PROJECT IDENTIFICATION

HIGHLAND COUNTY

BLUEGRASS VALLEY ROAD AND NEW HAMPDEN AREA STREAM OVERTOPPING AND ROAD FLOODING

Location Description

38.48962, -79.56641

Bluegrass Valley Road (Route 640/654 corridor) in the New Hampden area; road runs at or near the same elevation as the South Branch of the Potomac River (or major tributary) over a considerable length (**Figure 1**); small private dam on adjacent tributary associated with a former water supply system.

Project Issue

Riverine road flooding — river overtops banks and floods Bluegrass Valley Road during substantial rainfall events; flash flood scenario driven by rapid mountain terrain runoff with little warning and the road and stream at essentially the same elevation over considerable length. Bedrock geology prevents streambed lowering. If road floods, all Bluegrass Valley residents must detour, adding approximately 8 miles and 20 minutes; emergency services response times similarly delayed.

Project Purpose

Reduce frequency and duration of road flooding on Bluegrass Valley Road to maintain community access and preserve emergency services response times for the Bluegrass Valley area.

Identified Constraints

a. Roadway and other infrastructure
b. Potential collaboration with VDOT
c. Bedrock geology limits stream bed modification

Additional Information Needed

a. H&H study
b. Presence of easements along road

Project Proposal and Planning-Level Cost Estimate

To address the flooding concerns along Bluegrass Valley Road in New Hampden, it is recommended that a study first be conducted. An H&H study would identify sections of the road that are particularly vulnerable to flooding of the South Branch Potomac River. Additionally, this study would determine if there are any problem areas or bottlenecks on the river that create backwater during floods; this could be culverts, bridges, or narrow sections of the valley. There

are multiple crossings and a dam in the vicinity of the project area that should be evaluated if prior studies have not been completed. If there are any problem areas, these could be addressed by upsizing culverts, widening bridge spans, or resolving other sources of constrictions.

Currently, the road through New Hampden has inadequate ditches (**Figure 2**). Highland County could excavate and install ditches through the community (**Figure 3**). These ditches would reduce the volume of stormwater that pools on the road and divert the flow back into the river. This design would provide a slight reduction in flooding on the road, potentially ensuring the road is traversable during a slightly wider range of storm events, particularly flooding due to localized, intense storms. Ditches would not, however, address floodwater from the stream itself encroaching on the road.



Figure 1. Bluegrass Valley Rd with the South Branch Potomac River running adjacent to the road. Photograph was taken facing southwest.



Figure 2. Bluegrass Valley Rd with New Hampden in the background. A suitable location for the ditch is noted on the left shoulder. Photograph was taken facing north.

