flood Reduction	Cost	Community Benefits	Maintenance
			

Concept 5. Greenbelt/Frisbee Golf Area



Concept: This is a beautiful and popular section of the Greenbelt. Some areas close to the streambank could use more vegetation to help hold the banks in place. This could include native plants—including [river cane](#)--that customarily grow on the banks and trees on top of the bank. There are other areas of mowed grass that could be planted with trees. In addition, the Town has been interested in developing a trail system in the wooded area below Town Hall, where there is a variety of forest and habitat types.

Concept 5. Greenbelt/Frisbee Golf Area -- Location



Concept 5. Greenbelt/Frisbee Golf Area – Examples



Source: River Cane planting by Virginia Natural Heritage Program and volunteers



Source: Streambank plantings (and Mala) as part of a restoration project. Ecosystem Services, LLC.

Concept 5. Greenbelt/Frisbee Golf Area – Benefits

Flood Reduction	Cost	Community Benefits	Maintenance*
			

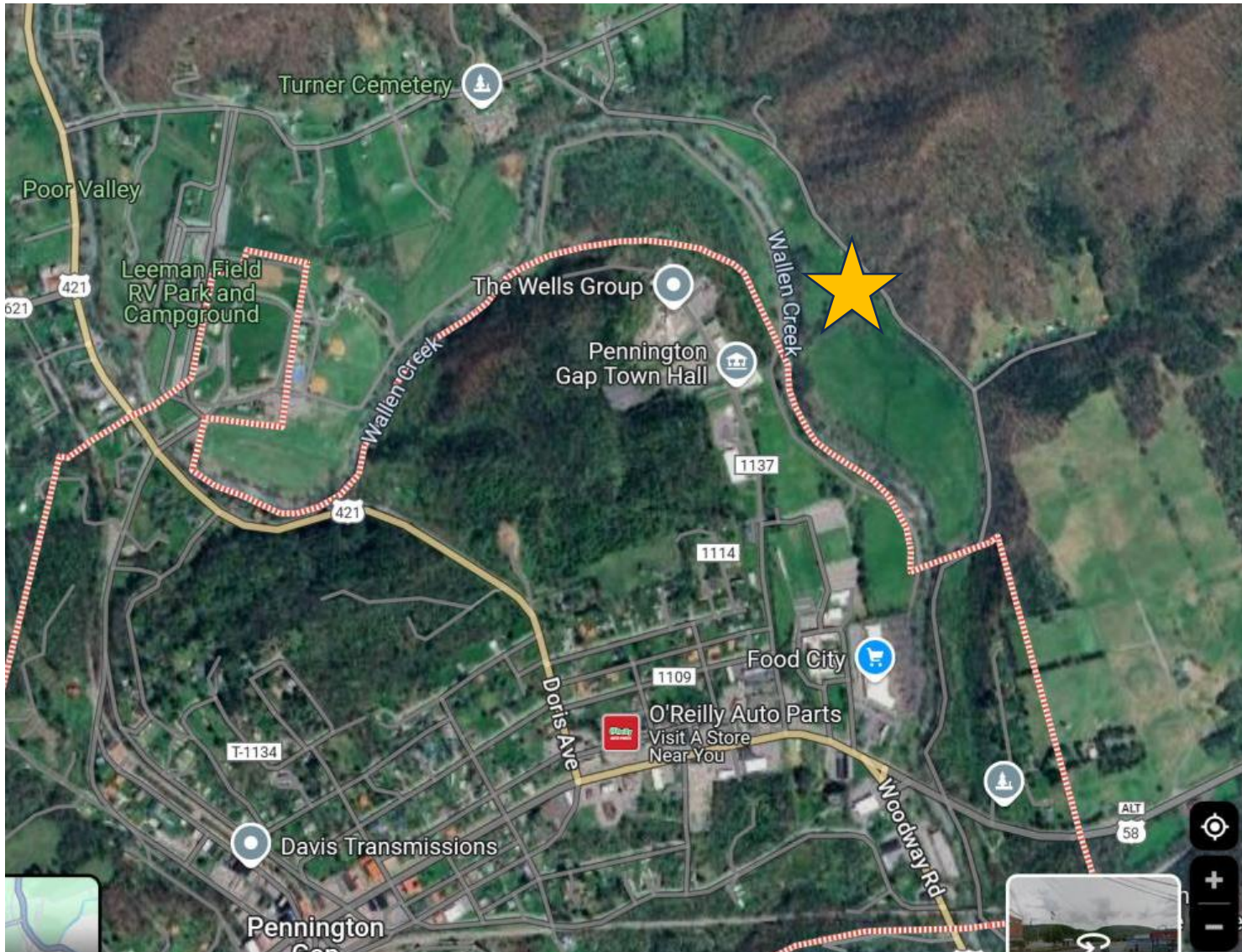
* For all tree and native plant zones, maintenance is most rigorous during the first 2 to 3 growing seasons to control invasives and ensure that plants are watered and get established. After that early phase, maintenance burdens can drop off significantly.

Concept 6. Stream Restoration



Concept: The property on the east side of the South Fork Powell is a floodplain that is not actively used for agriculture. There are several areas along this stretch where the streambanks are eroding, creating a sediment and nutrient source. Stream restoration techniques can both reduce the erosion and sediment as well as create more overbank storage during high water events.

Concept 6. Stream Restoration -- Location



Concept 6. Stream Restoration -- Examples



BEFORE

Source: Ecosystem Services, LLC. South Fork Shenandoah stream restoration project.



AFTER

Concept 6. Stream Restoration -- Benefits

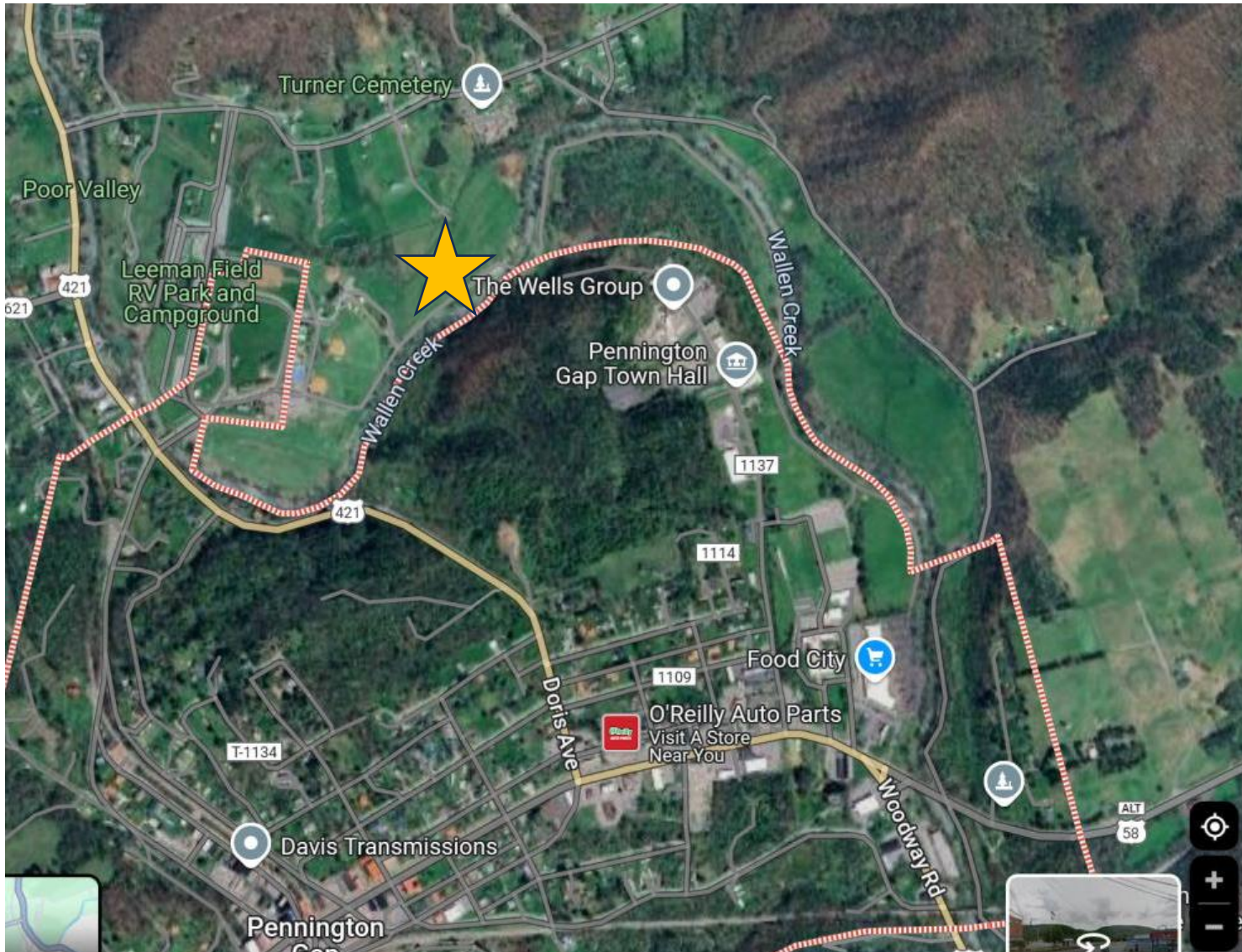
Flood Reduction	Cost	Community Benefits	Maintenance
			

Concept 7. Leeman Park Across Footbridge



Concept: This grassy streamside area is a popular gathering spot for the community, so the open areas are a community asset. Some tree planting, especially along the riverbank could help with bank stability and also provide shade in the summertime. The immediate bank area could be another place for River Cane, although some water access paths should be maintained.

Concept 7. Leeman Park Across Footbridge -- Location



Concept 7. Leeman Park Across Footbridge -- Examples



Tree planting, greenbelt extension, and picnic tables maintain a park-like amenity.

