PROJECT IDENTIFICATION
TOWN OF MOUNT CRAWFORD
MILL STREET AND OLD BRIDGEWATER ROAD CULVERT REPLACEMENT

Location Description
38.35703, -78.94272
Intersection of Mill Street and Old Bridgewater Road, private residence at 222 Mill Street is the primary impacted property. VDOT-maintained culvert at this location conveys cross-road drainage from the Mill Street hillside.

Project Issue
Undersized and structurally damaged culvert — culvert was crushed by heavy truck traffic (18-wheelers) during a North River Road detour; repeated VDOT repair attempts have not restored functional drainage and chronic clogging causes stormwater to pond and infiltrate the adjacent property. Prolonged water loading caused the stone foundation walls of the home at 222 Mill Street to collapse, temporarily displacing the resident. Town Staff note that the resident has filed a claim against VDOT.

Project Purpose
Replace damaged culvert at Mill Street/Old Bridgewater Road with properly sized culvert to restore adequate drainage capacity.

Identified Constraints
a. Culvert and roadways are VDOT jurisdiction
b. Proximity of private residences
c. Resident's legal claim against VDOT may complicate the legal and procedural context for future work

Additional Information Needed
a. Discuss possibility of partnering with VDOT to address if CFPF monies can be made available
b. Presence of utilities
c. Evaluate capacity of curb inlet on western side of Route 11 to accept additional drainage or feasibility of upsizing if inadequate

Project Proposal and Planning-Level Cost Estimate
The culvert remains in degraded condition after being crushed by large trucks following a detour through this intersection. The resident has installed temporary protective measures and has filed a

claim with VDOT following a foundation collapse (**Figure 1**). VDOT is aware of the situation, but no funded repair or replacement is underway.

The ditch leading down Mill Street to the culvert should be re-graded. The culvert should be checked for blockages and replaced if the crushed end cannot be repaired. Concurrently, the culvert sizing can be evaluated. VDOT coordination will be required as the road and culvert owner, and ideally VDOT would be the responsible party given their ownership and responsibility.



Figure 1. Culvert of concern (marked by cones), photo taken facing north. Concrete barrier visible at center of photo installed by resident as temporary protective measure.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Survey and Design					**$50,000**
Construction Administration and Oversight					**$7,000**
Access and Erosion/Sediment Control					**$8,000**
Construction					**$64,710**

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Stakeout	1	LS	$12,000	$12,000	
As-Built Survey	1	LS	$12,000	$12,000	
Mobilization	1	LS	$10,000	$10,000	
Excavation & Hauling	25	CY	$100	$2,500	
Culvert Pipe	50	LF	$190	$9,500	
Ditch Excavation	150	LF	$30	$4,500	
Permanent Seeding	1	LB	$10	$10	
Erosion Control Matting	100	SY	$2	$200	
Pavement Patching	200	SQ YD	$70	$14,000	
Contingency (30%)					**$38,913**
TOTAL ESTIMATED BUDGET					**$168,623**

The table above presents estimated costs for the existing conditions survey, H&H analysis, design, and installation of a replacement culvert.

Possible Alternatives and Additional Considerations

It is possible that there would be additional capacity in the stormwater system running along Rt 11/Main Street, which has drop inlets along the western side of Rt 11, but installing a conveyance system to connect to those existing pipes would be very challenging given the density of structures along Rt 11.

TMDL/MS4 Considerations

The watershed drains to North River, which has an approved bacteria TMDL, which joins the South Fork Shenandoah River which does have a benthic impairment but not an approved TMDL to address it. Rockingham County became an MS4 permittee in 2025, so this is an aspect to consider into the future. Additionally, the area is in 2020 Census Urbanized Area, so it is possible VDOT would be interested in partnering for credits should a TMDL requiring sediment reductions be approved in the future.

Assumptions

The downstream stormwater system this culvert flows into is assumed to be adequate.

Recommended Next Steps

Re-open dialogue with VDOT under the possibility of CFPF funding for culvert replacement.

References

Virginia Tech Department of Biological Systems Engineering. 2006. Bacteria Total Maximum Daily Load Development for North River.

PROJECT IDENTIFICATION
TOWN OF MOUNT CRAWFORD
PARSONS COURT AND ROUTE 11 STORMWATER DRAINAGE

Location Description
38.36219, -78.93694
Intersection of Parsons Court and US Route 11 (North Main Street), particularly the stretch of frontage adjacent to Peak View Motors and self storage facility as well as the first 200 ft of Parsons Court.

