

STORMWATER MANAGEMENT PROGRAM

COUNTY BOARD WORK SESSION

OCTOBER 16, 2018 @3:00 PM



AN ISSUE-RESOLUTION APPROACH



Public Concerns

- Flooding impacts over time
- Expensive, time-intensive capital solutions
- Need for parcel-, localized, and Watershed-based solutions



Public Concerns

- Does Arlington's Stormwater Management Ordinance balance
 - On-site investment and
 - Neighboring and downstream impact mitigation
- With optimal outcomes

PROGRAM OVERVIEW/CONTEXT

PROBLEM DEFINITION – DEMANDS
AND CONSTRAINTS

WHAT'S NEXT?

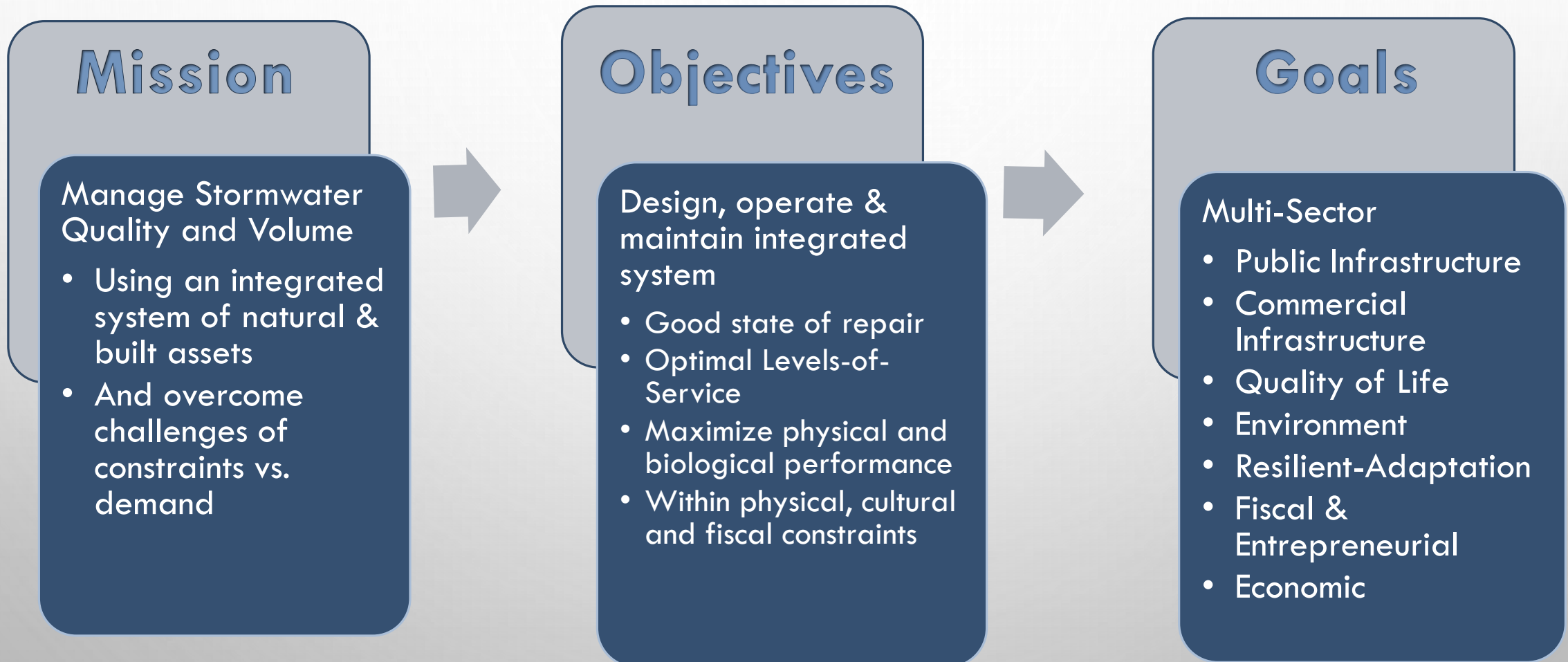
PUTTING THE STORMWATER PROGRAM INTO CONTEXT

MISSION AND EVOLUTION – HOW DID WE GET HERE



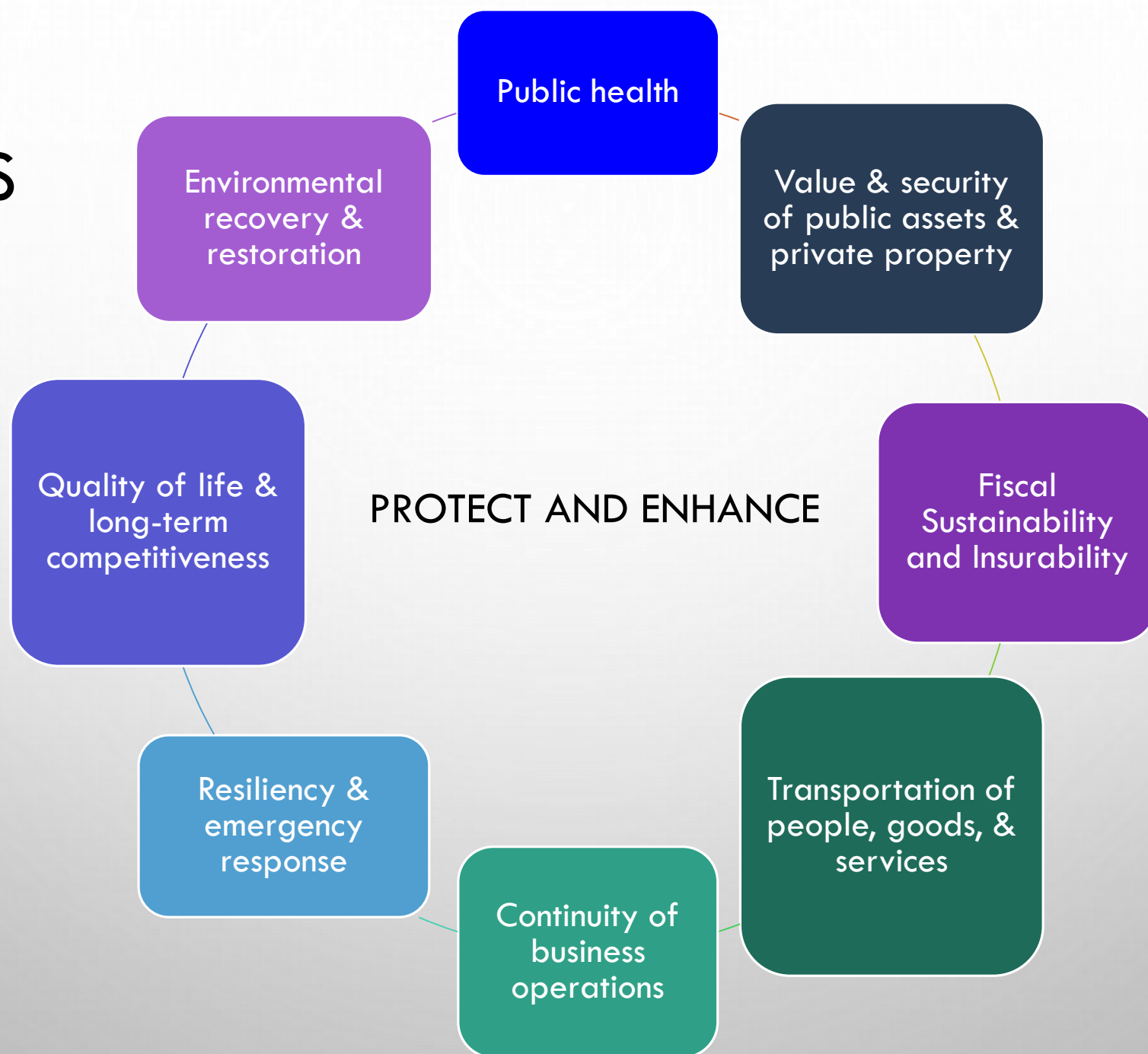
STORMWATER MANAGEMENT PROGRAM

STORMWATER MASTER PLAN PROVIDES THE FRAMEWORK AND BLUEPRINT



IMPLEMENTED THROUGH THE STORMWATER CIP

OUTCOMES



PROGRAM TRAJECTORY 2013 - PRESENT

STORMWATER MASTER PLAN ADOPTION – 2014

COMPLETED WATERSHED, CAPACITY, AND STREAM CONDITION STUDIES

- INFRASTRUCTURE
 - COMPLETED 4 OF THE 10 “HOT SPOT” PROJECTS IDENTIFIED IN THE CAPACITY STUDY + multiple localized property and safety construction projects
- REGULATORY/ECOLOGICAL RECOVERY AND RESTORATION
 - COMPLETED 9 GREEN INFRASTRUCTURE + 2 STREAM RESTORATION PRIORITY PROJECTS
- ASSET INVENTORY
 - 400 MILES OF PIPES AND 32,000 STRUCTURES (UNDERGROUND INFRASTRUCTURE)
 - 3,200 WATER QUALITY AND VOLUME CONTROL ELEMENTS (>80% SINGLE FAMILY)
 - 32 MILES OF STREAMS

*\$15M
capital
execution
2015-2018*

Flat \$0.013 Rate Since 2011

PROGRAM TRAJECTORY 2013 - PRESENT

MS4 PERMIT – 2013

- FIRST IN VA WITH CHESAPEAKE BAY CLEANUP TARGETS
- FIRST PERMIT CYCLE TARGET ACHIEVED (5% 2013-2018)

STORMWATER MANAGEMENT ORDINANCE ADOPTION – 2014

2015 – PLAN REVIEW AND INSPECTIONS STAFF

- 1,100 PERMITS APPROVED
(75% SINGLE FAMILY HOMES)
- 1,800 STORMWATER MANAGEMENT FACILITIES
(94% SINGLE FAMILY HOMES)

EARLY OPTIMIZATION / COST-EFFECTIVENESS ACTIONS

- CROSS-CUTTING PROJECT BENEFITS
- INTRA- AND INTER-AGENCY LEVERAGING AND PUBLIC/PRIVATE PARTNERSHIPS



Private stormwater
management facilities



Windy Run stream
restoration project



Green
infrastructure
32nd Street North

PROGRAM - SYSTEM CAPACITY SUCCESSES

TRUNK STORM SEWERS

FOUR (4) MAJOR, HIGH PRIORITY CAPACITY PROJECTS COMPLETE



West Little Pimmit Run



Lee Hwy. And John Marshall Dr.



