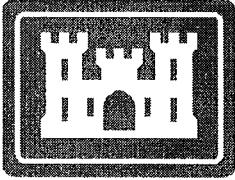




**MONTHLY WORK SESSION AGENDA
MONDAY WEDNESDAY OCTOBER 14, 2026, 7:00 P.M.
REMINGTON TOWN COUNCIL
105 E MAIN ST
REMINGTON, VA 22734**

- I. CALL TO ORDER, RECOGNITION OF TOWN COUNCIL, STAFF AND GUESTS**
- II. PLEDGE OF ALLEGIANCE**
- III. CITIZENS TIME**
- IV. TOPICS FOR DISCUSSION**
 - WEBSITE USE POLICY**
 - ELLERSLIE FARM**
 - STORMWATER FLOOD STUDY DRAFT**
 - PUBLIC WORKS TRAILER**
- V. CLOSED SESSION**
- VI. ADJOURNMENT**



STORMWATER FLOOD STUDY FOR THE TOWN OF REMINGTON, FAUQUIER COUNTY, VIRGINIA

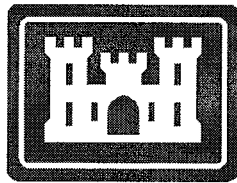


Prepared for: Town of Remington
105 East Main Street
Remington, Virginia 22734

Prepared by: U.S. Army Corps of Engineers, Norfolk District
803 Front Street
Norfolk, Virginia 23510

DRAFT SEPTEMBER 2026

**STORMWATER FLOOD STUDY
FOR THE TOWN OF REMINGTON,
FAUQUIER COUNTY, VIRGINIA**



Prepared for:

**Town of Remington
105 East Main Street
Remington, Virginia 22734**

Prepared by:

**U.S. Army Corps of Engineers, Norfolk District
803 Front Street
Norfolk, Virginia 23510**

**DRAFT
SEPTEMBER 2026**

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EXHIBIT 1: STORMWATER SYSTEM MAPPING





1 INTRODUCTION

1.1 BACKGROUND AND STUDY PURPOSE

The Town of Remington ("Remington"), Virginia, has experienced flooding on several primary roads during severe, localized storms. These storms are overloading the town's stormwater drainage network causing flooding in multiple areas within the town limits.

Remington has requested assistance from the U.S. Army Corps of Engineers (USACE, Norfolk District-NAO), to provide technical assistance in completing a stormwater flood study within the town limits. This study would provide Remington with a plan for reducing the risk of flooding from localized stormwater flooding to property owners and critical roadways within the study area. The two primary objectives of this study were to: 1) identify areas within the town that are prone to stormwater-related flooding and assess the existing vulnerabilities and 2) recommend measures to improve the existing stormwater system to manage flood impacts through infrastructure solutions.

1.2 STUDY AUTHORITY

This study was conducted by the USACE, NAO, under the Planning Assistance to States (PAS) program which is authorized by Section 22 of the Water Resources Development Act of 1974 (PL 93-251), as amended. The PAS program is designed to provide planning-level assistance to communities and partners for water resource related issues. Remington is an at-risk community as defined by Section 8119 of the Water Resources Development Act (WRDA) 2022. This designation waived the cost sharing requirements of the PAS program. The study is planning level only. This investigation will not result in detailed design or construction. It is the intent of the study to provide recommendations and concept-level measures that the town can use as a springboard to pursue design/construction projects from either federal, state, and local programs or from qualified engineering firms.

1.3 STUDY AREA

The study area for this investigation is Remington in Fauquier County, Virginia (Figure 1.1). Remington, with a population of approximately 650 people, is located along the U.S. Route 15 corridor, on the west bank of the Rappahannock River. The town, approximately 0.2 square miles in size, has a mix of commercial and residential land use. The stormwater infrastructure in Remington consists of open drainage ditches in the residential areas and a closed (underground) system in the commercial downtown areas.

1.4 DATA SOURCES

Data was collected from various federal, local, and private entities to support the analyses in this investigation (Table 1.1). The data includes, but not limited to, Geographic Information System (GIS) data, subdivision as-built plans, and terrain data. For terrain data, a project digital elevation model (DEM) dataset was created for this investigation using United States Geological Survey (USGS) Light Detection and Ranging (LiDAR) flown by Sanborn Map Company, Inc. in 2022. The data was published in 2024. This high-resolution dataset was mosaicked and resampled to a 1-meter (approximately 3-ft.) resolution and was used to delineate drainage areas for the flood modeling, for use for ground elevations for 2D flood modeling, and to establish baseline ground conditions for the development of flood risk management measures. This dataset was the most recent, highest-resolution digital elevation data available at the onset of this investigation and is in the North American Datum of 1983 (NAD83) State Plane Virginia North horizontal datum and the North American Vertical Datum of 1988 (NAVD88) vertical datum.



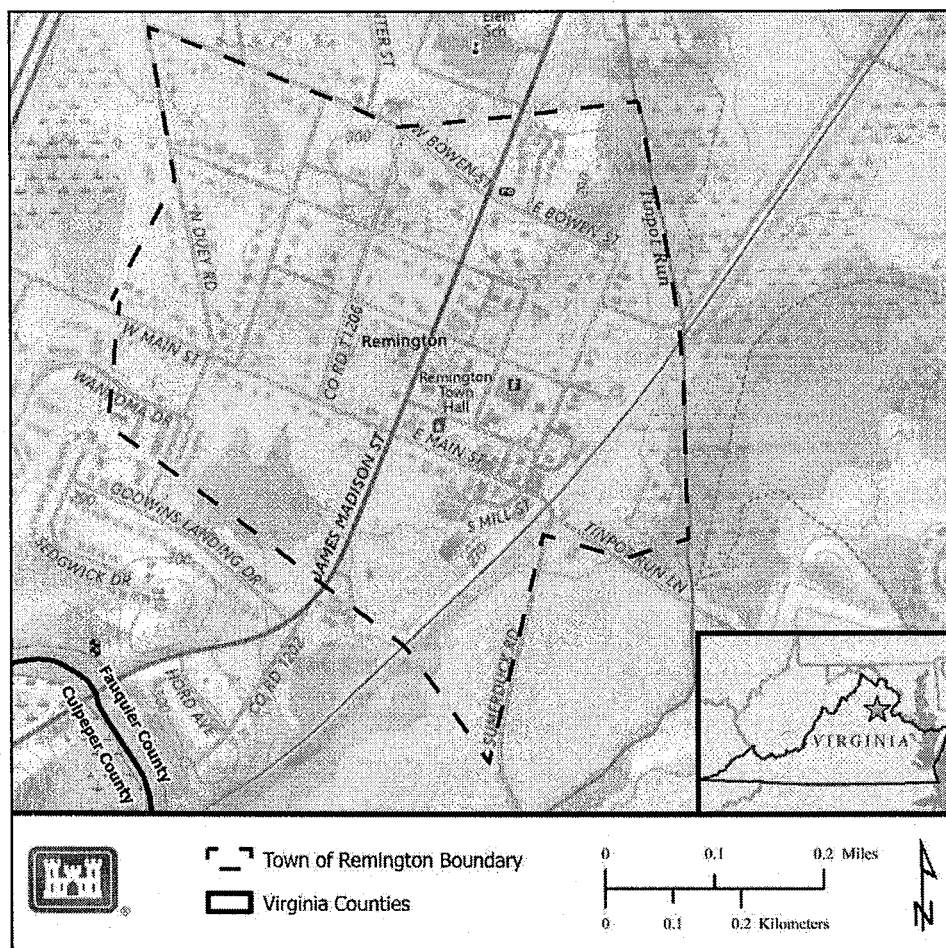


FIGURE 1.1: STUDY AREA-TOWN OF REMINGTON

TABLE 1.1: DATA COLLECTED

Data	Source	Use
Photographs of flood areas (date unknown)	Town of Remington Public Works	Identify and confirm flood areas and calibrate/verify models.
GIS Data	Fauquier County GIS Department	Modeling, mapping, and analysis
Subdivisions Plans- Rappahannock Landing	Fauquier County Community Development	Confirm stormwater system layout and drainage patterns
Terrain Data	USGS (2022)	Modeling, mapping, and analysis
Land Cover Data (2017-2018)	Chesapeake Conservancy	Modeling and analysis
Soil Data	Natural Resource Conservation Service (NRCS)	Modeling and analysis



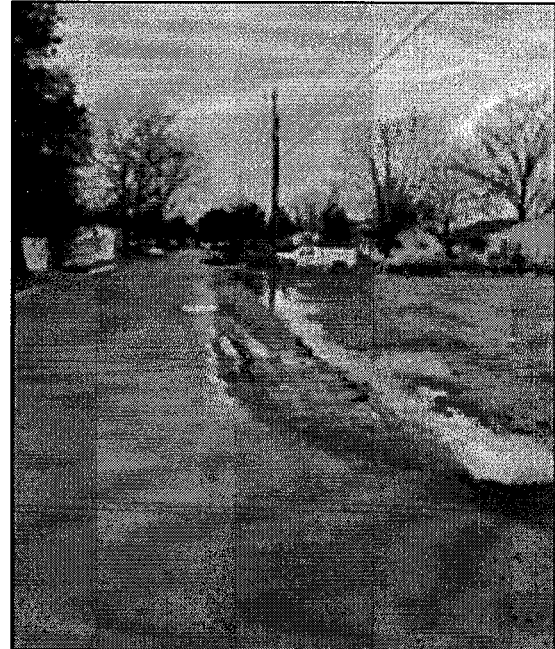
1.5 STORMWATER FLOODING FOCUS AREAS

At the onset of this study, Remington officials identified four focus areas where stormwater flooding occurs. These stormwater flooding focus areas include (1) North Dewey Road, (2) Franklin Street, (3) Main and Franklin, and (4) West of Norfolk Southern Railroad. The location of these stormwater flooding focus areas is shown on Figure 1.2, with photographs showing the flooding in Figure 1.3. Much of the stormwater flooding in Remington is the shallow ponding of water along streets and drainage ditches.



FIGURE 1.2: STORMWATER FLOODING FOCUS AREAS





TYPICAL DITCH FLOODING IN FOCUS AREAS 1 AND 2



STORMWATER FLOODING IN FOCUS AREA 3

FIGURE 1.3: FLOODING IN THE STORMWATER FLOODING FOCUS AREAS



During this USACE study, USACE was contacted by the Virginia Department of Transportation (VDOT) in June 2026 regarding their proposed stormwater improvements along Franklin Street. These improvements are to mitigate flooding in Focus Area 2 (Franklin Street), Focus Area 3 (Main and Franklin), and may also impact Focus Area 4 (West of Norfolk Southern Railroad). VDOT's plan for the stormwater system improvements is shown on Figure 1.4.

The VDOT plan for Franklin Street is a three-phase drainage improvement effort that is targeted to be completed by 2030. The overall intent of the VDOT project is to replace and improve the existing stormwater network along Franklin Street, extending from the stormwater system outfall location upstream to Marshall Street and to obtain easements to install and maintain the part of the network that is currently outside of the VDOT Right of Way (ROW). The VDOT study has the focus of addressing capacity, condition, and drainage concerns. At this time of this USACE study, VDOT is still in the early stages of project development and is working through survey, drainage analysis, and easement needs.

The VDOT project is divided into three phases: Phase 1 is focused on addressing flooding concerns near the intersection of North Franklin Street and East Main Street. Phase 2 is drainage and pedestrian improvements. Phase 2 includes continued drainage upgrades along with significant sidewalk and Americans with Disabilities Act (ADA) improvements. Phase 3 will include additional drainage, sidewalk, and ADA improvements further north along North Franklin Street.

To avoid duplicating VDOT's effort, the scope of this study was changed to determine a plan for reducing the risk of flooding from localized stormwater flooding in Focus Area 1 and Focus Area 4 only. Therefore, recommended measures to improve the existing stormwater system to manage flood impacts through infrastructure solutions will only be determined for Focus Area 1 and Focus Area 4 in this USACE study.