Project Issue
Stormwater drainage capacity – runoff accumulates on US Route 11 and Parsons Court during heavy rain events due to inadequate roadside drainage capacity, pooling along US Route 11's eastern lane (northbound) and nearest portion of Parsons Court. Recurrent flooding poses a safety hazard along the roadway.

Project Purpose
Address roadway flooding.

Identified Constraints
a. Both roadways are VDOT maintained, as is all associated stormwater management infrastructure.

Additional Information Needed
b. Discuss possibility of partnering with VDOT to fund if CFPF monies can be made available
c. Presence of utilities
d. Evaluate capacity of storm sewer system on western side of US Route 11 to accept additional drainage or feasibility of upsizing if inadequate

Project Proposal and Planning-Level Cost Estimate
Following an assessment to verify that the existing stormwater infrastructure has adequate capacity, additional inlets and connecting stormwater infrastructure should be installed to convey water off of the roadway. One additional inlet on south side of Parsons Court could connect to the existing curb inlet and stormwater network conveying east along Parsons Court. Additional inlets along the eastern curb of US Route 11 could connect to existing infrastructure on the western curb directing stormwater to the west (**Figure 1**). The existing stormwater system is understood to be owned and maintained by VDOT, making coordination with VDOT critical to the project success. VDOT recently milled and repaved US Route 11 but maintained the prior central crest in the roadway separating north- and south-bound lanes to drain separately.



Figure 1. Map of Parsons Court/US 11 flooding concern.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Survey and Design					**$164,000**
Construction Administration and Oversight					**$15,000**
Access and Erosion/Sediment Control					**$54,350**
Construction					**$508,550**
Stakeout and As-Built	1	LS	$36,000	$36,000	
Mobilization	1	LS	$26,000	$26,000	
Excavation and Hauling	900	CY	$100	$90,000	
Curb Drop Inlets	3	EA	$10,000	$30,000	
Storm Sewer Pipe	650	LF	$300	$195,000	
Curb & Gutter	650	LF	$50	$32,500	
Concrete Sidewalk	600	SQ YD	$80	$48,000	
Pavement Replacement	600	SQ YD	$80	$48,000	
Mill and Overlay	70	SQ YD	$25	$1,750	
Striping	650	LF	$2	$1,300	
Contingency (30%)					**$222,570**
TOTAL ESTIMATED BUDGET					**$964,470**

The table above presents estimated costs for the existing conditions survey, H&H analysis and capacity verification, design, and installation of storm sewer extending the existing systems on US Route 11 and Parsons Court to capture runoff from the area of concern.

Possible Alternatives and Additional Considerations

It is possible that instead of incorporating these drainage areas into the existing VDOT stormwater infrastructure, some or all of it could be captured by regrading the corner lot where My Car Outlet and US Route 11 Self Storage are located, where an existing drop inlet is already located, though its downstream connection isn't currently known. This property is one of the most impacted by flooding on US Route 11 and Parsons Court as both entrances experience flooding. The owner's agreement and an evaluation of designed stormwater infrastructure on site would be necessary to determine if there is additional capacity available.

TMDL/MS4 Considerations

The watershed drains to North River, which has an approved bacteria TMDL, which joins the South Fork Shenandoah River which does have a benthic impairment but not an approved TMDL to address it. Rockingham County became an MS4 permittee in 2025, so this is an aspect to consider into the future. Additionally, the area is in 2020 Census Urbanized Area, so it is possible

VDOT would be interested in partnering for credits should a TMDL requiring sediment reductions be approved in the future.

Assumptions

Additional stormwater infrastructure assumed to only be warranted on one side each of US Route 11 and Parsons Court, 650 linear feet total.

Recommended Next Steps

Request from VDOT design documentation of existing infrastructure to understand existing capacity and open dialogue for additional culvert installation under the possibility of CFPF funding. Pursue mapping of stormwater infrastructure in general.

References

Virginia Tech Department of Biological Systems Engineering. 2006. Bacteria Total Maximum Daily Load Development for North River.

TOWN OF MOUNT CRAWFORD
POST OFFICE AND RURITAN PARK AND US ROUTE 11 STORMWATER DRAINAGE

Location Description
38.35877, -78.94045
Behind Post Office building at 411 North Main Street and adjacent Hawks Auto Repair and across Ruritan Road to the park.

Project Issue
Pluvial flooding - Runoff accumulates after behind post office and auto shop buildings and at the intersection of US Route 11 and Ruritan Road, causing localized flooding before flowing over Ruritan Road to an existing stormwater drop inlet. Standing water remains for many days after any significant rainfall event.

