Path to Flood Resilience
Torreyson Run

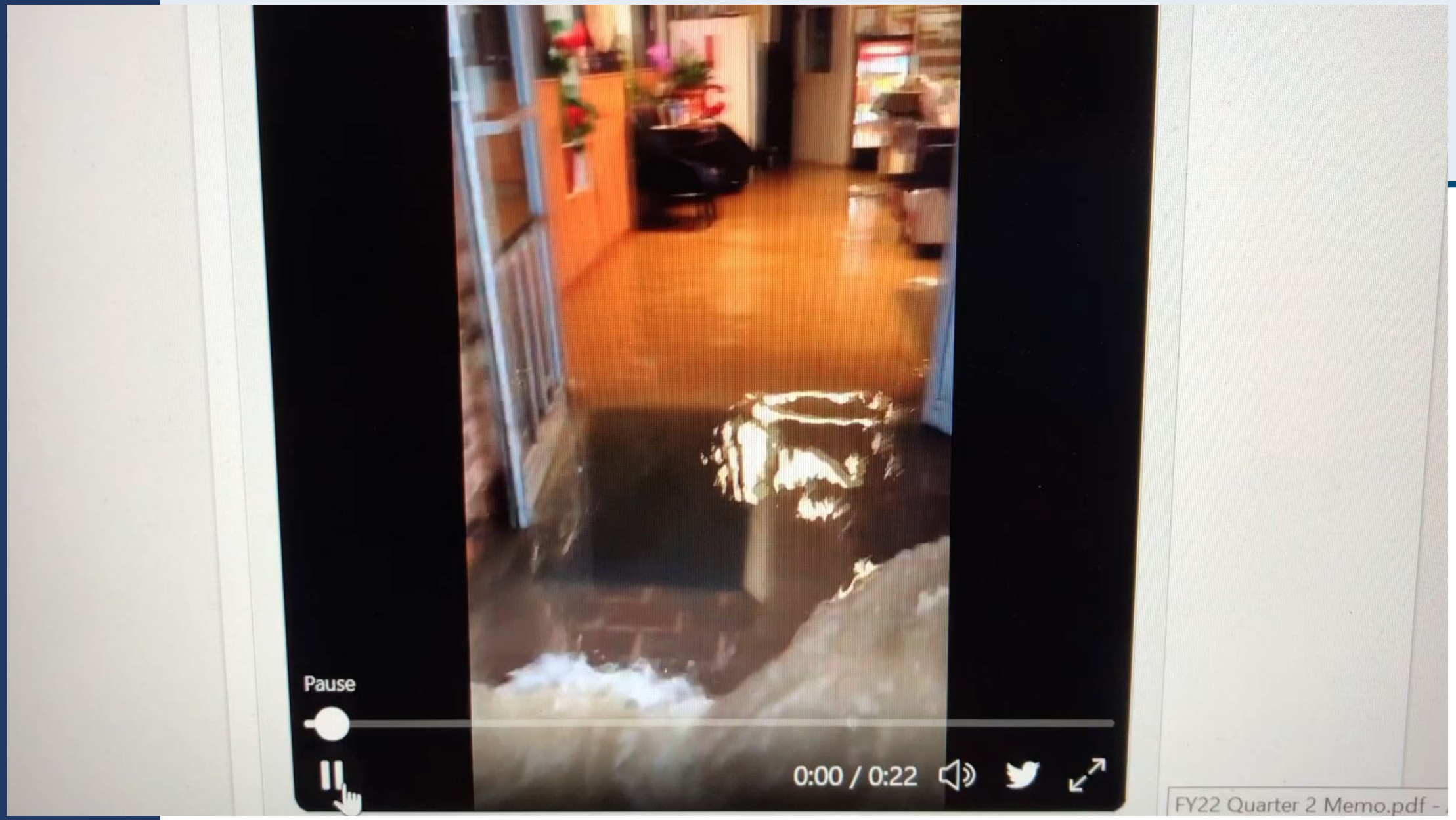
Flood Resilient Arlington

November 2, 2022

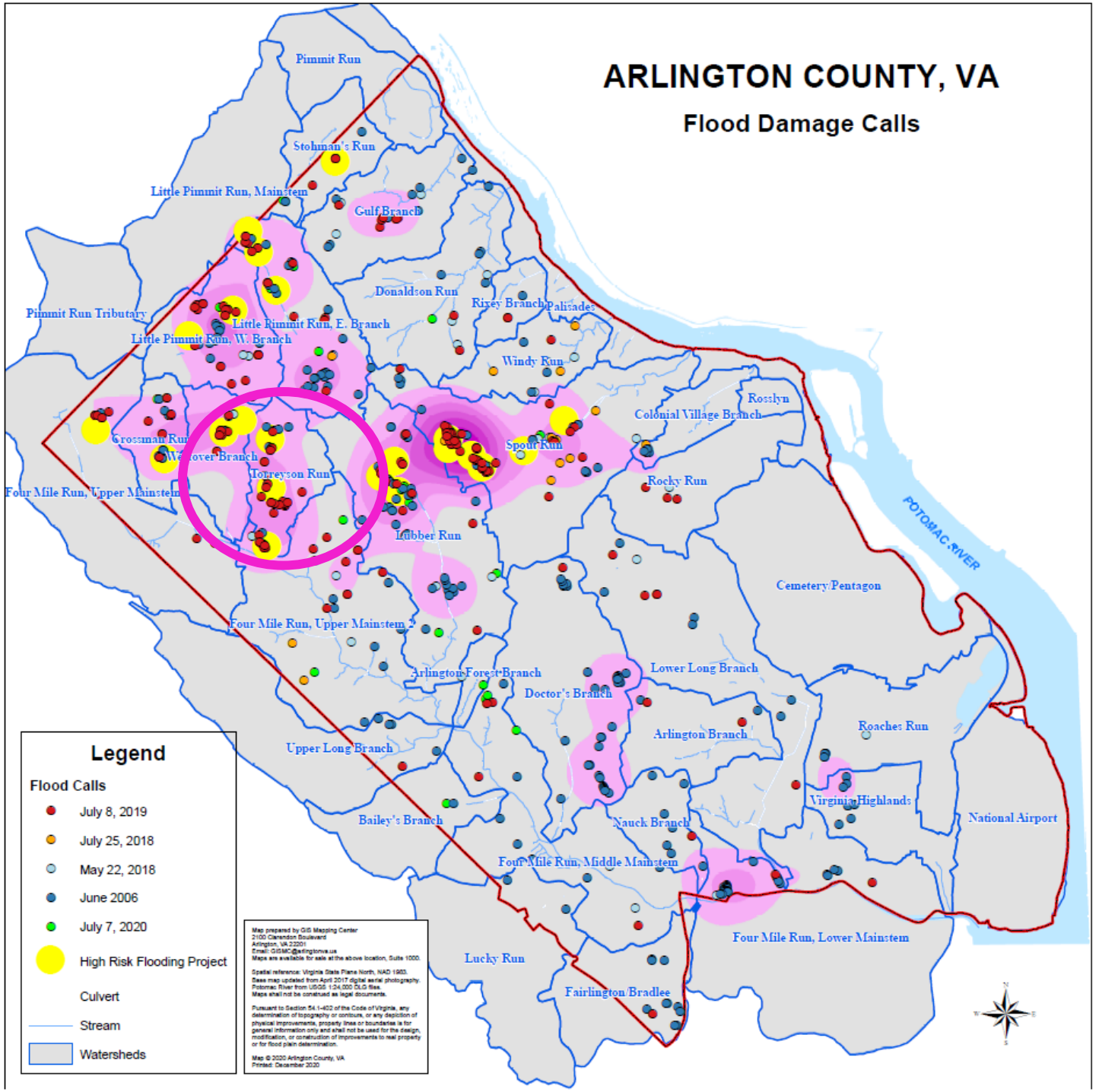
ARLINGTON
VIRGINIA

Agenda

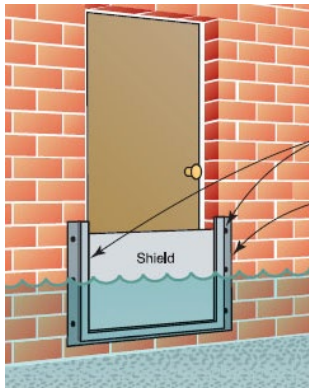
- Why are we having this discussion?
- Flood Resilient Arlington
- Resilience
- Causes of Flooding and Overland Relief
- Know Your Flood Risk
- Progress in Torreyson Run Watershed
  - Cardinal School Vault
  - N. Lexington Improvements
  - 4 Additional Projects Initiated
- CIP Funding
- Brief Updates on other Initiatives
- Questions


Pause
0:00 / 0:22
FY22 Quarter 2 Memo.pdf -

Note: Torreyson Run is one of the five critical watersheds that experienced severe flooding in 2019.