Concept 7. Leeman Park Across Footbridge -- Benefits

Flood Reduction	Cost	Community Benefits	Maintenance*
			

* Since this area is already mowed on a regular basis, the incremental level of maintenance may not be that high, and would include maintenance of planted trees. Maintenance would be similar to Concept 4.

Concept 8. Leeman Park Wet Areas



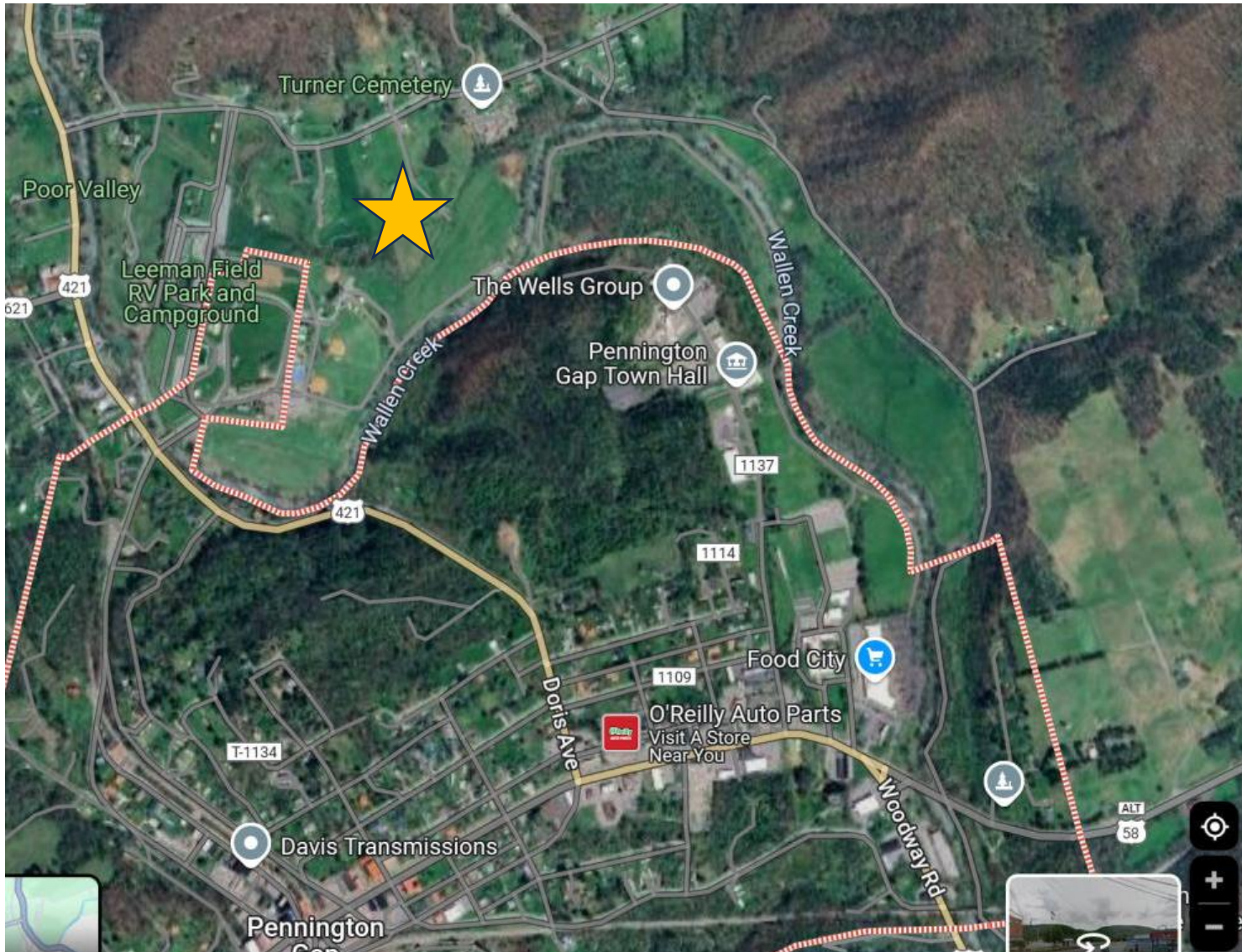
Concept: Leeman Park has several wet areas near the ballfields. Some are overgrown (left photo) and others mowed (right photo). Some of the areas are difficult to mow due to wetness, and these areas are generally not used by the public. A small, straight channel runs along this area. These interconnected wet areas could be designed and managed with control structures as wetlands that could provide more water/flood storage, habitat areas, and possibly boardwalk viewing areas. Only some of this property is owned by the Town, so property ownership issues would have to be worked out.

Concept 8. Leeman Park Wet Areas (Feb. '25)



Concept: Leeman Park has several wet areas near the ballfields. Some are overgrown (left photo) and others mowed (right photo). Some of the areas are difficult to mow due to wetness, and these areas are generally not used by the public. A small, straight channel runs along this area. These interconnected wet areas could be designed and managed with control structures as wetlands that could provide more water/flood storage, habitat areas, and possibly boardwalk viewing areas. Only some of this property is owned by the Town, so property ownership issues would have to be worked out.

Concept 8. Leeman Park Wet Areas -- Location



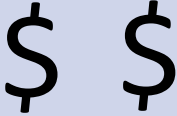
Concept 8. Leeman Park Wet Areas – Examples



Wetland Park in Chautauqua, NY

NOTE: The photo shows a fairly highly managed and maintained practice, but lower maintenance options are available, which would look similar to the existing site.

Concept 8. Leeman Park Wet Areas – Benefits

Flood Reduction	Cost	Community Benefits	Maintenance*
			

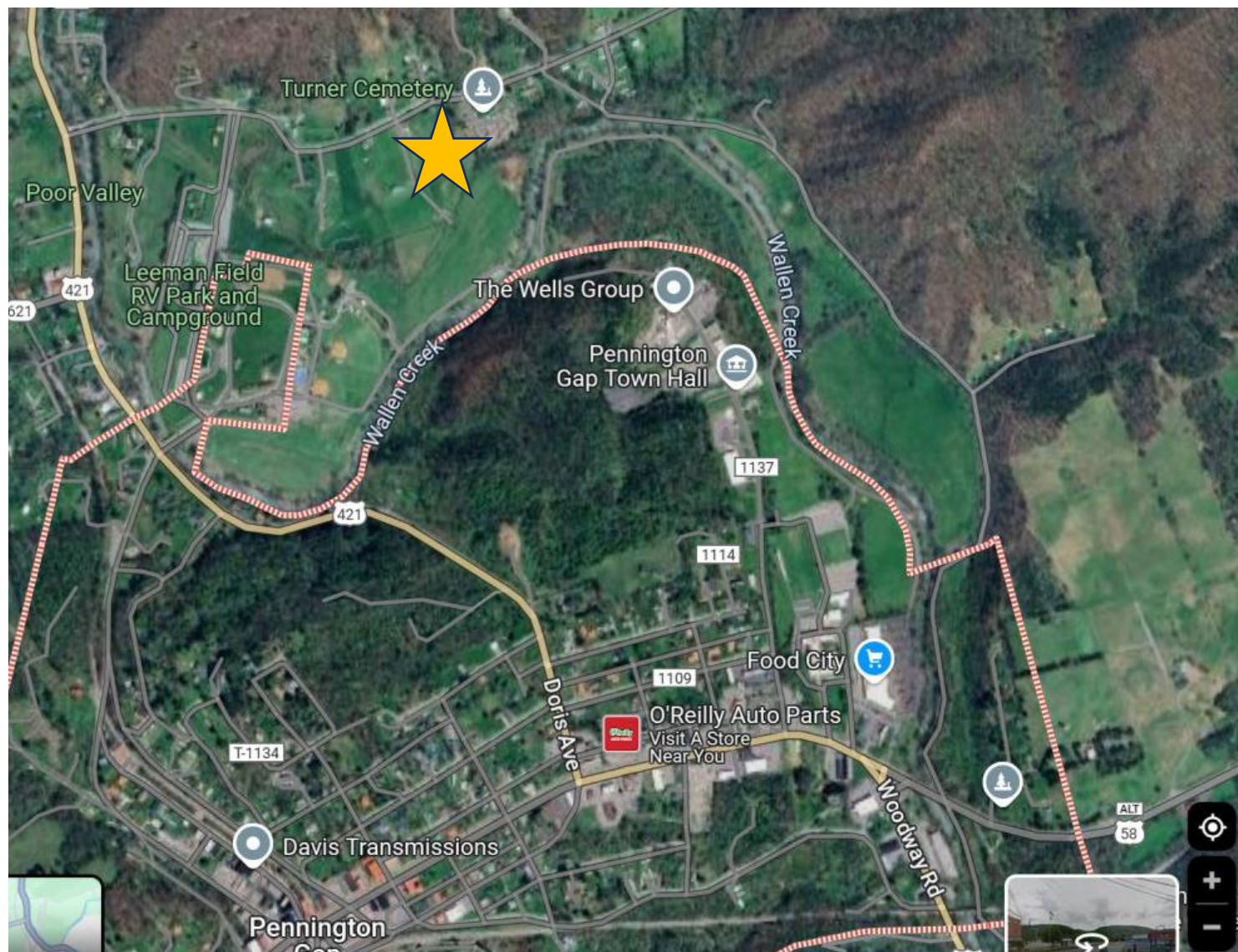
* Maintenance depends on the desired aesthetic between “neat and organized” vs. more natural-looking, and also on whether of amenities, such as trails, are included.

Concept 9. Leeman Park Pond



Concept: This pond could be built into and interconnected with the wetlands in Concept 7, as there is a wet channel that connects the pond to the small channel below. The pond spillway would need to some rehabilitation for structural integrity. Floating treatment wetlands could also be added to enhance variety and habitat.

