Cecil County Nuisance Flooding Plan

July 28, 2020- DRAFT

Cecil County Nuisance Flooding Plan

Table of Contents

Background

Pursuant to Maryland House Bill 1427 (2019), §3-1018(b) and (c), on or before October 1, 2020, a local jurisdiction that experiences nuisance flooding (NF) shall develop a Plan to address nuisance flooding. In addition, a local jurisdiction shall update the plan every five years; publish the plan on the local jurisdiction's website; and shall submit a copy of the Plan to the Maryland Department of Planning. This legislation is an update to Maryland Senate Bill (SB) 1006 and House Bill 1350 (2018) states that "on or before July 1, 2019, a local jurisdiction that experiences nuisance flooding shall develop a plan to address nuisance flooding." The legislation further specifies that the plan must be submitted to the Maryland Department of Planning, published on the local jurisdiction's website, and updated at least every five years.

The Cecil County Nuisance Flood Plan (NFP) will help to better understand the extent of nuisance flooding, create an inventory of conditions that attribute to nuisance flooding, and document the number and location of nuisance flood events, in an effort to respond to and implement risk reduction actions.

I. Introduction

Flooding is one of the most common natural hazards experienced in Cecil County. Depending on the circumstances, flooding may be widespread or isolated, developing slowly or quickly. It may take the form of coastal, overland, or flash flooding. Floods may originate from ice jams or from the failure of dams. Nuisance flooding is a more specific and commonplace phenomenon which dictates a slighter response and threatens the community in less intrusive ways.

The National Oceanic and Atmospheric Administration (NOAA) defines nuisance flooding, or high tide flooding, as "flooding that leads to public inconveniences such as road closures. It is increasingly common as coastal sea levels rise." The language of SB 1006 refers to nuisance flooding as "high-tide flooding that causes public inconvenience." Nuisance flooding is typically unrelated to particular storm events, though it may be exacerbated by long-duration wind events or passing storm systems. As such, it is frequently referred to as "sunny day flooding."

Nuisance flooding is capable of disrupting daily activities through a variety of mechanisms, such as the closure of roads due to high water, the inundation of yards and parks, and the impairment of engineered and natural drainage systems. Currently, these disruptions typically occur for a period of several hours and then abate. However, as a changing climate drives sea levels higher and precipitation events to greater severity, these repeated "nuisance" impacts will become significant stressors on the infrastructure, natural systems, emergency response, public health and safety, and fabric of the community.

In Cecil County, nuisance flooding occurs most predominately in locations near or adjacent to major bodies of water. Along the Big Elk Creek, nuisance flooding is common on residential and commercial properties. Elsewhere in the County, nuisance flooding is experienced as debris from farm fields washes into ditches and eventually settles on roadways as ditches overflow. Culverts in low-lying areas may have difficulty conveying water adequately, causing ponding on low-lying roadways throughout the County. Without the development of strategic restoration strategies, County government could end up bearing the costs associated with the endless cycle of damage and repair.

II. Preparing for Nuisance Flooding

Because nuisance flooding is a complex problem, strong partnerships between planning, public works, emergency management, and geographic information systems (GIS) are necessary for Cecil County to properly prepare for the impacts of nuisance flooding. In particular, it is important that departments collaborate to inventory and map chronically inundated areas and prepare to implement targeted mitigation actions

As part of the nuisance flood planning process for Cecil County, a team of staff created a thorough inventory of known flood hazard areas, which can be found as Appendix I to this document. The inventory will be used as a baseline for areas of further study and evaluation. Stakeholder groups and agencies involved in the nuisance flood planning and inventory process can be found in Appendix II.

In addition to mapping, accurate flood forecasting and warning is critical to the safety and preparedness of a community. Weather forecast data is received from the National Weather Service (NWS) forecasting office at Mount Holly, New Jersey. Critical tide information is received from the NOAA tide gauges stationed at the Big Elk Creek, Conowingo, and Octoraro Creek, as well as additional gauges elsewhere throughout the County. These gauges allow Cecil County to be aware of and prepare for possible nuisance flooding impacts.

The Cecil County Department of Emergency Services (DES) maintains a close relationship with NWS Mount Holly, receiving notifications of special hazards and watches or warnings of severe weather before the community is impacted. The timeliness of these severe weather alerts is critical when the potential for public safety impacts exists, such as in flood situations. Additionally, it is the responsibility of the Cecil County DES to disseminate public safety information via their mass notification system and social media outlets. When nuisance flooding is anticipated, it may be necessary for Cecil County DES to initiate a message to flood hazard areas via social media outlets with details about flood severity, duration, or impacts such as road closures.

The Cecil County Nuisance Flood Plan is consistent other Cecil County plans, including the 2010 Comprehensive Plan, the 2015 Hazard Mitigation Plan, the 2017 Land Preservation, Parks & Recreation Plan, the 2019 Green Infrastructure Plan, and the 2020 Strategic Plan. Additionally, elements from Cecil County's municipalities' plans including Elkton's 2007 Flood Control Study & 2018 Flood Risk Assessment; Charlestown's 2019 Stormwater Vulnerability and Floodplain Management Assessment; and Port Deposit's 2018 Waterfront Master Plan have been incorporated into this plan. This plan covers the period from October 1, 2020 through December 31, 2025.

III. Responding to Nuisance Flooding

A. Emergency Response

Thresholds are maintained for Cecil County which direct a set of actions based on an inundation level or frequency of flooding. These thresholds are meant to supplement actions directed by the Cecil County Emergency Operations Plan.

Threshold	Response Level	Required Action
Forecast data from the NWS or NOAA tide gauge indicates likely nuisance flooding impacts	Public Warning	Make the public aware of nuisance flooding threat via social media.

Flood waters are present below nuisance levels and are rising	Monitor Inundation	Above actions; notify Department of Public Works (DPW) and State Highway Administration (SHA) personnel to monitor flood levels as needed and place high water signs at impacted locations.
Flood waters are high enough to warrant temporary road closures	Flood Response	Above actions including mass notifications; Place additional DPW and SHA personnel on standby; close roads and reroute traffic as flooding reaches hazardous levels

When flooding reaches such a severity that life safety, critical infrastructure, and key resources are threatened, "nuisance" flooding levels have been exceeded. Below are response concepts consistent with the Cecil County Emergency Operations Plan which may become necessary as flood waters rise beyond nuisance levels.

- Response
  - Lifesaving activities
  - Incident containment
  - Public health concerns
  - Maintenance of transportation routes
  - Maintenance of critical facilities
  - Public warning mechanisms
  - Responder health & safety
  - Media & VIP management
  - Control & coordination of operations
  - Provision of transport, shelter and documentation of displaced persons
  - Restoration of normality
- Recovery
  - Begins when life safety actions are complete
  - Facilitate the restoration of systems to normality
  - Assess damage and return vital life support systems to minimum operating standards
  - Collate financial cost of the event
  - Legal implications, claim investigation
  - Debrief & compilation of final report
  - Community & restoration of services

B. Documentation

Documenting the extent and impacts of nuisance flooding is critical to public safety and the long-term resilience of Cecil County. This information will be documented and updated on a regular basis for emergency planning purposes and informing future restoration activities. A review of flood documentation should provide Cecil County a comprehensive view of trends in flooding over time. The following factors will be recorded by Cecil County DES and reported to the Department of Land Use and Development Services (DLUDS) for tracking and archiving. This includes instances of nuisance flooding addressed by SHA and communicated over the radio. Documentation and mapping analyses will be distributed to stakeholder groups and agencies as part of the annual review process

- Date, time, and location of nuisance flooding

- Impacts (e.g. “estimated depth and extent of water on the roadway,” “ditch overflow,” “docks underwater,” critical facility threats, etc.)
- Agency notified and action taken

See Appendix III for a copy of the Cecil County nuisance flooding documentation tool.

C. Hazard Assessment

Responding to and documenting nuisance flooding are building blocks to assessing the hazard’s location and impacts. County Staff has created a preliminary countywide inventory of critical facilities, roads, and sewer infrastructure that are located within the 100-year floodplain. Critical facilities have also been identified within the 500-year floodplain and sea level rise inundation areas predicted for the year 2100, when combined with a 100-year storm event. The sea level rise study for the region also includes an estimate for the number of buildings that could be impacted by 2050 and 2100, including damage estimates in US dollars. Additionally, staff will be reviewing the locations of roads compared to Base Flood Elevation and topography, and reviewing available bridge and culvert data. These sites already have quantified flood threats, and when combined with nuisance flooding documentation, will provide for a clearer picture for specific mitigation actions to consider. The documented nuisance flooding areas will be reviewed by stakeholder groups and agencies to help assess the problems. Once the problems are identified, mitigation strategies will be developed with the ultimate goal of providing an individualized action plan for the site. Once the action plan is implemented, the outcomes will be evaluated, and the action plan will be revised. This cycle will continue until nuisance flooding is minimized to the maximum extent possible.

IV. Nuisance Flooding Planning Goals

Cecil County has established the following goals to help inform the review of possible activities and future mitigation actions:

1. Protect the lives and properties of residents and businesses from flooding.
2. Ensure that public services and critical facilities operate during and after flooding.
3. Prioritize mitigation projects to reduce flood damage to communities.
4. Inform the general public of actions they can take to reduce their flood risk.
5. Protect, preserve, and restore natural floodplain functions.

V. Nuisance Flooding Management Activities

A. Preventative Measures

Cecil County uses a variety of ordinances and codes to help ensure new development does not adversely impact existing homes and businesses, as well as, several ongoing programs to help reduce flood threats.

1. Floodplain ordinance
2. Building codes

3. Stormwater management

4. Drainage system maintenance

B. Property Protection

New residential development in the 100-year floodplain is required to be elevated two feet above the base flood elevation and new critical facilities in the 100-year floodplain are required to be elevated three feet above the base flood elevation. Existing structures can also be voluntarily elevated or retrofitted to reduce flood risk, and flood insurance can be purchased to help recover from flood damages.

C. Natural Resource Protection

Cecil County has a number of different agencies and local non-profit groups whose primary functions are land stewardship, and making sure open spaces are preserved and/or restored. These activities include erosion and sediment control, wetland protection, maintaining wildlife corridors, and water quality improvement projects.

D. Emergency Services

Cecil County's Department of Emergency Services takes measures to reduce the impacts of flooding on our communities. They are responsible for recognizing threats, providing warning to citizens, and responding during and after a flood event to help protect lives, health, and properties.

E. Public Information

Cecil County agencies disseminate flood risk information in a variety of ways, including an online floodplain map information service, outreach projects via social media and community events, local libraries, and environmental education activities. Nuisance flooding information dissemination activities will be further developed in this plan and future plans including the Program for Public Information Plan to be developed in the near future.

VI. Mitigating Nuisance Flooding Impacts

Both the Emergency Operations Plan and the Hazard Mitigation Plan (HMP) for Cecil County address measures by which the impacts of flooding can be mitigated, or lessened, by structural and nonstructural means. The Green Infrastructure Plan identifies natural infrastructure solutions, such as open space preservation, restoration of natural systems, and living shorelines, which can also help to reduce flood risks. The purpose of the Nuisance Flooding Plan is to augment and support the information and recommended actions found in other planning documents. According to the County's 2017 HMP (p. 6-7):

> *The Hazard Mitigation Plan addresses the County's waterfront community with 120 miles of shoreline along the Chesapeake Bay, its tributaries, and the Susquehanna River. The Hazard Mitigation Plan identify shoreline control/stabilization measures and both residential and agricultural best management practices as viable means of reducing accretion/erosion of Cecil's highly erodible soils. The plan also emphasizes the maintenance, enforcement, and strengthening of floodplain regulations and participation in the Community Rating System. All county projects will be evaluated for consistency with the Hazard Mitigation Plan.*

The principles of floodplain management are fundamental to the proper mitigation of nuisance flooding in Cecil County. Cecil County's floodplain regulations already exceed the minimum requirements set by FEMA and the NFIP. For example, two or three feet of freeboard, development restrictions on the size of accessory structures, and open foundations for new dwellings, etc. – can be more effective in mitigating the impacts of both nuisance flooding and other major flooding events.

Cecil County's HMP identifies four areas of focus that help direct mitigation activities. These four areas include:

- Ensure that existing structures are resistant to flood-related damage,
- Create awareness of floodplain hazards and protective measures,
- Protect critical facilities, and
- Prepare/update stormwater management plans for various areas in the County.

In addition to actions specified in the HMP, the NFP includes activities which Cecil County will implement or consider implementing to mitigate the impacts of nuisance flooding. These activities support the four areas of focus found in the Hazard Mitigation Plan. They also support the implementation strategies identified in the Cecil County Green Infrastructure Plan and the goals and objectives of the Cecil County Comprehensive Plan.

Area of Focus	Action Items	Lead Agency	Partners & Support	Funding Options	Timeline
Structural	Expand the lateral extent of the regulatory flood zone boundaries to include the 0.2-percent chance or 500- year floodplain and determine the base flood elevations.	DLUDS	FEMA, MDE	PDM, HGMP	2-3 years
	Continue to improve stormwater management infrastructure to more effectively convey water from flood-prone areas.	DLUDS, DPW	SCD		2-3 years
	Incentivize residents and businesses to implement stormwater management practices and runoff retention, including rain barrels, rain gardens, and conservation landscaping.	DPW	DLUDS, Town DPW, SCD, SR	County CIP, DNR CR	0-1 year
	Design ways for existing open space areas to better address flood hazards, such as holding water and collecting sediment and debris, create local demonstration projects.	DLUDS	DPR, DPW, Town DPZ/DPW, FEMA	CBT G3, CBT WAGP, PDM, HGMP, FMA, DNR CR	2-3 years
	Develop watershed master plans to better understand flood risks and create incentives to implement strategic natural infrastructure protection and stormwater management solutions that benefit entire communities.	DLUDS	DPW, SCD	County CIP, CBT WAGP	0-1 year
	Conduct regular maintenance of drainage and stormwater control systems.	DPW	DLUDS	County CIP	0-1 year
	Consider green infrastructure options rather than conventional grey infrastructure stormwater solutions, or consider a hybrid approach.	DLUDS, DPW	SCD	County CIP, CBT WAGP	0-1 year
	Develop criteria and update mapping of critical facilities, roads, water and sewer infrastructure.	DLUDS, DPW		County CIP, CBT WAGP	0-1 year
	Document nuisance flood locations capturing depth, extent, and duration and maintain records for dissemination.	DLUDS, DPW	DES	County CIP, CBT WAGP	0-1 year

Area of Focus	Action Items	Lead Agency	Partners & Support	Funding Options	Timeline
Public Information *Nonstructural*	Communicate the risk of nuisance flooding in non-emergency times to residents and businesses via mass mailings, social media, press releases, or automated phone calls.	DES, DLUDS	PIO	staff time	0-1 year
	Disseminate flood preparedness information to enable a safer and more aware public in the face of flooding.	DES, DLUDS	PIO	staff time	0-1 year
	Integrate nuisance flooding-related public messaging into Cecil County's Program for Public Information Plan (under development), and incorporate a flood insurance coverage assessment and implementation plan.	DLUDS, DES	PIO, MIA	staff time	0-1 year
	Incorporate a nuisance flooding element into the County's current Floodplain Map Information Service.	DLUDS		staff time	0-1 year
Planning *Nonstructural*	Ensure Cecil County's NFP is kept up to date and integrate with the Hazard Mitigation Plan, other pertinent plans, and regulations.	DES, DLUDS	DPW	staff time	2-3 years
	Schedule annual review of the nuisance flooding planning committee to develop a report on the status of the implementation strategies.	DES, DLUDS		staff time	0-1 year
	Improve stormwater management planning and strengthen policies to reduce runoff.	DLUDS, DPW		staff time	2-3 years
Implementation *Nonstructural*	Educate and train County staff on responsibilities under the NFP.	DES, DLUDS	DPW	staff time	0-1 year
	Create a thorough flood hazard profile and mitigation action plan for each critical facility and County roadway vulnerable to nuisance flooding.	DLUDS, DPW	DES	staff time	2-3 years
	Identify areas of flood concern in close proximity to capital improvements and prioritize mitigation solutions for high-risk assets.	DLUDS, DPW	FEMA	County CIP, CBT G3, PDM, HMGP, FMA, DNR CR	2-3 years
	Identify and acquire vacant lots in flood risk areas for natural infrastructure protection.	DLUDS	DPR, DES, FEMA, ESLC, CLT	PDM, HGMP, FMA, VLT	2-3 years
	Increase funding for and incentivize the Purchase of Development Rights (PDR) program, to strategically preserve lands with flood risk.	DLUDS		County CIP, PDM, HMGP, FMA, DNR CR	2-3 years
	Protect and restore natural coastal features (forests, marshes, dunes, underwater grasses, and oysters) that can reduce the impacts of flooding.	DLUDS, DPW	SR	County CIP, CBT G3, PDM, HMGP, FMA, DNR CR	2-3 years
	Identify opportunities to re-use dredge material for living shoreline projects and determine candidate sites for developing a local grant program.	DLUDS	DNR CCS, USACOE, MDE	CBT WAGP, DNR CR	0-1 year

VII. Projections for Future Impacts

The areas impacted by nuisance flooding are projected to increase gradually in the coming years as changing climate elevates water levels and drives precipitation patterns to new extremes. This shift, however, is likely to accelerate gradually over time. New areas will also become impacted, leading to an increased number of businesses, residents, and critical infrastructure at risk. Public services will also be more frequently impaired as flooding increases.

Cecil County will maintain a level of awareness of data made available by NOAA, the State of Maryland, the University of Maryland Center for Environmental Science, and other scientific institutions as it pertains to the community and local flood risks. These risks of increased nuisance flooding will be communicated appropriately to residents and decision makers and direct them to take appropriate action in the areas of emergency response and hazard mitigation. Elected officials and County staff will utilize venues such as County Council meetings and Planning Commission meetings to communicate information on long-term flood risks. Future projections of sea level change and nuisance flooding should also be integrated into land use planning, floodplain management, comprehensive planning, and capital investment planning.

VIII. Plan Maintenance

Implementation and maintenance of the nuisance flooding plan is critical to the success of this planning process. Once adopted, plan maintenance will adhere to a schedule of developing an annual progress report on the action items identified in the section on Mitigating Nuisance Flooding Impacts. Members of the nuisance flooding plan steering committee will be invited to an annual meeting conducted by the DLUDS and DES to discuss collaborative efforts with community partners, monitor funding sources, and recommend any adjustments to lead and support agencies, funding sources, and timeframes for completion. Understanding local capacity will be a key part of the discussions and will revolve around new approaches getting projects into the ground, engaging different groups and new technical experts, and developing incentive programs. The DLUDS and DES are responsible for preparing the annual progress report and will submit the document to the appropriate agencies for review and comment. The DLUDS and DES are also responsible for coordinating with other Departments and the Towns to integrate the appropriate nuisance flooding implementation strategies into future updates of the Comprehensive Plan, Hazard Mitigation Plan, Stormwater Management Plan, Land Preservation, Parks, and Recreation Plan, Green Infrastructure Plan, and Strategic Plan. Finally, the plan must be updated every five years and include any changes within the nuisance flooding areas, mapping assessments, and mitigation actions. The next plan update will occur in 2025.

Appendix I – Nuisance Flooding Location Inventory

A. Inventory of roads and bridges that are vulnerable to flooding[1]

Location	Approx. Length of Road(s)	Flooding Source	Road Ownership	Bridge Present
200 block of Delaware Ave.	1,610 ft.	Big Elk Creek	State of Maryland	Yes (State Owned)
100 block of Howard St.	1,200 ft	Big Elk Creek	Town of Elkton	No
100-200 blocks of S. Bridge St. (MD RTE 213)	1,540 ft	Big Elk Creek	State of Maryland	Yes (State Owned)
300 Block of Fletchwood Road. (MD RTE 277)	1,230 ft	West Creek	Cecil County	Yes (XCE-2012)
Deaver & S. Simpers Rd.	250 ft	East Branch of Laurel Run	Cecil County	No
Elkton Rd. (MD RTE 279) at W. Pulaski Hwy. (US RTE 40)	1300 ft of Elkton Rd 2730 ft. of W. Pulaski Hwy.	Little Elk Creek	State of Maryland	Yes (state owned) – Elkton Rd. Yes (state owned) – W. Pulaski Hwy.
Ricketts Mill Rd. at Appleton Rd. (MD RTE 316)	685 ft of Ricketts Mill Rd. 220 ft. of Appleton Rd.	Big Elk Creek	Ricketts Mill Rd. – Cecil County Appleton Rd. – State of Maryland	Yes (County owned, CE-0027)- Ricketts Mill Rd. Yes (State owned) – Appleton Rd.
900 block of Broad St. (MD RTE 7)	575 ft	Mill Creek	State of Maryland	Yes (state owned)
1400 Block of Frenchtown Road (Perryville)	1030 ft	Susquehanna River	Town of Perryville	No
0-100 blocks of Edgewater Ave.	920 ft	North East River	Cecil County	No

[1] Source: Cecil County Green Infrastructure Plan, August 2019 – Appendix H

Location	Approx. Length of Road(s)	Flooding Source	Road Ownership	Bridge Present
Shore Dr, Pennsylvania Ave. and Kline Ave.	1,925 ft.	North East River	Shore Dr. – Cecil County Pennsylvania Ave. & Kline Ave. - Private	No
0 block or N. Main St. & 0-200 blocks of S. Main St. (MD RTE 272)	575 ft. of N. Main St. 900 ft. of S. Main St.	North East River	State of Maryland	Yes (state owned) – N. Main St. No – S. Main St.
100-200 blocks of W. Cecil Ave. (MD RTE 7)	1,900 ft	North East River	State of Maryland	Yes (state owned)
0 block of Washington St.	400 ft.	North East River	Town of North East	No
0-100 blocks of W. Race St. (North East)	840 ft	North East River	Town of North East	No
300-400 blocks of W. Old Philadelphia Rd. (MD RTE 7) & North East Isles Dr.	700 ft of W. Old Philadelphia Rd. 1,130 ft of North East Isles Dr.	North East River	W. Old Philadelphia Rd. – State of MD North East Isles Dr. – Town of North East	Yes (Amtrak owned) – W. Old Philadelphia Rd. Yes (Town of North East owned, CE-NE01)
500 block of Calvert Rd.	885 ft.	North East Creek	Cecil County	Yes (County owned, CE-0011)
300 block of Bank St.	675 ft.	Chesapeake & Delaware Canal	Town of Chesapeake City	No
300-500 block of Slicers Mill Rd.	2,200 ft.	Stone Run	Cecil County	Yes (County owned, CE-0082)
Crothers Rd. & England Creamery Rd.	1500 ft of Crothers Rd. >100 ft of England Creamery Rd.	North East Creek	Cecil County	Yes (County owned (CE-0056) – Crothers Rd. Check Bridge Inventory for Eng. Creamery.
0-100 block of Moore Rd.	2,200 ft	Octoraro Creek	Cecil County	No
1800 block of Principio Rd.	585 ft	Principio Creek	Cecil County	Yes (County Owned, CE-0052)
300 block of Wilson Rd.	700 ft	North East Creek	Cecil County	No
Oldfield Point Rd. at Jones Creek	1,800 ft	Jones Creek	Cecil County	No

B. Inventory of sewer infrastructure that is vulnerable to flooding[2]

Sewer Segment	Notes
Stony Run Interceptor, Manholes 806-811	See Map 46 through Map 54 in appendix IV for identified risk locations
Stony Run Interceptor, Manholes 831-850	
Stony Run Interceptor, Manholes 837-845	
Stony Run Interceptor, Manholes 856-858	
Stony Run Interceptor, Manholes 858-871	
Stony Run Interceptor, Manholes 872-876	
Stony Run Interceptor, Manholes 872-876	
Stony Run Interceptor, Manholes 875-1211	
Stony Run Interceptor, Manholes 1282-1287	
Stony Run Interceptor, Manholes 1288-1396	

[2] Source: Cecil County Green Infrastructure Plan, August 2019 – Appendix H

C. Other Locations Identified by NFP workgroup

Location	Jurisdiction	Notes
George Street	Cecil County	Fredericktown
Buena Vista Drive	Cecil County	
Church Road	Cecil County	North of Rumsey Road
Glebe Road	Cecil County	South of Mill Lane
River Road	Cecil County	Locust Point
Conestoga Street, from Bladen to Water Streets	Charlestown	
Water Street, from Conestoga to Frederick Streets	Charlestown	
Intersection of Water and Conestoga Streets	Charlestown	Long Point Park
Intersection of Water & Louisa Streets	Charlestown	Avalon Park
Intersection of Bladen and Conestoga Streets	Charlestown	Foot Log Park
Baltimore Street	Charlestown	Foot Log Beach
Colonial Drive	Charlestown	Sewer Pump/inlet station on beach
Holloway Beach	Charlestown	Identified problem with septic along Long Beach Road
Big Elk Creek Area	Elkton	Areas adjoining the Big Elk Creek beginning at Historic Elk Landing including under US RTE 40 bridge, through Marina Park, under MD RTE 213 bridge into properties along Main Street, Eder Park, and Meadow Park on both sides' MD RTE 7 (Delaware Avenue).
269 E. Main St.	Elkton	
US RTE 40 and Aiken Avenue	Perryville	
Aiken Avenue and Broad Street	Perryville	
Broad street	Perryville	At the rail overpass just past Town Hall
Marion Tapp Parkway	Perryville	Floodplain
Marina Park	Port Deposit	Public Trails, Playground, & Parking
North Main Street	Port Deposit	Between 140 and 220 North Main Street. Stormwater facilities failing; causing road to flood

D. Inventory of critical facilities that are vulnerable to flooding[3]

Critical infrastructure includes power production and transmission facilities, hospitals, police stations, fire stations, emergency management centers, water supplies, wastewater treatment facilities, evacuation routes, and more. We compared locations of critical infrastructure in Cecil County to SHA's predicted 1% flood extent in the year 2100 in coastal areas (described in previous section), as well as, the current 0.2% flood extent in riverine areas. Scientists typically use statistical probability to put a context to floods and their occurrence. For example, 0.2% has a 1 in 500 chance of occurring any given year, 1% has a 1 in 100 chance, and 10% has a 1 in 10 chance. We found 49 potentially vulnerable facilities, each with varying degrees of threat level, current protection, and recommended flood reduction measures.