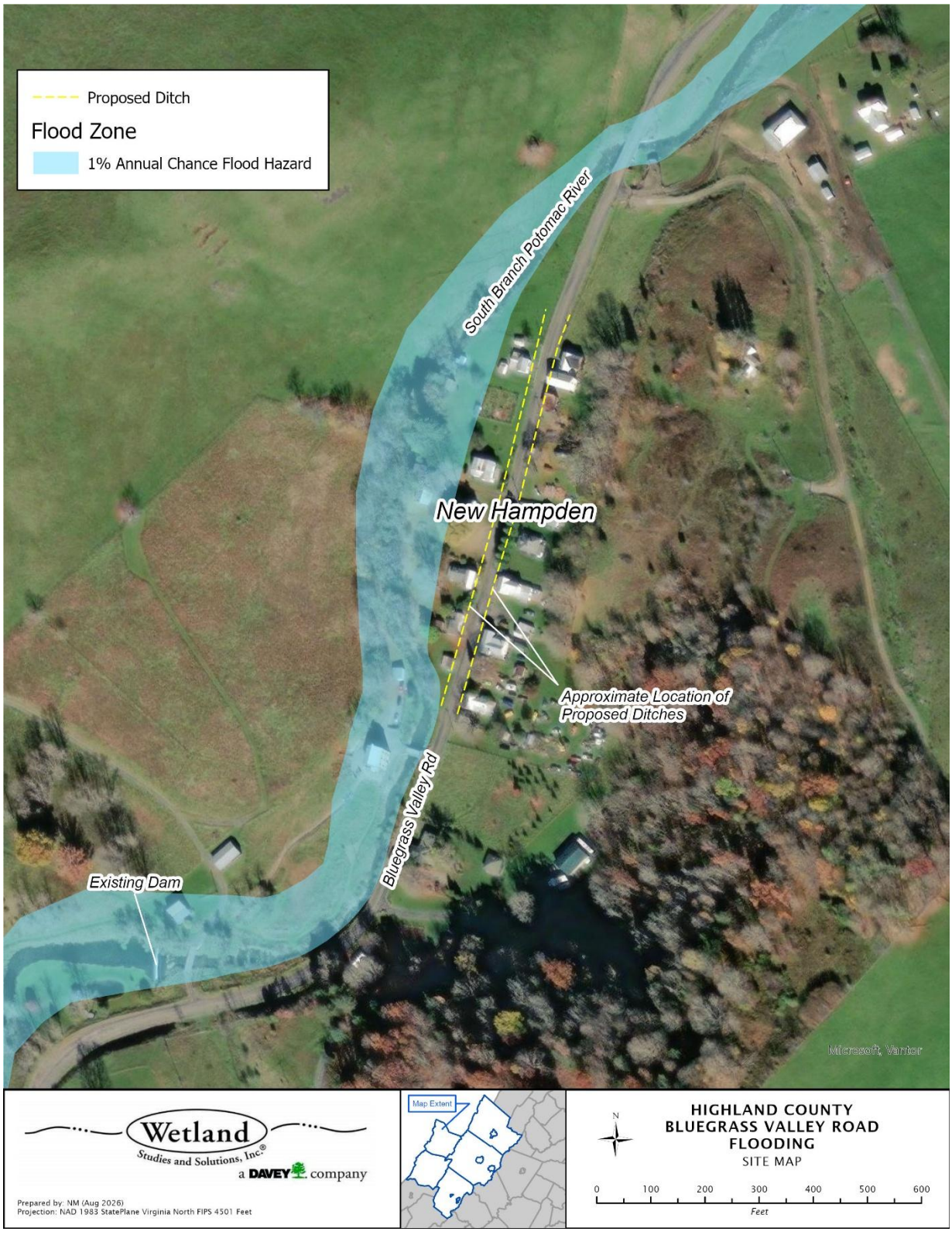

Figure 3. Bluegrass Valley Rd through the New Hampden community, marking the proposed solution and a flood scenario.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Floodplain/Stream Study					**$114,400**
Floodplain/Stream Study					**$88,000**
Contingency (30%)					**$26,400**
Optional Ditch Development					**$190,567**
Ditch Design					**$33,000**
Ditch Administration and Oversight					**$7,000**
Ditch Access and ESC					**$15,300**
Ditch Construction					**$91,290**
Stakeout	1	LS	$13,000	$13,000	
As-Built Survey	1	LS	$13,000	$13,000	
Mobilization	1	LS	$7,000	$7,000	
Excess Material Load & Haul Offsite	230	CY	$45	$10,350	
Ditch Excavation	1500	LF	$30	$45,000	
Permanent Seeding	14	LB	$10	$140	
Erosion Control Matting	1400	SY	$2	$2,800	
Contingency (30%)					**$43,977**
TOTAL ESTIMATED BUDGET					**$304,967**

The table above presents estimated costs for performing an H&H study and developing a preliminary engineering report outlining possible flood reduction projects and/or management techniques. Estimation of costs associated with such construction-phase efforts will require additional study and scoping. Separately, estimated costs for the development of a ditch system through New Hampden along Bluegrass Valley Road are presented as an optional project.

Possible Alternatives and Additional Considerations

Options for altering the stream channel along this location are limited due to the bedrock confinement of the stream. An alternative solution for flooding would be to raise the elevation of the road, which would require extensive collaboration with VDOT. Potential benefits of raising the roadway would need to be evaluated against the potential that it would trap floodwater on the eastern side of the road, impact on structures currently very close to the roadway, as well as impacts of lengthy detours hindering access during construction.

Another possible alternative would be to implement a floodplain restoration project upstream of the constriction. The South Branch Potomac River winds through agricultural fields upstream. If the floodplain storage capacity could be increased significantly enough, some amount of peak flooding could be reduced in the downstream residential area. An assessment of the viability of this effort could be included in the floodplain study proposed to determine if enough added

capacity could be created to tangibly impact downstream flooding given the size of the contributing watershed. Enacting such a project would require the upstream landowners' willingness to participate.

TMDL/MS4 Considerations

Currently, no localities within Highland County hold an MS4 permit. The South Branch Potomac River is impaired for *E. coli* due to agriculture and non-point sources, but the river does not have a developed TMDL in this location. Thus, these stormwater and pollutant reduction considerations were not factored into the design choices at this site.

Assumptions

Watershed (via StreamStats 8/28/2026) is 14.2 square miles from bridge north of New Hampden. Estimating 750 feet of ditch on both sides of the road through New Hampden.

Recommended Next Steps

Determine prioritization and evaluate funding options for floodplain study. Reach out to VDOT regarding ditch project and other suggestions to mitigate flooding in the area – there may be potential for collaboration in pursuing a flood study as VDOT is a stakeholder in addressing roadway hazards such as flooding.

References

USGS. StreamStats v4.33.0. Accessed online 28 August 2026.

PROJECT IDENTIFICATION
HIGHLAND COUNTY
COWPASTURE RIVER ROAD CHANNEL MIGRATION AND ROADWAY OVERTOPPING

Location Description
38.260505, -79.5001
Cowpasture River Road (State Route 614), Highland County along the Cowpasture River.

Project Issue
River channel migration and recurring road overtopping — Cowpasture River noted to have progressively shifted its channel toward the roadway; VDOT documents overtopping at approximately 2-year storm frequency.

