PROJECT IDENTIFICATION

AUGUSTA COUNTY

HOTCHKISS BRIDGE EXTENSION AND JENNINGS BRANCH UPSTREAM STREAM IMPROVEMENTS — CHURCHVILLE

Location Description

38.225050, -79.159883

Hotchkiss Road Bridge over Jennings Branch in Churchville (**Figure 1**).

Project Issue

Undersized 1950s bridge severely constricting the Jennings Branch floodplain (**Figure 2**) — compresses 200–300 foot floodplain to ~80 foot span, causing severe backwater flooding throughout Churchville. The floodplain extends to back of curb on Churchill Avenue. Debris from 28 square mile mountain drainage area routinely clogs bridge, worsening backwater. County staff have stated that completing this project "would almost alleviate the vast majority of flooding in Churchville."

Project Purpose

Evaluate flooding related to Hotchkiss Bridge; address upstream channel north of US Route 42 as a feasible near-term nature-based interim improvement.

Identified Constraints

a. Infrastructure and roadways
b. Bridge replacement requires VDOT leadership and likely federal bridge funding
c. Property or easement acquisition for restoration

Additional Information Needed

a. Presence of utilities
b. Erosion extent and rate
c. Amount/rate of sediment/debris accumulation

Project Proposal and Planning-Level Cost Estimate

A bridge replacement project to expand the floodplain area at the Hotchkiss Road crossing would likely remediate some of the flooding issues experienced in Churchville. However, the budget for a bridge replacement was reported as $25-40 million, which exceeds the CFPF grant cap for an individual project ($7.5 million) and VDOT has declined to fund. VDOT currently ranks the bridge as Fair Condition. As an interim goal to support future funding applications, a flood study along the roadway could be conducted. This would identify the frequency and volume of flood that exceeds the current capacity and overtops the bridge. Assessing the flood risk could refine the

problem enough to open up grant opportunities for the County that could in turn encourage VDOT participation.

Some flooding impacts could be alleviated by increasing floodplain storage capacity upstream of Hotchkiss Road. An existing stream restoration project has been previously implemented between the US Route 42 and Hotchkiss Road bridges; this proposed restoration would extend that work upstream of the US Route 42 bridge (**Figure 3**). This restoration project would involve grading the banks and creating additional floodplain capacity to allow greater flood storage along 1,900 feet of Jennings Branch. This would slightly reduce the peak flow that is experienced at the bridge. The corridor should be planted with native vegetation to protect the banks against further erosion. These plants would also slow the flow of floodwater before reaching Churchville downstream and increase infiltration to reduce overall flood volume. Cross vanes or other grade control structures could be installed to promote bank stability and deflection of velocity and shear stresses around the bridge. Acknowledging the presence of some houses along the southern bank, work would focus on the northern floodplain. A significant length of the stream is owned by just a few large lot private landowners, thus limiting the number of easements necessary for project implementation.



Figure 1. Existing bridge along Hotchkiss Road; photograph was taken facing southwest.



Figure 2. Jennings Branch after running through Churchville. Photograph was taken from the Hotchkiss Bridge, facing downstream (approximately southeast).



Figure 3. Proposed stream restoration location for Jennings Branch, upstream of the US Route 42 bridge. Property boundaries are displayed. Hotchkiss Bridge is not mapped here, as it is located approximately 3300 ft to the southeast.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Phase 1: Flood Impact Study					**$143,000**
Flood Impact Study					**$110,000**
Existing Conditions Survey	1	LS	$50,000	$50,000	
H&H Study	1	LS	$60,000	$60,000	
Phase 1 Contingency (30%)					**$33,000**
Phase 2: Floodplain and Stream Restoration					**$1,219,985**
Survey and Design					**$135,000**
Construction Administration and Oversight					**$30,000**
Access and ESC					**$24,900**
Construction					**$748,550**
Stakeout and As-Built	1	LS	$36,000	$36,000	
Mobilization	1	LS	$43,500	$43,500	
Clearing	1.3	AC	$30,000	$39,000	
Grading – rough	1.3	AC	$7,000	$9,100	
Grading – fine	1.3	AC	$9,000	$11,700	
Cross Vanes	4	EA	$30,000	$120,000	
Excavation	4200	CY	$20	$84,000	
Excess Material Load & Haul Offsite	4200	CY	$45	$189,000	
Driveway Relocation	1	LS	$15,450	$15,450	
Plantings	1	LS	$200,800	$200,800	
Phase 2 Contingency (30%)					**$281,535**
TOTAL ESTIMATED BUDGET					**$1,362,985**

The table above outlines estimated costs for developing an H&H study to document flooding severity and identified constrictions in Phase 1. This would inform Phase 2, which presents estimated costs for developing and implementing a nature-based floodplain and stream restoration project from permitting and design through construction.

Possible Alternatives and Additional Considerations

A significant length of the northern side of Jennings Branch in this reach is comprised of agricultural fields within a single parcel. With landowner and grant funding support, the project could be extended upstream significantly. The current length estimated at 1,900 linear feet is approximately the same length as the previous restoration project implemented downstream of US Route 42. Shifting the entire project upstream approximately 1,000 – 1,500 ft should also be evaluated, which would eliminate the need to relocate the driveway currently running along the stream near US Route 42. Additional stream restoration projects to increase floodplain storage capacity throughout the watershed could be encouraged and pursued.

