

Cary's Adaptive Stormwater Journey



Approach

1. Citizen Engagement

2. Program and Policy

Ordinance, Condition Assessment, & Maintenance

3. Walnut Creek Pilot Area

Model, Imagine Cary, & Open Space

Downtown Stormwater Working Group



EXECUTION STEPS

- WORKING GROUP
- COMMUNICATION STEPS
- OUTREACH/COMMUNIC.
- INTERNAL COMMUNICATION, NEW APPROACH,
- COMMON UNDERSTANDING OF MESSAGES ACROSS ORGANIZATION
 - HOW WE GOT HERE
- SITE VISITS
- PROJECT MGT
- MONEY

THEMES

0. ADAPTIVE CHALLENGE

1. MOBEL

Danna, Dan, Billy, Doug

2. MAINT.

Scott H., Carolyn, Karen

3. ORDINANCE

Meredith, Chris, Lisa, Billy, Matt, Todd

4. OPEN SPACE

Dan, Danna, Meredith, Todd Milam

* WORKING GROUPS
Dan

All
Ted
Steve
(Dan FYI)
Doug

JOURNEY

- AUDIENCE
- HEARD THE STORY ABOUT THE JOURNEY?
- NEED TO EXPLAIN IT INTERNALLY
- Document ALL in Box

Q Report
Points

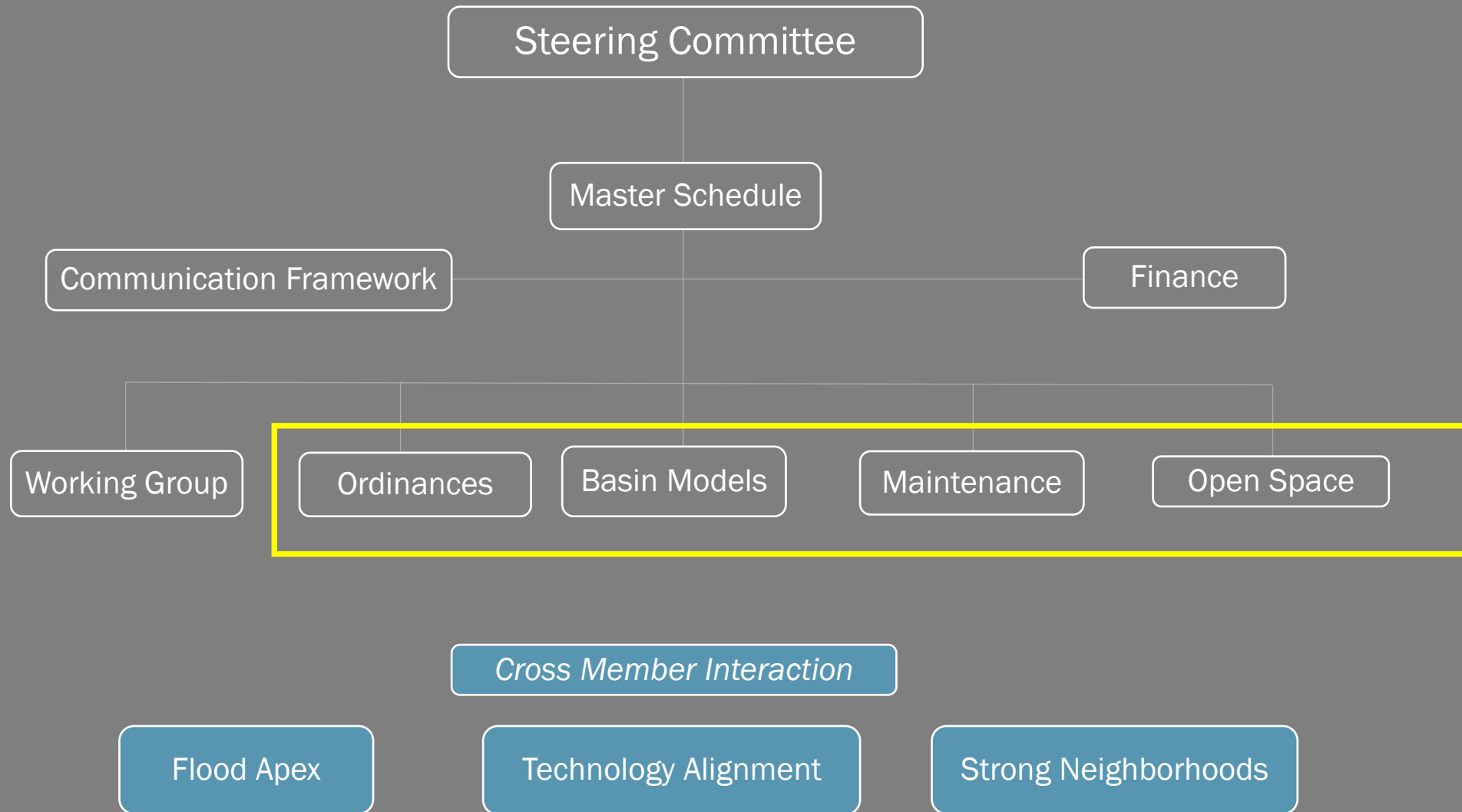
Q3 (May '18)