Facility Name	Hazard	Threat Level	Current Protection	Potential GI Measures to Reduce Flood Risk
Port Herman Condominiums Treatment Plant	• Not in 100yr or 500yr floodplain • 1% chance storm with sea level rise by 2100	**Low**	permeable surfaces surrounding, little wooded area	• Retention or detention pond nearby • Constructed wetland and/or submerged gravel wetlands
Harbour View WWTP	• Within 100yr floodplain • 0.2% chance storm with sea level rise by 2050 • 1% chance storm with sea level rise by 2100	**High**	existing forest provides some protection, most plant components have been relocated outside of 100 yr floodplain	• Constructed wetland with infiltration berms and retentive grading • Restoration of floodplain once relocation is complete
Elkton Water Treatment Plant	• Within 100yr floodplain • 1% chance storm with sea level rise by 2100 • 0.2% chance storm with sea level rise by 2050, level 3 Hazard Vulnerability on Delaware Ave	**Medium**	wooded areas surrounding facility and lining adjacent creek	• Bio-swale into adjacent forested area • conservation landscaping • Constructed wetland with infiltration berms and retentive grading
Cecil County Detention Center	• Within 500yr floodplain • 1% chance storm with sea level rise by 2100	**Medium**	Minimal pervious surfaces surrounding facility	• Retention or detention pond on the grounds • Upgrade to porous pavement and addition of filter strips • Constructed wetland

[3] Source: Cecil County Green Infrastructure Plan, August 2019 – *Table 10. Potentially vulnerable critical facilities in Cecil County*

Facility Name	Hazard	Threat Level	Current Protection	Potential GI Measures to Reduce Flood Risk
North East Town Hall	• Within 100 Yr floodplain • 0.2% storm with sea level rise by 2050, level 3 Hazard Vulnerability on Main St; level 2 on West St. • 0.2% chance storm with sea level rise by 2050	**High**	little natural protection, micro bioretention project installed in parking lot in May of 2016	• Green roof or wall • Rain gardens and cisterns • Upgrade to porous pavement
North East Police Department	• Within 100yr floodplain • 0.2% storm with sea level rise by 2050, level 3 Hazard Vulnerability on Cecil Ave; level 2 on Race St. • 1% chance storm with sea level rise by 2100	**High**	forested area behind facility	• Detention area on grounds or in parking lot and/or filter strips • Upgrade to porous pavement • Conservation landscaping and bio-swale into forested area • Managed retreat if other options are unsuccessful
Perryville Vol. Fire Department	Within 500yr floodplain	**Low**	wooded areas surrounding 2/3 of facility	• Conservation landscaping • Rain garden and cisterns • Upgrade to porous pavement • Bio-swale and/or detention ponds on ground • Green roof and/or wall
Port Deposit WWTP	• Within 100 year floodplain • 10% chance storm with sea level rise by 2050	**High**	large forested area behind facility	• Possible relocation out of 100yr floodplain • Higher floodproofing
Port Deposit Town Hall and Police Station	• Withn 500yr floodplain • 1% chance storm with sea level rise by 2100; level 3 Hazard Vulnerability on S Main St	**Medium**	large forested area behind facility	• Bio-swale to forested area • Upgrade to porous pavement in parking lot • Backfill foundation crawlspaces • Improve flood openings and Elevate utilities
Water Witch Vol. Fire Department	• Within 100yr floodplain • 1% chance storm with sea level rise by 2100; level 3 Hazard Vulnerability on S Main St	**High**	wooded area behind adjacent structures	• Upgrade to porous pavement in parking lot and addition of filter strips or bio-swale • Rain garden and cisterns

Facility Name	Hazard	Threat Level	Current Protection	Potential GI Measures to Reduce Flood Risk
Port Deposit WTP	• Within 100yr floodplain • 1% chance storm with sea level rise by 2100 ; level 2 Hazard Vulnerability on Rock Run Landing	**Medium**	Adjacent wooded strip between facility and shoreline	• Constructed wetland with infiltration berms and retentive grading • Conservation landscaping and bio-swale into forested area
Meadowview WWTP influent pump station	• Within 100yr floodplain	**High**	wooded area behind adjacent structures	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns
Persimmon Creek Pump Station	• Within 500yr floodplain	**Medium**	wooded area behind adjacent structures, detention pond on the grounds	• Bio-swale to forested area • Floodproofing
W.L.Gore Elk Mills Campus Pump Station	• Within 500yr floodplain	**Medium**	wooded area behind adjacent structures, detention pond on the grounds	• Bio-swale to forested area • Floodproofing
Carpenter's Point Grinder Station #11	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns • Floodproofing • Backup generator
143 Greenbank Grinder Station	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns • Floodproofing • Backup generator
121 Kirk Road Grinder Station	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns • Floodproofing • Backup generator

Facility Name	Hazard	Threat Level	Current Protection	Potential GI Measures to Reduce Flood Risk
72 Little River Road Grinder Station	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns • Floodproofing • Backup generator
Newport Landing Grinder Station	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns • Floodproofing • Backup generator
Charlestown Manor Pump Station	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Conservation landscaping • Rain garden and cisterns • Floodproofing
Church Point Pump Station	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Conservation landscaping • Rain garden and cisterns • Higher floodproofing • Managed retreat if other options are unsuccessful
Greenbank Pump Station	• 1% chance storm with sea level rise by 2100	**Low**	wooded area behind adjacent structures	• Conservation landscaping • Rain garden and cisterns • Floodproofing
Mechanic's Valley Pump Station	• Within 100yr floodplain	**High**	adjacent bridge culvert has been enlarged	• Higher floodproofing • Managed retreat if other options are unsuccessful
North East Isles Pump Station	• 1% chance storm with sea level rise by 2100	**Low**	little natural protection	• Conservation landscaping • Rain garden and cisterns • Higher floodproofing
Rt. 40 Pump Station	• Within 500yr floodplain	**Low**	large forested area surrounds facility	• Higher floodproofing
Price Marina Pump Station	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Conservation landscaping • Rain garden and cisterns • Higher floodproofing • Managed retreat if other options are unsuccessful

Facility Name	Hazard	Threat Level	Current Protection	Potential GI Measures to Reduce Flood Risk
Port Deposit Town Hall Pump Station	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns • Floodproofing • Backup generator
Port Deposit Vannort Pump Station	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns • Floodproofing • Backup generator
Chesapeake Estates Pump Tank #9	• 1% chance storm with sea level rise by 2100	**Low**	wooded area behind adjacent structures	• Bio-swale to forested area • Floodproofing
Chesapeake Estates Pump Tank #11	• 1% chance storm with sea level rise by 2100	**Low**	wooded area behind adjacent structures	• Bio-swale to forested area • Floodproofing
Elkton Pump Station 13002	• Within 500yr floodplain, 1% chance storm with sea level rise by 2100	**Medium**	little natural protection	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns • Floodproofing • Backup generator
Elkton Pump Station 17001	• 1% chance storm with sea level rise by 2100	**Low**	wooded area behind adjacent structures	• Bio-swale to forested area • Floodproofing
Frenchtown Road Pump Station #49	• Within 500yr floodplain	**Medium**	large forested area surrounds facility	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns • Floodproofing, Backup generator
South Chesapeake City Pump Station	• Within 100yr floodplain, 1% chance storm with sea level rise by 2100	**High**	little natural protection	• Constructed wetland with infiltration berms and retentive grading • Rain garden and cisterns • Floodproofing • Backup generator

Appendix II – Nuisance Flooding Committee Members

AGENCY
Cecil County Department of Emergency Services
Cecil County DLUDS – Planning
Cecil County DLUDS – Zoning
Cecil County DLUDS – GIS
Cecil County DPW - Stormwater
Cecil County DPW - Stormwater
Cecil County DPW - Roads
Environmental Health Department
Cecil County - Public Information Officer
Cecil County Sheriff's Office
Maryland Department of Transportation – State Highway Administration
Town of Cecilton
Town of Charlestown
Town of Chesapeake City
Town of Elkton
Town of North East
Town of Perryville
Town of Port Deposit
Town of Rising Sun
Sea Grant Extension Office
Eastern Shore Land Conservancy
Cecil Soil Conservation District
Critical Area Commission
Maryland Park Service
Artesian Water, Inc.

Appendix III- Nuisance Flood Documentation Tool

Nuisance Flooding Report

Cecil County Department of Emergency Services

Submitted By: Paula Robinson
Date/Time Submitted: Jun 16, 2020 at 12:12

Definition

Nuisance Flooding: High tide flooding that causes a public inconvenience. Frequently referred to as "sunny-day" flooding, it is typically unrelated to storm events. It may be exacerbated by long duration wind events, passing storm systems, and tides. It dissipates quickly.

General Information

Date of Flooding: Jun 16, 2020 **Time of Flooding:** 1211

Reporting Information

Location of Flooding: 107 Chesapeake Blvd Suite 108 Elkton, MD 21901
Name of Caller: Paula Robinson

Phone Number of Caller: 4439074086
CAD Event #: 123456789
Impacts of the Flooding: None -– this is a test

Notifications (If Necessary)

Cecil County Departments : Emergency Services
OutsideAgencies: None

Actions Taken: None – this is a test

Appendix IV - Nuisance Flooding Location Maps

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
200 block of Delaware Ave, Elkton, MD

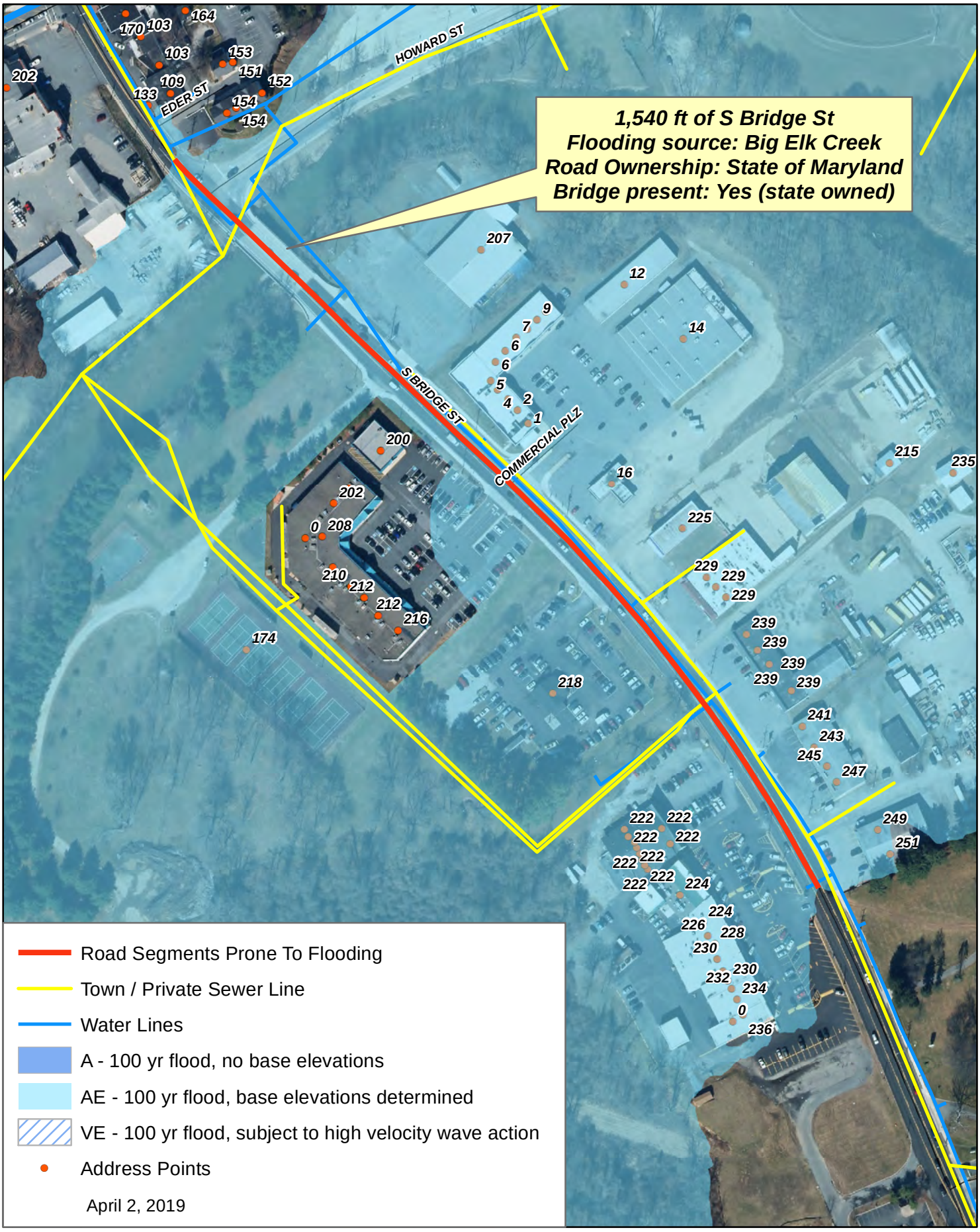
DRAFT 07/28/2020

Map 1

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
100 block of Howard St, Elkton, MD

DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
100 and 200 block of S Bridge St, Elkton, MD



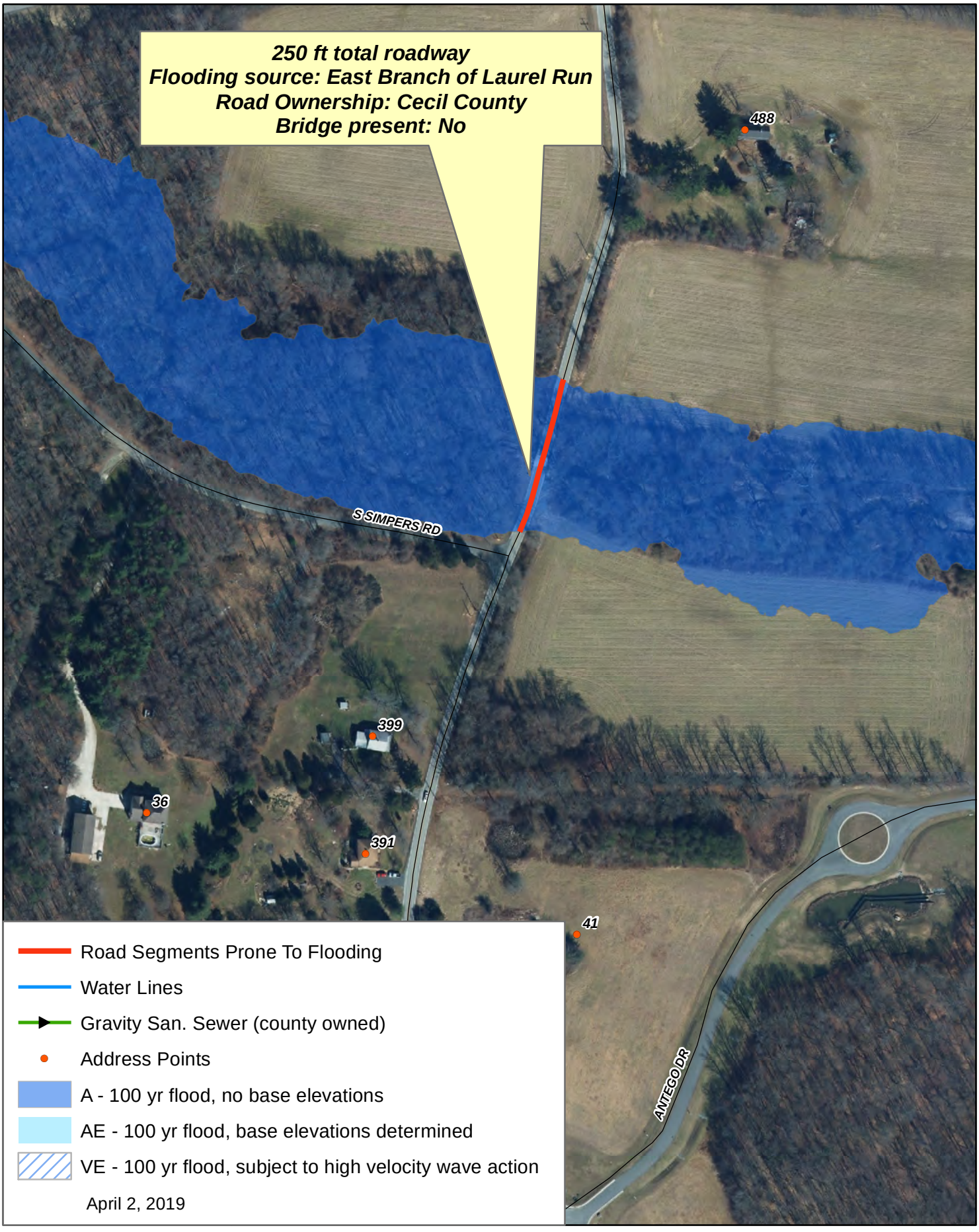
DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Vicinity of 300 block of Fletchwood Rd, Elkton, MD

DRAFT 07/28/2020

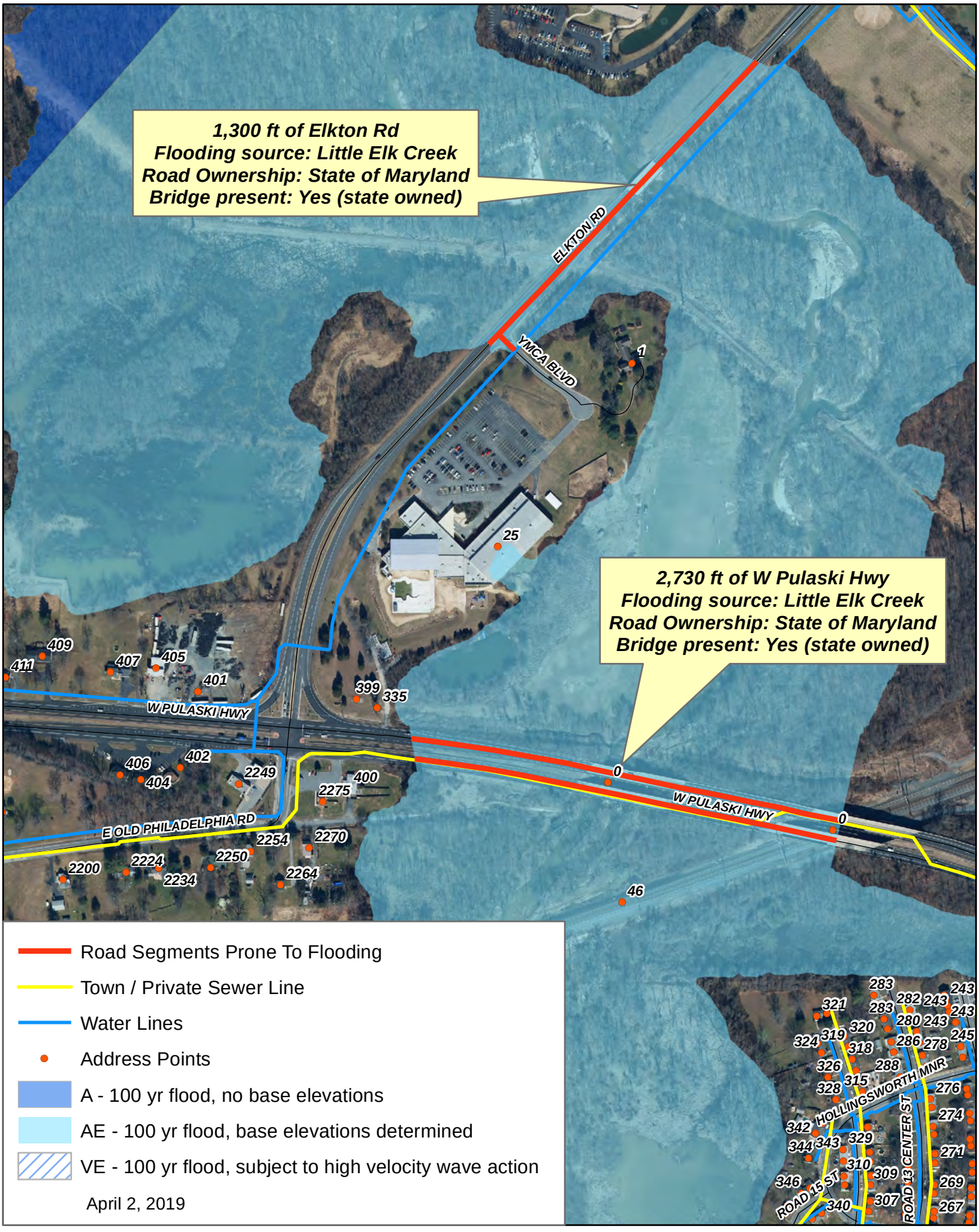
Map 4

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Intersection of Deaver Rd and S Simpers Rd, Elkton, MD