24th Street North and North Rockingham ST



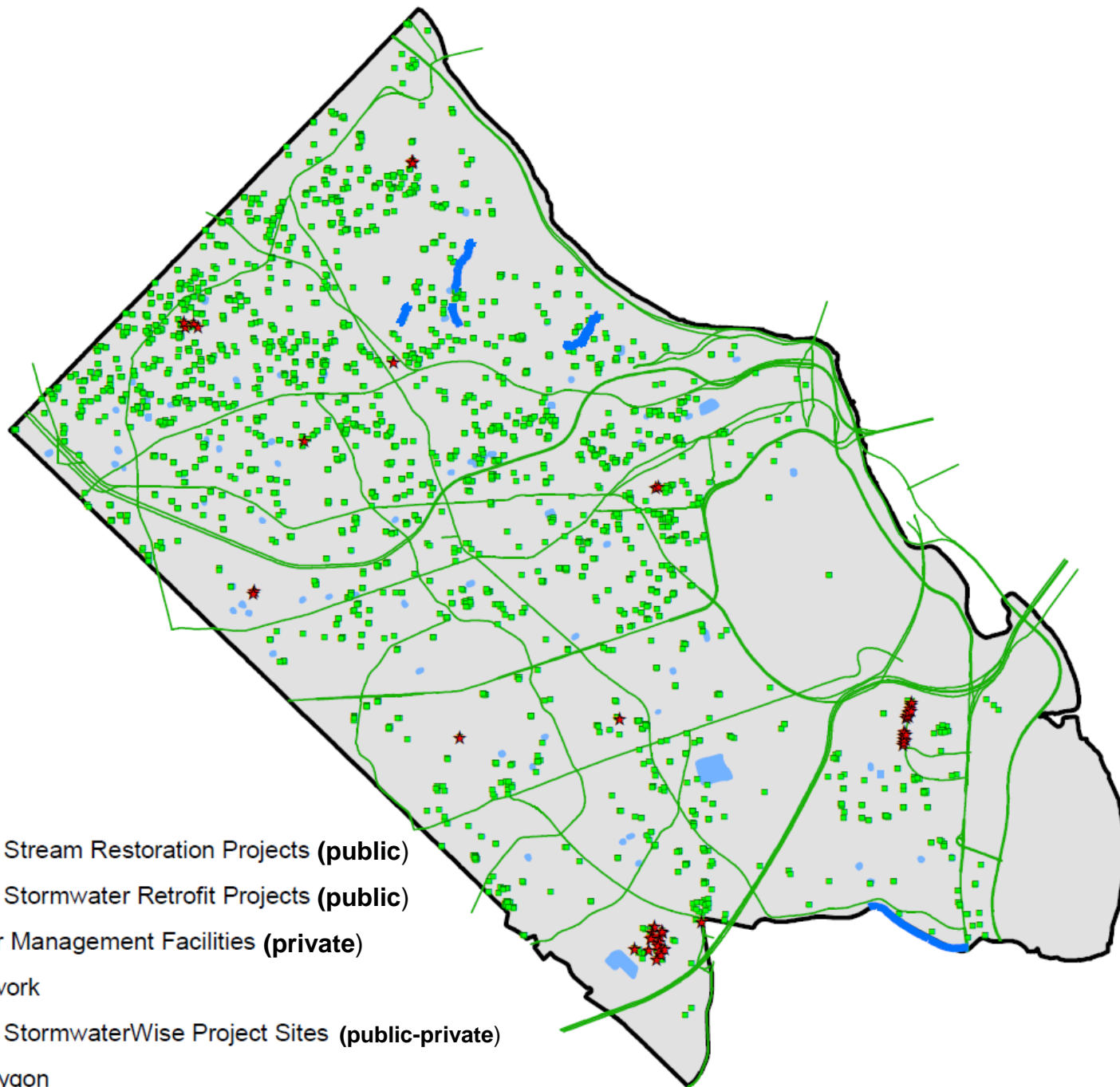
9th Street North and North Liberty ST

REGULATORY, WATER QUALITY, AND ECOLOGICAL RESTORATION PROJECTS



Legend

- Completed Stream Restoration Projects (**public**)
- Completed Stormwater Retrofit Projects (**public**)
- Stormwater Management Facilities (**private**)
- Street Network
- Completed StormwaterWise Project Sites (**public-private**)
- County Polygon



PROGRAM/FUND ELEMENTS AND EXPANSION

BASELINE

- REGULATORY IMPLEMENTATION
- ECOLOGICAL RECOVERY & RESTORATION
- CAPACITY, INFRASTRUCTURE, & DRAINAGE
- ENGINEERING AND PLANNING
- MAINTENANCE & OPERATIONS
- EDUCATION & OUTREACH
- MAPPING, TRACKING, & REPORTING

SUPPLEMENTAL – ADDED FY 2017-2018

- STREET SWEEPING (STAFF AND EQUIPMENT)
- PARKS TREE CONTRACT AND ANALYST (CONTRACT AND STAFF)

FUND DISTRIBUTION AS OF FY 2019 (Program Areas)*

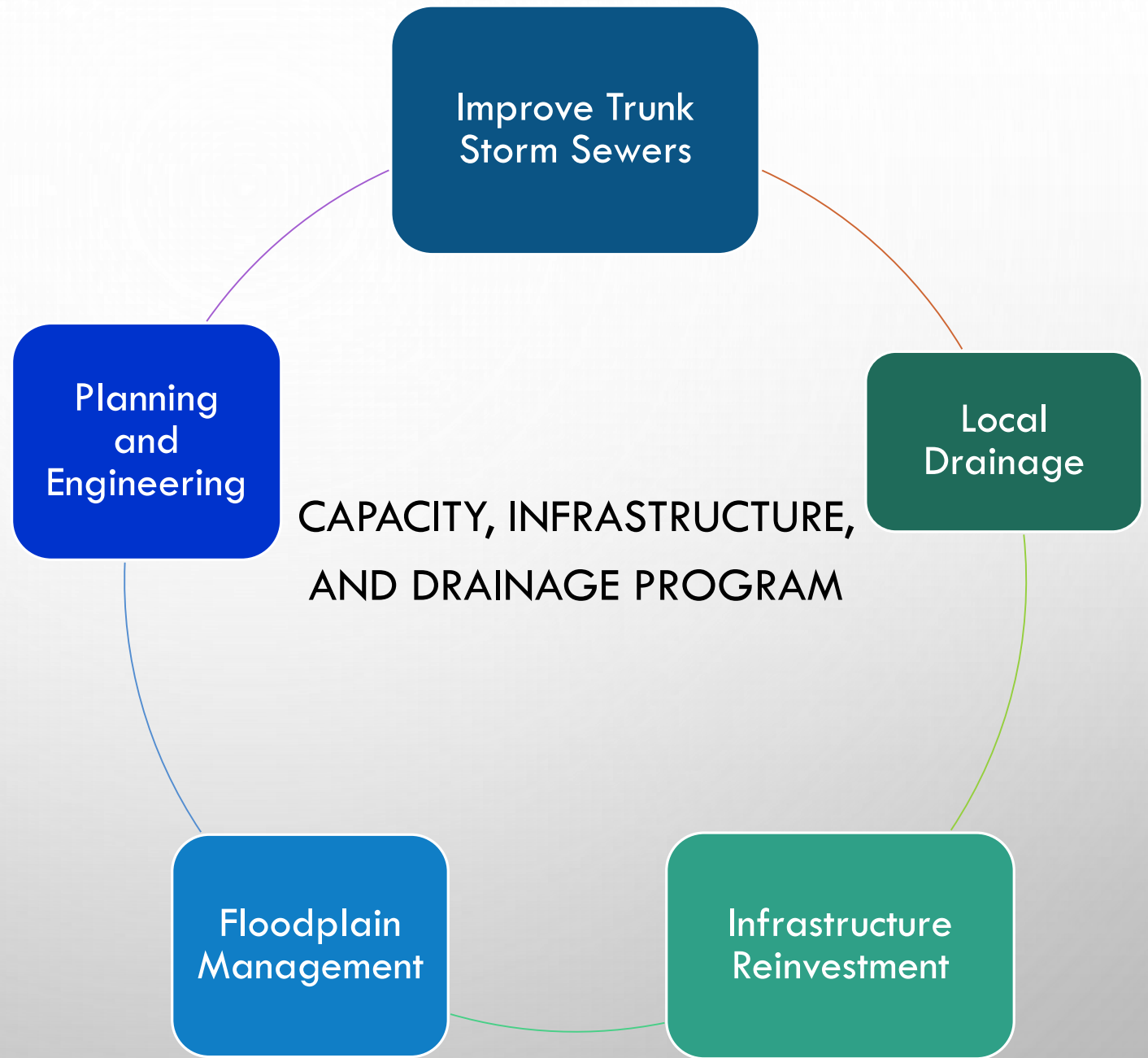
Office of Sustainability & Environmental Management
Water-Sewer-Streets
Parks
Capital Engineering
Development Services
G.I.S.
Solid Waste
Neighborhood Conservation
APS – Engineering, Technical, Regulatory Support

