Path to Flood Resilience West Columbia Pike

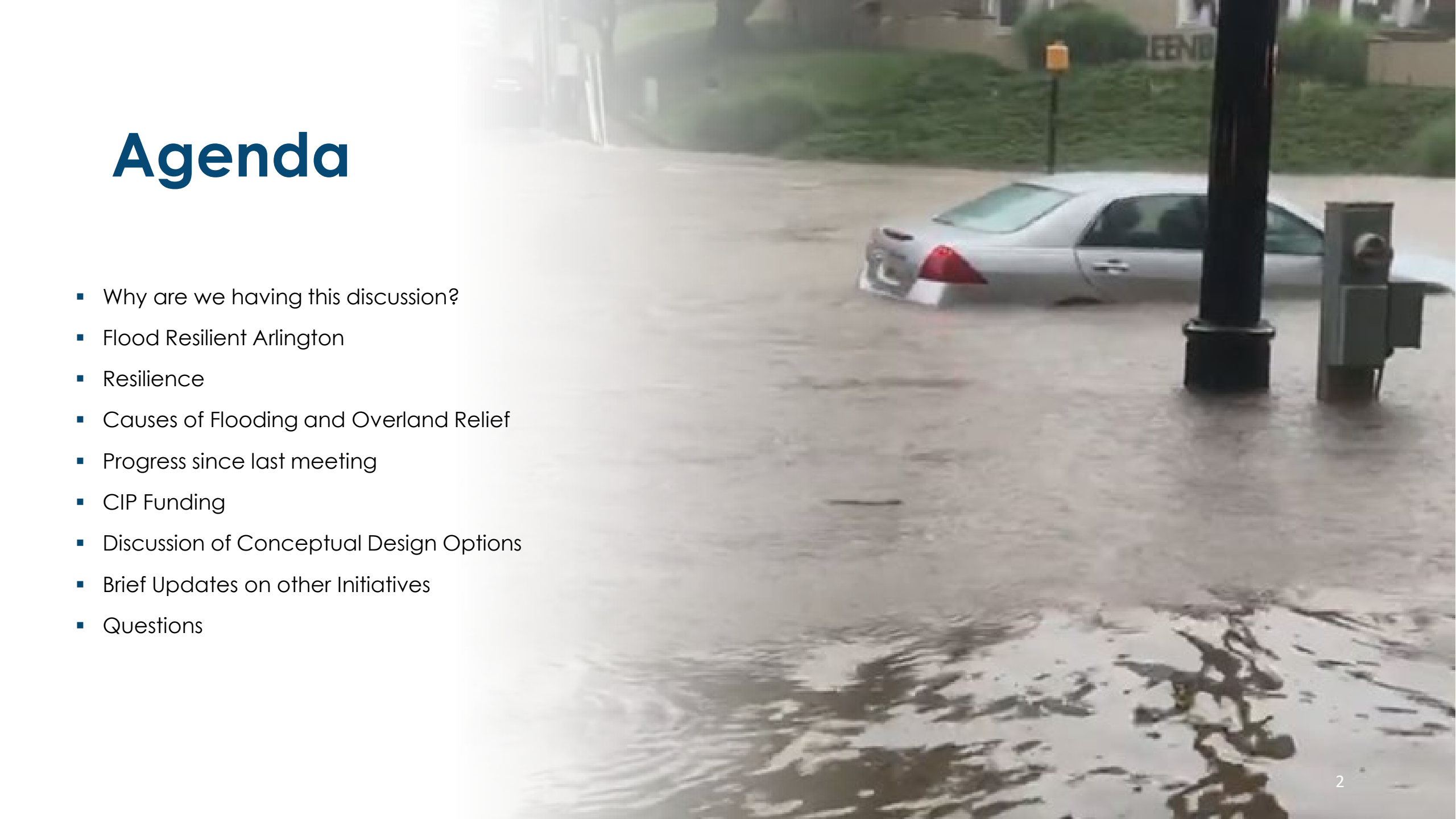
Flood Resilient Arlington

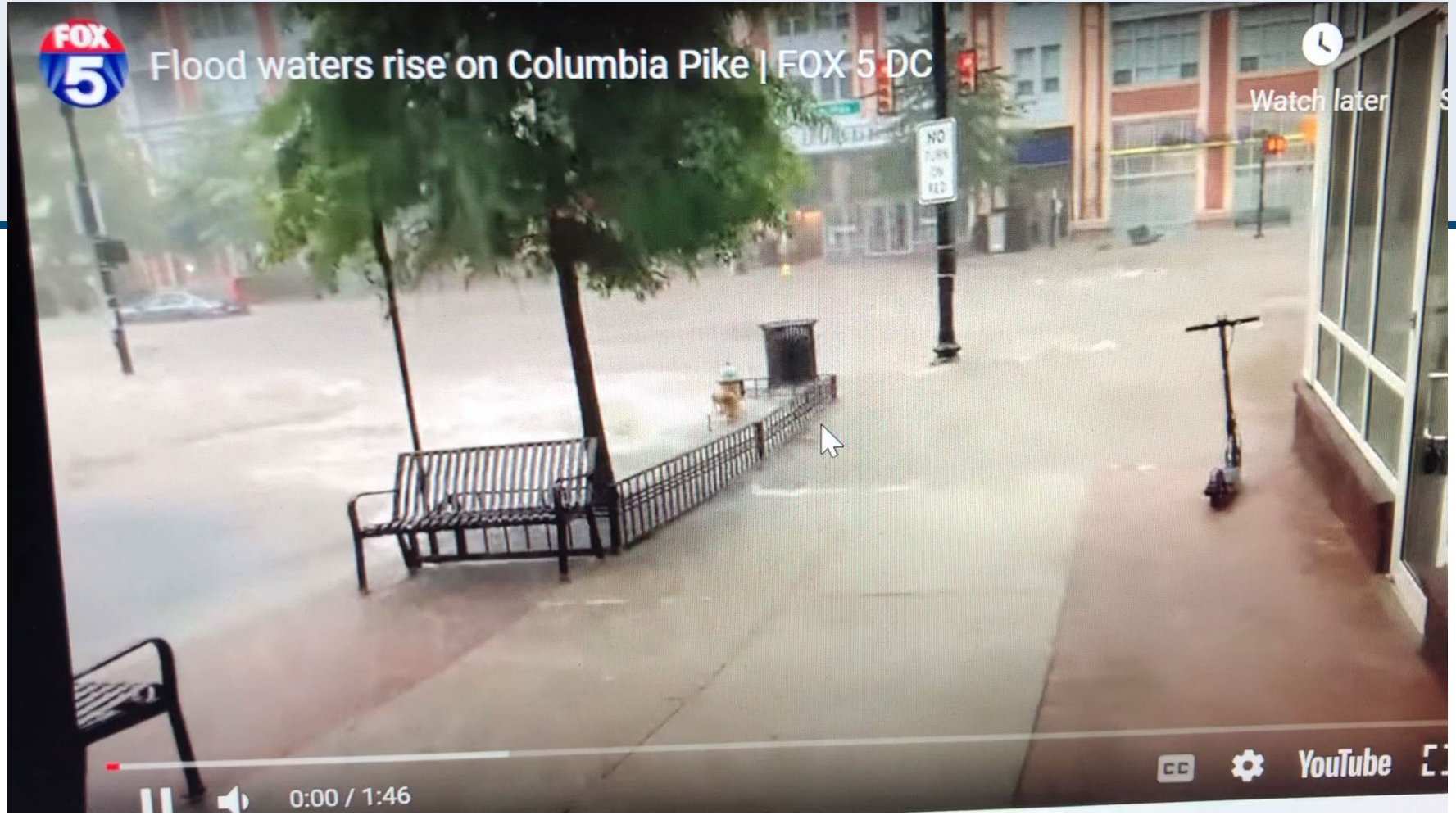
November 1, 2023

ARLINGTON
VIRGINIA

Agenda

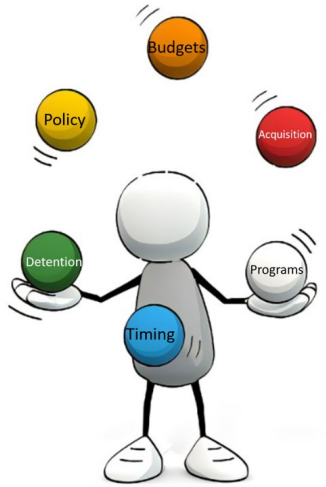
- Why are we having this discussion?
- Flood Resilient Arlington
- Resilience
- Causes of Flooding and Overland Relief
- Progress since last meeting
- CIP Funding
- Discussion of Conceptual Design Options
- Brief Updates on other Initiatives
- Questions





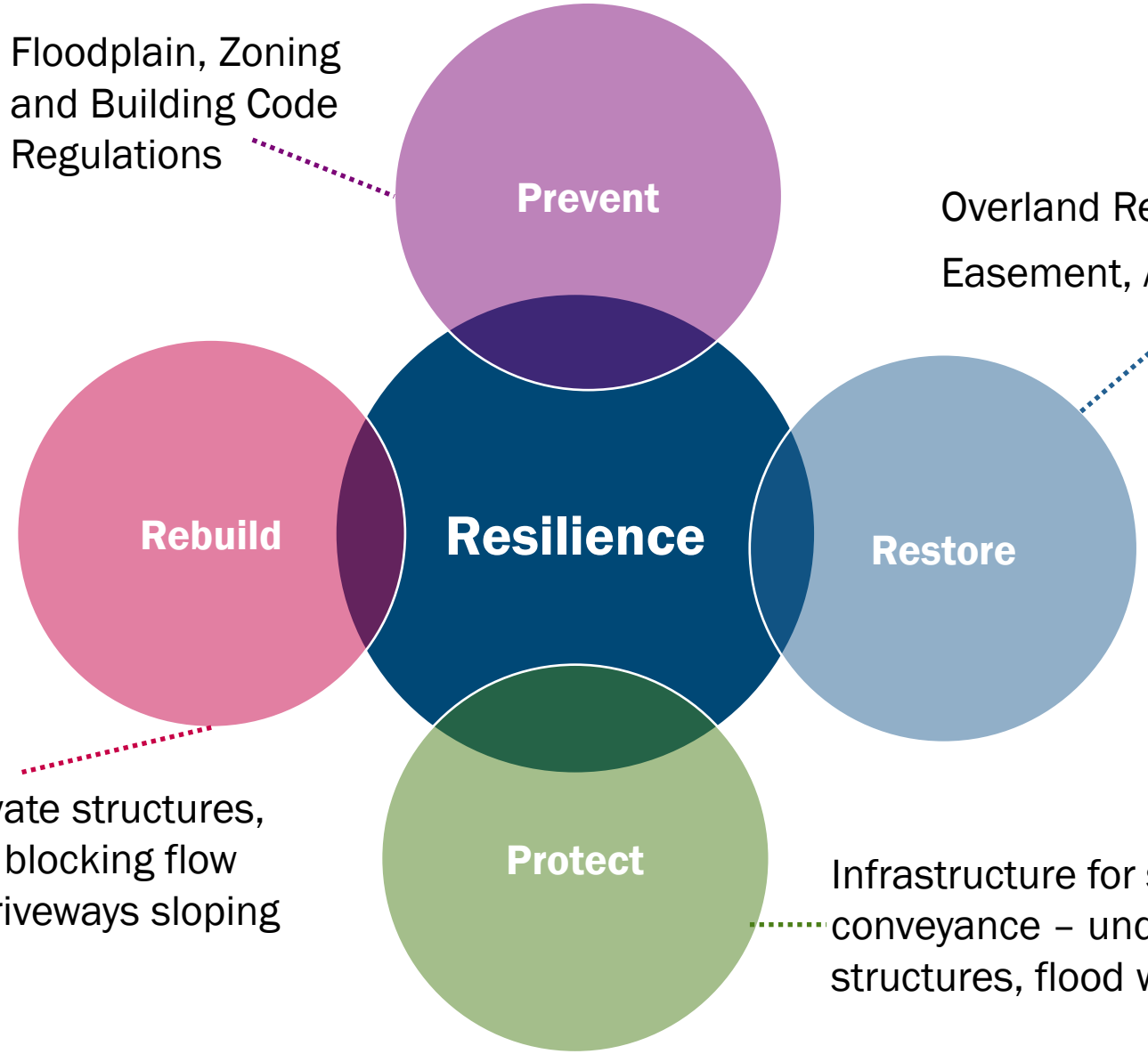
- Reminder for why we are having this Discussion – video of flooding in the intersection of Columbia Pike at S. Greenbrier St.
- In addition to the street flooding, buildings were also flooded.

