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Flood Resilient Arlington: Adapting for Climate Change

Agenda

The Legacy, the Challenge, the Response
- Call to Action, Pivot to Flood Resilient Arlington
- RAMP - A Foundation for Long-Term Resilience
  - RAMP process, brief results
  - What RAMP means for future design and planning

Current Program and Progress
- Update on work with the Critical Watersheds
- Capital projects
- Voluntary property acquisition
- LDA 2.0

- Stormwater Utility

Where we are going – things coming
- Flood Resilient Design and Construction Guidelines
- Future Resilience Planning

The Legacy, the Challenge, the Response


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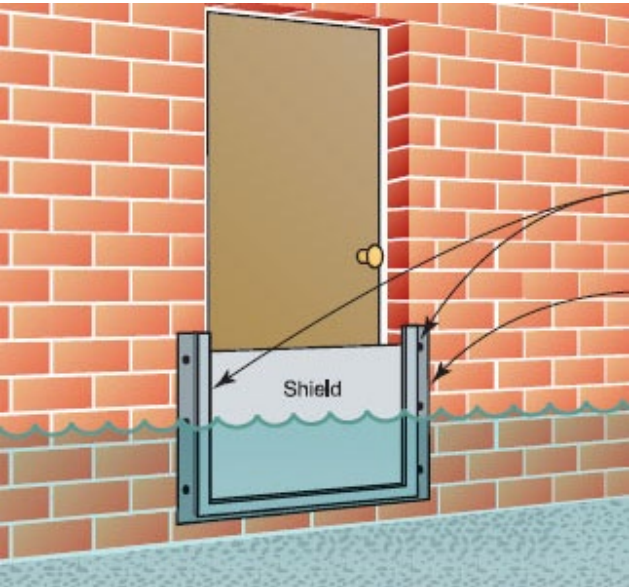

Pivot to Flood Resilient Arlington

Analytics and Data Assessment

New Types and Locations for Capacity Projects

Increased Stormwater Requirements

Increased Funding

Voluntary Property Acquisition

Floodproofing Outreach

The Civic Voice

TWO RESOLUTIONS – including

- Planning for both 10-year and 100-year storms
- Greater rigor and transparency in site plan reviews
  - Formulate both site and downstream impacts
- Enhanced engagement with civic associations in flood-vulnerable areas
- Greater measurement (gauges, flow meters) and reporting
- Focus on risk mitigation
- Focus on high-performing, cost-effective projects and programs
- Improved policy approach, e.g., impervious coverage
- Fee based on coverage
- Diversity funding options

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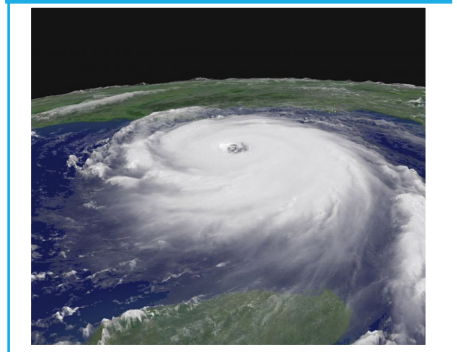
- RAMP, the County's Risk Assessment and Management Plan, is a comprehensive framework for modeling, measuring and reducing risk in the face in increasing frequency and intensity of storms
- Includes climate projections, inundation maps, risk assessments and cost benefit analysis

RAMP Resilience Planning Approach

Develop Framework

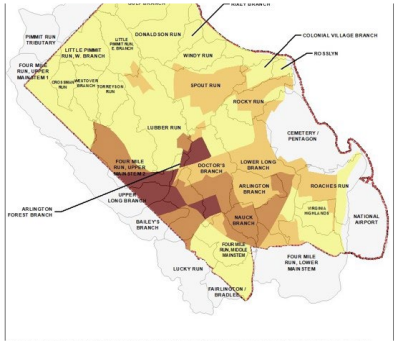


Goals

Climate Scenarios

Tools

Identify Vulnerabilities

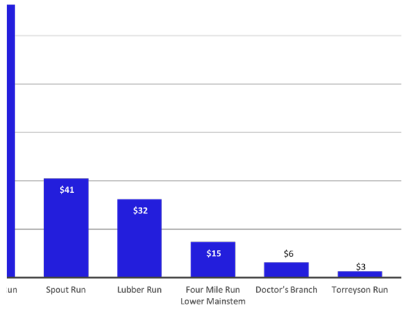


Facility inventory
Flood modeling

Vulnerability Assessments

Risk Analysis

Adaptation Strategies



Cost benefit analysis

Programmatic strategies

Watersheds Analyzed in the RAMP

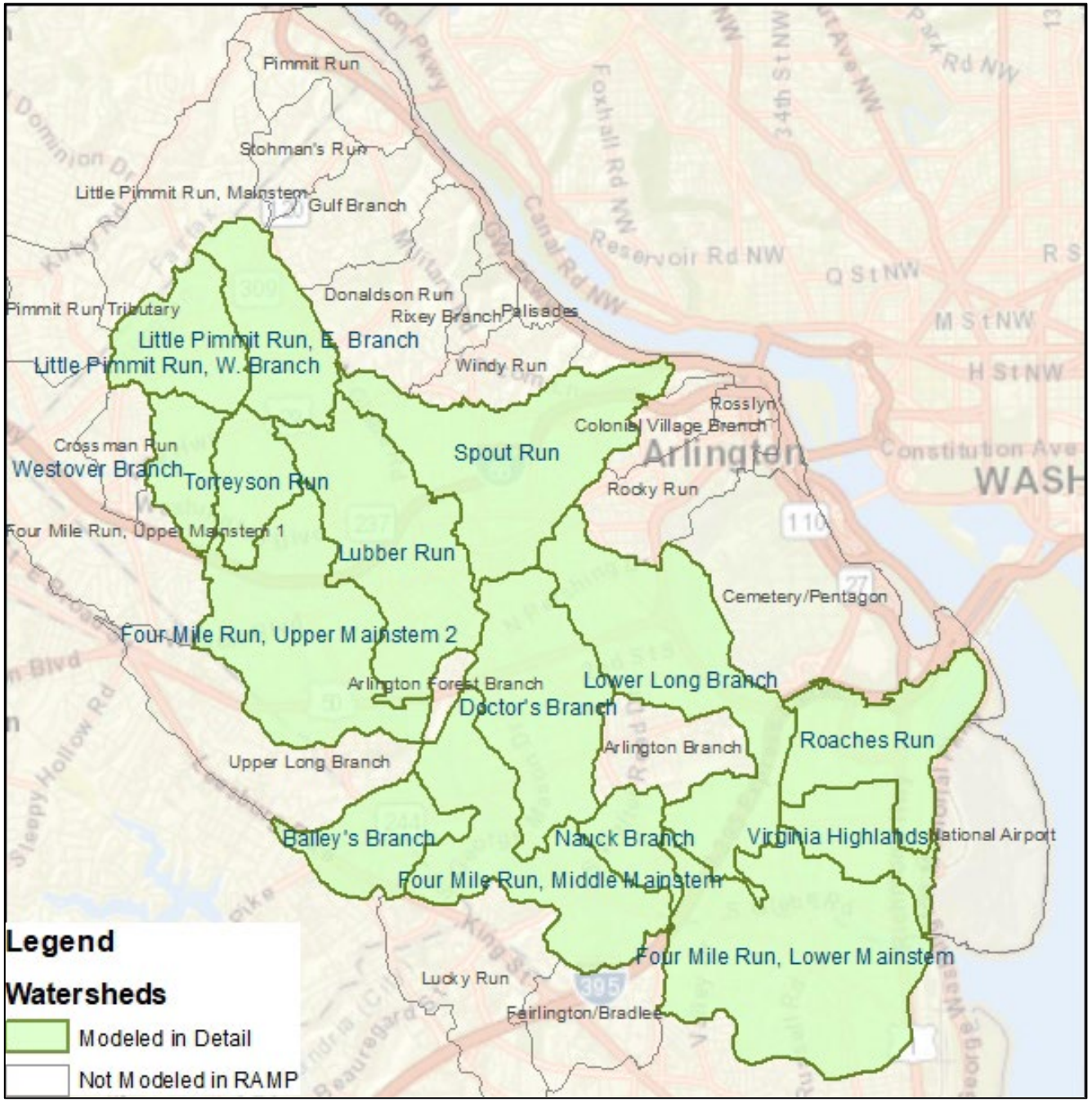


Figure 2-1. Arlington County Watersheds and the Watersheds Selected for Detailed Analysis in RAMP Project

Climate Scenarios for Modeling are Based on Climate Change Threats: Rainfall, Sea Level Rise and Storm Surge

Precipitation

2- to 10-year storms

100-year storms

Stormwater/ Drainage Management

- Localized flooding
- Increased SSOs/CSOs

Riverine Floodplain Management

- Regional flooding

Sea Level Rise

Recurrent flooding from increased tide levels


Miami Herald Miami Beach

Rain or no rain, beachfront streets flood due to 'spring tide'

Miami Beach residents can expect high tides through Saturday — not just on the sand, but in the street.