Key Elements of Flood Resilient Arlington



- Analytics and Data Assessment
- New Types and Locations for Capacity Projects
- Increased Stormwater Requirements
- Increased Funding
- Voluntary Property Acquisition
- Floodproofing Outreach

Mapping Program Investments

Legend

Watersheds

Storm Water Management Projects

Program / Status

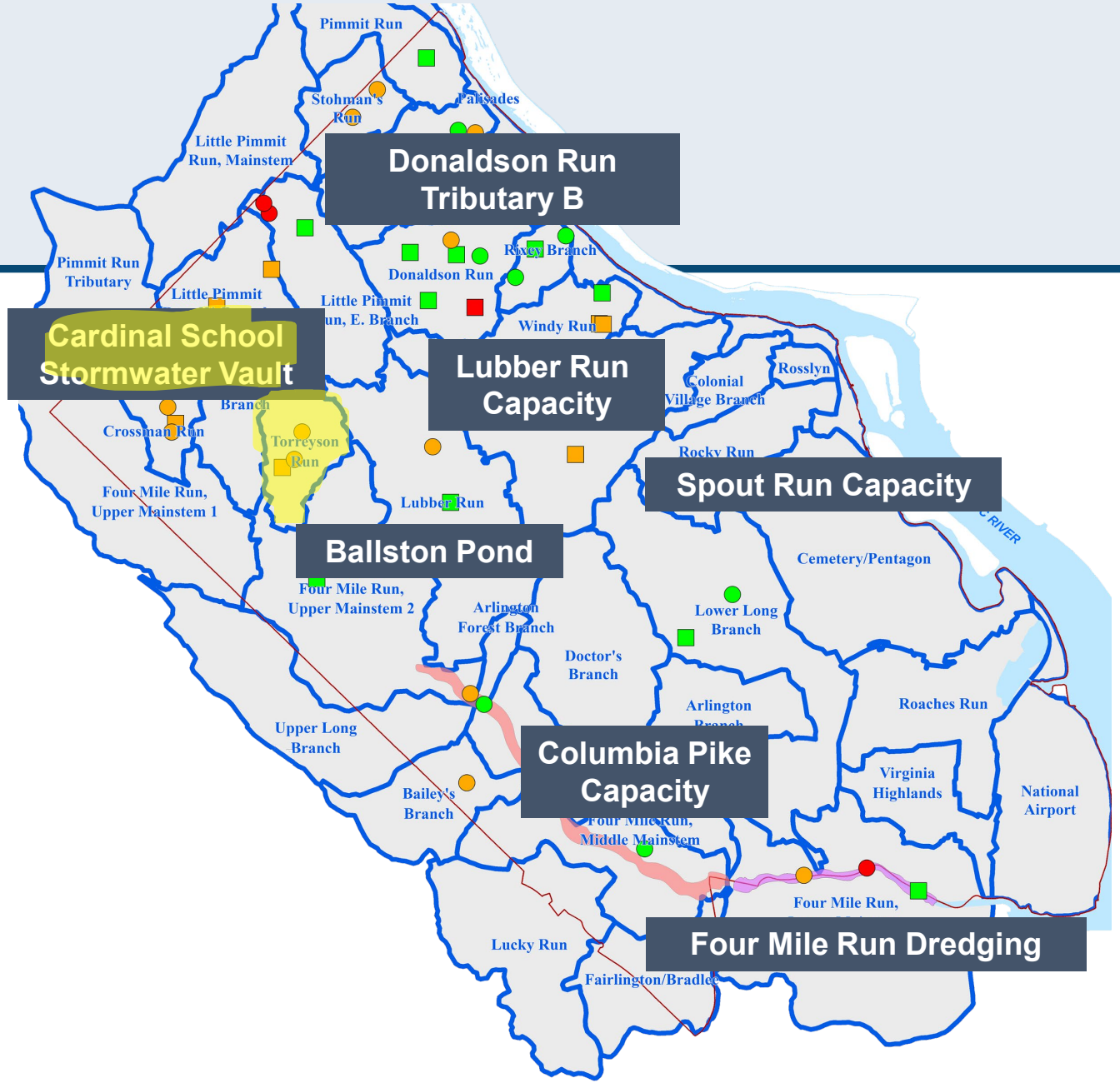
- Capacity Complete / Under Construction
- Capacity / Planned
- Maintenance Capital / Complete
- Maintenance Capital / Planned
- Water Quality / Complete
- Water Quality / Planned

Past Storm Water Management Initiatives

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

Other Map Elements

- County Line
- Potomac River



County Watersheds

Legend

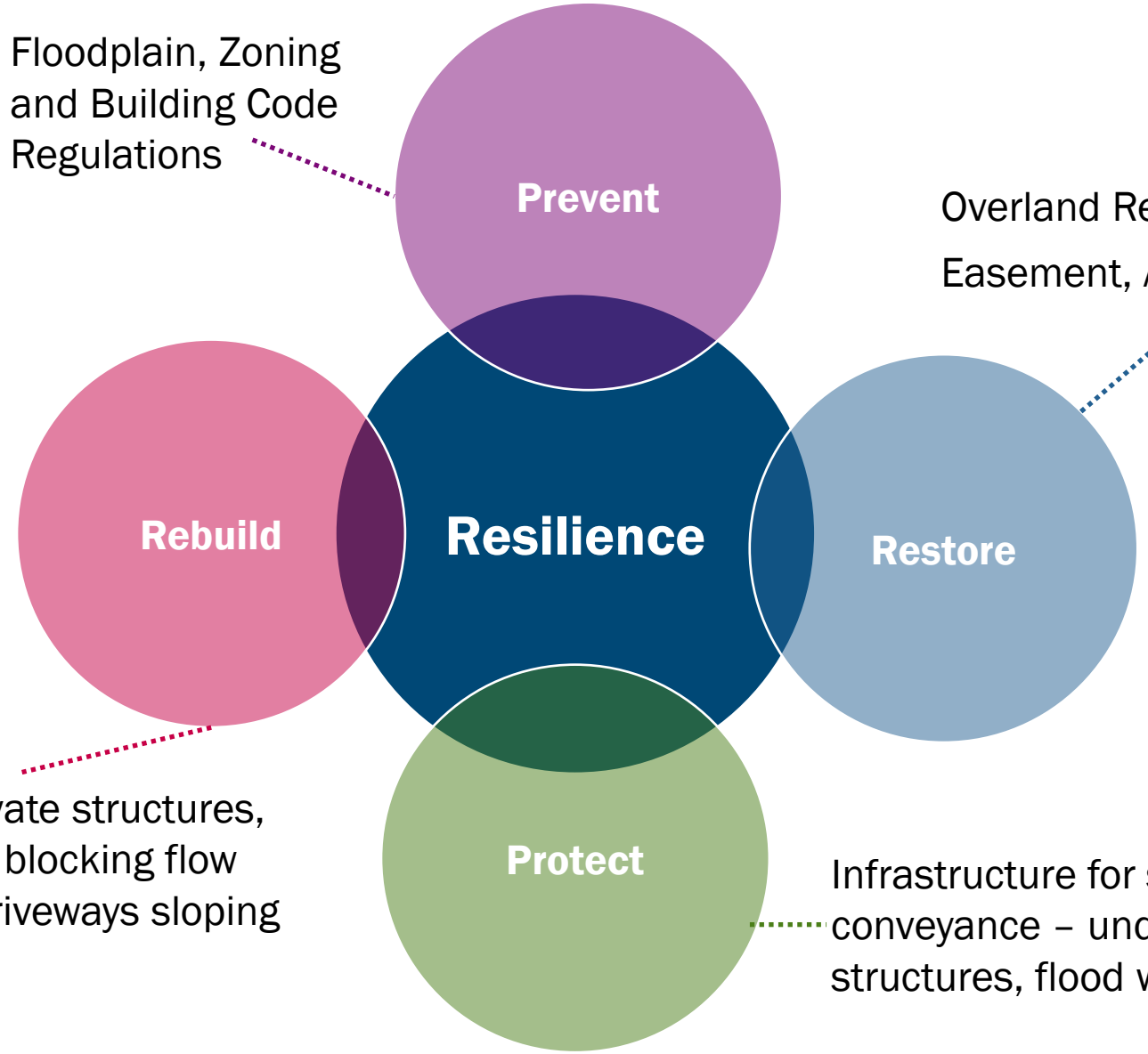
- Watershed Boundary
- Stream and Open Channels
- Landmark Buildings
- Major Roads
- Potomac River
- County Line

Target program areas for Capacity Improvements program

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

Causes of Flooding

Some properties are at a higher risk of flooding due to their location in former stream valleys.

- During Arlington's early development, there were no stormwater management regulations, and standards for storm systems were less rigorous than today.
- Streams were buried in stormwater pipes and homes and businesses were built within the former floodplains.
- Given the low topography in these former stream valleys, these areas remain at higher risk of flooding despite the presence of the underground stormwater pipes.

Stormwater System Design Standards and Overland Relief

- Over time, the US government has collected rainfall data. This database of storm events is used to define the likelihood of a storm occurring.
- The 10-year storm is defined as having a 10% chance of happening each year, 100-year storm a 1% chance.
- Currently, stormwater systems are designed for a 10-year storm, with the assumption that there is overland relief present for larger storms.
- Overland relief is a safe pathway for stormwater to flow for storms greater than the 10-year storm.