Project Purpose
Address localized flooding in area behind post office and auto shop along US Route 11.

Identified Constraints
a. Stormwater infrastructure presumed VDOT maintained.
b. Ruritan Road assumed maintained by Ruritan Club
c. Post office building privately owned, rented by USPS
d. Coordination with private landowners

Additional Information Needed
a. Discuss possibility of partnering with VDOT to fund if CFPF monies can be made available
b. Presence of utilities
c. Evaluate capacity of DI at Ruritan Park and overall system connected to curb inlet on eastern side of US Route 11 to accept additional drainage or feasibility of upsizing if inadequate

Project Proposal and Planning-Level Cost Estimate
In a site visit, it appeared that there was a continuation of the drainage path through the depressional area behind the Post Office into the back property of the auto shop which was being blocked by the growth of vegetation in the fenceline (**Figure 1**, **Figure 2**). It appeared quite likely that the drainage connected to the ditch along Ruritan Road, which appears to eventually overflow and enter the existing drop inlet in the park area. Given permission by the owner of the auto shop, the vegetation and accumulated sediment and debris in the fenceline and along the drainage path within the fenceline could be cleared and likely solve much of the recurring flooding behind the Post Office at minimal cost. If this clearing addresses the recurring flooding, an agreement regarding regular access for scheduled maintenance would be recommended. The

format and frequency and responsibility for the maintenance agreement would be negotiated among the various stakeholders (Town of Mount Crawford, USPS, Hawks Auto, Ruritan Club, private landowners).

Should this minimal cost effort not prove to adequately alleviate flooding behind the Post Office, the overall stormwater system in the area should be evaluated. There is not a defined channel or culvert currently conveying flow from the ditch on the southern side of Ruritan Road towards the drop inlet in the park. It is also unclear where the flow collected in the back of the auto shop property flows. If the flow diverts into the ditch along Ruritan Road, the benefits of installing a culvert under Ruritan Road or grading a shallow diversion to convey flow to the drop inlet should be evaluated. However, it is also possible that flow collected behind the auto shop is already connected to the existing infrastructure – this could be verified by opening the existing manhole in the front of the auto shop and checking for conveyance from the back of the property.



Figure 1. Drainage path behind Post Office, photo taken facing north.



Figure 2. Map of area of concern around Post Office building and nearby drainage infrastructure.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Phase 1: Clear Existing Flowpath					**$4,000**
Labor to clear flow path					**$4,000**
Phase 2: Stormwater System Expansion					**$87,730**
Survey and Design					**$35,000**
Construction Administration and Oversight					**$5,000**
Access and Erosion/Sediment Control					**$3,600**
Construction					**$23,500**
Stakeout and As-Built	1	LS	$10,000	$10,000	
Mobilization	1	LS	$3,000	$3,000	
Excavation and Hauling		CY	$100	$0	
Ditch Excavation	150	LF	$30	$4,500	
Culvert Pipe under Ruritan Road	30	LF	$200	$6,000	
Phase 2 Contingency (30%)					**$20,130**
TOTAL ESTIMATED BUDGET					**$91,230**

The table above presents estimated costs for two phases of work. The first phase consists of clearing the existing flow path from behind the Post Office and through the Hawks Auto property. If this effort adequately addresses flooding in the vicinity, Phase 2 would not need to be implemented. Estimated costs presented for Phase 2 include existing conditions survey, assessment of downstream capacity, design, and construction of an improved ditch line along Ruritan Road and a culvert under Ruritan Road to more directly connect to the existing drop inlet in the corner of Ruritan Park.

Possible Alternatives and Additional Considerations

The overall lack of stormwater capture along the north side of US Route 11 in this area was discussed with the Town, noting that VDOT has maintained a central crest in the roadway that separates the stormwater flow of either lane. However, given the sorts of possible stormwater contaminants generally located in auto shops, the installation of an additional drop inlet on the northern side of US Route 11 was not currently recommended. These potential sources of stormwater contamination should also be considered in clearing the existing flow path so that work does not negatively impact stormwater quality.

<u>TMDL/MS4 Considerations</u>

The watershed drains to North River, which has an approved bacteria TMDL, which joins the South Fork Shenandoah River which does have a benthic impairment but not an approved TMDL to address it. Rockingham County became an MS4 permittee in 2025, so this is an aspect

to consider into the future. Additionally, the area is in 2020 Census Urbanized Area, so it is possible VDOT would be interested in partnering for credits should a TMDL requiring sediment reductions be approved in the future.