Project Purpose
Quantify risk to infrastructure (State Route 614) and frequency of roadway overtopping.

Identified Constraints
a. VDOT ownership of road
b. Remote location
c. Adjacent private properties
d. Road is within FEMA floodplain

Additional Information Needed
a. Channel migration extent and rate
b. Flood study

Project Proposal and Planning-Level Cost Estimate
A restoration project along the Cowpasture River would work to mitigate the channel migration towards the road and damage due to flooding. To determine what kind of restoration/stabilization project would be best suited for this location, a field assessment of estimated erosion rates and the extent of prior riprap bank stabilization (some is visible in aerial imagery) needs to be completed, as well as an assessment of current sediment transport capacity to estimate critical rock sizing, and a flood impacts analysis given that the roadway is within the FEMA Special Flood Hazard Area. It is possible that a combination of a stone toe and establishing riparian vegetation would be a reasonable stabilization effort, the cost of which would depend on the results of the estimated rock sizing. However, it appears that the channel has possibly been historically straightened to flow along one side of the valley in this area (NHD categorizes the channel in this area as an Artificial Flowpath) (**Figure 1**), and the most stable long-term solution could be a stream restoration to restore the appropriate sinuosity. This level of stream restoration would require

easement/acquisition of land on the eastern side of the existing channel. Aerial imagery readily available (via Google Earth) only dates back to 1998, and in the interim between 1998 and 2004 imagery no measurable channel migration was noted, making it difficult to quantify the severity of the problem without a more intensive study.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Stream Assessment					**$88,000**
Stream Channel Condition Assessment	1	LS	$30,000	$30,000	
Survey	1	LS	$28,000	$28,000	
H&H Study	1	LS	$30,000	$30,000	
Contingency (30%)					**$26,400**
TOTAL ESTIMATED BUDGET					**$114,400**

The table above presents estimated costs for performing a stream channel condition assessment, including bank erosion hazard indices, as well as an H&H study to quantify flood hazard along the corridor. Estimation of costs associated with construction-phase efforts will require additional study and scoping.