Since many areas in Arlington developed before the adoption of stormwater design standards which included overland relief, there is limited, or no, overland relief in many watersheds, including Torreyson Run.

Goal = 10-Year storm + Overland Relief

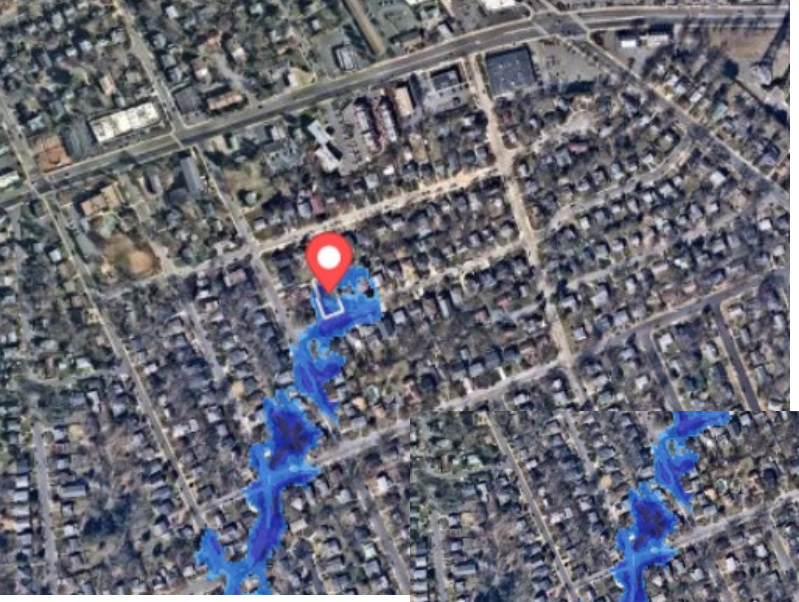
Overland relief does not exist for this area!
This area will always have some flood risk.

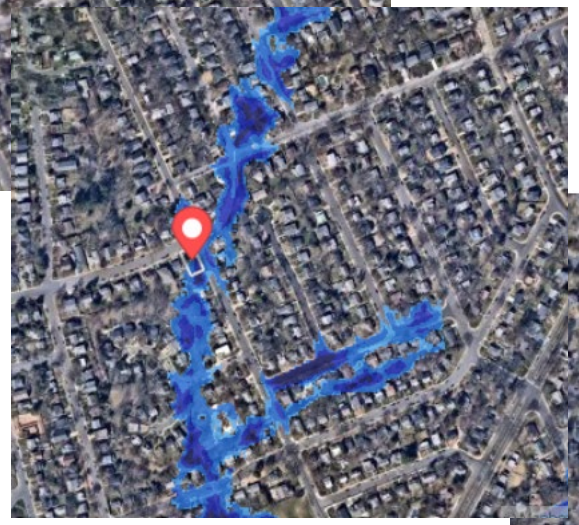
ARLINGTON VIRGINIA

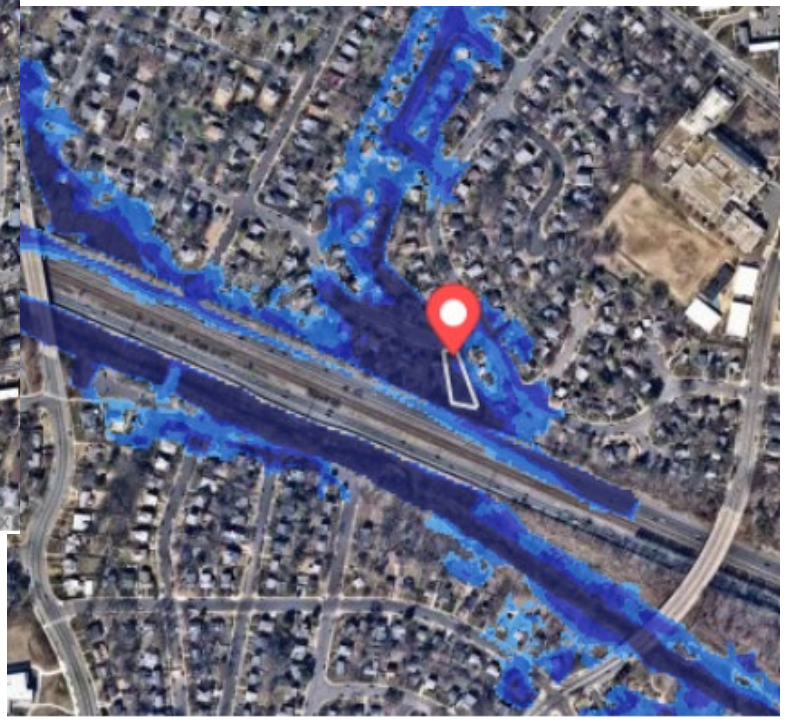
Know Your Flood Risk

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.



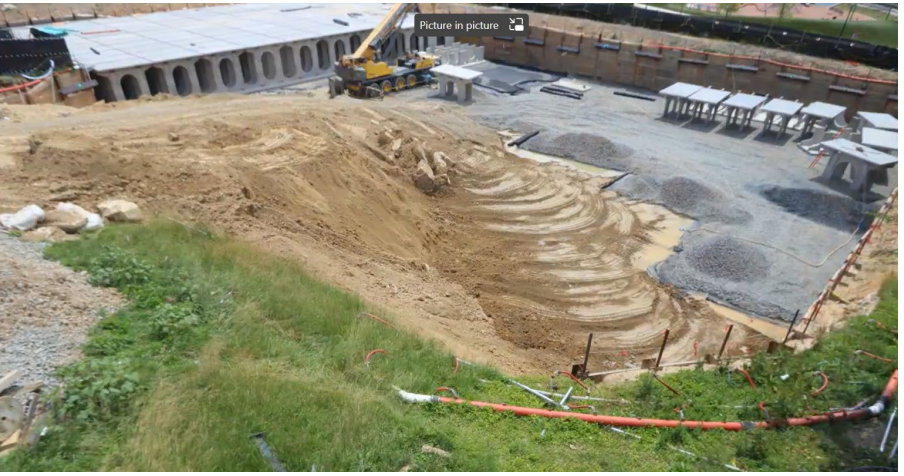




Climate Alpha is another web tool

https://climatealpha.ai/

Progress in Torreyson Run

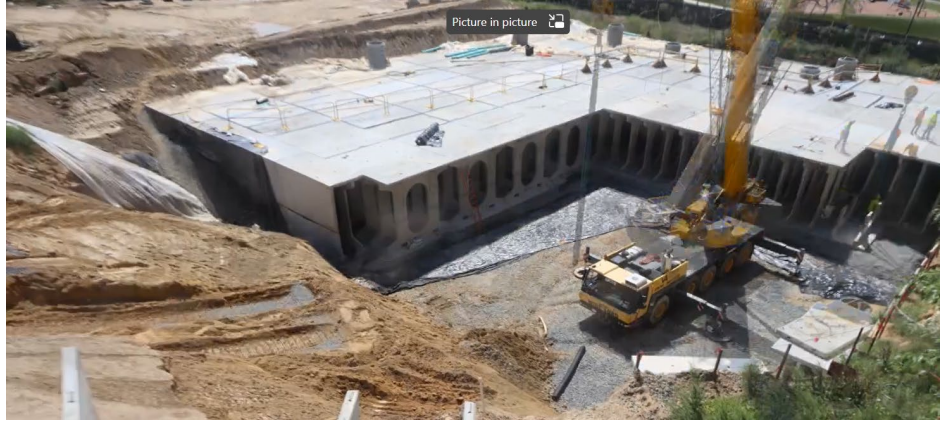


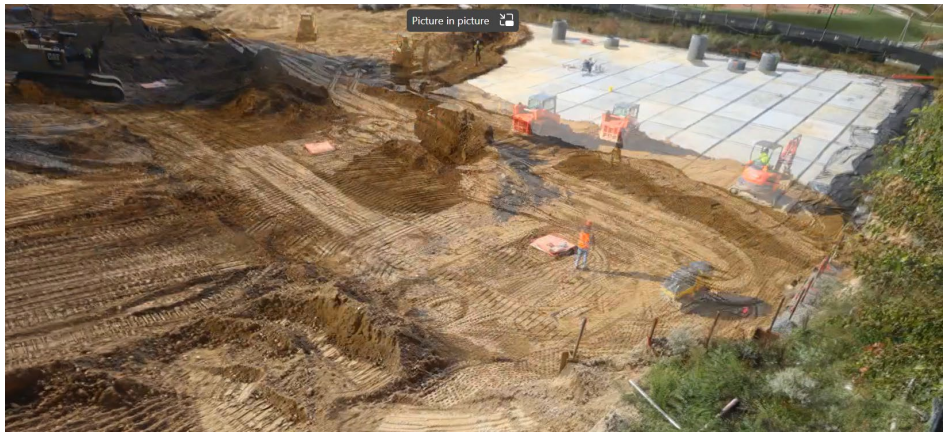
Project consists of two underground stormwater storage vaults
Photos show construction of first, larger vault