The cost of implementing floodplain culverts along Hotchkiss Road could be evaluated and compared to the bridge replacement estimates previously acquired. These would run under the road and convey floodwater that is trapped on the upstream side, alleviating some of the backwatering. The culverts in the floodplain would provide some decrease in flooding, but they would not completely convey the floodwater through the floodplain. It is also unclear if there would be enough clearance to install floodplain culverts under the existing roadway, which would be part of the evaluation. An additional scenario to explore would be to create a new connecting route from Hotchkiss Road to US Route 42 just outside of the floodplain and eliminate the Hotchkiss Road bridge and lower the road profile currently impeding flow along the floodplain.

The County could also assist residents or businesses along Jennings Branch with obtaining and implementing individual flood protection strategies on properties in the floodplain, such as raising structures/utilities above the base flood elevation, installing flood barriers, or full relocation out of the floodplain.

TMDL/MS4 Considerations

The County of Augusta holds an MS4 permit. There are no approved TMDLs for Jennings Branch itself, but there are approved TMDLs for the larger drainage area that the stream is in. The Shenandoah River watershed holds an approved TMDL for PCB and mercury levels. Jennings Branch runs into the Middle River downstream of the site; the Middle River has an approved TMDL due to violations of *E. coli* and benthic macroinvertebrate standards. Excessive sediment has been identified as one of the probable stressors for aquatic life in the Upper Middle River. A stream restoration project would not assist in reaching goals for PCB or mercury levels. However, a restoration project that targets bank instability and erosion might assist in reduction goals for sediment pollution.

Assumptions

Watershed of Jennings Branch (via StreamStats 9/15/2026) is 28 square miles from Hotchkiss Bridge. The budget estimate is based on 1900 lf of stream restoration along Jennings Branch.

Recommended Next Steps

Revisit the conversation with VDOT and get their input on feasibility of developing alternative routes and/or floodplain culverts. Evaluate utility of initiating an H&H study (Phase 1) to document the current flooding conditions and identified constrictions.

References

MapTech, Inc., 2004. Fecal Bacteria and General Standard Total Maximum Daily Load Development for Impaired Streams in the Middle River and Upper South River Watersheds, Augusta County, VA.

U.S. Environmental Protection Agency. 2001. Development of Shenandoah River PCB TMDL.

USGS. StreamStats v4.33.0. Accessed online 15 September 2026.

Virginia Department of Environmental Quality. 2009. Total Maximum Daily Load Development for Mercury in the South River, South Fork Shenandoah River, and Shenandoah River, Virginia.

PROJECT IDENTIFICATION

AUGUSTA COUNTY

MIL-MAR SUBDIVISION / PRINCESS ANNE LANE FLOODING

Location Description

38.02347, -79.01978

Mil-Mar subdivision on Princess Anne Lane, Stuarts Draft; drainage flows from Gloucester Road south through subdivision easements and culverts under Wayne Avenue to two Norfolk Southern Railroad culverts — primary: 15-inch CMP; secondary: 4×6 box culvert at East High Street/Crestview Drive — before discharging to the South River.

Project Issue

Flooding along Wayne Avenue and subdivision on Princess Anne Lane. A prior completed flood study was noted by County as identifying the railroad culverts as the limiting constraints causing flooding. All stormwater from the uphill contributing area converges at the railroad embankment. Reported Wayne Avenue experiencing floods up to 3–4 ft depth. The five lowest Mil-Mar homes are reported as elevated ~6 ft above grade, reflecting historic flood depths. Norfolk Southern Railroad has declined to engage on improvements. VDOT has been made aware of flooding on Wayne Avenue but has not committed to improvements.

Project Purpose

Address flooding along Princess Anne Lane and Wayne Avenue.

Identified Constraints

a. Coordination with railroad
b. Coordination with VDOT
c. Easements/property acquisition

Additional Information Needed

a. Prior flood study noting railroad culverts as primary constraint
b. Presence/location of utilities

Project Proposal and Planning-Level Cost Estimate

Work should begin with an assessment of the prior-completed flood study to better understand the current system and the scale of storm events causing the flooding reported. It would still be worthwhile to attempt coordination with Norfolk Southern about the possibility of upgrading the culvert under the railroad tracks, which was presumably designed well before much of the residential development in the watershed occurred. Continued coordination with VDOT regarding

flooding of Wayne Avenue is also recommended, especially as there is potential for collaboration towards CFPF-funded projects.

Given the lack of responsiveness of Norfolk Southern thus far, though, a separate approach is also proposed. A mixture of small BMPs have been implemented with the sporadic (1960s to present) development. These BMPs were designed to address the increased stormwater associated with development, in accordance with the evolving state stormwater regulations. Several of these basins can be identified on aerial imagery and topographic mapping (**Figure 1**). One or more of these basins may be suitable for a retrofit and/or expansion that could serve to increase its capacity to reduce flooding impacts further downstream. Additionally, there are several locations in the watershed that may be suitable for new BMPs aimed at flood mitigation. Any of these possible projects could serve to decrease the severity of flooding at Wayne Avenue and Princess Anne Lane, though the effectiveness of each will be best determined through individual design assessments:

1. An existing stormwater basin is noted in the northern portion of the drainage area at Stone Drive and Fossil Drive which could be evaluated for retrofitting to enhance detention.

