PROJECT CONCEPT

BATH COUNTY

HOT SPRINGS AND MAIN STREET FLOODING ALONG HOT SPRINGS RUN

Location Description

38.00040, -79.83167

Hot Springs Run flows through the center of Hot Springs parallel to Main Street, collecting runoff and stormwater from multiple sources along the commercial and residential area.

Project Purpose

Assess the feasibility of intervention measures, including upsizing stormwater or upstream peak reduction structures, to address flooding along Hot Springs Run.

Additional Information Needed

a. Presence and locations of utilities
b. Presence and locations of existing stormwater infrastructure
c. Discuss possibility of partnering with VDOT to fund if CFPF monies can be made available

Background

Multiple drainage areas meet in the village center, emptying into Hot Springs Run (**Figure 1**). Buildings and other infrastructure have been developed around the stream, degrading natural floodplain function and constraining the stream (**Figure 2**). During high storm events, floodwater from the stream as well as direct runoff flowing down from either direction of US Route 220 accumulates on Main Street and encroaches on adjacent buildings.

Flow funnels from both the 'north drainage' and 'south drainage' watersheds (**Figure 1**) into Hot Springs' downtown area, which lies in a natural constriction where flow passes through a gap in the ridge. Much of the runoff from the south drainage area (estimated 2.02 square miles) is captured by a series of curb and drop inlets along US Route 220 from near the hospital to the vicinity of Virginia Avenue and Main Street (**Figure 2**). It is not clear where that collected flow enters Hot Springs Run, whether it connects directly to Hot Springs Run at the intersection of Main Street and US Route 220 or if the south drainage stormwater collection is connected to the stormwater infrastructure along Main Street and conveyed further northwest prior to entering Hot Springs Run. The north drainage area (estimated 0.99 square miles) does not appear to have any stormwater system addressing flow along US Route 220 from the north, conveying stormwater in shallow ditches until reaching a box culvert carrying water under the bend of US Route 220 to the intersection with Main Street.