PROBLEM DEFINITION DEMANDS AND CONSTRAINTS

INFRASTRUCTURE AND CAPACITY

CHALLENGES – **NOT ONE-SIZE FITS ALL**

- Watershed-Scale
- Localized-Scale
- Parcel-Scale

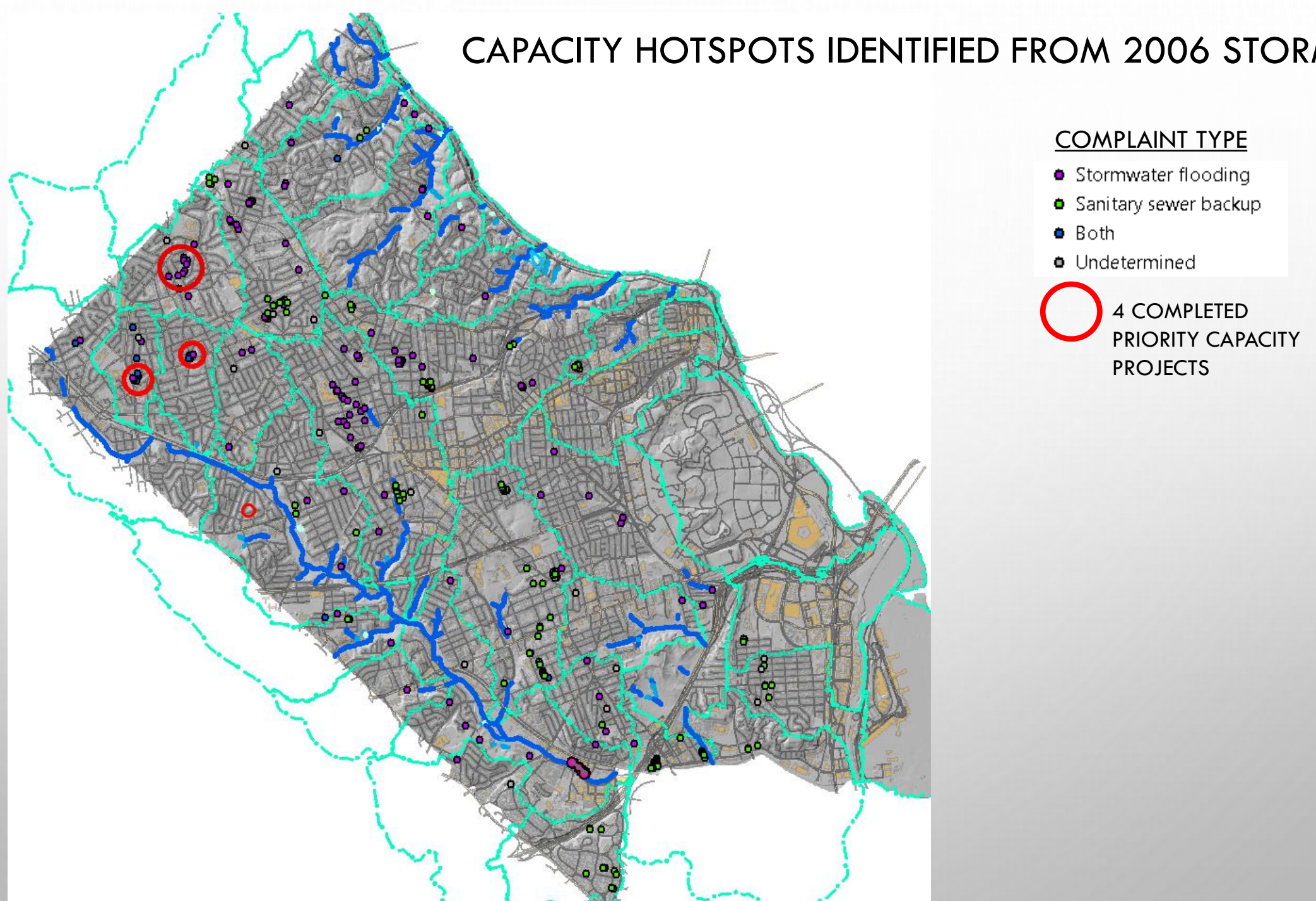


SYSTEM CAPACITY – WATERSHED SCALE

- UP TO 52% OF THE EXISTING SYSTEM HAS CAPACITY LIMITATIONS
- STORMWATER MASTER PLAN IDENTIFIED 107 DISTINCT UPGRADES
- IDENTIFIED UPGRADES CONSTITUTE 89,000 LINEAR FEET OF PIPE (17 MILES)
- MANY AREAS THAT FLOODED IN JUNE 2006 HAVE FLOODED AGAIN IN SUMMER OF 2018



CAPACITY HOTSPOTS IDENTIFIED FROM 2006 STORM



MACRO- AND MICRO- CHALLENGES OF THE WATERSHED SCALE PROBLEM

MACRO

- UNDERGROUNDING OF MOST OF PRIMARY STREAM NETWORK
- HOMES AND ROADS BUILT ABOVE
- LACK OF OVERLAND RELIEF
- AMPLIFICATION BY PRESENT DAY DEVELOPMENT PATTERNS

MICRO

- COMMUNITY DISRUPTION
- DIFFICULTY OF EASEMENT GRANTS
- CROSS-COLLABORATION (E.G., EASEMENTS)
- REMOVAL OF TREE CANOPY
- RESISTANCE TO CHANGE
- “SPLIT INCENTIVE” – CONSTRUCTION IMPACTS LESSER-AFFECTED PROPERTIES



----- Storm drain system

LOCAL DRAINAGE – LOCALIZED SCALE

- DRAINAGE ISSUES ON SMALLER DIAMETER STORM SEWERS THAT SERVE LOCALIZED AREAS, NOT IMPROVEMENTS TO TRUNK STORM SEWER LINES
- INVESTIGATION, RESOLUTION, DOCUMENTATION

*INDICATORS OF SYSTEM “INADEQUACY” -- INSUFFICIENT
INFRASTRUCTURE IN MANY LOCATIONS*



PARCEL-BASED SCALE

- FREQUENTLY MISTAKEN AS COMING FROM A SINGLE SOURCE
- CAN BE SYMPTOMATIC OF A LOCALIZED OR WATERSHED-SCALE ISSUE
- AREA WHERE INDIVIDUAL ACTIONS CAN HAVE THE GREATEST POSITIVE IMPACT
- OFTEN AMPLIFIED BY NEIGHBORING ACTIVITY – NEED TO SEGREGATE PUBLIC-PRIVATE REMEDIES



PROBLEM DEFINITION DEMANDS AND CONSTRAINTS

STORMWATER REGULATIONS FOR DEVELOPMENT

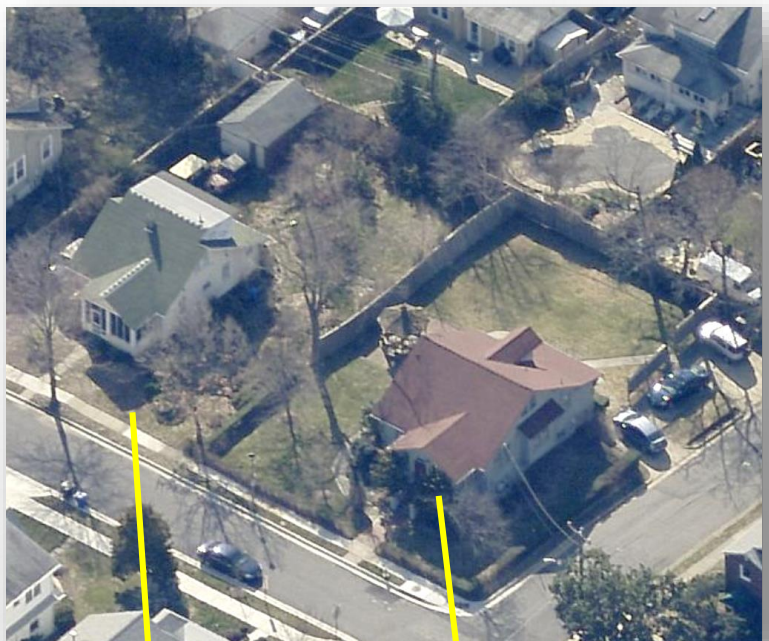
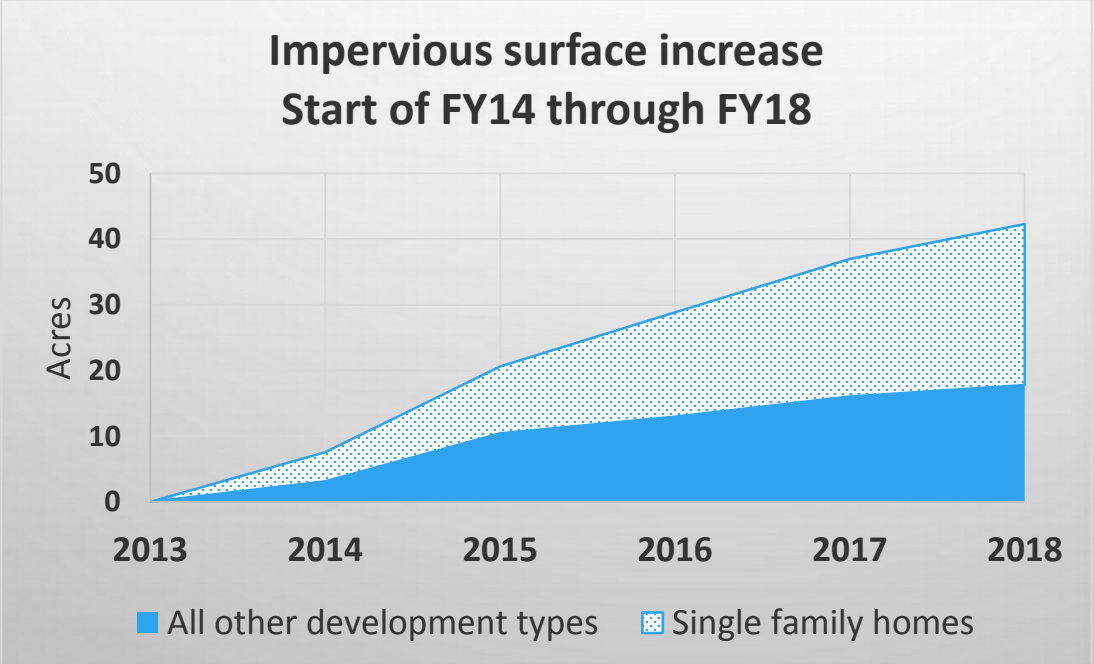
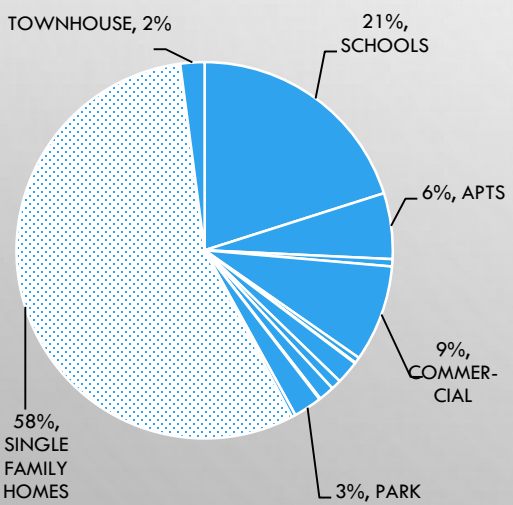
STORMWATER MANAGEMENT ORDINANCE