Alton Road near 10th Street, on the bay side of the island, became a flood zone Thursday, the result of poor drainage and rising waters. So did parts of Purdy Avenue, and West Avenue.

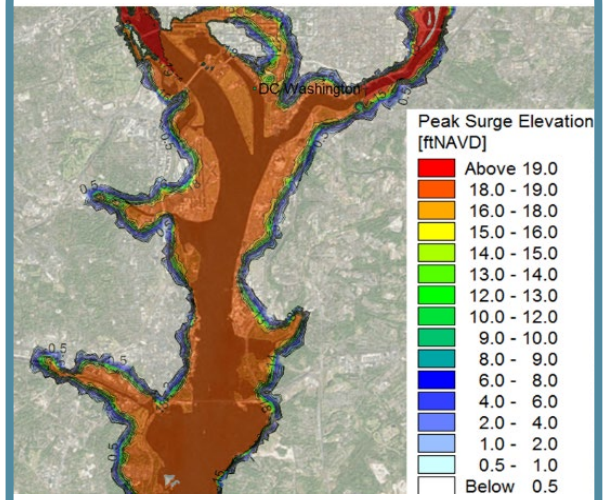
In Broward County, Hollywood also reported flooding.

Rain or no rain, the waters still rose.

Moses Schwartz is one of the latest victims. He was pulling his Nissan to the curb along Alton to

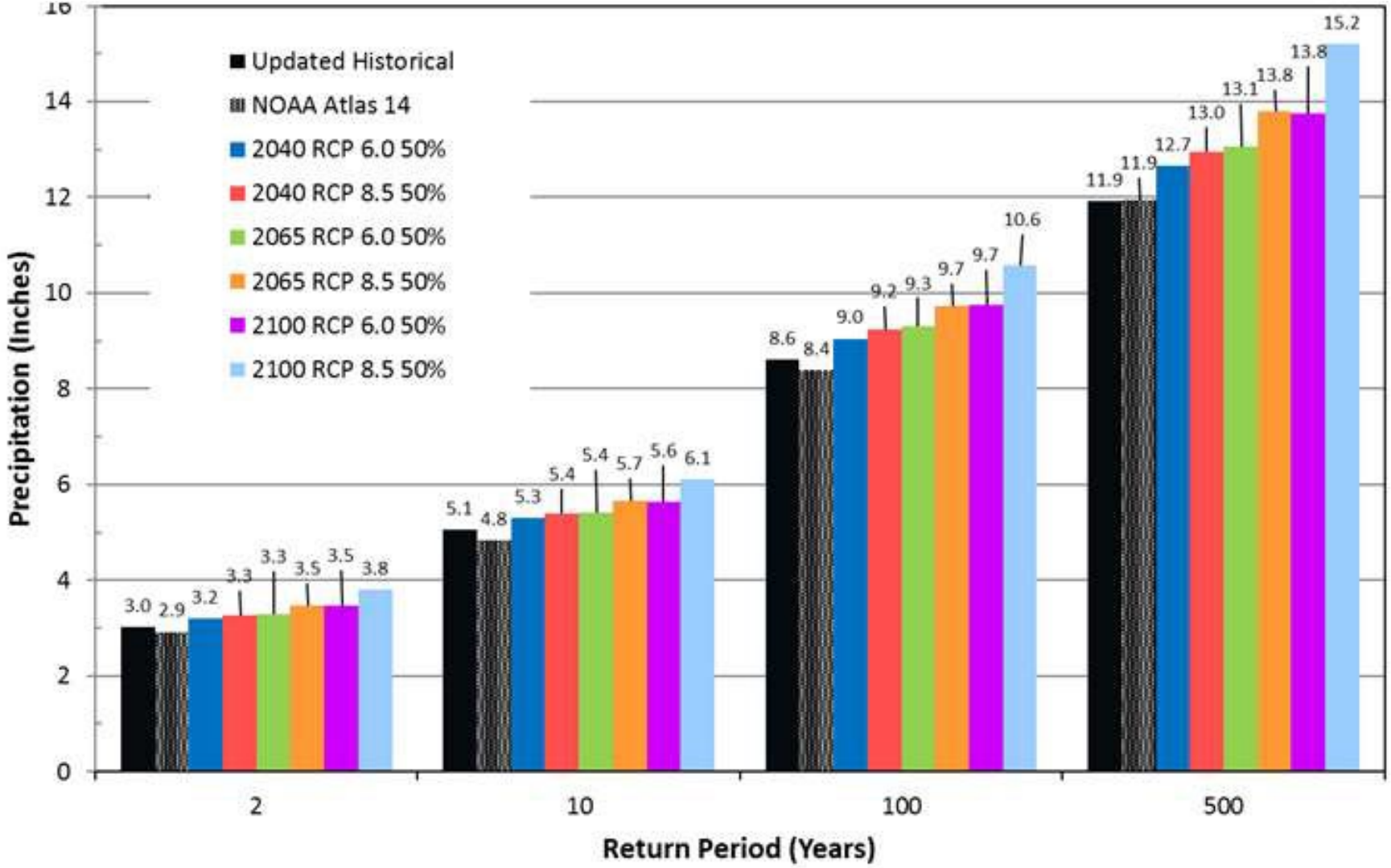
Moses Schwartz calls for a tow truck after his Nissan SUV sunk into the standing water on the 800 block of Alton Road in Miami Beach on Thursday, Oct. 17, 2013. WALTER MICHOT / MIAMI HERALD STAFF