Concept 9. Leeman Park Pond -- Location



Concept 9. Leeman Park Pond -- Example



Source: Lancaster Clean Water Partners. Photo shows examples of Floating Treatment Wetlands

Concept 9. Leeman Park Pond -- Benefits

Flood Reduction	Cost	Community Benefits	Maintenance
			

Concept 10. Control Invasive Plants



Concept: Many of the park and streamside areas are overrun with invasive plants that are choking out other (native) species, reducing streambank stability, diminishing pollinator value, and impacting tree health. The main culprits appear to be Japanese Knotweed and Kudzu. It would be impractical to control the invasives in all areas, so strategies would have to focus on priority areas, such as places where new natives are being planted or where valuable trees are being impacted. An education campaign can also educate property owners about not using invasives in their home landscapes. Organizations, such as [PRISM](#), can provide training and guidance.

Concept 10. Control Invasive Plants -- Examples

BLUE RIDGE PARTNERSHIP FOR REGIONAL INVASIVE SPECIES MANAGEMENT

www.blueridgeprism.org

KUDZU

Annihilates Trees, Houses, and Entire Landscapes in a Single Gulp



The lumpy forms here are trees and shrubs engulfed and smothered by kudzu vines. These formations are nicknamed "kudzu sculptures" by people who are all-too familiar with them. Kudzu also covers the ground along the river.

The Culprit

The reason kudzu (*Pueraria montana* var. *lobata*) is sometimes called "the vine that ate the South" is that it can grow as much as a foot a day during summer and 60 feet during a single growing season. Kudzu has engulfed at least 7 million acres of public and private land in the Southeast. Hailing from China and Japan, kudzu first arrived in North America in 1876 as an ornamental vine planted to cover the Japanese Pavilion at the Philadelphia Centennial Exposition. The bold-textured vine with fragrant flowers caught the public's attention and was imported to use as an ornamental cover for garden pergolas and arbors. In Japan, kudzu is used as fodder. In 1902, agricultural extension agents began recommending it to farmers in the southern US as a forage crop. The rampant vine was also planted by many states' transportation departments to control erosion along highways. Soon thereafter, kudzu began eating the South. Today, kudzu infests public and private lands from Maine to Nebraska, south to Texas and Florida, and populations have recently been found and controlled with early detection and rapid response methods in the Pacific Northwest. It has no natural predators or pests on this continent, so it grows undeterred. In 1997, the federal government listed kudzu as a noxious weed.

Known Hangouts

Kudzu voraciously grows in pastures, agricultural and natural fields, vacant lots, power line cuts, ravines, stream sides, riverbanks, and at forest edges. Anyplace where soil is disturbed and sun is plentiful are its favorite hangouts. Kudzu climbs up power lines and telephone poles and from there

can invade lawns and yards. It even seems to mow down buildings with its rampant growth. This invasive vine enters forests at their sunny edges or in clearings and tree-fall locations. After scaling trees, it can crawl across the treetops. Its leafy, twisting tangle of growth quickly becomes impenetrable.

Modus Operandi

Kudzu's fast-growing vines reach out across the ground and form roots at their leaf nodes. They then spread, sprawl and climb. These rooted nodes form their own crowns, which send out more vines. This is its main method of propagating itself. The vines have strong tendrils that can grab onto shrubs, slender tree trunks and branches, wires, fences and buildings.

A massive, below-ground storage tuber that is stuffed with starch gives kudzu its life force. Even after vines are cut back by livestock grazing or a machete, the tuber fuels new stems. The plant suffers no setback in its unbridled growth because grazing does not destroy the growing points on the crowns. Where winters are cold enough to kill the tops of the vine, the stored starch in the tuber fuels new growth from the crowns the next season.



Seen here leafless in early spring, kudzu vines have actually engulfed a house.

If growing in full sun, kudzu flowers in August and September. The flowers have few pollinators outside of the vine's native range, so few seeds are set. However, any viable seeds that form are long-lived. Seedpods and broken stems can float downstream in creeks and rivers to begin new populations.

Kudzu is most destructive in areas with high summer temperatures and plentiful rainfall, but it easily survives drought and cold. Vines thicker than 1/2 inch survive freezing. Slender stems die back to the crowns from cold, but crowns sprout new growth in spring.

Positive Identification

Kudzu is a woody perennial vine in the pea family. Its large, dark green leaves have three distinct leaflets and are arranged alternately on the stems. Leaves mature at 8 to 10 inches long. The middle of the three leaflets has a short stalk and three rounded lobes. The top two leaflets have two lobes and no stalk. Leaf undersides

Follow all herbicide label directions.

©2023 Blue Ridge PRISM

One of many factsheets crated by Blue Ridge PRISM

Concept 11. Private Property Incentive Program for Rain Gardens & Other Practices



Concept: The [Virginia Conservation Assistance Program \(VCAP\)](#) provides cost-share funds for homeowners, businesses, and government agencies to install small-scale practices that capture and treat runoff. This is similar to existing agricultural cost-share programs administered through the soil and water conservation districts. Currently, the program is not available in Lee County, but if there is interest, it could be made available.

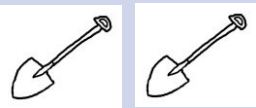
Concept 11. Private Property Incentive Program for Rain Gardens & Other Practices -- Examples



Currently, there are 12 practices covered by VCAP. Some examples include rainwater harvesting, permeable pavement, rain gardens, vegetated swales, and conservation landscaping using native plants.

Source: VASWCD

Concept 11. Private Property Incentive Program for Rain Gardens & Other Practices -- Benefits

Flood Reduction	Cost	Community Benefits	Maintenance
			

Concept 12. Local Floodplain Program & CRS



Concept: The local floodplain program includes the Town's Flood Damage Prevention code (Chapter 99), the local floodplain administrator, and working with Lee County Building Inspection. For future planning, the Town can update its ordinance in accordance with the Virginia Department of Conservation & Recreation model ordinance (2017) and also receive training or community workshops on applicability of the Community Rating System (CRS), which has benefits for property owners paying for flood insurance.

The CRS Program

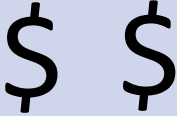


- Voluntary NFIP program that provides reduced flood insurance premiums in communities that go beyond the minimum requirements
- More credits = greater flood insurance discounts
- Program is administered by the “community” = government division with land use authority (locality)



WWW.WETLANDSWATCH.ORG

Concept 12. Local Floodplain Program & CRS -- Benefits

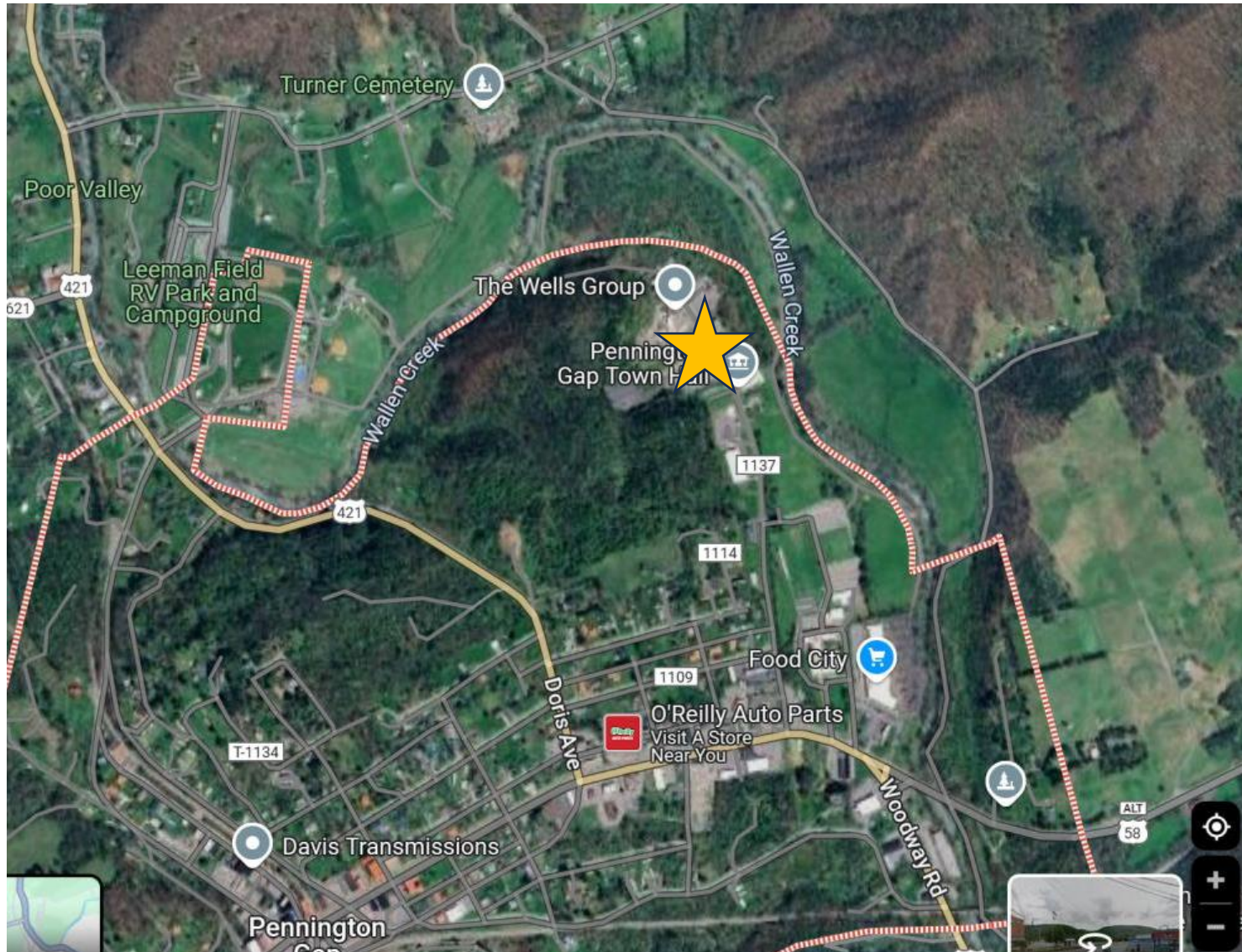
Flood Reduction	Cost	Community Benefits	Maintenance
			

Concept 13. Town Hall Resilience Hub

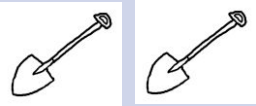


Concept: The Town has been interested in using the facility as an evacuation and shelter-in-place center for major storms. To accomplish this, there would need to be investments in the facility for generators and other equipment and spaces for food, sleeping, and communications. Given the recent and historical catastrophic flooding the region, this is a timely and important concept.