FIGURE 1.4: VDOT PLAN FOR FRANKLIN STREET FLOODING

(DASHED BLACK LINES ARE PIPE IMPROVEMENTS; DASHED YELLOW LINE IS NEW PIPE; RED BOX IS THE OUTFALL; PINK BOXES ARE NEW INLETS; RED DOTS ARE STORMWATER FLOODING FOCUS AREAS. GRAPHIC PROVIDED BY VDOT AND NOT TO SCALE)



2 FIELD SURVEYS

Field surveys were completed by USACE staff to support the hydrologic and hydraulic analyses in this investigation. All survey activities employed relative positioning techniques, achieving horizontal and vertical accuracies typically within ± 2 centimeters. More specifically, Real-Time Kinematic (RTK) Global Positioning System (GPS) techniques were used. The Trimble R12 GNSS (Global Navigation Satellite System) unit was utilized to perform field surveys. The collected survey points are in NAD83 State Plane Virginia North horizontal datum and the NAVD88 vertical datum (GEOID18).

2.1 STORMWATER FIELD SURVEY

A stormwater system survey and assessment were completed in September 2025 for the entire Town of Remington, including private driveways. The objective was to complete comprehensive mapping layers of the stormwater conveyance system to (1) determine the location of existing stormwater infrastructure; (2) assess the overall condition of the existing stormwater infrastructure (excluding underground pipes); and (3) collect data to support hydrologic and hydraulic modeling.

2.1.1 METHODOLOGY

Stormwater structures in Remington include curb inlets, grate inlets, manholes, pipe inlets, pipe outlets, and underground junctions (Figure 2.1). Pipes inlets and outlets are locations where open channel flow enter or exit a closed stormwater system or culvert at a roadway or driveway, and underground junctions are defined as areas where two or more pipes meet underground, without a surface manhole for access.

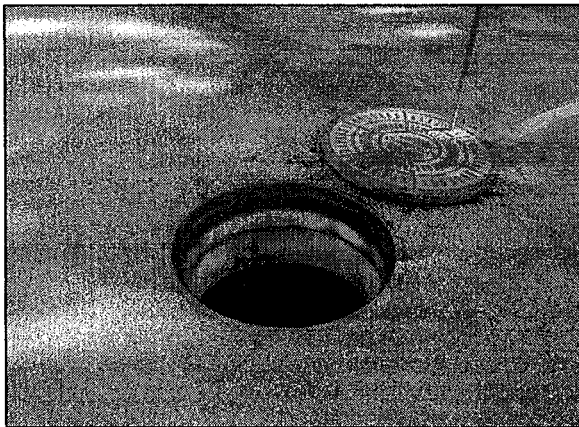
For stormwater structures, the geographic location and invert elevations were determined by taking a survey point at the top of the structures or the top of the headwall for pipe inlets and outlets. Distance measurements were made from the surface to any inside piping of the structures using a tape measure or stadia rod and the inverts of the internal pipes were determined by subtraction. For structures that had a sump lower than entering/exiting pipes, the sump elevation was also determined by this methodology.

The location and information on the stormwater pipes, such as shape, material, size, elevations, and slope, were derived from data compiled for the stormwater structures. At underground junctions and structures that were blocked or unable to be accessed where information for the pipes could not be obtained, the location was assumed, the top elevation was taken from the project DEM, and the invert elevations of the pipes were interpolated from the upstream and downstream structures. For the stormwater system assessment, stormwater inlets were assessed for both physical condition and conveyance condition. The stormwater structures were categorized as being in good, fair, poor, or unknown condition. Table 2.1 defines the condition categories for each stormwater structure.

2.1.2 CONNECTIVITY LAYER

Data collected from the stormwater system survey were used to develop comprehensive mapping of the connectivity of the stormwater system in Remington. The mapping was completed in a GIS platform, as separate shapefiles for stormwater structures (points) and stormwater pipes (lines). Each data point or line is complete with *attribution*. Attribution is the data collected during the stormwater system survey and assessment for each individual stormwater structure and stormwater pipe. There are several fields within the attribution table for each data point or line. A *field* is a specific piece of data for each individual data

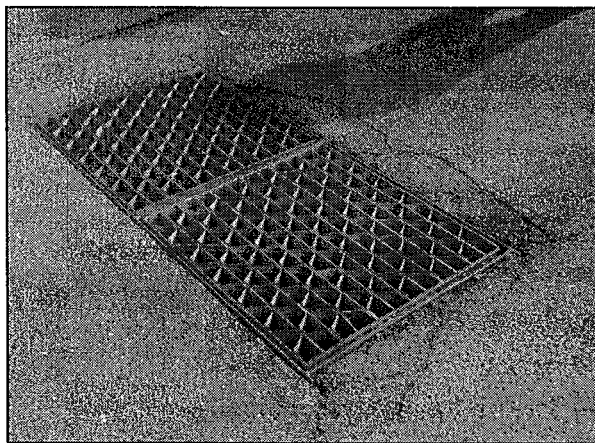




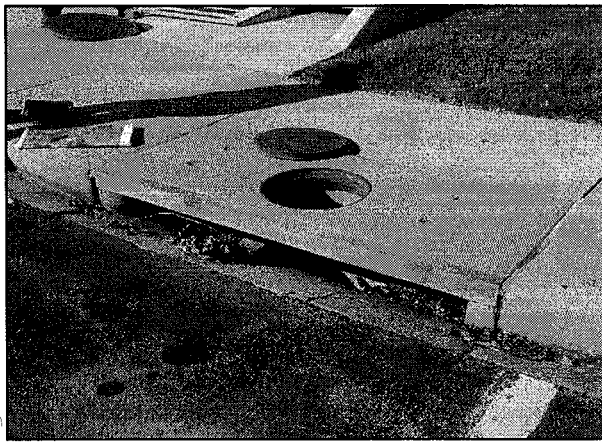
MANHOLE



PIPE INLET/OUTLET



GRATE INLET



CURB INLET

FIGURE 2.1: TYPES OF STORMWATER STRUCTURES IN REMINGTON**TABLE 2.1: STORMWATER STRUCTURE CONDITION CATEGORIES**

Assessment	Condition			
	Good	Fair	Poor	Unknown
Physical	No deterioration of precast or cast-in place material.	Minor deterioration of precast or cast-in place material (i.e. cracks, slumping, rusting).	Major deterioration of precast or cast-in place material (i.e. cracks, slumping, rusting).	Structure could not be accessed due to physical condition such as paved or rusted-in manholes or heavy vegetation.
Conveyance	Minimal or no debris, vegetation, and/or silt reducing conveyance of stormwater flow.	Structure contains debris, vegetation, or silt causing a 10%-50% blockage that hinders stormwater flow.	Structure contains debris, vegetation, or silt causing a greater than 50% blockage that hinders stormwater flow.	Structure could not be accessed due to physical condition such as paved or rusted-in manholes or heavy vegetation.



point or line. The fields were developed to correspond to the specific information collected during the survey and assessment. These shapefiles are provided in the project folder deliverable, accompanied with a photograph of each stormwater structure where able to be obtained.

Prior to the stormwater system survey, a random "Field ID" was assigned to each stormwater system feature to assist with the survey. The Field ID was a random number and was developed for the sole purpose of guiding the field team throughout the survey process. Once the stormwater system survey was complete, a "Permanent ID" was assigned to each stormwater feature in a logical alphanumerical order. For this study, all stormwater structures were assigned a Permanent ID that begins with the letter of the outfall to which they flow. In Remington, there are 14 outfalls (Table 2.2 and Figure 2.2). These outfalls were assigned the Permanent ID of A through M and another outfall named SJMS. The structures were then assigned a number based upon the location upstream from the outfall. For instance, Structure H50 is a stormwater structure that is within the Outfall H system. Structure B15 is a stormwater structure that is within the Outfall B watershed, and Structure B20 is also located in the Outfall B watershed, but further upstream.

Stormwater pipes were named based upon the stormwater structures in which they are flowing to and from. For example, a stormwater pipe between Structure C9 and Structure C8 has the Permanent ID of C9-C8. For stormwater pipes that connect to the system directly from a building, the Permanent ID begins with the abbreviation BLDG. Pipes that are assumed abandoned begin with the abbreviation ABDN.

TABLE 2.2: STORMWATER OUTFALL DESCRIPTIONS IN REMINGTON

Outfall	Drainage Area (acres)	Description
A	3.9	18" Circular Concrete Pipe Projecting from Fill
B	8.4	15" Circular Concrete Pipe in Concrete Headwall
C	12.3	15" Circular Concrete Pipe Projecting from Fill
D	86.8	53" x 43" Elliptical Concrete Pipe in Concrete Headwall
E	3.9	21" Circular Concrete Pipe Projecting from Fill
F	1.1	21" Circular Concrete Pipe in Concrete Headwall
G	40.5	30" Circular Terra Cotta Pipe Projecting from Fill
H	14.3	21" Circular Corrugated Metal Pipe Projecting from Fill
I	7.2	21" Circular Corrugated Metal Pipe Projecting from Fill
J	4.3	15" Circular Corrugated Metal Pipe Projecting from Fill
K	14.4	24" Circular Terra Cotta Pipe Projecting from Fill
L	0.8	15" Circular HDPE Pipe Projecting from Fill
M	3.8	8" Circular Concrete Pipe Projecting from Fill
SJMS	12.1	4.0' x 3.0' Concrete Box in Concrete Headwall





FIGURE 2.2: STORMWATER OUTFALLS AND WATERSHEDS IN REMINGTON

2.1.3 SUMMARY OF MAPPING AND ASSESSMENT RESULTS

The purpose of this section is to provide data on the existing stormwater system in Remington. Maps showing the location of the existing stormwater system are included as Exhibit 1.

STORMWATER STRUCTURES

At the time of this study, there are a total of 397 stormwater structures in Remington. 38-percent are pipe inlets, 38-percent are pipe outlets, 7-percent are curb inlets, 10-percent are grate inlets, 3-percent are manholes, and 4-percent are underground junctions (Figure 2.3).