- ADOPTED BY COUNTY BOARD 2014
- PURPOSE: MITIGATION OF STORMWATER RUNOFF IMPACTS FROM DEVELOPMENT
 - DOWNHILL PROPERTIES, STORM DRAIN CAPACITY, WATER QUALITY, AND STREAMS
- ALSO A PROGRAMMATIC REQUIREMENT OF THE MS4 PERMIT
- AND HELPS WITH REGULATORY PROGRESS TOWARDS BAY CLEANUP REQUIREMENTS AND COMPLEMENTS PUBLIC EFFORTS

PRESENT DAY DEVELOPMENT PATTERNS

OVERALL, REGULATED DEVELOPMENT ACTIVITY ADDS FOOTPRINT OF **PENTAGON** EVERY 3-4 YEARS

NEARLY **60%** OF THE IMPERVIOUS FOOTPRINT INCREASE IS FROM SINGLE-FAMILY HOME REDEVELOPMENT



RATIONALE and PRINCIPLES

REGULATING SINGLE FAMILY HOMES UNDER THE ORDINANCE

SCALE: Largest cumulative source of new stormwater impacts from development

EQUITY: Impacts addressed at source, by source, rather than shifting mitigation of private impacts to public sector

PREDICTABILITY FOR EXISTING AND POTENTIAL RESIDENTS:
Arlington development regulations pay attention to downstream impacts from new homes

MITIGATION

Downstream properties,
storm drain capacity, streams
and water quality

COMPLIANCE

Water quality and
regulatory progress through
redevelopment opportunities

OBJECTIVES

MAXIMIZING MITIGATION AND PERFORMANCE IN A CHALLENGING ENVIRONMENT

- RUNOFF CONTROL MEASURES AND GRADING REQUIRE **QUALIFIED SKILLS AND SITE-SPECIFIC ATTENTION** TO ACHIEVE OBJECTIVES
 - MITIGATION OF RUNOFF IMPACTS
 - REGULATORY CREDITS
- PERFORMANCE AND MAINTENANCE SUCCESS COME FROM WELL-PLANNED AND EXECUTED DESIGNS

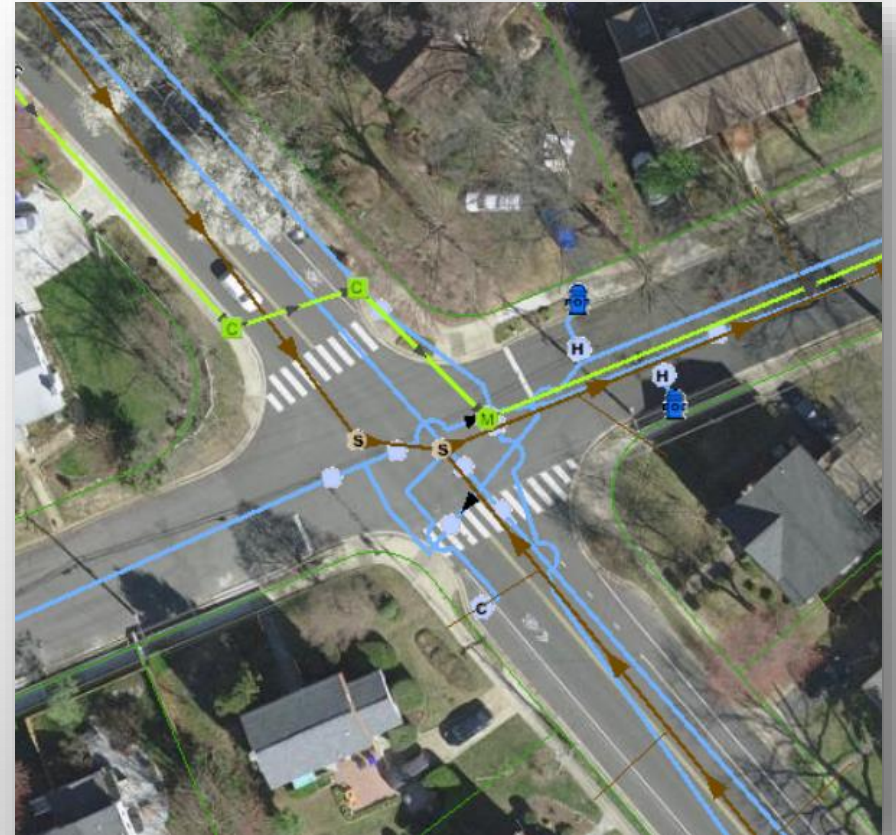


COMPLIANCE: PROGRESS THROUGH OPPORTUNITIES

- REGULATING SINGLE FAMILY HOMES IS AN IMPORTANT OPPORTUNITY
- MITIGATION OF DOWNSTREAM RUNOFF IS BOTH A KEY OBJECTIVE AND BENEFIT
- OBTAINING REGULATORY CREDITS IS A LOGICAL AND IMPORTANT CO-BENEFIT
- DEVELOPMENT ACTIVITY WOULD OTHERWISE BECOME AN INCREASING WATER QUALITY AND REGULATORY LIABILITY
 - POLLUTION INCREASE > REDUCTION

CONSTRAINTS FOR OFF-SITE MITIGATION

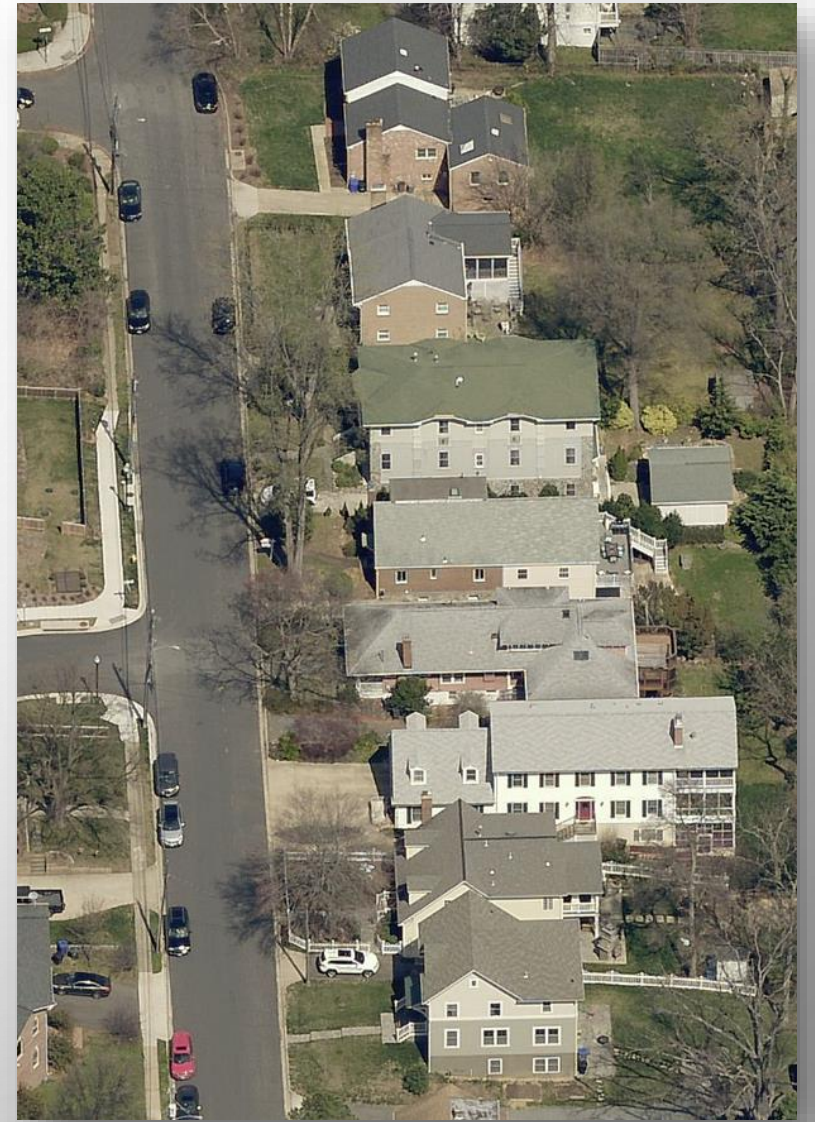
- LAND USE RESTRICTS PUBLIC SECTOR ABILITY TO COMPENSATE OFF-SITE AT SAME TIME SCALE AND COST
- EQUITY IMBALANCE WITH SHIFTING COMPLIANCE AND MITIGATION FOR PRIVATE IMPACTS TO PUBLIC SECTOR
 - COST
 - OVERHEAD
 - UNCERTAINTY
 - CONFLICTS
- OBJECTIVE OF MITIGATING IMPACTS TO DOWNSTREAM PROPERTIES NOT ADDRESSED