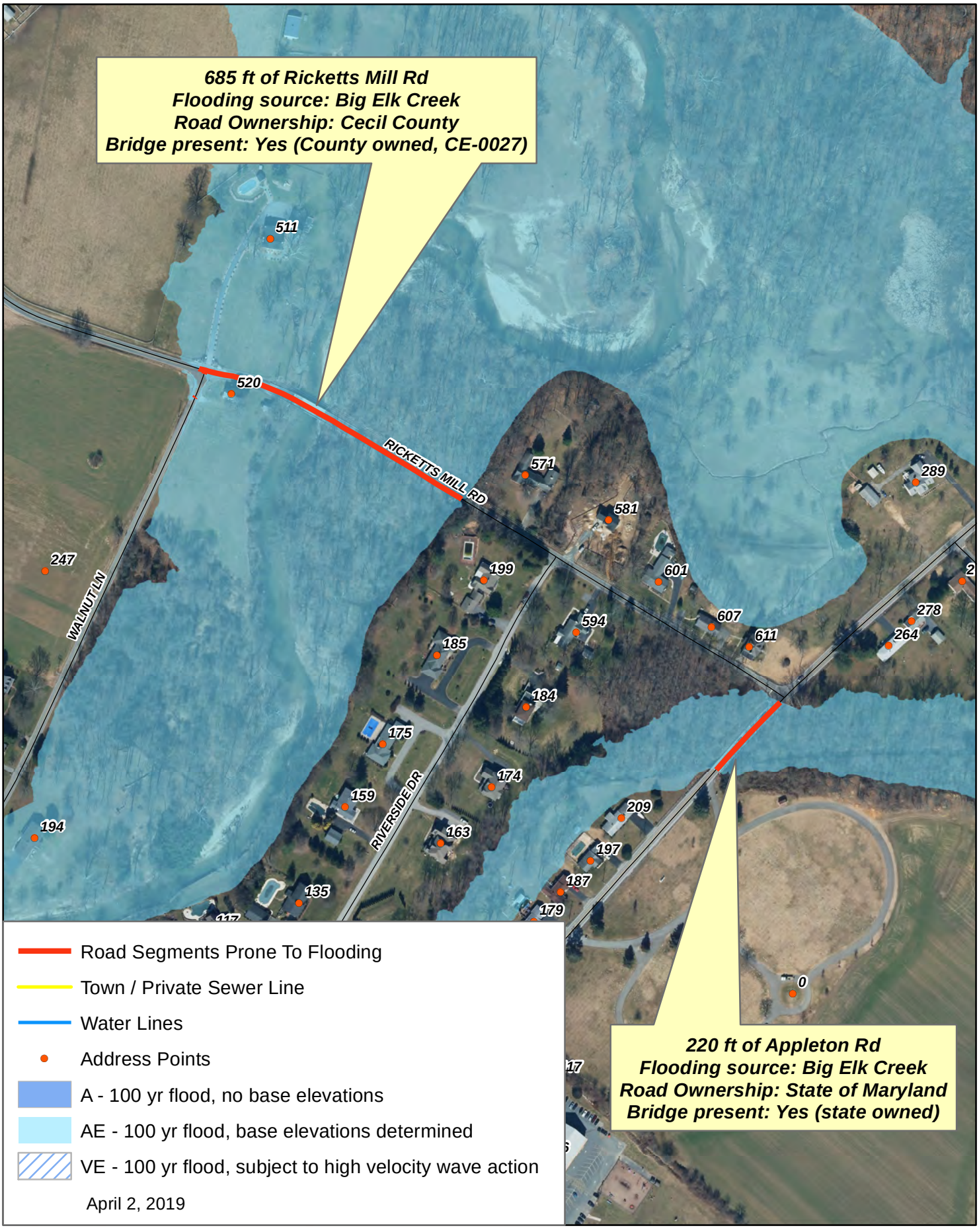
DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Elkton Rd and W Pulaski Hwy, Elkton, MD



DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Ricketts Mill Rd and Appleton Rd, Elkton, MD

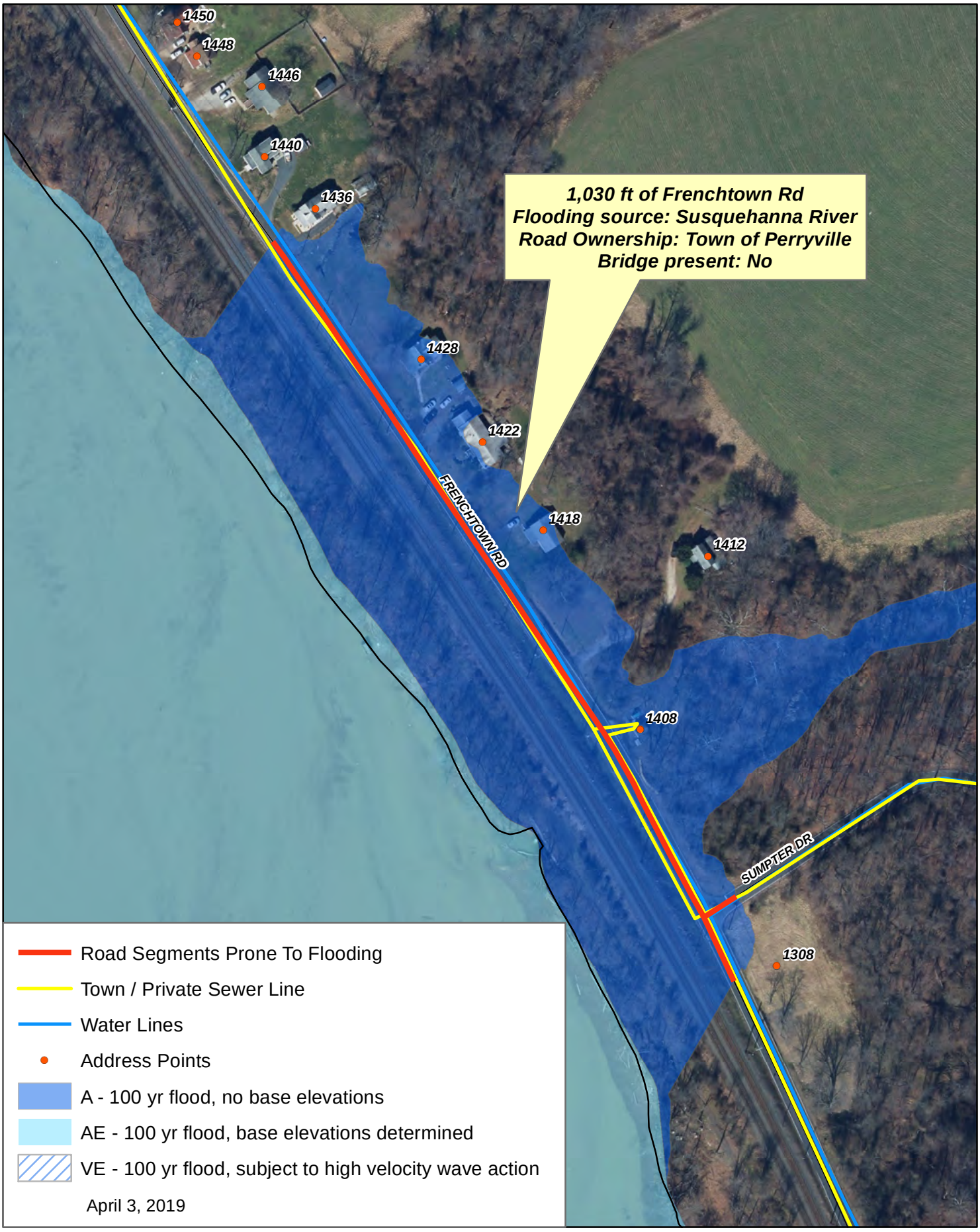


DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
900 block of Broad St, Perryville, MD

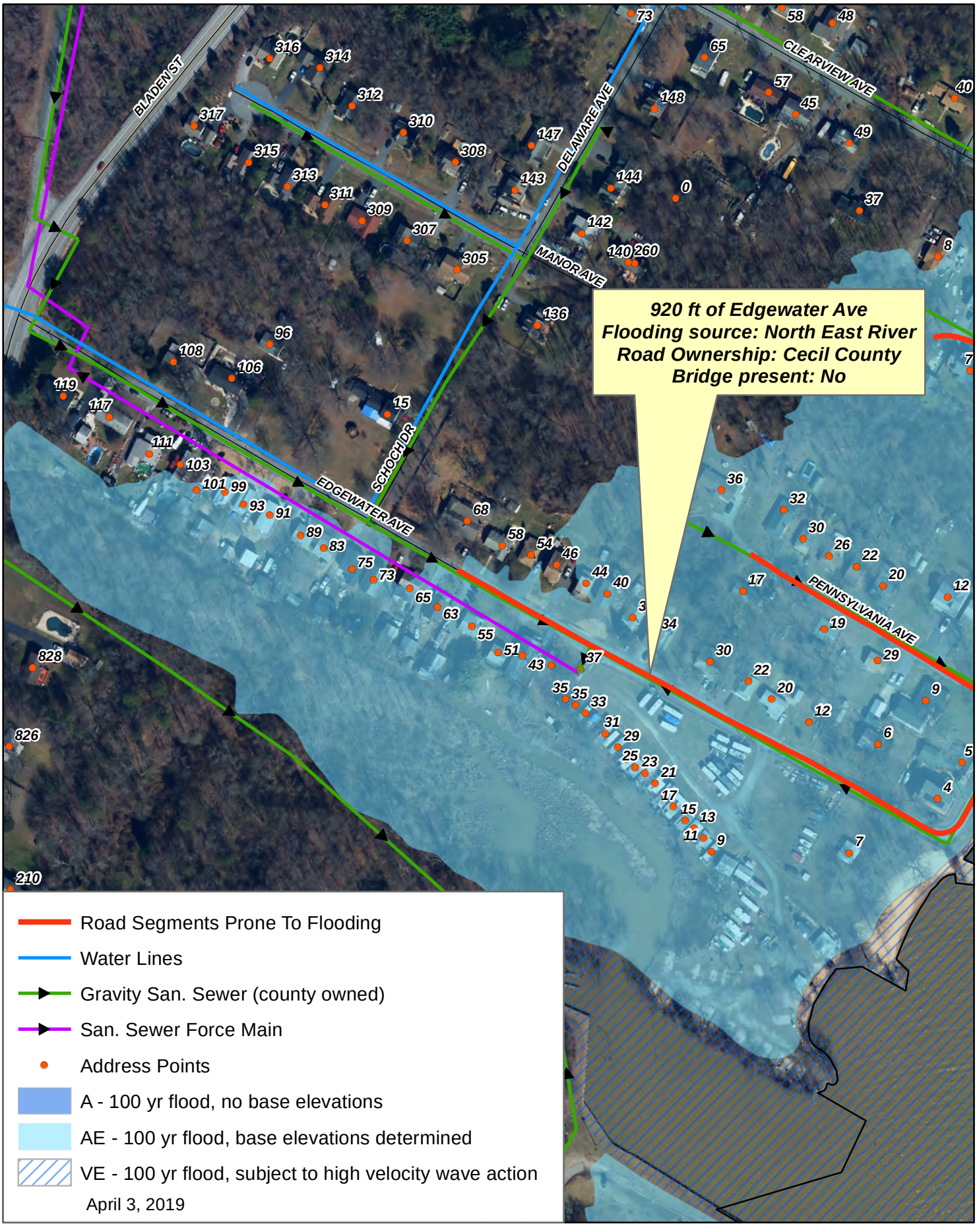
DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
1400 block of Frenchtown Rd, Perryville, MD



DRAFT 07/28/2020

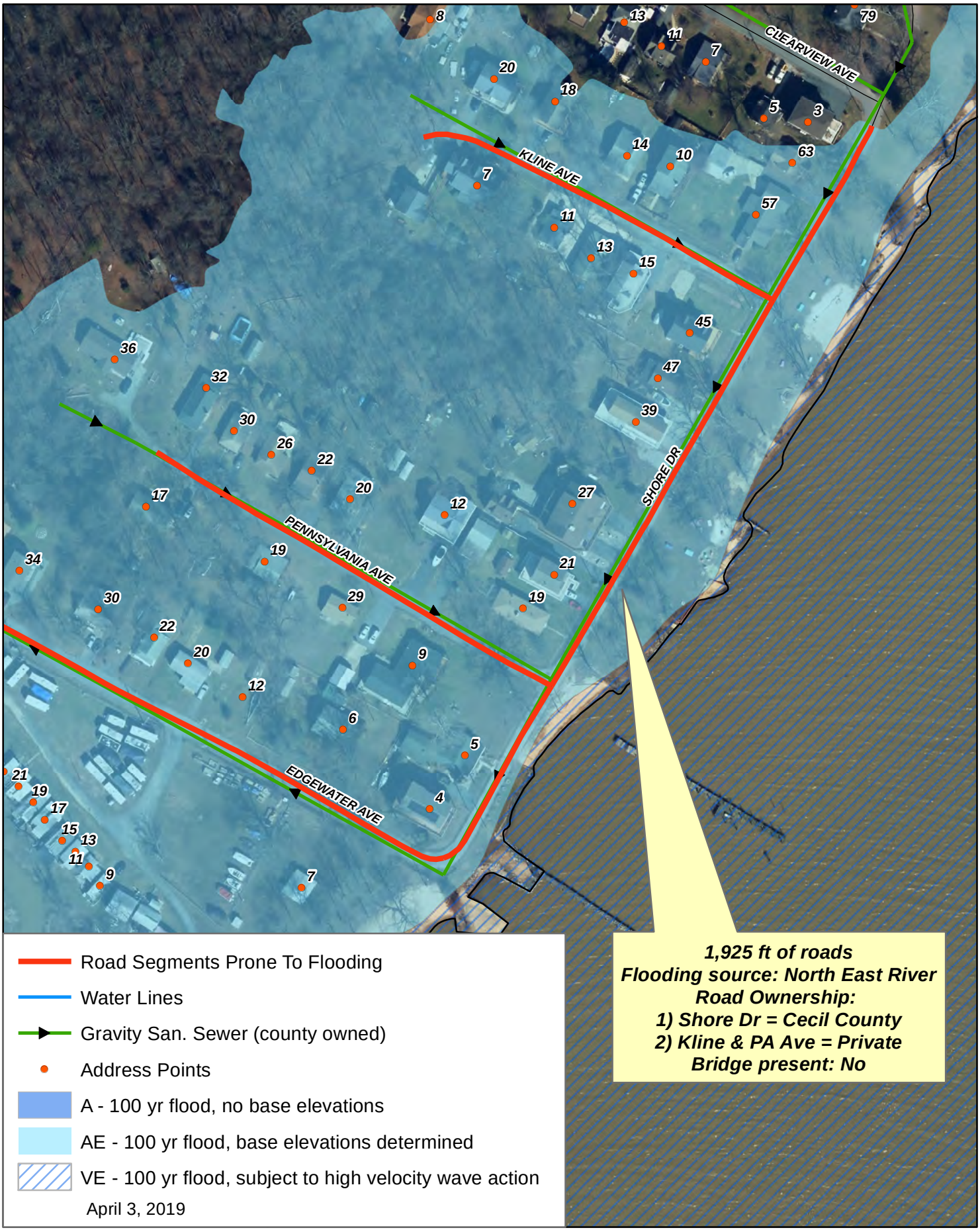
Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Edgewater Ave, Charlestown, MD



DRAFT 07/28/2020

Map 10

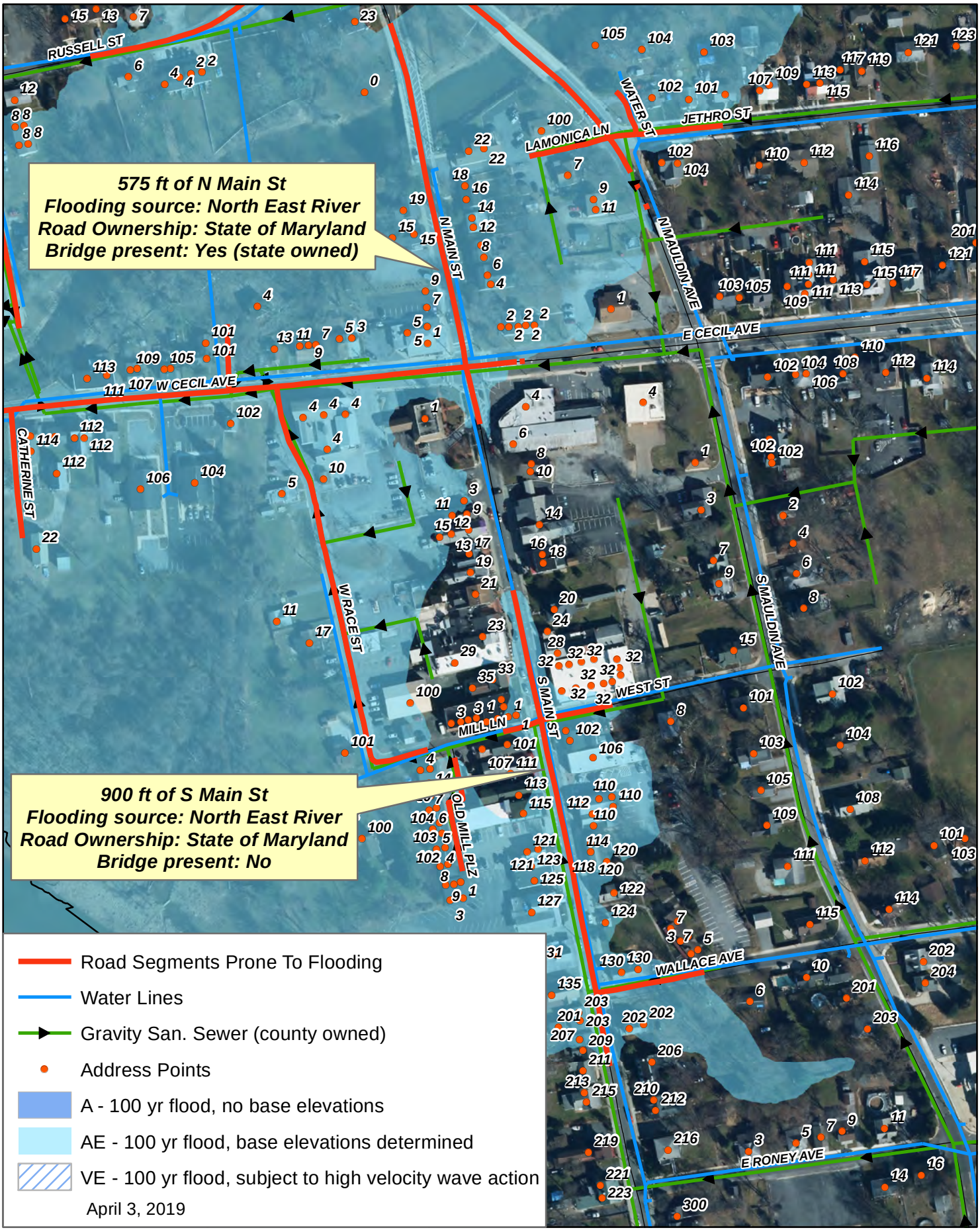
Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Shore Dr, Pennsylvania Ave, and Kline Ave, Charlestown, MD



DRAFT 07/28/2020

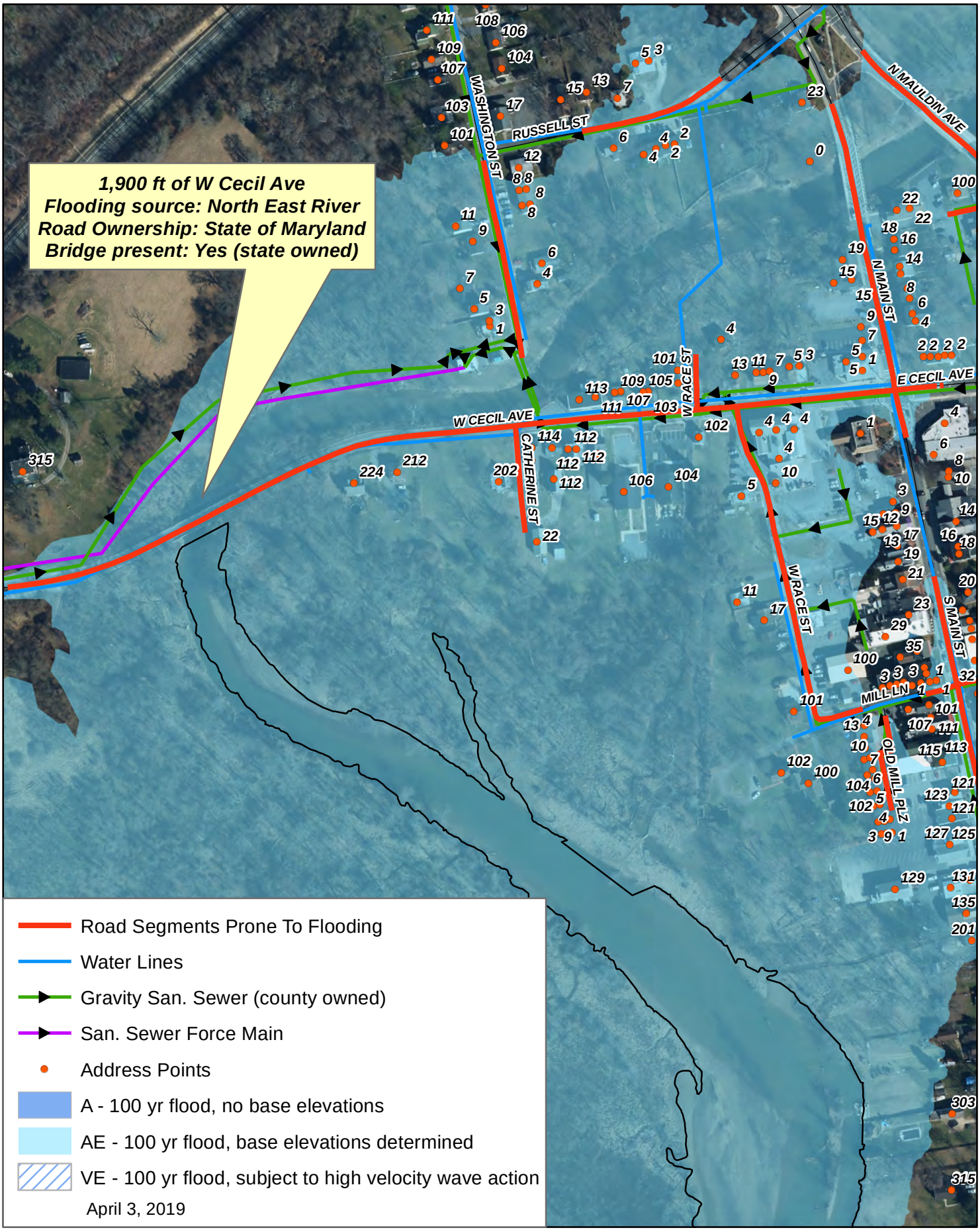
Map 11

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
N Main St (unit block) and S Main St (0-100 block), North East, MD



DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
W Cecil Ave (0-200 block), North East, MD



DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Washington St (unit block), North East, MD