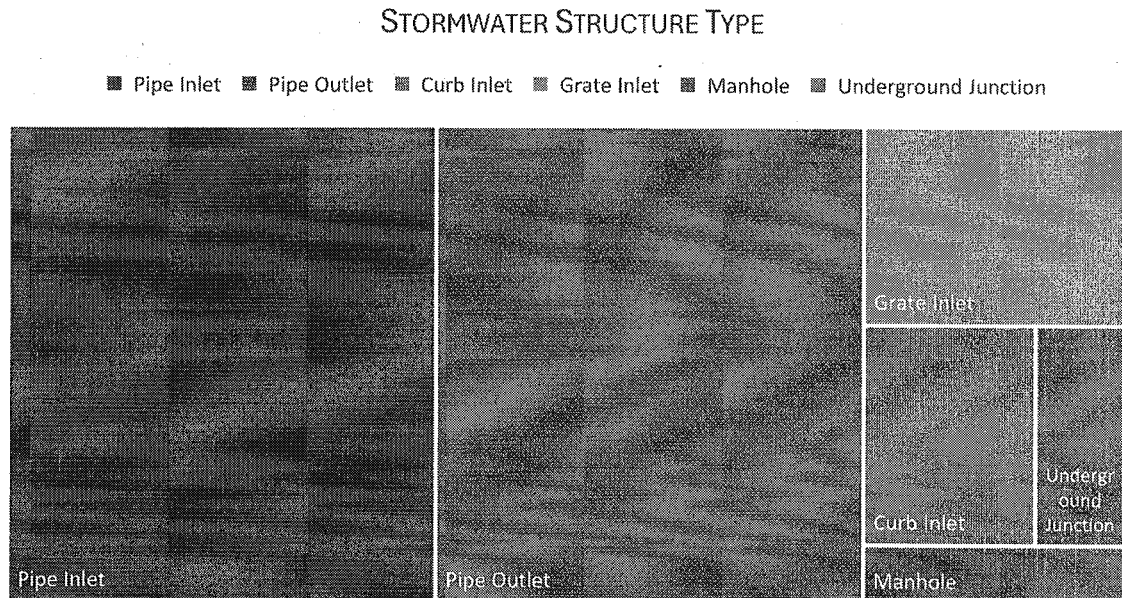


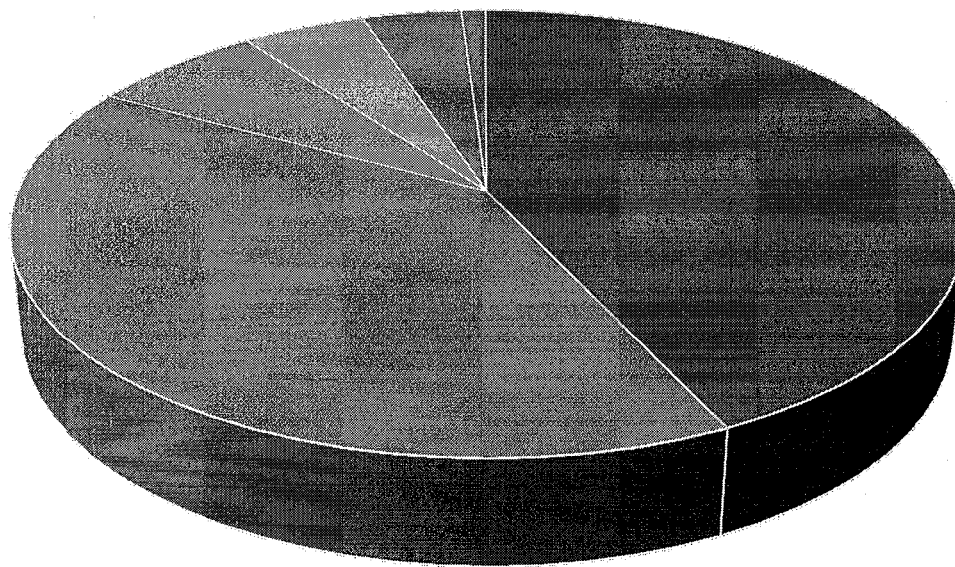
FIGURE 2.1: STORMWATER STRUCTURE TYPES IN REMINGTON

At the time of the survey, the existing stormwater system in Remington is in fair to good condition. Of the 397 stormwater structures, 58-percent were assessed as being in fair condition, and 36-percent were noted to be in good condition (See Table 2.2). The remainder of the structures were assessed as being in poor condition (2-percent) and unknown (4-percent) condition (underground junctions that could not be assessed). The physical condition issues include erosion, while the primary conveyance condition issues include blockage by debris and sedimentation. The results of the stormwater survey can be used by the Remington to identify those stormwater structures that require maintenance.

STORMWATER PIPES

There are approximately 13,327 linear feet (2.5 miles) of existing stormwater piping in Remington. Approximately 43-percent is corrugated metal piping (CMP) and 40-percent is reinforced concrete (RCP). The remaining 17-percent of the piping consists of 7-percent of smooth high-density polyethylene (HDPE), 4-percent of polyvinyl chloride (PVC), 5-percent of terra cotta piping, and less than 1-percent of cast iron piping (Figure 2.4).





■ CMP ■ Concrete ■ Smooth HDPE ■ Terra Cotta ■ PVC ■ Cast Iron

FIGURE 2.2: STORMWATER PIPE MATERIAL IN REMINGTON

The actual internal condition of the stormwater piping could not be determined within the scope of this stormwater system survey. Only the portions of the pipes at the stormwater structures could be assessed. To obtain data on the internal condition of the stormwater pipes, CCTV (Closed Circuit Television) would be required. CCTV is the insertion of a video camera into the stormwater pipe to inspect for any collapses or blockages. CCTV inspection was outside the scope of this investigation.



3 STORMWATER FLOODING ANALYSIS

The stormwater modeling for Remington was performed in an advanced modeling software, PCSWMM, Version 7.7.3910, to identify the potential causes of stormwater flooding in the four flooding Focus Areas (see Figure 1.2). SWMM is a spatial decision support system for water management modeling, which utilizes the Storm Water Management Model 5 (SWMM5) computational engine (Computational Hydraulics, Inc., 2024). SWMM5 is maintained by the Environmental Protection Agency (EPA) and has been approved by numerous federal and state agencies for conducting mapping, modeling, and analysis.

The SWMM5 engine allows for the simulation of runoff quantity for drainage systems. SWMM5 contains a flexible set of hydraulic modeling capabilities used to route runoff and external inflows through a link-node drainage system network comprised of pipes, channels, storage/treatment units, diversion structures, and other hydraulic structures. It utilizes sophisticated graphical tools together with associated GIS data and can be used to model the full hydrologic cycle from stormwater flow to simulation of the hydraulics in any combined system of open and/or closed conduits with any boundary condition.

The model was run for three existing-conditions design storms, including the 50% annual chance (2-year, 24-hour) storm, the 10% annual chance (10-year, 24-hour) storm and the 1% annual chance (100-year, 24-hour) storm. This report focuses on the results of the 10 annual chance (10-year) storm.

3.1 HYDROLOGIC INPUT

The SWMM5 Runoff Non-linear Reservoir Method was utilized for the hydrologic computations in the PCSWMM model. For this method, the development of hydrologic data is required. This data includes drainage area to each inlet, drainage area width and slope, percent impervious area, and infiltration data. Precipitation data and control specifications are also required for a successful simulation.

DRAINAGE BASINS

The project DEM discussed in Section 1.4 was used to delineate the drainage basins to each stormwater inlet (in addition, manholes that directly receive building drainage have drainage basins delineated). The drainage basins are shown in Figure 3.1. Width and slope for each drainage basin were calculated utilizing a GIS routine. The total drainage area of stormwater system impacting Remington is approximately 213.8 acres.

LAND COVER

The most recent, high-resolution land cover dataset available for the study area (2017-2018) was obtained from the Chesapeake Conservancy. Percent impervious area for each drainage basin was calculated using this dataset and was utilized within the model for land cover inputs. A map showing the existing-conditions land cover (impervious and pervious) data for the study area is shown in Figure 3.2. In total, the watersheds impacting the stormwater system in Remington contain approximately 53.0 acres of impervious land, which is 24.8-percent.

SOILS DATA

The Horton Infiltration Method was used within PCSWMM to model infiltration using the current Natural Resources Conservation Service (NRCS) soils data as a basis for the setting of infiltration parameters (Figure 3.3). The Horton Infiltration Method requires the input of numerous infiltration parameters, including: depression storage, Mannings "n", zero detention percentage, maximum infiltration rate,