Balancing Stormwater Priorities and Issues



Floodplain, Zoning and Building Code Regulations

Overland Relief Pathway Easement, Acquisition



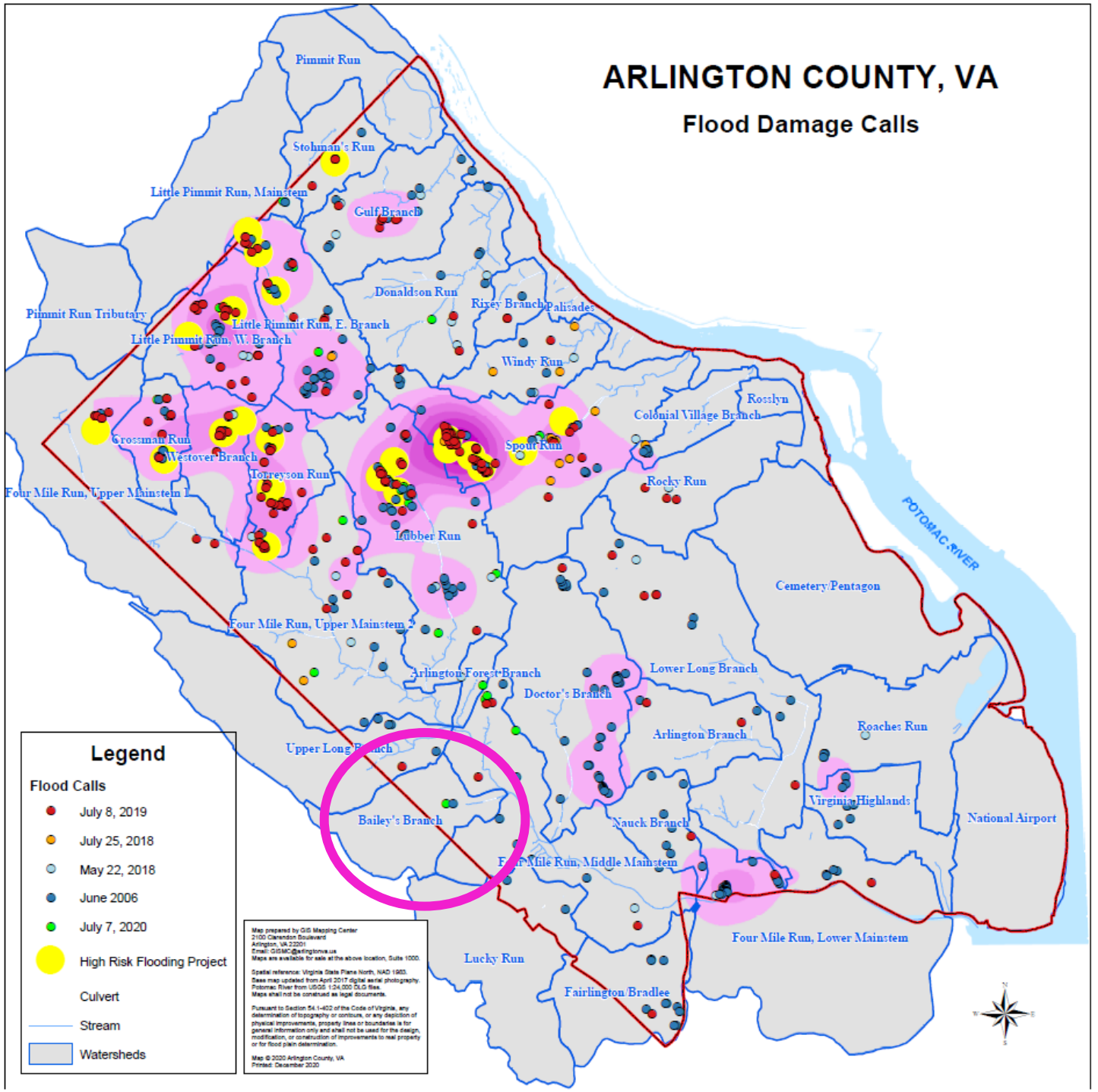
Floodproof/Elevate structures, Remove fences blocking flow path, remove driveways sloping towards home

Infrastructure for safe conveyance – underground structures, flood walls, swales

The Stormwater Team is working on all of these priorities and has multiple initiatives underway

Note: Bailey's Branch is not one of the 5 critical watersheds, but the severity of the flooding in the intersection of Columbia Pike and S. Greenbrier St. has caused the County to prioritize the area for storm drainage improvements plus a high-water detection system (discussed later in the presentation).

Area also included in the RAMP



Overview: Mapping Program Investments

Legend

Watersheds

Storm Water Management Projects

Program / Status

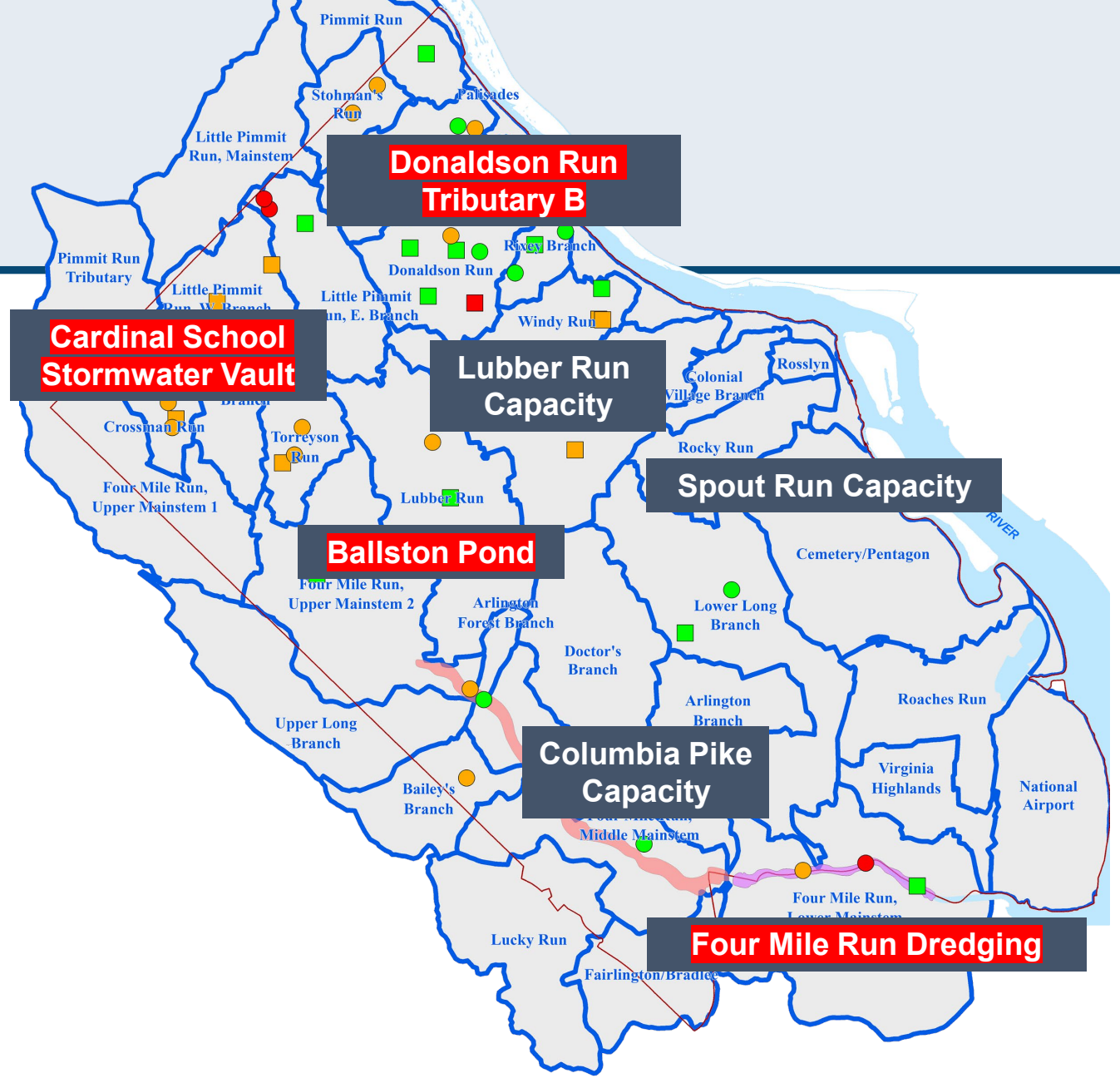
- Capacity Complete / Under Construction
- Capacity / Planned
- Maintenance Capital / Complete
- Maintenance Capital / Planned
- Water Quality / Complete
- Water Quality / Planned

Past Storm Water Management Initiatives

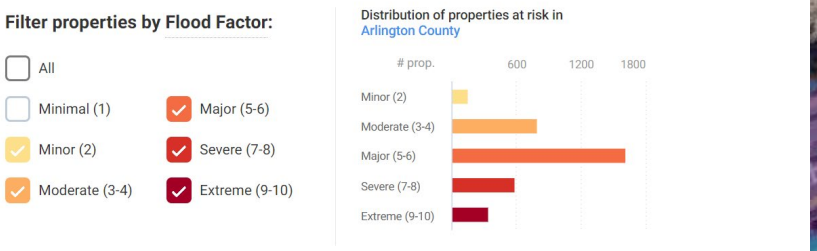
- Flood Control 1984
- Flood Plain Aquisition 60's-70's