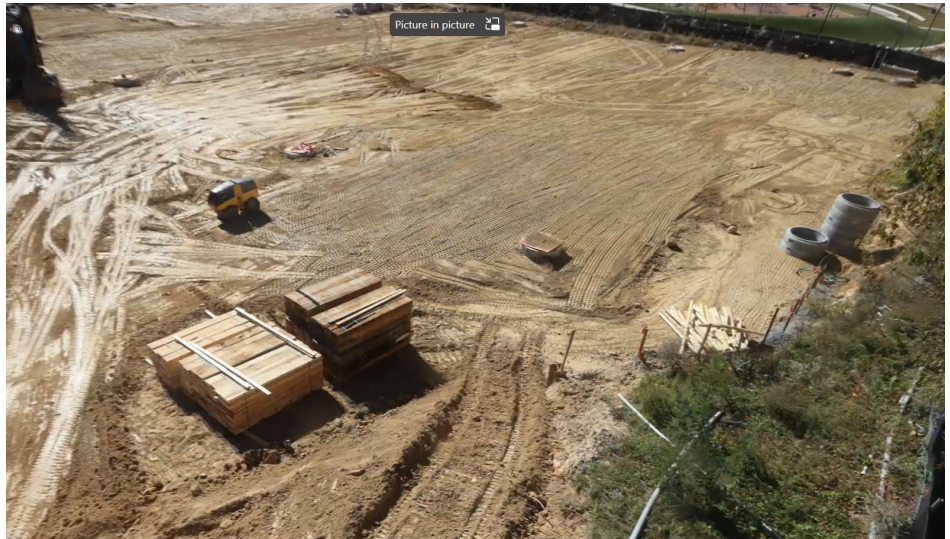
- **Cardinal School Stormwater Vaults Phase I construction completed & Phase II construction well underway.**
- **Secured substantial CIP funding – see next slide on CIP funding**
- **Initiated 4 additional Capacity Projects**

[Cardinal Elementary School Stormwater Vault – Official Website of Arlington County Virginia Government (arlingtonva.us)]

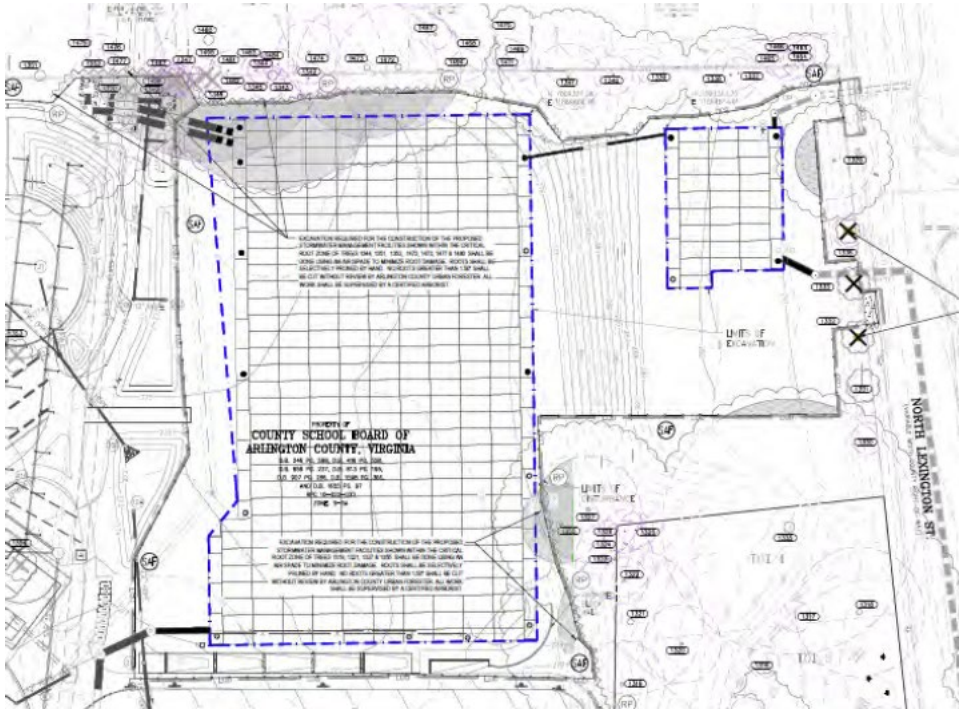
[Cardinal Elementary StormTrap Time lapse, Oct. 17, 2022 - YouTube]







Cardinal Stormwater Vault Project



Construction of first, large **vault** is completed and the vault is now covered with soil. Final grades yet to be achieved.
Restoration of playing field still to be completed.

Cardinal Elementary StormTrap Time lapse, Oct. 17, 2022 - YouTube

Cardinal Stormwater Vault Project

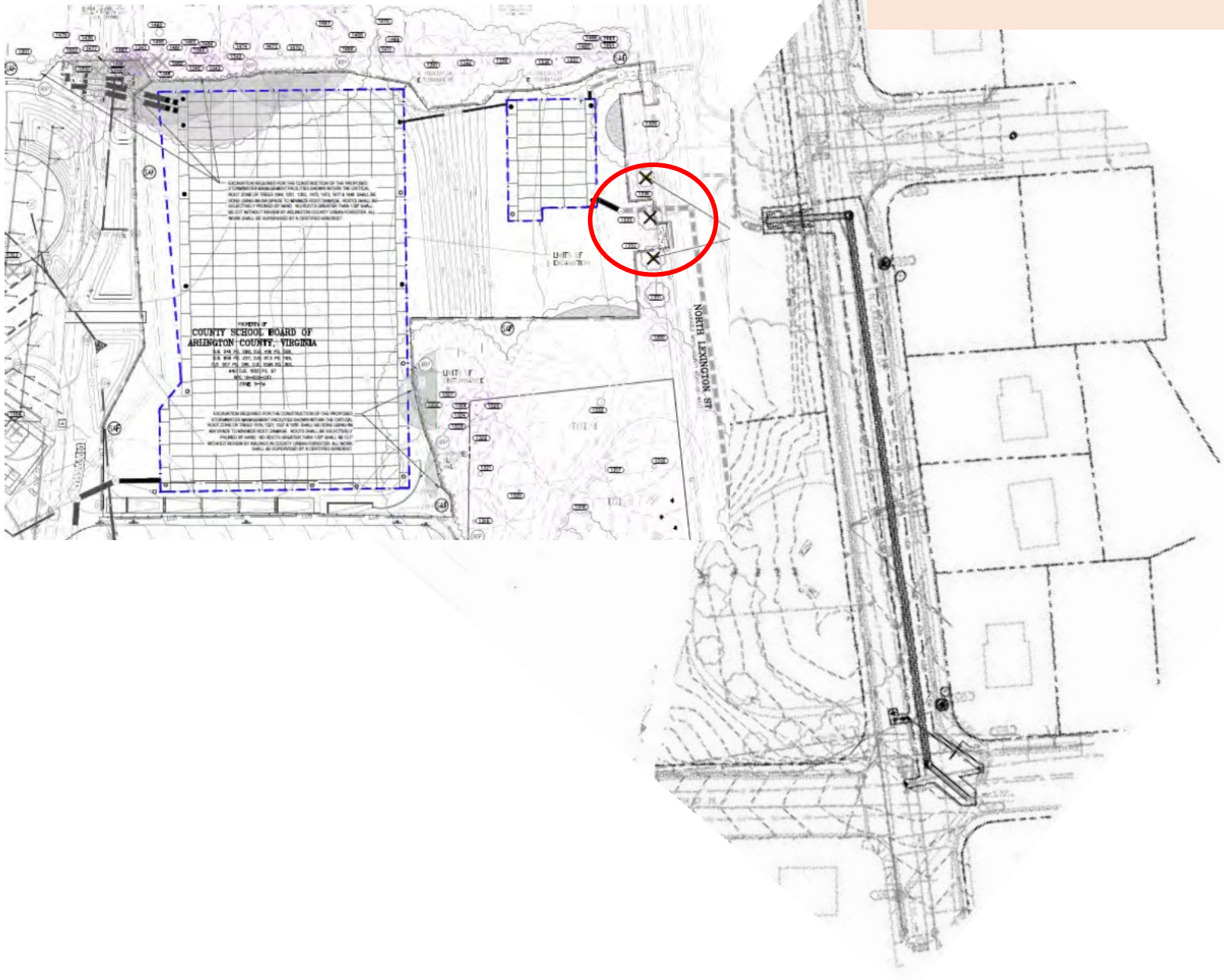
Construction of the second, smaller **vault** has begun with the excavation occurring now.

- Final completion projected in spring 2023
- Project team is looking for ways to sod this winter – not guaranteed
- Construction of N Lexington St. supplemental storm sewer projected to begin once MOT (jersey barricades) can be removed and new MOT in place to permit construction. Work will begin with Washington Gas. They will prepare their own MOT.
- N Lexington St. work to require about 4 months.