Q4 (Aug '18)

Q1 (NOV) Full Report

Q2 Refresh

Adaptive Stormwater



ADAPTIVE STORMWATER ROSTER

Steering Committee

Dan Ault
 Ted Boyd
 Steve Brown
 Dan Clinton
 Marie Cefalo
 Scott Hecht
 Matt Flynn
 Meredith Gruber
 Billy Lee
 Doug McRaine
 Karen Mills
 Susan Moran
 Jan Patterson
 Carolyn Roman
 Chris Simpson
 Danna Widmar*

Working Group

Citizens
 Scott DeDeugd
 Tim Devinney
 Jordan Gussenhoven
 Bill Hunt
 Tim Luckadoo
 Sam Ravenel
 David Schouse
 Ken Taylor
 Peggy Taylor

Staff

Dan Ault
 Ted Boyd
 Steve Brown
 Dan Clinton*
 Meredith Gruber
 Billy Lee
 Doug McRaine
 Carolyn Roman
 Danna Widmar

Ordinance

Dan Ault
 Mary Beerman
 Ted Boyd
 Steve Brown
 Matt Flynn*
 Lisa Glover
 Meredith Gruber
 Billy Lee
 Doug McRaine
 Chris Simpson

Maintenance

Dan Ault
 Lynn Brilz
 Ted Boyd
 Steve Brown
 Paul Campbell
 Dan Clinton
 Dave Hallgren
 Jim Hallows*
 Scott Hecht
 Billy Lee
 Chad Lemke
 Tom Lubcker
 Mike Mazanek
 Doug McRaine
 Karen Mills
 Jan Patterson
 Jamie Revels
 Carolyn Roman
 Bill Roy

Open Space

Juliet Andes
 Dan Ault
 Emily Barrett
 Dan Clinton
 Meredith Gruber*
 Jerry Jensen
 Paul Kuhn
 Billy Lee
 Doug McRaine
 Todd Milan

Finance

Dan Ault
 Kimberly Branch*
 Steve Brown
 Dan Clinton
 Jim Hallows
 Scott Hecht
 Jim Holloway
 Billy Lee
 Karen Mills
 Jan Patterson
 Stacey Teachey

Basin Model

Dan Ault
 Ted Boyd
 Steve Brown
 Dan Clinton
 Matt Flynn
 Billy Lee*
 Doug McRaine
 Jan Patterson
 Danna Widmar

Steering Committee	Working Group	Ordinance	Maintenance	Model	Open Space
Topics	Topics	Topics	Topics	Topics	Topics
What does success look like?	What does success look like?	What does success look like?	What does success look like?	What does success look like?	What does success look like?
Whats the Story?	Whats the Story?	Whats the Story?	Whats the Story?	Whats the Story?	Whats the Story?
Communication Framework	Communications Framework	Communications Framework	Communications Framework	Communications Framework	Communications Framework
Public Purpose	Public Purpose	Public Purpose	Public Purpose	Public Purpose	Public Purpose
Public vs Private	Public vs Private	Public vs Private	Public vs Private	Public vs Private	Public vs Private
Level of Service		Level of Service	Level of Service	Level of Service	
Extent of Service		Extent of Service	Extent of Service	Extent of Service	
- Education & Outreach	Engagement - Encounter	Peak Flow	Condition Assessment	Pilot Project	Tree Canopy
- Public Particiaption	Educate -Inform	- Storm vs Flood Mgt	SCARP	Cedar St	Invite Stakeholder
and Involvement 95/5	Explore	- 100-yr	Pilot Maintenance Program	DT Park	Green Infrastructure
Flood Apex	Problems of the Past	Stormwater Impact Analyses	Maintenance Policies	Green Infrastructure	How to create story map
- White Paper	Address the Present	- Town vs Development	GIS Integration	E Park St PP	Riparian Buffer
- Stream Gages	Plan for the Future	- Rezoning Use		Survey	Public Purpose
- G&H Leverage	Partnerships	- Extent of Regulation		Greenway	
Strong Neighborhoods	Holistic -vs- R/W	- Notification	Targeted Mainteneace	point source nonpointsource	
Technology Alignment	No Adverse Impact	Green Infrastructure	with technology	gauges	
FY19 Q1 Presentation	Resilience	Policy Amendments		Rezoning	
Committee Staffing	Incentives	- PS 35 & 146		Target Maintenance	
		- PS 75		with Technlogy	
		- PS 106 Retirement		Inventory of homes	
		Exempt Lot subdivisions		Coronado	
		Citizen Advisory Board			
		Floodplain Map Changes		Swift Creek	
		Riparian Buffer			
TCAP	October Meeting	List of obstacles to GSI	Recommendations	Sensors	Maps: canopy,
Weekly Communications	Reachout to BH, JG, SD, DS	Open Space/Tree Ordinances	Justification for EOS	Site Selection	Pocket Park (maps)
Whats going well	Capstone connection	Stormwater Impact Analysis	Quatify work	Finalize Model	greenway alignment and connections
	Add Realitor??		document story	Develop the story	policies open space, real estate,
Weekly-development opportunities		Next step is o reach out to Jordan and sam	Complete field work? Pilot	Look at other watersheds	stormwater
Kildaire/Penny		objective of is the 100 yr portion		Define Pockets	engage tree avdicates
Kildaire Church		gauge of impression on how it would be received		Tree Canopy	
N Harrison Grant		what peers might say about this		Plan	Story map for acquisistions
Glennaire		is anyone willing to avdocate conversion	Next Steps	Destination centers vs neighborhoods	Real Estate Cost
Open space tree canopy 20% monthly		easy to explain in short time	Open Space - How to solve problem - fu	Map of investment disinvestment	
How citizen learn more (website)		Dan - stick in brain state vs local	ordinances		List of Assignment
Utility vs Status Quo		preimpt a strike	floodplain/buffer		
		relationships at fed to get approved		EOS	Opportunity locations
		surface what to do		Regulatory/Maintenance	
		changes that just fit downtown			
		other areas it does not apply			
		exempt subdivisions			