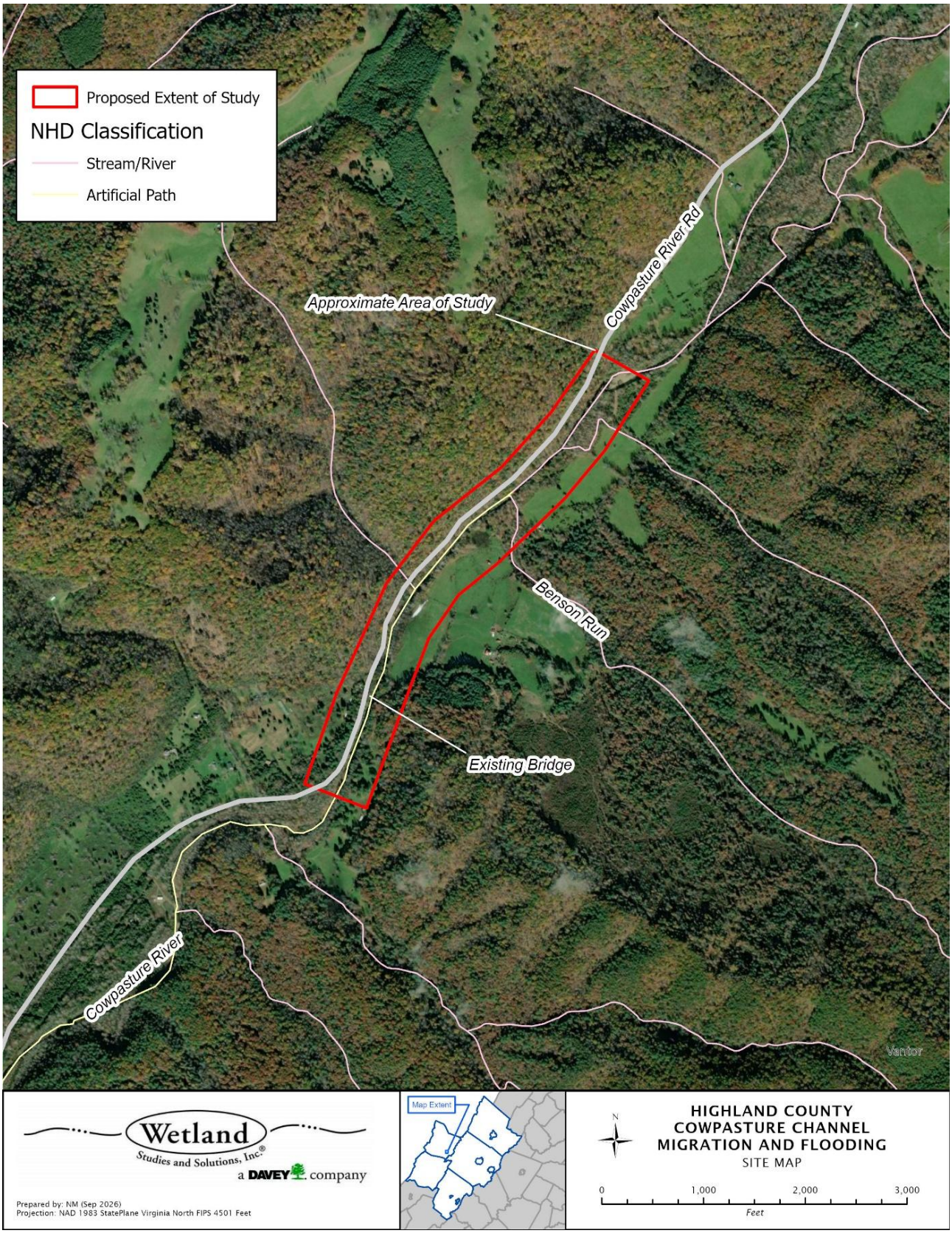

Figure 1. Proposed location for stream evaluation. Notable streams and roads are marked.

Possible Alternatives and Additional Considerations

Alternative designs along this roadway are limited due to the remote location and the limited space between the road and stream. Fully armoring the bank between the road and the channel would likely be at a greater expense per linear foot than a stone toe with riparian vegetation establishment, but either alternative would hinge on the results of the proposed study to determine viability.

TMDL/MS4 Considerations

There are no localities within Highland County that hold an MS4 permit, so stormwater permitting benefits were not accounted for in the design choice. The Cowpasture River is located within the Upper James watershed, which has an approved TMDL for PCBs. Stream restoration or bank stabilization plantings in this area would likely provide no benefit towards pollutant removal goals associated with this TMDL.

Assumptions

Watershed (via StreamStats 9/1/2026) is 56.6 square miles from marked coordinates.
Estimated 1.1 miles of stream evaluation used as the basis of budget estimate development.

Recommended Next Steps

Determine prioritization and evaluate funding options for floodplain study. Reach out to VDOT regarding ditch project and other suggestions to mitigate flooding in the area – there may be potential for collaboration in pursuing a flood study as VDOT is presumed a stakeholder in addressing roadway hazards such as flooding.

References

USGS. StreamStats v4.33.0. Accessed online 1 September 2026.

Virginia Tech Department of Biological Systems Engineering. 2025. PCB Total Maximum Daily Load Development for the Middle and Upper James River, Maury River, and Jackson River Watersheds

PROJECT IDENTIFICATION
HIGHLAND COUNTY
FROG POND AND US ROUTE 220 FLOODING

Location Description
38.43257, -79.55358
"Frog Pond" area along US Route 220 where road crosses West Strait Creek at a naturally low-lying, wetland-like bottomland via a concrete block culvert; area naturally functions as a low, wet bottomland with wetland characteristics (**Figure 1**).

Project Issue
Culvert capacity and low-lying road flooding — road crosses a naturally wet bottomland via concrete block culvert (**Figure 2**, **Figure 3**). During heavy precipitation events, the stream and associated bottomland exceed culvert capacity, causing water to overtop US Route 220. The crossing is in the FEMA Special Flood Hazard Area (1% annual chance of flooding).

Project Purpose
Evaluate methods to increase crossing capacity and enhance upstream floodplain and wetland storage to reduce roadway overtopping frequency on US Route 220 at this location.

Identified Constraints
a. Interruption of traffic
b. VDOT ownership and collaboration
c. FEMA floodplain
d. Waters of the United States (WOTUS) features and potential impacts

Additional Information Needed
a. Presence of utilities
b. Flood study
c. VDOT design documentation

Project Proposal and Planning-Level Cost Estimate
US Route 220 is a major road running through Highland County that occasionally experiences road flooding due to flows of West Strait Creek exceeding the culvert capacity. To better understand the extent and severity, a flood study should first be conducted. This would identify the frequency of floods that overtop the road, the flow capacity of the existing culvert, and the extent of flooding in these scenarios. A study would inform design choices and the sizing of future improvements. If possible, VDOT design documentation should be reviewed to determine what level of flow the culvert was designed for and verify if it is still operating at designed capacity.



Figure 1. Aerial imagery of West Strait Creek running under US Route 220.



Figure 2. West Strait Creek after passing under US 220 in the concrete block culvert. Photograph taken facing north.



Figure 3. US 220 as it crosses over West Strait Creek. Floodplain and wetlands along the creek are seen on the right. Photograph taken facing west.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Flood Impact Study					**$55,000**
Existing Conditions Survey	1	LS	$25,000	$25,000	
H&H Study	1	LS	$30,000	$30,000	
Contingency (30%)					**$16,500**
TOTAL ESTIMATED BUDGET					**$71,500**

Estimation of costs associated with construction-phase efforts will require additional study and scoping.

Possible Alternatives and Additional Considerations

Any proposed work that may appear viable following the results of the study would require VDOT consultation and would likely be VDOT's responsibility to implement. The possibility of partnering with the County or otherwise utilizing the Community Flood Preparedness Fund to fund the work could increase VDOT's likelihood to commit to an altered design.