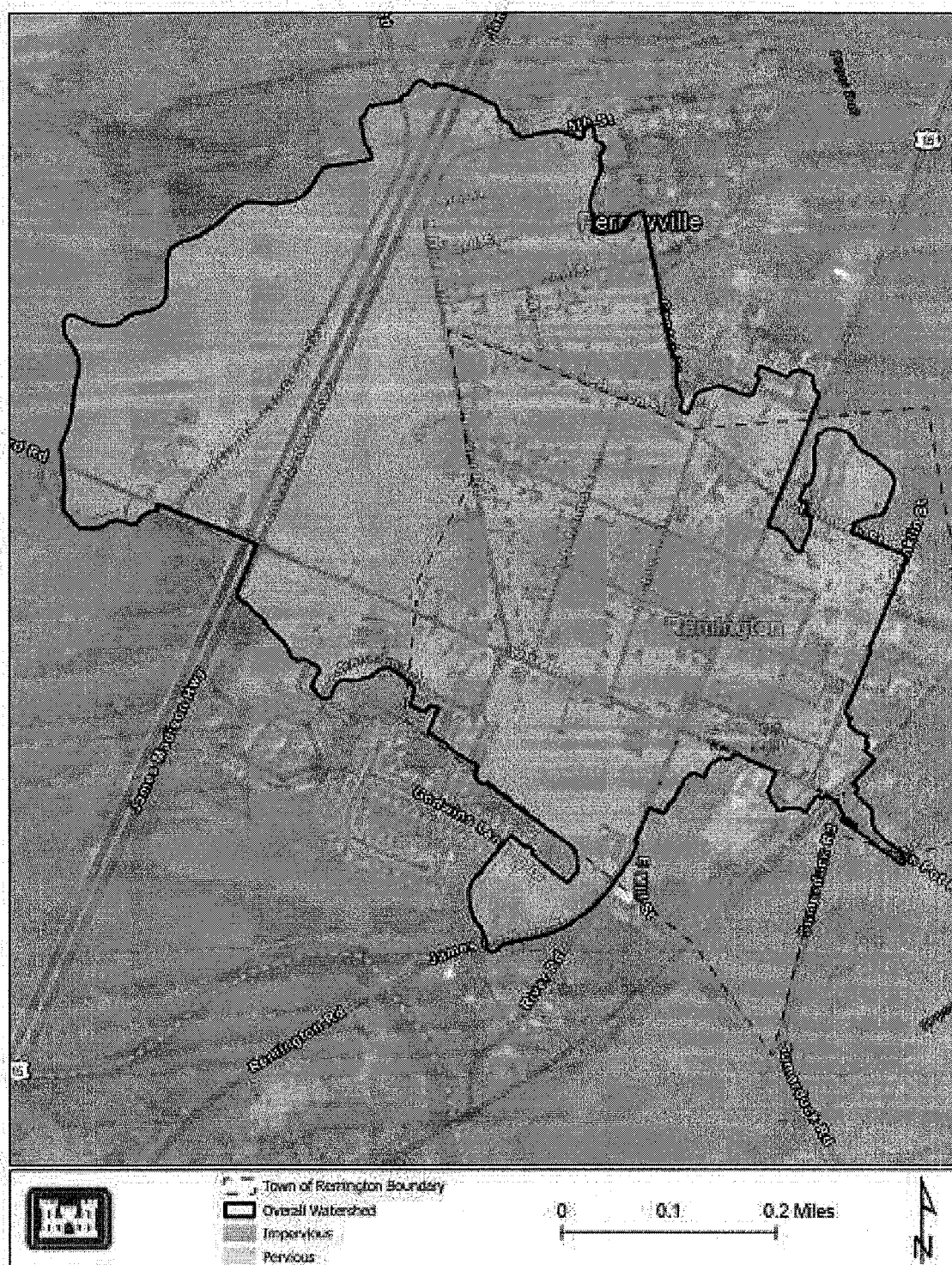


FIGURE 3.2: LAND COVER IN REMINGTON STORMWATER MODEL



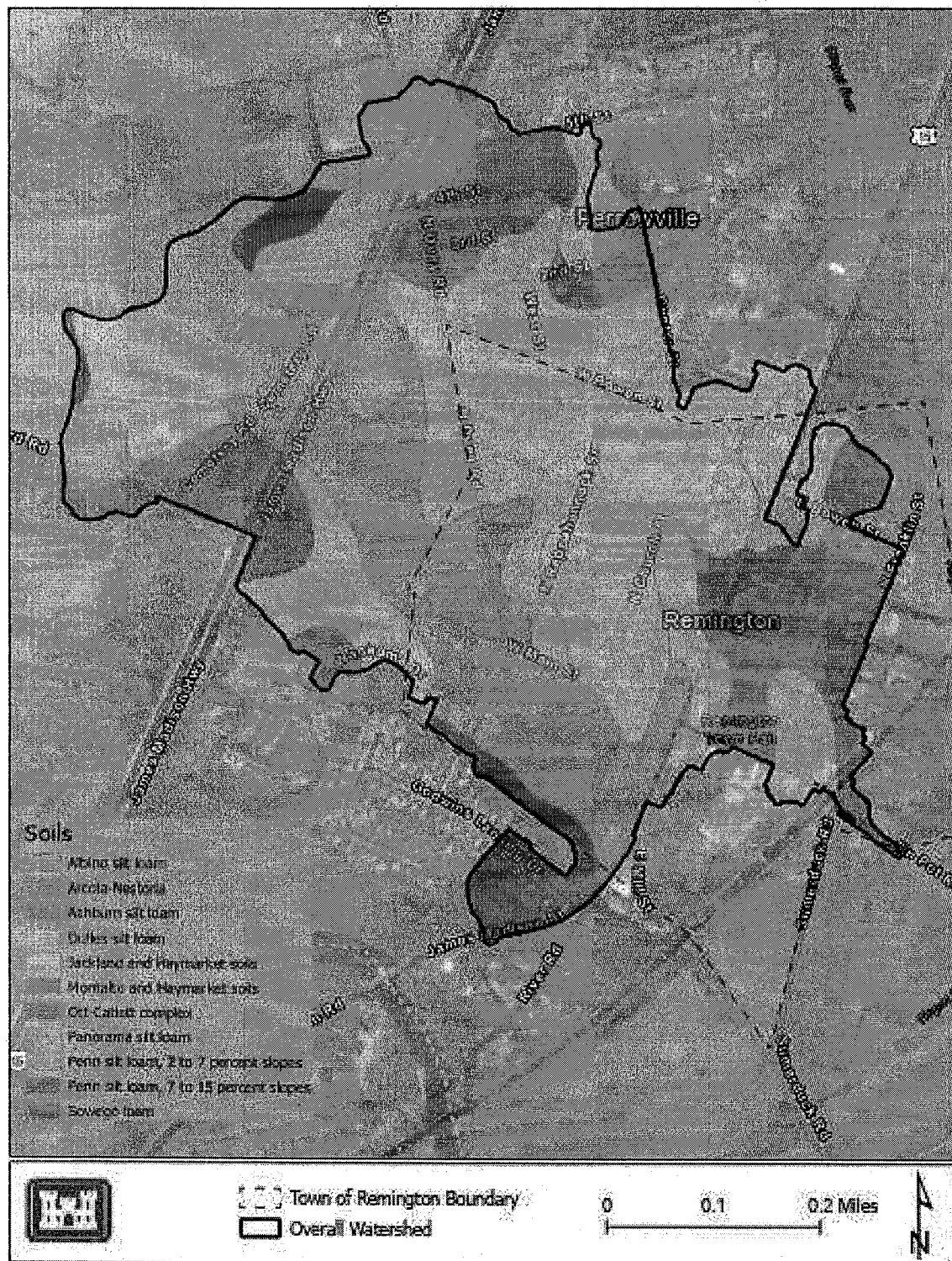


FIGURE 3.3: SOILS IN REMINGTON STORMWATER MODEL



minimum (asymptotic) infiltration, decay rate of infiltration, and maximum infiltration volume (Table 3.1). Most soils within Remington are classified as loams and silt loams, and the Horton infiltration parameters were selected to represent these soil types.

TABLE 3.1: HORTON INFILTRATION PARAMETERS

Variable	24-Hour Run Values
Depression Storage-Impervious	0.05 in
Manning's "n"-Impervious	.01
Depression Storage-Pervious	.05 in
Manning's "n"-Pervious	.10
Zero Impervious %	25.0%
Max Infiltration Rate (Fo)	1.0 inches/hour
Min (Asymptotic) Infiltration	0.03-0.08 inches/hour
Decay Constant	3.0 inches/hour
Maximum Infiltration Volume	0.0 in

3.2 HYDRAULIC INPUT

PCSWMM models both hydrology and hydraulics simultaneously. The hydraulic input required for the model is the stormwater infrastructure data discussed in Section 2.

STORMWATER STRUCTURES AND PIPES

Stormwater structures and pipes GIS data were uploaded into the PCSWMM hydraulic model. The model was first run in a one-dimensional environment to assure the model was running correctly and to identify any warnings or errors in the model. It was assumed that all pipes are flowing free at full capacity (no blockages) in the modeling.

TWO-DIMENSIONAL GRID

To develop the two-dimensional (2D) portion of the PCSWMM model, the digital elevation model (DEM) was imported and used to generate the 2D computational domain. A variable cell size of 5-20 feet was applied across the 2D mesh to balance model accuracy with computational efficiency, with smaller cells used in areas of complex topography and larger cells in uniform terrain (Figure 3.4). Overland roughness (Manning's *n*) values were assigned to represent surface resistance based on land use characteristics. The *n*-values were obtained from the PCSWMM User's Manual (Computational Hydraulics, Inc., 2024), which references the *U.S. Army Corps of Engineers Flood Runoff Analysis – Engineering Manual (EM 1110-2-1417)*. Manning's *n* values varied from 0.014-0.4 for the 2D mesh, consistent with the developed nature of the study area and some forested cover.





FIGURE 3.4: 2D MESH FOR REMINGTON PCSWMM MODEL

3.3 PRECIPITATION DATA

For this investigation, annual maximum precipitation data for the storms modeled in this study were taken from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3 (NOAA, 2006). A summary of the design storms that were modeled, along with the total precipitation in inches for each storm, is shown in Table 3.2.



TABLE 3.2: DESIGN STORMS FOR THE REMINGTON STORMWATER MODEL

Storm Event (24-Hour)	NOAA Atlas 14 Rainfall Depth
50% annual chance (2-year)	3.16 inches
10% annual chance (10-year)	4.84 inches
1% annual chance (100-year)	8.27 inches

3.4 CONTROL SPECIFICATIONS

Control specifications are required in the PCSWMM model to indicate the timeframe of the simulation being performed. For all design storms, the control specifications were set randomly from 2/15/2026 at 12:00 (12:00 PM EST) to 2/16/2026 at 12:00 (12:00 PM EST) to simulate a synthetic 24-hour storm. A 0.25-second time step was used for the 2D modeling for all design storms.

3.5 MODEL RUNS AND RESULTS

The PCSWMM model was run for the three existing-conditions design storms using the infiltration parameters from Table 3.1, precipitation data shown in Table 3.2 and the control specifications outlined in Section 3.4. The downstream boundary condition for all outfalls was set as “free outfall”, as the purpose of this study is determining inefficiencies in the existing stormwater system in Remington and not flooding from riverine sources (Tinpot Run and Rappahannock River). The probability of flooding on the rivers at the same time as stormwater flooding is low. Flooding from Tinpot Run and the Rappahannock does occur in Remington, however.

The results of the stormwater modeling show that the focus areas are at risk of shallow depth, low velocity stormwater flooding during a 10% annual chance (10-year, 24-hour) storm (Figures 3.5), to varying degree. Significant flooding in any of the focus areas did not occur during a 50% annual chance (2-year, 24-hour) storm. An assessment of the flooding in the focus areas is described in Table 3.3.

TABLE 3.3: STORMWATER FLOODING ASSESSMENT IN REMINGTON

Stormwater Flooding Focus Area	Area Description	Stormwater Flood Risk Assessment
1	North Dewey Road	Up to 1.0 feet of flooding in the open ditches during a 10-year storm and up to 1.5 feet in the open ditches for a 100-year storm. Buildings are not impacted.
2	Franklin Street	Up to 1.0 feet of flooding in the open ditches during a 10-year storm and up to 1.5 feet in the open ditches for a 100-year storm. Buildings are not impacted.
3	Main and Franklin	Up to 0.5 feet of shallow, sheet flow flooding on the roadway for a 10-year storm and up to 1.0 feet of shallow, sheet flow flooding on the roadway for a 100-year storm. Buildings are not impacted.
4	West of Norfolk Southern Railroad	Ponding of water up to 6.0 ft. west of the railroad for 10-year storm. Minimal impact to buildings and roadways.



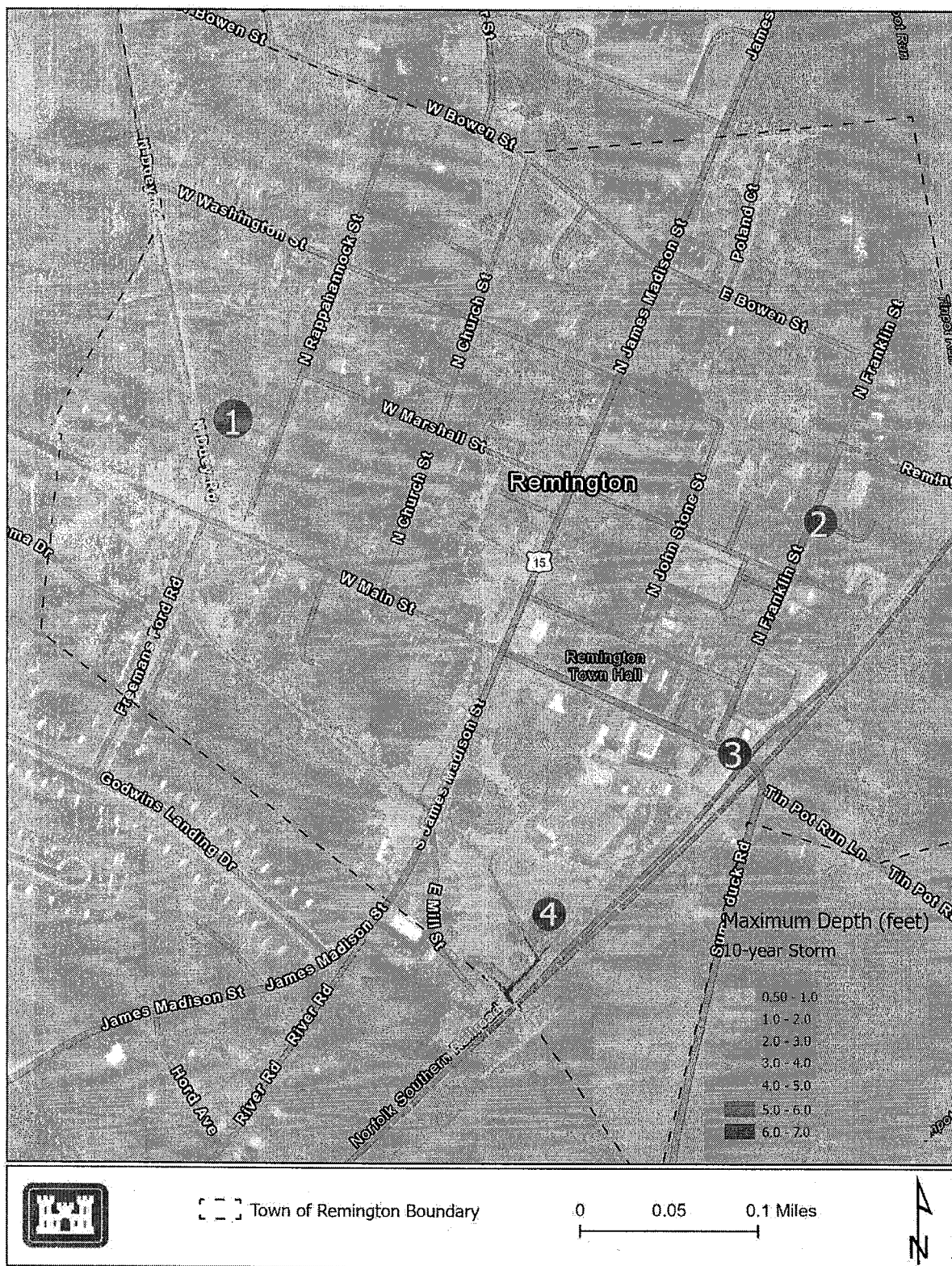


FIGURE 3.5: EXISTING CONDITIONS RESULTS-10 YEAR STORM



There is insufficient data available to calibrate and verify the stormwater modeling. The data required would be rainfall data and high-water marks for a particular storm event; however, the results of the stormwater modeling match well with the observed flooding shown in Figure 1.3 for Focus Areas 1 and 3.