DRAFT 07/28/2020

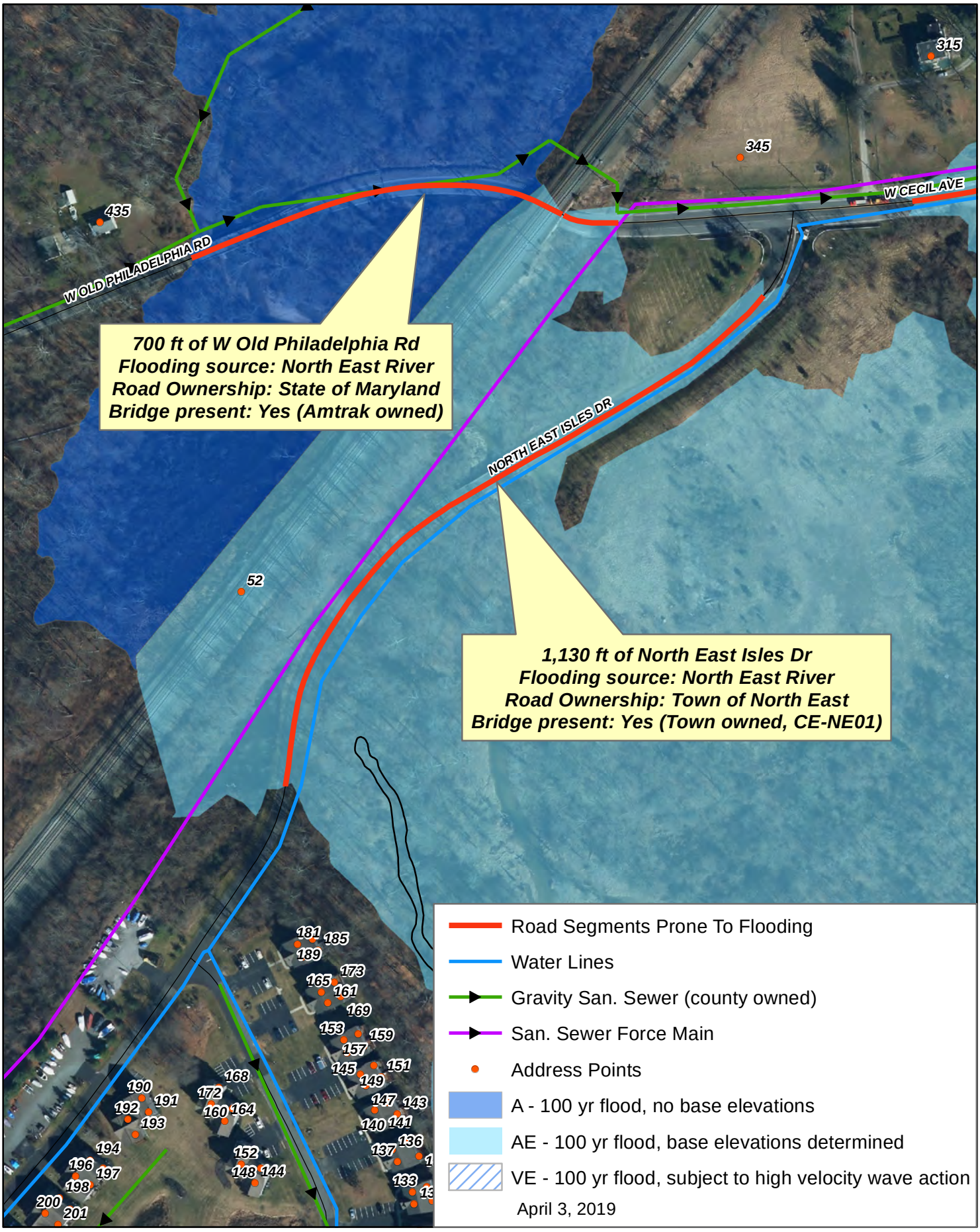
Map 14

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
W Race St (0-100 block), North East, MD

DRAFT 07/28/2020

Map 15

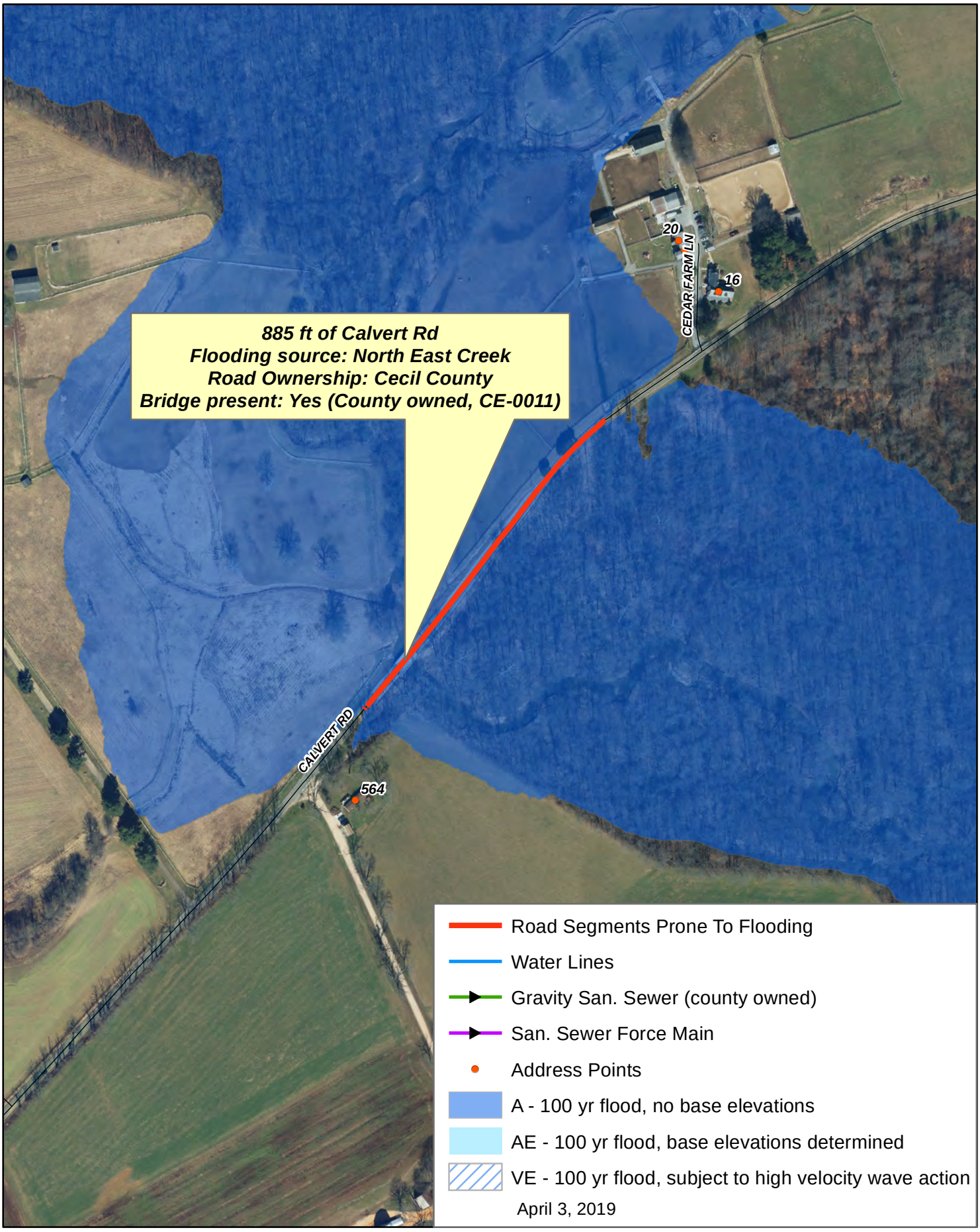
Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
W Old Philadelphia Rd & North East Isles Dr, North East, MD



DRAFT 07/28/2020

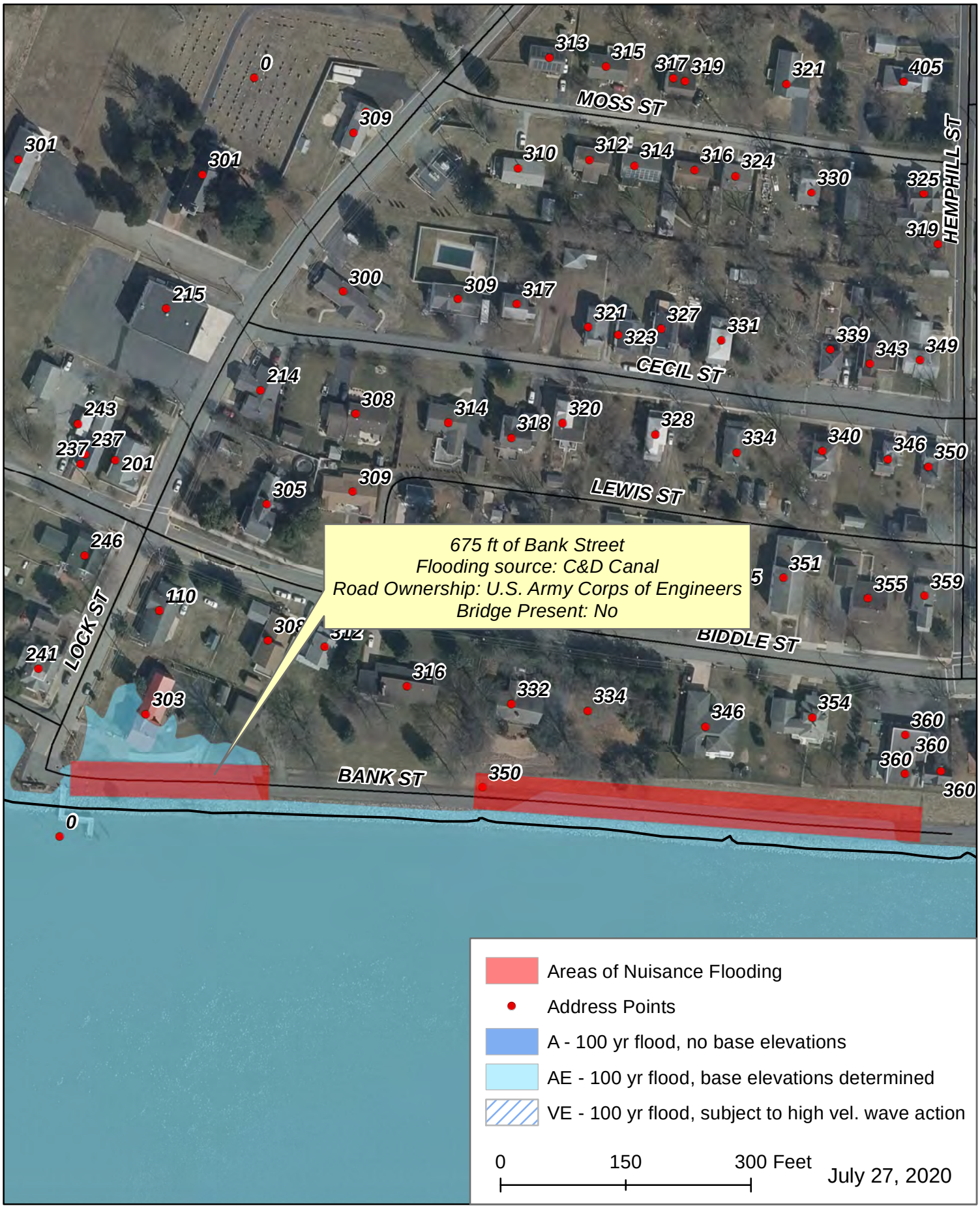
Map 16

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan Flooding 500 block of Calvert Rd, Rising Sun, MD



DRAFT 07/28/2020

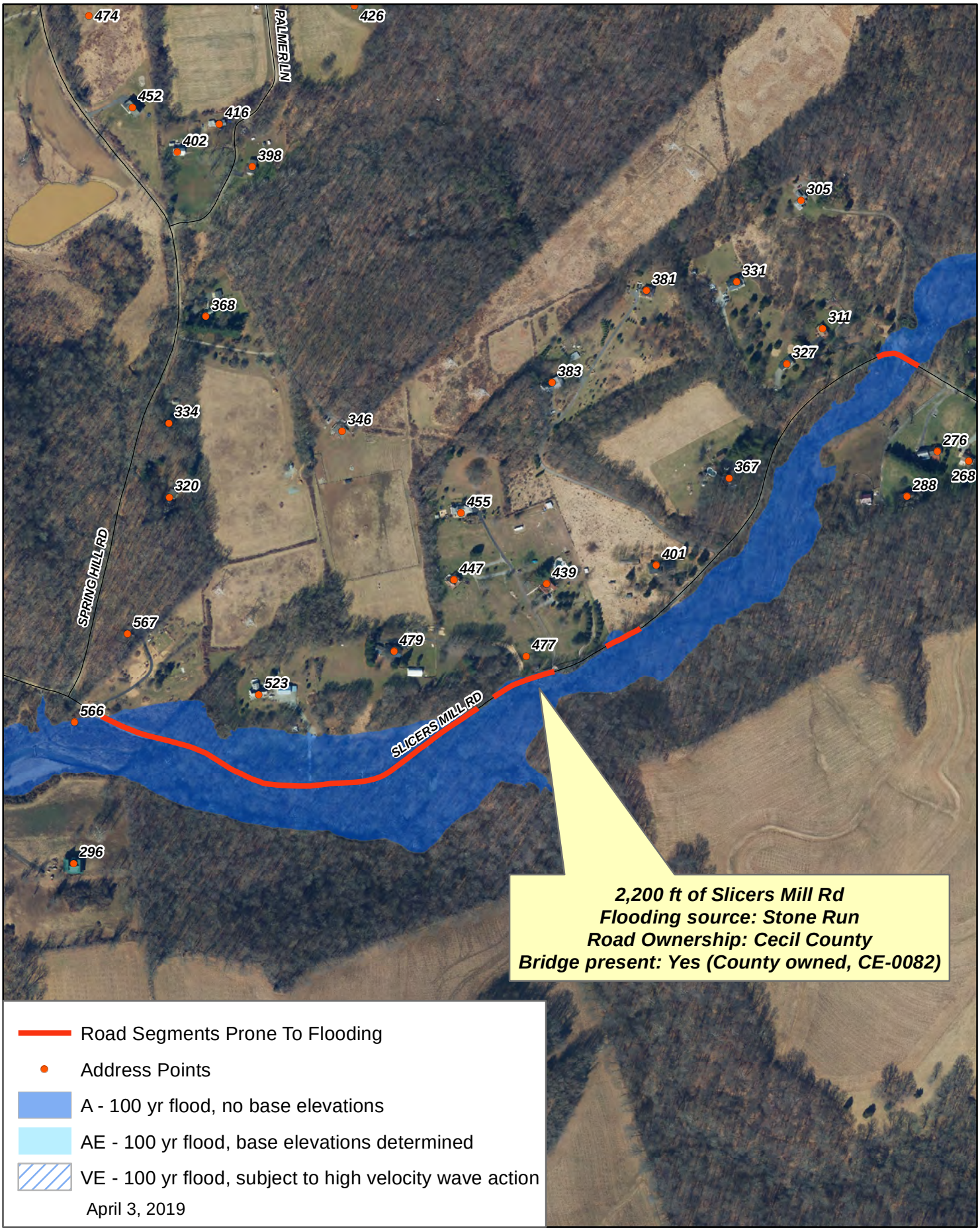
Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Bank Street, Chesapeake City, MD



DRAFT 07/28/2020

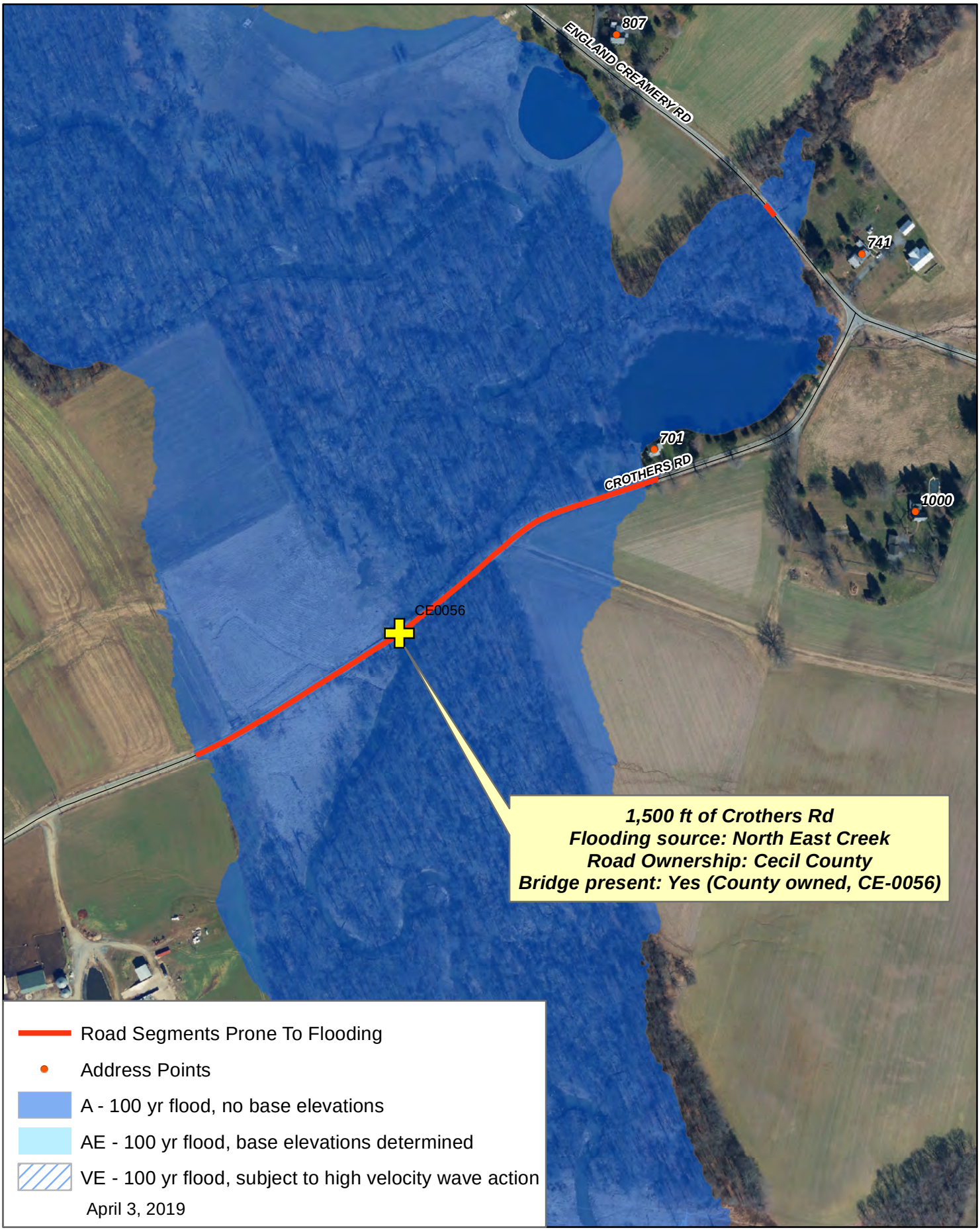
Map 18

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
300-500 block of Slicers Mill Rd, Rising Sun, MD



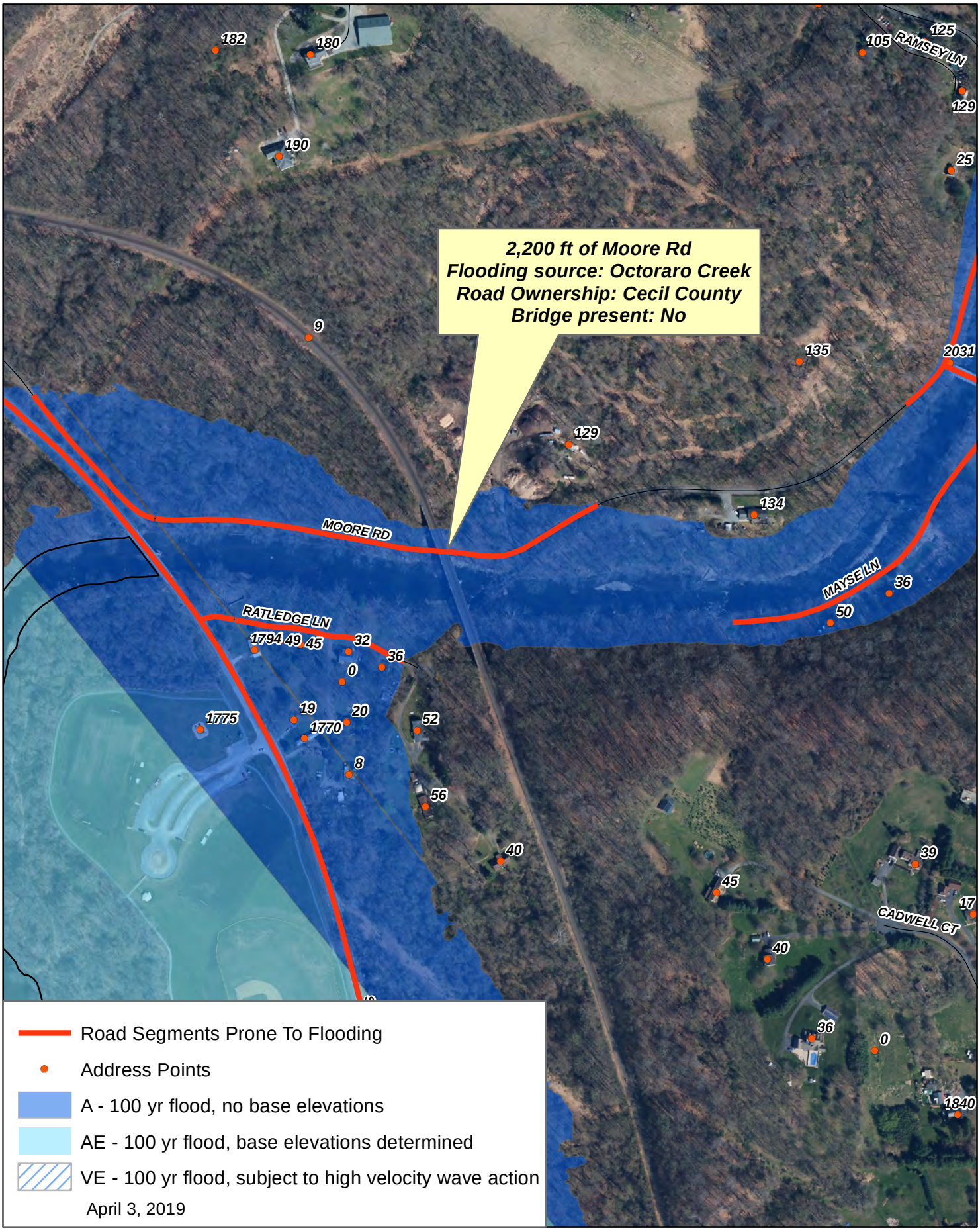
DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Crothers Rd & England Creamery Rd, Rising Sun, MD