Several possible alternatives could be evaluated following the results of the flood study. Floodplain culverts could be installed under the roadway to convey a greater amount of flow during floods. These culverts would run parallel to the existing culvert but specifically set at the elevation of the floodplain to enable conveyance of the overbank flow under the road during flood events.

Another option to address flooding over the road could be to raise the road through the floodplain crossing. This could be done alone or in conjunction with the potential floodplain culverts. It is also possible that a retrofit of the existing block culvert would be adequate, replacing it with a structure that can convey flow without flooding the road. A conditions assessment of the existing culvert structure will be important to informing design alternatives.

<u>TMDL/MS4 Considerations</u>

There are no localities within Highland County that hold an MS4 permit, so stormwater permitting benefits were not considered when exploring potential designs. A section of West Strait Creek upstream of the study site has an approved TMDL for sediment, ammonia, and CBOD5. Strait Creek, to which West Strait Creek is a tributary, has an approved TMDL for sediment. The various flood reduction measures most likely to result from the study proposed here would probably provide no benefits towards achieving TMDL related goals.

Assumptions

Watershed (via StreamStats 8/31/2026) is 4.85 square miles from US 220.

Recommended Next Steps

Determine prioritization and evaluate funding options for floodplain study. Reach out to VDOT regarding ditch project and other suggestions to mitigate flooding in the area – there may be potential for collaboration in pursuing a flood study as VDOT is a stakeholder in addressing roadway hazards such as flooding.

References

Engineering Concepts, Inc. 2008. Benthic Total Maximum Daily Load Development for Strait Creek and West Strait Creek.

USGS. StreamStats v4.33.0. Accessed online 31 August 2026.

PROJECT IDENTIFICATION
HIGHLAND COUNTY
MILL GAP ROAD STREAM BANK EROSION AND ROAD UNDERMINING

Location Description
38.378816, -79.647386
Approximately the 1000 block of Mill Gap Road (State Route 84) in the Meadowdale area (**Figure 1**), the stream runs alongside and at nearly the same elevation as the road for a mile or more. High priority active failure area located just east of 1451 Mill Gap Road.

Project Issue
Active stream bank erosion causing progressive road undermining and active roadway surface failure — stream has eroded the road bank to the point where the road surface has broken off at the white line just east of 1451 Mill Gap Road. Prior riprap additions to the failure area have been insufficient. For approximately 1 mile east of this site, the stream and roadbed closely parallel each other at nearly the same elevation. Along this reach the river rises during significant rainfall events and overtops the road. Bedrock conditions make channel lowering infeasible. If road fully fails or is fully flooded during an emergency, alternate emergency services route adds approximately 25 minutes to already-long rural response times.

Project Purpose
Stabilize eroding stream bank along the vulnerable Mill Gap Road corridor to arrest active road failure and preserve emergency services access for residents west of the failure site in the Meadowdale area. Assess possible flooding mitigation solutions for the stretch east of the failure.

Identified Constraints
a. Stream is confined by bedrock
b. Nearby road and other infrastructure
c. Interruption of traffic

Additional Information Needed
a. Presence of utilities
b. Modelling to determine flood extents and severity

Project Proposal and Planning-Level Cost Estimate
This project is comprised of two phases: a high priority phase to address the bank erosion endangering Mill Gap Road and a second to assess possible flooding solutions from the high priority site eastward along Mill Gap Road where the river and road are very close in elevation.

The bank erosion beginning to undermine Mill Gap Road is at the downstream end of a recently completed stream restoration project. The restoration effort does not appear to have caused the failure, rather County staff noted excessive overland flow from the hillside to the south crossing the road and spilling over the shoulder into the channel created a point failure that has continued to degrade (**Figure 2**). To address the issues related to the bank degradation along the road, an imbricated stone wall could be constructed along the failing bank, from the toe of the stream to just below or at the elevation of the roadway, with a layer of footer rocks buried beneath the toe. This would provide a more stable structure than the riprap that is currently in place to protect the slope. The stone wall would armor the bank, preventing further erosion from runoff traveling either over the roadway or within the channel. A guardrail could also be installed on the shoulder in this area, between the header rocks and the roadway; there is a narrow shoulder in this stretch, and the stone wall would not reduce the already steep drop off of approximately 8 feet.

The Jackson River along Mill Gap Road is confined by road infrastructure and bedrock along the bed, so options to address riverine flooding are limited in this area. A channel and floodplain survey and flood impact study should be completed to better capture the limitations and potential avenues for reducing flood inundation of Mill Gap Road in the approximately 1-mile long study area (**Figure 1**).