Modeling was completed for existing-conditions land use only. Based upon current land use, the Town of Remington is essentially built out and there are no large-scale developments planned within the Town limits that would impact stormwater-related flooding. In Fauquier County, however, the land along the U.S. Route 15 corridor is currently zoned RA (to the west of U.S. Route 15) and R-4 (to the east of U.S. Route 15). RA is a rural agricultural designation, and it allows low-density residential development under specific guidelines to preserve rural character. R-4 is a residential, 4 dwelling units/acre designation. This potential future development impacts primarily Watershed D (see Figure 2.2). It is anticipated that the potential new developments will not impact stormwater flooding in Remington as all development must comply with Virginia Stormwater Management Program (VSMP) regulations, which are managed by the Virginia Department of Environmental Quality (DEQ). These regulations specify that runoff and flows in areas downstream of the new developments must not increase and should be managed using stormwater best management practices (BMPS) for stormwater quantity control.



4 STORMWATER FLOOD RISK MANAGEMENT MEASURES

The results of the PCSWMM modeling were used to determine potential causes of stormwater flooding in Remington and develop measures that would reduce the overall risk of stormwater flooding. For Focus Areas 1 and 2, the system of open ditches that convey stormwater flooding allows the ponding of water within the ditches, with minimal impact to roadways. For Focus Area 3, stormwater flooding is a result of insufficient capacity to route the stormwater. The system surcharges out of the inlets and onto the roadway. For Focus Area 4, stormwater flooding, though minimal, is a result of back-up of stormwater behind a bridge under the Norfolk Southern Railroad. Mitigation measures for Focus Areas 2 and Focus Area 3 are being developed by VDOT, as described in Section 1.5 of this report. VDOT's plan may also impact Focus Area 4 to some degree.

4.1 FOCUS AREA 1-NORTH DEWEY ROAD

The results of the PCSWMM modeling for the 10% annual chance (10-year) storm for Focus Area 1 is shown in Figure 4.1. Using the results of the PCSWMM modeling, stormwater flood risk management measures for Focus Area 1 were developed to reduce or eliminate the risk of stormwater flooding for the existing-conditions 10% annual chance (10-year), 24-hour storm. This is consistent with guidance in the VDOT Drainage Manual, published in June 2025. Possible types of projects in Focus Area 1 considered included:

- Stormwater management in the upland watersheds to provide quantity (flood) management. This measure was ruled out as there is not enough open space in the watershed to provide stormwater quantity management.
- Upsize and/or parallel existing infrastructure (pipes, inlets, culverts) to add capacity or the addition of stormwater infrastructure (inlets or manholes).
- Overland safe conveyance of larger storms using swales/channels and possibly berms.
- Curb and gutter improvements to provide sufficient curb reveal to safely convey flows in street.

Through an iterative analysis using the PCSWMM model, the installation of a new curb and gutter system is the preferred measure to reduce the flood risk along North Dewey Road for a 10% annual chance (10-year), 24-hour storm. Consideration for a "no action" measure could also be explored. With the "no action" measure, stormwater system improvements would not be made. Up to 1.0 feet of flooding would still occur for a 10% annual chance (10-year) storm in open drainage ditches along North Dewey Road. In the existing-conditions, buildings are not impacted by the flooding, and North Dewey Road is still passable.

This measure for Focus Area 1 is similar to the improvements proposed by VDOT for Franklin Avenue. It would entail the installation of approximately 2,200 linear feet of gutters (Figure 4.2) and 18 new combinations inlets (Figure 4.3). For piping, the PCSWMM model was used to determine that all piping, 2,200 linear feet of it, should be 18" round HDPE piping.

This system would run from 3rd Street south to West Main Street on North Dewey Road (Figure 4.4-4.6). The existing stormwater system would tie into the existing stormwater system at West Washington Street. The improved system would then tie into the existing stormwater system at a 24" concrete pipe on West Main Street.

Based upon previous USACE studies, the estimated cost for this measure is \$950,000. This estimate is planning level only and is subject to change pending further design and/or study. The cost includes all labor and material for installation and resurfacing of the roadway as well as a 50-percent contingency to



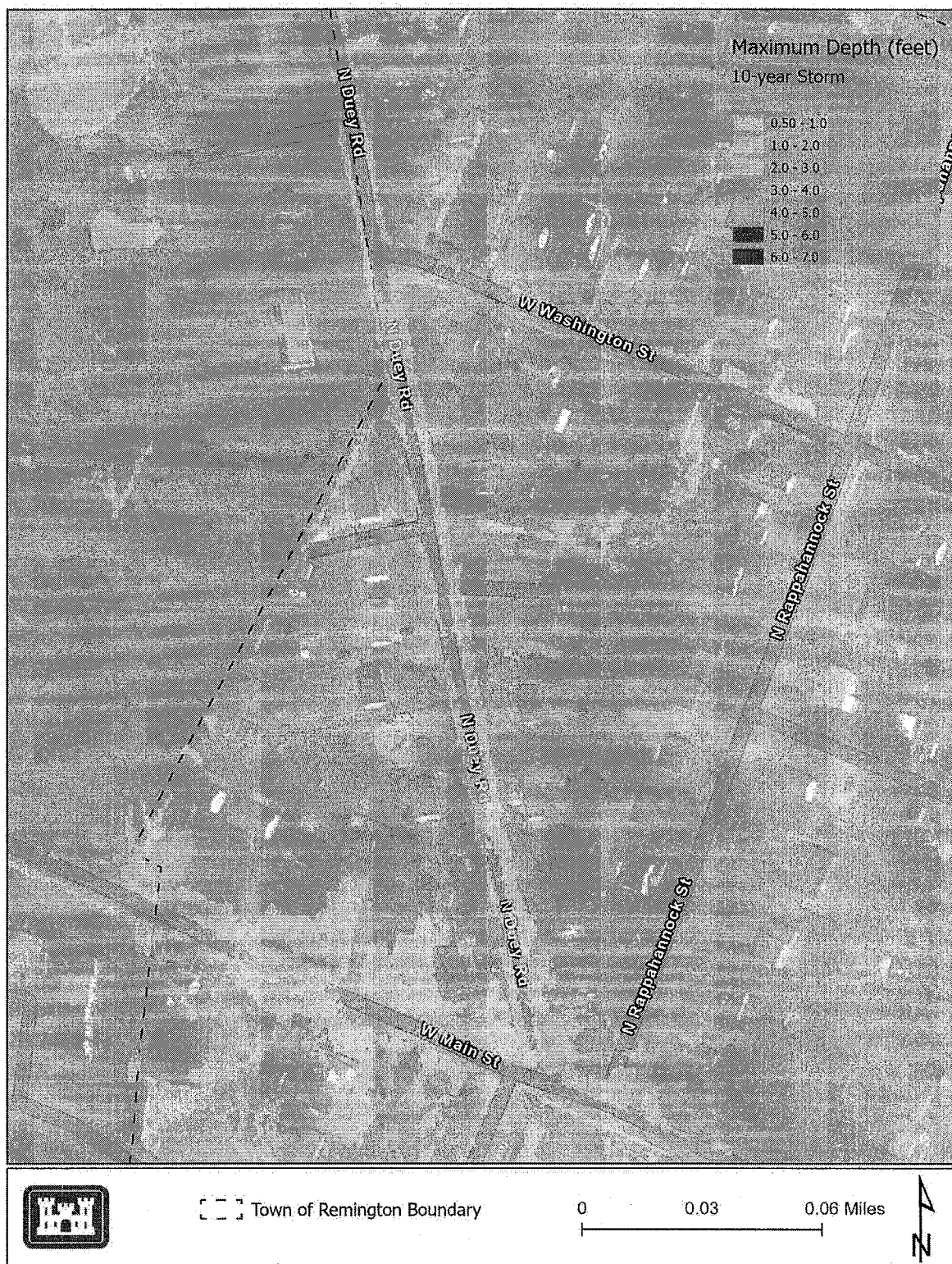


FIGURE 4.1: 10-YEAR FLOODING IN FOCUS AREA 1



account for factors such as utility impacts or relocations and annual maintenance. It does not include design or permitting costs.

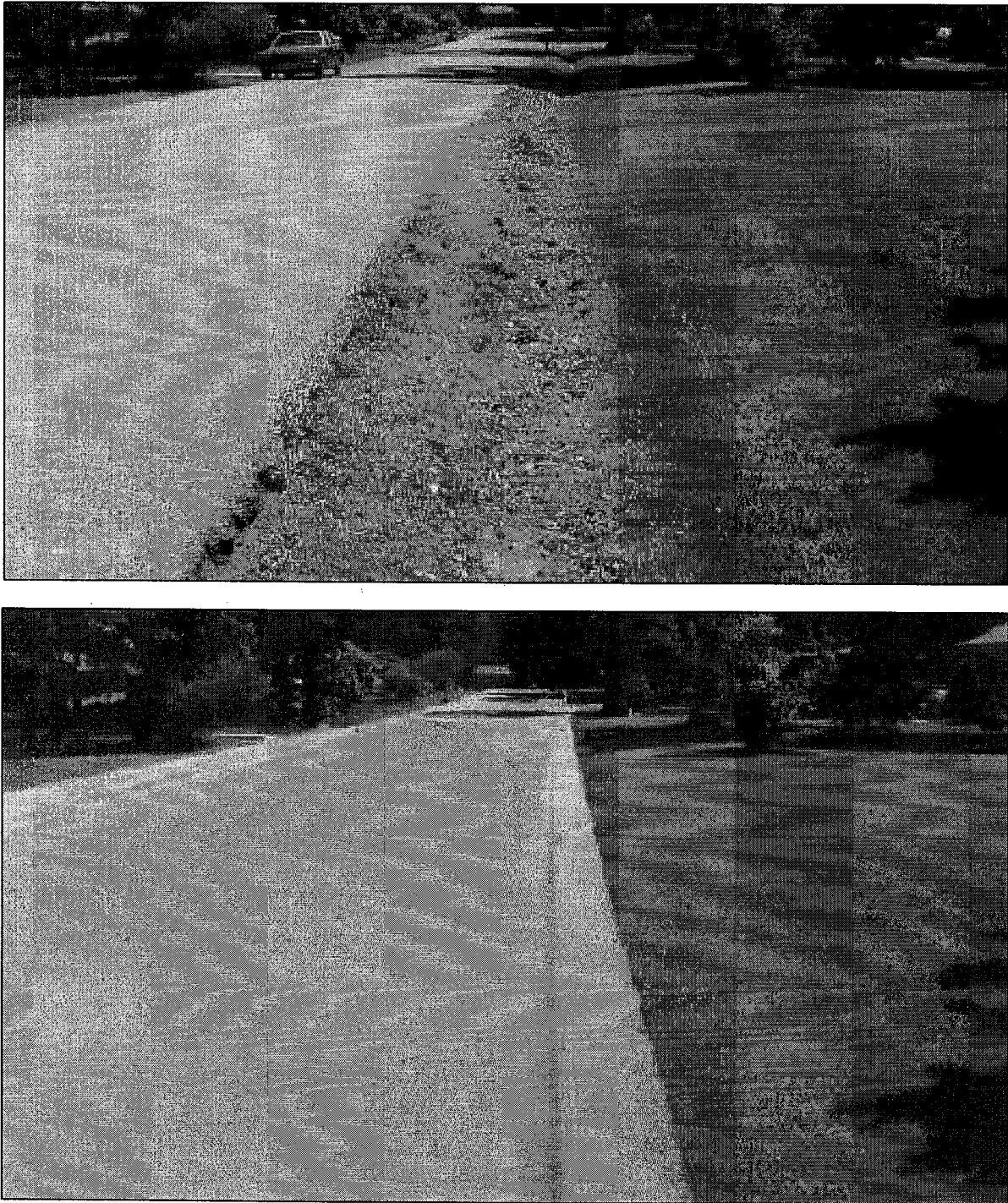


FIGURE 4.2: TYPICAL GUTTER (BEFORE AND AFTER)