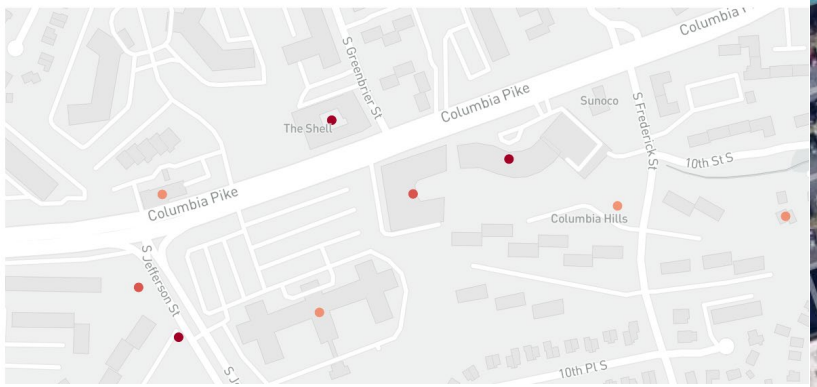
Other Map Elements

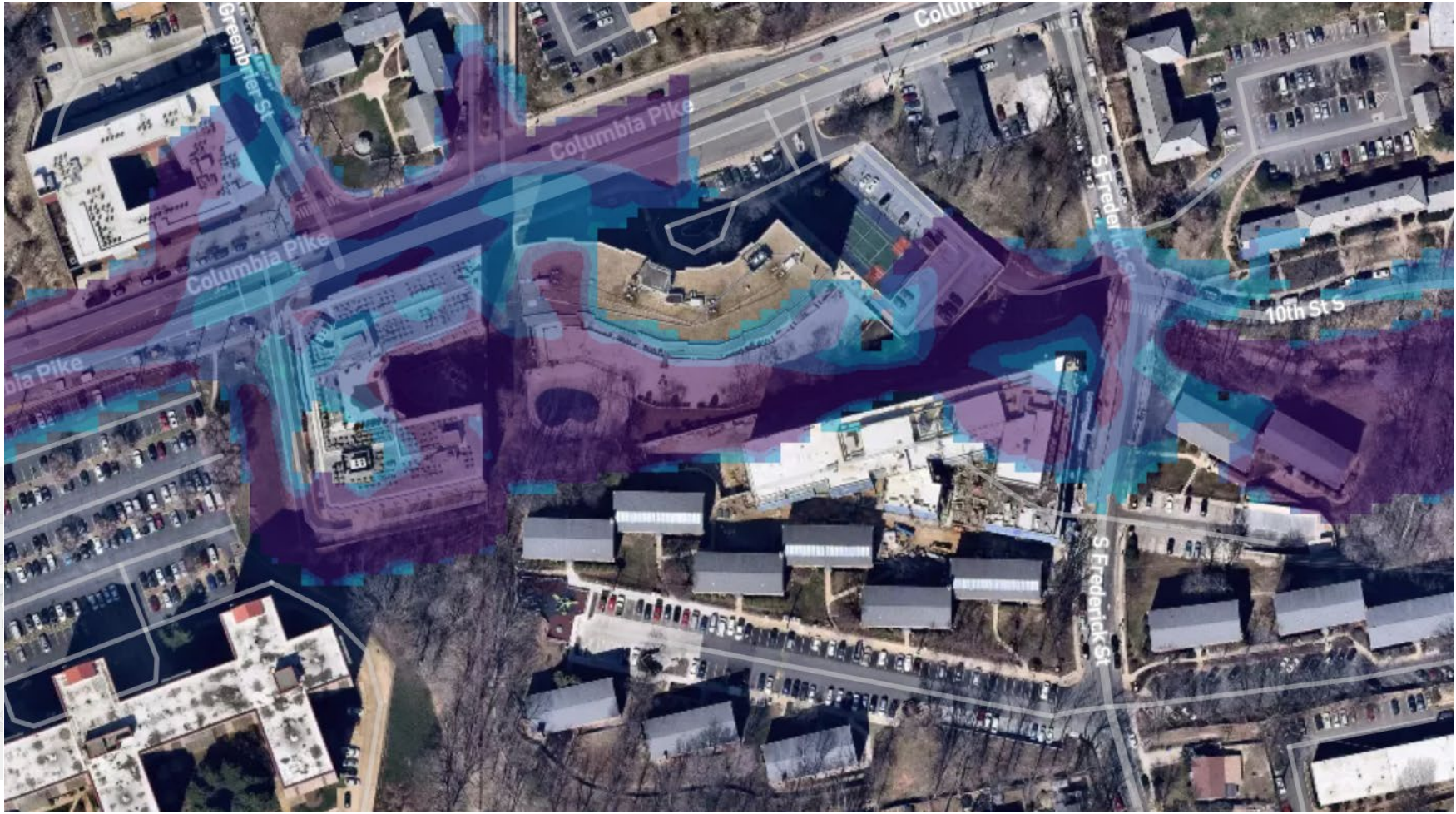
- County Line
- Potomac River



Know Your Flood Risk



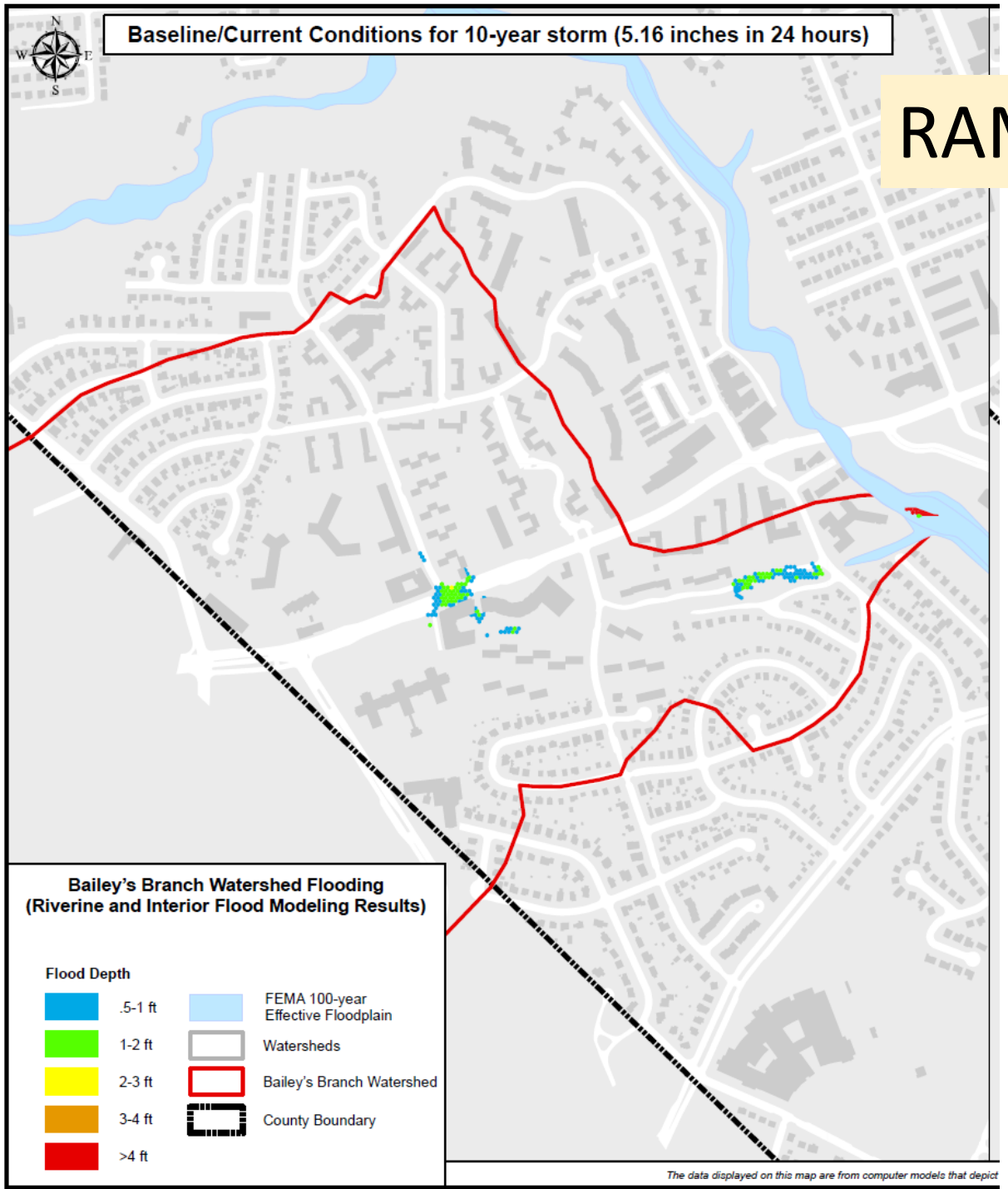


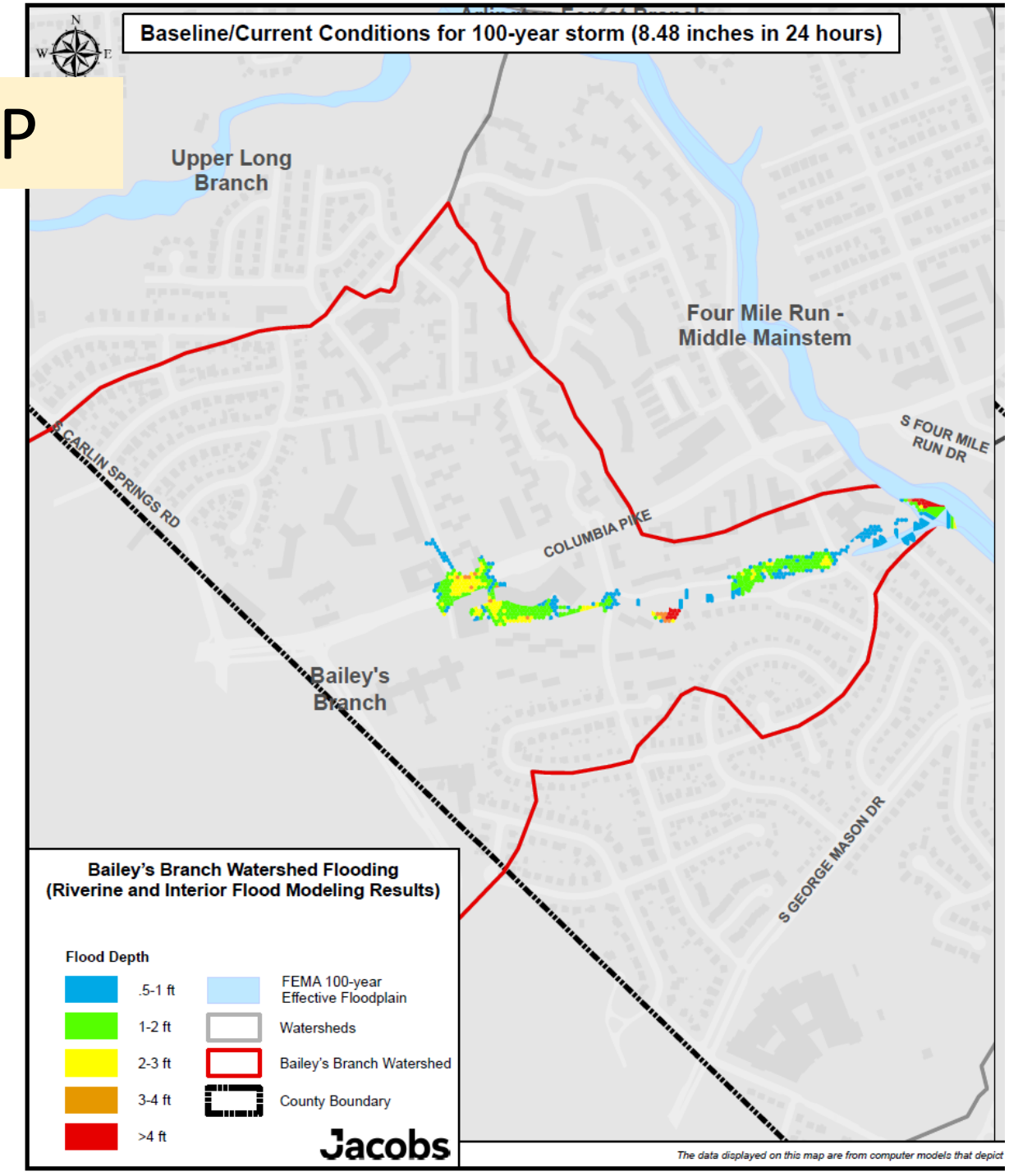


Riskfactor.com

Riskfactor.com provides risk assessment information to the public and is being promoted by major real estate listing websites such as Redfin, Zillow, etc.

RAMP


Baseline/Current Conditions for 10-year storm (5.16 inches in 24 hours)
Bailey's Branch Watershed Flooding
(Riverine and Interior Flood Modeling Results)
Flood Depth
.5-1 ft
1-2 ft
2-3 ft
3-4 ft
>4 ft
FEMA 100-year Effective Floodplain
Watersheds
Bailey's Branch Watershed
County Boundary
The data displayed on this map are from computer models that depict


Baseline/Current Conditions for 100-year storm (8.48 inches in 24 hours)
Upper Long Branch
Four Mile Run - Middle Mainstem
S CARLIN SPRINGS RD
COLUMBIA PIKE
S FOUR MILE RUN DR
Bailey's Branch
S GEORGE MASON DR
Bailey's Branch Watershed Flooding
(Riverine and Interior Flood Modeling Results)
Flood Depth
.5-1 ft
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Watersheds
Bailey's Branch Watershed
County Boundary
Jacobs
The data displayed on this map are from computer models that depict

Progress since October 5, 2022 Meeting

- Secured substantial CIP funding – see next slide on CIP funding
- Developed PCSWMM model of entire watershed
- Included area in RAMP
- Initiated Conceptual Study of watershed options
  - Still working on technical challenges
- Cost analysis of options not completed yet