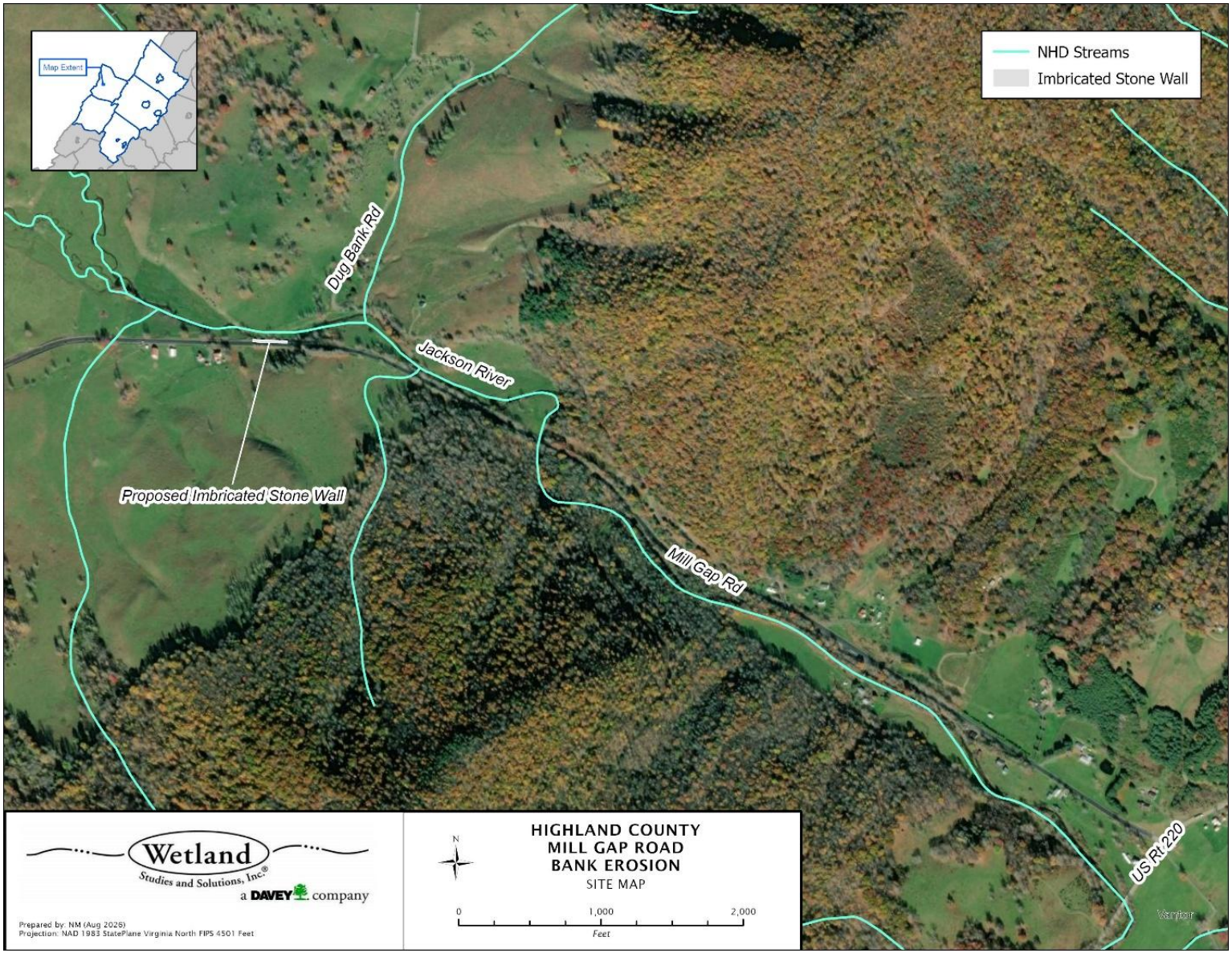

Figure 1. Site map showing the Jackson River as it runs in close proximity to Mill Gap Road. The proposed location for the stone wall between Mill Gap Road and the Jackson River is labeled.



Figure 2. Erosion along Mill Gap Road. Photograph taken facing downstream, approximately east.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Phase 1: Stabilization of Failing Bank					**$362,733**
Design					**$58,000**
Construction Administration and Oversight					**$7,000**
Access and Erosion/Sediment Control					**$17,850**
Construction					**$196,175**
Stakeout	1	LS	$18,000	$18,000	
As-Built Survey	1	LS	$18,000	$18,000	
Mobilization	1	LS	$10,000	$10,000	
Imbricated Rock Wall	250	LF	$500	$125,000	
Geotextile Fabric	225	SY	$3	$675	
Excavation	225	CY	$20	$4,500	
Guardrail (250 lf and end terminals)	1	LS	$20,000	$20,000	
Phase 1 Contingency (30%)					**$83,708**
Phase 2: Floodplain/Stream Study					**$114,400**
Floodplain/Stream Study					**$88,000**
Survey	1	LS	$18,000	$18,000	
H&H Study	1	LS	$30,000	$30,000	
PER	1	LS	$40,000	$40,000	
Phase 2 Contingency (30%)					**$26,400**
TOTAL ESTIMATED BUDGET					**$477,133**

The table above presents estimated costs as two phases. Phase 1 includes existing conditions survey, design, permitting, and construction of a stabilizing imbricated stone wall in the area of the failing bank. Phase 2 represents the development of a floodplain H&H study and report assessing potential projects to mitigate roadway flooding along the approximately 1-mile corridor downstream of the failing bank where the channel is nearly level with the roadway. Estimation of costs associated with construction-phase efforts identified in the floodplain/stream study will require additional study and scoping.