Concept 13. Town Hall Resilience Hub -- Location



Concept 13. Town Hall Resilience Hub -- Benefits

Flood Reduction	Cost	Community Benefits	Maintenance
			

Concept 14. Workforce Programs



Concept: At indicated in the concepts, maintenance of nature-based practices is an important consideration, and this maintenance requires a workforce. This requires particular skills, such as distinguishing native plants from non-native when weeding or planting, and knowing when to prune trees and shrubs. There are programs that can support the Town with workforce training (e.g., [Chesapeake Bay Landscape Professional – Associate](#)) and/or organizing actual crews (e.g., [Appalachian Conservation Corps](#)).

Concept 14. Workforce Programs -- Benefits

Flood Reduction	Cost	Community Benefits	Maintenance
			

Appendix B

Town Hall Wetlands Report

Assessment of wetlands below Town Hall and
along Greenway

Pennington Gap, VA – Wetland Assessment in Floodplain Below Town Hall

For: Town of Pennington Gap, VA

By: Hirschman Water & Environment, LLC & Ecosystem Services, LLC, November 27, 2024

Introduction

As a component of the Community [Flood Preparedness Fund \(CFPF\)](#) Capacity Building grant (Virginia DCR), the Town of Pennington Gap was interested in the regulatory status of the large floodplain “half-moon” area below Town Hall in the bend of the North Fork Powell River floodplain. The Town is interested in this area for possible future recreational activities, such as trails (the area is adjacent to the existing greenway trail). The area also figures prominently in the Town’s search for “nature-based solutions,” as prescribed by the CFPF program.

As part of the October 9, 2024 field assessment with Parks & Recreation staff, Hirschman Water & Environment and Ecosystem Services conducted a preliminary investigation of potential wetlands in the target area. This included examining six “data points” where the team looked at soils, vegetation, and hydrology in accordance with the Army Corps of Engineering wetland delineation protocols.

The Question About Wetlands

There is conflicting information about wetland status in the target area. The [National Wetland Inventory](#) (NWI) consists of broad-based, high-level mapping conducted by the U.S. Fish & Wildlife Service using available geospatial data, but not intended to define wetland boundaries. In this case, the NWI portrayed the entire half-moon area as emergent and/or scrub/shrub wetlands (Figure 1). The NWI wetlands were summarized in a memo from the Environmental Defense Fund (Adam Gold), noting that total wetland areas came to 27.14 acres

Meanwhile, [Web Soil Survey](#) – another online mapping tool developed by the U.S. Department of Agriculture, Natural Resources Conservation Service – lists the mapped soil units within the floodplain. Major soil units are characterized by non-hydric soils that are moderately well-drained and with deeper water tables (generally, not indicative of wetlands). However, minor components have somewhat poorly drained soils, elevated water tables, and hydric soils ratings that do indicate potential wetlands (Figure 2).

These existing resources raised the question of whether the area was in fact a mosaic of wetland and non-wetland zones. The field reconnaissance conducted as part of this study lent credence to that observation. It may also be that historic uses of the land, such as vehicle access (creating small depressions) or other activities influenced the current hydrology of the site. Figure 3 shows a Google Earth Pro aerial image from 1995 that clearly shows some linear features in a landscape that was much less vegetated compared to current conditions.

Methods

The team assessed the southeast corner of the half-moon as representative of the vegetated floodplain area between the greenway's adjacent mowed areas and the slope leading up to Town Hall.

The team selected six data point sites to represent slight variations in landscape position and micro-topography. At each station, we examined soils, vegetation, and hydrology in general accordance with the 1987 Corps Wetland Delineation Manual and the [Eastern Mountains and Piedmont Regional Supplement](#). These were preliminary analyses, and some additional work would be needed to the purposes of any permitting. However, the data were sufficient to create some wetland delineation forms that are included in the attachments.

The team followed up the field work with some modeling to create a potential wetlands map based on field observations, collected wetland data points, and a desktop GIS and hydraulic analysis (Figure 4).

For the GIS and hydraulic analysis, a 1-meter resolution digital elevation model (DEM) from 2016 LiDAR was processed for the area of investigation. Next, a hydraulic model was developed using GeoHEC-RAS that modeled precipitation and the resulting runoff patterns and depths. This model showed areas where runoff accumulated in low areas. Since field observations confirmed that the wetland hydrology in this area is based on toe-of-slope seep wetlands and depressional areas with low infiltration, the hydraulic model results could then be used to identify the general shape of the potential wetlands. The potential wetland map does not constitute a Preliminary Jurisdictional Determination and is intended for planning and not regulatory purposes.

Are Permits Needed?

Both the U.S. Army Corps of Engineers and Virginia Department of Environmental Quality maintain regulatory permit programs.

The need for permits depends on the amount of disturbance (generally fill, but also excavation) in jurisdictional stream and wetlands. There are a variety of U.S. Army Corps [“nationwide permits”](#) for a range of activities. For instance, [Nationwide Permit 18](#) for small disturbances regulates filling of wetlands or “waters of the U.S.” up to 25 cubic yards and fill or excavation up to 1/10 acre. Very small disturbances can often be addressed through simple notification procedures.

Similarly, [Virginia DEQ General Permit WP-1](#) addresses temporary and permanent impacts to less than one-half acre of non-tidal wetland or up to 300 linear feet of stream channel through the Virginia Water Protection Permit Program.

Of course, more substantial disturbance increases the level of documentation, permitting, and possible compensation for both state and federal permit programs.

Summary

This analysis suggests that wetlands in the target area exist in distinct patches based on micro-topography (e.g., low areas, some of which appear as linear features) and landscape position (e.g., at the toe of the steep slope where seeps appear). Historic uses of the land may have also influenced the current shape of the land and its hydrology. A combination of field investigation, mapping, and modeling resulted in the potential wetland map shown in Figure 4.

A more detailed delineation would be needed for the purposes of any future permitting. A simple trail system could very easily avoid and minimize any impacts to wetlands. However, a pre-application meeting with the regional Army Corps of Engineers representative would provide guidance on permit requirements based on proposed activities and the information in this report.

References

Environmental Defense Fund, Adam Gold Ph.D. *Pennington Gap, VA Wetlands Summary*

U.S. Army Corps of Engineers. (2012). *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)*. Vicksburg, MS: U.S. Army Corps of Engineers.

U.S. Department of Agriculture, Natural Resources Conservation Service. *Web Soil Survey*. Retrieved from USDA website
<https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

Figures

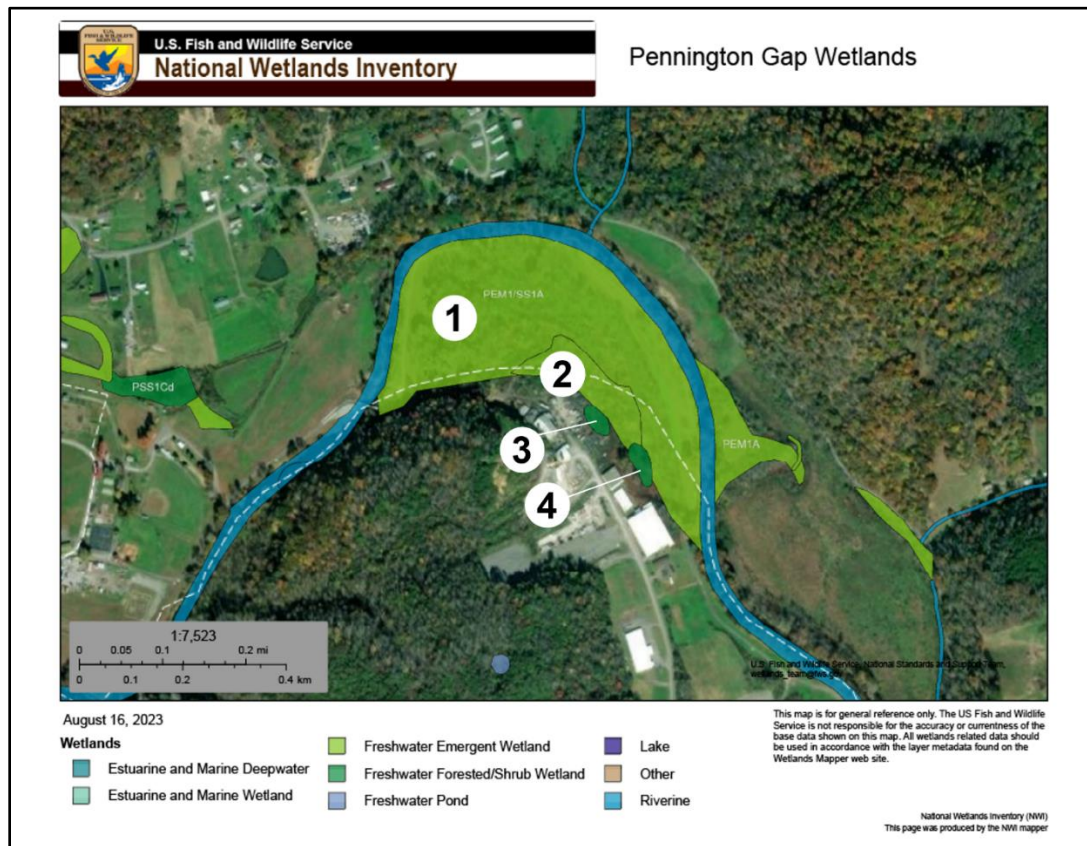


Figure 1. National Wetland Inventory Portrayal of Wetland Types in the Floodplain.