CIP Funding for Columbia Pike @ Greenbrier

Restore

Adopted FY 23 – FY 32 CIP

10 YEAR CATEGORY SUMMARY (in $1,000s)

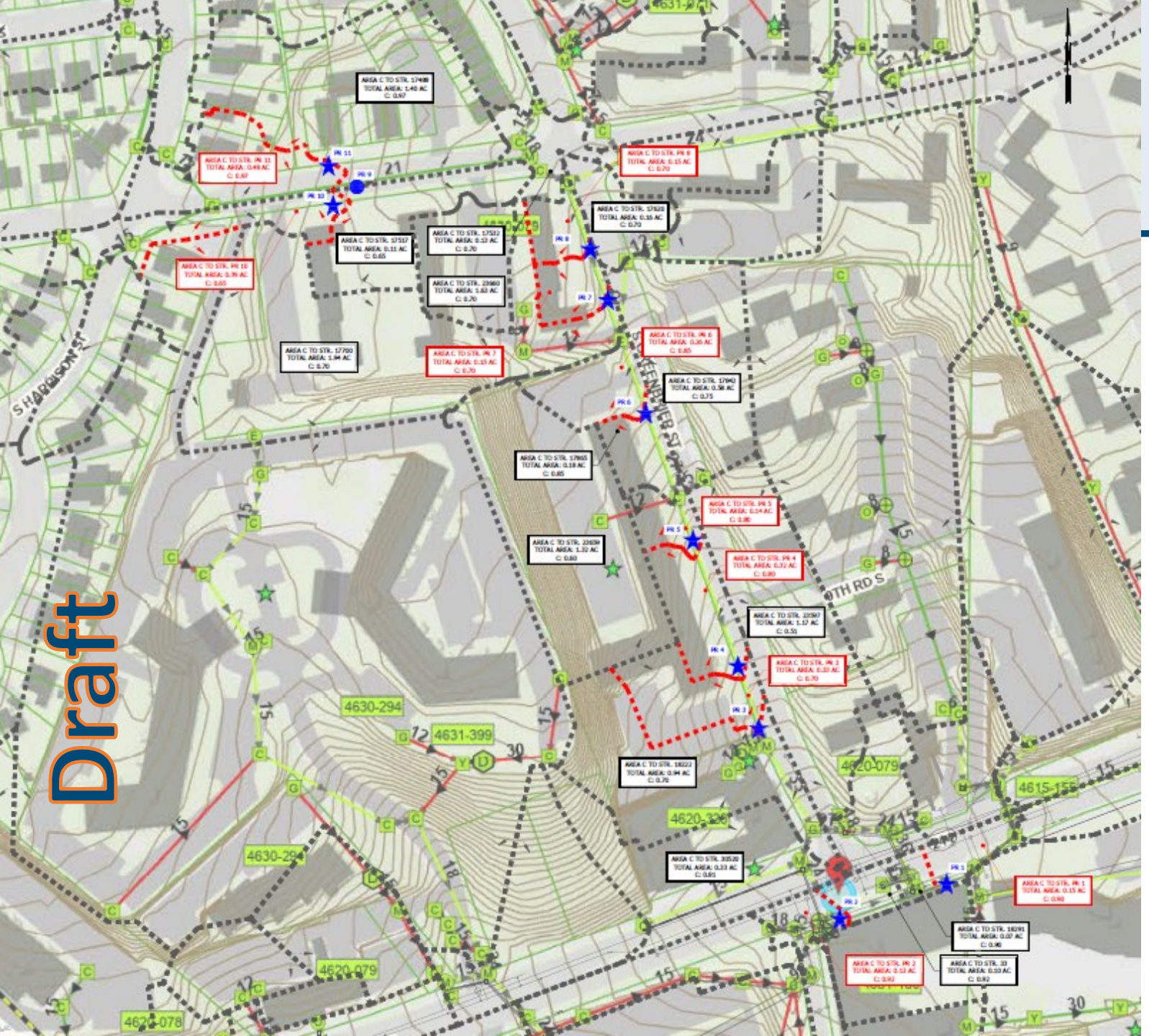
	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	10 Year Total
4. Columbia Pike at Greenbrier	1,300	1,155	775	8,240	4,770	0	0	0	0	0	16,240

Note that this FY is for design work, which is on-going.

Upcoming CIP will be similar but with minor adjustments

Note: The proposed level of funding for this projects begins to approach the funding levels for stormwater that sister jurisdictions already provide.

Options for Bailey's Branch



Option 1:
Add Inlet Capacity

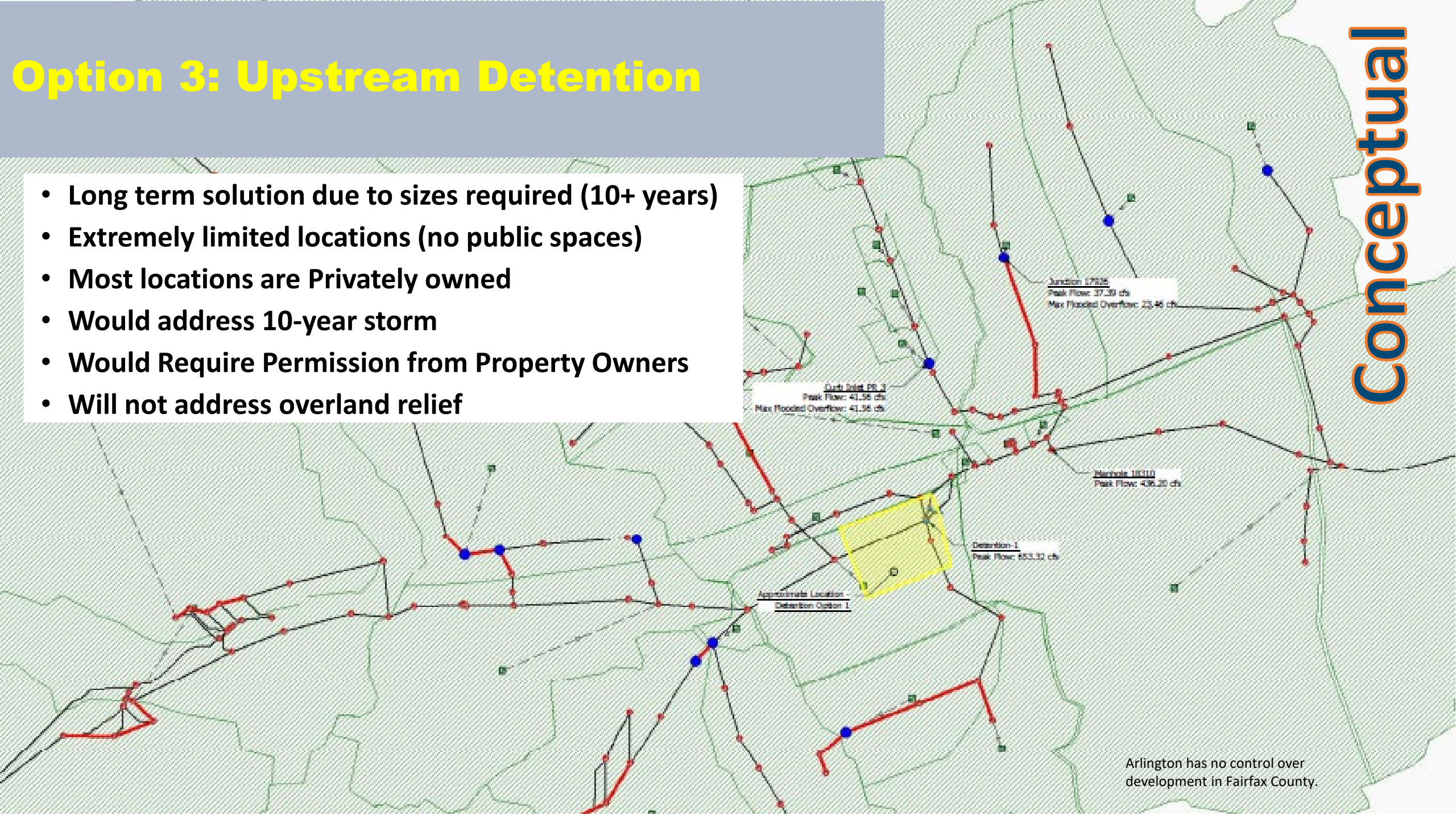
- **Blue stars indicate new inlets**
- **Can be accomplished short term (4-6 months)**
- **Should reduce nuisance flooding from 2-year storm by intercepting stormwater sooner, so that it cannot run downhill and pond in the intersection.**
- **Will not address pipe capacity or overland relief**

Option 2: Disconnect Storm Drains

- Disconnect conveyance systems north and south of Columbia Pike in Arlington County
- Addresses capacity for 10-year storm
- Long term due to pipe sizes (5-10 years)
- Technical Difficulties (grades, utility crossings, etc.) - test pits not yet performed and results may change alignments
- Will not address overland relief

Option 3: Upstream Detention

- Long term solution due to sizes required (10+ years)
- Extremely limited locations (no public spaces)
- Most locations are Privately owned
- Would address 10-year storm
- Would Require Permission from Property Owners
- Will not address overland relief

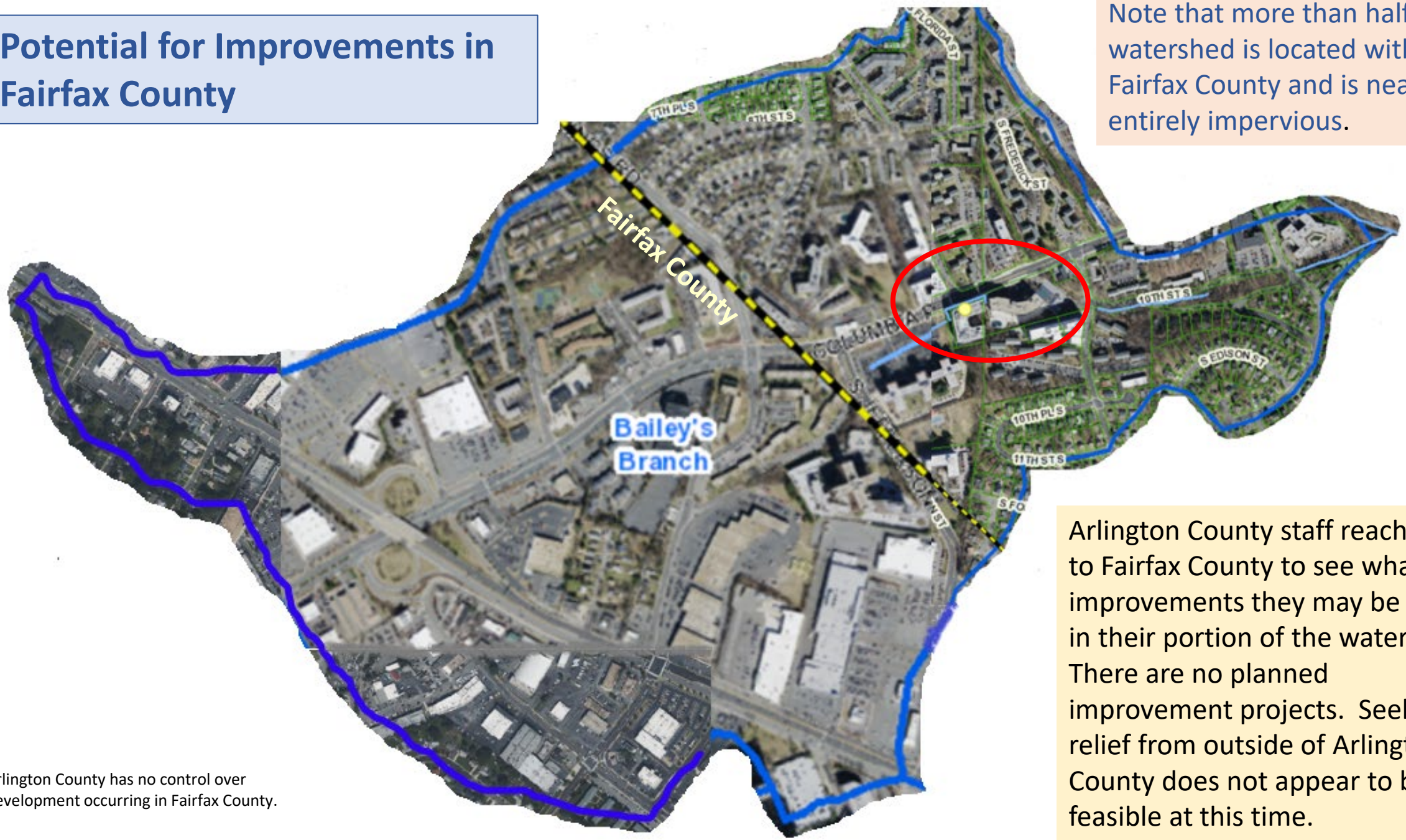


Conceptual

Arlington has no control over development in Fairfax County.

Potential for Improvements in Fairfax County

Note that more than half of the watershed is located within Fairfax County and is nearly entirely impervious.