Cardinal Elementary School Stormwater Vault – Official Website of Arlington County Virginia Government (arlingtonva.us)

Cardinal Elementary StormTrap Time lapse, Oct. 17, 2022 - YouTube

N Lexington St. Storm Drainage Improvement

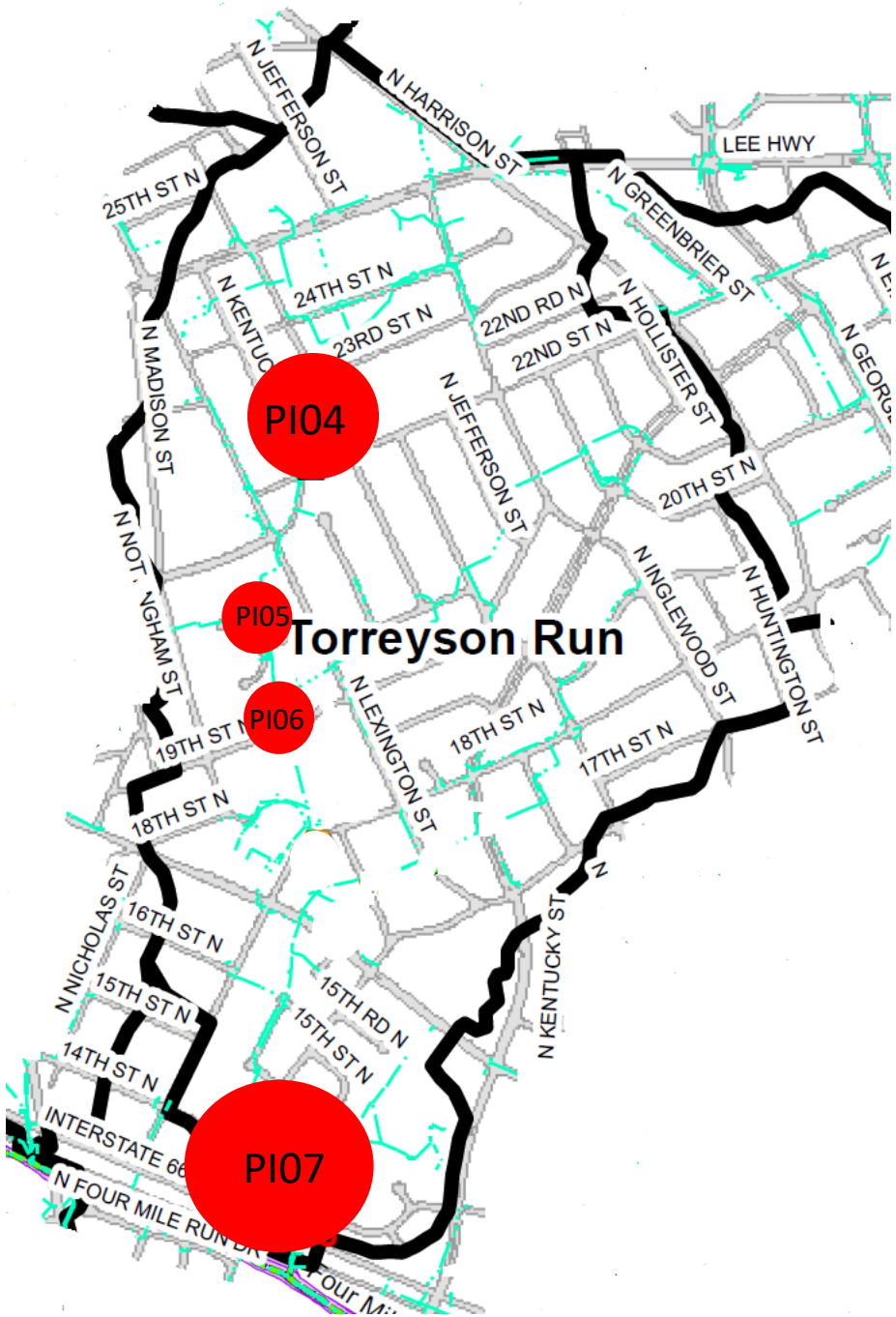


N Lexington St. work to require about 4 months.

Project collects additional runoff volume and diverts it into Vault 2, which drains to Vault 1

Washington Gas will relocate some gas lines first – expected in February 2023. They will prepare their own MOT.

4 Additional Storm Drainage Projects



Design of four additional Storm Drainage Projects for additional reaches of the Watershed have been initiated:

1. PI04 N Kensington @ 23rd St.
2. PI05 N Lexington @ 20th St. N
3. PI06 19th St. @ N Lexington St.
4. PI07 Expansion of Culvert at I-66 and N Longfellow

Projects in **Design** phase

No Schedule determined yet

Continuation of Watershed Improvements to facilitate storm water to enter Vaults at Cardinal School

Also working on Flow monitoring of Vault flows and performance

CIP Funding for Torreyson Run

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
15. Torreyson Run Watershed Capacity Improvements	340	2,165	2,225	2,515	3,585	3,900	0	0	0	0	14,730

Note that funding for this FY is for design work on additional projects for other reaches of the watershed, which is underway. Funding for the Cardinal School Vaults was in previous CIP's and is not part of this CIP.

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

Updates on Other Stormwater Initiatives

- Voluntary Land Acquisition Program
- FEMA FIRM update
- Arlington County Floodplain Ordinance update
- High Water Detection Sensors
- LDA 2.0
- RAMP update
- Stormwater Utility Update
- Zoning Study
- Flood Resilient Design and Construction Manual

Since we know that you may hear about this from other Civic Leaders, we want to explain this to you also. At this time, this is not proposed for Torreyson Run Watershed.

Proposed Supplemental Watershed Strategy for Some Watersheds

Voluntary Property Acquisition for Overland Relief and System Expansion

Restore

- None of the solutions evaluated can manage the updated 10-year storm.
- Designing for a 10-year storm event is only appropriate where overland relief is available for larger storm events.
- There may not be sufficient available space within existing rights-of-way to maintain the infrastructure, make resilient system upgrades, or to provide overland relief.
- **Upon completion of more detailed Engineering Studies, the long-term solution to reduce flood risk in Torreyson Run may require overland relief.** (Note that initially, voluntary property acquisition will focus on properties located in Spout Run Watershed. A few properties are also located in Lubber Run Watershed.*)
- Phased Property Acquisition is a necessary component of a resilient stormwater improvement program to provide overland relief or expand the system capacity and reduce flood risk to the community.

Proposed Supplemental Watershed Strategy for Some Watersheds
Voluntary Property Acquisition for Overland Relief and System Expansion

Restore

- Land acquisition of properties in 100-year inundation zone proposed to be phased in prioritized/tiered approach
- Property would become open space to maintain the infrastructure, enhance the system, or to provide overland relief. Properties would be protected from development encroachments by regulation
- Problematic flooding areas and stormwater overflow paths have been identified by numerous studies and empirical evidence:
    - Capacity Study, Stormwater Masterplan and Engineering Studies
    - Riskfactor.com
    - RAMP
    - Flood events (2006, 2018, 2019, 2020)
- Voluntary land acquisitions

FAQs Available Online

How do I know if the County is interested in purchasing my property? *The County's real estate team will begin contacting homeowners this fall -about potential property acquisitions by letter. Properties will be considered based on the degree that they can be used by the County for the purposes noted above and the flood risk present in specific areas of the watershed based on historic development patterns, topography, etc.*

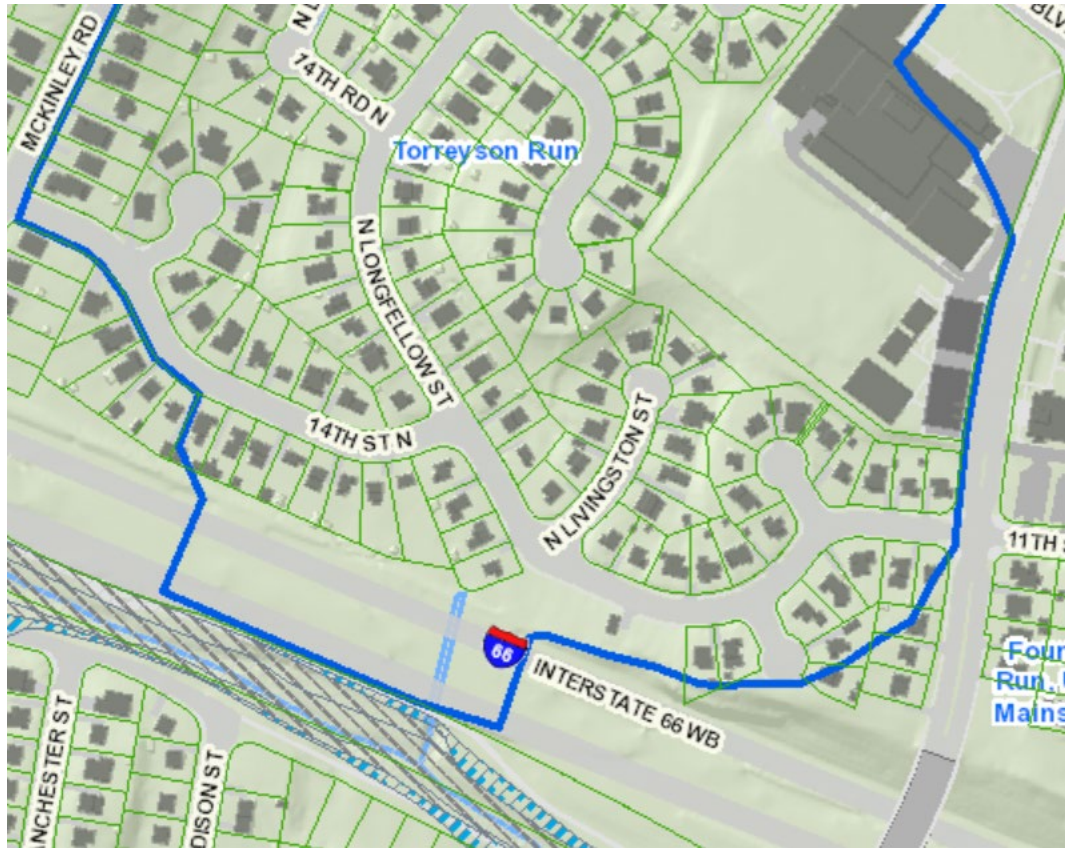
What will the purchased properties be used for? *Properties acquired through voluntary acquisitions will be used to:*