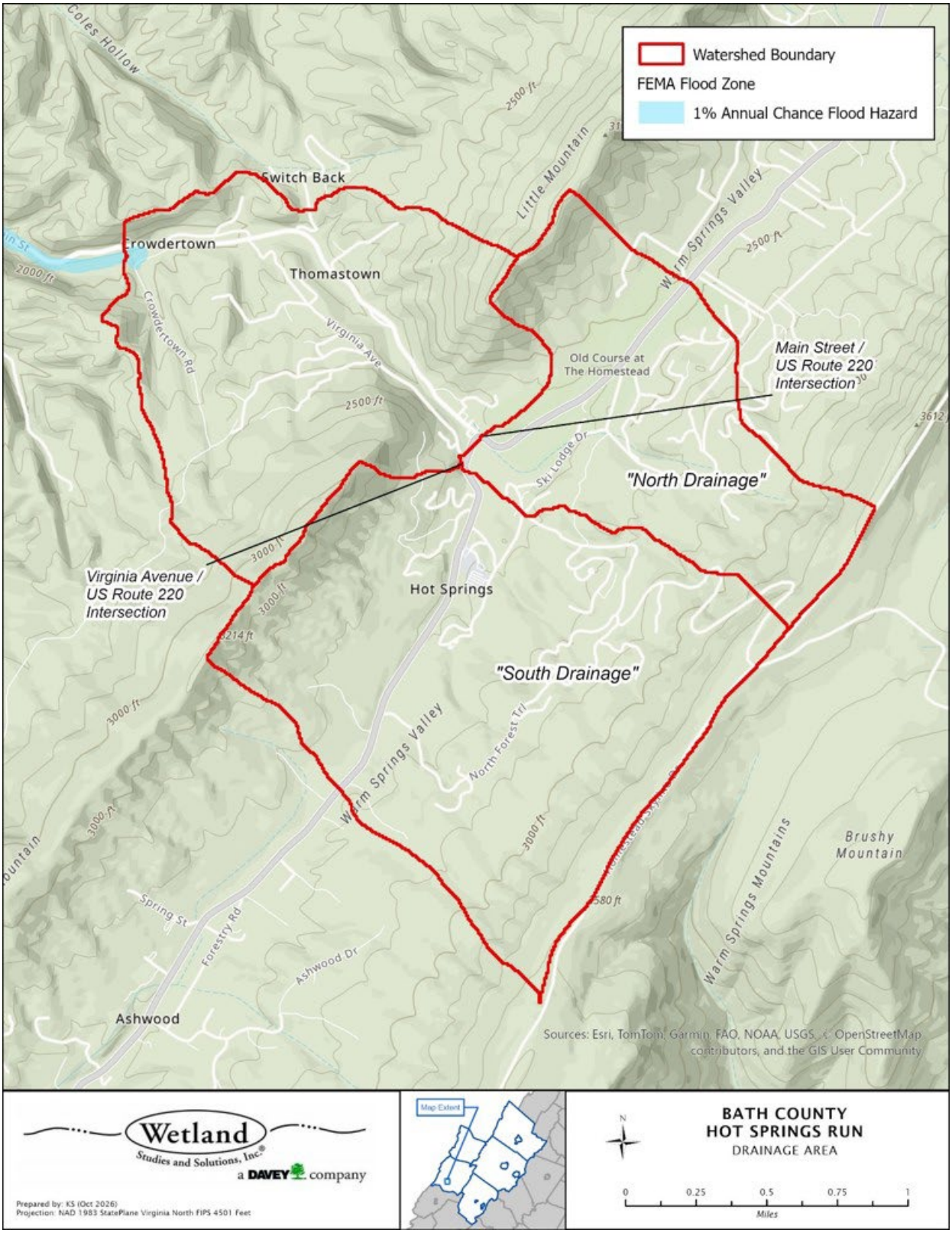

Figure 1. Hot Springs Run watershed subdivisions entering downtown (confluence of North and South Drainages) and further watershed contributing to the uppermost identified FEMA floodplain to the northwest. Watersheds based on USGS StreamStats outputs.