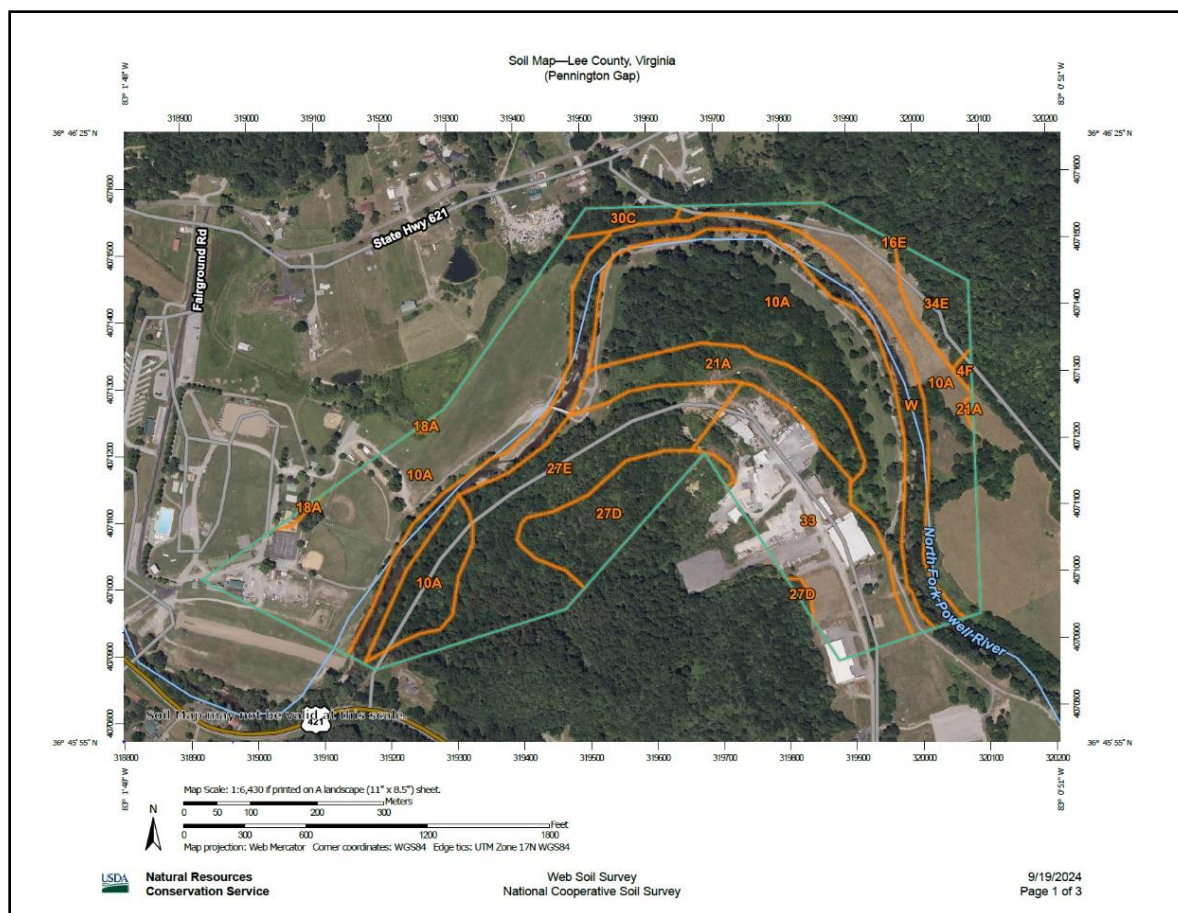


Figure 2. Image from USDA Web Soil Survey.

Soil Unit 10A: Chagrin-Lobdell complex, 0 to 3 percent slopes, occasionally flooded. The major components (Chagrin, Loam, Occasionally Flooded & Lobdell, Silt Loam, Occasionally Flooded) are well-drained or moderately well-drained, hydrologic soil groups B and C, respectively, and non-hydric. A minor component (Holly, loam, frequently flooded) is listed as hydric.

Soil Unit 21A: Lobdell-Orrville complex, 0 to 3 percent slopes, occasionally flooded: This unit also has the Lobdell, Silt Loam as noted above, but also Orrville, Loam, Occasionally Flooded & Holly, loam, frequently flooded, both of which are somewhat poorly drained, have shallower water tables, the latter is characterized as hydric. These units would explain the potential wetlands appearing at the toe of the slope.



Figure 3. Google Earth Pro Aerial Image from 1995 showing much less vegetation than currently exists and some linear features.

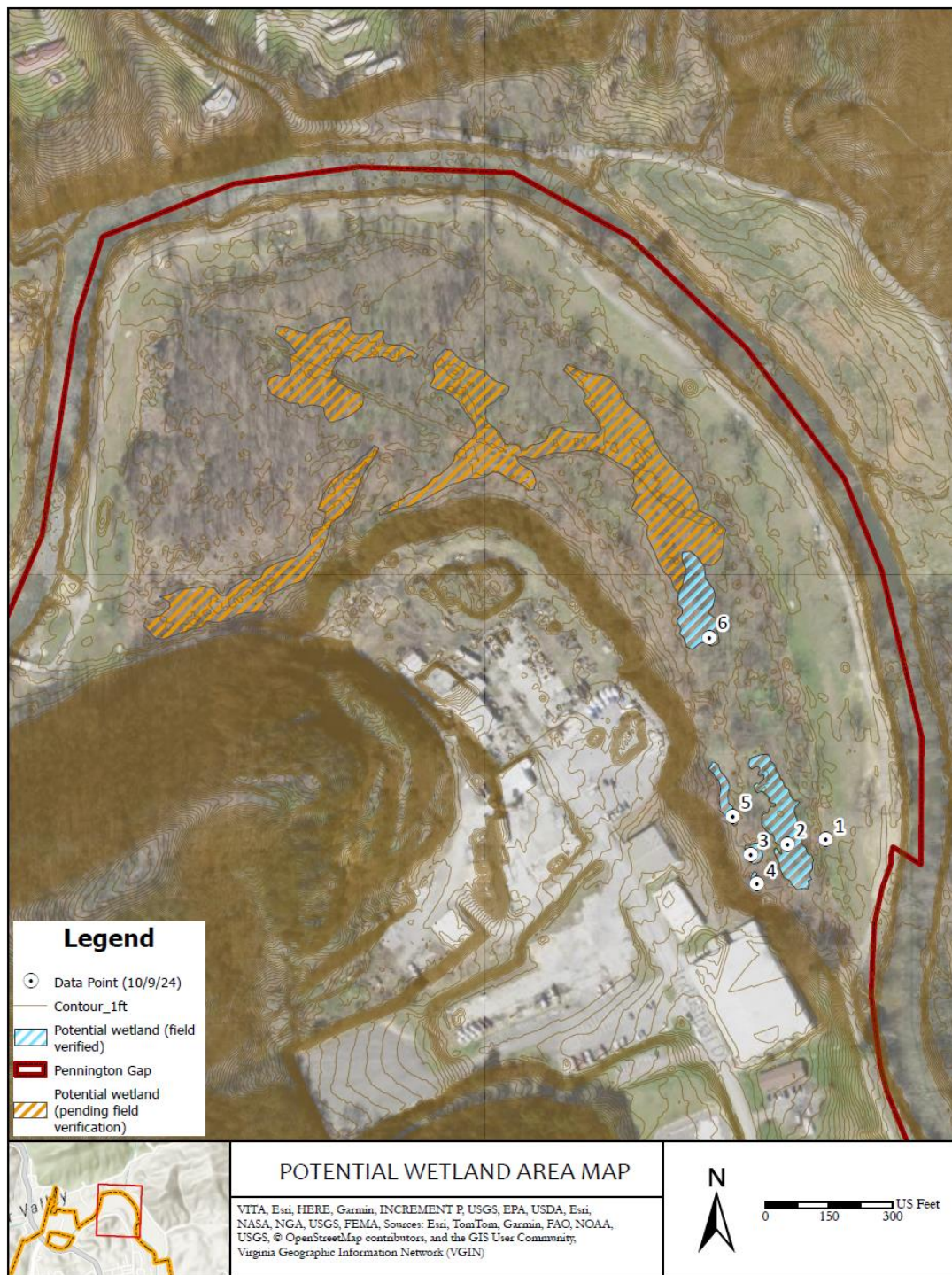


Figure 4. Potential Wetland Map created using field data, geospatial data, and hydraulic modeling.

Appendix C

Town Floodplain Ordinance Review

Review of Flood Damage Prevention Ordinance
(Chapter 99) as per Department of Conservation
& Recreation Model Ordinance

Comments Comparing Chapter 99 (Flood Damage Prevention) of the Pennington Gap Code with the Department of Conservation & Recreation (DCR) Example Floodplain Management Ordinance.

NOTE: This is a preliminary review and not a comprehensive line-by-line analysis. It is intended to raise questions and opportunities or further discussion between the Town, County, respective legal counsels, and DCR.