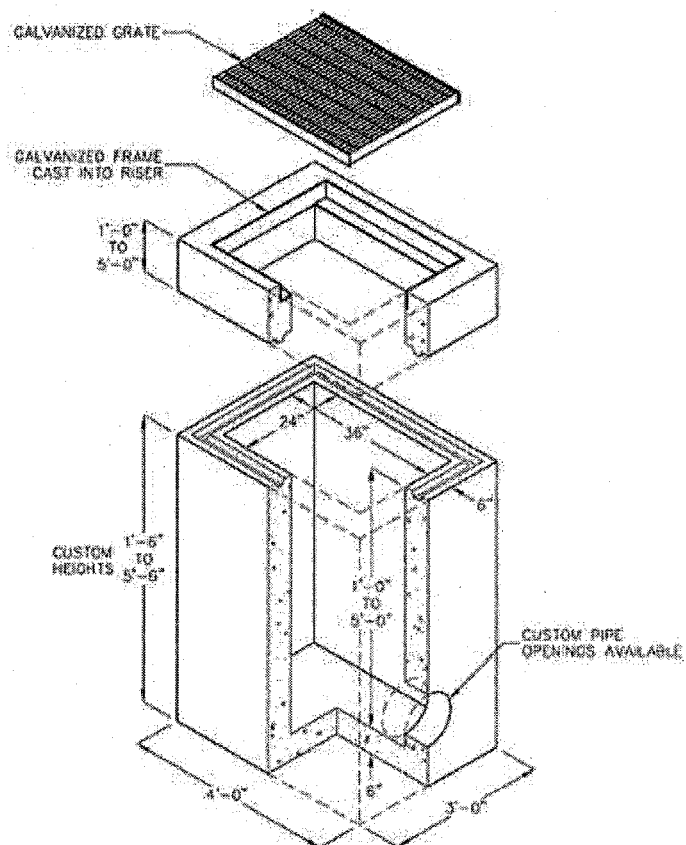
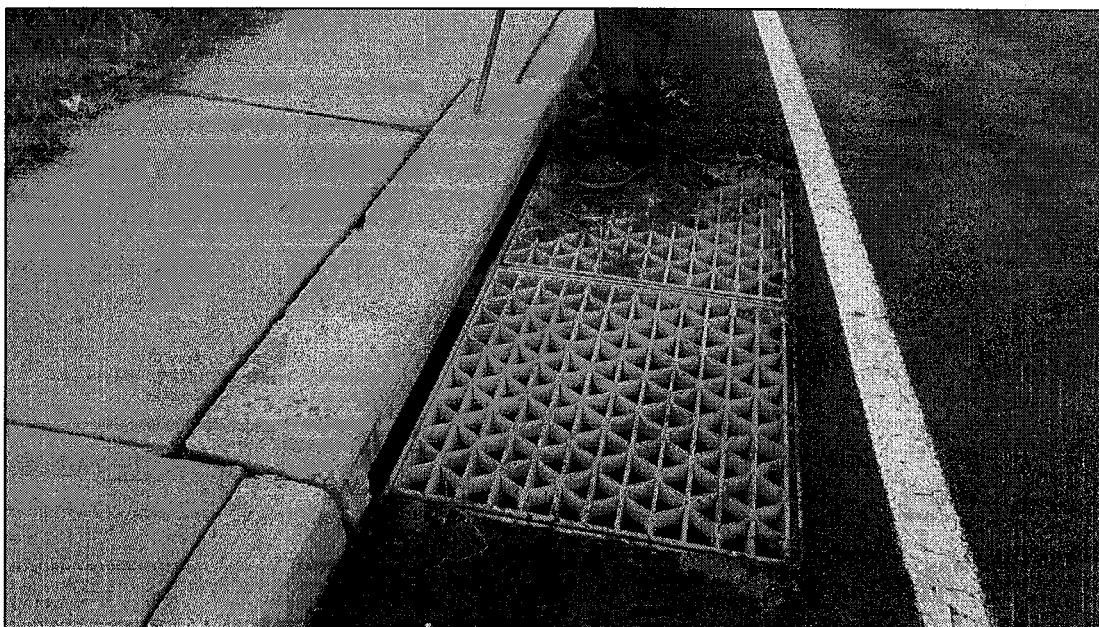


FIGURE 4.3: TYPICAL COMBINATION INLET





FIGURE 4.4: STORMWATER SYSTEM IMPROVEMENTS-3rd STREET TO WEST BOWEN STREET



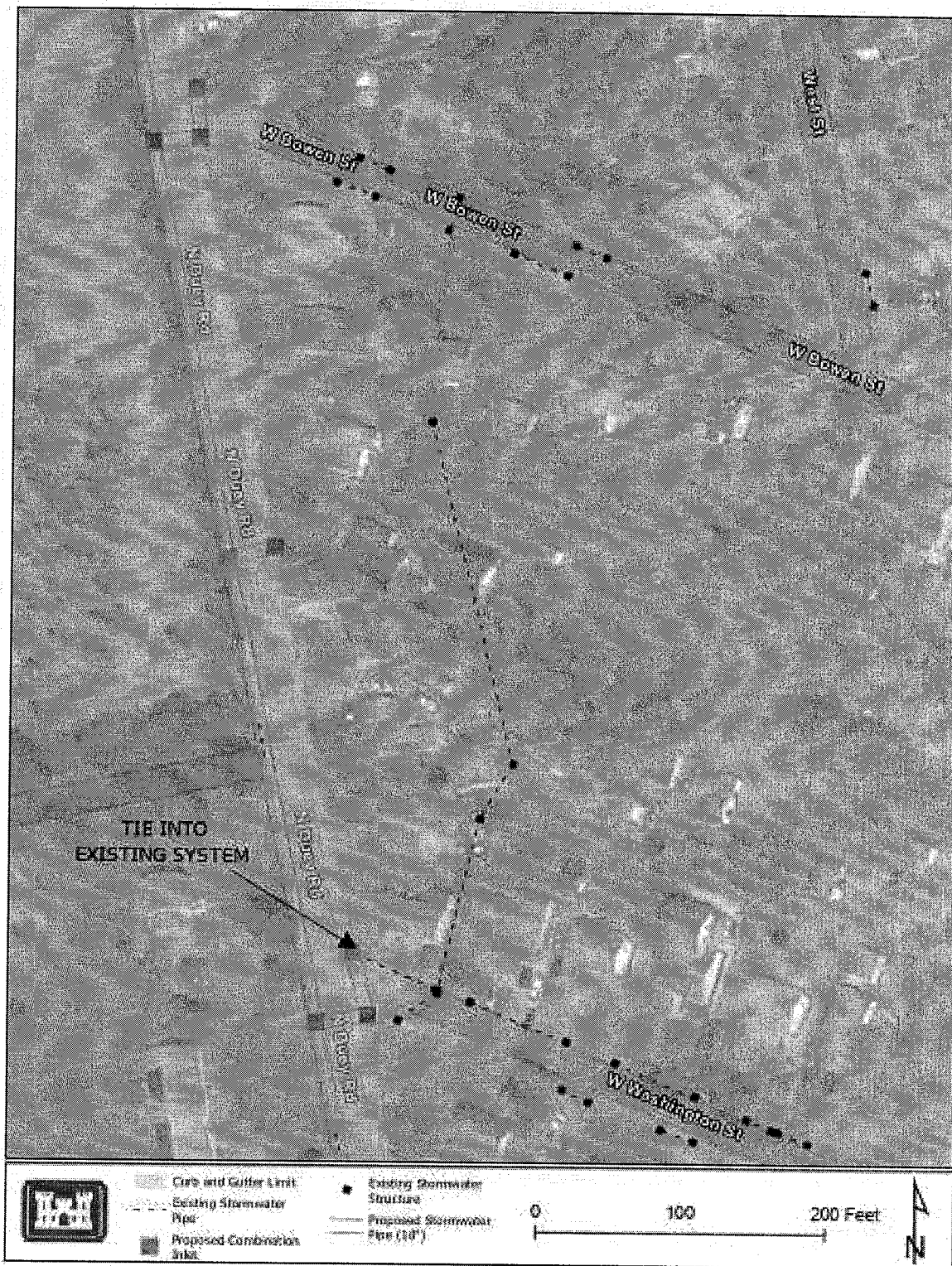


FIGURE 4.5: STORMWATER SYSTEM IMPROVEMENTS-WEST BOWEN STREET TO WEST WASHINGTON STREET



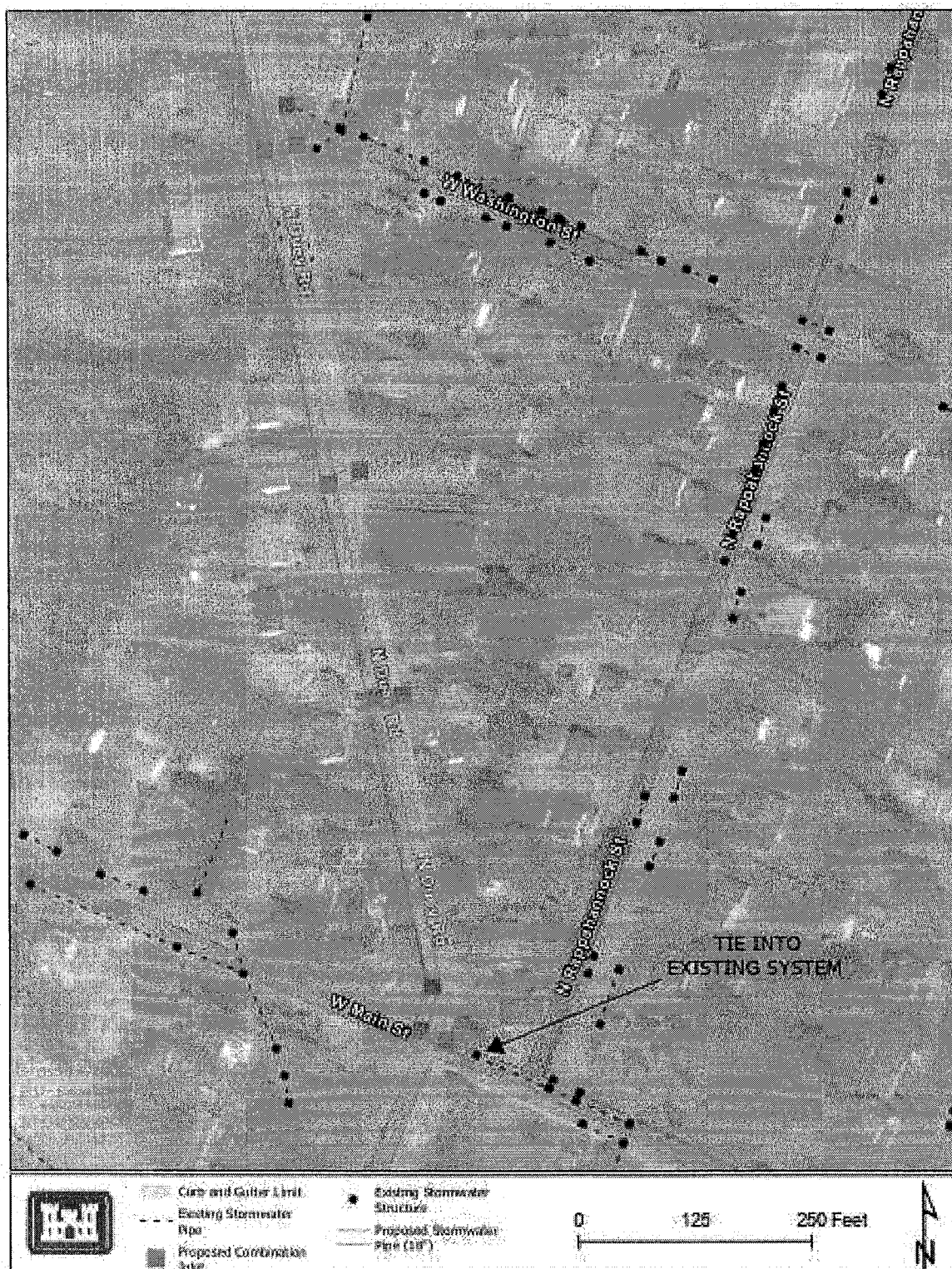


FIGURE 4.6: STORMWATER SYSTEM IMPROVEMENTS-WEST WASHINGTON STREET TO WEST MAIN STREET



4.2 FOCUS AREA 2-FRANKLIN STREET

The results of the PCSWMM modeling for the 10% annual chance (10-year) storm for Focus Area 2 is shown in Figure 4.7. Mitigation of stormwater flooding in this area will be addressed in the VDOT study discussed in Section 1.5 of this report.