Storm Surge



- Coastal flooding

Updated IDF Curves Allow for Future Ready Design

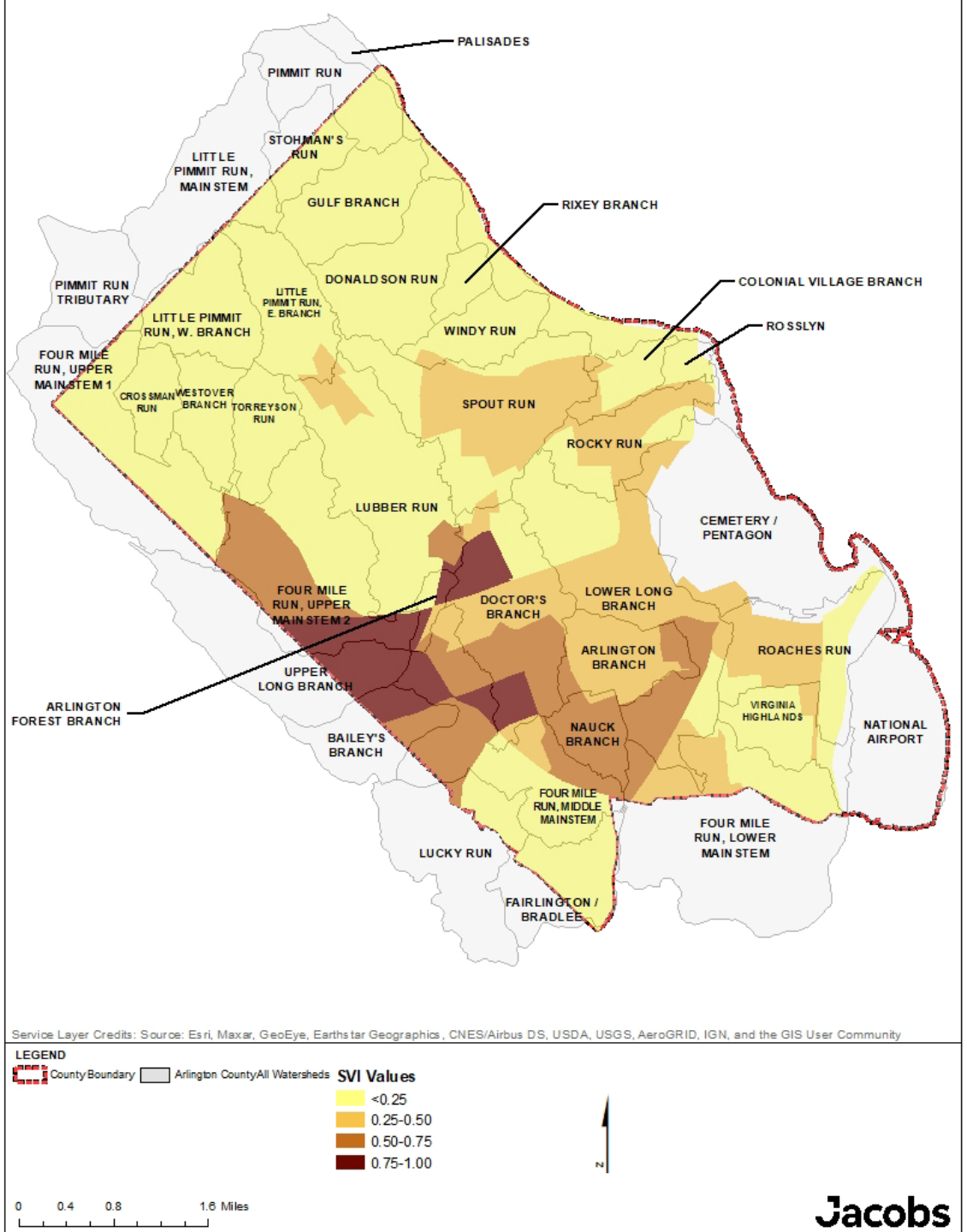


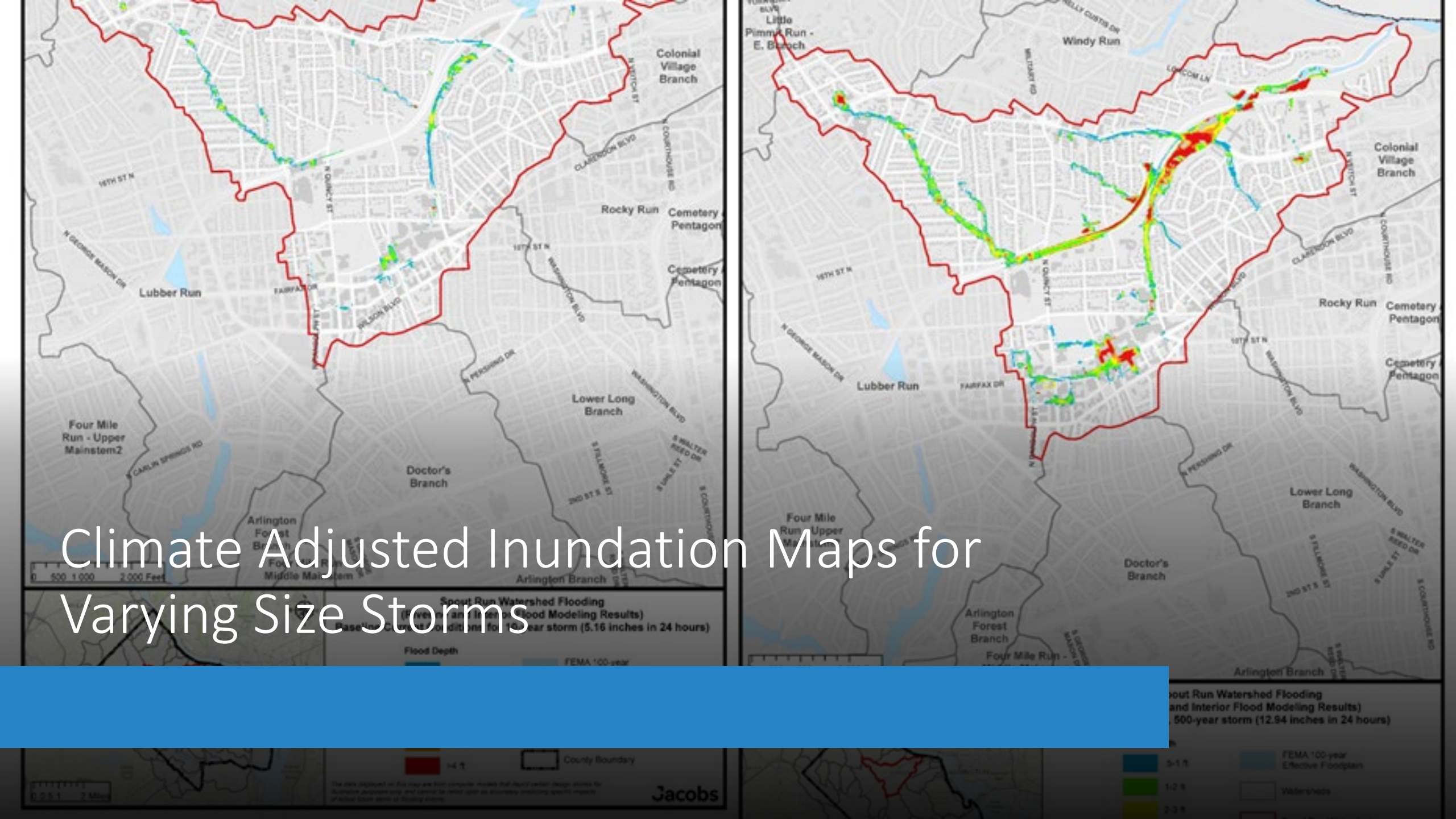
Engineers use precipitation records, know as intensity, duration, frequency curves (IDF curves) in designing stormwater infrastructure. Arlington's previous IDF curves were developed by NOAA and had not been updated since 2000. The RAMP provides updated rainfall depths for Arlington County based on different climate scenarios

RCP stands for representative concentration pathway and is a prediction of future greenhouse levels.

Vulnerability Assessments

Vulnerability assessments include social vulnerability, environmental and critical facilities