Multiple utilities

MITIGATION LIMITS

- SMALL LOTS
- LARGE HOME AND DRIVEWAY FOOTPRINTS ALLOWED BY-RIGHT
- LIMITED REMAINING SPACE TO CONTROL RUNOFF
- WITH LARGER STORMS, RUNOFF FLOWS TO DOWNHILL PROPERTIES
- THESE PROPERTIES ARE DIFFICULT TO PROTECT



Increased runoff, extensive re-grading, soil compaction, and tree loss

TOPOGRAPHIC AND SYSTEM CONSTRAINTS

- TOPOGRAPHY AND FLOW PATHS MAJOR CONSTRAINTS ON MITIGATION OPTIONS AND OUTCOMES
- OFTEN IN COMBINATION WITH LACK OF DRAINAGE INFRASTRUCTURE TO INTERCEPT RUNOFF TO DOWNHILL PROPERTIES

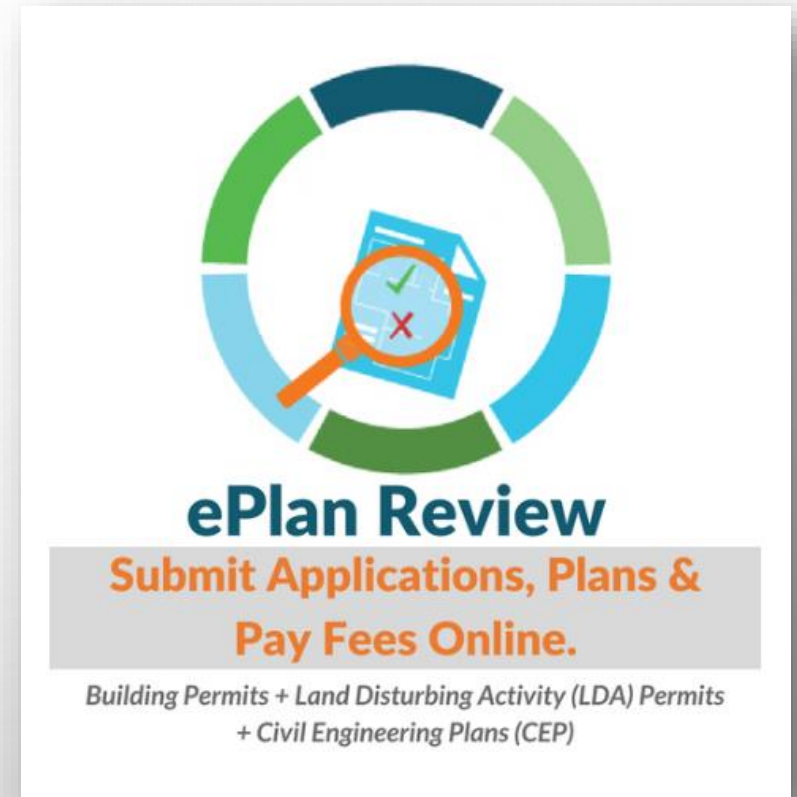


NEIGHBORING JURISDICTIONS

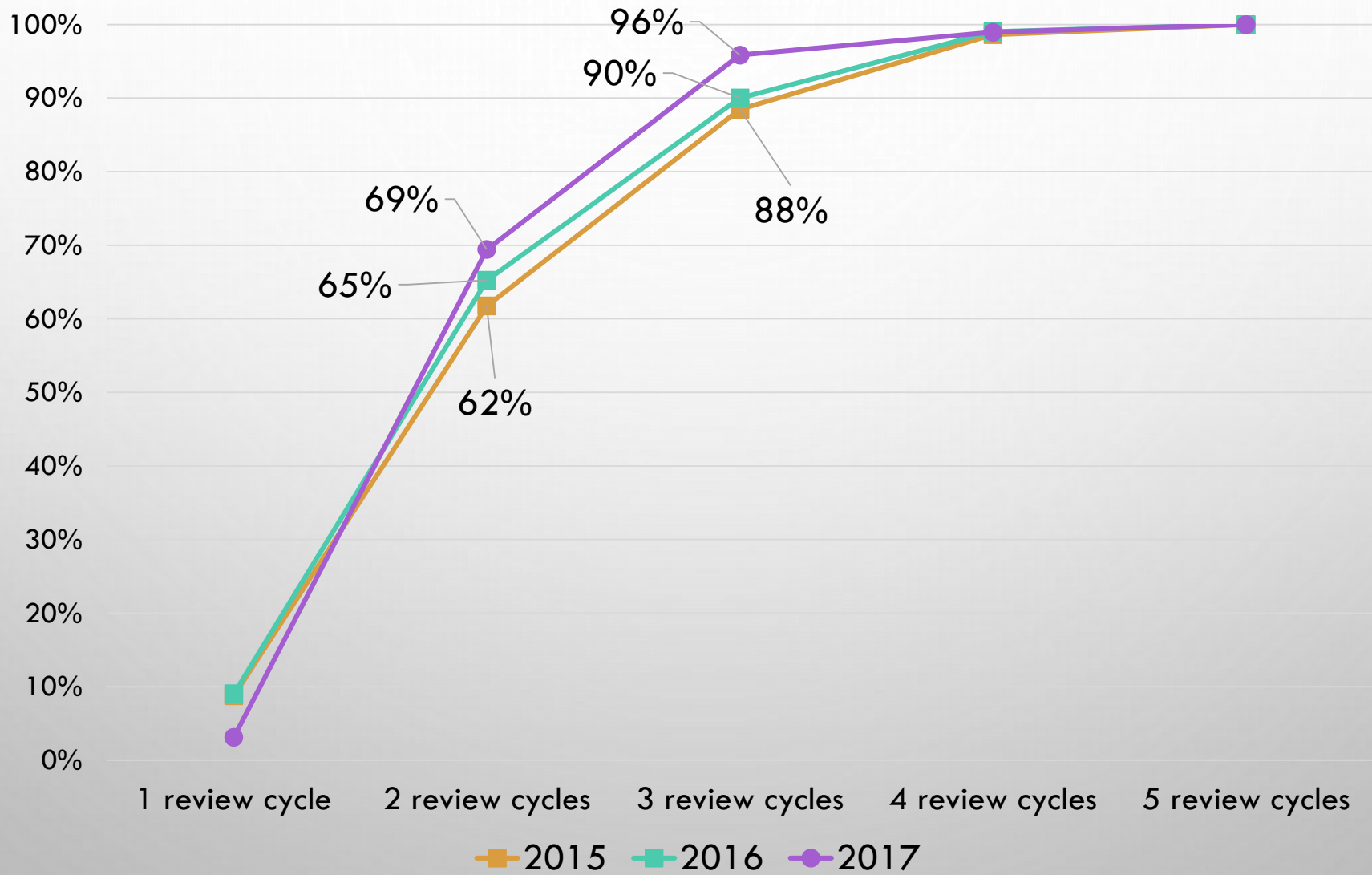
- FAIRFAX COUNTY AND ALEXANDRIA DO NOT REQUIRE ON-SITE MITIGATION FOR MOST INDIVIDUAL SINGLE FAMILY HOMES
- AND DO NOT TRACK TOTAL STORMWATER IMPACT INFORMATION
- AGGREGATED IMPACTS FROM SINGLE FAMILY HOME REDEVELOPMENT – RELATIVE TO OTHER DEVELOPMENT ACTIVITY – APPEAR TO BE FAR MORE ACUTE IN ARLINGTON
 - PACE AND SCALE
 - GEOGRAPHIC CONSTRAINTS
 - AGE OF SYSTEM
 - LOT SIZE AND COVERAGE

IMPROVING CUSTOMER SERVICE FOR STORMWATER PERMITTING

- SITE-SPECIFIC CHALLENGES AND SOLUTIONS TAKE SKILL AND TIME TO DESIGN AND REVIEW
 - BASED ON TWO-YEAR SAMPLING OF PROJECTS, GAP BETWEEN STORMWATER REVIEW AND BUILDING PERMIT REVIEW IS ~3 WEEKS
 - ONGOING EFFORTS TO REDUCE THIS GAP
- LAND DISTURBING ACTIVITY PERMITS CAN BE SUBMITTED IN **ADVANCE** OF BUILDING PERMIT
- PRE-SUBMISSION MEETINGS
- ELECTRONIC PLAN REVIEW