Possible Alternatives and Additional Considerations

Vegetated soil lifts could be installed as an alternative to an imbricated rock wall, which would be a softer, greener solution to the bank instability on site. With vegetated soil lifts, the slope would be rebuilt in lifts of soil wrapped in geotextile fabric, much like layers of a cake offset from each other to create a stepped slope, and vegetation established throughout to stabilize and anchor the soil. Although this would provide increased ecological benefits, it is dependent on the health of the vegetation, which is in turn susceptible to clearing/mowing crews that may not be aware of the purpose of the plantings.

Alternative design options are limited along this stretch of the Jackson River. As identified previously, the stream channel is confined by the underlying bedrock. If possible, a stream restoration project altering the planform and guiding the stream away from the road could provide some flood relief to the roadway. This could be possible in this site, however, there is little room in the narrow floodplain to alter the stream path and excavation of the left bank would increase construction costs, as well as potential costs for easements or property acquisition.

Emergency Alert System

Highland County has started to plan and explore funding for the expansion of the emergency alert flood warning system. The concern at many of the sites identified by the County is access along roadways for evacuation and emergency response. A reliable system that provides early warning for flooding throughout the area would reduce the current risk to life and property, particularly in these communities with limited routes of access or evacuation. Continued advancements in monitoring and assessing risk and conveying timely information should be pursued.

TMDL/MS4 Considerations

No localities within Highland County hold an MS4 permit, so the pollutant removal benefits to support stormwater program requirements were not factored when proposing a design. The Jackson River does have an approved TMDL for total nitrogen and phosphorous. The Jackson River also has a TMDL developed for PCBs found in fish tissue. Bank stabilization projects might prevent nutrients and pollutants in the stream bank soil from entering the creek and traveling downstream. Thus, this project might provide benefits toward TMDL goals.

Assumptions

Watershed (via StreamStats 8/27/2026) is 12.1 square miles from the bridge on Mill Gap Rd.
Approximately 250 lf of imbricated stone wall, estimated to stabilize the failing roadside at a maximum of 8 feet high along current site of bank erosion.

Recommended Next Steps

Reach out to VDOT regarding partnership for project implementation and restrictions/desire to add a guardrail in this area. Evaluate funding options for pursuit of Phase 1.

References

The Louis Berger Group, Inc. 2010. Benthic TMDL Development for the Jackson River, Virginia

USGS. StreamStats v4.33.0. Accessed online 27 August 2026

Virginia Tech Department of Biological Systems Engineering. 2025. PCB Total Maximum Daily Load Development for the Middle and Upper James River, Maury River, and Jackson River Watersheds

PROJECT IDENTIFICATION
HIGHLAND COUNTY
MILL GAP ROAD NEAR VALLEY CENTER ROAD RIVERINE ROAD FLOODING

Location Description
38.306897, -79.720430
Mill Gap Road (State Route 84) near Valley Center Road in the southwest part of Highland County, along East Back Creek.

Project Issue
Riverine road flooding — Mill Gap Road flooding occurs where East Back Creek flows closely parallel to the road (**Figure 1**). During heavy rainfall up to two feet of water reported over the road with post-flood deposition of large rocks in roadway that required clearing.

Project Purpose
Evaluate frequency of riverine road flooding on Mill Gap Road.

Identified Constraints
a. Collaboration with VDOT
b. Cooperation from private landowners

Additional Information Needed
a. H&H study for culvert capacity and flooding extent
b. Presence of utilities

Project Proposal and Planning-Level Cost Estimate
During WSSI site visit (29 June 2026), some erosion of the banks of East Back Creek was noted, with particular concern in the reach closest to Mill Gap Road (**Figure 2**, **Figure 3**). However, it was also noted that the stream was not deeply incised and that it would be highly improbable for the stone sizes reported on Mill Gap Road following a flood event to have been transported from the East Back Creek channel. It is much more plausible that the stones were transported from the slopes on the southeastern side of Mill Gap Road. Two tributaries draining the slopes are conveyed under Mill Gap Road in this vicinity and the culverts may be undersized compared to current VDOT channel crossing standards (50-year or 25-year return period depending on the actual road classification) (**Figure 4**, **Figure 5**). The tributary conveyed in the double-barrel CMP culverts in particular drains approximately 466 acres of steep mountain slopes. A survey and H&H study should be completed to evaluate the severity of flooding in this system and the adequacy of the existing culverts. If either or both conveyances are indeed undersized, flood

flows exceeding the capacity of these culverts would lead to the structures backing up and water running over Mill Gap Road.