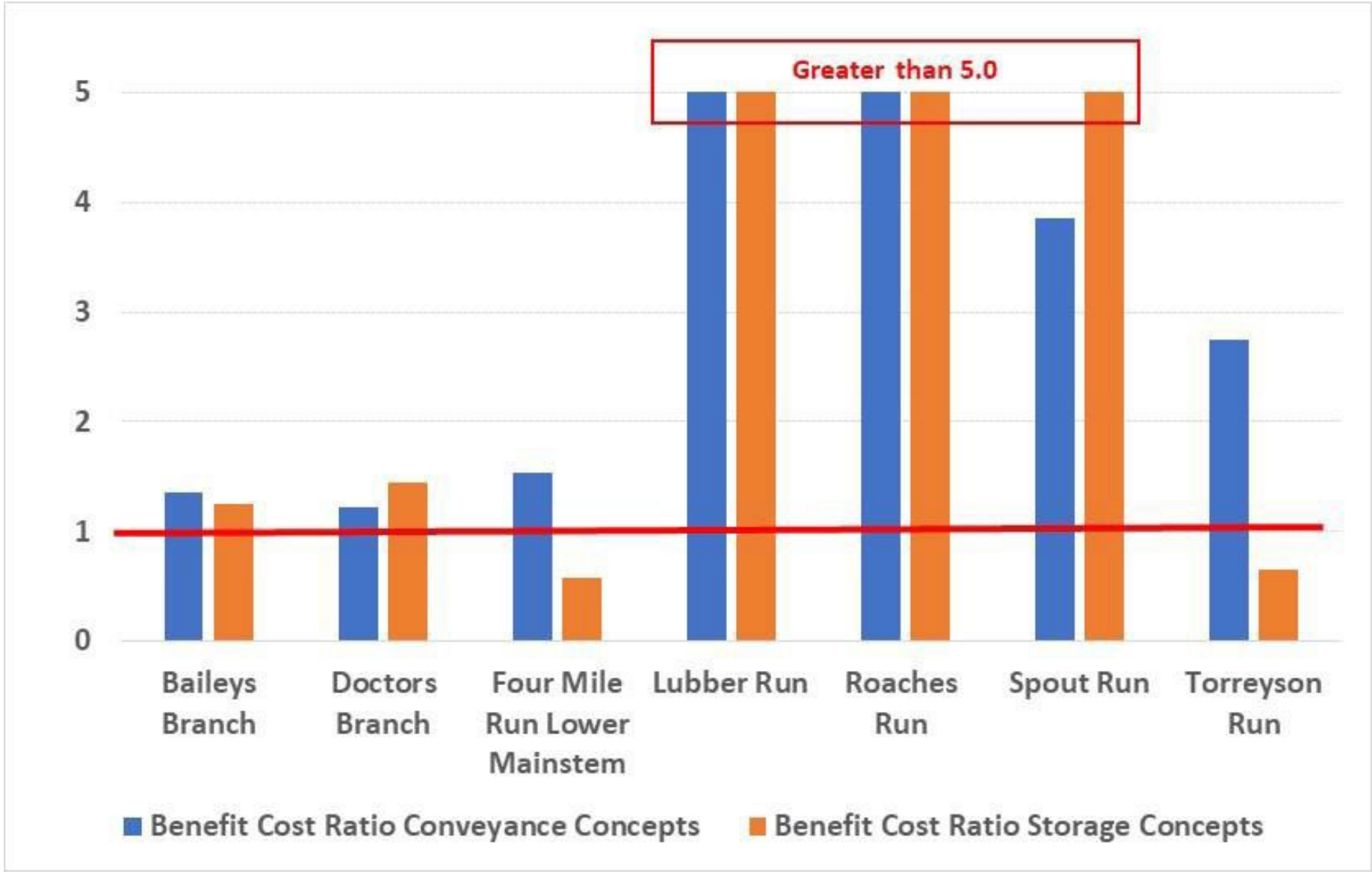




Climate Adjusted Inundation Maps for Varying Size Storms

Cost Benefit Analysis

Allows for prioritization of projects and community understanding of investments

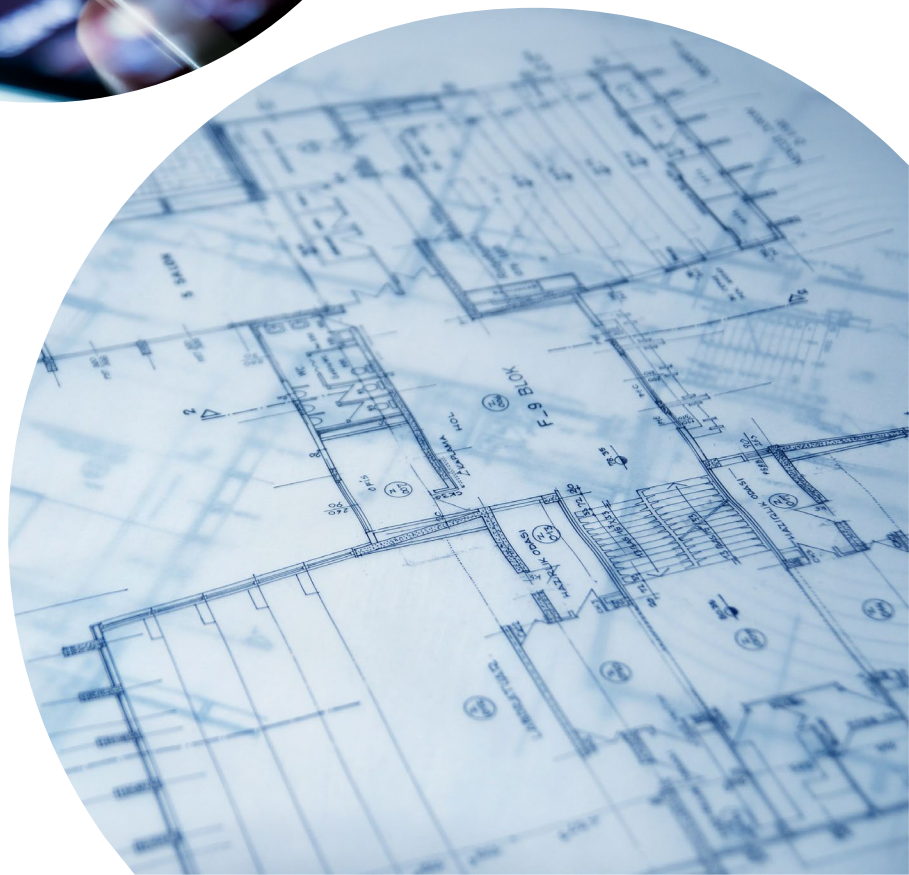


Economic Risk by Watershed

Watershed	Annualized Risk of Losses (millions $)	Potential Losses for 100-year Storm (millions $)	
		100-year Storm in 2020: 8.5 Inches in 24 Hours	100-year Storm in 2070: 9.6 Inches in 24 Hours
Roaches Run	112.8	718.9	803.5
Spout Run	41.0	234.4	263.4
Lubber Run	32.4	297.1	344.2
Four Mile Run Lower Mainstem	14.7	109.2	136.8
Doctor's Branch	6.4	39.0	46.1
Torreyson Run	2.6	17.9	19.7
Bailey's Branch	1.0	7.5	n/a

Sample RAMP Applications/Uses

- **Resiliency planning** and measurement
- Inform **flood resilient design** and construction standards
- Demonstrates **value of current investments** against **cost of inaction**
- Use in **plan reviews** (private and public)
- Provides **independent confirmation** of previous watershed analyses
- **Eliminated the need for additional analysis** at several critical facilities
- Provides **guidance** for development of needed projects for next **CIP** process
- Provides guidance on **policies and programmatic measures** for implementation
- **Certifications, rankings, recognition,** and **grant support**



Environmental Risks Affect Municipal Credit Ratings

- Economic disruption
  - Property loss, supply chain disruption
- Physical damage
  - Damage to roads, utilities, communications, buildings, facilities
- Health and public safety
  - Loss of life, interruption in critical emergency services
- Population displacement
  - Short term displacement, long term relocation

Questions?