PERCENT OF PROJECTS APPROVED IN 3 OR FEWER REVIEW CYCLES IS INCREASING



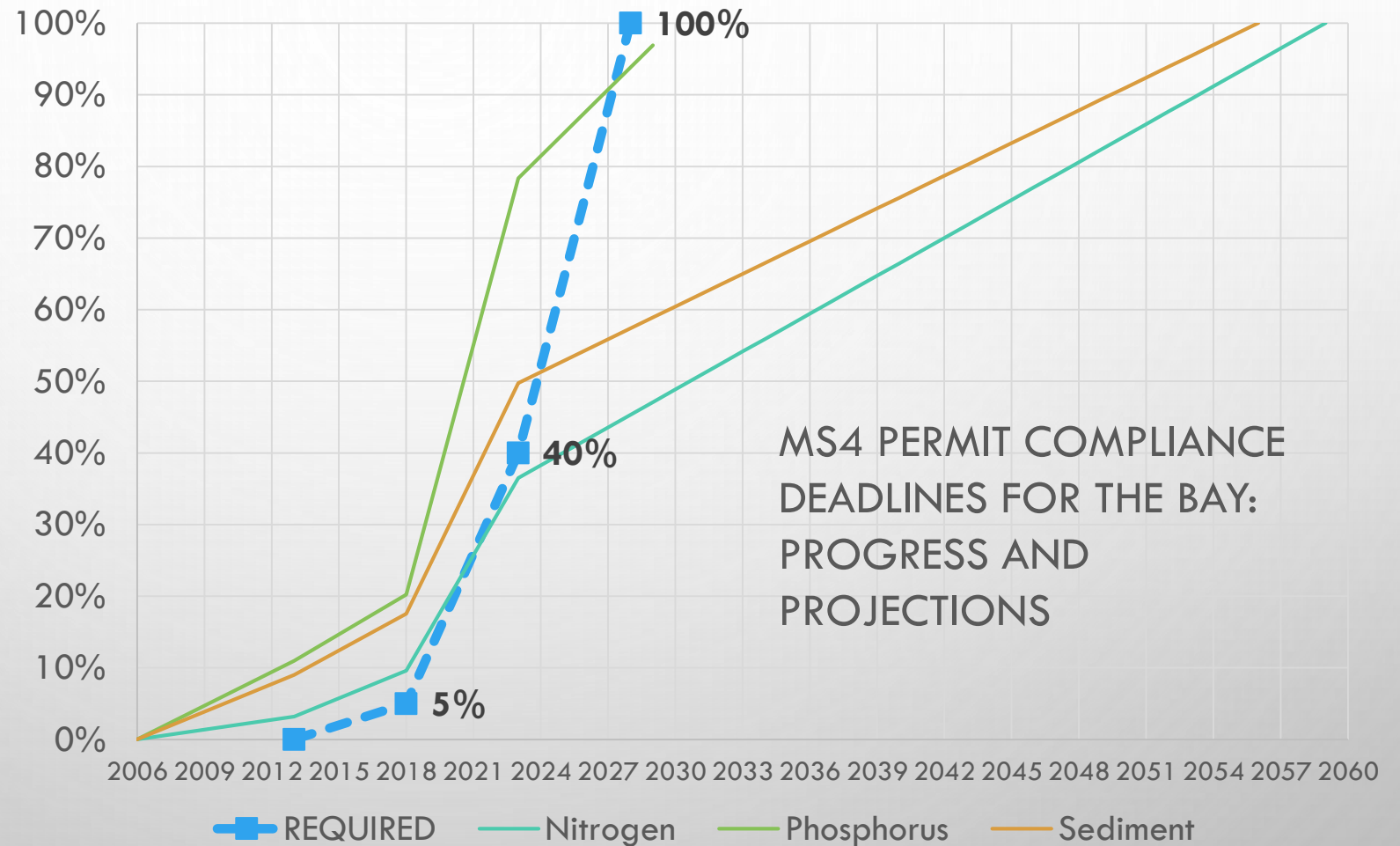
STREAMLINED APPROACH – PILOT

- REFINED REGULATORY TRIGGER ABOVE 2,500 SF LAND DISTURBANCE THRESHOLD, TIED DIRECTLY TO IMPERVIOUS COVER CHANGES
- TEMPLATE DESIGN & REDUCED MITIGATION
- NEW HOMES AND PROJECTS OF SIMILAR SCOPE AND SCALE CONTINUE TO BE HELD TO FULL REQUIREMENTS
 - CUMULATIVE IMPACTS CONTINUE TO BE MITIGATED OVERALL
 - LIMITED REDUCTION IN COMPLIANCE PROGRESS



UPSCALED REGULATORY REQUIREMENTS

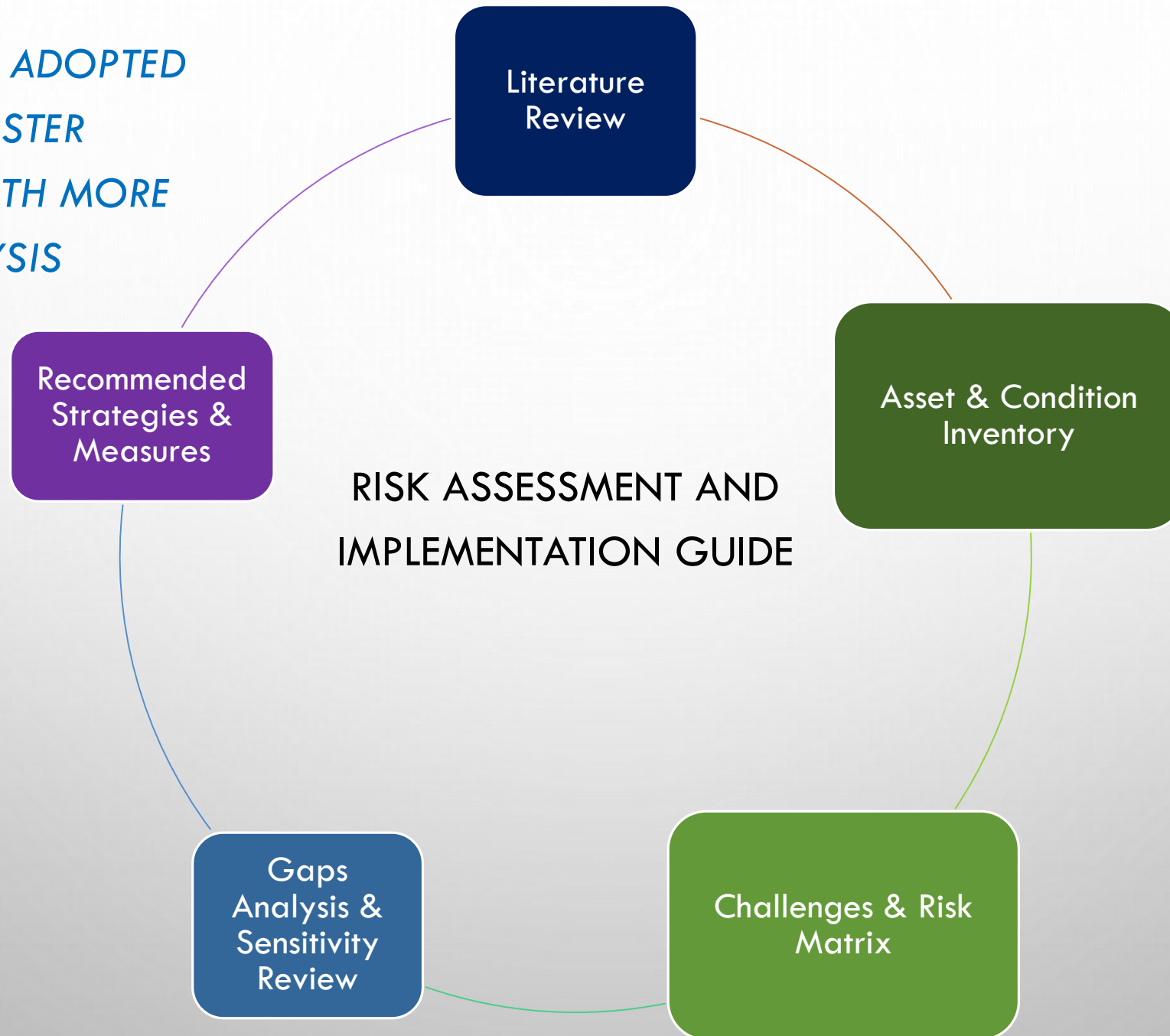
- NEXT MS4 PERMIT TO BE ISSUED BY DEQ IN 2019
- ON TRACK FOR 2023 40% TARGET (BUT NOT 100%)
- UPDATED TARGET LEVELS PENDING FROM EPA
- OTHER PROGRAMMATIC PERFORMANCE INCREASES ALSO POSSIBLE



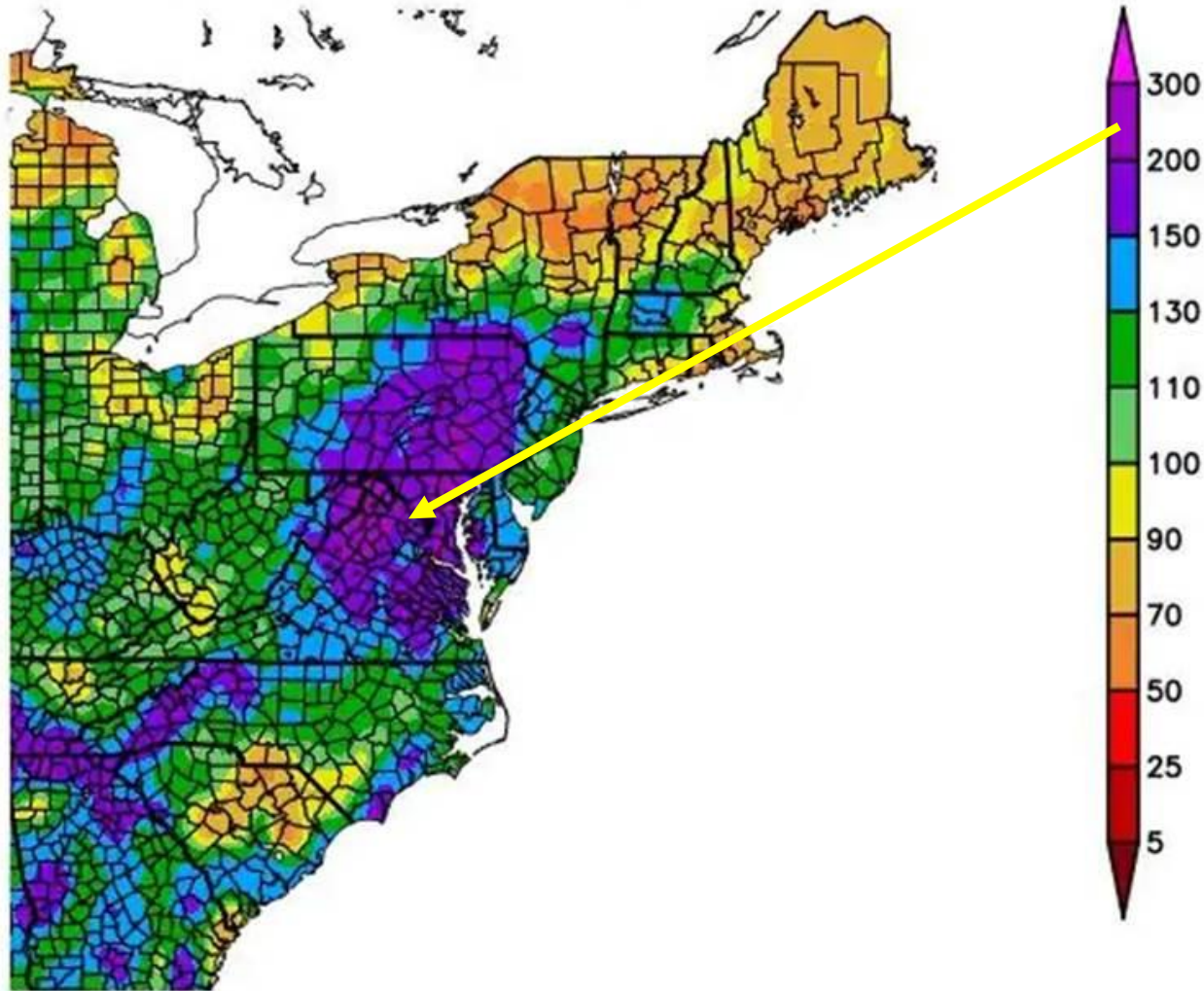
WHAT'S NEXT?

