PROJECT CONCEPT

TOWN OF GLASGOW

PRIMARY TOWN DRAINAGE CHANNEL IMPROVEMENTS — 4TH THROUGH 7TH STREETS

Location Description

37.641324, -79.446385

Drainage channels along 4th, 5th, 6th, and 7th Streets convey runoff from surrounding mountain slopes through the Town of Glasgow to the Maury River (**Figure 1**). Multiple channels cross under/through the Norfolk Southern railroad embankment.

Project Purpose

Maintain and improve the stormwater conveyance system to better handle routine and moderate rain events.

Additional Information Needed

- H&H study
- Presence and location of utilities
- Depth to groundwater and bedrock
- Existing easements for drainage channels through private property

Background

The ditches running along 4th, 5th, 6th, and 7th Streets in the Town of Glasgow convey water from the surrounding mountain slopes and the northern portion of town to a ditch that runs parallel to the railroad tracks. Sediment and other debris have accumulated in these ditches, reducing the flow capacity (**Figure 2**). Town staff note that the channels can sufficiently convey normal flow events when clear of debris, but their capacity is exceeded in extreme storms. In multiple places along the ditch that parallels the railroad, culverts convey water under the railroad tracks and to the Maury River, in some cases flowing under the Mohawk facility (**Figure 3**). These culverts are a known constriction within the system; trash, sediment, and other debris have previously clogged them. These capacity issues within the system lead to water over-topping the ditches, flowing onto adjacent yards and roadways. The Town of Glasgow has limited public works staff to maintain these drainage paths, limiting the ability to remove debris or sediment as they fill the channel.



Figure 1. Location map highlighting the path of drainage ditches along the streets in Glasgow.



Figure 2. Largely buried culvert at the intersection of 4th Street and Pocahontas Street.



Figure 3. Rebar debris racks on double culverts under railroad in line with drainage from 4th Street.

Conceptual Design and Planning-Level Cost Estimate

To adequately understand and address the drainage issues experienced along 4th, 5th, 6th, and 7th Streets in the Town of Glasgow, **Phase 1** proposes a survey of the existing stormwater infrastructure, and an H&H study should be conducted. This would quantify runoff and identify limitations of the drainage system. The study should also determine the existing capacity of the culverts and ditches and whether capacity would be adequate once known flow restrictions are addressed (e.g. culvert blockage shown in **Figure 2**). This study would also be used to inform the design of any infiltration or detention practices.

In **Phase 2**, the ditches along these streets should be excavated and revitalized to remove the accumulated sediment (**Figure 1**). The existing conditions survey and H&H study will guide which ditches require excavation to the original dimensions versus expansion of the original footprint. All ditches are currently turf-lined, and vegetation will be re-established as part of the revitalization to prevent erosion. The study area encompasses approximately 6,240 linear feet of ditch along the streets of concern. The culverts should also be cleared to restore the original conveyance capacity, allowing water to flow freely during extreme storms. The existing conditions survey may identify some culverts failing and in need of replacement, and the H&H study may identify undersized culverts where choke points exist. Improved debris racks, such as the example VDOT Road and Bridge Standards detail 114.05 (**Figure 4**) should be installed on the culverts that flow under the railroad to improve performance and simplify maintenance.

The large size of the drainage area to the ditches along 4th Street (>80 acres, **Figure 5**), while mostly forested, generates estimated runoff volumes and peak flow rates large enough to require a significantly larger detention/infiltration style BMP as previously theorized (**Table 1**). The density of structures and utilities in the study area prevents the installation of a regional BMP large enough to add tangible amounts of flood storage volume, with estimated contiguous undeveloped areas limited to less than 0.5 acres. The steep slopes leading to the study area prohibit the installation of BMPs further up the watershed. The results of the Phase 1 H&H study may highlight alternative BMP implementation possibilities. Further evaluation of BMP alternatives is needed following evaluation of model results.