2. An existing basin south of Lynn Circle currently collects stormwater from Lynn Circle and part of Gloucester Road which could be evaluated for retrofitting to increase its capacity.

3. It may be possible to add another BMP to address stormwater from Cambridge Drive and Gloucester Road. There is a linear drainage feature running between Gloucester Road and Cambridge Drive which could be modified to enhance infiltration along that path by retrofitting to a dry swale or other similar infiltration practice.

4. There is what appears to be a man-made pond, possibly an old stormwater pond or relic farm pond, southeast of Cambridge Drive (along a driveway off of Yarmouth Road) that currently intercepts the majority of the drainage area and could be evaluated for retrofitting. This feature's potential for a stormwater retrofit could be limited depending on its potential classification as a WOTUS or delineated wetland. If it is a jurisdictional wetland, however, it could potentially serve as the centerpiece of an integrated wetland and stream restoration project. Approximately 600 feet of upstream channel are within the same parcel as the pond and through reconnection to the floodplain and expansion of the wetland system could serve to mitigate stormwater runoff from the entire upstream area. The channel extends further upstream through agricultural fields nearly 4,000 feet through a single additional

parcel, visible as a narrow strip of riparian vegetation in aerial imagery (**Figure 1**). If the channel is deeply incised as is so often observed in streams through agricultural fields, reconnecting it to the floodplain and re-establishing wetland presence could significantly increase the system's capacity to absorb and infiltrate stormwater.

5. It may be possible to add another BMP to address stormwater from Sylvan Drive and the contributing drainage area directly west. There is a visible channel scar through the field to the east where the flow leaves the subdivision (**Figure 1**). It may be possible to install a BMP either in the field or in a vacant lot on the western side of Sylvan Drive that happens to be along the flow path.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Preliminary Engineering Report					**$110,000**
Existing Conditions Survey	1	LS	$40,000	$40,000	
H&H Study	1	LS	$40,000	$40,000	
PER	1	LS	$30,000	$30,000	
Contingency (30%)					**$33,000**
TOTAL ESTIMATED BUDGET					**$143,000**

The table above outlines estimated costs for developing an H&H study and Preliminary Engineering Report to assess viability of any of the proposed potential projects and identify others. Some cost savings may be attained if as-built plans for the various BMPs can be acquired. Estimation of costs associated with construction-phase efforts will require additional study and scoping.



Figure 1. Map of drainage area to culvert of concern south of Wayne Avenue, with various BMP and potential retrofit locations identified with numbering matching narrative descriptions.

Possible Alternatives and Additional Considerations

This possible series of stormwater/flood mitigation improvements should be considered as a watershed-level plan to maximize potential effectiveness.

Any future development in the area should be closely reviewed in the design stage to ensure that Virginia requirements for flood protection are being met. Augusta County is the local VESMP (Virginia Erosion and Stormwater Management Program) Authority which would be responsible for reviewing stormwater quality and quantity requirements for permitting future development. Detailed review will be important for ensuring future development does not detrimentally impact the stormwater flow through the downstream neighborhoods.

Residents in the area can be encouraged to install residential-scale stormwater management practices to enhance the flooding reduction efforts, such as rain gardens (micro-bioretention) and rain barrels.

Regulatory Changes

The watershed draining to this location is a mix of already developed single-family subdivisions and active agricultural fields (hay). The possibility of future development in the watershed supports considering regulatory changes regarding future development. More restrictive stormwater quantity management requirements could be incorporated into the County Ordinances.

TMDL/MS4 Considerations

The watershed drains to South River, which has a benthic impairment and TMDLs established for sediment, phosphorus, and bacteria. Augusta County is an MS4 permittee, and so there may be permit-related benefit to projects impacting TMDL-pollutants, which most stormwater BMPs do.

Assumptions

Watershed (via StreamStats 8/3/2026) is 1.1 square miles (705 acres) at the railroad crossing.

Recommended Next Steps

Evaluate presence of easements and begin discussion of study with landowners to gain approval for survey access to develop H&H study and PER.

References

USGS. StreamStats v4.33.0. Accessed online 3 August 2026.
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PROJECT IDENTIFICATION

AUGUSTA COUNTY

PATTON FARM BRIDGE — SOUTH RIVER CROSSING REPLACEMENT

Location Description

38.01356, -78.9891

Patton Farm Bridge over the South River in the Stuarts Draft / Riverheads area south of Staunton; primary crossing for residents whose only alternate evacuation route (Howardsville Turnpike) also floods during South River events.

Project Issue

Undersized bridge constricting the South River floodplain — bridge does not span the full floodplain width, creating hydraulic backwater and cutting off residents during South River flood events (Error! Reference source not found.; **Figure 2**). Both the Patton Farm Road bridge and the alternate evacuation route Howardsville Turnpike flood under many of the same events, leaving residents with no reliable evacuation route. VDOT acknowledges the need but cannot fund the estimated $25–$30 million bridge replacement.