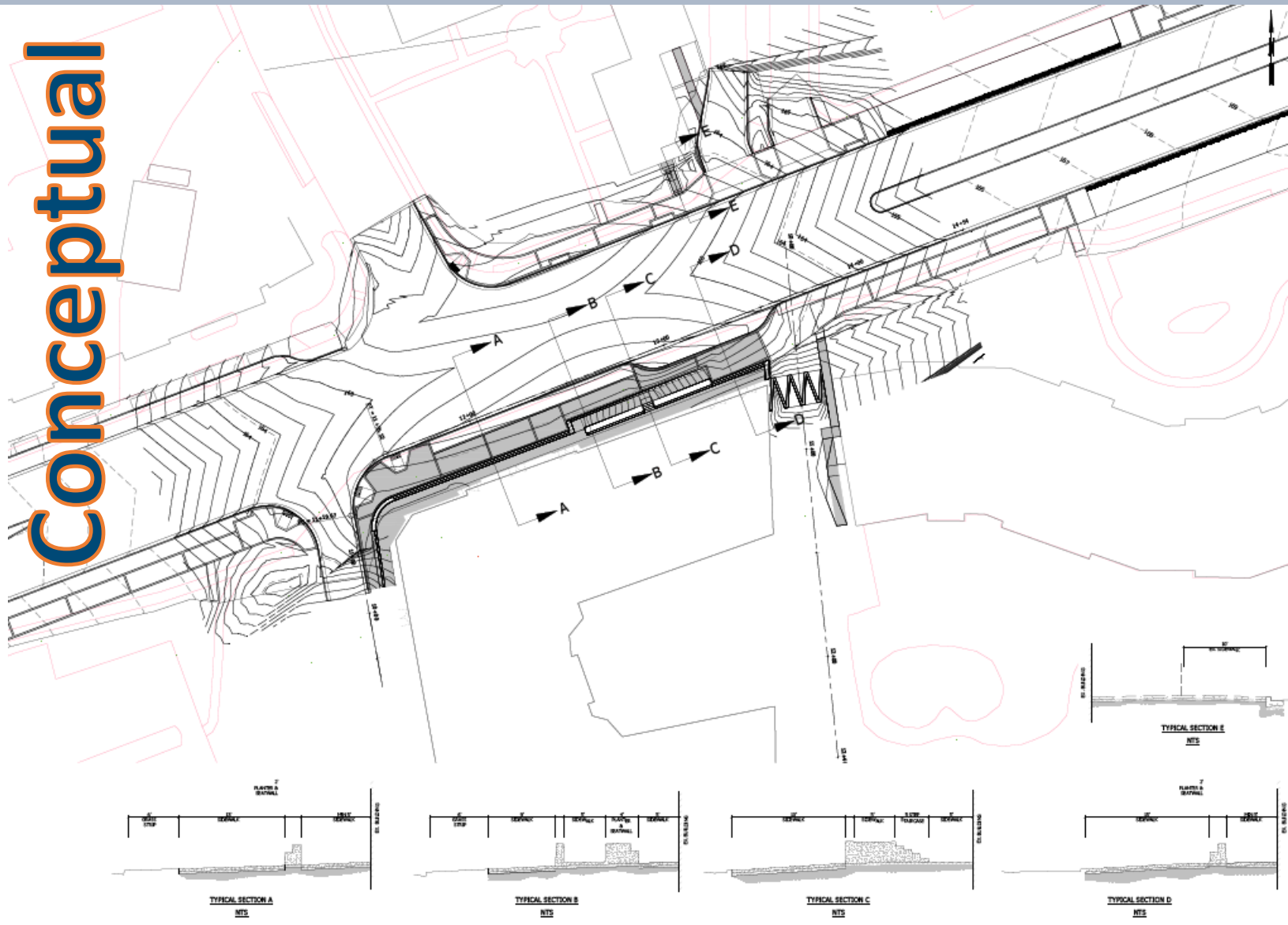
Arlington County has no control over development occurring in Fairfax County.

Arlington County staff reached out to Fairfax County to see what improvements they may be making in their portion of the watershed. There are no planned improvement projects. Seeking relief from outside of Arlington County does not appear to be feasible at this time.

Option 4: Overland Relief – Along Columbia Pike

- Concrete seat wall along the frontage of 5500 Columbia Pike to prevent flooding of the building
- A 2.0' wall offers protection from the 2- to 5- year storm
- A 2.5' wall offers protection from the 5- to 10-year storm
- A 2.0' wall with a 2.0' glass panel offer protection from the 100-year storm
- Required clear walking space along the sidewalk would be maintained

Additional walls may be needed at 5300 Columbia Pike also. Still being evaluated.

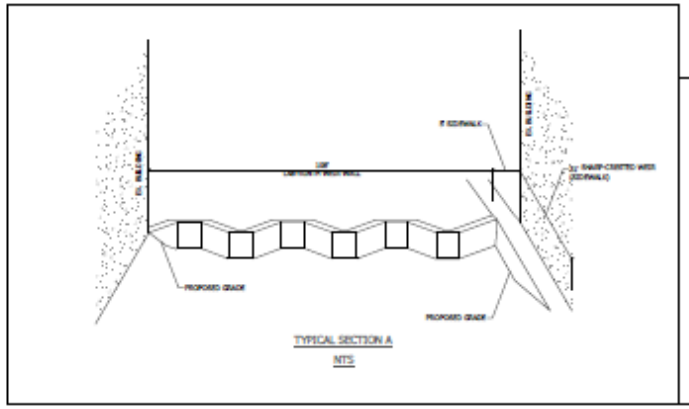


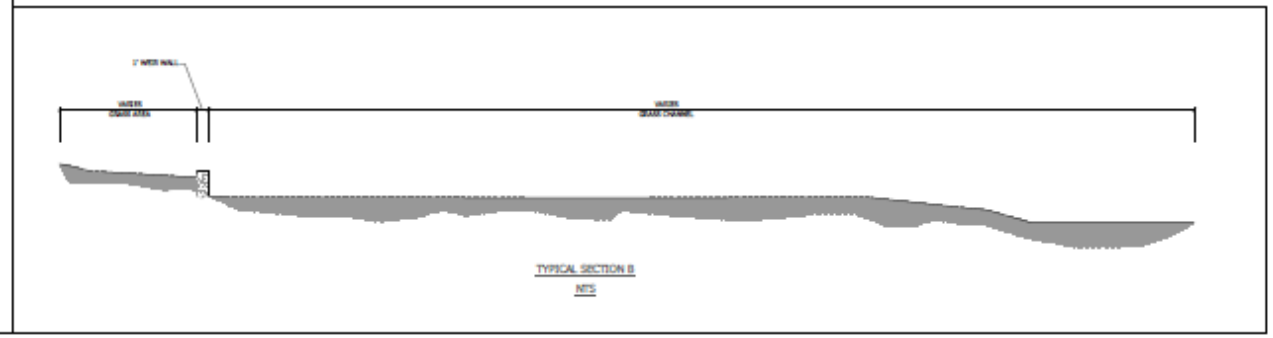
Option 4: Overland Relief – Between Buildings

- 2' maximum height weir wall between 5500 and Carlyle House to manage overland flows between the buildings
- The zigzag design provides additional wall length to help manage flows

Conceptual

PLAN VIEW AND WEIR CROSS-SECTIONS





Option 4: Overland Relief - Renderings

2.5' concrete seat wall protects against 5- to 10-year storm

2.0' concrete seat wall with 2.0' glass panel protects against 100-year storm

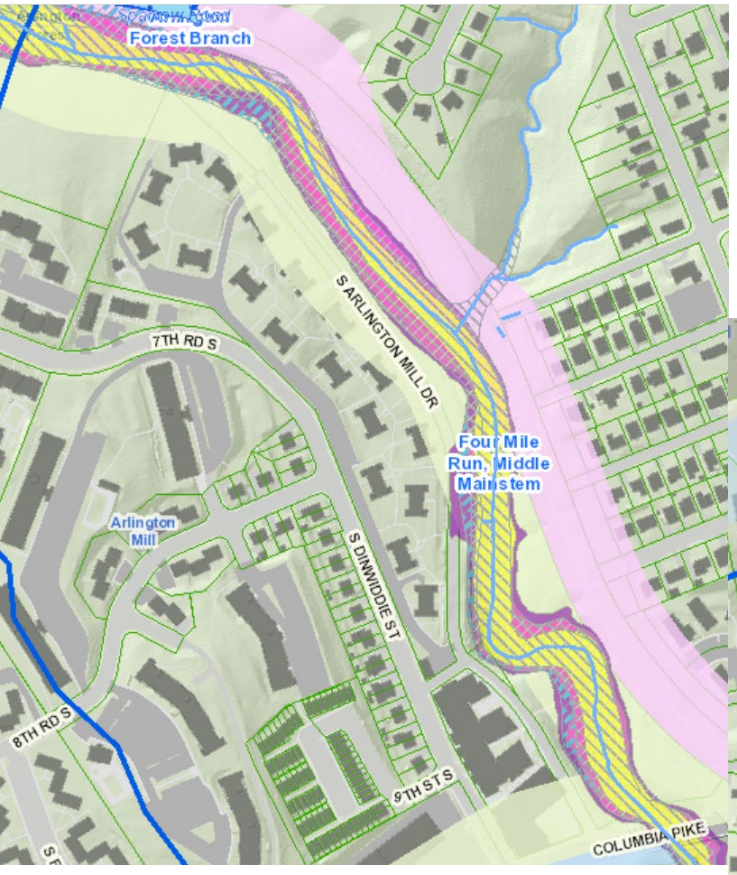
Updates on Other Stormwater Initiatives

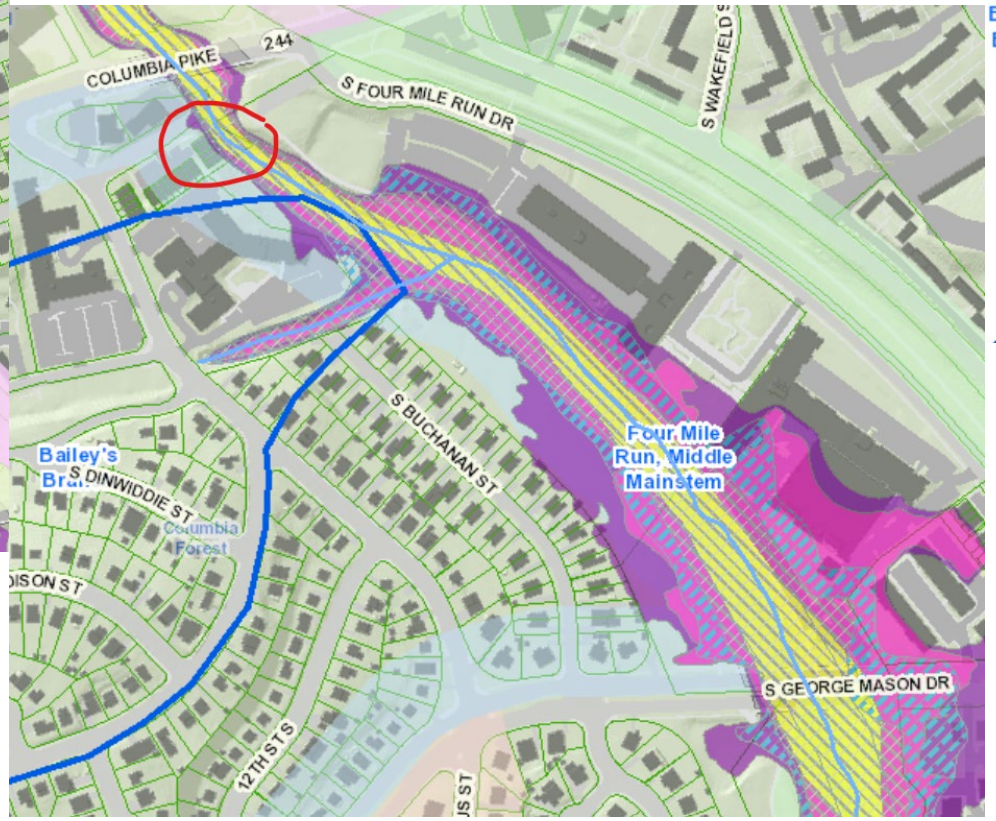
- FEMA FIRM update
- Arlington County Floodplain Ordinance update
- Stormwater Utility Update
- RAMP update
- High Water Detection Sensors