- RISK ASSESSMENT AND IMPLEMENTATION GUIDE (NEXT STEP IN STORMWATER MASTER PLAN)
- FORMALIZING CROSS-CUTTING APPROACH TO INCREASE SCALE AND SCOPE OF CO-BENEFITS
- FUNDING, FINANCING MECHANISMS, AND BUDGET OPTIMIZATION STRATEGIES
- EXPANDING OUTREACH AND EDUCATION PLATFORMS AND CHANNELS

*BUILDING ON THE ADOPTED
STORMWATER MASTER
PLAN AND CIP WITH MORE
ADVANCED ANALYSIS*



Percent of Normal Precipitation (%)
5/10/2018 – 9/6/2018



AMPLIFICATION - CHANGING RAINFALL PATTERNS

Intensity

Frequency

PRIORITIZING INVESTMENTS

- LARGE-SCALE INVESTMENTS MUST BE BALANCED WITH REASONABLE FLOW OF DIRECT AND ALTERNATIVE REVENUE
- THE STORMWATER MASTER PLAN ANTICIPATED THIS TENSION
- ASSET INVENTORY AND RISK MANAGEMENT STRATEGY
 - SUPPORTS HIGHEST-BEST SCHEDULING AND USE OF FUNDING
 - SETS STAGE FOR PROJECT VALUATION (SIMILAR TO BUSINESS RISK MANAGEMENT QUADRANT)



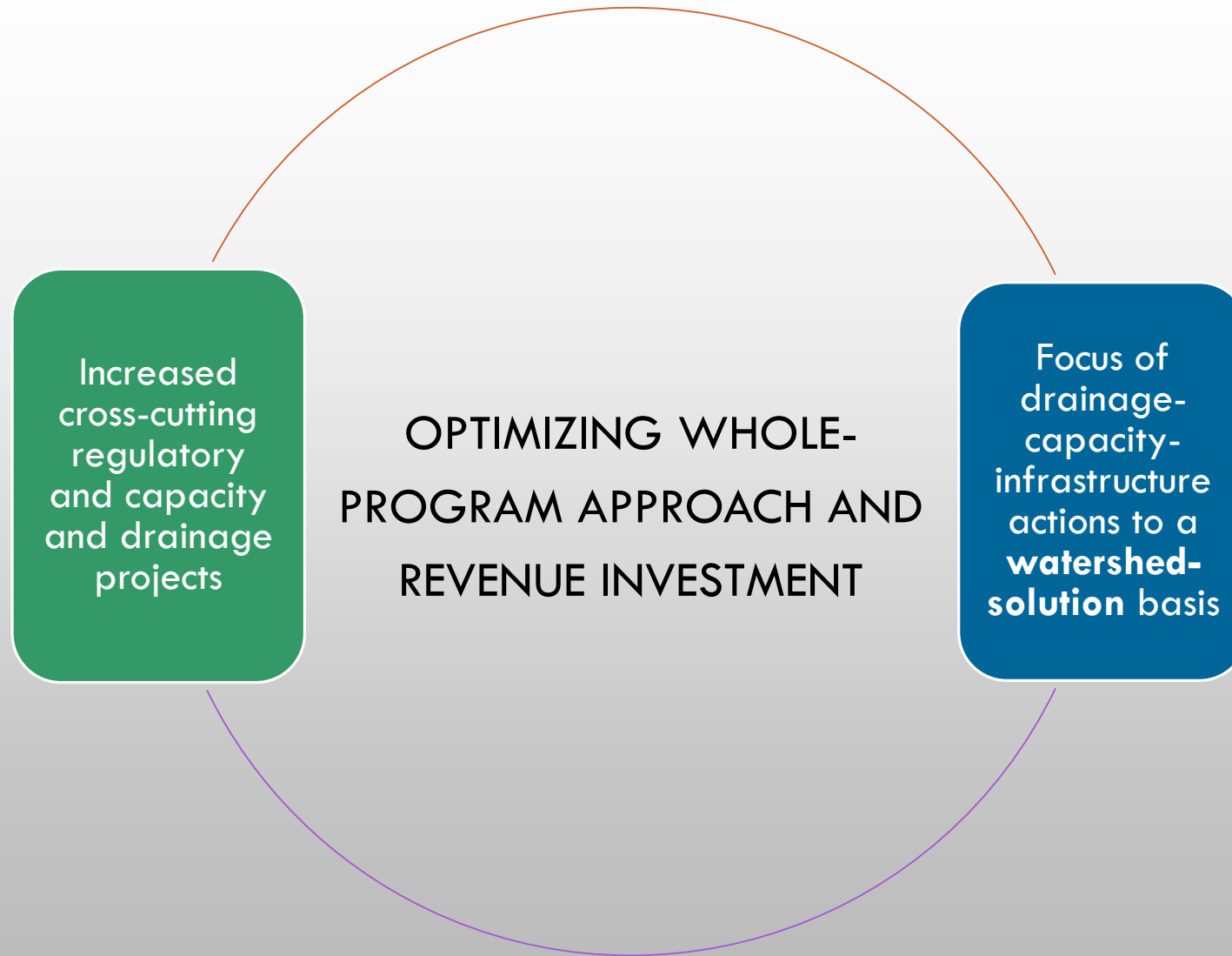
HOW RISK IS RANKED AND ASSESSED

Risk Matrix						
		Consequence				
		Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	A Almost Certain	High	High	Extreme	Extreme	Extreme
	B Likely	Moderate	High	High	Extreme	Extreme
	C Moderate	Low	Moderate	High	Extreme	Extreme
	D Unlikely	Low	Low	Moderate	High	Extreme
	E Rare	Low	Low	Moderate	High	High

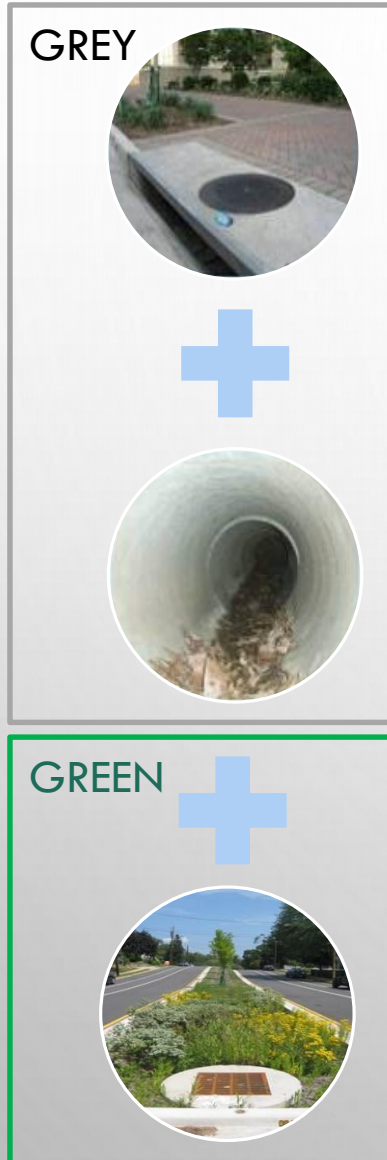
FINANCIAL / FISCAL ASSESSMENTS

- REPLACEMENT COSTS / LOSS
- INCREASED COST OF OPERATIONS OR MAINTENANCE
- LOSS OF REVENUE
- LOSS OR IMPAIRMENT OF ECONOMIC ACTIVITY