4.3 FOCUS AREA 3-MAIN AND FRANKLIN

The results of the PCSWMM modeling for the 10% annual chance (10-year) storm for Focus Area 3 is shown in Figure 4.7. Mitigation of stormwater flooding in this area will be addressed in the VDOT study discussed in Section 1.5 of this report.

4.4 FOCUS AREA 4- WEST OF NORFOLK SOUTHERN RAILROAD

The results of the PCSWMM modeling for the 10% annual chance (10-year) storm for Focus Area 4 is shown on Figure 4.8. Stormwater flooding in this focus area is controlled by a 12.0 ft. wide by 10.0 ft. high bridge under the Norfolk Southern Railroad (see Figure 4.8). The depth of flooding during a 10% annual chance (10-year) storm reaches approximately 6 feet directly at the railroad bridge, with depth of flooding reaching approximately 2.0-3.0 feet in the open area between the railroad and South James Madison Street; however, the flooding minimally impacts buildings or roadways. The results of the PCSWMM modeling show that the existing bridge is sufficient size to convey the 10% annual chance (10-year) storm without significantly flooding any buildings, roadways, or critical infrastructure. The flooding ponds in the natural floodplain.

Potential measures to reduce the depth of flooding in this Focus Area 4 would be to enlarge the bridge opening or add a secondary culvert/bridge under the railroad to convey floodwaters. These measures would be costly and would not provide minimal benefit, as the existing flooding does not significantly impact buildings or roadways. Therefore, the “no action” measure is recommended for Focus Area 4. Focus Area 4 is also subject to riverine flooding, which would be far more severe during flood events.



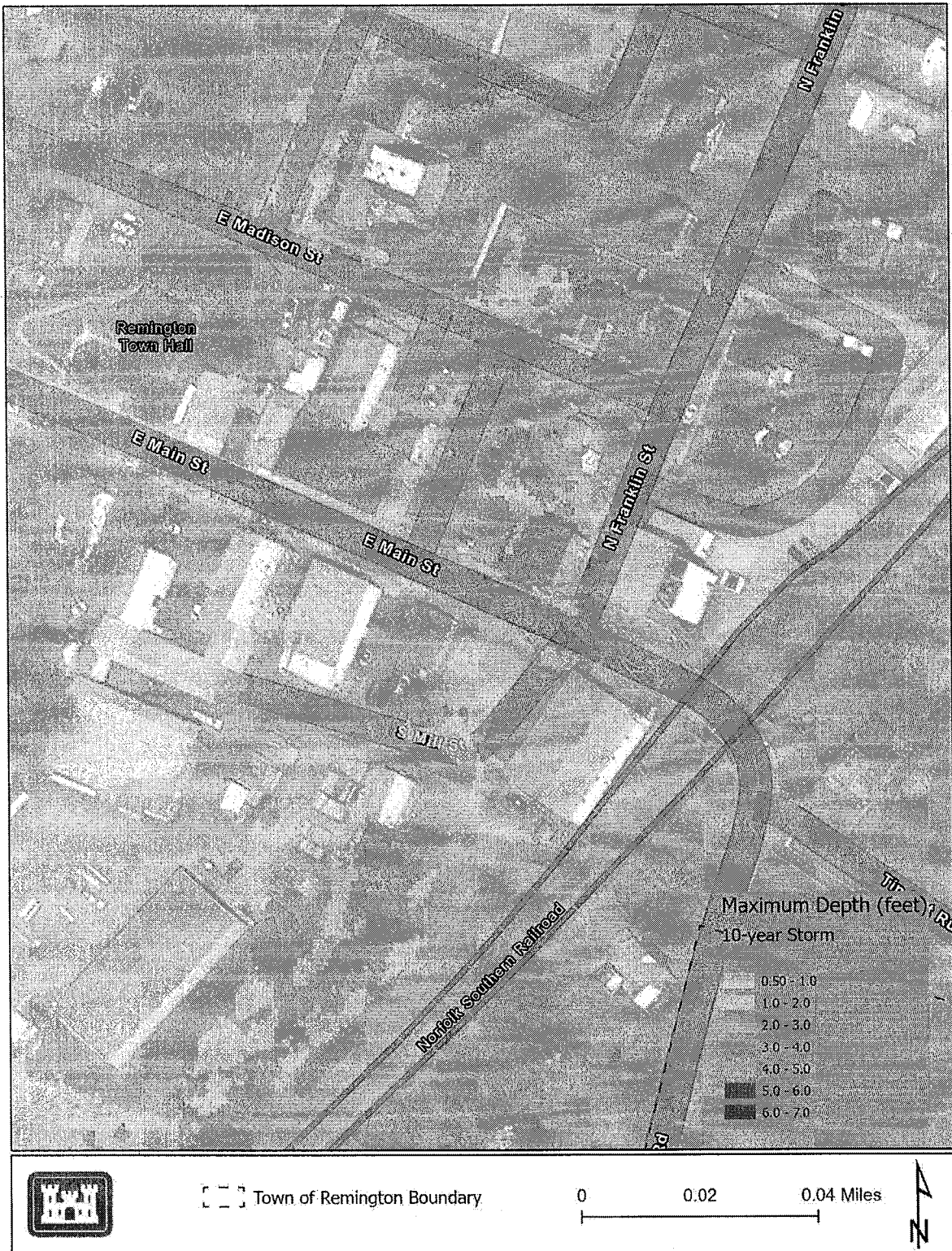


FIGURE 4.7: 10-YEAR FLOODING IN FOCUS AREAS 2 AND 3



FIGURE 4.8: 10-YEAR FLOODING IN FOCUS AREA 4



5 CONCLUSIONS

Remington has experienced flooding on several primary roads during severe, localized storms. These storms are overloading the town's stormwater drainage network causing flooding in multiple areas within the town limits. Remington requested assistance from USACE to provide technical assistance in completing a stormwater flood study within the town limits. This study provides Remington with a plan for reducing the risk of flooding from localized stormwater flooding to property owners and critical roadways within the study area. The two primary objectives of this study were to: 1) identify areas within the town that are prone to stormwater-related flooding and assess the existing vulnerabilities and 2) recommend measures to improve the existing stormwater system to manage flood impacts through infrastructure solutions.

At the onset of this study, Remington officials identified four focus areas where stormwater flooding occurs. These stormwater flooding focus areas include (1) North Dewey Road, (2) Franklin Street, (3) Main and Franklin, and (4) West of Norfolk Southern Railroad. Much of the stormwater flooding in Remington is the shallow ponding of water along streets and drainage ditches.

During this study, USACE was contacted by VDOT regarding their proposed stormwater improvements along Franklin Street. These improvements are to mitigate flooding in Focus Area 2 (Franklin Street), Focus Area 3 (Main and Franklin), and may also impact Focus Area 4 (West of Norfolk Southern Railroad). Due to this VDOT study, and to not duplicate effort, the scope of this USACE study was changed to determine a plan for reducing the risk of flooding from localized stormwater flooding in Focus Area 1 and Focus Area 4 only.

Stormwater modeling for Remington was performed using PCSWMM, Version 7.7.3910, to identify and determine the potential causes of stormwater flooding in the four flooding Focus Areas. The model was run for three design storms, including the 50% annual chance (2-year, 24-hour) storm, the 10% annual chance (10-year, 24-hour) storm and the 1% annual chance (100-year, 24-hour) storm. The results of the existing-conditions model show that for Focus Area 1, there is approximately 1.0 feet of flooding in the open ditches during a 10% annual chance (10-year, 24-hour) storm and up to 1.5 feet in the open ditches for the 1% annual chance (100-year, 24-hour) storm. Buildings are not impacted in Focus Area 1 because of this flooding. For Focus Area 4, several feet of flooding backs-up behind the bridge under the railroad causing flooding of a natural floodplain area.

Through an iterative analysis using the PCSWMM model, the installation of a new curb and gutter system is the preferred measure to reduce the flood risk along North Dewey Road for a 10% annual chance (10-year), 24-hour storm. This measure for Focus Area 1 is like the improvements proposed by VDOT for Franklin Avenue. It would entail the installation of approximately 2,200 linear feet of gutters and 18 new combinations inlets. For piping, the PCSWMM model was used to determine that all piping, 2,200 linear feet of it, should be 18" round HDPE piping. This system would run from 3rd Street south to West Main Street on North Dewey Road. The existing stormwater system would tie into the existing stormwater system at West Washington Street. The improved system would then tie into the existing stormwater system at a 24" concrete pipe on West Main Street. Based upon previous USACE studies, the estimated cost for this measure is \$950,000. This estimate is planning level only and is subject to change pending further design and/or study. The cost includes all labor and material for installation and resurfacing of the roadway as well as a 50-percent contingency to account for factors such as utility impacts or relocations and annual maintenance. It does not include design or permitting cost.



For Focus Area 4, the results of the PCSWMM modeling show that the existing bridge under the railroad is sufficient size to convey the 10% annual chance (10-year) storm without significantly flooding any critical infrastructure. The flooding ponds in the natural floodplain. Potential measures to reduce the depth of flooding in this Focus Area 4 would be to enlarge the bridge opening or add a secondary culvert/bridge under the railroad to convey floodwaters. These measures would be costly and would not provide any significant benefit. Therefore, the “no action” measure is recommended for Focus Area 4.



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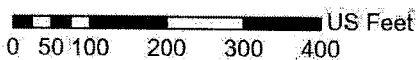
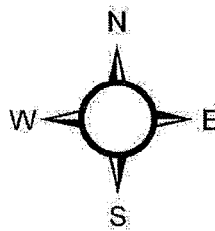
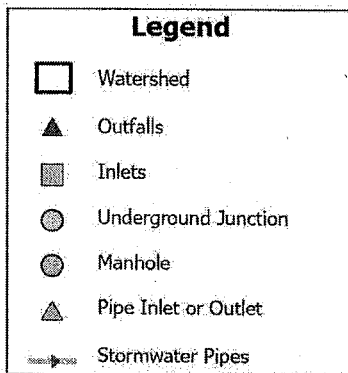
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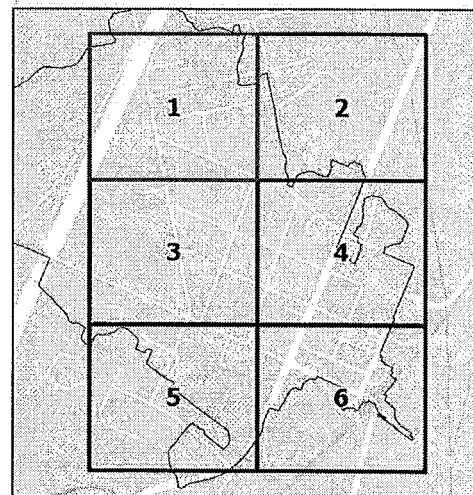
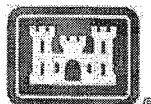
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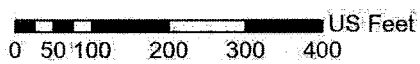
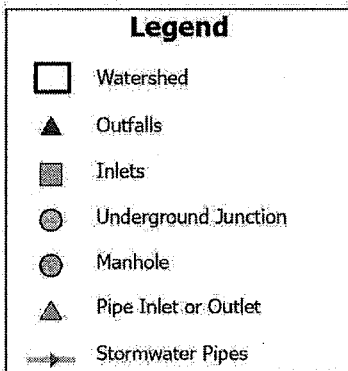
STORMWATER SYSTEM MAPPING