Project Purpose

Evaluate flooding related to Patton Farm Bridge and document hydraulic constraint(s) to support future funding applications.

Identified Constraints

a. Interruption of traffic
b. Scale and cost of project exceed CFPF funding limits
c. VDOT is required to be the lead agency with significant cost-share commitment

Additional Information Needed

a. Flood frequency that impacts bridge (USGS gauge data available on the South River)
b. Current bridge capacity
c. Emergency evacuation traffic volume

Project Proposal and Planning-Level Cost Estimate

A bridge replacement project would enable reliable access and evacuation for the affected residents. However, the budget for a bridge replacement was reported as $25-30 million, which exceeds the CFPF grant cap for an individual project ($7.5 million) and VDOT has declined to fund. VDOT currently ranks the bridge as Fair Condition. As an interim goal to support future funding applications, a flood study along the roadway could be conducted. This would identify the frequency and volume of flood that exceeds the current capacity and overtops the bridge. Assessing

the flood risk could refine the problem enough to open up grant opportunities for the County that could in turn encourage VDOT participation.

The study could be expanded along alternate evacuation routes; County officials have identified that Howardsville Turnpike is an alternate evacuation route for impacted residents, which also routinely floods. This information could be used in conjunction with population statistics for individuals in the area affected by road closure during floods to support the need for this project.

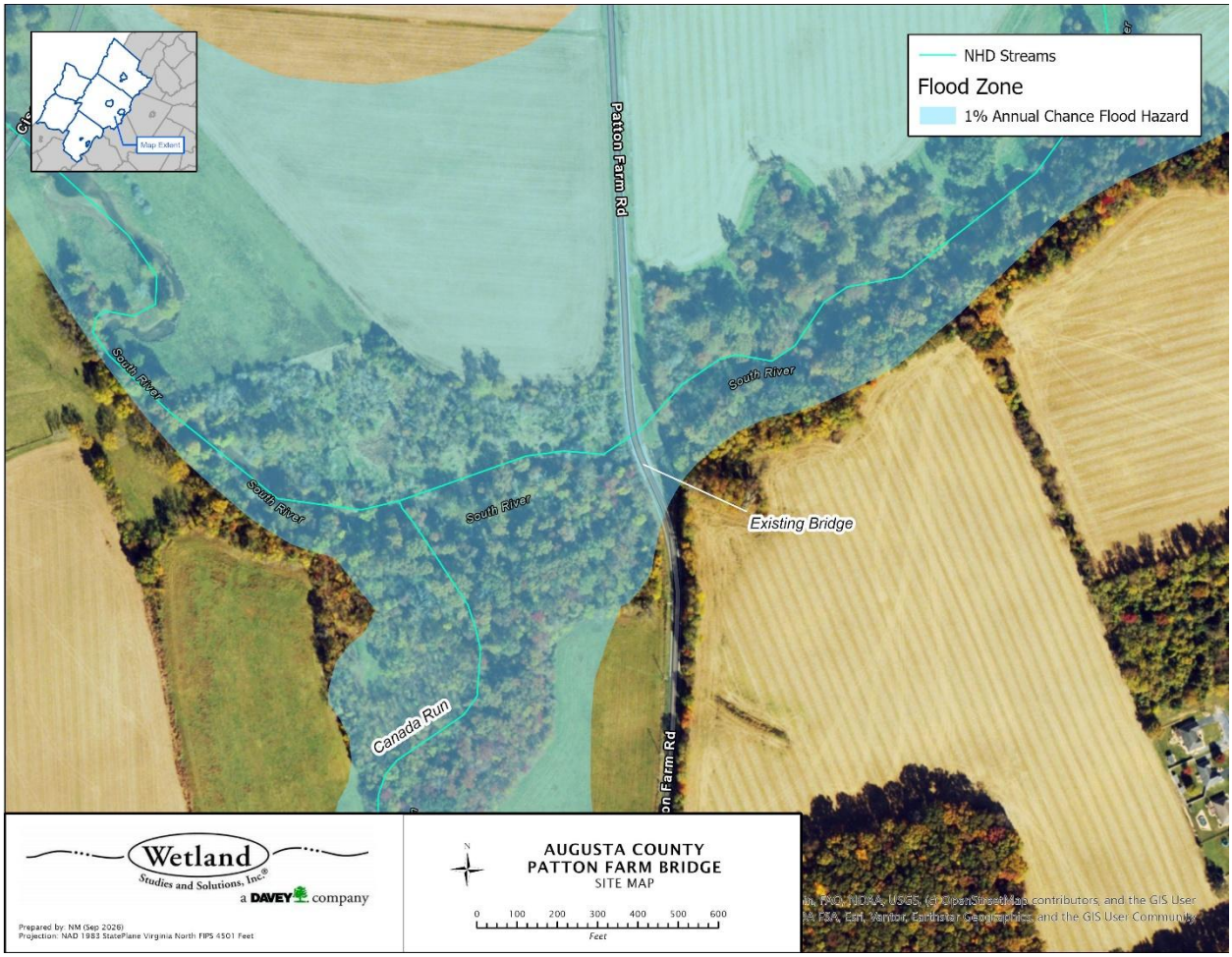

Figure 1. South River as it crosses under Patton Farm Bridge.