By: Hirschman Water & Environment, LLC, 02/20/25

Chapter 99 Section	Suggestions Based on DCR Floodplain Model	Notes & Considerations
General	Consider adopting Chapter 99 as a Zoning Overlay, as per Section 3.2 of the FPM Model	<i>An overlay would allow for the procedures of the Zoning Ordinance to be used, so provide some consistency across the Town codes. Lee County's code uses this approach (Chapter 8, Section 26-B).</i>
Add to Article I or new Article II	Consider adding all or part of Article II of Model: Floodplain Administration, which includes: 2.1. Designation of FP Administrator (FPA) 2.2. Duties & Responsibilities of FPA 2.3. Use & Interpretation of FIRMS 2.4. Jurisdictional Boundary Changes 2.5. District Boundary Changes 2.6. Interpretation of District Boundaries 2.7. Submitting Model Based Technical Data 2.8. Letters of Map Revision	<i>There is a lot here on the administrative and technical sides. It may be that the Town may choose to adopt only parts, as Lee County is also involved through the County Building Inspector. Code updates should likely be undertaken in conjunction with the County to ensure consistency.</i>
99-7 & 99-8	• Add "completed LOMR is record of approval" from Section 2.5 of Model • Add Sections 2.7 and 2.8 from Model about technical data and LOMRs	<i>These could be folded into a new Article II are explained in the row above.</i>
99-11. Flood-Fringe Districts	Consider adding more detail without limiting development rights, as per Article III of the Model, e.g., H&H studies and CLOMR process.	<i>The ordinance can specify technical methods to ensure that any encroachments meet the standards. See also County Code Section 8-42. Some communities are more restrictive than the Model if there is concern about allowing new structures that may be subject to future flooding.</i>

99-12-C. Drainage Facilities	It may advantageous to also tie to the State Stormwater Regulations (Chapter 870).	<i>If projects are also subject to state stormwater regulations, the BMPs in the Handbook would be applicable, although the Town could specify that only certain ones (e.g., underground) would be applicable for floodplain projects.</i>
99-12. Design Criteria	Article IV of the Model contains a lot of detail about the content and standards for development plans, some of which may be helpful for both Town and County FP codes and that go beyond the general statements in 99-12 and also 99-14. The Model also has standards in red that allow for added precautions compared to base flood elevations, as the discretion of the locality.	<i>The Town (and County) should consider how applicable these sections of the Model are to local development patterns and consistency with other provisions of Zoning.</i>
Article IV. Variances	Article VI of the Model contains considerations and factors for weighing variances. These are outlined in A – N in that section.	<i>These considerations may enhance the decision-making process for granting variances.</i>
Article V. Penalties	Both Article V of the Town Code and Section 1.7 of the Model suggest that civil penalties (e.g., fines) are an option, but it may be helpful to provide more specific guidance on how these would work procedurally.	<i>Civil penalties may be a more flexible compliance tool than criminal, so worth exploring with legal counsel.</i>
Article VI. Existing Structures	This Article is different than Article V of the Model, so worth considering making it consistent. In the Town version, Section A states that enlargements and expansions in the Floodway can be allowed if “the effect of the proposed expansion or enlargement on flood heights is fully offset by accompanying improvements,” while the Model, Section A, states that “No new square footage is being built in the floodway.”	<i>Since the Town code does not specify what offsetting expansion in the Floodway constitutes, it could be a precedent that is not worth keeping. With the Floodway being the highest risk zone, building walls, dikes, disturbing or excavating existing land, etc. may subject the property and downstream properties to increased risk.</i>

Appendix D

Selected River Level Cross-Sections For Priority Areas

Flood Water Surface Elevation Profiles For
Priority Areas:

1. Cas Walker Building Vicinity
2. Town Hall
3. Leeman Field Park

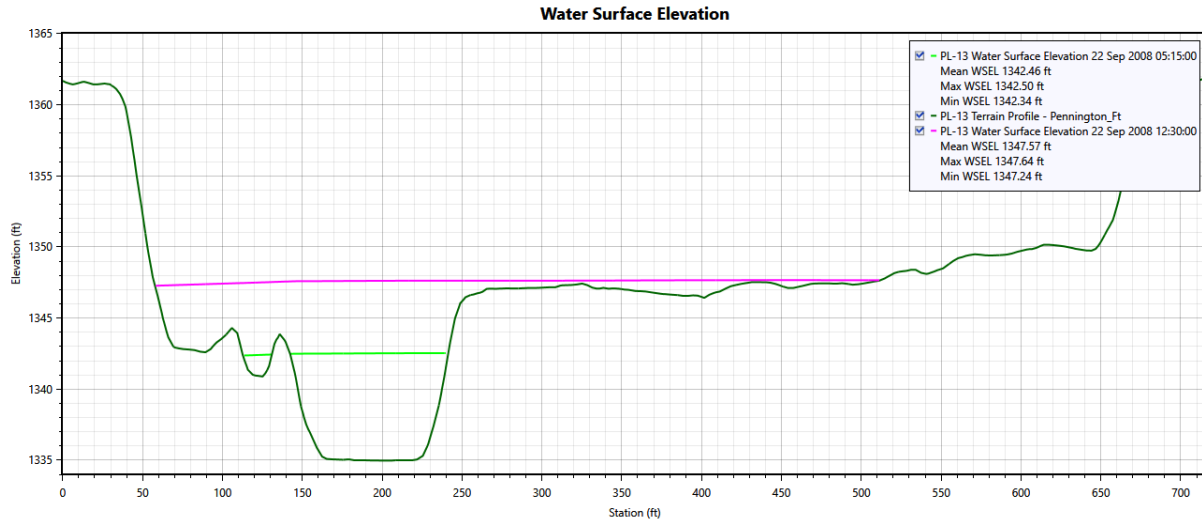


Figure Appendix D.1. Cross section view of the 2-year (green) and 10-year (magenta) near the Cas Walker Building and Veterans Memorial Highway Vicinity. As can be seen, the 2-year storm is contained within the banks of the North Fork Powell River while the 10-year storm activates the floodplain. See Figure 6 in main report for plan view.

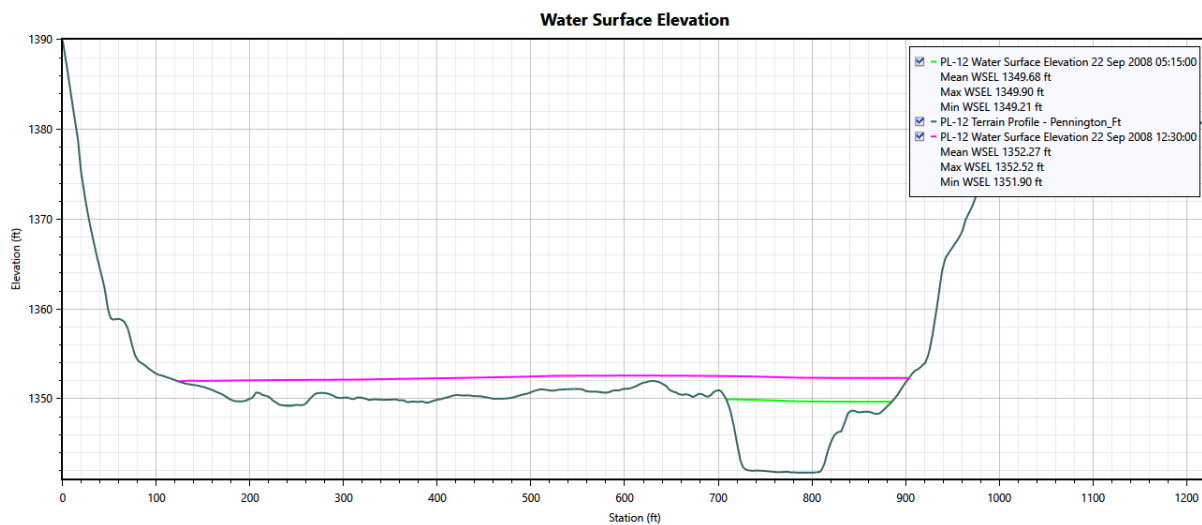


Figure Appendix D.2. Cross section view of the 2-year (green) and 10-year (magenta) near Town Hall & Greenway Vicinity. As can be seen, the 2-year storm is contained within the banks of the North Fork Powell River while the 10-year storm activates the floodplain. See Figure 7 in main report for plan view.

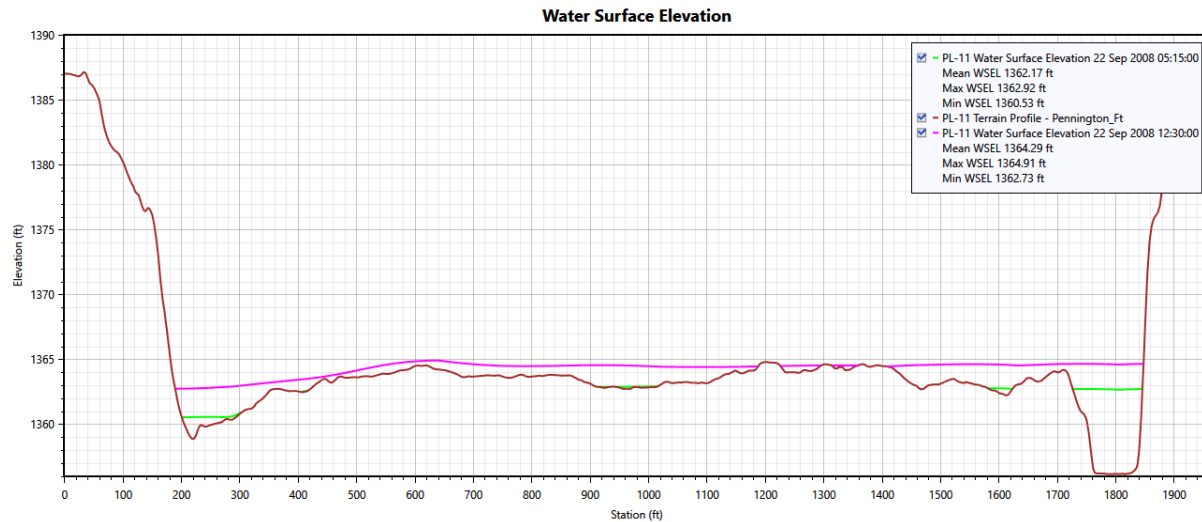


Figure Appendix D.3. Cross section view of the 2-year (green) and 10-year (magenta) in Leeman Field Park. As can be seen, the 2-year storm is contained within the banks of the North Fork Powell River (right side of graph) while the 10-year storm activates the floodplain. See Figure 8 in main report for plan view.