FEMA Floodplain Map Update

Detail of Pending floodplains

Overall view of Arlington Mill CA and Columbia Forest CA Preliminary floodplains





No Buildings impacted in Arlington Mill CA

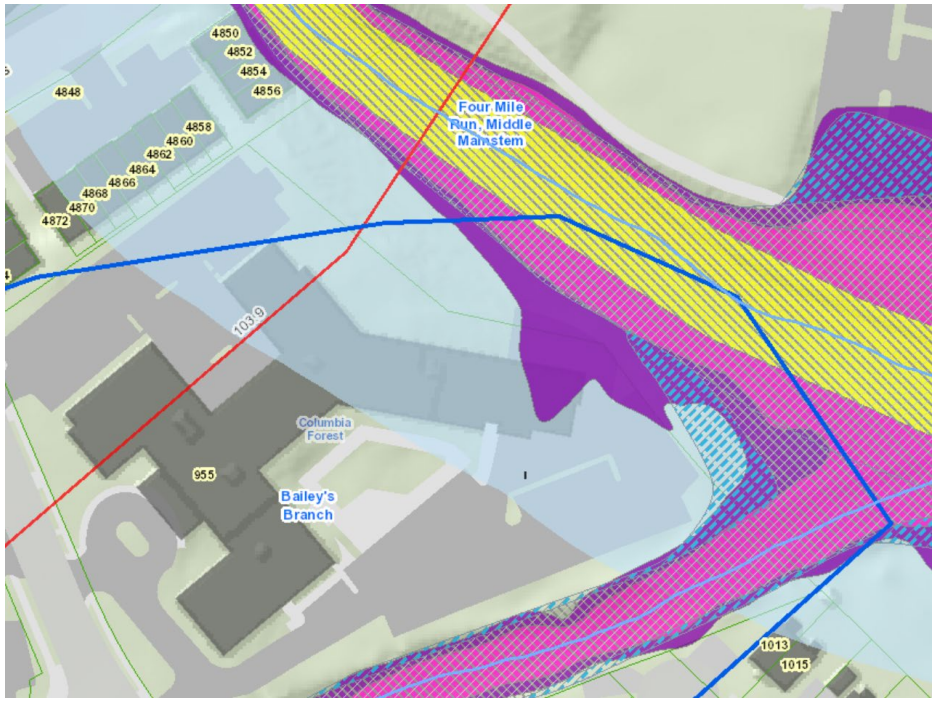
- A,
- AE,
- AE, FLOODWAY
- X, 0.2 PCT ANNUAL CHANCE

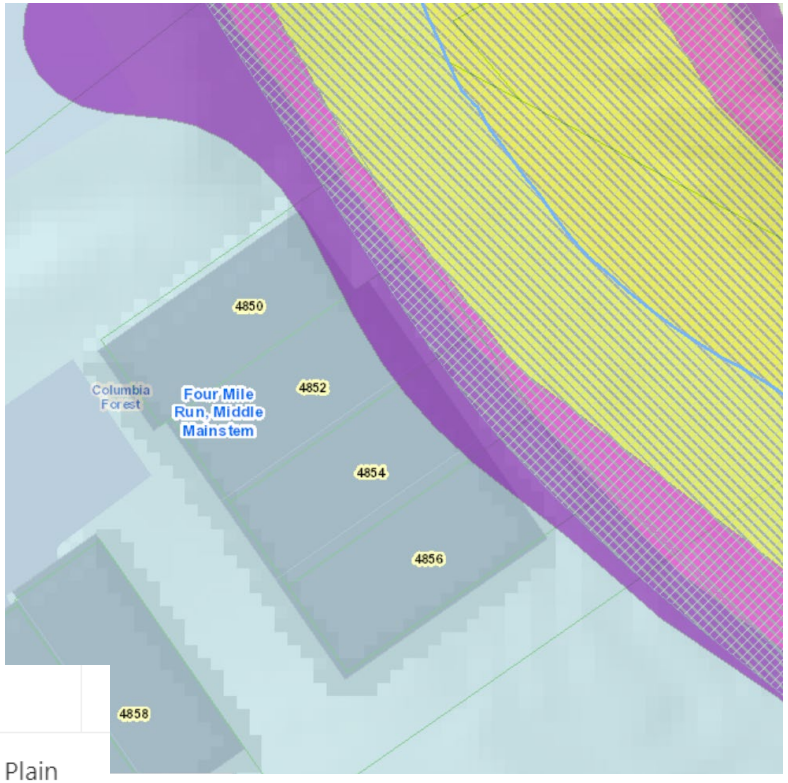
Most properties and buildings in Arlington Mill and Columbia Forest CA's are not impacted.

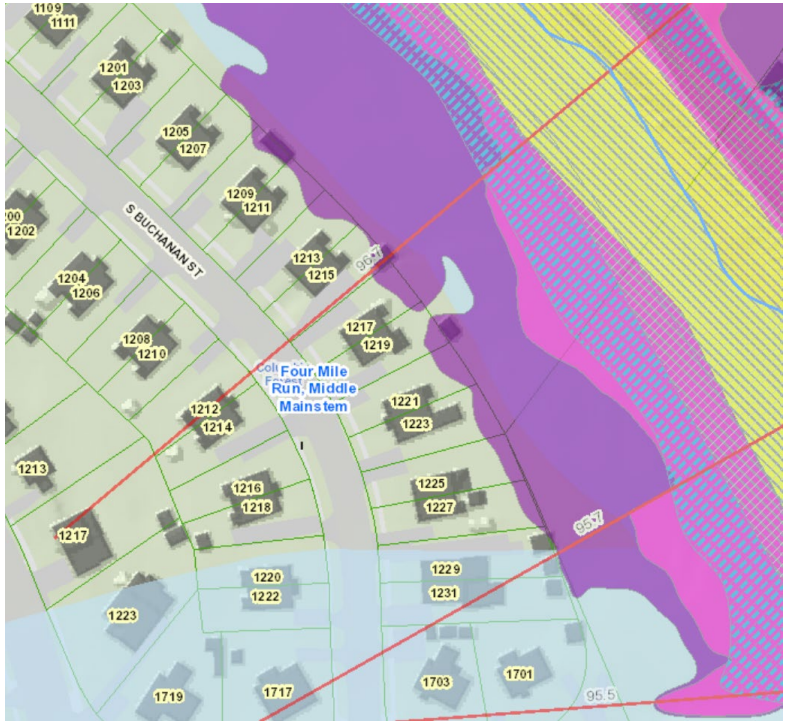
FEMA Map Update Details

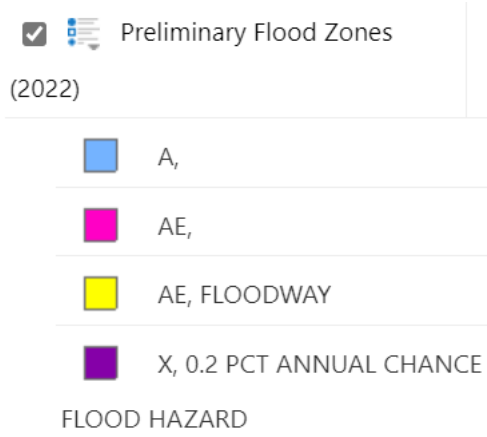
Note:

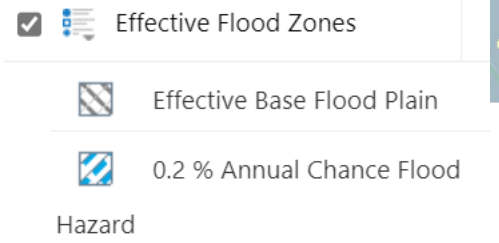
- Buildings are in 0.2% chance flood zone (500 year return period).
- Impacts are Minimal.
- These areas are on Panels 76D, but this panel was not revised as a result of the County Appeal.











Preliminary FIRM

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

ARLINGTON COUNTY, VIRGINIA
(All Jurisdictions)

PANEL 76 OF 83

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ARLINGTON COUNTY	515520	0076	D

PRELIMINARY
9/18/2020

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS
- NO SCREEN Areas of Minimal Flood Hazard Zone X
- Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

- (E) 18.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- (8) Coastal Transect

VERSION NUMBER
2.6.4.6
MAP NUMBER
51013C0076D
MAP REVISED

Floodplain Ordinance Update

Schedule mandated by FEMA

- Required due to FIRM updates
- Must be approved by DCR and FEMA
- Must conform to model ordinance
- Must be adopted within 6 months after Letter of Final Determination (LOD)
- Letter of Final Determination May 16, 2023
- New Maps Effective November 16, 2023

Overall, proposed changes are minor

Flood Insurance Rate Maps Update Process – Official Website of Arlington County Virginia Government (arlingtonva.us)

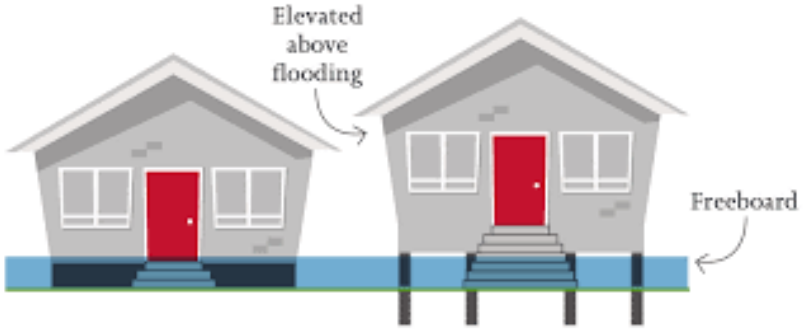
Floodplain Ordinance Update

- Required due to FIRM updates
- Must be approved by DCR and FEMA
- Must conform to model ordinance
- Must be adopted within 6 months after Letter of Final Determination (LOD) or approximately December, 2023

Overall, proposed changes are minor

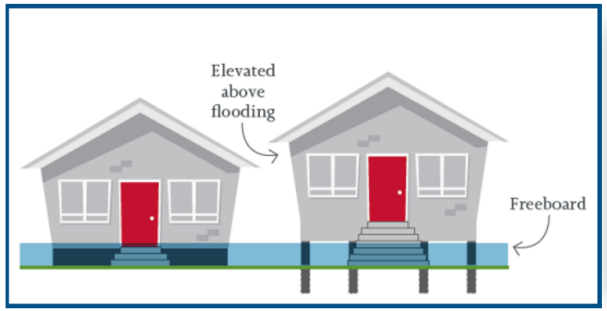
Proposed changes to Floodplain Ordinance

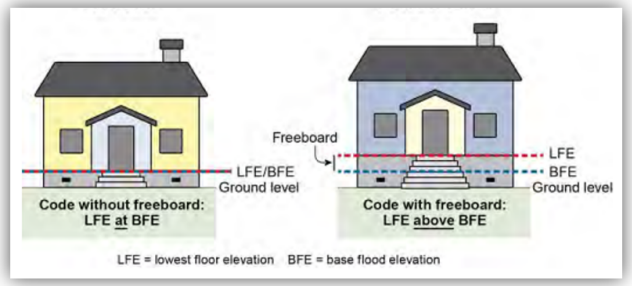
- Increase in required freeboard (distance above base flood elevation) from 12 to 18 inches, or
- Buildings in 100-year floodplain must be watertight 2 feet above the base flood elevation (previous requirement 1 foot)
- Accessory structures can not be larger than 600 feet
- No emergency service records, medical records or government records can be stored in 500 year floodplain



Summary of Proposed Changes to Floodplain Ordinance

Freeboard Update





When the base flood elevation data is utilized, the lowest floor shall be elevated to or above the base flood level plus eighteen (18) inches. The additional elevation is called 'freeboard', which provides an added margin of safety to address the flood modeling and mapping uncertainties associated with FIRMs.