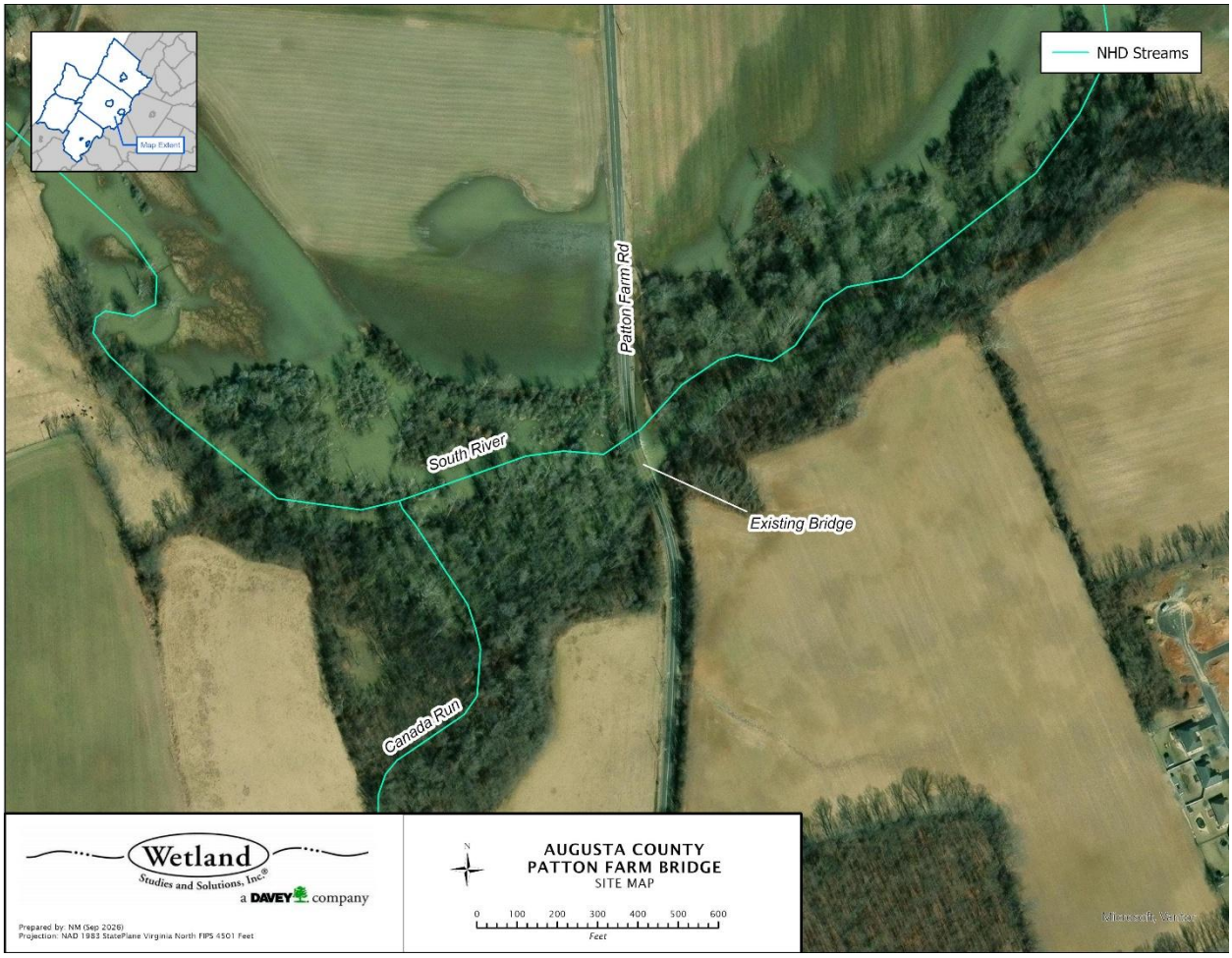

Figure 2. South River crossing under Patton Farm Bridge. A flood that exceeds the bridge was captured in this aerial imagery identified as dated 2/17/2025.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Flood Impact Study					**$110,000.00**
Existing Conditions Survey	1	LS	$50,000.00	$50,000.00	
H&H Study	1	LS	$60,000.00	$60,000.00	
Contingency (30%)					**$33,000.00**
TOTAL ESTIMATED BUDGET					**$143,000.00**

The table above outlines estimated costs for developing an H&H study to assess current flooding frequency and severity. Estimation of costs associated with construction-phase efforts will require additional study and scoping.

Possible Alternatives and Additional Considerations

As the County has identified, a bridge replacement in this area would likely alleviate many of the flooding concerns along this route. There are some alternate designs that could be considered if funding is not secured, though many would not reduce the flood hazard meaningfully. Flooding also occurs along Howardsville Turnpike, which was identified as another evacuation route for many residents in the area. The flood study might identify the area with most severe flooding along this road; there may be a project that eliminates flood concerns on this route at a lower cost than the Patton Farm Bridge replacement, securing a safe evacuation route for residents. Additional efforts towards improving and expanding flood warnings and developing or updating emergency plans for impacted residents could be beneficial, depending on the current status of those efforts.