Appendix E

VDOT culvert plans pertaining to Kentucky Street Drainage

Plans for 76-foot long, 6 x 6 box culvert under East Morgan Avenue. In place since at least 1932.

NOTE: This culvert is only part of the overall drainage system is responsible for routine flooding along Kentucky Street.

INDEX OF SHEETS				
SHEET NO.	TITLE SHEET	STA.	to	STA.
1	SUMMARY SHEET	58+140		63+000
2	PLAN & PROFILE	63+000		71+000
3		71+000		79+000
4		79+000		87+000
5		87+000		95+000
6		95+000		103+000
7		103+000		111+000
8		111+000		117+11.7
9				
10				

27 SHEETS OF CROSS SECTIONS



COMMONWEALTH OF VIRGINIA
DEPARTMENT OF HIGHWAYS

PUB. ROAD DIV. NO.	STATE	FEDERAL AID ROUTE	STATE PROJECT	SHEET NO.	TOTAL SHEETS
2	VA.		70 2552-01	1	10

Old 761 SW-1

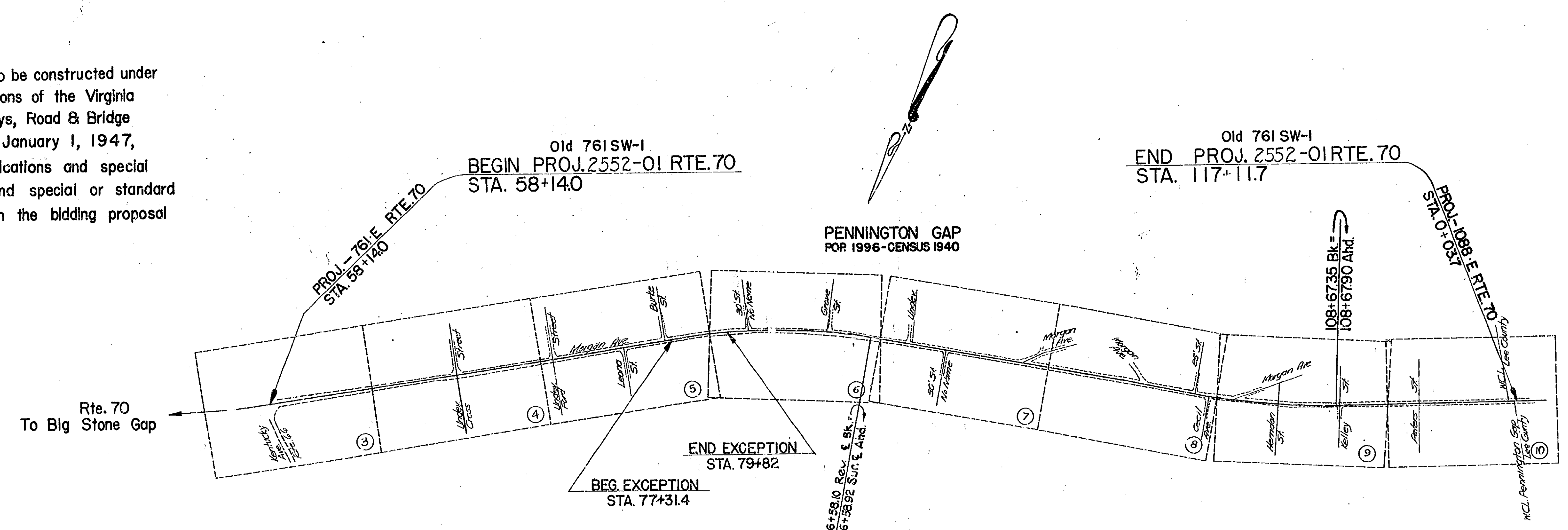
PLAN AND PROFILE OF PROPOSED
STATE HIGHWAY

LEE COUNTY

FROM INT. RTE. 66 IN PENNINGTON GAP TO W.C.L. PENNINGTON GAP
MORGAN AVENUE - PENNINGTON GAP

SCALES (PLAN, 1 IN. = 25 FT.
PROFILE HOR. 1 IN. = 25 FT., VERT. 1 IN. = 10 FT.
LAYOUT, 1 IN. = 300 FT.)

NOTE:- This project to be constructed under the standard specifications of the Virginia Department of Highways, Road & Bridge Specifications dated January 1, 1947, and additional specifications and special provisions, if any, and special or standard designs, as provided in the bidding proposal and contract.



SHEETS 1, 3, 4, 5, 6, 7, 8, 9
REVISED Sept. 14, 1948
APPROVED *B. S. Muller*
CHIEF ENGINEER

SHEETS 3, 6, 7, 8, 9, 10
REVISED Feb. 2, 1949
APPROVED *B. S. Muller*
CHIEF ENGINEER

RECOMMENDED FOR APPROVAL *Dec. 22, 1948*
1948
B. S. Muller
CHIEF ENGINEER
DEPARTMENT OF HIGHWAYS

APPROVED *Dec. 22, 1948*
1948
B. S. Muller
CHIEF ENGINEER
DEPARTMENT OF HIGHWAYS

RECOMMENDED FOR APPROVAL DATE

DISTRICT ENGINEER
PUBLIC ROADS ADMINISTRATION
FEDERAL WORKS AGENCY

APPROVED DATE

DIVISION ENGINEER
PUBLIC ROADS ADMINISTRATION
FEDERAL WORKS AGENCY

CONVENTIONAL SIGNS

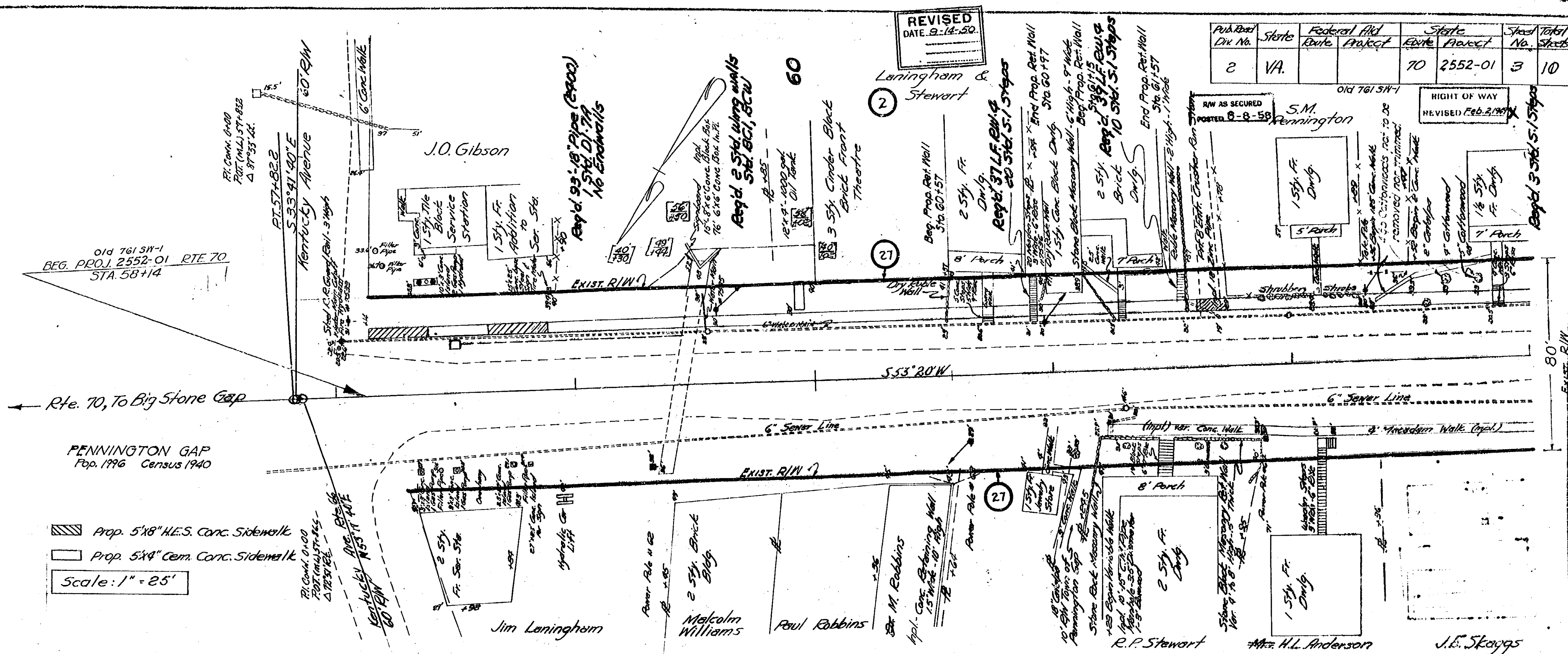
STATE LINE	LEVEE OR EMBANKMENT
COUNTY LINE	BRIDGES
CITY, TOWN OR VILLAGE	CULVERTS
RIGHT OF WAY LINE	DROP INLET
FENCE LINE	TROLLEY POLES
UNFENCED PROPERTY LINE	POWER POLES
FENCED PROPERTY LINE	TELEPHONE OR TELEGRAPH POLES
TRAVELED WAY	MARSH
GUARD RAIL	HEDGE
RETAINING WALL	WOODS
RAILROADS	GROUND ELEVATION
BASE OR SURVEY LINE	GRADE ELEVATION
	POLES WITHIN CONSTRUCTION LIMITS

EQUALITIES = -1.37 Ft
TOTAL GROSS LENGTH = 5896.33 Ft. = 1.116 MI.
EXCEPTIONS = 250.60 Ft. = 0.047 MI.
TOTAL NET LENGTH = 5645.73 Ft. = 1.069 MI.

Note - Power Poles property of Old Dominion Power Co.
Telephone Poles property of Chesapeake & Potomac Telephone Company.