STRATEGIC PIVOT



CROSS-CUTTING APPROACH

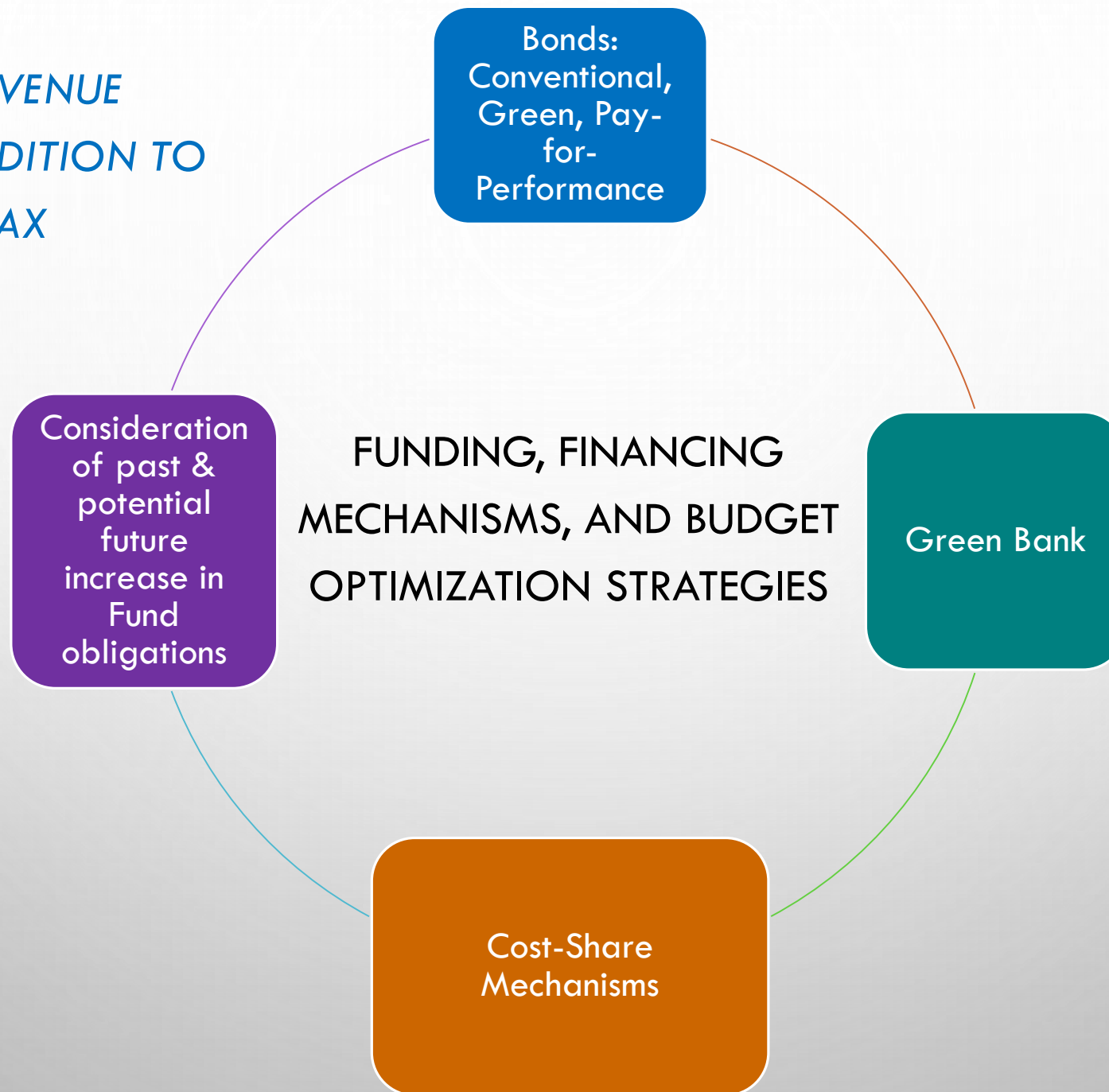


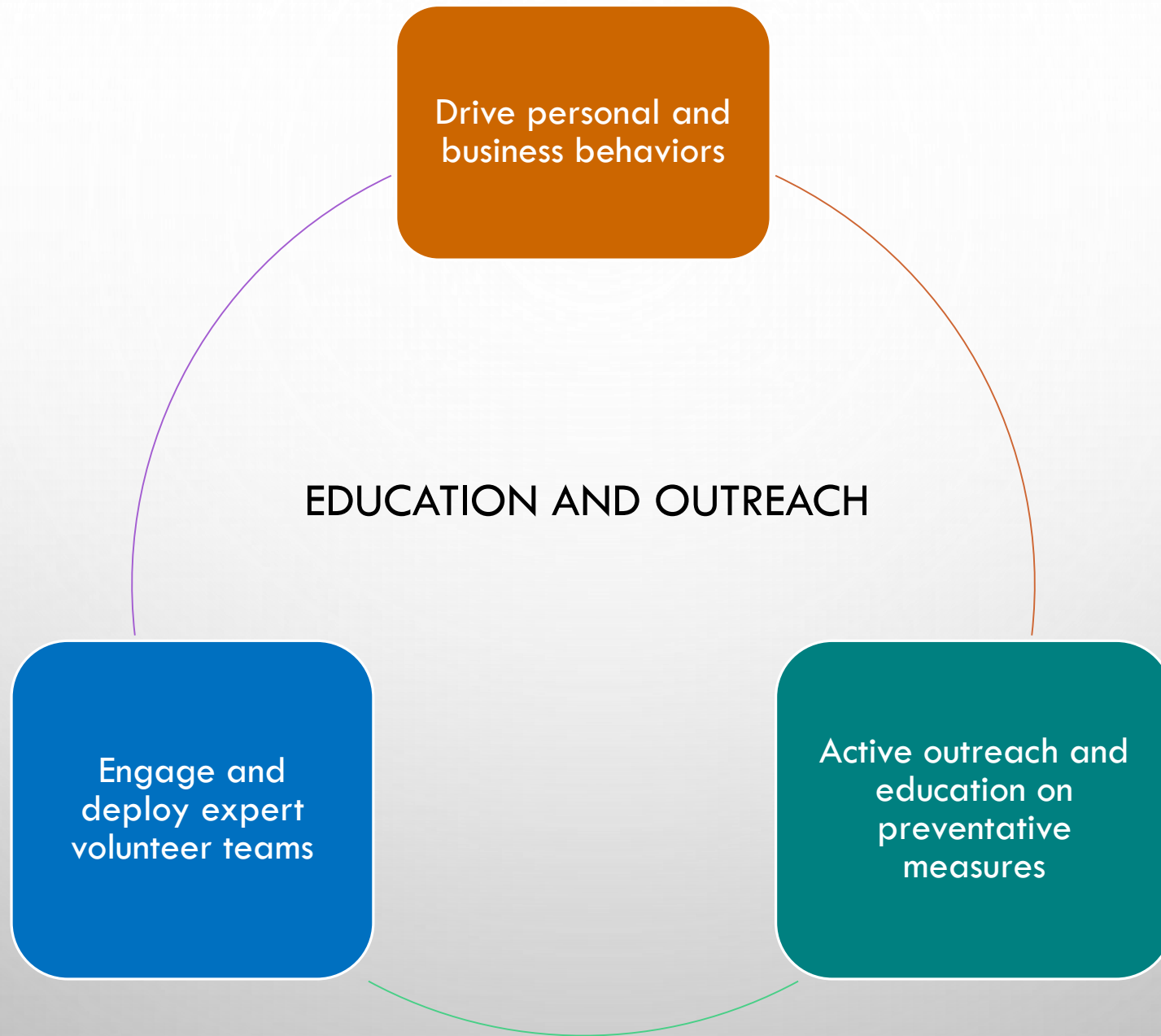
**Integrated
stormwater
management**

PERFORMANCE-BASED, COLLABORATIVE AND COST-EFFECTIVE

- USES PROJECT AND ENGINEERING DESIGN TO PROMOTE WATER QUALITY AND ENHANCE RUNOFF CONTROL
- MULTI-TASKS PROGRAM DOLLARS & INVESTMENTS
- PROMOTES INTRA- AND INTER-AGENCY LEVERAGING AND PUBLIC/PRIVATE PARTNERSHIPS

*PRELIMINARY REVENUE
OPTIONS IN ADDITION TO
STORMWATER TAX*





FLOODING OUTREACH

- EXPANDED WEBSITE; FACTSHEET; MAILINGS
- PRIORITIZING OUTREACH TO TARGET AUDIENCES BASED ON LOCATION (E.G., FLOODPLAINS AND NEAR STREAM AREAS) AND PROPERTIES AND AREAS WITH PRIOR HISTORY OF FLOODING
- EMPHASIS ON SHARED PUBLIC-PRIVATE EFFORTS
- MONTHLY NEWSLETTER

KEY MESSAGES:

- [PREPARE FOR FLOODING](#)
- [CONSIDER PERMANENT MEASURES](#)
- [PURCHASE FLOOD INSURANCE](#)

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Reducing Your Risk of Flooding

Flooding can be a very costly disaster. The risk for flooding can vary within the same neighborhood and even property to property. Flooding can occur not only in identified high-risk areas, but may also occur in areas that may not have been identified as high risk. [More than 20% of flood claims are from low to moderate flood risk areas.](#)

The County has assessed the storm sewer system and is working on system improvements. Here are steps that you can take as a property owner to reduce your risk of flooding.

Prepare for flooding by doing the following:

- Know how to shut off the electricity and gas to your house, in the event of flooding.
- Make a list of emergency numbers and identify a safe place to go.
- Make a household inventory of belongings, especially the contents in the basement.
- Keep important documents and medicine in a water proof container in a safe place.
- Gather supplies in case you have to leave immediately, or if services are cut off — medications, pet supplies, batteries.
- If your home needs a sump pump, get a battery backup in case the power goes out. Check on the pump regularly, especially if it's more than eight years old.
- Read more [tips for Preparing for Storms.](#)



Consider permanent flood protection measures:

- Mark your circuit breaker box to show which circuits feed the parts of your house that are most susceptible to flooding. Turning off the electricity to the basement may reduce property damage in event of a flood.
- Check your house for water entry points. During a flood, water may enter through basement windows, basement stairwells, doors, and dryer vents. Some of these features can be protected with low walls or temporary shields.
- Install a sanitary sewer backflow valve to prevent sewer backup flooding.
- Consider elevating your house above flood levels.
- Some flood protection measures may require a building permit and others may not be safe for your type of building. Be sure to contact the [Arlington County Permitting and Inspection Services Division](#) for more information and resources.
- More information can be found in FEMA's publication, "Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding."

Purchase a flood insurance policy.

- Homeowner's insurance policies do not cover damage from floods, but because Arlington participates in the National Flood Insurance Program (NFIP), you can [purchase a separate flood insurance policy](#). This insurance is backed by the Federal government and is available to everyone, including properties that have previously been flooded. Additionally, because the County participates in the NFIP Community Rating System, you will be eligible for a reduction in your insurance premium.
- If you have a flood insurance policy, consider adding to the policy to cover your homes contents – typically flood insurance policies cover only the structure.
- In most cases there is a 30 day waiting period before a flood insurance policy becomes effective.
- Consider adding coverage for sewage back-ups to your existing homeowner's policy.
- Contact your insurance agent for more information on rates and coverage.

Contact Us

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703-228-3610

Quick Links

[Reducing Your Risk From Flooding](#)
[Floodplains and Flood Insurance Rate Maps](#)
[Flooding - Preparing for a Storm](#)
[Flooding - During and After a Storm](#)
[County Stormwater Management Projects](#)
[Stormwater Master Plan](#)

QUESTIONS/DISCUSSION