Assumptions

The downstream receiving stormwater system is assumed to be adequate and no modifications of that system are included in the estimated budget.

Recommended Next Steps

Clear accumulated debris and vegetation to re-establish flow path (Phase 1) and monitor for effectiveness. Pursue mapping of stormwater infrastructure in general.

References

Virginia Tech Department of Biological Systems Engineering. 2006. Bacteria Total Maximum Daily Load Development for North River.

PROJECT IDENTIFICATION

TOWN OF MOUNT CRAWFORD

TOWN PARK RIVER ACCESS AND KAYAK LANDING FLOOD VULNERABILITY AND WALKWAY IMPROVEMENTS

Location Description

38.351754, -78.945955

Town park river access area and kayak/canoe landing on the North River; paved access walkway and landing at or near the ordinary high-water mark of the stream.

Project Issue

Flood inundation of public recreational facility and walkway design defect causing ongoing erosion — kayak/canoe landing floods during significant events (flood reached bottom step; a 600-pound concrete trash can was displaced during two events in the prior year and remains lodged in the dry bed downstream). Additionally, a paved walkway was improperly installed at time of construction, causing ongoing erosion that will worsen over time.

Project Purpose

Halt erosion along walkway, assess whether landing warrants structural floodproofing or access area redesign.

Identified Constraints

a. Current/ongoing (2026) construction of Town Park facilities
b. Anticipated flooding due to proximity to natural system
c. Debris in flood flows from North River

Additional Information Needed

a. Frequency and extent of inundation of kayak landing

Project Proposal and Planning-Level Cost Estimate

As of the WSSI site visit (6/16/2026), the erosion issue along walkway appears to have been addressed (**Figure 1**). There remains opportunity to enhance the ongoing work of establishing the first town park (currently under construction, 2026) and the kayak landing access area. The area could be enhanced with native riparian plantings for bank stabilization and added recreational and educational benefits. Native plantings can additionally provide habitat for other native species.

The kayak landing did not show sign of damage from flooding and appeared to be appropriately designed to withstand anticipated flooding. However, the level of inundation regularly anticipated in the lower end of the kayak landing area largely preclude the installation of typical park

furnishings or equipment, which is supported by the 600-pound concrete trash can that Town staff noted was displaced by floods within the past year. For reference, the base flood elevation of the 1% annual chance flood (100-year flood) noted by FEMA is more than 10 feet above the elevation of the bottom of the kayak landing. Maintenance of equipment or park furnishings in the lower portion near the kayak landing would also need to be resilient to the kinds of woody debris typically transported in the North River during flood events. The added maintenance burden of removing accumulated debris would need to be accounted for. The current work on the Town Park uphill from the landing is better situated for those kinds of amenities.



Figure 1. Repaired erosion along walking path to kayak landing.



Figure 2. Kayak landing area as of 6/16/2026.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Riparian Buffer Enhancement					**$7,100**
Riparian Buffer Seed and Straw	800	SY	$3	$2,400	
Live Stakes	250	EA	$10	$2,500	
Tubelings	275	EA	$8	$2,200	
Contingency (30%)					**$2,130**
TOTAL ESTIMATED BUDGET					**$9,230**

The table above presents estimated costs for native plantings for a 30-foot wide riparian buffer extending approximately 125 feet to either side of the kayak landing. The extent of work described here is likely below thresholds for procurement requiring bid solicitation and could be sole-sourced if reasonable. The effort may also be a good candidate for volunteer activity and could further enhance community engagement and awareness through the process.

Possible Alternatives and Additional Considerations

The Town noted previous contact with the Virginia Department of Forestry regarding plantings at the park – that effort could be expanded to riparian plantings at the kayak landing. Depending on

the variety of plants, educational signage could be incorporated to encourage observation and identification of the various native species.

TMDL/MS4 Considerations

The watershed drains to North River, which has an approved bacteria TMDL, which joins the South Fork Shenandoah River which does have a benthic impairment but not an approved TMDL to address it. Rockingham County became an MS4 permittee in 2025, so this is an aspect to consider into the future. Additionally, the area is in 2020 Census Urbanized Area, so it is possible VDOT would be interested in partnering for credits should a TMDL requiring sediment reductions be approved in the future.

Assumptions

Vegetation establishment only estimated for the back-channel where the kayak/canoe launch is located.

Recommended Next Steps

Evaluate volunteer opportunity/interest, pursue funding (e.g. Chesapeake Bay Trust, Department of Forestry)

References

Virginia Tech Department of Biological Systems Engineering. 2006. Bacteria Total Maximum Daily Load Development for North River.