Current Program and Progress

Stormwater Program Elements

System Assessment and Upgrades

- Modeling, Assessment, Plan reviews
- Capacity Projects
- Local Drainage Projects

System Maintenance

- System repairs
- Channel maintenance
- Routine maintenance

Floodplains and RPAs

- Plan Reviews
- Map Updates and modeling
- Outreach and education

Development regulations

- Plan review and construction site inspections
- Training and Outreach

Water Quality

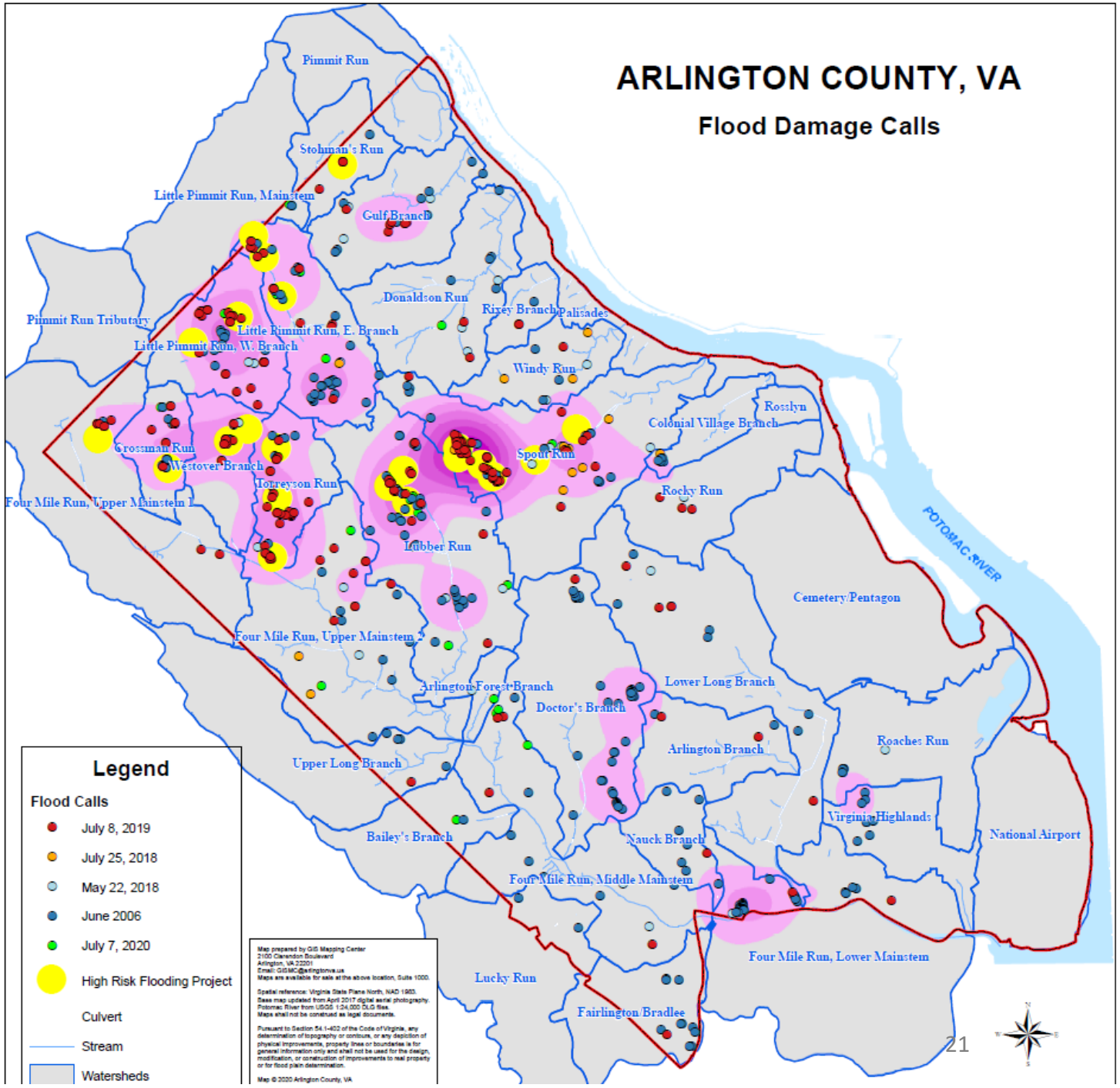
- Stream Resilience, pond projects, green streets
- MS4 permit (regulatory TMDLs), Pollution prevention, training and outreach, monitoring

Policy

- Legislative
- Regulatory

Critical Watersheds

- Spout Run
- Torreyson Run
- Westover Branch
- Lubber Run
- Crossman Run
- West Columbia Pike (Bailey's Branch)
- *Doctors Run*
- *Roaches Run*



Overview: Mapping Program Investments

Legend

Watersheds

Storm Water Management Projects

Program / Status

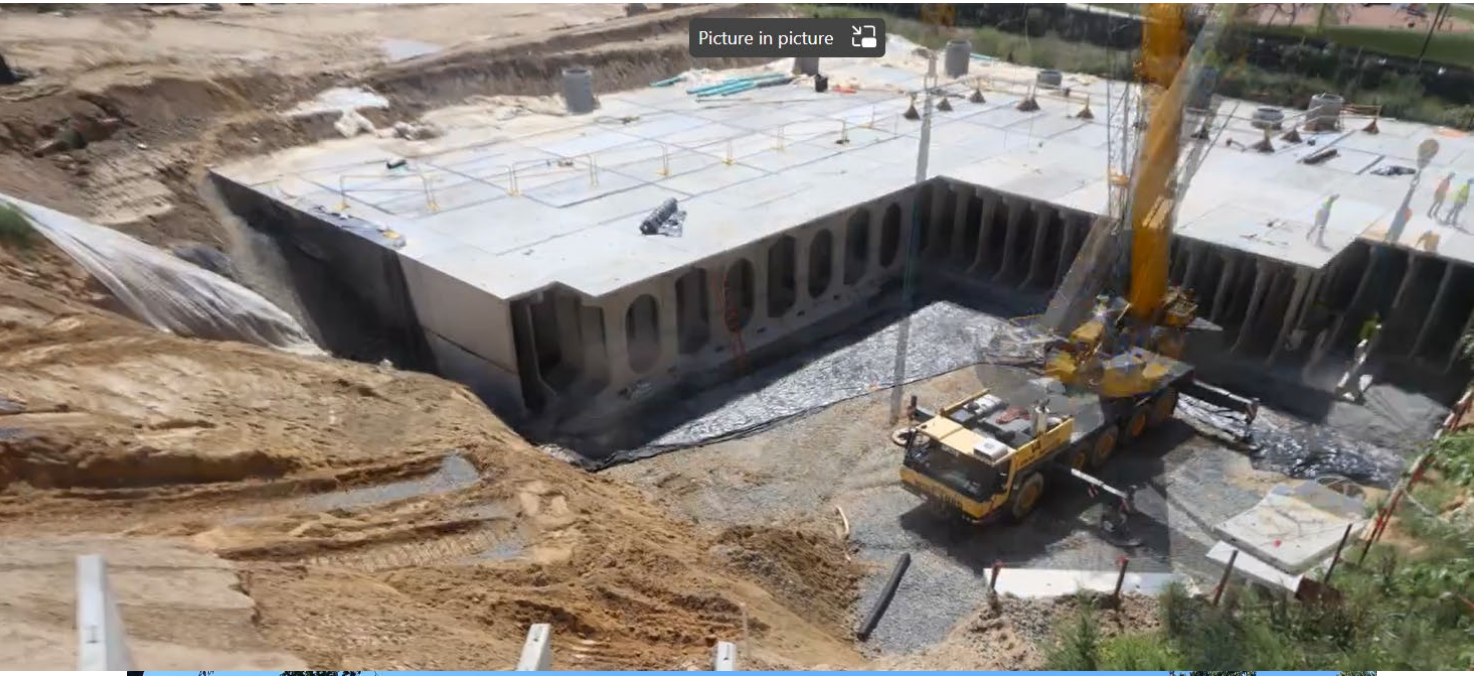
- Capacity Complete / Under Construction
- Capacity / Planned
- Maintenance Capital / Complete
- Maintenance Capital / Planned
- Water Quality / Complete
- Water Quality / Planned