Note - From Sta. 57+82.7 to Sta. 147+00.0, C.M. 161.86 to 95' taken from plans of Proj. 761-51 - Secured by Resolution dated June 17, 1956.

Note - Dashed lines & figures in brackets denote approximate limits of construction.



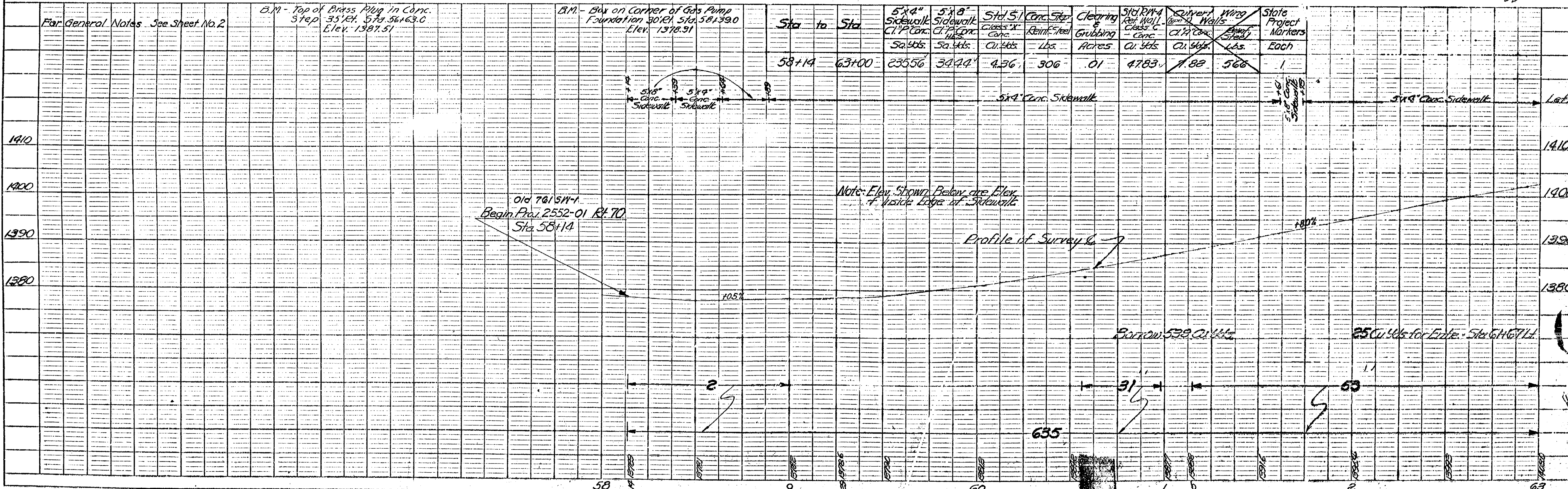
Prop. 5'x8" H.E.S. Conc. Sidewalk
Prop. 5'x8" Cem. Conc. Sidewalk
Scale: 1" = 25'

For General Notes See Sheet No. 2

B.M. - Top of Brass Plug in Conc. 35' H. 5'x8" 56+63.0 Elev. 1387.51

B.M. - Box on Corner of Gas Pump Foundation 30' H. Sta. 58+39.0 Elev. 1378.91

Sta. to	Sta.	5'x4" Sidewalk C.P. Conc.	5'x8" Sidewalk C.P. Conc.	Std. 5" Conc. Slab	Clearing & Grubbing	Std. R.W. Ret. Wall	Curved Wing Walls	State Project Markers
		Sq. Yds.	Sq. Yds.	Cu. Yds.	Acres	Cu. Yds.	Cu. Yds.	Each
58+14	63+00	235.56	34.24	4.36	.01	47.83	7.82	566



Note: Elev. Shown Below are Elev. of Inside Edge of Sidewalk

Profile of Survey

Borrow 539 Cu. Yds.

25 Cu. Yds. for Eros. Sta. 61+67.14

Appendix F

Summary of Community Input on Concepts

Notes and feedback from the March 25, 2025
Community Input Sessions

Pennington Gap March 25 Public Meeting Notes

Itals = brought up at afternoon stakeholder meeting

Attendees: Wally Smith, Richard Johnson, Billie Coleman, Elizabeth Cooperstein, Brian Skidmore with PG, Kara, Emma, Dave, Kip, Tammy Jo, Laura broke down en route

Non-itals = brought up at evening community meeting

Attendees: Larry Holbrook (mayor), Shannon Dixon, Corrine Ornato, Kim Knight, Connie Byington, Sidney Kolb, Billy Byington, Rick and Lori Watson, Darell Hayes, David Sword, Harmony BRodie, Linda Sully, Bill Wireman

1. Cas Walker Building

- Basketball or tennis court
- Covered picnic area; picnic area (multiple mentions)
- Truck parking
- Playground; also concerns about safety with playground
- Pollinator garden & picnic table
- Continuation of Greenway
- Small greenhouse
- Park
- Splash pad, handicap accessible
- Pavilion
- Outdoor gym/exercise
- Hammock area
- *Top priority, heat sink, great place for rivercane (Elizabeth)*
- *Playground/park also mentioned as afternoon mtg.*
- *Cas Walker is a priority*

2. Riverbend Shopping Center

- 4H could help
- Nice for river's sake
- Kids could help plant
- Plant donation
- Waterlilies, ferns, watercress, cattails, willows
- *Riverbend shopping center: make retaining pond, more impervious land, would need land easements*
- *Greenway next to shopping center: tree planting adjacent to river*

3. Kentucky Street

- Sidewalk from Morgan Ave. to Leeman Field along Kentucky St.
- 4-5 houses, apartments flood once/year, regularly (multiple mentions)
- Floods even with small rain
- Drain pipe on main, downtown, losing water
- Catastrophic if blocked up, Miles Holler
- *VDOT has good maps for KY St.; already started model for re-dragging ditches; make sure they know about this site*
- *Not enough land for private rain gardens*
- *Concerns about responsibilities falling on dilapidated building owners*
- *Residences with long-term flooding; runs under several structures, pharmacy, etc.*
- *Where will the water go? Threatens first responder station*
- *TOP PRIORITY*

4. Town Property, Greenway

- Larger outdoor classroom amphitheater (Steele Creek Park in Bristol, TN as an example)
- Shelters (Steele Creek Park in Bristol, TN as an example)
- Need shade trees (particularly around outdoor classroom area)
- Need additional seating
- Interest in pollinator gardens
- Potential recreational use near Food City that can be compatible with flooding conditions (tennis or basketball court(s))

5. Greenway/Frisbee Golf Area

- *Greenway/Frisbee golf: more vegetation, especially along riverbank, Laura and her rivercane, more for co-benefits than floodwater absorption*
- Interest in picnic shelters
- Grill or pavilion area
- Recreational use is impacted by flooding
- Interest in pollinator gardens
- Interest in hiking trails (possibly in wooded area)
- More planting (preference by some to not have tall growing trees specifically within frisbee golf area)
- Streambank planting desired
- Showy planting desired (interest in different blooms)

6. Stream Restoration

- *Reframing “clean” river bank and create area for collecting water*
- *Potential nexus with USDA-NRCES hellbender habitat restoration, needed to help restore connectivity throughout watershed*
- Strong interest, but concerns over local funding. Grants are preferred.
- Interest in volunteer opportunities for planting. Potential to integrate school children into planting or assessment activities
- Diversity of habitat (e.g., backwater areas, vernal pools, etc.)
- Landowner is supportive and wants to learn more

7. Leeman Park Footbridge

- Benches, Gazebo or shelter to get out of the sun (applies down the Greenway as well in terms of recommending shade structures—like bus stop structures--or trees)
- Picnic tables
- Whatever is built or planted, don’t interfere with people casting for trout
- Fruit trees, blueberries
- Fishing (multiple mentions)
- *Priority of this area*
- *Leeman across footbridge: Popular area so it still needs to be functional for community gatherings, more of a deliberate planting, popular area for fishing, could have defined river access points*

8. Leeman Park Wetland

- Walkway/boardwalk, ADA accessible (multiple mentions at both meetings)
- Seen cranes, eagles in that area
- Small bridge
- Keep vegetation short
- Habitat for wildlife
- Wetland Estonsia in St. Paul a good example (multiple mentions)
- Signage explaining what it is, educational
- *Water lilies, cattails, watercress*
- *Goat grazing for difficult mow areas*
- *Consider wildlife (bird, amphibian) habitat*
- *Outdoor classroom, education opportunities*
- *Leeman park wet areas: conversion to floodplain wetland, boardwalk for viewing, possible DWR interest for this one, pretty easy lift but would need maintenance plan*
 - *Estonsia!*
 - *Wally knows school groups with funding to help*

9. Leeman Park Pond

- Fishing, especially for youth. Already popular down at the river, so pond would be another place (safe) for fishing (multiple mentions at both meetings)
- Docks for fishing access
- Vegetation, make it pretty; watercress was mentioned
- Other edible berries, fruit trees
- Keep water moving, prevent mosquitoes – could also larvae-eating fish, habitat of dragonflies, etc.
- Goats to control vegetation (may also apply to wetland)
- Signage, as above
- *Leeman Park Pond: could be connected with wetland idea; also adjacent to SOLVE IT panels?*

10. Leeman Park (general)

- *Flood-proofing, raising buildings; damage across whole park*

Programmatic Concepts

- *Private Property Incentive Program: Wally says his area is thinking about implementing it there so we could maybe expand down here?; administered by Soil and Water District but there currently hasn't been enough demand in Daniel Boone*
- *Explore [Cumberland Forest Fund](#) opportunity*
- *Local Floodplain Ordinance: Check out new FEMA NFIP estimate tool, don't need to be in floodplain to qualify*
- *Town Hall Resilience Hub*
- *Workforce programs: Important for maintenance, could tie in with ASP (two month stint), UVA Wise about to implement service requirement, could use Works program, 4H*