The order in which proposed Phase 1 and 2 activities are executed should be evaluated based on resource limitations and risk assessment. Completing the study (Phase 1) first informs whether certain ditches or culverts should be replaced or re-sized in the revitalization (Phase 2) efforts, allowing all construction work to be completed as a single effort. However, ditches could be excavated and culverts cleared to re-establish their designed capacity prior to an H&H study, at the risk of potentially mobilizing construction a second time if the study supports re-sizing elements of the stormwater system and lacking the clarity provided by an existing conditions survey. Cooperation and coordination with VDOT and Norfolk Southern Railroad would also be required for this project, as the drainage paths cross the railroad and state-maintained roads.

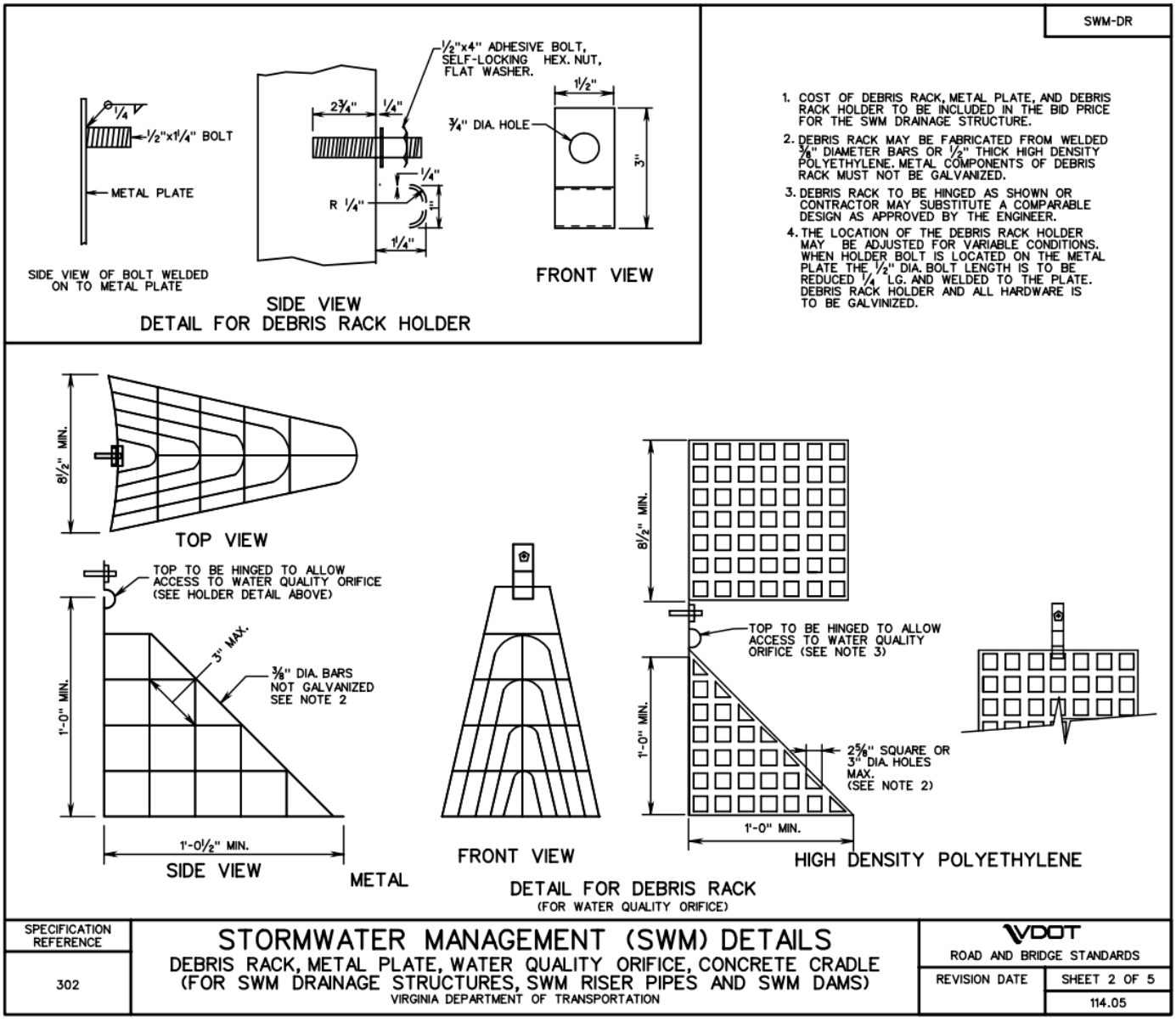

Figure 4. Example debris rack specification for improvements to culverts under railroad.

Table 1. Estimated runoff volumes and peak flow rates for the watershed to 6th Street using TR-55 SCS curve number method.

NOAA Atlas 14 Event	Precipitation (inches)	Runoff Volume (ac-ft) (CN 57.6)	Peak Flow Rate (cfs)
5 year 24 hour	3.86	4.36	53.1
10 year 24 hour	4.54	6.72	81.9
25 year 24 hour	5.53	10.7	131
50 year 24 hour	6.36	14.5	177