- *re-establish overland relief flow paths for water during large storm events for flood mitigation,*
- *provide access to existing stormwater infrastructure to conduct necessary maintenance or upgrades,*
- *locate future stormwater infrastructure stormwater detention facilities and/or water quality facilities*

Property Acquisition FAQs

FEMA Floodplain Map Update

Effective Floodplains – there are none in this watershed



[ACMaps (arlingtonva.us)]

FEMA Floodplain Map Update

Detail of Preliminary floodplains

ACMaps (arlingtonva.us)

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

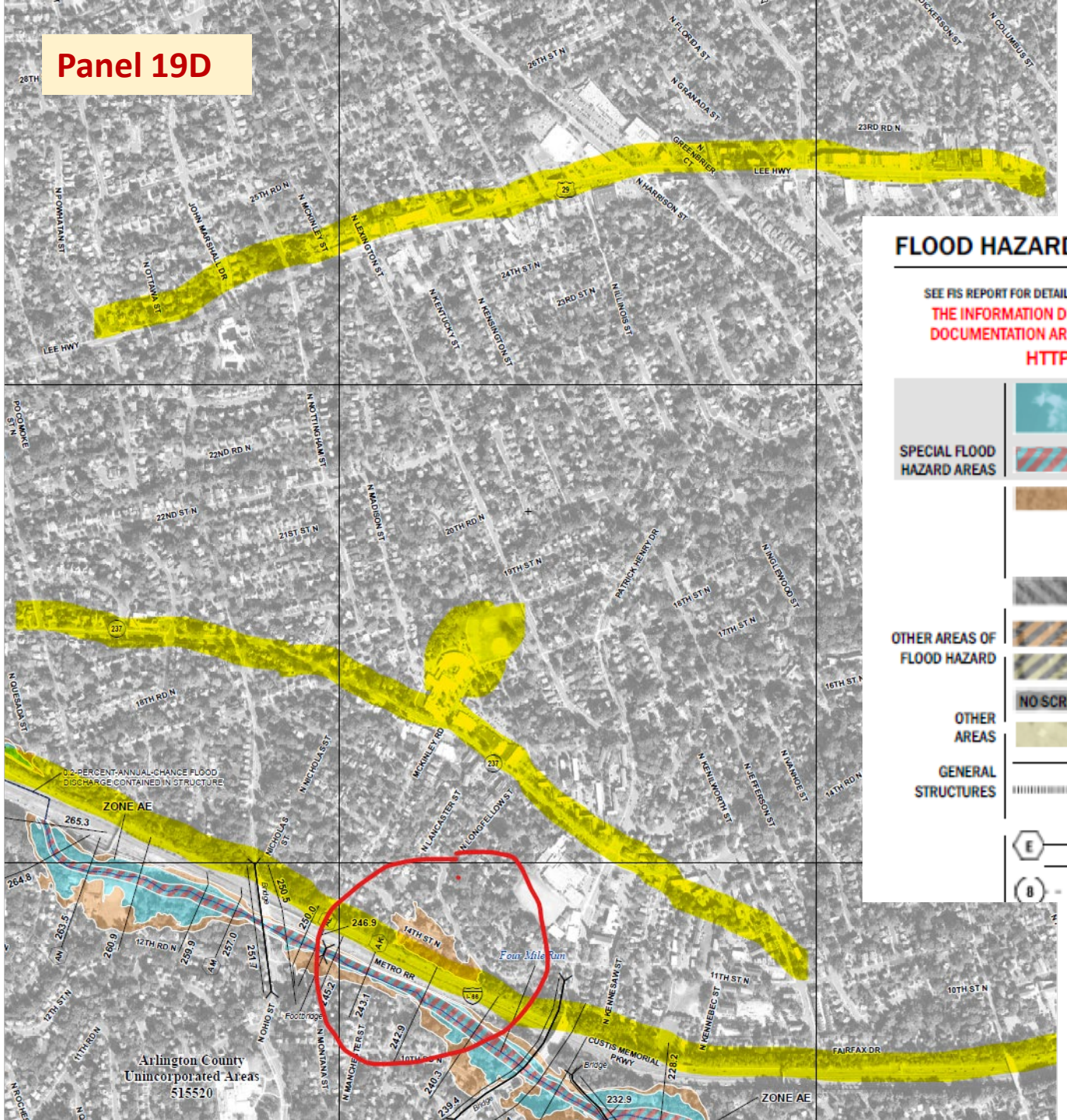
A few lots will now be in the 0.2% chance flood zone (aka 500-year flood zone) which will remain unregulated except for prohibition on storage of emergency service records, medical records or government records.

Impact is almost zero.

- 90 Day appeal of only three revised panels began October 6 –doesn't affect this watershed

Preliminary FIRM

Panel 19D



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

- 18.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

ARLINGTON COUNTY, VIRGINIA
(All Jurisdictions)

PANEL 19 OF 83

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ARLINGTON COUNTY	515520	0019	D

PRELIMINARY
9/18/2020

VERSION NUMBER
2.6.4.6
MAP NUMBER
51013C0019D
MAP REVISED

Tentative Schedule for updated FIRM and Floodplain Ordinance:

Step / Milestone	Start Date	End Date	Notes
Revised Preliminary Issued	04/29/2022	n/a	County received / downloaded files
30-Day comment period	04/29/2022	05/29/2022	County provided comments to FEMA
Prep work for Appeal Start	June 2022	July 2022	FEMA's contractor will begin prep work for the Appeal Period*
FR notice prepared, submitted, and published	July 2022 (submitted)	08/02/2022 (published)	FEMA's contractor will prepare and submit the *Federal Register* notice for publication
Newspaper publications (2)	09/29/2022 (tentative)	10/06/2022 (tentative)	FEMA's contractor will contact local newspaper and arrange for 2 publications
Appeal Period (90 days)	10/06/2022 (tentative)	01/06/2023 (tentative)	FEMA's contractor will mail out the Appeal Start letter
Prep work to ready the study for LFD	Jan. 2023	Mar. 2023	FEMA's contractor will begin prep work for completing the study*
Study is independently reviewed by another contractor	May 2023	June 2023	Independent contractor has 60 days to review and approve the study
Letter of Final Determination	June 2023	Nov 2023	Independent contractor has 60 days to review and approve the study
New Study Effective Date	Dec. 2023	n/a	County will receive new products

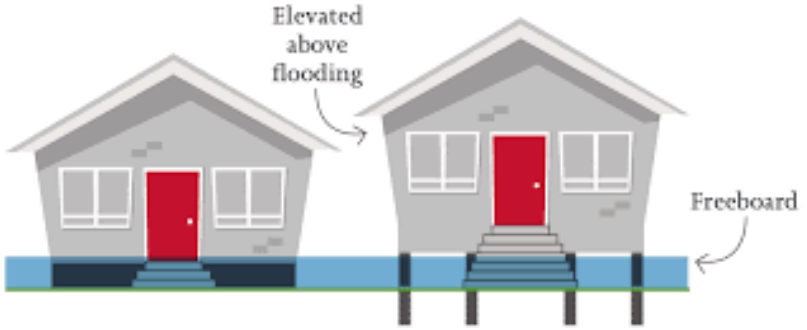
Floodplain Ordinance Update

- 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

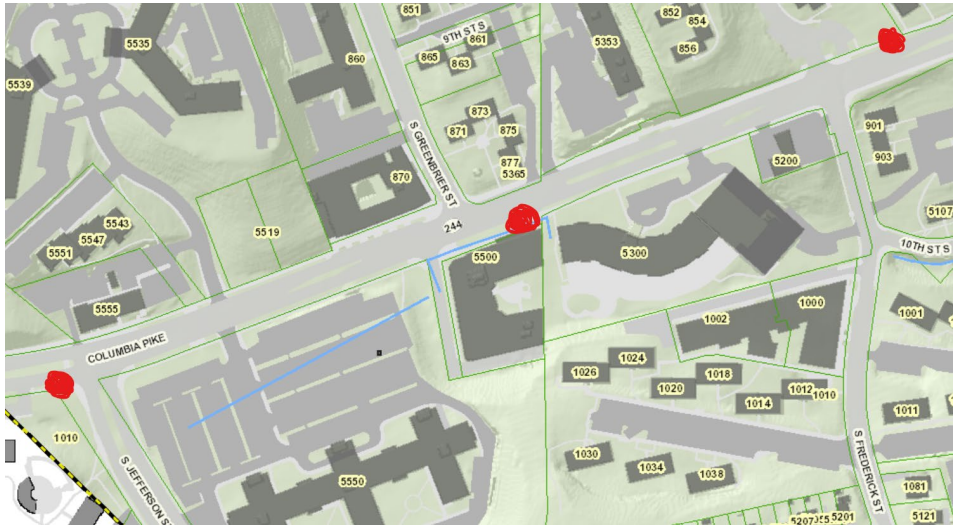
Proposed changes to Floodplain Ordinance