The possibility of addressing some instances of bridge inundation via the installation of floodplain culverts under the roadway adjacent to the bridge should be evaluated as part of the studies and future design. Floodplain culverts can reduce the amount of flood water trapped on the upstream side of the roadway, lowering the hydraulic head and increasing the flow rate capable of passing the roadway prior to inundation.

TMDL/MS4 Considerations

Augusta County holds an MS4 permit, but projects associated with the Patton Farm Bridge would probably not provide formal stormwater permitting benefits. Additionally, there are TMDLs that have been approved for the South River and the Shenandoah River watershed. The South River is a tributary of the South Fork Shenandoah River and the Shenandoah River, which has an approved TMDL for PCBs in the watershed. These watersheds also have a TMDL for mercury levels. The South River is impaired for low benthic macroinvertebrate bioassessments and due to exceedances of the *E. coli* standard. The most probable stressors for the benthic macroinvertebrate community are sediments and phosphorus. A flood study or bridge replacement would not assist in pollutant reduction or other TMDL goals.

Assumptions

Watershed of the South River (via StreamStats 9/14/2026) is 69.5 square miles from Patton Farm Bridge.

Recommended Next Steps

Revisit the conversation with VDOT and get their input on feasibility of addressing the constriction. Evaluate utility of initiating an H&H study to document the current flooding conditions.

References

Engineering Concepts, Inc. 2009, Bacteria and Benthic Total Maximum Daily Load Development for South River

U.S. Environmental Protection Agency. 2001. Development of Shenandoah River PCB TMDL

USGS. StreamStats v4.33.0. Accessed online 14 September 2026.

Virginia Department of Environmental Quality. 2009. Total Maximum Daily Load Development for Mercury in the South River, South Fork Shenandoah River, and Shenandoah River, Virginia

PROJECT IDENTIFICATION

AUGUSTA COUNTY

RIDGEVIEW ACRES SUBDIVISION DRAINAGE EASEMENT RECONSTRUCTION

Location Description

38.007731, -79.033843

Ridgeview Acres subdivision in the Stuarts Draft area, main drainage easement runs from Sugar Camp area down through Ridgeview Drive to the South River (**Figure 1**)

Project Issue

Subdivision drainage easement failure — aging grass-lined drainage easements in a late-1960s subdivision are deteriorating, with some sections accumulating sediment and others actively eroding. Sandy AB soils with high water table lead to minimal infiltration once saturation occurs and thus flooding in yards and some basements along Ridgeview Drive regularly occurs (i.e. annually).

Project Purpose

Reconstruct the primary drainage easement in Ridgeview Acres to reduce chronic flooding of residential backyards and basements.

Identified Constraints

a. Width of existing easement, landowner coordination
b. Access routes for construction
c. Infrastructure (e.g. roadways, buildings, utilities, etc.)
d. Potential VDOT involvement regarding road culverts

Additional Information Needed

a. Detailed survey of channel and defined drainage area
b. Presence of utilities
c. Erosion extent and rate

Project Proposal and Planning-Level Cost Estimate

Lacking a defined channel and stabilizing riparian vegetation, the drainage path along the easement has begun downcutting, adding difficulty accessing portions of their property on top of periodic flooding issues for landowners along Ridgeview Drive (**Figure 2**). Significant channel degradation noted as far upstream as Greenway Road (**Figure 3**), though the County has not received complaints from these upper portions of the watershed, likely due to only Ridgeview Drive parcels straddling the drainage easement.

Following full channel survey and analysis, the design of a multi-stage channel and native riparian buffer can be developed. This nature-based solution would seek to re-establish an appropriate low-flow channel for the intermittent, seasonal flows within a larger channel designed to convey bankfull flow events. Where possible, better floodplain connection can be established to dissipate flood water energy and increase infiltration. Small, ford-style crossings could be incorporated into the design to restore maintenance access to the western portions of parcels (where erosion has cut off access). Native vegetation, selected for both root mass and aesthetic appeal, would be used to foster long-term channel stability. Community outreach and education for affected landowners will be critical to establishing the buy-in needed for long-term success. Design would encompass the channel from Ridgeview Drive upstream to Falling Rock Drive at a minimum (approximately 1,125 ft) (**Figure 1**). Significant additional benefits may be feasible with replacement of culverts on Falling Rock Drive and extension of restoration efforts upstream toward Greenway Road (an additional ~1,100 ft). Further study is needed to understand the full scope of benefits associated with restoration efforts in this upper reach.