Past Storm Water Management Initiatives

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

Other Map Elements

- County Line
- Potomac River



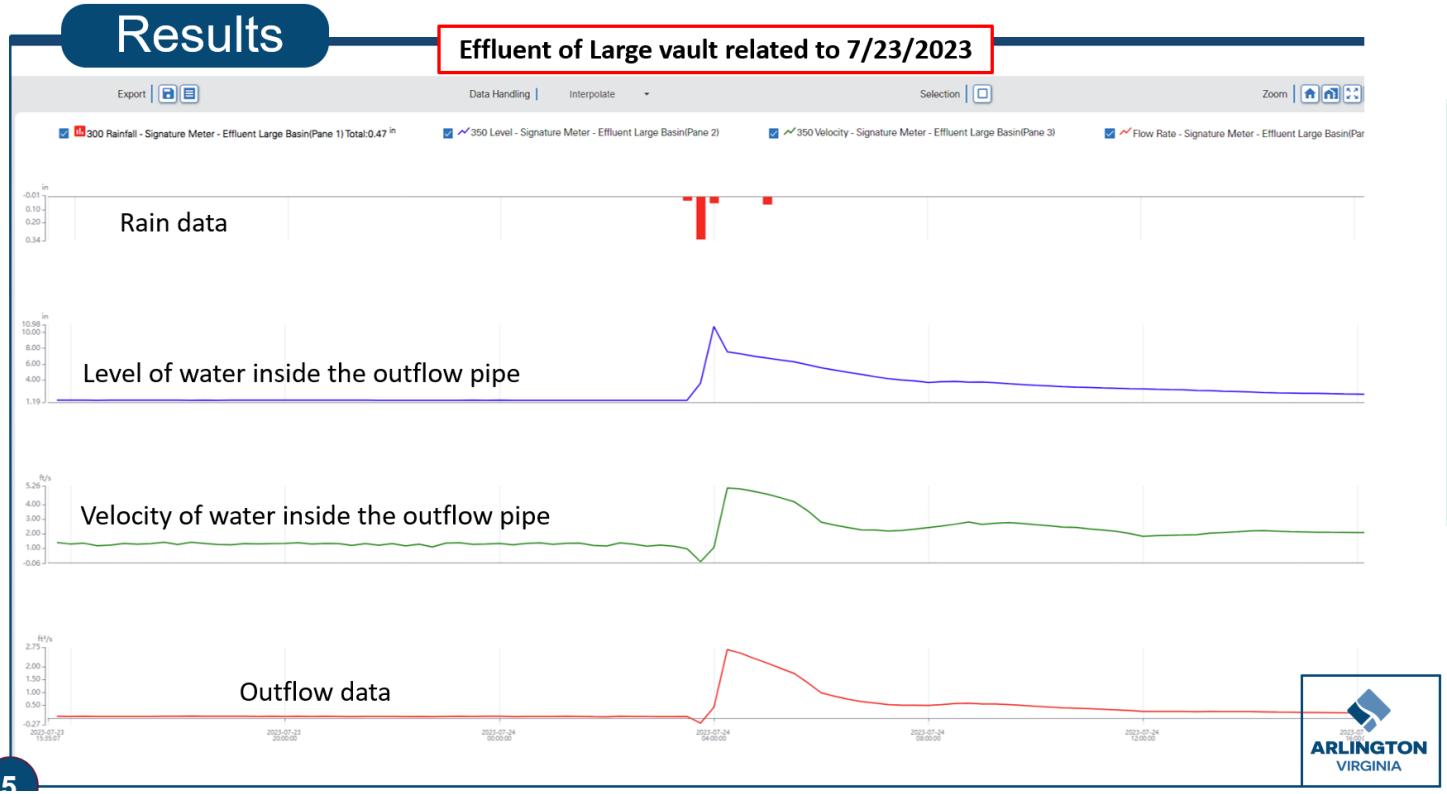
Cardinal Stormwater Vault Project is completed

First project completed as part of Flood Resilient Arlington

Projects to watch video

Cardinal Elementary Vault Construction time lapse

Vault Includes Flow Monitoring System



- Cardinal School Vault Flow Monitoring System is currently recording data and staff is analyzing.
- The data will be used to evaluate other potential vault systems, for example in Lubber Run
- Maintenance Contract has been procured and inspections have taken place. This will be useful for any other such systems that are installed.

Cardinal School Reports (8/14/2023):

- 0.82” Rain in 30 minutes, intensity: 1.64 in/hr
- Max Level of water in Large vault: 25”
- Max level of water in Small vault: 42”

Four Mile Run Dredging

Critical maintenance of Four Mile Run Flood Channel completed

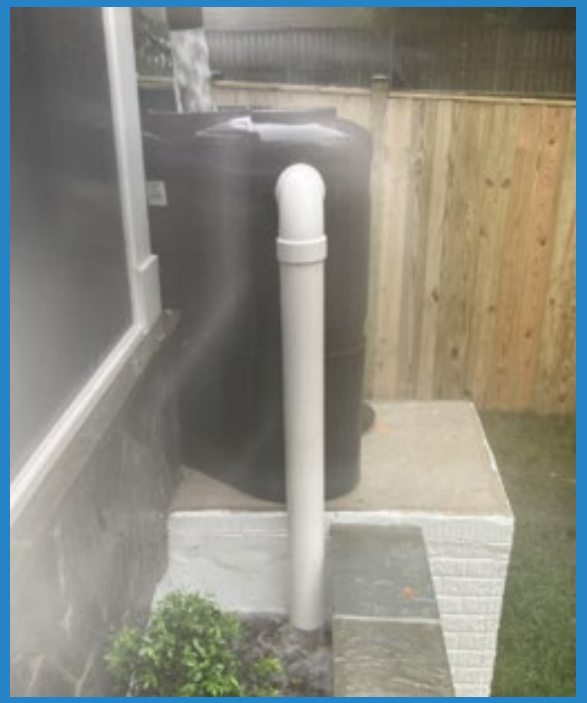
https://www.arlingtonva.us/Government/Projects/Project-Types/Environment-Projects/Four-Mile-Run-Dredge-Project

Ballston Wetland Park

Key project to help the County meet regulatory pollution reduction requirements, but also reduces peak storm flows in Lubber Run by 30% to help with managing flood risk

Voluntary Property Acquisition Program

- Some properties are at a higher risk of flooding due to their location in former floodplains (low topography areas)
- Program introduced in 2022, letters sent to some property owners
- Overall, five properties have been acquired (three in Spout Run).
- Several additional properties are in various stages of the process
- Properties will be used for overland relief flowpaths, access to existing infrastructure, or space for future infrastructure or stormwater facilites



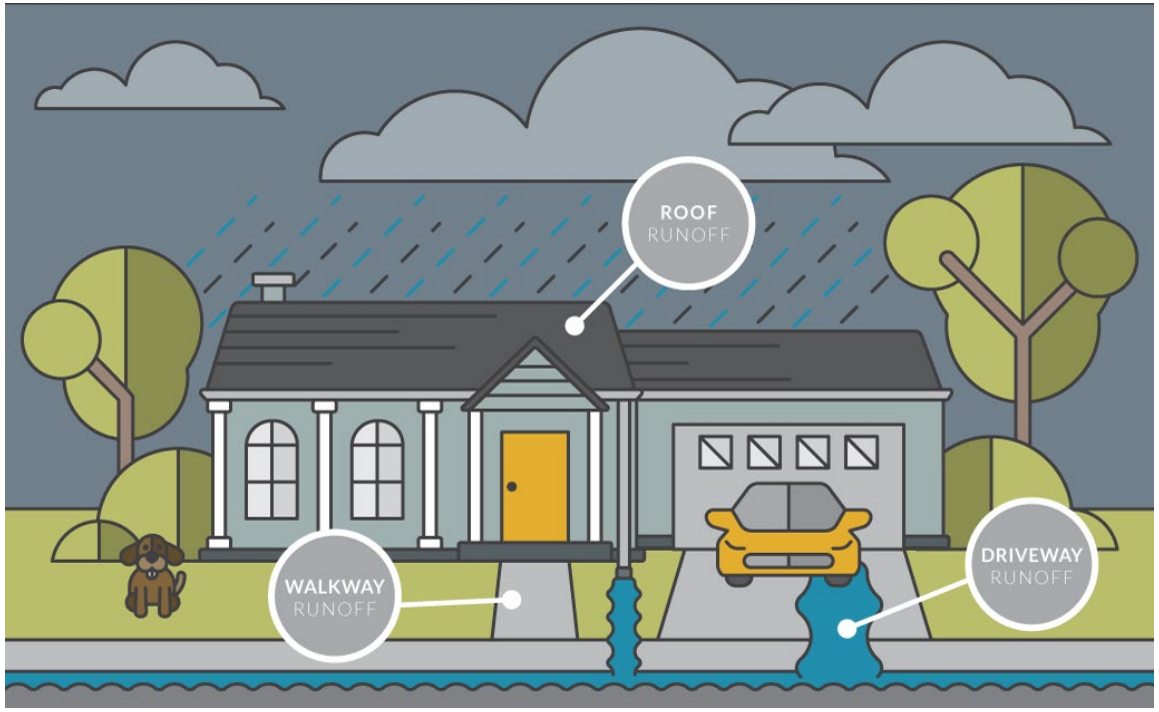
LDA 2.0 - Increased Stormwater Management Requirements

- With LDA 2.0, the County has increased stormwater management requirements for single-family home projects to reduce impacts to neighboring properties.
- Developed with feedback from neighbors of redeveloped properties and development community
- Took effect September 2021
- Increased detention requirement to 3” rainfall
- New requirement to restore soil permeability after construction

Questions?