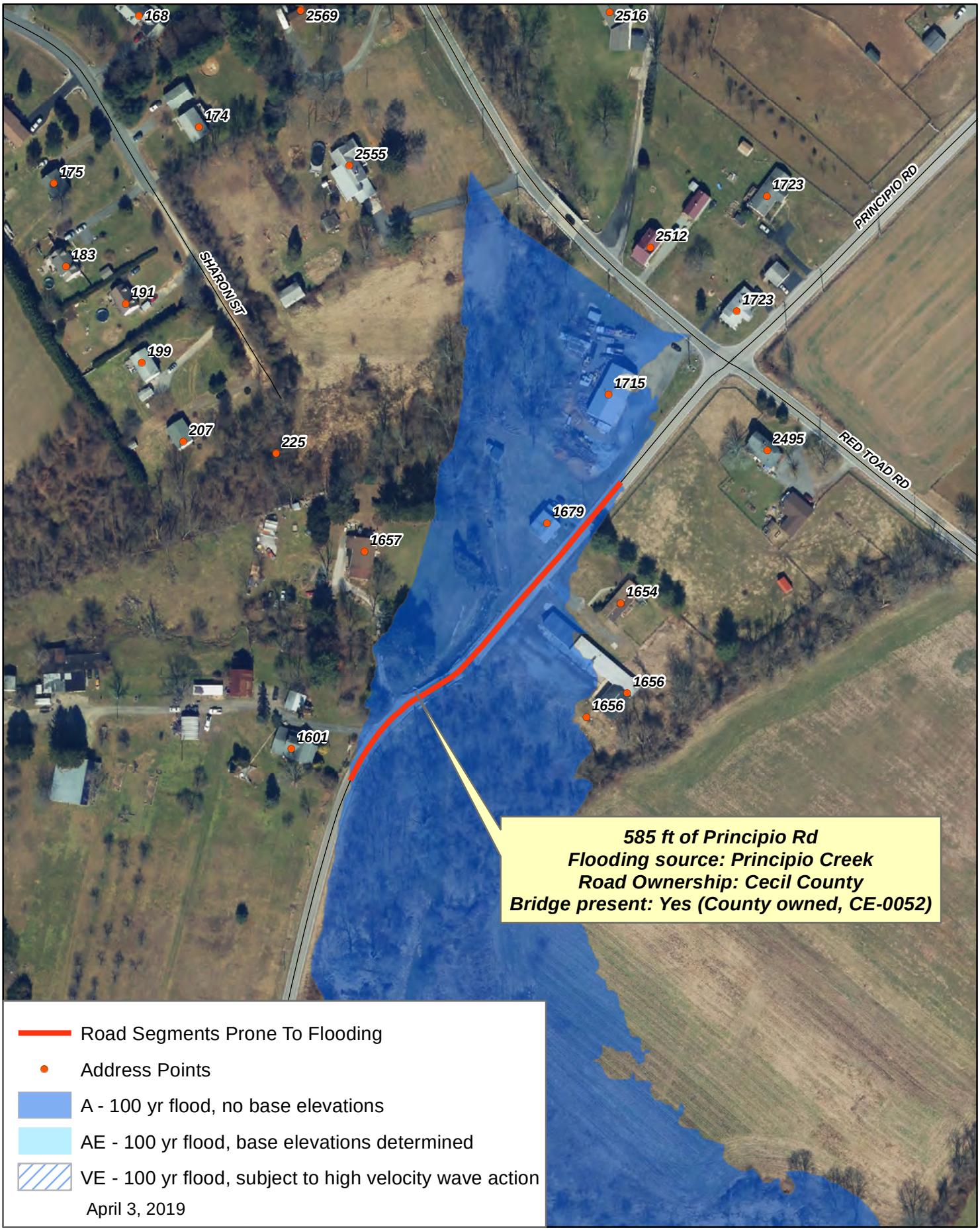
DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Moore Rd (0-100 block), Conowingo, MD



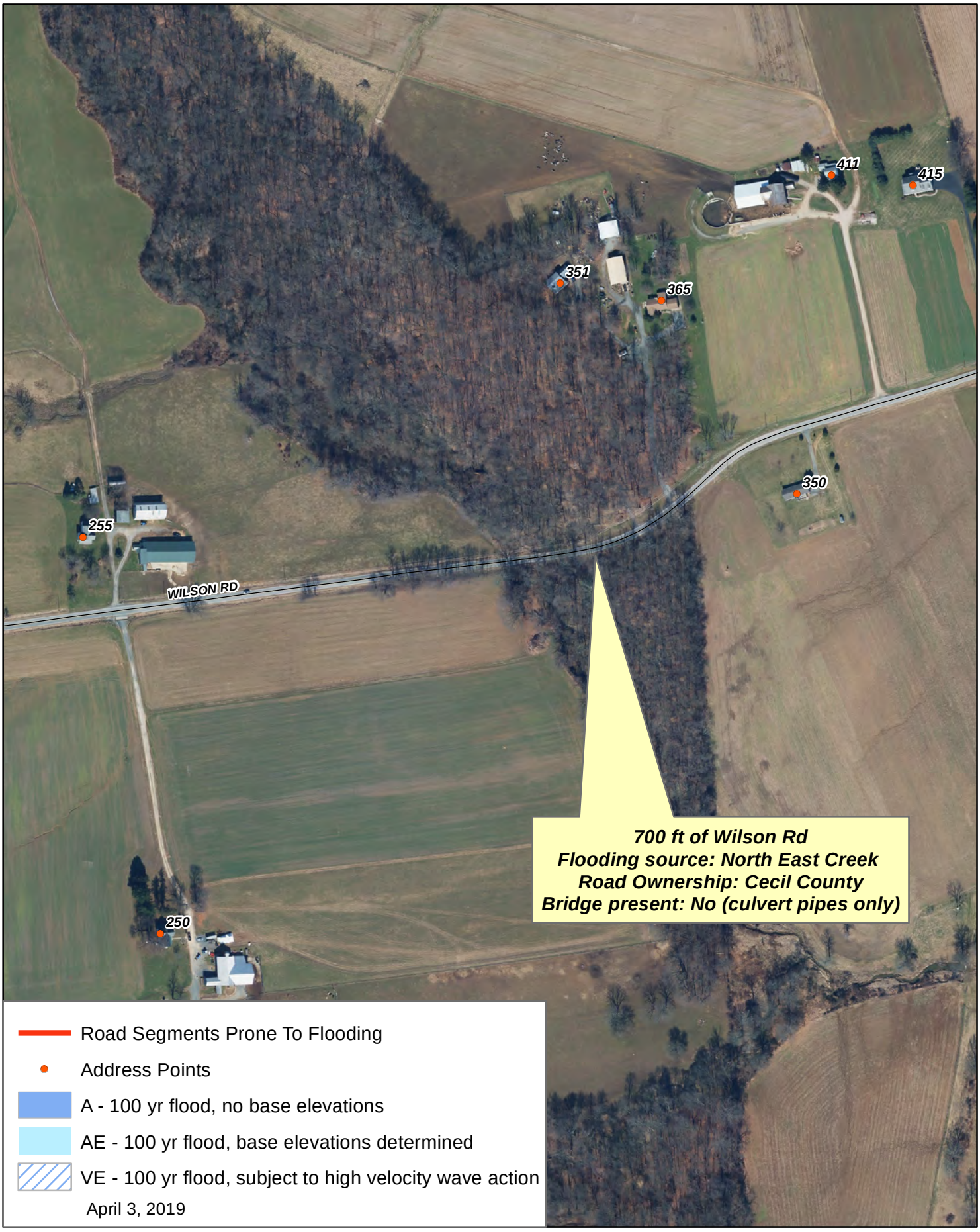
DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Principio Rd (1800 block), Port Deposit, MD



DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Wilson Rd (300 block), Rising Sun, MD



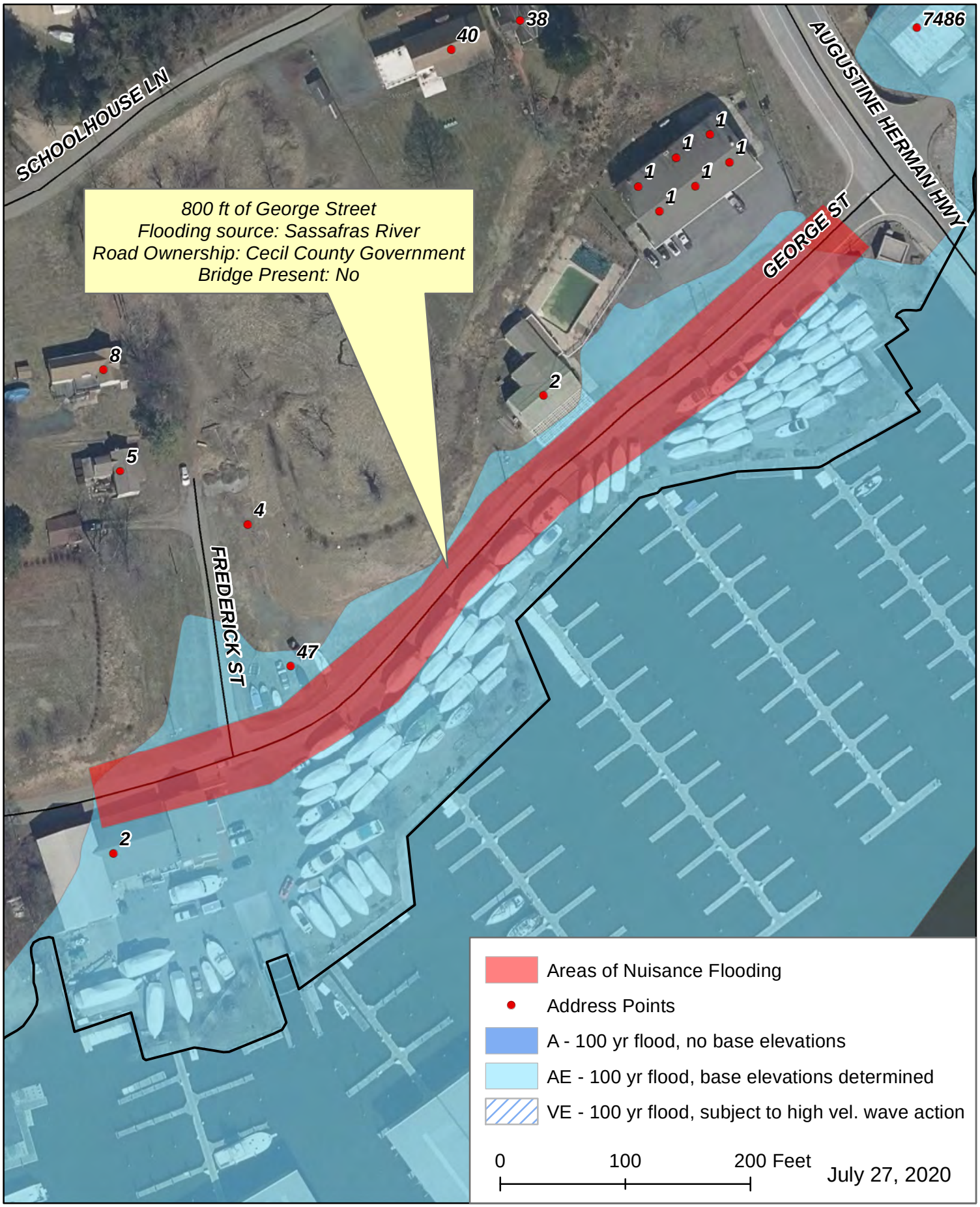
DRAFT 07/28/2020

Inventory of roads and bridges that are vulnerable to flooding from the Cecil County Green Infrastructure Plan
Oldfield Point Rd at Jones Creek, Elkton, MD

DRAFT 07/28/2020

Map 24

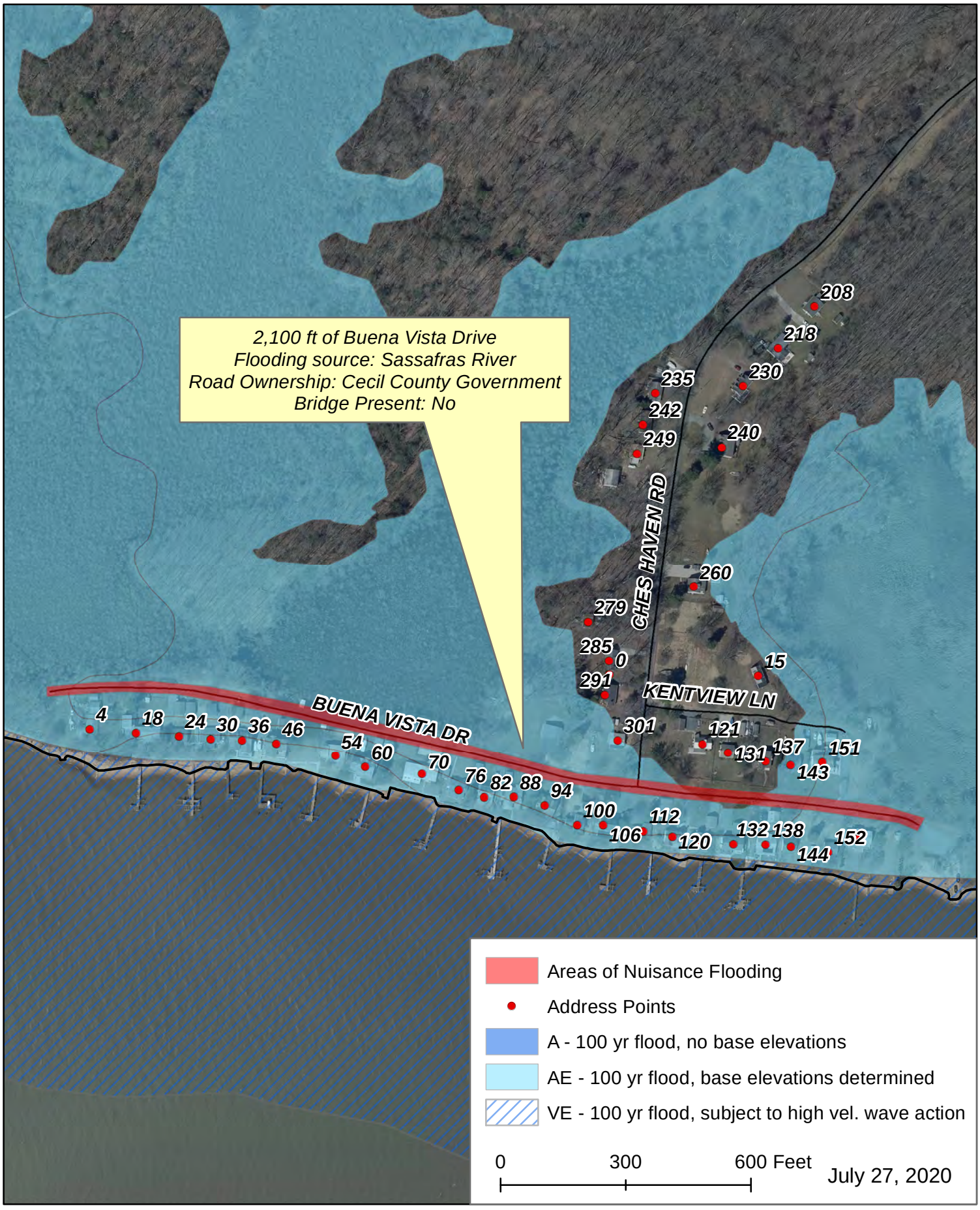
Other Locations Identified by Nuisance Flood Plan Work Group
George Street, Fredericktown, MD



DRAFT 07/28/2020

Map 25

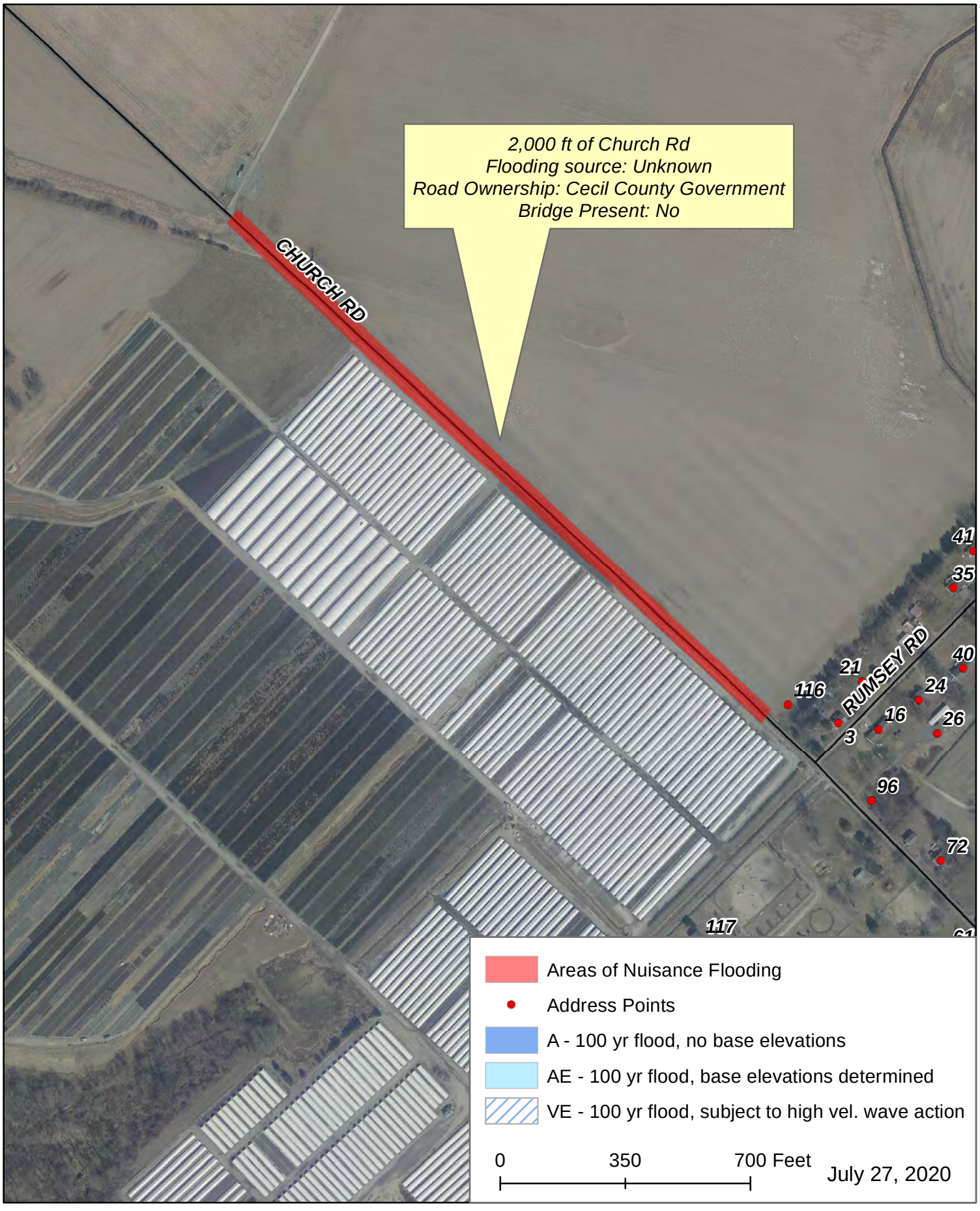
Other Locations Identified by Nuisance Flood Plan Work Group
Buena Vista Drive, Earleville, MD



DRAFT 07/28/2020

Map 26

Other Locations Identified by Nuisance Flood Plan Work Group
Church Road, Warwick, MD



DRAFT 07/28/2020

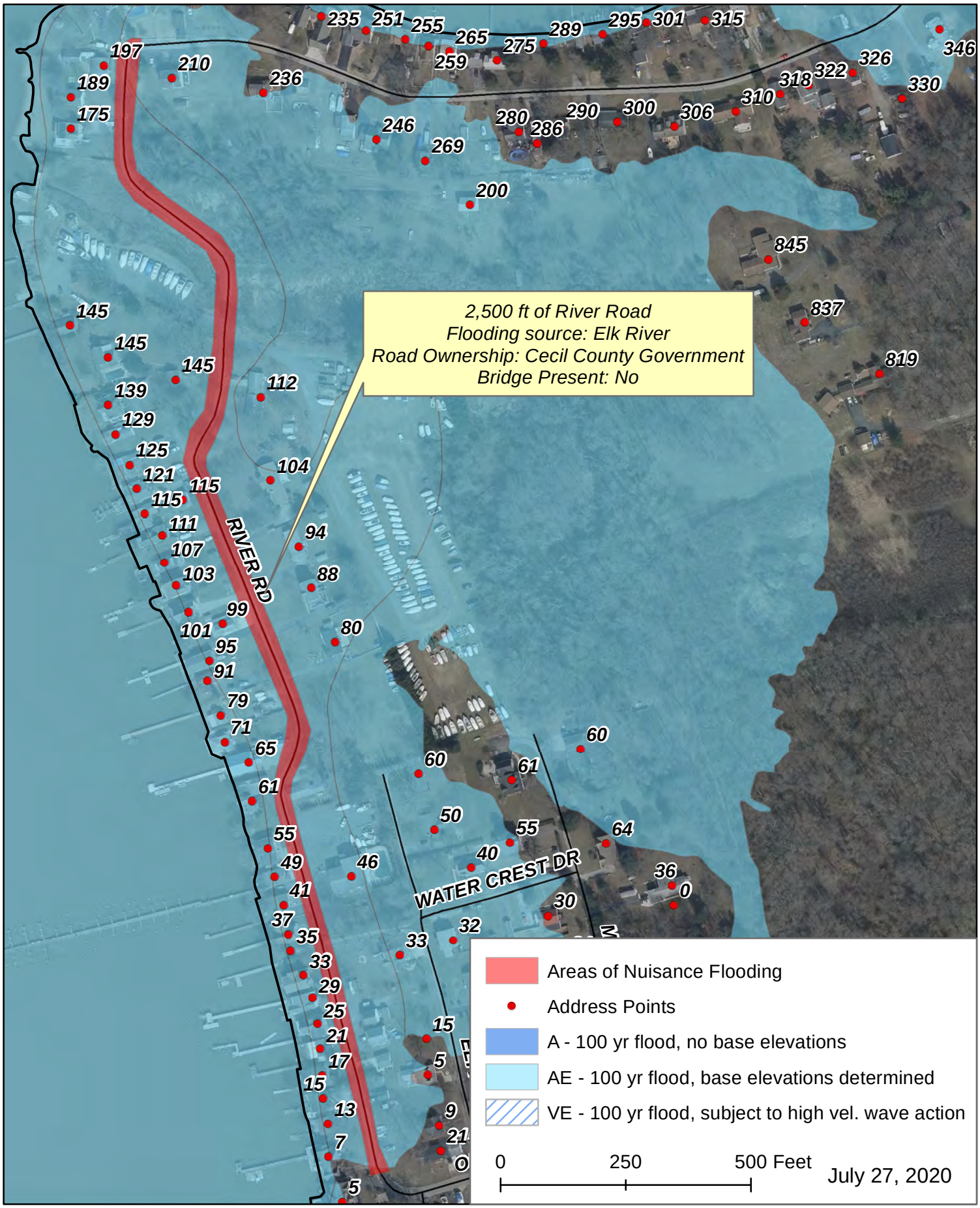
Map 27

Other Locations Identified by Nuisance Flood Plan Work Group
Glebe Road, Earleville, MD

DRAFT 07/28/2020

Map 28

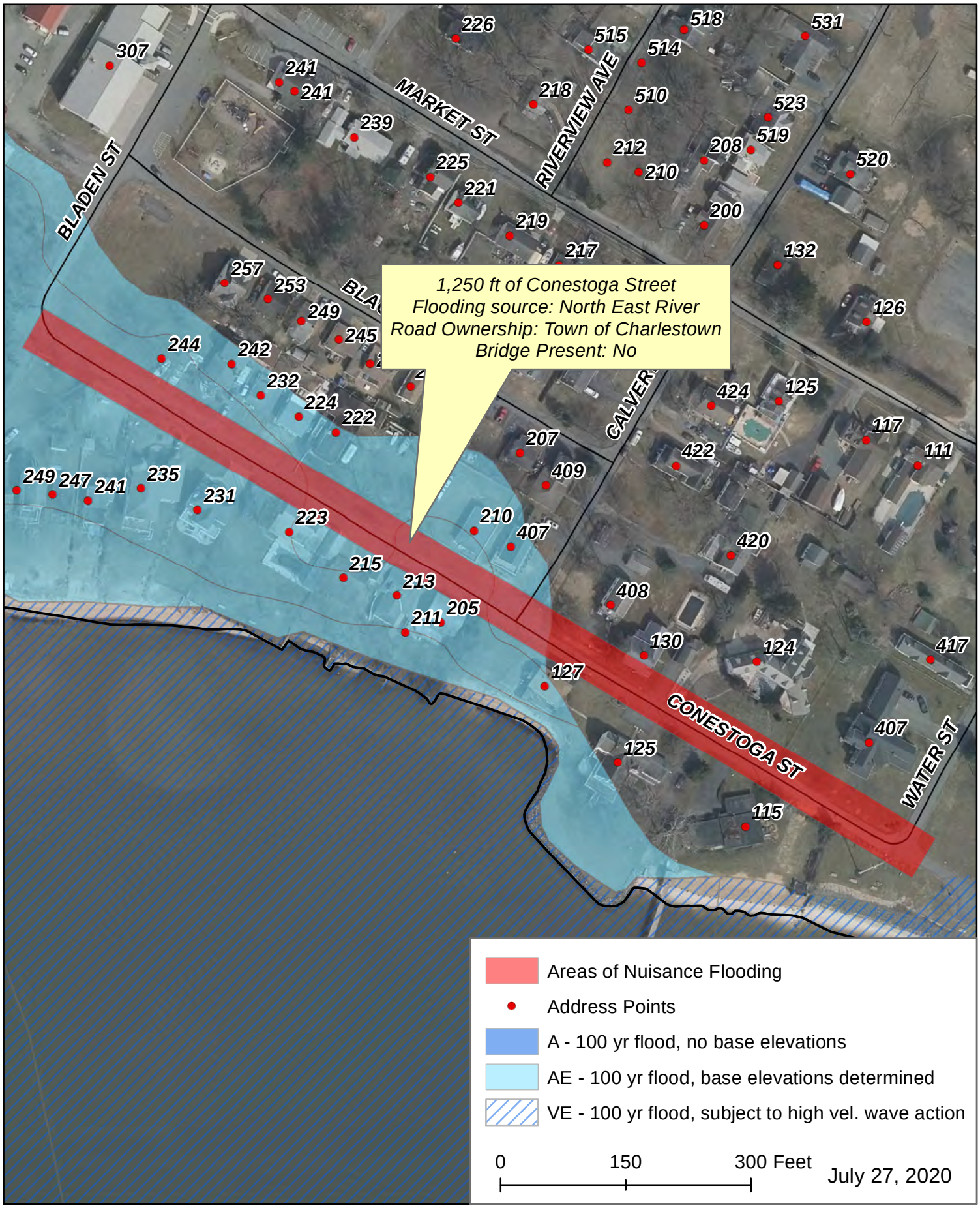
Other Locations Identified by Nuisance Flood Plan Work Group
River Road, Elkton, MD