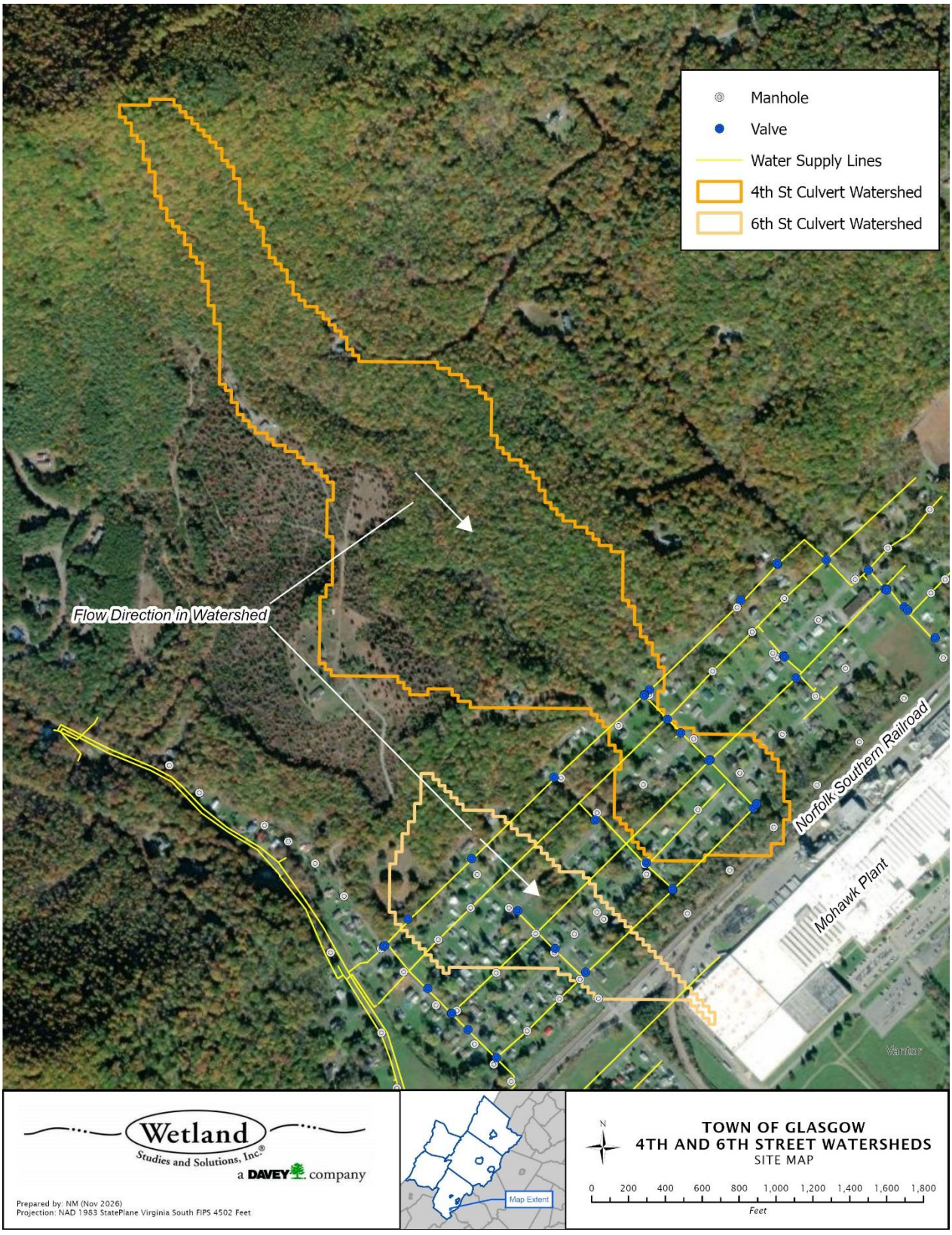

Figure 5. Map of contributing watersheds.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Phase 1 Stormwater Study					**$97,500**
Northern Glasgow Stormwater Study					**$75,000**
Existing Conditions Survey	1	LS	$35,000	$35,000	
H&H Study	1	LS	$40,000	$40,000	
Phase 1 Contingency (30%)					**$22,500**
Phase 2 Drainage Improvements					**$497,120**
Ditch Revitalization Design					**$20,000**
Design	1	LS	$20,000	$20,000	
Construction Administration and Oversight					**$15,000**
Construction Oversight	1	LS	$15,000	$15,000	
Access and Erosion/Sediment Control					**$54,100**
Temporary Construction Entrance	1	EA	$5,000	$5,000	
Super Silt Fence	300	LF	$9	$2,700	
Rock Filter Outlets	14	TON	$100	$1,400.00	
Traffic Control	90	DAY	$500	$45,000	
Ditch Revitalization Construction					**$293,300**
As-Built Survey	1	LS	$18,000	$18,000	
Ditch Excavation	6240	LF	$30	$187,200	
Debris Racks	6	EA	$1,500	$9,000	
Culvert Pipe (24”)	250	LF	$210	$52,500	
Pavement Replacement	120	SQ YD	$150	$18,000	
Permanent Seeding	28	LB	$10	$280	
Erosion Control Matting	4160	SY	$2	$8,320	
Phase 2 Contingency (30%)					**$114,720**
TOTAL ESTIMATED BUDGET					**$594,620**

Assumptions

- Watershed (via StreamStats 8/21/2026) is 0.18 (115.2 acres) square miles along 4th and 6th Street.
- The drainage area to 4th Street is 0.14 square miles (89.6 acres) via StreamStats 10/27/2026.
- The majority of culverts are assumed to be in good condition, aside from sediment deposition, though a set-aside for replacement of up to 250 feet of culvert is included in the estimated budget. Approximately 6,240 linear feet of ditch lines are assumed to be needing revitalization.
- Double culverts under railroad tracks were identified in three places for upgraded debris racks: near 6th Street, 4th Street, and 2nd Street.

Recommended Next Steps

Reach out to Norfolk Southern regarding upgrading debris racks on culverts. Determine whether priority lies in study development or immediate ditch revitalization.

References

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online. Accessed 27 October 2026.

USGS. StreamStats v4.33.0. Accessed online 21 August 2026.

Virginia Department of Environmental Quality. 2025. *Virginia Stormwater Management Handbook*. Version 1.2. https://www.deq.virginia.gov/water/stormwater/stormwater-construction/handbooks.

Virginia Department of Transportation. 2016. Road and Bridge Standards.