To address the potential bank instability along the creek and road, a stream restoration project could be implemented on East Back Creek (**Figure 2**). This could be a targeted restoration along the meander bend that runs closest to Mill Gap Road (**Figure 1**). The restoration project could alter the planform of the stream, likely incorporating a stone vane to maintain the desired planform geometry of routing the stream farther away from the road. This practice would address the current bank erosion concerns along the roadway (**Figure 3**). The stream cross section geometry should also be altered to a two-stage channel. This would incorporate a base flow channel for typical flows and a floodplain channel for higher flows. The floodplain channel would allow for more space for higher flows to access and distribute across, reducing the volume of water that is running over the road. Native vegetation should also be planted to slow the velocity of high flows, anchor the banks to prevent further erosion, and provide habitat for native fauna. Ideally, the cattle that currently have access to the stream should be fenced out, particularly around the restoration site. This would protect the banks from further degradation and decrease pollutants from directly entering the stream.



Figure 1. Stream restoration site proposed for East Back Creek with culvert locations marked.



Figure 2. East Back Creek running parallel to Mill Gap Road. Photograph was taken standing on Mill Gap Road facing upstream (north).



Figure 3. Location that East Back Creek flows closest to Mill Gap Road. Photograph taken facing upstream (northeast.)



Figure 4. Inlet of corrugated metal culverts running under Mill Gap Road, eventually draining into East Back Creek.



Figure 5. Inlet of concrete culvert that runs under Mill Gap Road before entering East Back Creek.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Phase 1: Culvert Capacity Study					**$87,100**
Culvert Capacity Study					**$67,000**
Phase 1 Contingency (30%)					**$20,100**
Phase 2: Stream Restoration					**$496,210**
Survey and Design					**$69,000**
Construction Administration and Oversight					**$10,000**
Access and Erosion/Sediment Control					**$33,100**
Construction					**$189,600**
Stakeout	1	LS	$15,000	$15,000	
As-Built Survey	1	LS	$15,000	$15,000	
Mobilization	1	LS	$14,000	$14,000	
Clearing	0.4	AC	$30,000	$12,000	
Grading – rough	1	AC	$7,000	$7,000	
Grading – fine	0.4	AC	$9,000	$3,600	
Cross Vane	1	EA	$45,000	$45,000	
Excavation and Haul Offsite	1300	CY	$60	$78,000	
Plantings					**$80,000**
Native Seed and Natural Fiber Matting	2000	SY	$12	$24,000	
Live Stakes	1200	EA	$10	$24,000	
Tubelings	4000	EA	$8	$32,000	
Phase 2 Contingency (30%)					**$114,510**
TOTAL ESTIMATED BUDGET					**$583,310**

The table above presents estimated costs as two phases. Phase 1 the development of an H&H model and report assessing the capacity of the culverts of concern and potential improvements. Estimation of costs associated with construction-phase efforts for potential culvert improvements identified in the H&H study will require additional study and scoping. Phase 2 includes existing conditions survey, design, permitting, and construction of natural channel design stream stabilization effort.

Possible Alternatives and Additional Considerations

If the culverts do not have sufficient capacity to convey necessary flows, they should be resized and replaced. This would require significant coordination with VDOT, the owner and maintainer of the road.

An alternative to the stream restoration effort to move the channel away from the edge of the road would be to install an imbricated stone wall, riprap, or similar hard armoring along the stream. Although this would address bank instability concerns close to the road, it would not be able to improve flooding conditions. If floodplain studies indicate that East Back Creek does inundate the roadway during flood events, a floodplain restoration project could be implemented to increase the floodplain storage capacity of the corridor, which would involve grading down the existing floodplain to allow greater volume and access for flood flows. Alternatively, raising Mill Gap Road could be explored through this area. This practice would decrease the frequency that flooding occurs and ensure the road is accessible during storm events, but the road is owned and maintained by VDOT, requiring extensive work with the state agency for this project.

TMDL/MS4 Considerations

No localities within Highland County hold an MS4 permit, so the pollutant removal benefits to support stormwater program requirements were not factored when proposing a design. The Jackson River watershed does have an approved TMDL for total nitrogen and phosphorous. The Jackson River also has a TMDL developed for PCBs found in fish tissue. A stream restoration project might work to achieve goals related to the TMDL, reducing the sediment and associated nutrients entering the stream due to erosion.

Assumptions

Watershed of East Back Creek (via StreamStats 8/31/2026) is 7.8 square miles, taken from site of bank erosion. Watershed to the double-barrel CMP (**Figure 4**) estimated at 466 acres, and the watershed to the concrete culvert (**Figure 5**) estimated at 275 ac.

Approximately 600 lf of stream restoration was included in the estimated budget; cattle fencing was excluded from the estimate.

Recommended Next Steps

Reach out to VDOT regarding existing culvert data and potential partnership for project implementation. Evaluate funding options for pursuit of Phase 1. Monitor erosion of streambank close to roadway and determine prioritization for Phase 2.

References

The Louis Berger Group, Inc. 2010. Benthic TMDL Development for the Jackson River, Virginia.

USGS. StreamStats v4.33.0. Accessed online 31 August 2026.

Virginia Tech Department of Biological Systems Engineering. 2025. PCB Total Maximum Daily Load Development for the Middle and Upper James River, Maury River, and Jackson River Watersheds.