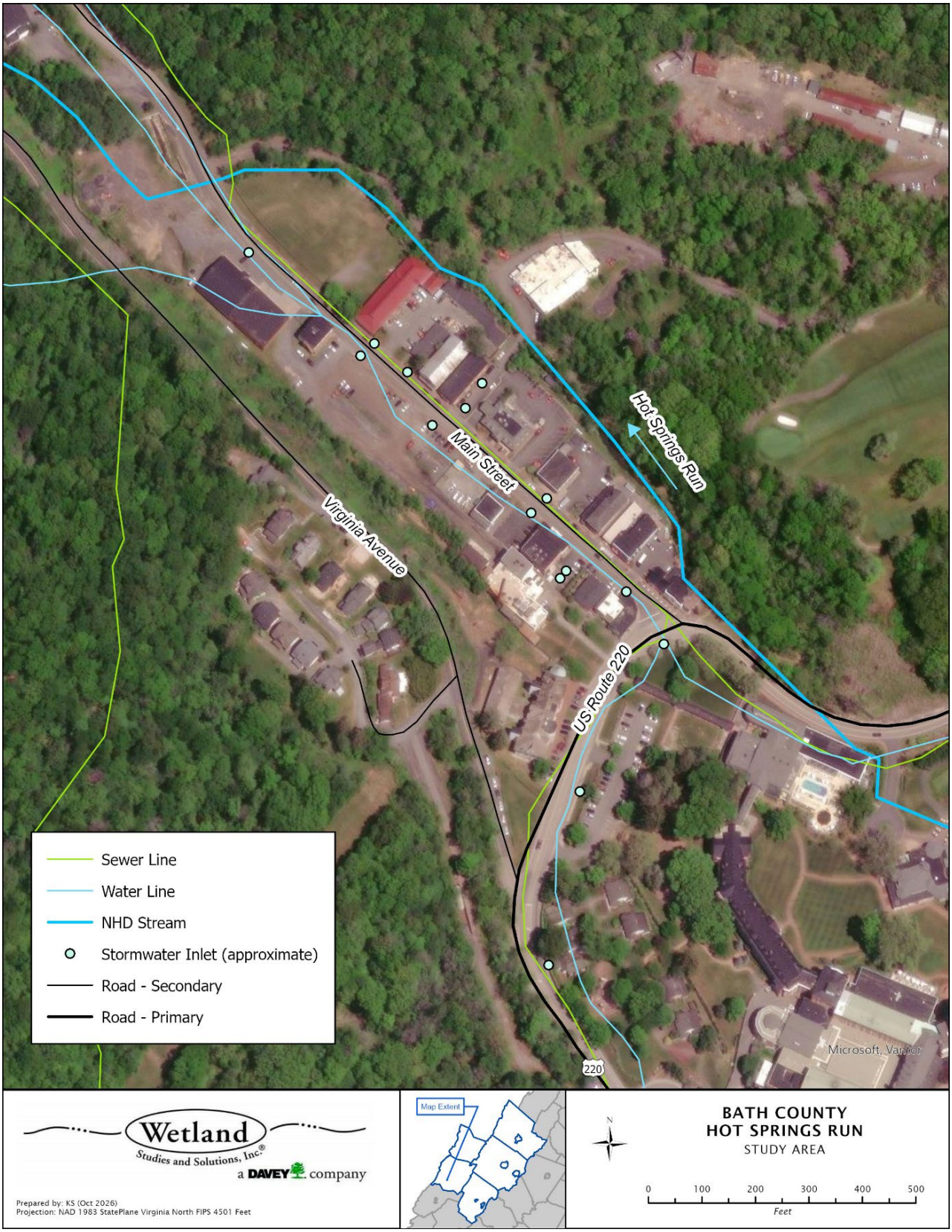

Figure 2. Study area proposed in downtown Hot Springs. Stormwater inlet locations approximated based on aerial imagery, field observations, and Google StreetView.

Hot Springs Run flows north behind Main Street, with a notable constriction as it flows under a commercial building at the intersection of Main Street and US Route 220 (Sam Snead Highway) (**Figure 3**). The downtown area noted by County staff as the most frequently impacted by flooding is very topographically flat, especially when compared with the surrounding terrain and contributing drainage area (**Figure 4**, **Figure 5**).



Figure 3. Hot Springs Run flowing under 2849 Sam Snead Highway (left) and exiting behind the building and parking lot in the village center (right).