DRAFT 07/28/2020

Map 29

Other Locations Identified by Nuisance Flood Plan Work Group
Conestoga St, Charlestown, MD



DRAFT 07/28/2020

Map 30

Other Locations Identified by Nuisance Flood Plan Work Group
Water St, Charlestown, MD

DRAFT 07/28/2020

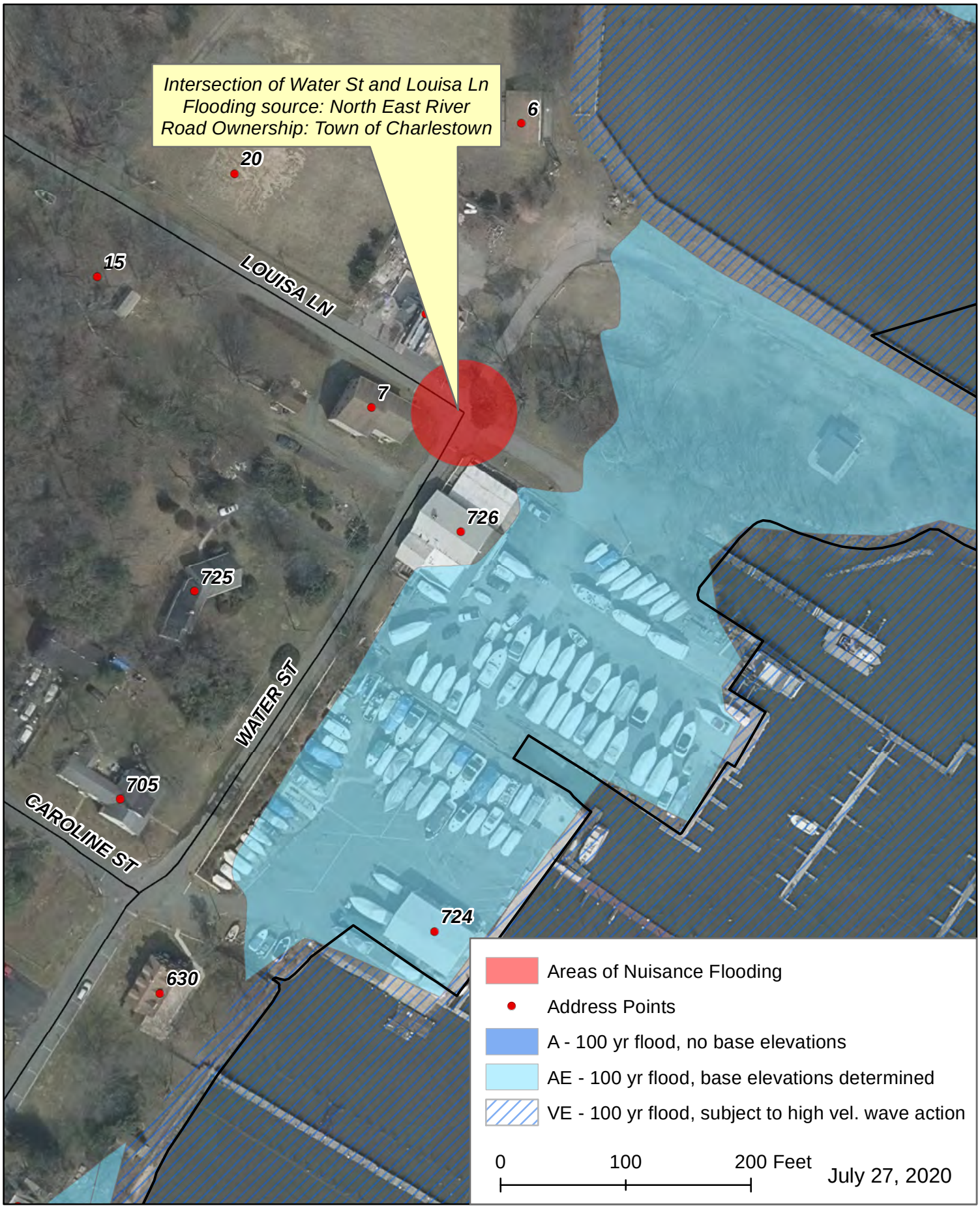
Map 31

Other Locations Identified by Nuisance Flood Plan Work Group
Long Point Park, Charlestown, MD

DRAFT 07/28/2020

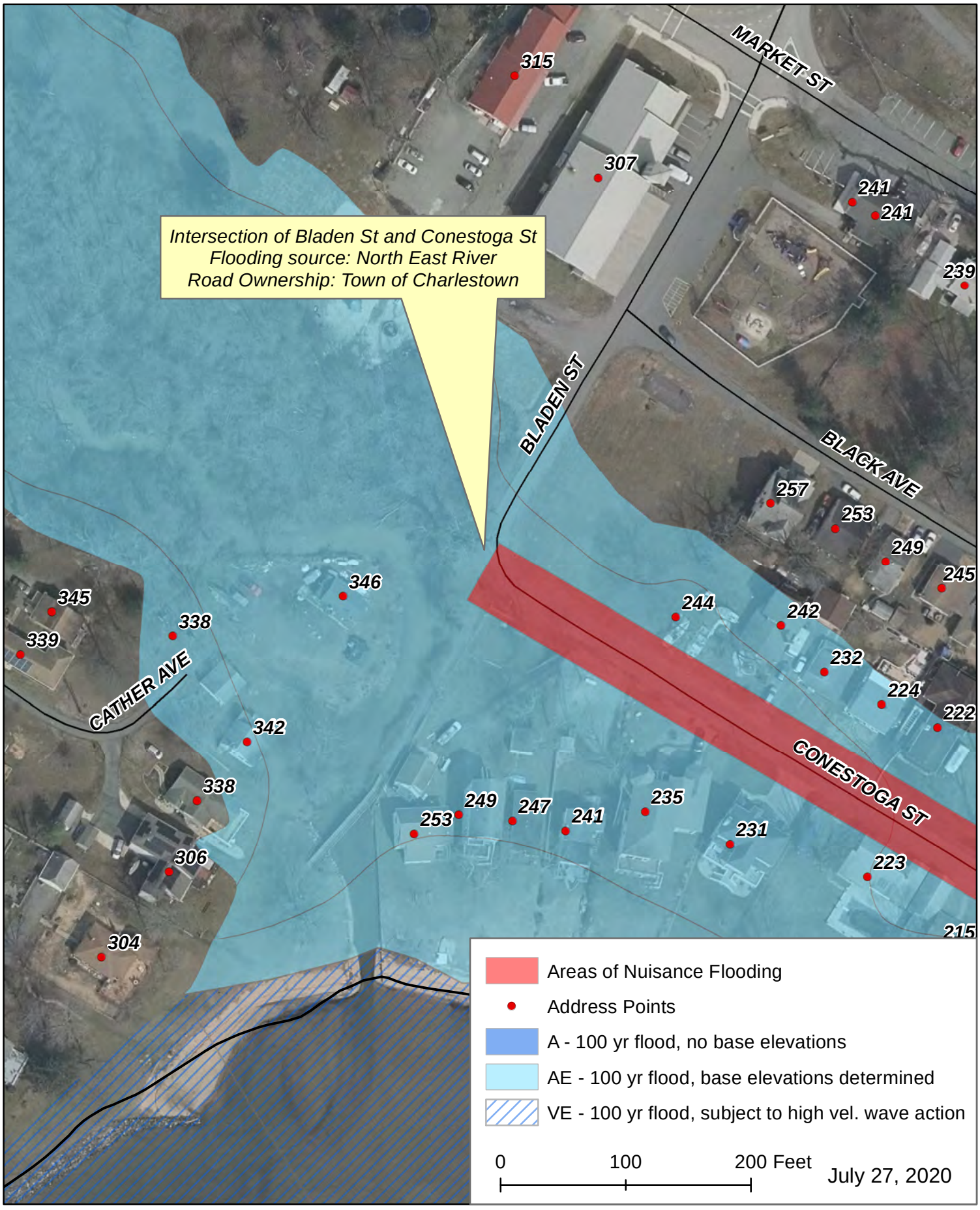
Map 32

Other Locations Identified by Nuisance Flood Plan Work Group
Water St and Louisa Ln, Charlestown, MD



DRAFT 07/28/2020

Other Locations Identified by Nuisance Flood Plan Work Group
Bladen St and Conestoga St, Charlestown, MD



DRAFT 07/28/2020

Map 34

Other Locations Identified by Nuisance Flood Plan Work Group
Baltimore St (Foot Log Beach), Charlestown, MD

DRAFT 07/28/2020

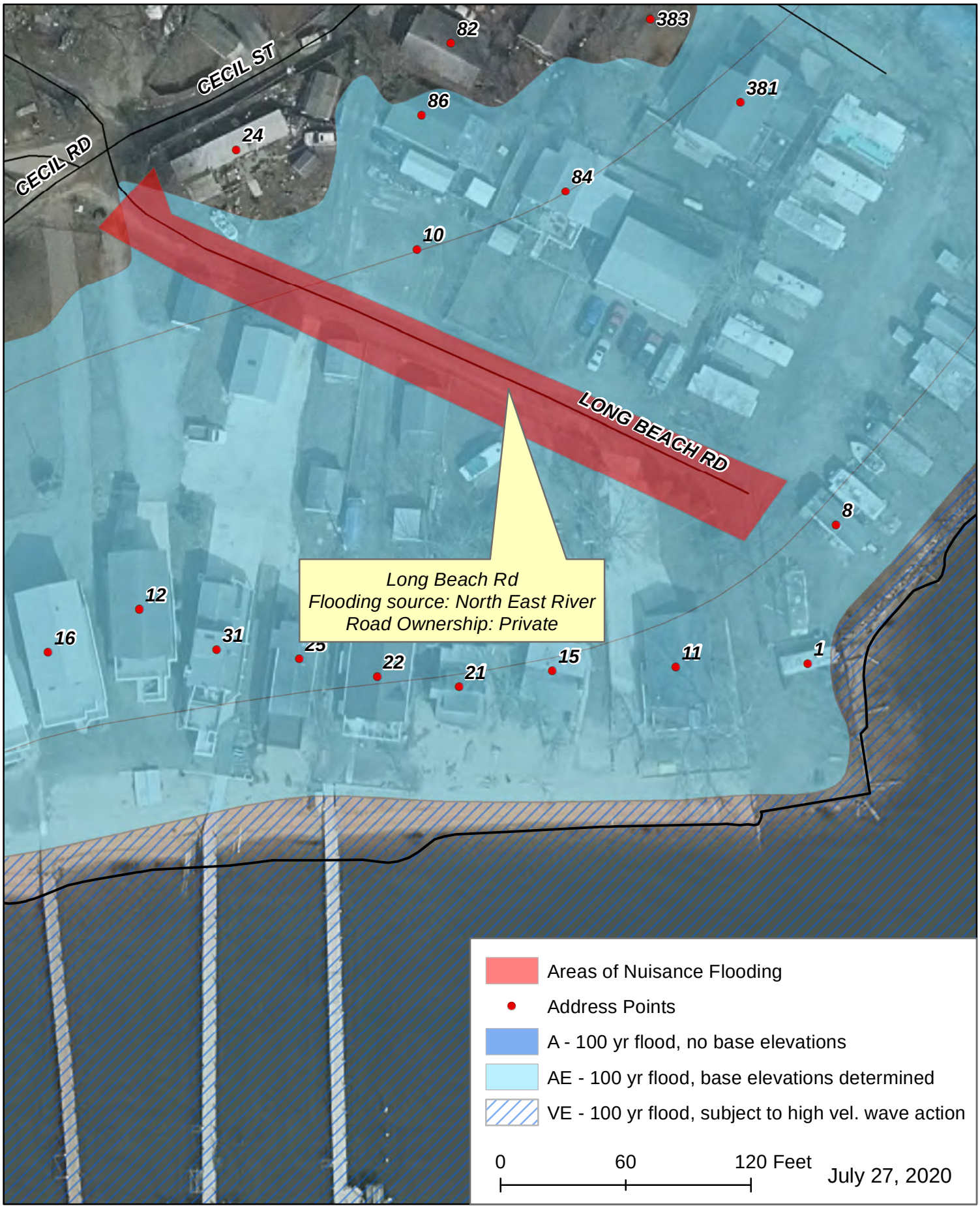
Map 35

Other Locations Identified by Nuisance Flood Plan Work Group
Colonial Drive (at beach), Charlestown, MD

DRAFT 07/28/2020

Map 36

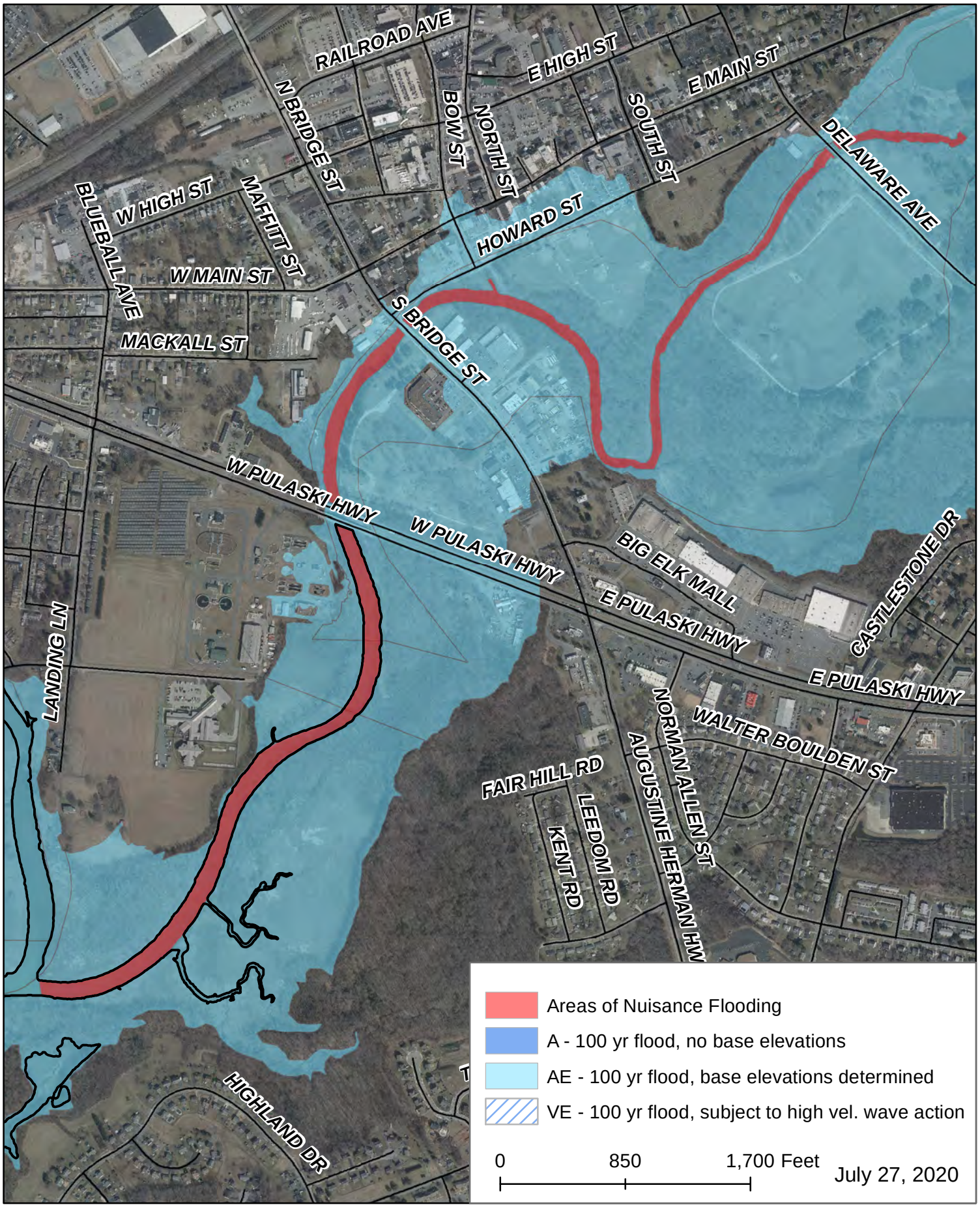
Other Locations Identified by Nuisance Flood Plan Work Group
Long Beach Rd, Charlestown, MD



DRAFT 07/28/2020

Map 37

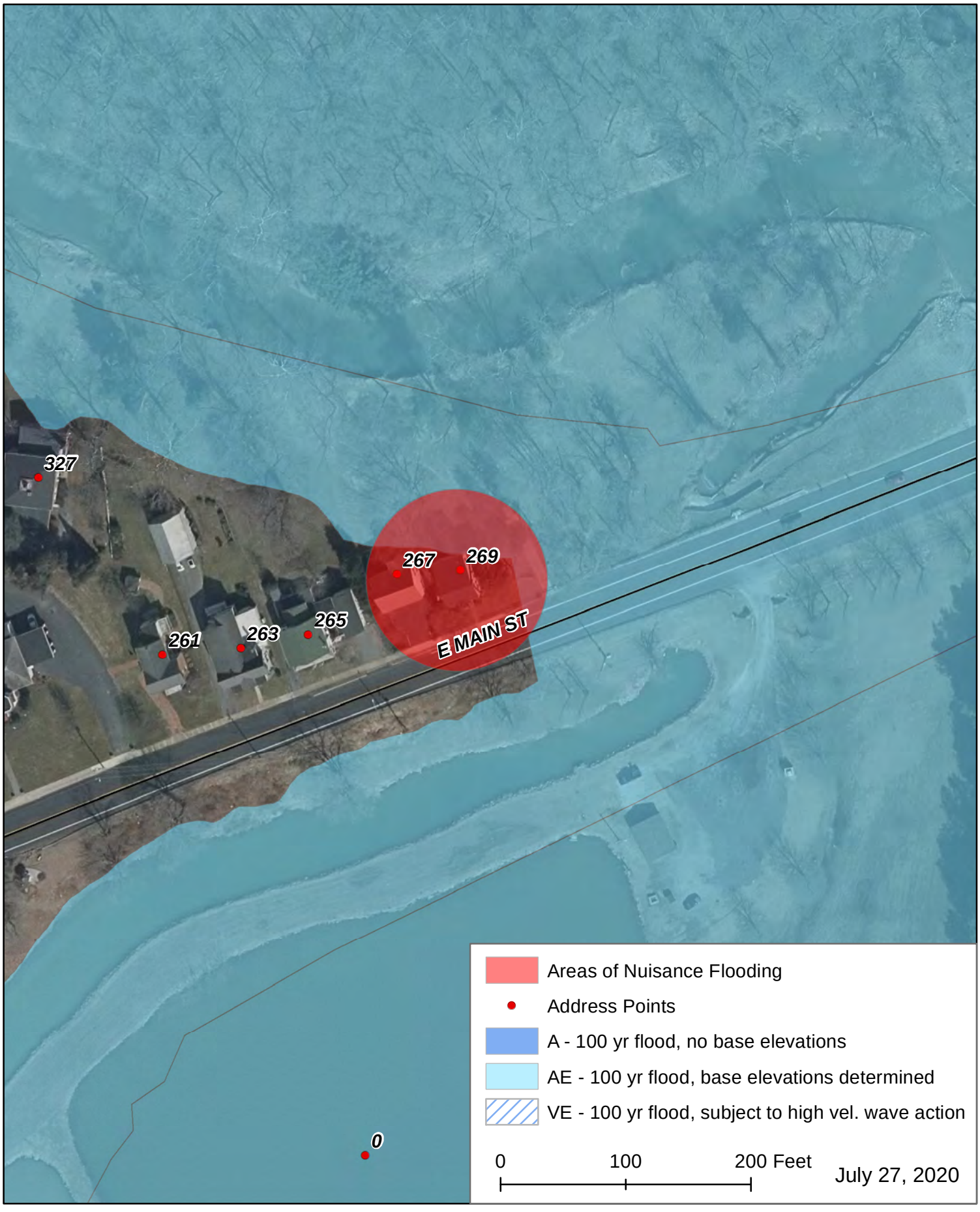
Other Locations Identified by Nuisance Flood Plan Work Group
Big Elk Creek area, Elkton, MD



DRAFT 07/28/2020

Map 38

Other Locations Identified by Nuisance Flood Plan Work Group
269 East Main Street, Elkton, MD



DRAFT 07/28/2020

Other Locations Identified by Nuisance Flood Plan Work Group
Intersection of Aiken Ave and Pulaski Hwy, Perryville, MD