What is a Stormwater Utility?

- Since 2008, most property owners have paid part of their real estate tax (sanitary district tax) towards the stormwater program. The amount is based on a property's assessed value.
- Beginning in 2024, the County will replace the sanitary district tax with a Stormwater Utility fee based on the amount of impervious area on a property
- We all benefit from an effective stormwater management system, so the stormwater utility charges properties a user fee based on its estimated use of the County's stormwater system
- A property's impervious area is better correlated with how much stormwater runoff each property generates than the property assessment
- https://arlingtonva.us/stormwaterutility



Why change to a Stormwater Utility?

- **With increased investment necessary** for the system, costs will rise
- **Fairer basis for funding** the stormwater management program
- **Demand-Based Fees:** Utility fees are based on property's estimated contribution to the stormwater system
- **Includes currently tax-exempt properties (non-profits, places of worship, and eligible federal properties)** which contribute runoff, but don't currently contribute to stormwater funding
- **Aligns with industry trend** of funding stormwater management programs with a user fee

What will the Stormwater Utility fund?

A Utility would fund the same Stormwater Programs funded by the current Sanitary District Tax, which include:

- Maintaining approximately 200 miles of storm sewer pipe
- Tens of thousands of culverts, inlets, outlets and other elements
- Funding to upgrade the system and increase capacity
- Water quality and regulatory programs
- Green infrastructure and restoration projects
- Flood plain management
- Education and training
- Stream water quality monitoring

New costs include operating costs to run the Utility, estimated at $320k per year and 2.5 full time employees.

How would a Utility work?

- Impervious area is measured through GIS imagery is used to calculate the square footage of the impervious area.

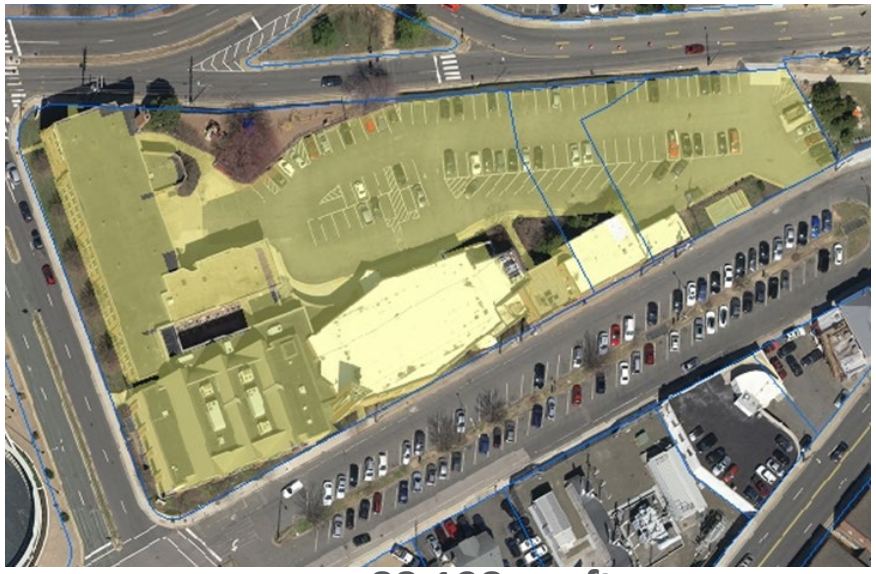
- Properties would be charged based on a unit of measurement called an ERU or **Equivalent Residential Unit**– the median amount of impervious square footage specific to Arlington County.

1 ERU = 2,400 sq. ft Impervious Area (IA)

3,997 sq. ft.

1,465 sq. ft.

3,419 sq. ft



88,198 sq. ft.

Single Family Residential Credits

Mandatory Structural ***(Mandated by Statute)*** **5 -15%**	• Stormwater facilities installed as part of development (LDA permit) • Will receive automatic credit if in compliance with required inspection • Pre-2014 = 5% • Installed after 2014: ▪ Less than 1 acre = 10% ▪ Over 1 acre = 15% ▪ LDA 2.0 = 15%
Voluntary Actions 5% each	• Conservation landscaping, 150 ft^2 (new, ongoing credit) • Tree planting, 1-3 trees (new, annual credit) • Rainwater collection, 100 gallons (new or existing, ongoing credit)
Voluntary Actions 10% each	• Rain garden, 100 ft^2 (new or existing, ongoing credit) • Permeable driveway, 150 ft^2 (new or existing, ongoing credit)
Maximum Credit = 35% per property	

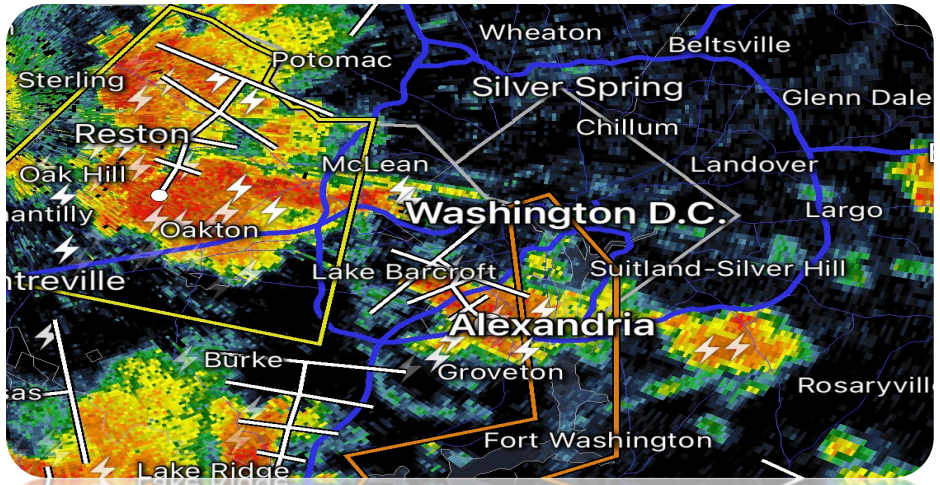
Multi-family and Non-Residential Credits

Mandatory Structural ***(Mandated by Statute)*** **5 -15%**	• Stormwater facilities installed as part of development (LDA permit) • Will receive automatic credit if in compliance with required inspection • Pre-2014 = 5% • Installed after 2014: ▪ Less than 1 acre = 10% ▪ Over 1 acre = 15% ▪ LDA 2.0 = 15%
Voluntary Actions 5% each	• Conservation landscaping, 300 ft^2 (new, ongoing credit) • Tree planting, 4 trees (new, annual credit) • Stormwater education event (annual credit) • Storm drain marking (annual credit)
Voluntary Actions 10% each	• Rain garden, 200 ft^2 (existing or new, ongoing credit) • Permeable parking lot/driveway, 300 ft^2 (existing or new, ongoing credit) • Adopt-a-Street, 30 hours (annual credit) • Stream clean-up, 30 hours (annual credit) • Invasive plant removal, 30 hours (annual credit) • Parking lot/private street sweeping (annual credit)
Maximum Credit = 35% per property	