Residential Construction Freeboard Update

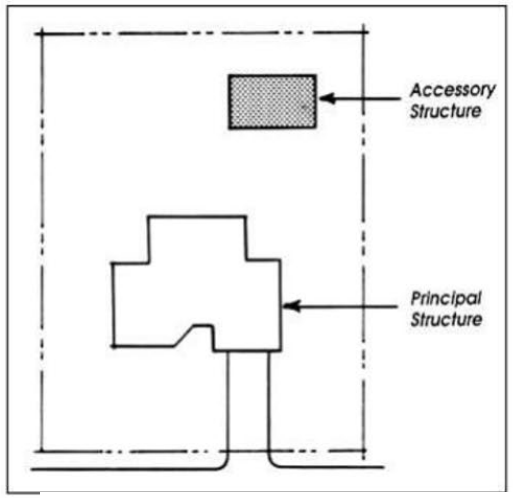
New construction or substantial improvement of any residential structure in Zones AE and A with detailed base flood elevations shall have the lowest floor, including basement, elevated to a minimum of eighteen (18) inches above the base flood level. *The previous minimum elevation was one (1) foot.*

Non-Residential Construction Freeboard Updates

New construction or substantial improvement of any commercial, industrial, or non-residential building shall have the lowest floor, including basement, elevated to or above the base flood elevation (BFE) a minimum of eighteen (18) inches. *The previous minimum floor elevation was one foot above the BFE.*

Buildings located in Zone AE may be flood-proofed in lieu of being elevated provided that all areas of the building components below the BFE plus two (2) feet are watertight with walls substantially impermeable to the passage of water and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. *The previous requirement was the BFE plus one (1) foot.*

Appurtenant or ‘Accessory Structure’



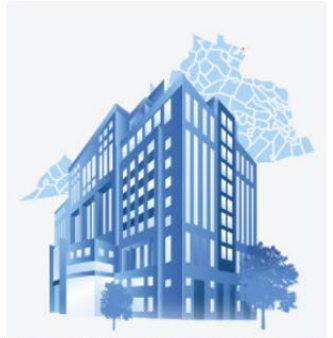
Appurtenant or ‘Accessory Structure’

- **Structure Size** - the footprint of the structure can be no greater than 600 square feet in area
- **Characteristics** –
  - Not be used for human habitation
  - Be useable only for parking of vehicles or limited storage
  - Be constructed with flood damage-resistant materials below the base flood elevation
  - Be constructed and placed to offer the minimum resistance to the flow of floodwaters
  - Be anchored to prevent flotation
  - Have electrical service and mechanical equipment elevated to or above the base flood elevation

Summary of Proposed Changes to Floodplain Ordinance

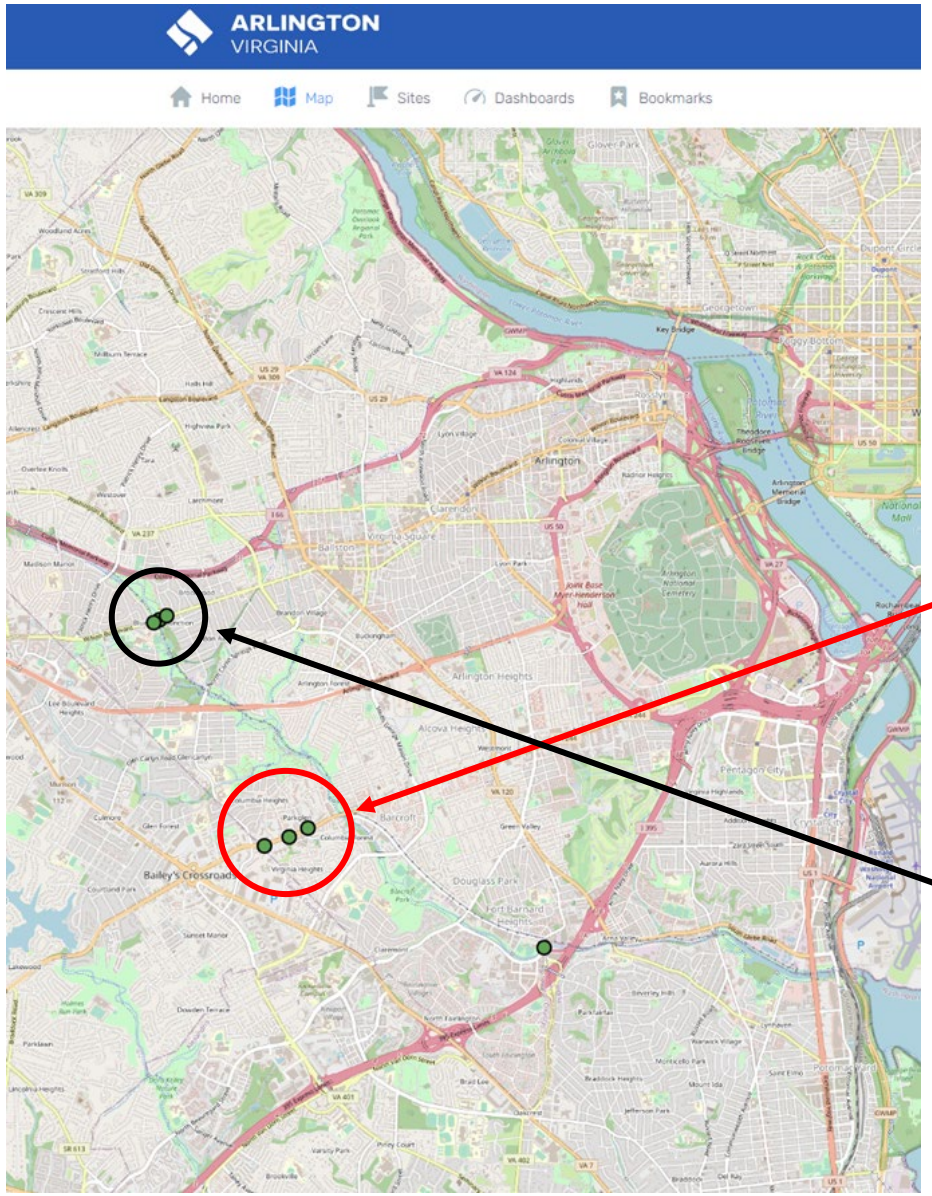
0.2 Percent Annual Chance Flood Hazard Area

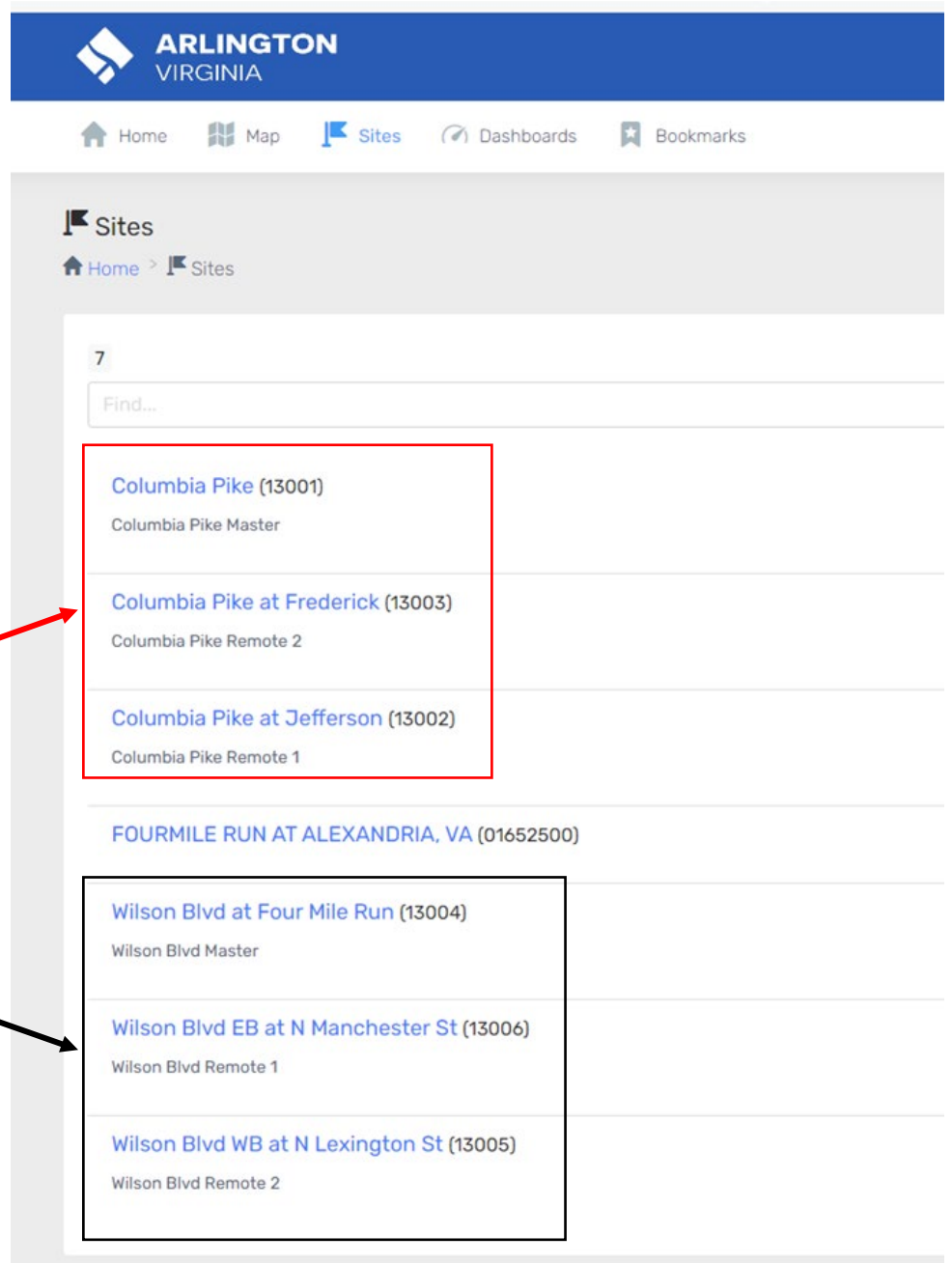
The mapped floodplain includes the districts designated as having a 0.2 percent annual chance of flooding as shown on the Flood Insurance Rate Map.
In this district no emergency service, medical service, or governmental records storage shall be allowed, except by special exception using the waiver process.



High Water Detection Devices

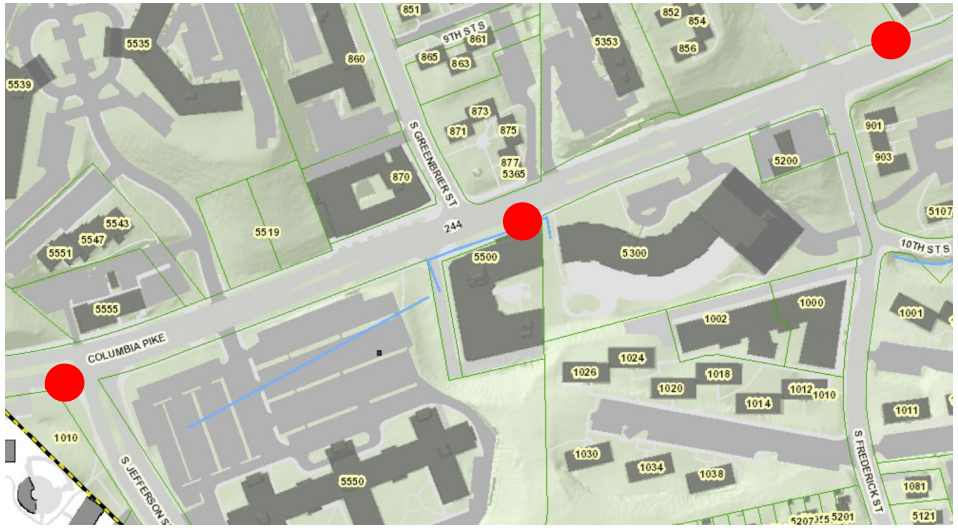
Two high water detection devices installed

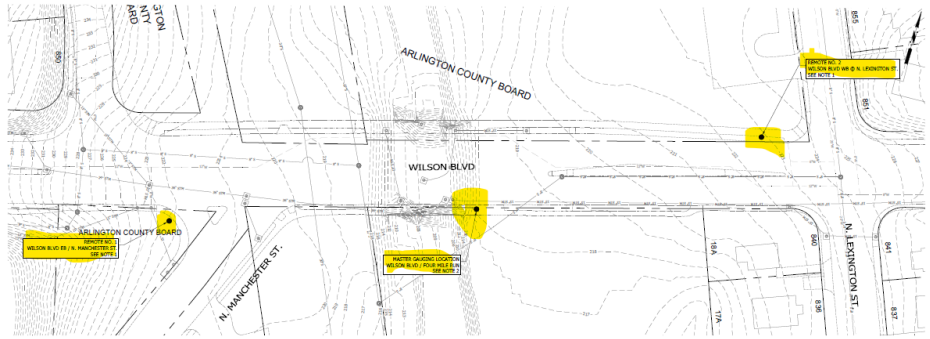




High Water Detection Devices

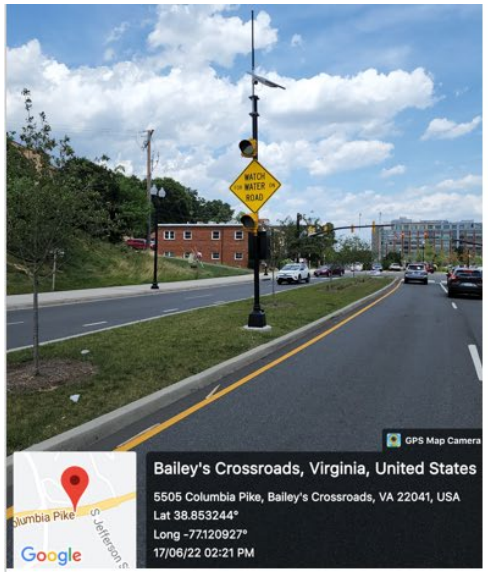
Two high water detection devices installed

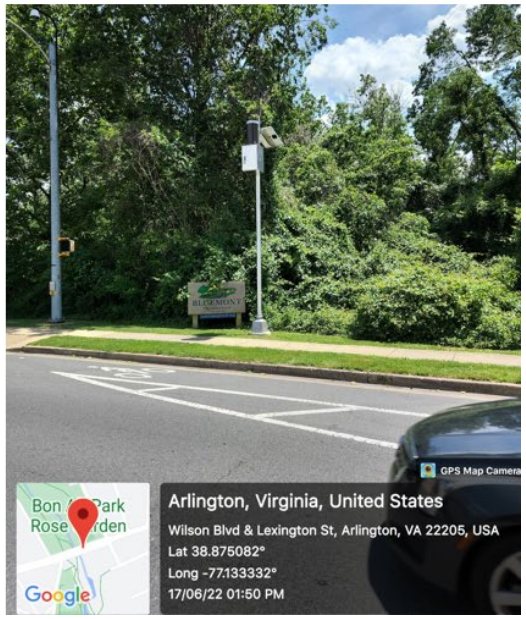




A third set of devices is slated for Kirkwood Rd. @ Langston Blvd.