DRAFT 07/28/2020

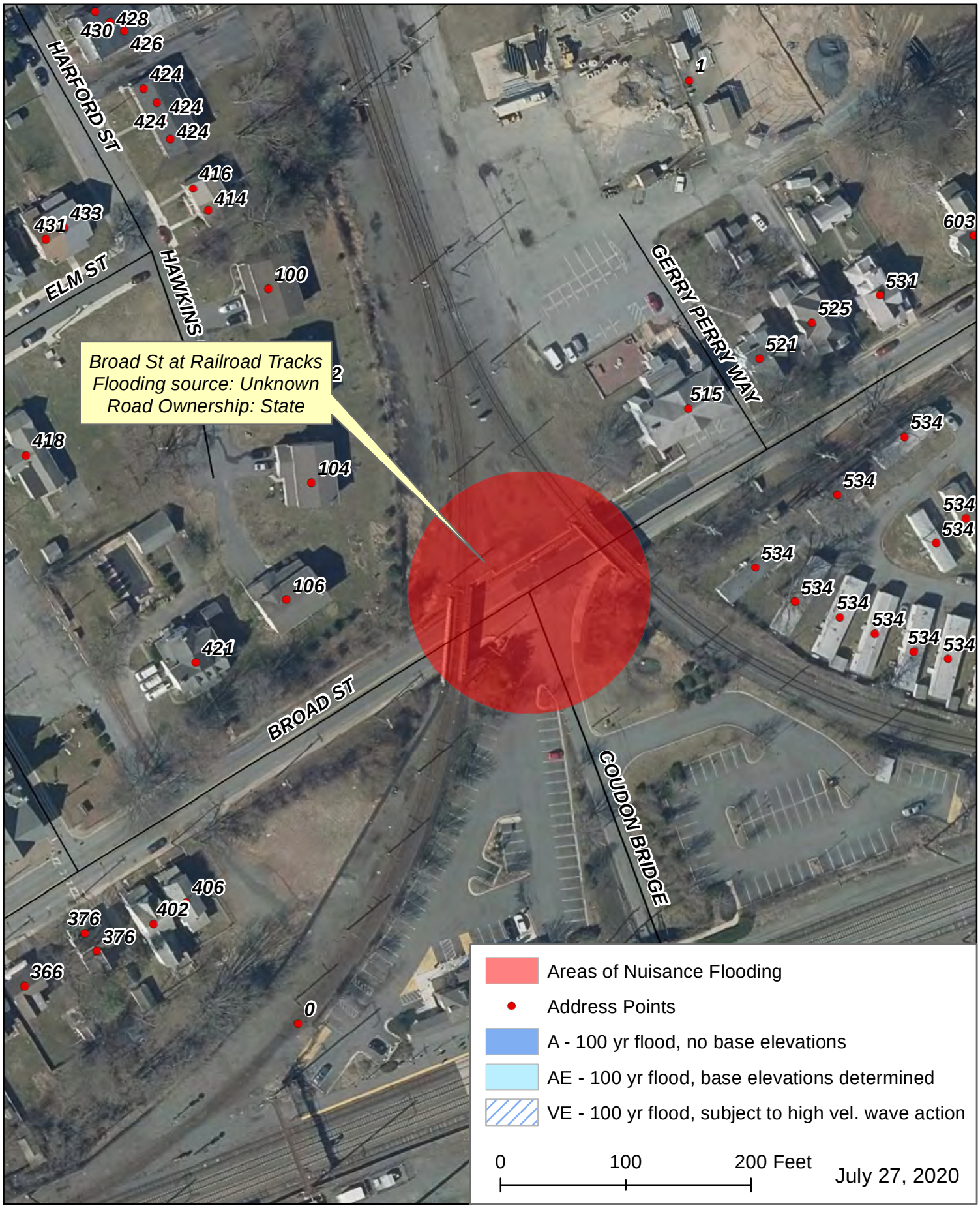
Map 40

Other Locations Identified by Nuisance Flood Plan Work Group
Intersection of Aiken Ave and Broad St, Perryville, MD

DRAFT 07/28/2020

Map 41

Other Locations Identified by Nuisance Flood Plan Work Group
Broad St at Railroad Tracks, Perryville, MD



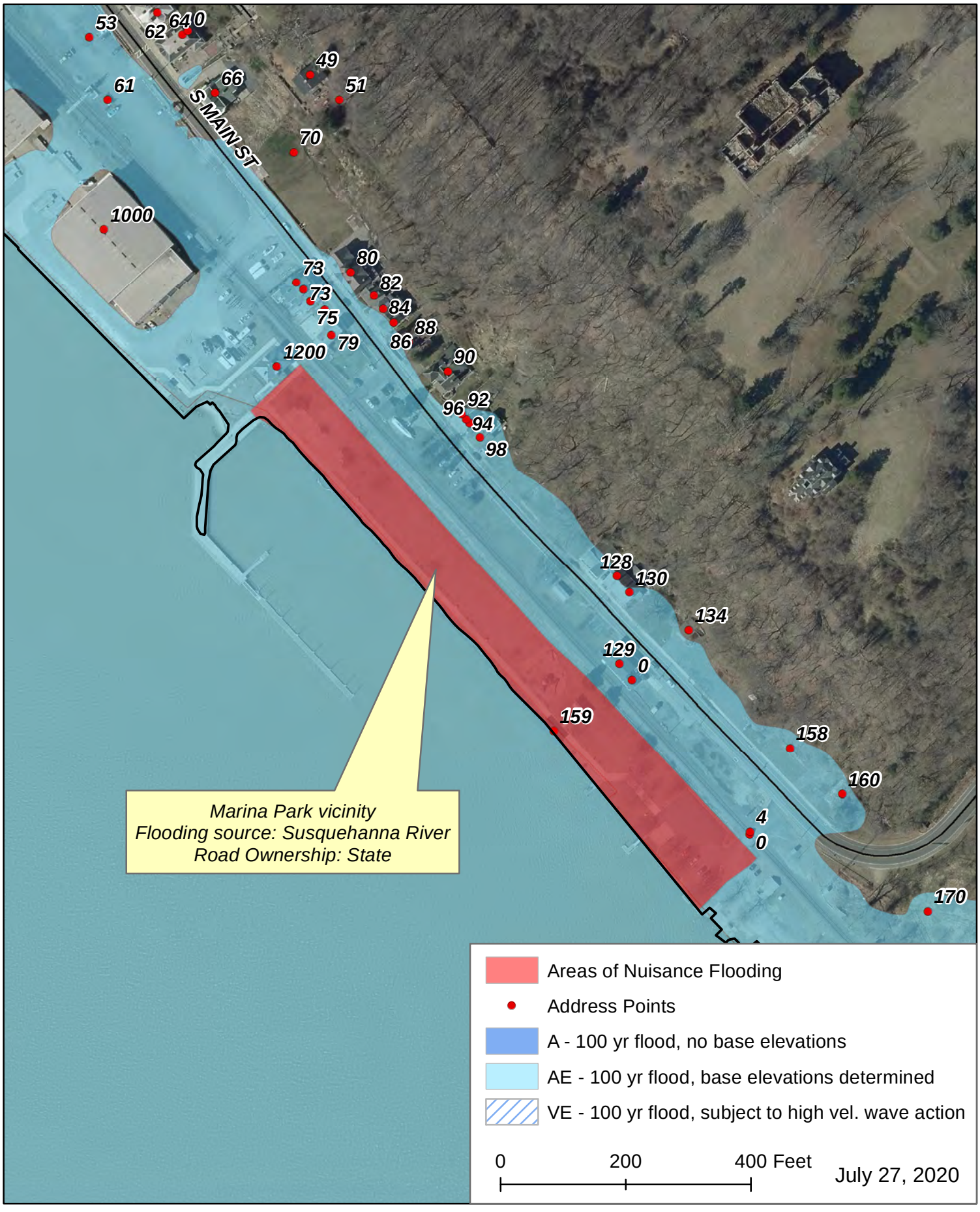
DRAFT 07/28/2020

Map 42

A
Other Locations Identified by Nuisance Flood Plan Work Group
Marion N Tapp Pkwy, Perryville, MD

DRAFT 07/28/2020

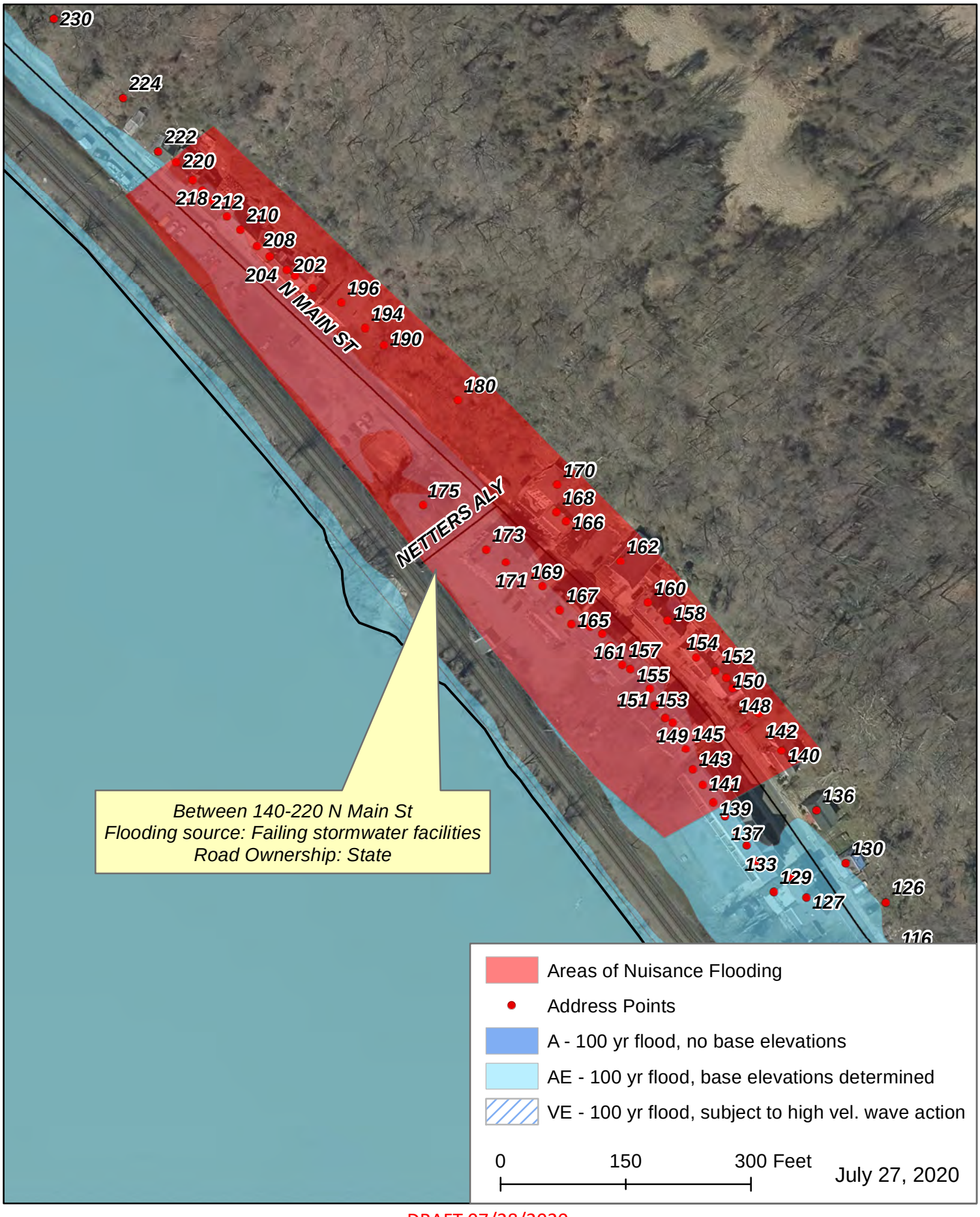
Other Locations Identified by Nuisance Flood Plan Work Group
Marina Park vicinity, Port Deposit, MD



DRAFT 07/28/2020

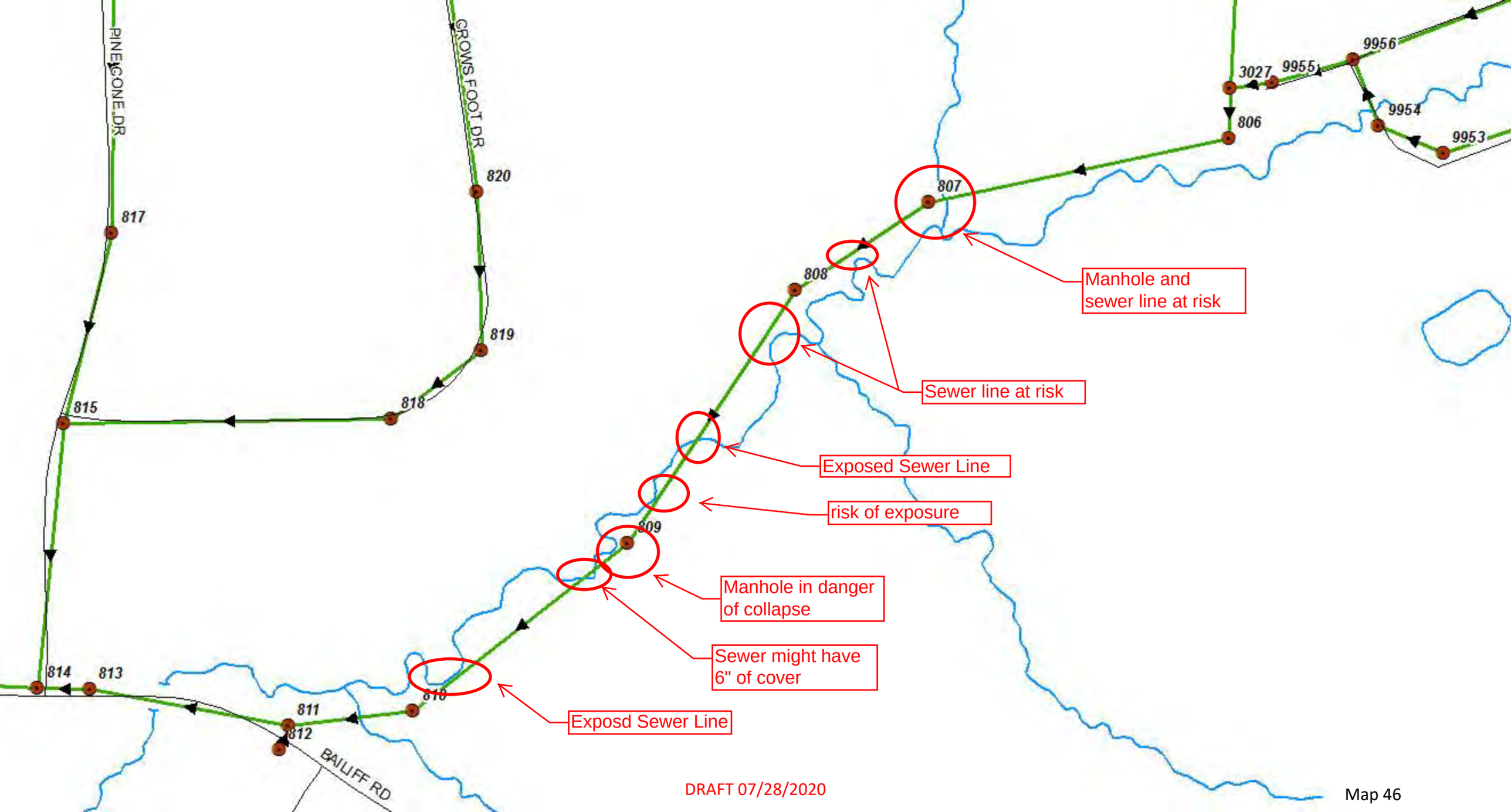
Map 44

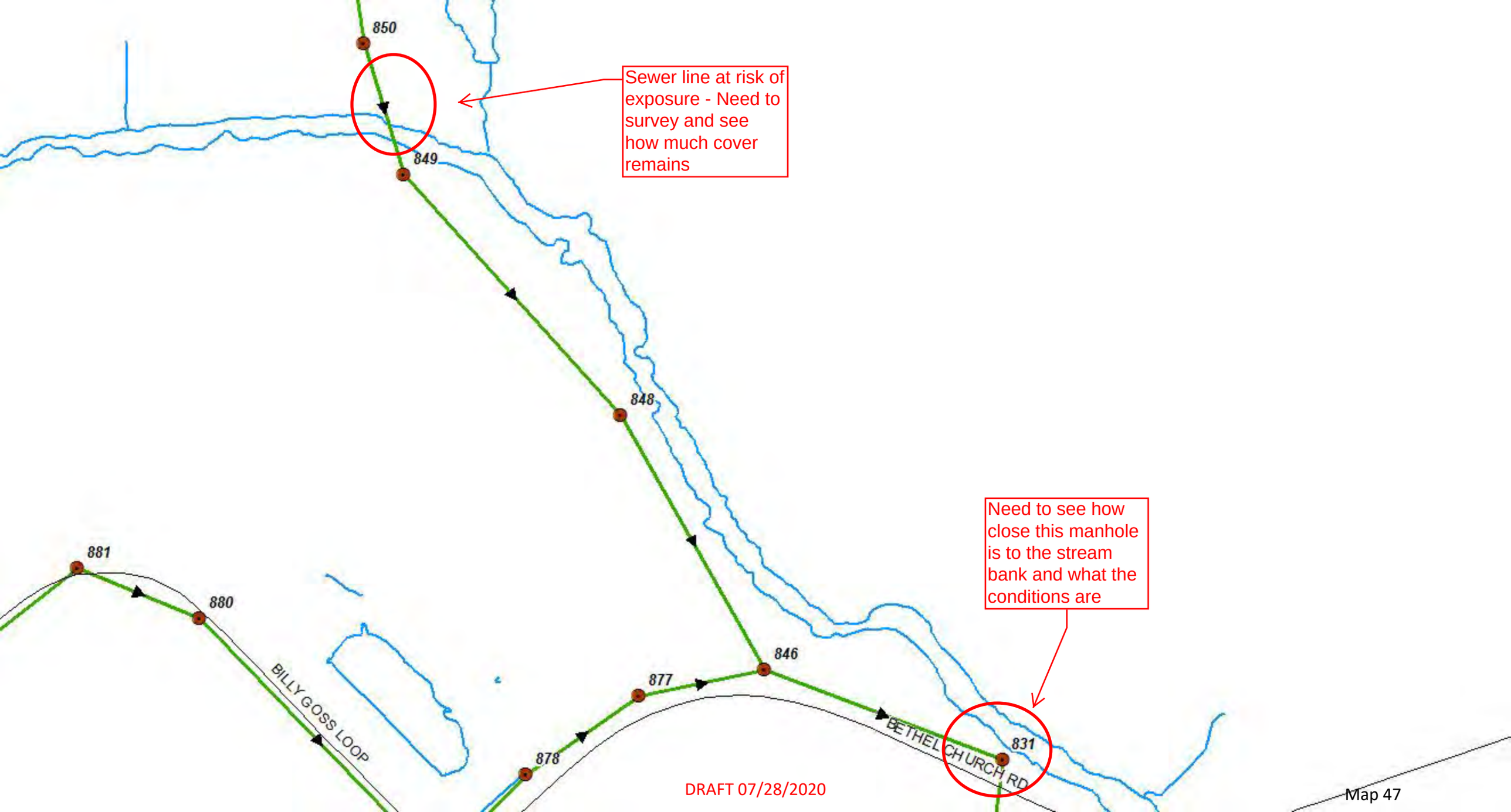
Other Locations Identified by Nuisance Flood Plan Work Group
Between 140-220 N Main St, Port Deposit, MD



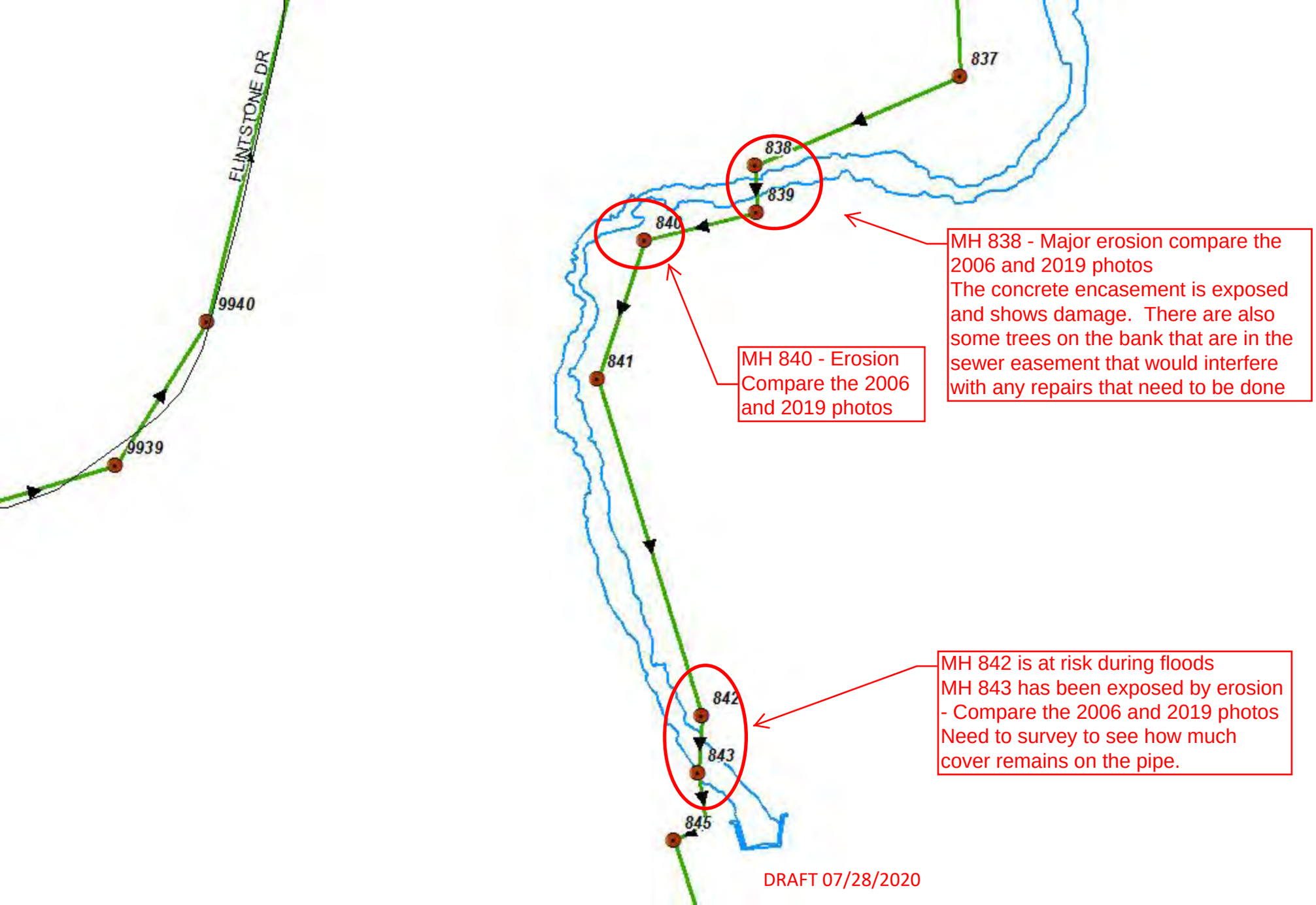
DRAFT 07/28/2020

Map 45

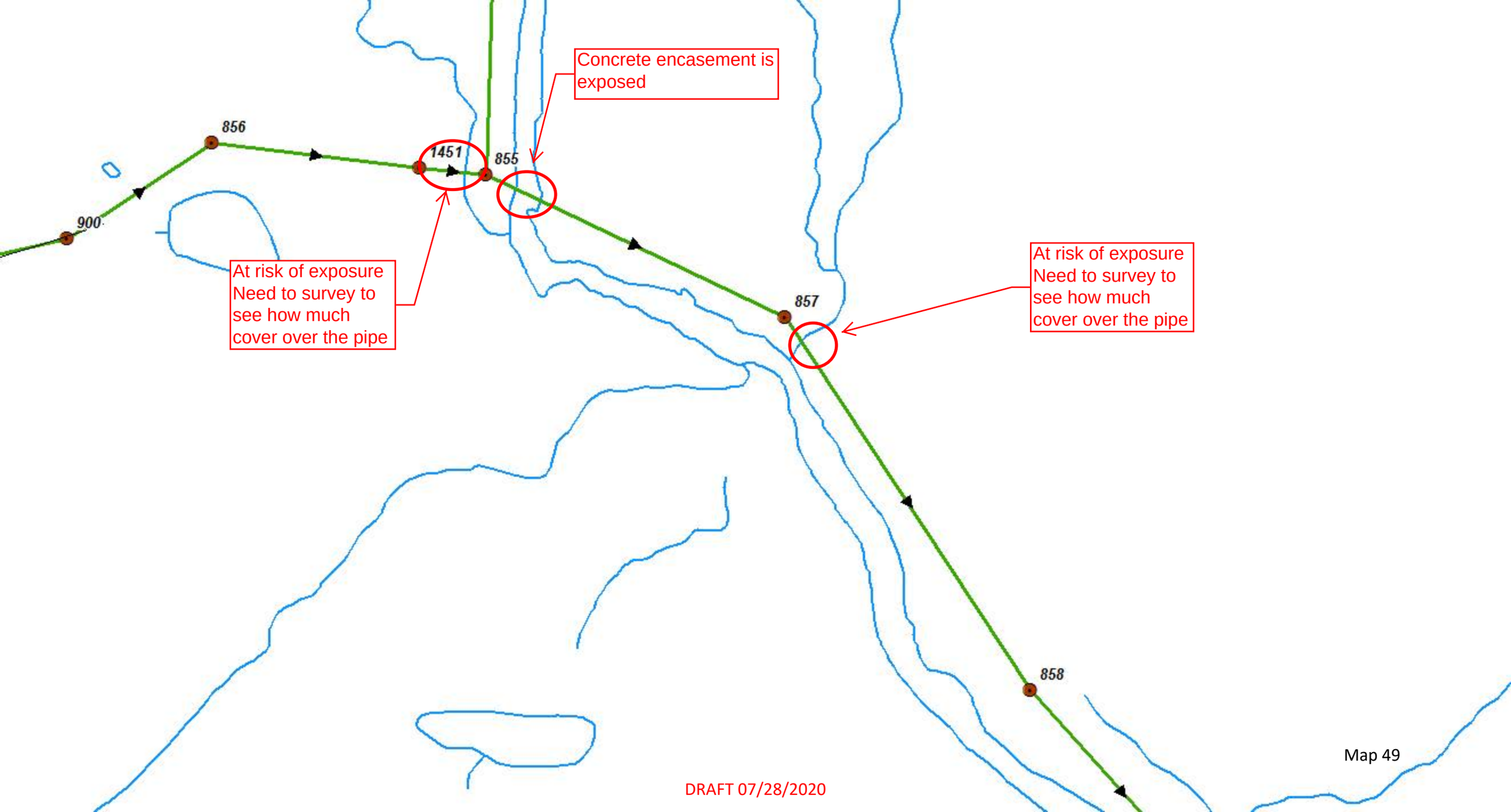

PINECONE DR
GROWS FOOT DR
BAILIFF RD
820
817
819
818
815
814
813
812
811
810
809
808
807
806
3027
9955
9956
9954
9953
Manhole and sewer line at risk
Sewer line at risk
Exposed Sewer Line
risk of exposure
Manhole in danger of collapse
Sewer might have 6" of cover
Exposd Sewer Line