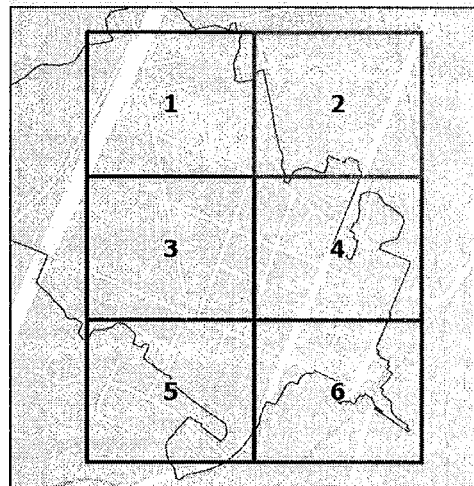
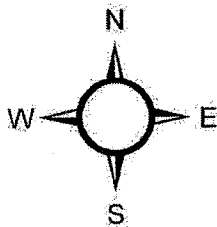


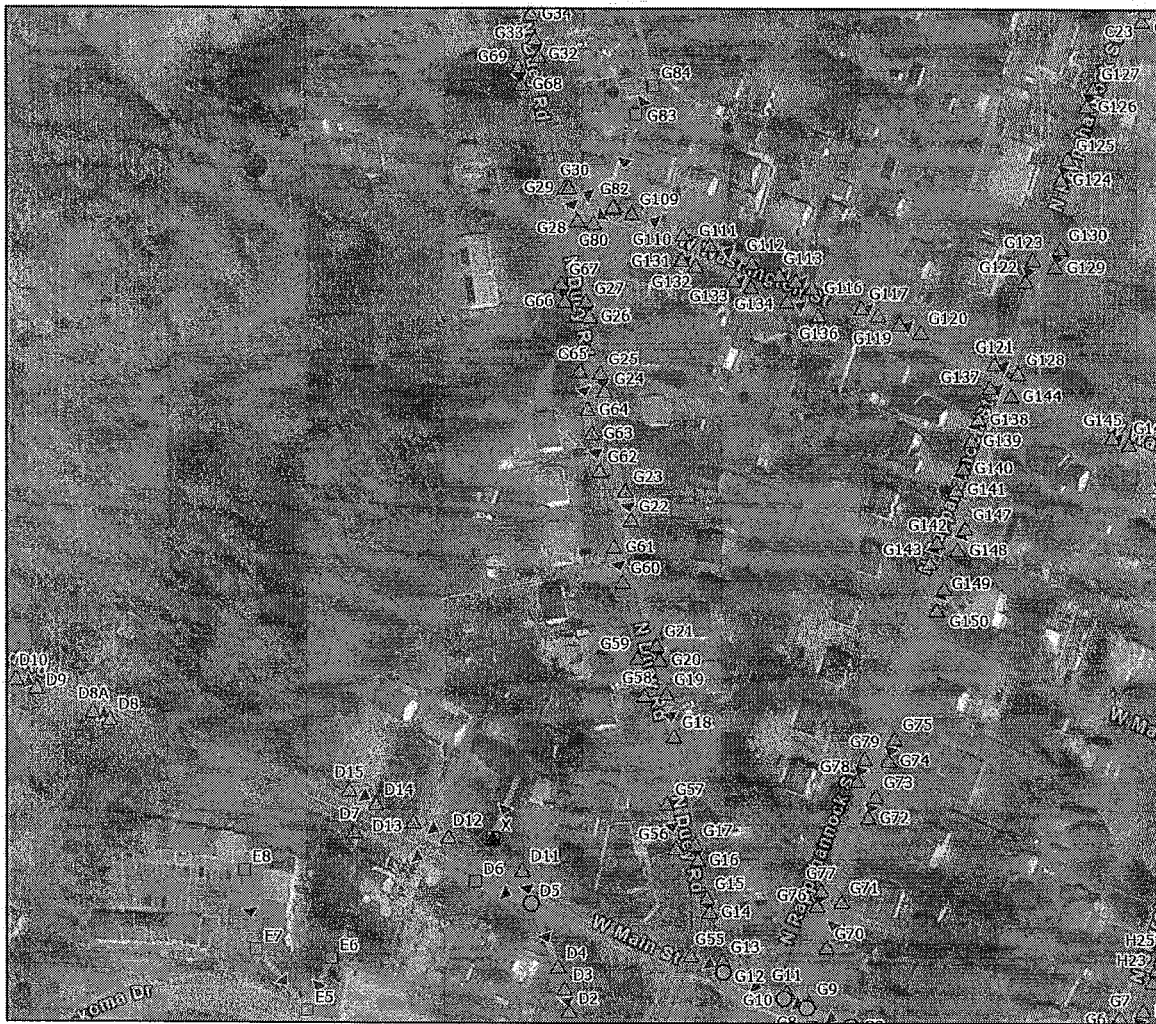
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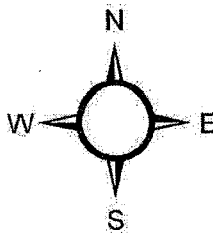
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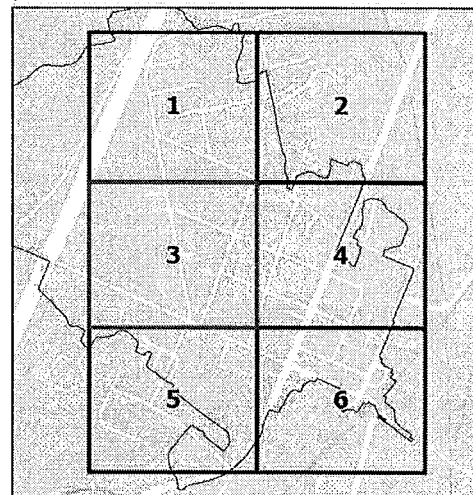
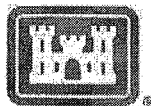
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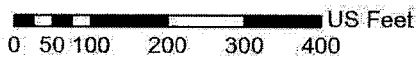
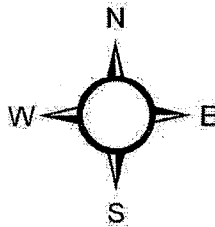
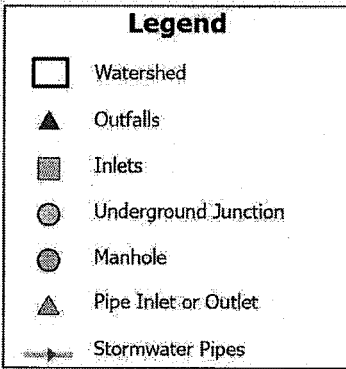
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- Inlets
- Underground Junction
- Manhole
- Pipe Inlet or Outlet
- Stormwater Pipes



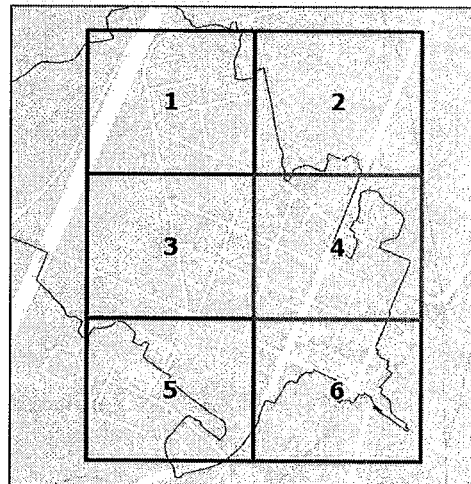
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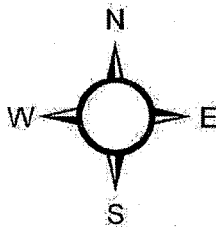
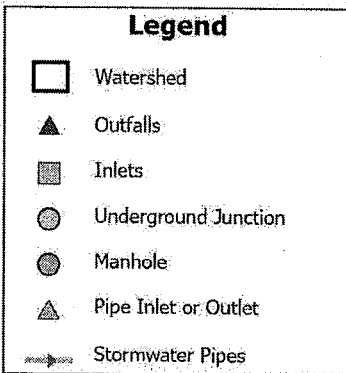
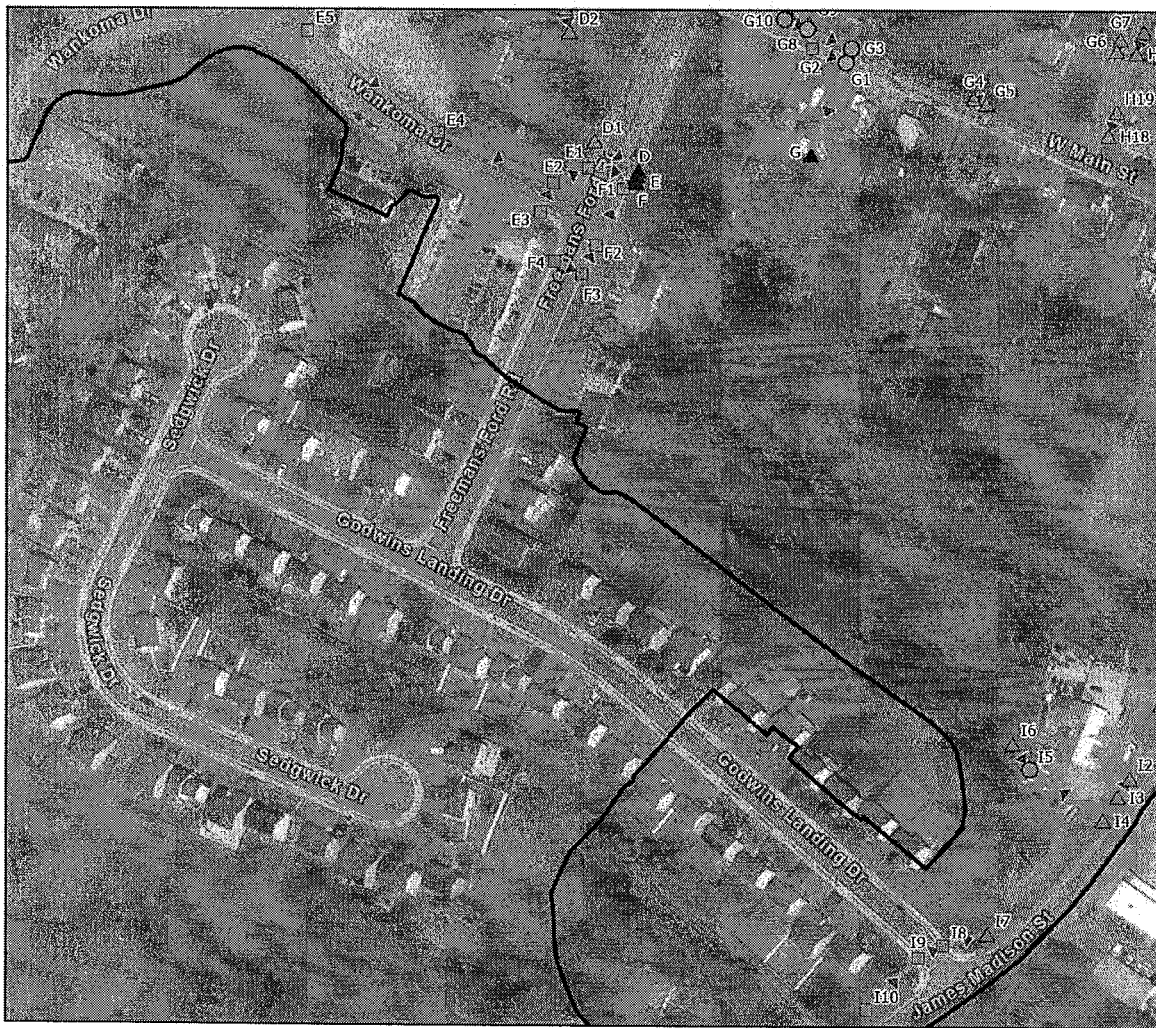
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