Location #1: Columbia Pike near S Greenbrier St.

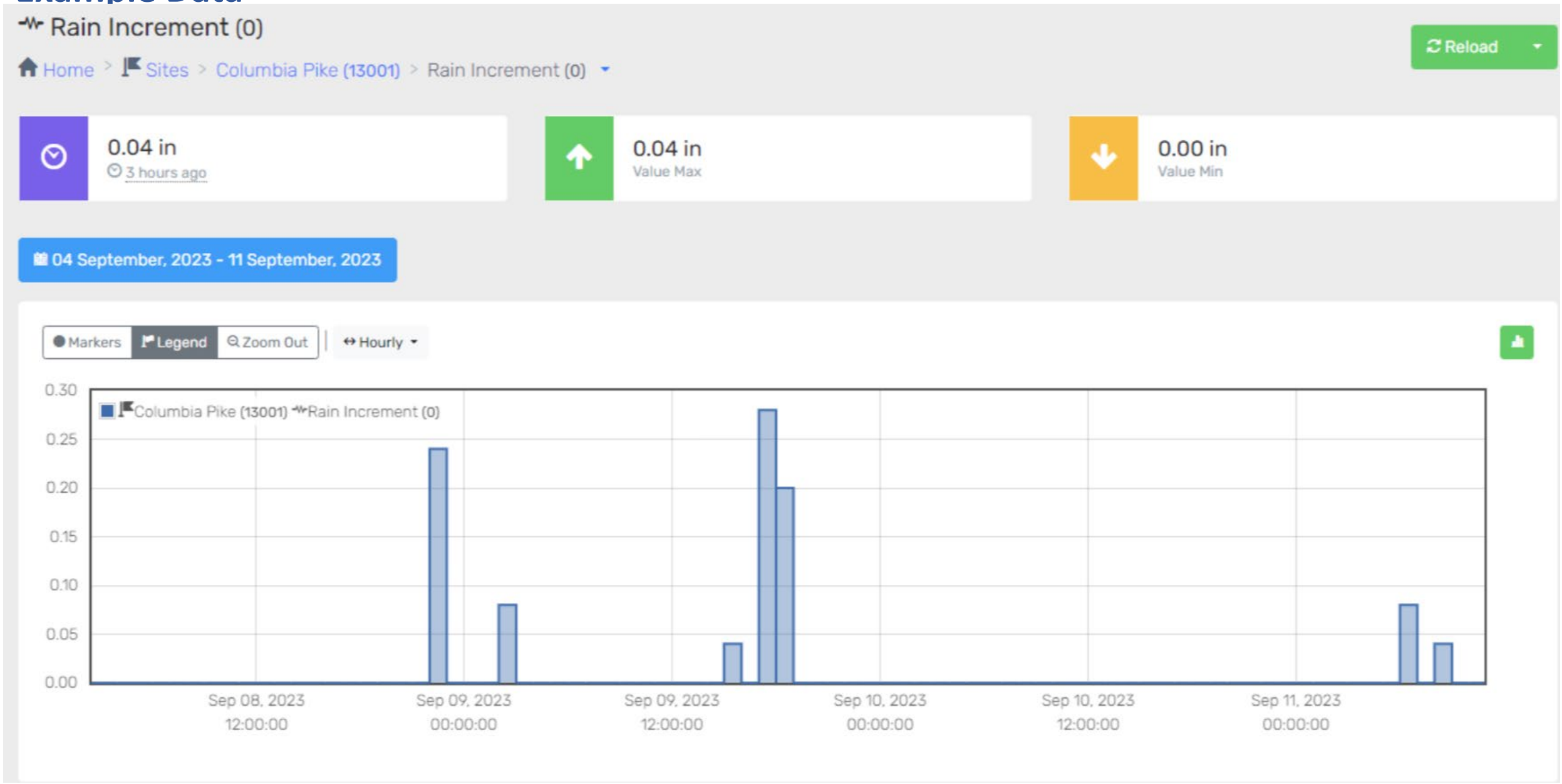




Location #2 Wilson Blvd. near N Lexington St. and N Manchester St.

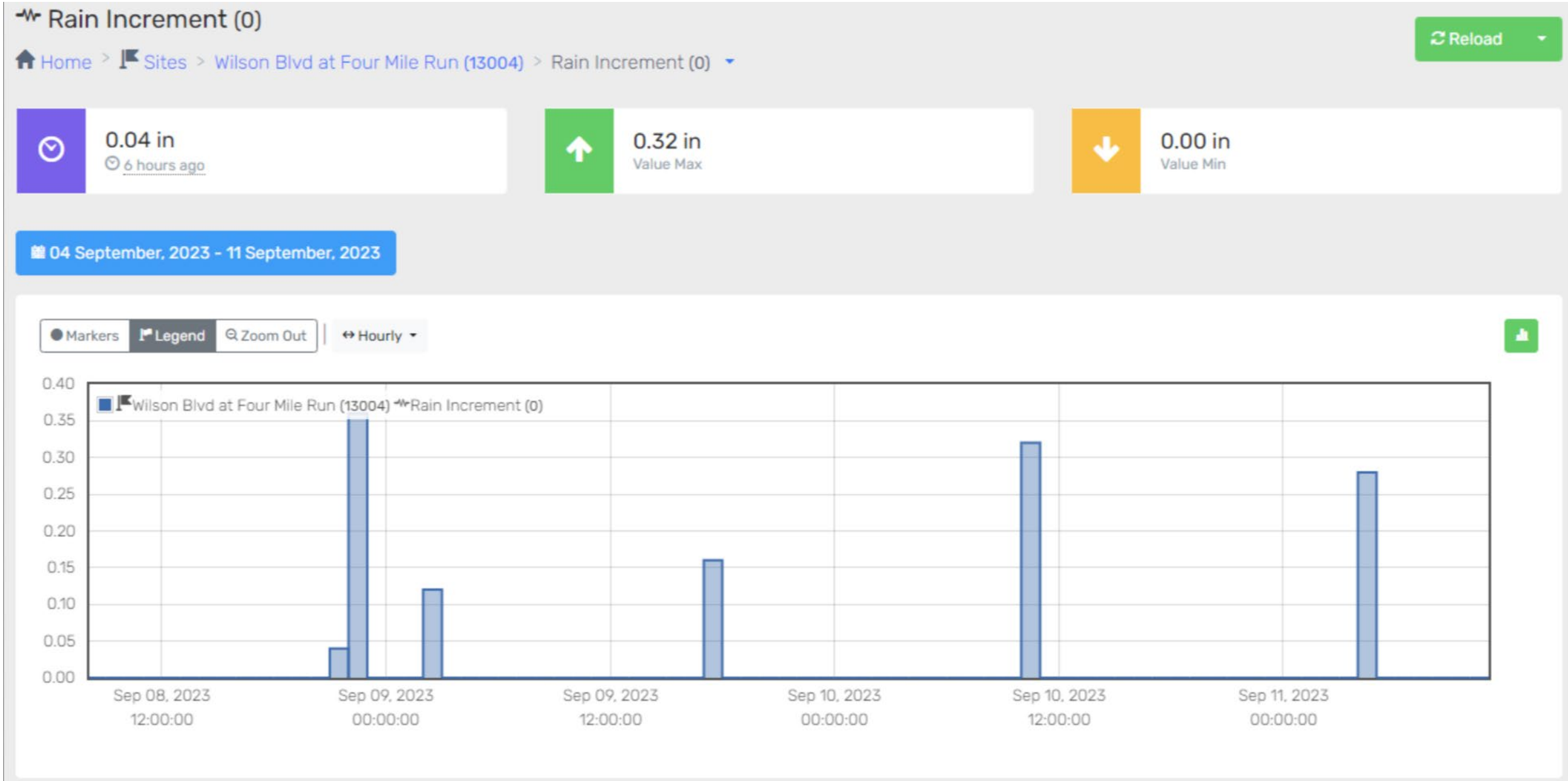
High Water Detection Devices Example Data

Location #1: Columbia Pike near Greenbrier



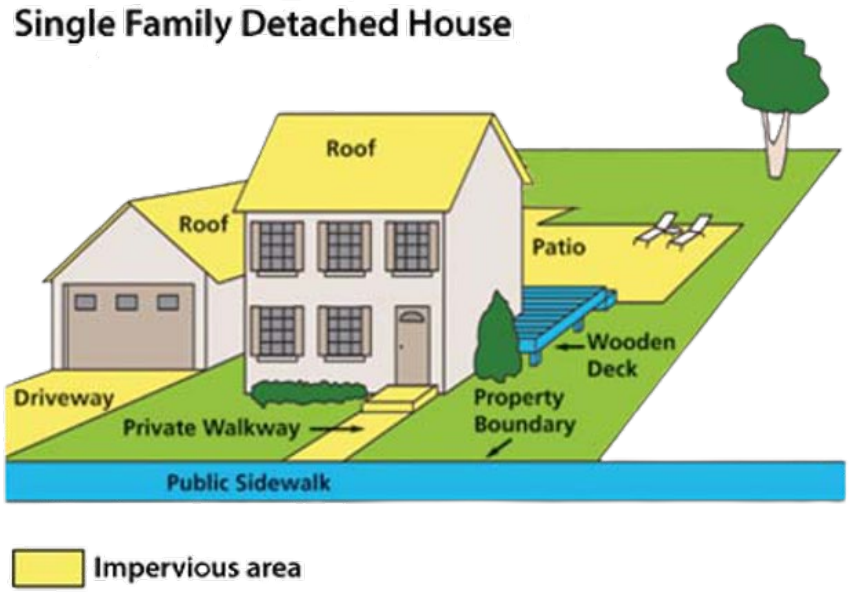
High Water Detection Devices Example Data

Location #2 Wilson Blvd. near N Lexington St. and N Manchester St.



Stormwater Utility

- County is transitioning to a stormwater utility for funding the stormwater program
- Currently, property owners pay a stormwater tax based on property assessment. Stormwater utility fee would instead be based on impervious cover on the lot
- Credit would be offered for some actions taken to reduce runoff. Apply for credits Nov 1, 2023 – Jan 15, 2024
- County Board will vote on rate in Nov/Dec.
- More information and resources on the web page



https://arlingtonva.us/stormwaterutility

Risk Assessment and Management Plan (RAMP)

- Will deliver updated rainfall curves, 10 year design standard and 2040 and 2070 climate projections
- The RAMP maps critical community facilities in all sectors, to support vulnerability and risk assessments, and allow mitigation planning.
- Map County's "urban" floodplains (outside FEMA floodplains)
- Measures both Flooding and Sea Level Rise/Storm Surge Risks
- Define and value risks from flooding
- Informs flood resilient design and construction standards

Ballston Wetland Park

Ballston Wetland Park project is complete!

Path to a Flood Resilient Baileys Branch/ West Columbia Pike

Questions?

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