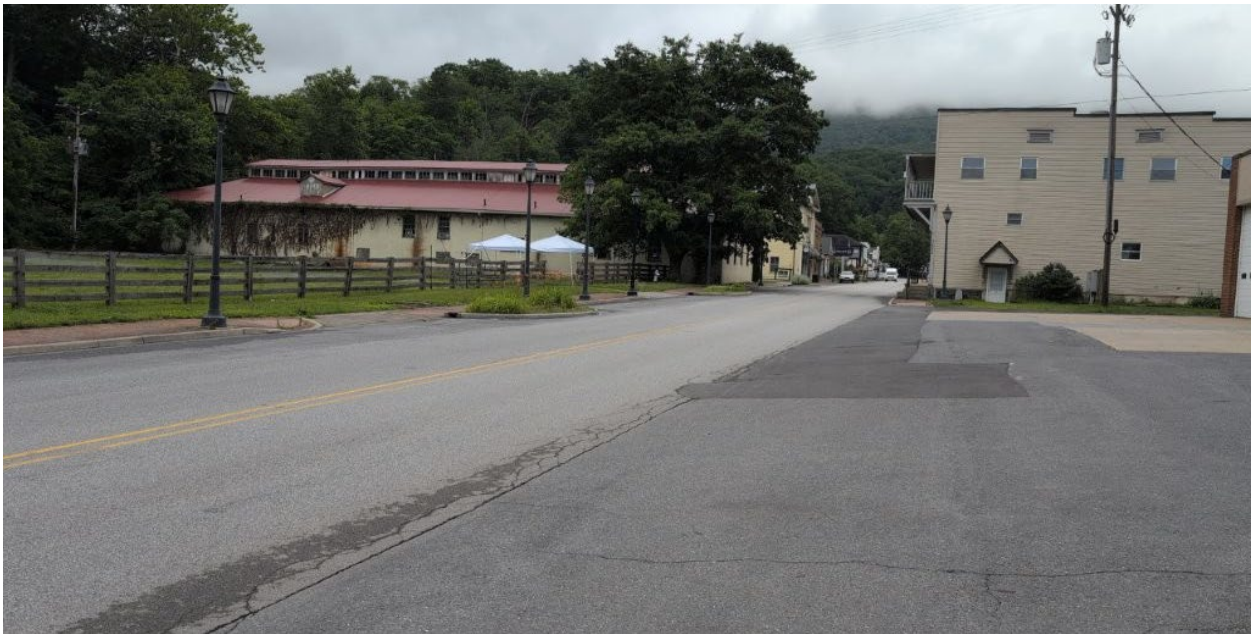

Figure 4. View of downtown Hot Springs along Main Street, facing southeast from the Fire Department.



Figure 5. View of downtown Hot Springs along Main Street, facing northwest from intersection of Main Street and US Route 220.

Conceptual Design and Planning-Level Cost Estimate

Given the number of unknowns in the stormwater system and the size of the contributing watershed(s), a stormwater utility survey and inspection and an H&H study should be performed on the corridor prior to any formal design or development of engineering solutions. This study would map existing stormwater conveyances, calculate the current capacity, and identify any obstructions or constrictions within the system. It is possible that development has increased over time without corresponding improvements to the existing stormwater conveyances, leaving the system inadequate to convey the design storm events. A comprehensive survey and H&H study will enable identification of sections of the stormwater system that may be undersized or have deteriorated. The County has also identified that stormwater pipes that run under Main Street often become clogged, likely worsening flood severity throughout the area. The H&H study could identify the locations that experience the worst sediment and debris buildup. A maintenance schedule could then be developed for the stormwater system to clear out these conveyances and remove obstructions. This maintenance would be in coordination with VDOT, as they are responsible for much of the infrastructure along Main Street, including bridges and culverts.

Existing Conditions Survey should include at a minimum:

1. Channel survey
    a. Cross sections
    b. Longitudinal profile (channel slope)
    c. Box culvert upstream of and channel under 2849 Sam Snead Highway
    d. Bridge at Sunset Hill Road
    e. Any other field-identified constrictions

   f. Location, type, size, condition of any identifiable stormwater outfalls into the channel
2. Stormwater infrastructure
   a. Location, type, size, and condition of existing stormwater infrastructure (curb inlets, drop inlets, culverts, etc.)
   b. Documentation of debris accumulation
3. Verification of water and sewer lines (GIS data provided on maps in this document identified as 2022)

Hydraulics and Hydrology Study should include at a minimum:

1. Quantification of baseflow (anticipate larger than StreamStats estimated baseflow due to spring flow)
2. Quantification of storm runoff flow for events of concern (2, 5, 10, 25, 50, 100-year storm) based on current land cover and up-to-date precipitation values
3. Assessment of stormwater system capacity based on survey data
4. Assessment of flood risk in Hot Springs for storm events of concern

Hot Springs is outside of the FEMA floodplain (1-1.5 miles upstream of mapped floodplain in Crowdertown – see **Figure 1**), which appears to have been mapped in 2009, though the FIS report was unavailable online to verify extent of the model. The contributing drainage area to the upstream extents of the mapped FEMA floodplain is estimated at 4.44 square miles (StreamStats), 68% of which is comprised of the north and south drainage areas (0.99 and 2.02 square miles, respectively) upstream of where downtown Hot Springs is situated in the gap in the ridge. While an update of the FEMA floodplain models may or may not be a worthwhile endeavor, a more tailored assessment of flood risk in Hot Springs could support and inform further flood resilience projects and initiatives in the area.

ITEM/DESCRIPTION	QTY	UNIT	UNIT COST	ITEM SUB-TOTAL	EXTENDED SUB-TOTAL
Design and Survey					**$75,000.00**
Existing Conditions Survey	1	LS	$35,000.00	$35,000.00	
H&H Study	1	LS	$40,000.00	$40,000.00	
Contingency (30%)					**$22,500.00**
TOTAL ESTIMATED BUDGET					**$97,500.00**

Recommended Next Steps

Pursue survey/mapping of existing infrastructure to ease maintenance and enable a desktop analysis of likely constrictions.

References

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