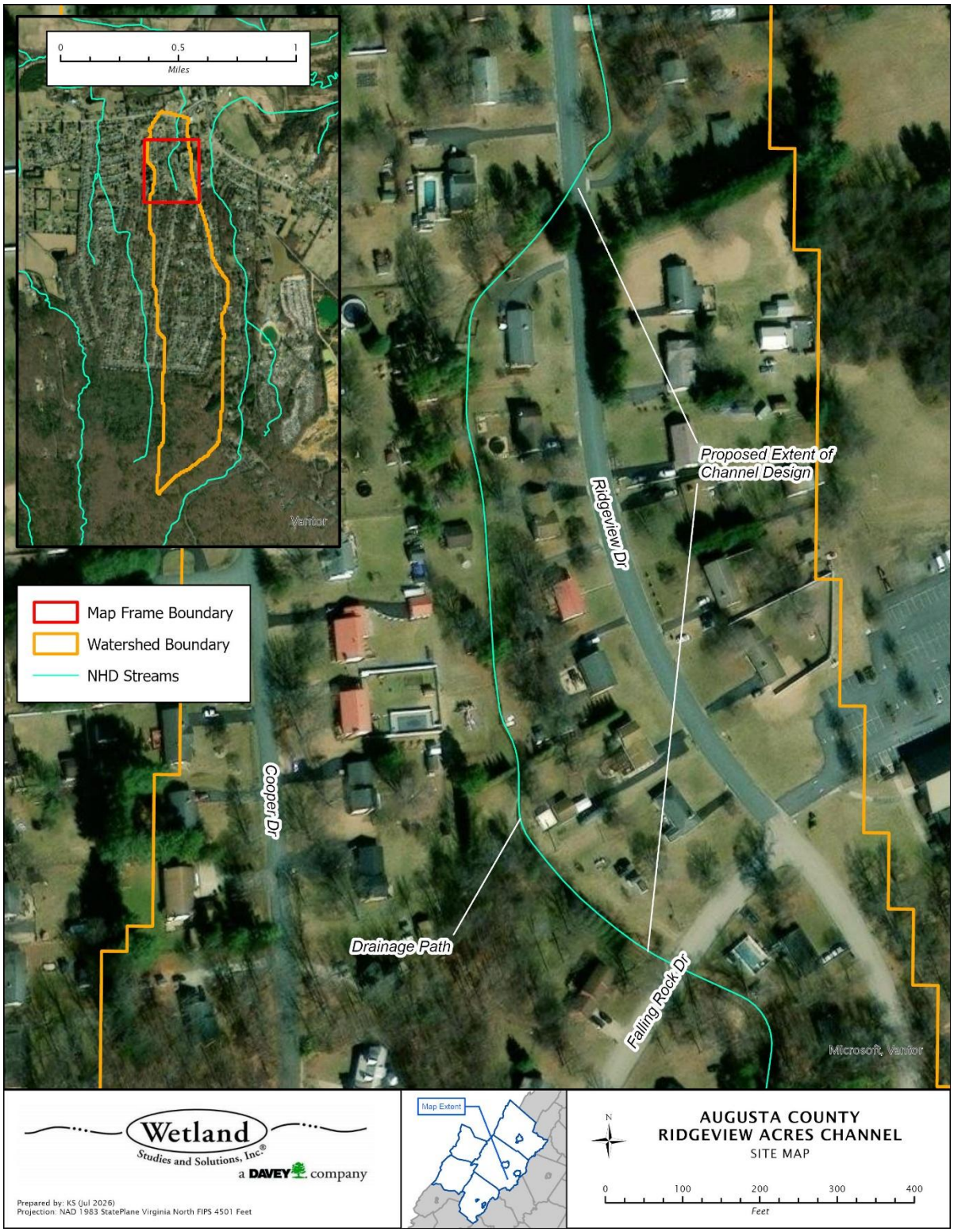

Figure 1. Drainage channel running along Ridgeview Drive with the proposed extent of channel alterations marked.



Figure 2. Drainage easement channel downcutting and widening in yards of Ridgeview Drive residences.



Figure 3. Channel downstream of Greenway Road showing channel bottom downcut to saprolite.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Survey, Design, and Permitting					**$105,000**
Construction Oversight and Administration					**$35,000**
Access and Erosion/Sediment Control					**$45,200**
Construction					**$351,250**
Stakeout and As-Built	1	LS	$32,000	$32,000	
Mobilization	1	LS	$35,000	$35,000	
Clearing	1	AC	$30,000	$30,000	
Grading – rough	1	AC	$7,000	$7,000	
Grading – fine	0.25	AC	$9,000	$2,250	
Excavation & Hauling	1000	CY	$75	$75,000	
Cross Vanes/Crossings	8	EA	$20,000	$160,000	
Reinforced Bed Material	100	TN	$100	$10,000	
Planting					**$82,500**
Native Seed and Natural Fiber Matting	5,000	SY	$12	$60,000	
Live Stakes	2,250	EA	$10	$22,500	
Contingency (30%)					**$185,685**
TOTAL ESTIMATED BUDGET					**$804,635**

The table above outlines estimated costs for developing and implementing a nature-based floodplain and stream restoration project from design and permitting (USACE and DEQ) through construction and planting.

Possible Alternatives and Additional Considerations

The channel could feasibly be stabilized via hardening, which has happened in some isolated properties on Ridgeview Drive. This could involve additional riprap installation, or more expensive alternatives such as flexible concrete block matting. These would likely be more expensive than a nature-based design and may require stream mitigation credit purchase, in addition to being limited in the portion of funding available through the CFPF funding mechanism.