Questions

Resiliency Planning in Place

RAMP



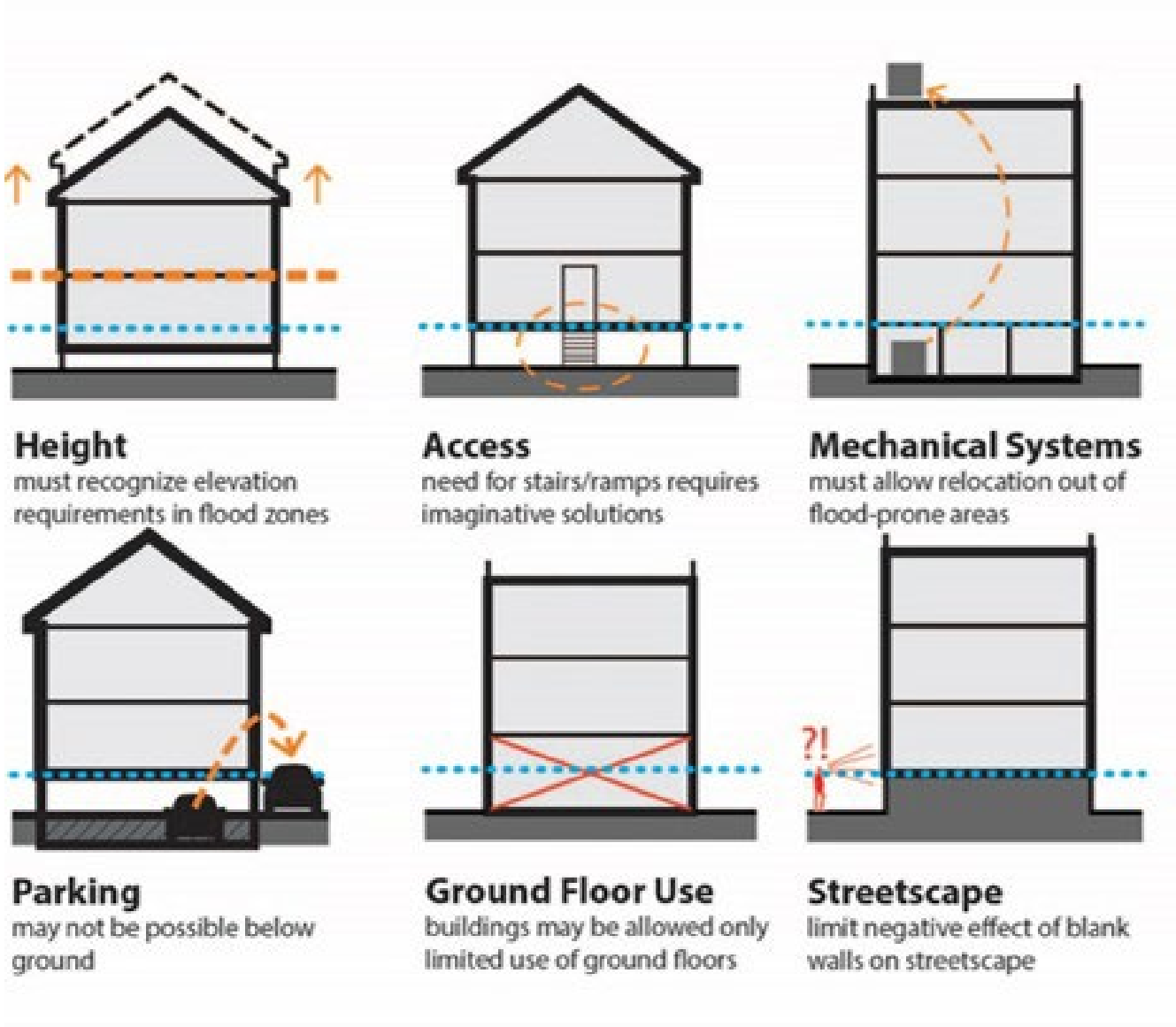
- Multiple applications/uses of projects
- Cost-Benefit Analysis to Measure Cost-Effectiveness
- Equity in Flood Mitigation
- Land-use and Building Design for Resiliency
- Supports competitive grant applications
- Mitigate the government and personal costs

Energy Assurance Plan

- Manage inoperability or interruption of grid
- Plan for continuity of key services and operations
- Equity-based planning – Resiliency Hubs
- Planned coordination across government departments, bureaus and offices
- Multi-sector policies, actions and programs
- Supports competitive grant applications

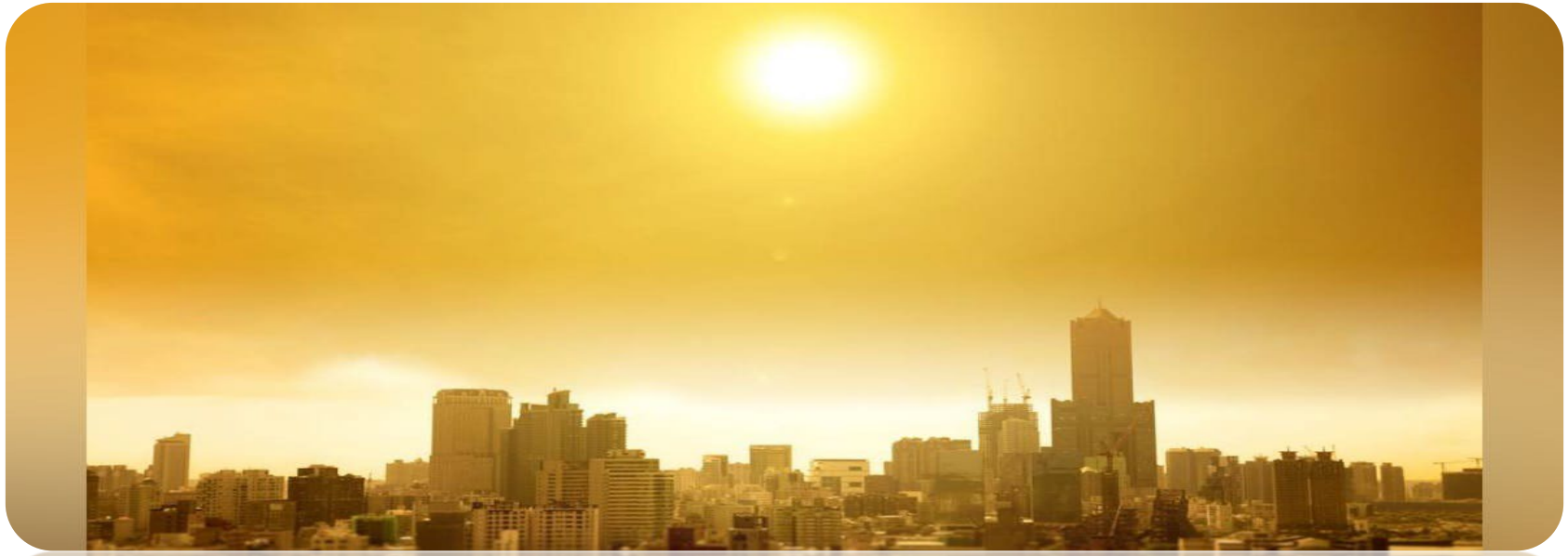
Flood Resilient Design and Construction Guidelines

- Est. Project Schedule – Q2 2024 – Q2 2025
  - Launch as voluntary
  - Inform public and private sector re/development
  - Positive impact on re/insurance



Resiliency Planning in Progress

Urban Metabolism and Heat Management



- Natural Resources & Forestry Plan
- RAMP / Stormwater Standards
- Re/Development, e.g., Plan Langston Boulevard
- Green Building Incentive Program
- Transportation / Green Streets
- Urban Metabolism/Urban Mechanics Guidelines
- Construction Recommendations re Materials
- Green Building Incentive Program
- Site Plan Review
- Enhanced green infrastructure options/uses

Contact Information

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Questions