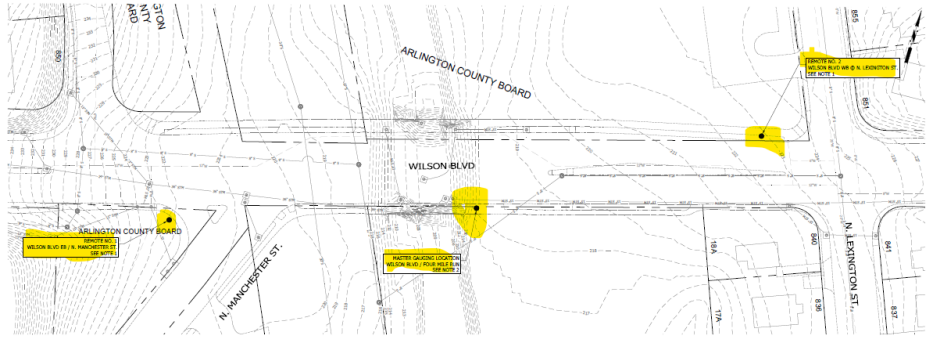
- Increase in required freeboard (distance above base flood elevation) from 12 to 18 inches, or
- Buildings in 100-year floodplain must be watertight 2 feet above the base flood elevation (previous requirement 1 foot)
- Accessory structures cannot be larger than 600 feet
- No emergency service records,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



High Water Detection Devices

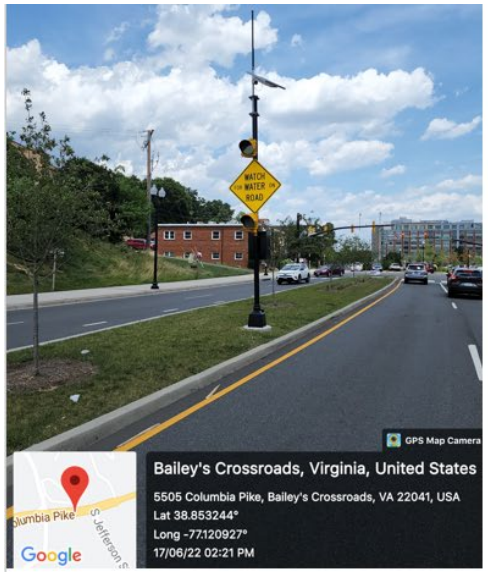
Two high water detection devices installed

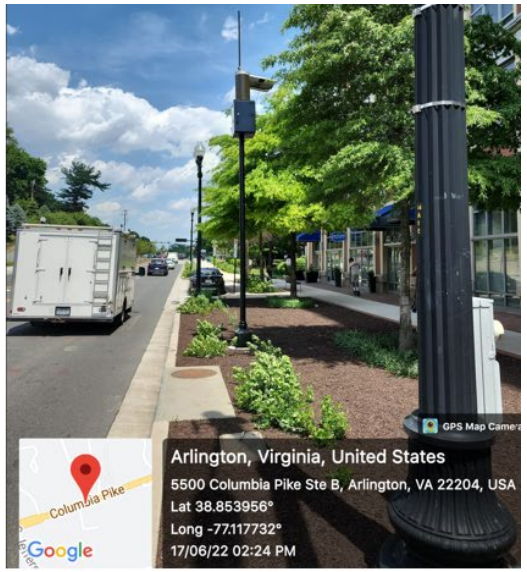


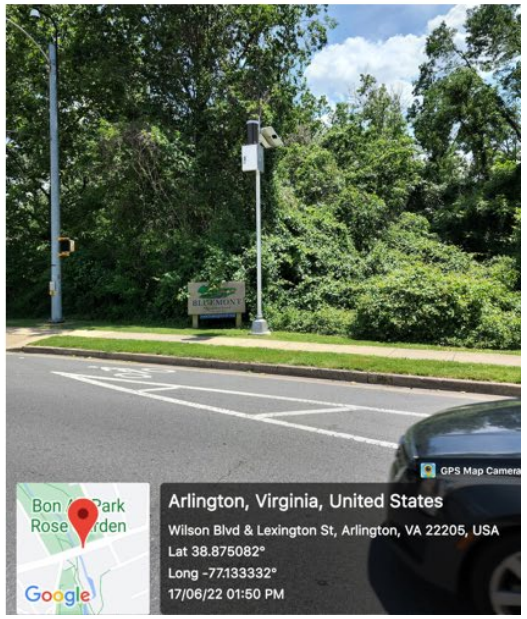


A third set of devices is slated for Kirkwood Rd. @ Langston Blvd.

Location #1: Columbia Pike near S Greenbrier St.

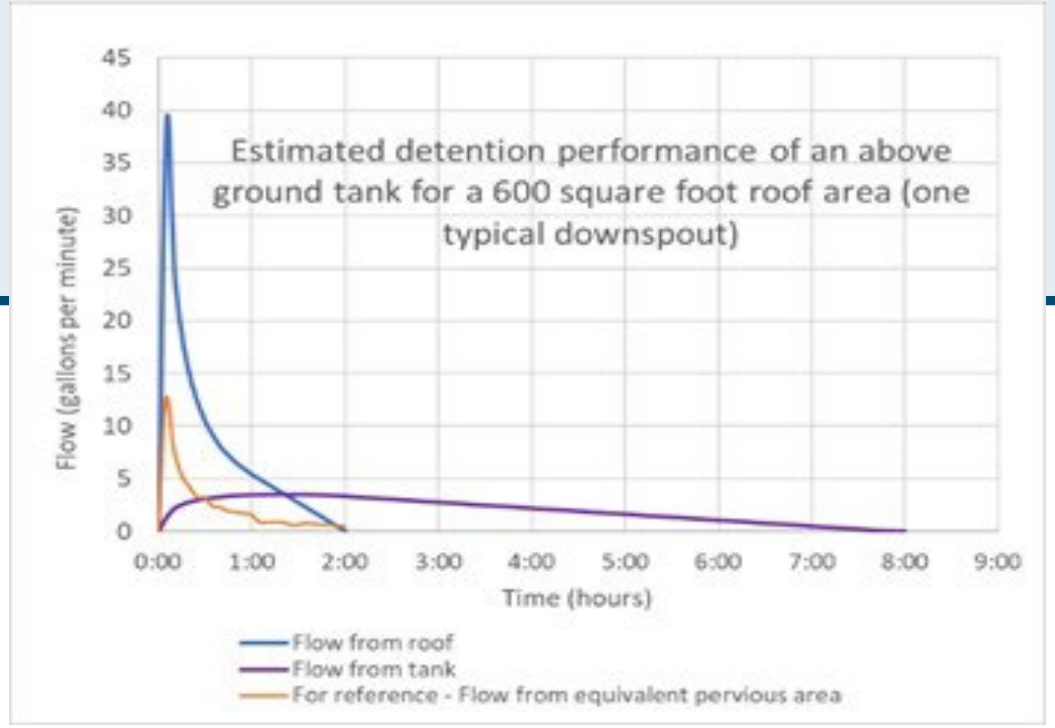






Location #2 Wilson Blvd. near N Lexington St. and N Manchester St.