<u>Downstream Impacts</u>

The channel work will end (and begin) at VDOT channel crossings, which will need to be evaluated and appropriately incorporated into the design.

TMDL/MS4 Considerations

The watershed drains to South River, which has a benthic impairment and TMDLs established for sediment, phosphorus, and bacteria. Augusta County is an MS4 permittee, so there may be permit-related benefits to projects impacting TMDL-pollutants.

Assumptions

Watershed (via StreamStats 7/31/2026) is 0.35 square miles (227 acres).

Recommended Next Steps

Reach out to VDOT for sizing calculations of the existing culverts. Gauge and/or develop landowner support for project prior to initiating design stages.

References

USGS. StreamStats v4.34.0. Accessed online 31 July 2026.

ECI. 2009. Bacteria and Benthic Total Maximum Daily Load Development for South River. https://www.deq.virginia.gov/home/showdocument?id=11162&t=637692104885470000

PROJECT IDENTIFICATION

AUGUSTA COUNTY

WEYERS CAVE AND DICES SPRINGS AREA SUBDIVISION DRAINAGE IMPROVEMENTS

Location Description

38.292275, -78.918993

The Weyers Cave and Dices Springs Road area in northern Augusta County, centered on the rectangle formed by Weyers Cave Road, Keezletown Road, Bluestone Drive, and the railroad tracks.

Project Issue

Subdivision drainage deficiency — older subdivision easements insufficiently sized for drainage load combined with high water table creates drainage problems and localized flooding. An existing county regional detention basin provides some attenuation but is insufficient.

Project Purpose

Improve drainage conveyance and attenuation for the two affected subdivisions in the Weyers Cave/Dices Springs area; assess whether the regional detention basin can be expanded and identify specific conveyance bottlenecks.

Identified Constraints

a. High water table limits infiltration-based solutions
b. VDOT coordination required for any culvert or conveyance modifications
c. County lacks internal engineering capacity for design without consultant support
d. Cooperation with Norfolk Southern for any projects involving the railroad

Additional Information Needed

a. H&H study
b. Local stormwater infrastructure locations and capacity
c. Information on regional detention pond

Project Proposal and Planning-Level Cost Estimate

There is currently no definitive information on the source of flooding throughout Weyers Cave and Dices Springs area, which is a widespread issue due to the shallow water table. There is likely an insufficiency somewhere in the system where the stormwater infrastructure is undersized. Additionally, the Chesapeake Western Railroad runs through the area, creating further system complexity. Due to these complications, a survey of the existing infrastructure and an H&H or stormwater study throughout the area of concern should be implemented to guide potential

solutions (**Figure 1**). The study would determine the existing capacity of the stormwater system and compare this with the expected peak flows. The subdivisions that have insufficient drainage should be included in this study, to identify the specific locations of flooding and drainage deficiencies. The County has identified that these channels through the easement and detention basin are likely undersized for the existing volume of runoff. The primary purpose of this study is to map the existing stormwater network and identify any pieces of infrastructure that are insufficient for the current demands.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Flood Impact Study					**$180,000.00**
Existing Conditions Survey	1	LS	$60,000.00	$60,000.00	
H&H Study	1	LS	$60,000.00	$60,000.00	
PER	1	LS	$60,000.00	$60,000.00	
Contingency (30%)					**$54,000.00**
TOTAL ESTIMATED BUDGET					**$234,000.00**

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



Figure 1. Map of Weyers Cave and surrounding areas with notable roads and railroad marked.

Possible Alternatives and Additional Considerations

Many of the designs to address the results of an H&H study might be stormwater infrastructure improvements. These could include upsizing culverts running under roadways or railroads, increasing the diameter of stormwater pipes, or installing inlets and conveyances along existing roads to eliminate potential choke points in the system. The County could also increase the size of the regional detention basin to increase the flood attenuation. The drainage ditches that convey runoff through the subdivisions could also be retrofit or converted into vegetated swales to increase capacity. Alternatively, an additional BMP such as an extended detention pond or other structures to attenuate flow could be constructed, since infiltration structures would not be as effective with the high-water table.

TMDL/MS4 Considerations

Augusta County holds an MS4 permit; a study of the existing stormwater infrastructure through Weyers Cave would provide no benefits towards this stormwater permitting. The area drains into the North River, which flows into the South Fork Shenandoah River and Shenandoah River. The Shenandoah River has approved TMDLs for PCBs. The South Fork Shenandoah River and Shenandoah River have an approved TMDL for mercury levels. The North River has an approved TMDL due to *E. coli* levels and water quality violations of the bacteria standards. Though the study itself would not provide any benefits toward reaching TMDL goals, certain projects that result from this study might help reach these goals.

Recommended Next Steps

Pursue survey/mapping of existing infrastructure to ease maintenance and enable a desktop analysis of likely constrictions. Recommend tailored outreach to residents in the area of concern to better quantify flooding in the area.

References

Virginia Department of Environmental Quality. 2009. Total Maximum Daily Load Development for Mercury in the South River, South Fork Shenandoah River, and Shenandoah River, Virginia

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