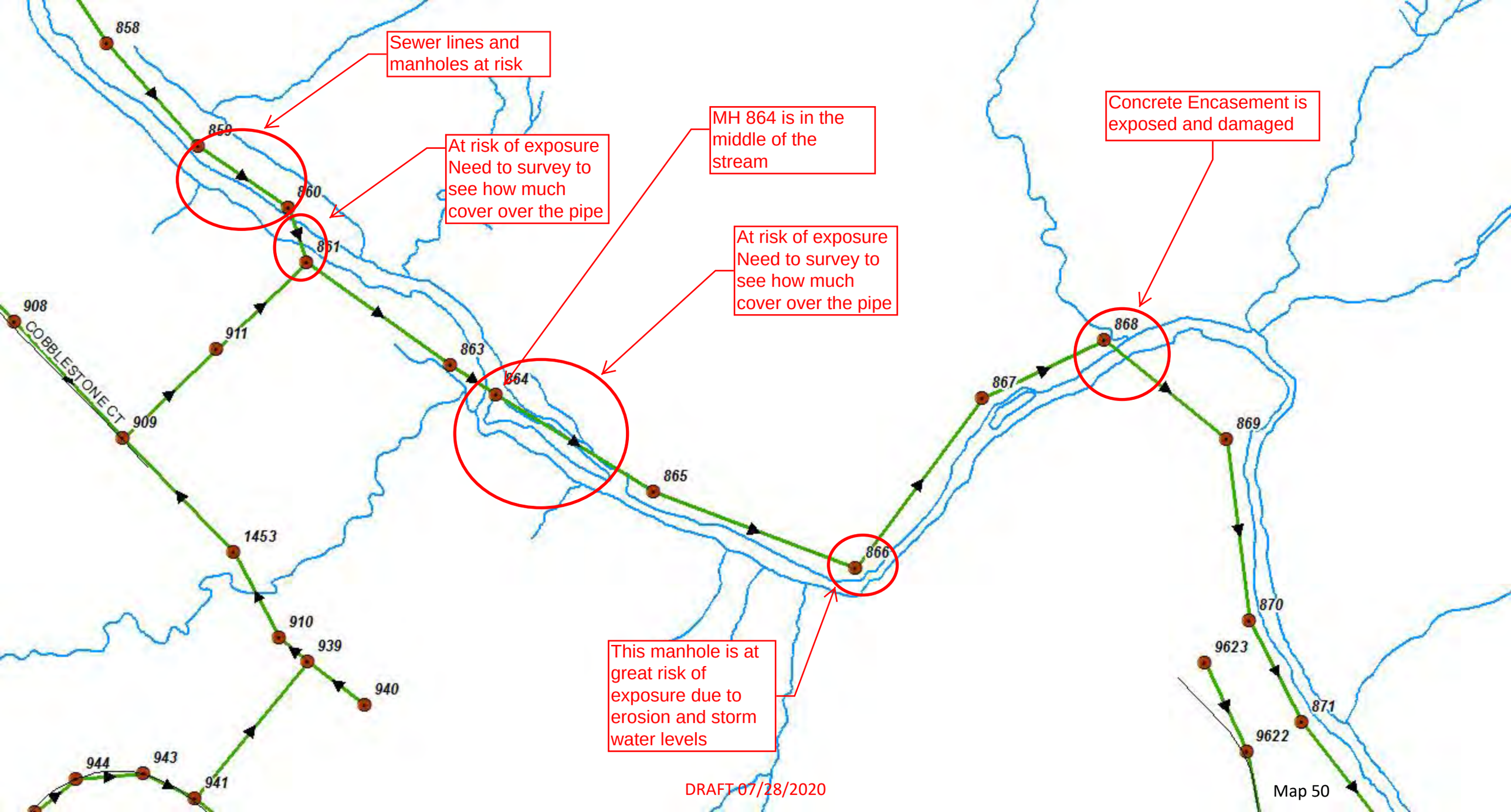
DRAFT 07/28/2020

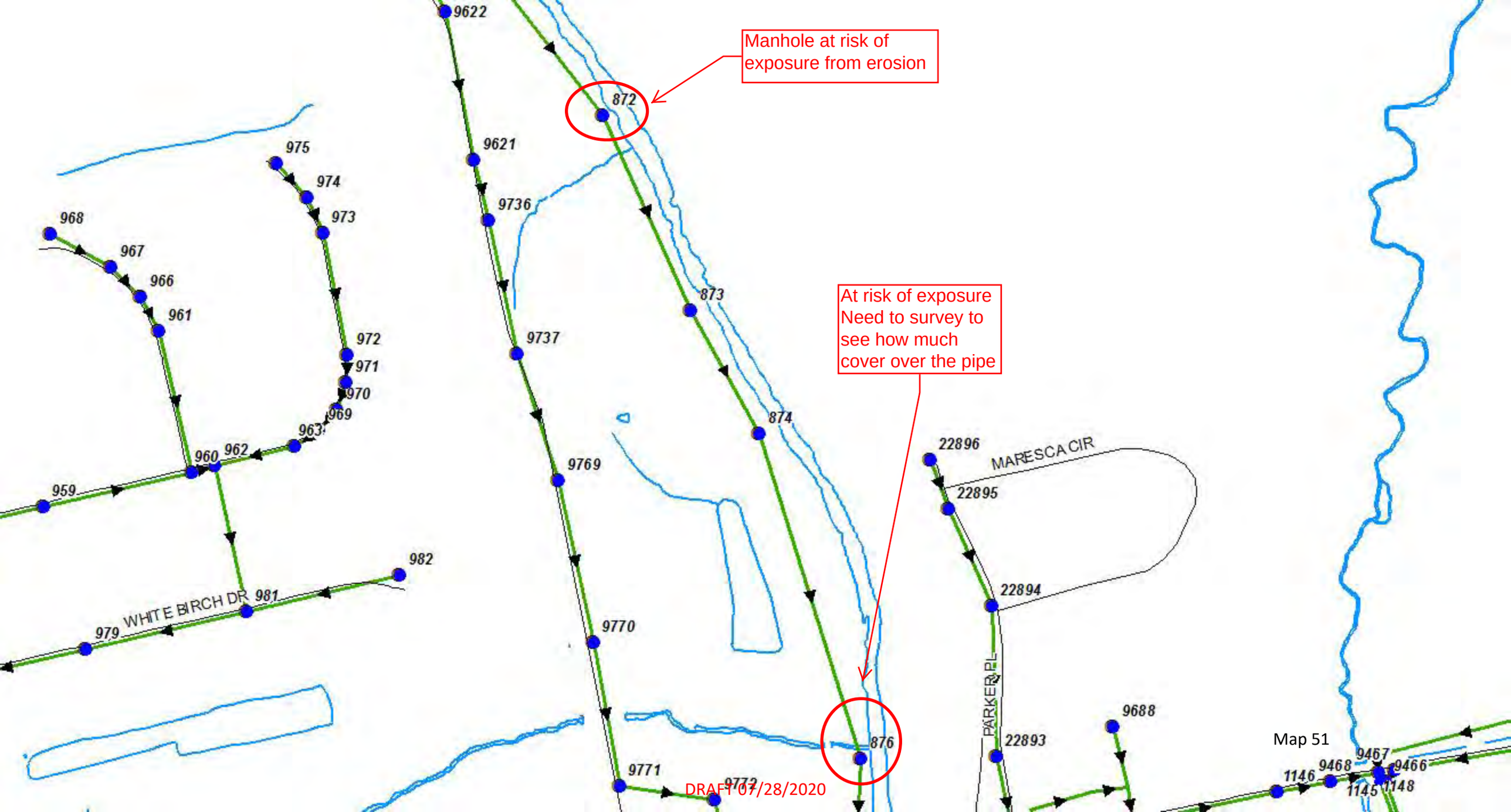


DRAFT 07/28/2020

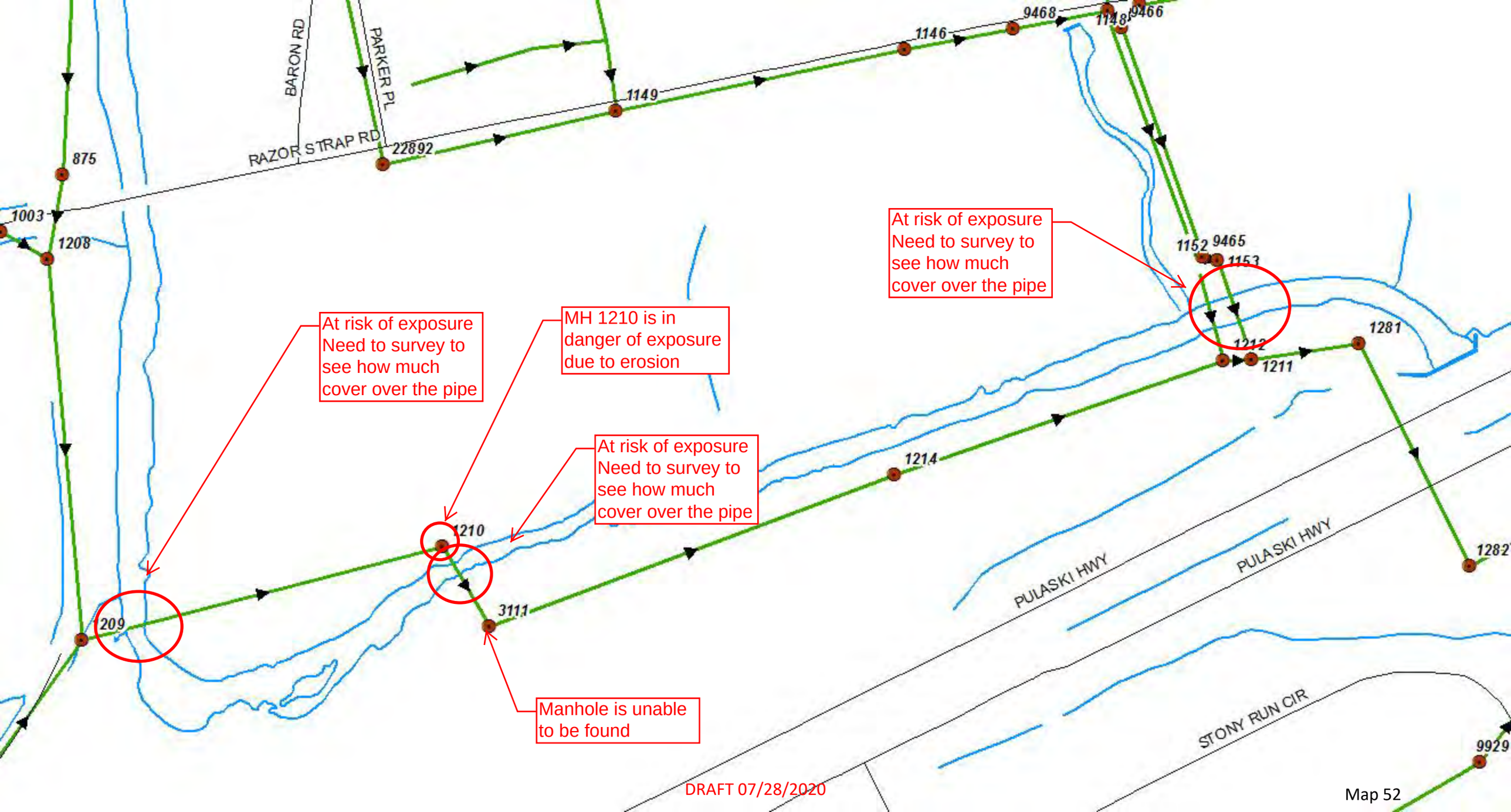

Concrete encasement is exposed
856
1451
855
900
At risk of exposure Need to survey to see how much cover over the pipe
857
At risk of exposure Need to survey to see how much cover over the pipe
858

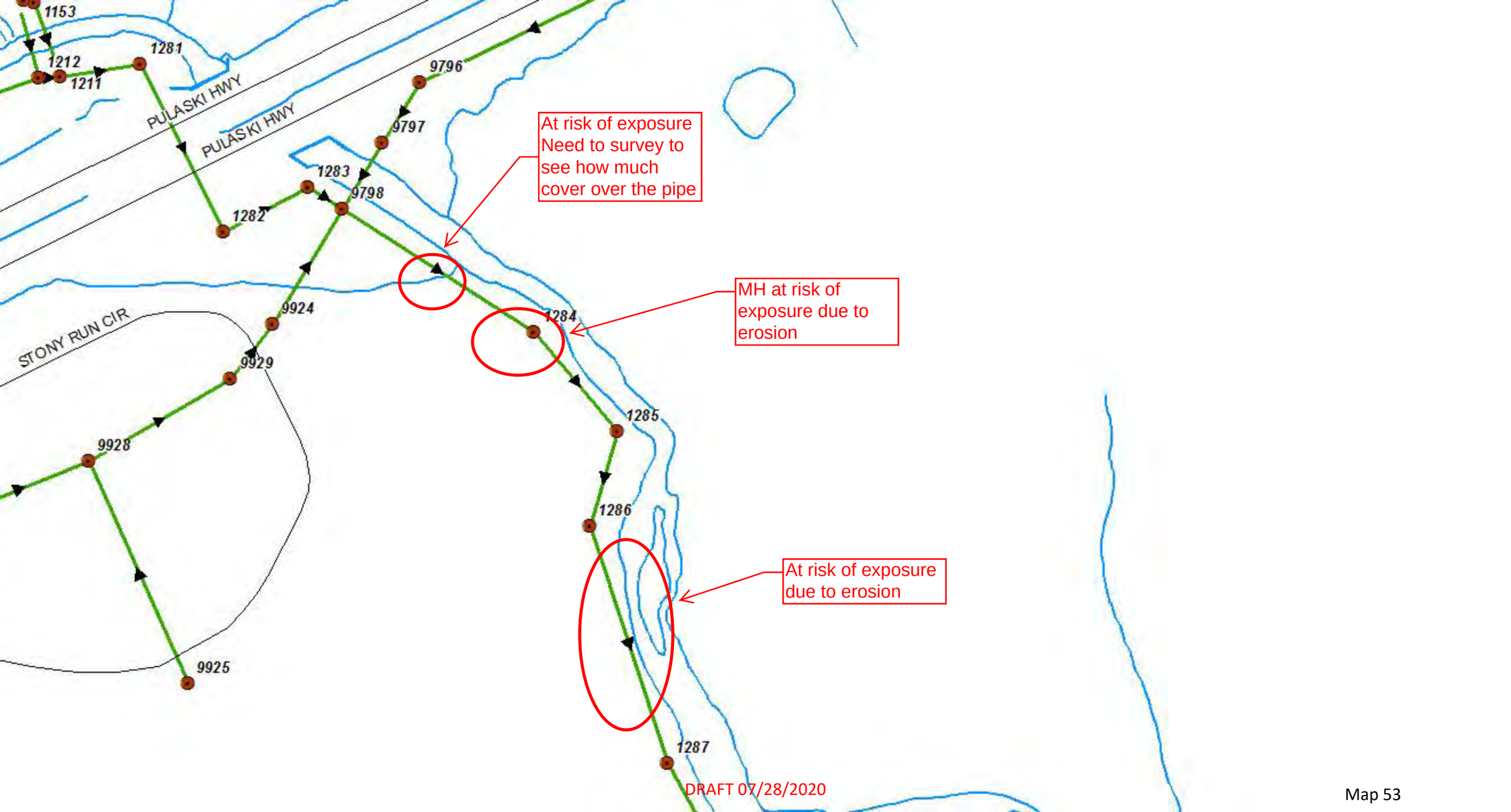
Map 49


Sewer lines and manholes at risk
At risk of exposure Need to survey to see how much cover over the pipe
MH 864 is in the middle of the stream
At risk of exposure Need to survey to see how much cover over the pipe
Concrete Encasement is exposed and damaged
This manhole is at great risk of exposure due to erosion and storm water levels
858
859
860
861
908
COBBLESTONE CT
911
909
863
864
865
866
867
868
869
870
871
9623
9622
1453
910
939
940
944
943
941

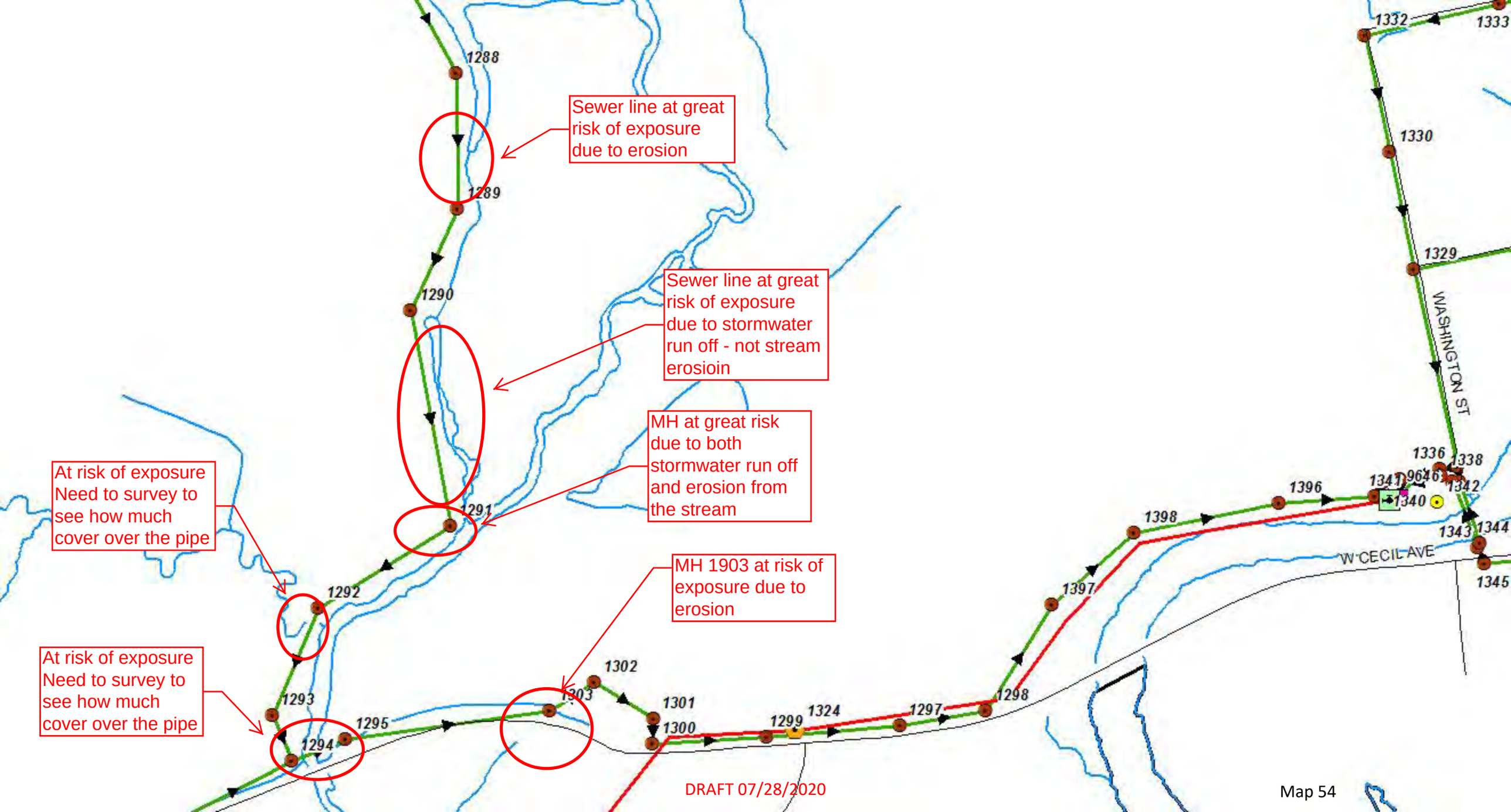

Manhole at risk of exposure from erosion
At risk of exposure Need to survey to see how much cover over the pipe
9622
872
9621
9736
873
9737
874
9769
9770
9771
9772
876
975
974
973
968
967
966
961
972
971
970
969
963
960
962
959
982
WHITE BIRCH DR
981
979
22896
MARESCA CIR
22895
22894
PARKER PL
22893
9688
9467
9468
9466
1146
1145
1148
DRAFT 07/28/2020

Map 51


BARON RD
PARKER PL
RAZOR STRAP RD
PULASKI HWY
PULASKI HWY
STONY RUN CIR
875
1003
1208
209
22892
1149
1146
9468
1148
9466
1152
9465
1153
1212
1211
1281
1214
1210
3111
1282
9929
At risk of exposure Need to survey to see how much cover over the pipe
MH 1210 is in danger of exposure due to erosion
At risk of exposure Need to survey to see how much cover over the pipe
At risk of exposure Need to survey to see how much cover over the pipe
Manhole is unable to be found



DRAFT 07/28/2020


1288
1289
1290
1291
1292
1293
1294
1295
1302
1303
1301
1300
1299
1324
1297
1298
1397
1398
1396
1340
1341
1342
1343
1344
1345
1336
1338
1332
1333
1330
1329
WASHINGTON ST
W CECIL AVE
Sewer line at great risk of exposure due to erosion
Sewer line at great risk of exposure due to stormwater run off - not stream erosioin
MH at great risk due to both stormwater run off and erosion from the stream
At risk of exposure Need to survey to see how much cover over the pipe
MH 1903 at risk of exposure due to erosion
At risk of exposure Need to survey to see how much cover over the pipe