LDA 2.0 - Increased Stormwater Management Requirements



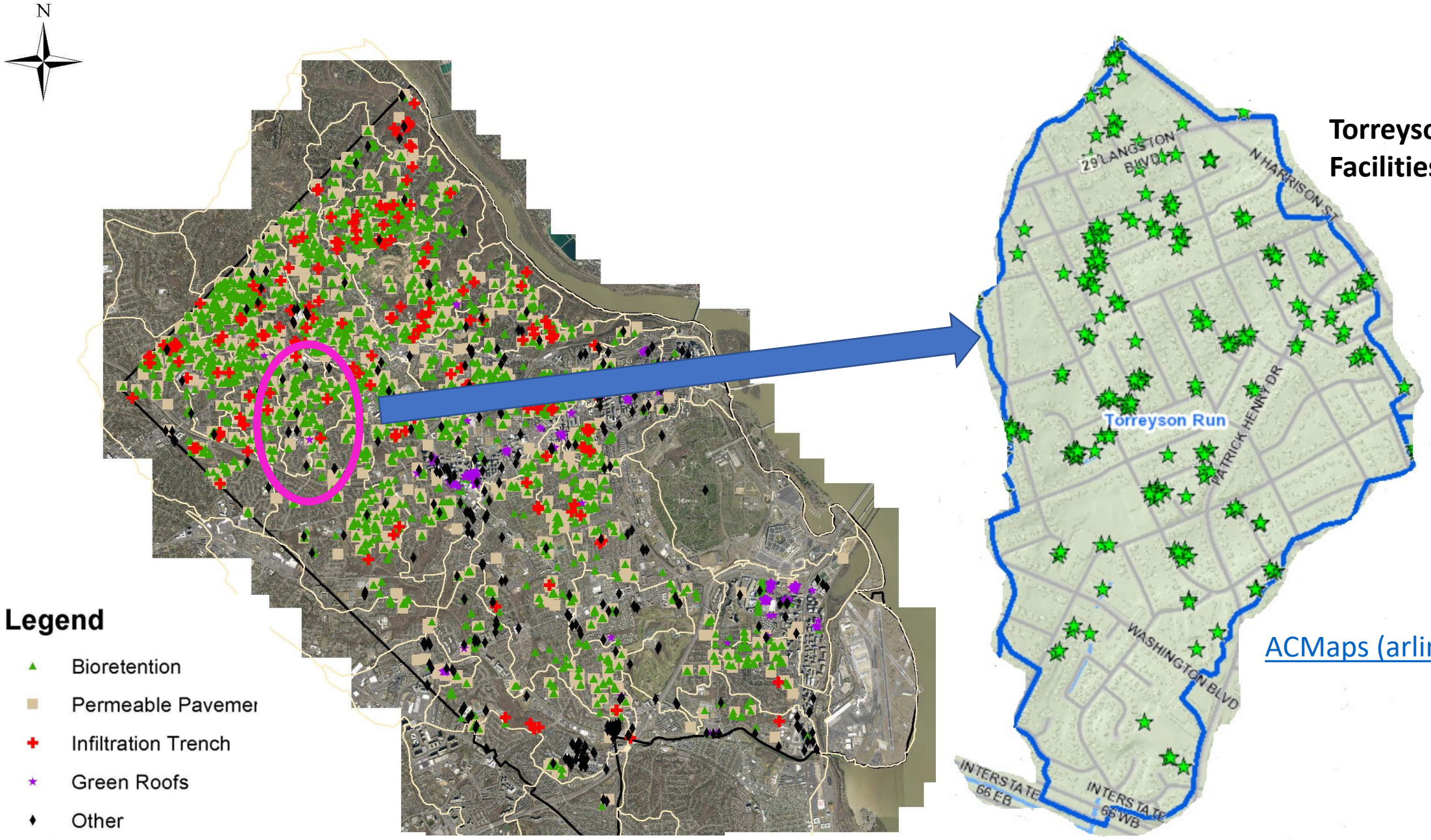
LDA = Land disturbing activity permit

With LDA 2.0, the County has increased stormwater management requirements for single-family home projects to reduce impacts to neighboring properties.

Took effect September 2021

Requirement to detain up to 3 inches of runoff from new impervious area on site and restore soil permeability after construction

Stormwater Management Facilities in Arlington County

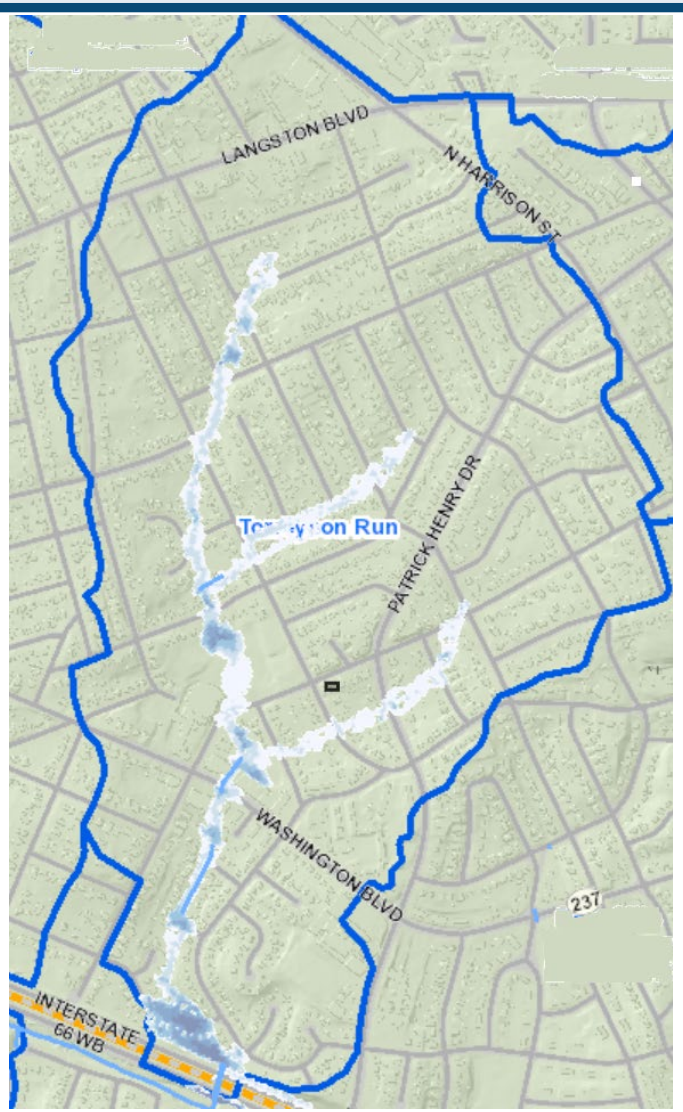


Torreyson Run Facilities

[ACMaps (arlingtonva.us)]

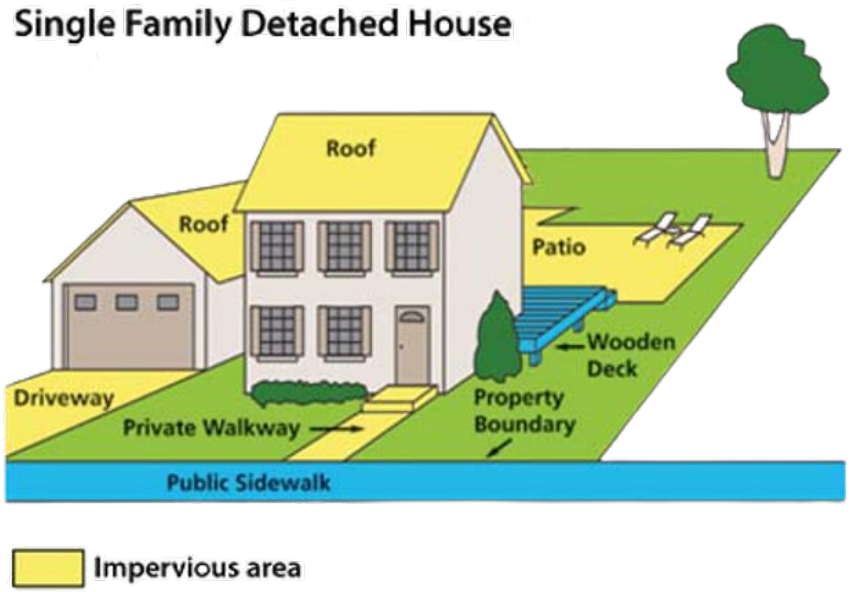
Risk Assessment and Management Plan (RAMP)

- Maps the County's "urban" floodplains (outside FEMA floodplains)
- Provides updated 2040, 2070 and 2100 climate projections, for both inland flooding and sea-level rise/storm surge
- Delivers updated rainfall curves and 10-year design standard
- Developed vulnerability assessments, including public infrastructure and critical public facilities
- Calculates and defines economic, environmental and social risk, or "the cost of inaction"
- Informs flood resilient design and construction standards
- Demonstrates value of current investments against cost of inaction



Stormwater Utility

- County is considering changing 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 (yellow areas on the diagram)
- Credit would be offered for actions taken to reduce runoff
- More information and resources on the web page



https://bit.ly/ArlingtonStormwaterUtility

Upcoming Zoning Study for Stormwater Facilities

Improve Consistency: The Zoning Ordinance treats stormwater systems differently for public zoned sites (ex., parks, schools) and also differs from how other water utilities are treated

Add Flexibility: The current zoning regulations do not readily enable the use of certain stormwater stormwater system components

Zoning study will take place over the next 6 months. Public meeting tentatively planned for December.

https://www.arlingtonva.us/Government/Projects/Plans-Studies/Environment/Stormwater-Management-Zoning-Study

- Work is beginning on a Flood Resilient Design Manual as well

Path to Flood Resilience
Torreyson Run

Questions?