Ordinances

Stormwater Master Plan Summary

Table 2-4- Summary of the Town's Land Development Ordinances Relating to Stormwater

#	Ordinance Name	Category	Department Responsible	Basins	Potential Benefits	Purpose	Ordinance Drivers
3.12	Development in flood hazard areas	- Flooding - Runoff Quantity	Engineering	All	Reduces risk of structural and yard flooding	Prevent lots and development in flood-prone areas	Flood prevention, buffer protection, & water quality
3.13	Grading Permits	E&SC	Engineering	All	Reduces erosion, sedimentation, & property loss	Permits for grading and development activities	Compliance with State Erosion Control Law and NPDES Phase II Permit
3.15	Certificates of Occupancy	Enforcement	Inspections and Permits	All	Can be used as a mechanism to proactively require compliance with ordinances	Issued by the department stating that the building complies with the Ordinance	Public Safety, protection with secondary compliance benefit
3.17	Vested Right	UTBs	Planning	All	Prevent hardships for property owners	Prevent hardships for property owners	Equity and fairness
3.22	Tree clearing certificate	UTBs	- Planning - Inspections and Permits	All	Water quality & aesthetics	Prevent loss of trees	Ensure that trees are not mistakenly removed
3.22.4	Required Buffers and Vegetation Protection Areas	UTBs	Planning	All	Water quality & aesthetics	Areas where vegetation is to be protected and buffers are required	Addresses all buffers, not just UTBs
4.4.6	Watershed Protection Overlays	Water Quality	Planning	Swift and Jordan	Protects water quality of potable water supply	Ensures the availability of water supplies at a safe and acceptable quality	DWQ requirement for WSW (15A NCAC 2B.0200
7.2.5	Tree Protection During Construction	UTBs	Planning	All	Reduces accidental removal & damage of trees & buffers	To protect trees from damage prior to and during construction	Protection of trees, sometimes required by DWQ
7.2.8	Screening (A) Stormwater Devices	Water Quality	Planning	All	Better public acceptance of BMPs	Improve BMP aesthetics	Public acceptance of BMPs
7.2.14	Urban Transition Buffer Regulations	UTBs	- Engineering - Planning	All	Water quality, flood prevention, & aesthetics	Protect riparian buffer and protect water quality	15A NCAC 2B.0200, but Town exceeds minimum requirements
7.3	Stormwater Management	- Water Quality - Flooding - Runoff Quantity	Engineering	All*	Water quality, flood prevention, & stream erosion	Protecting water quality by controlling nutrients, attenuating peak stormwater discharges, and requiring use of BMPs	15A NCAC 2B.0200, FEMA requirements Protection of Public
7.3.2	Nutrient Reduction Requirements	Water Quality	Engineering	All	Water quality	Limits the amount of pollutants in the stormwater runoff	15A NCAC 2B.0235, 15A NCAC 2B.02665, SL 2009-216, SL 2009-484
7.3.3	Peak Runoff Control	- Flooding - Runoff Quantity	Engineering	All	Flood prevention and stream erosion	To minimize damage to subject streams caused by storm flows	NPDES Phase II Permit
7.3.4	Allowable Best Management Practices	Water Quality	Engineering	All	Assures use of effective treatment strategies	A list of practices that can be utilized for nitrogen reduction	15A NCAC 2B.0235/.0265, SL 2009-216, SL 2009-484
7.3.5	Maintenance of Best Management Practices	Water Quality	Engineering	All	Assures proper maintenance of BMPs	BMPs require complete legal documentation and a maintenance plan	NPDES Phase II Permit
7.3.6	Illegal Discharges to the Storm Sewer System	Water Quality	- Engineering - Public Works & Utilities	All	Reduces sources of pollutants entering streams and ponds	Regulates non-stormwater discharges to the storm drainage system	NPDES Phase II Permit
7.3.7	Post Construction Runoff Controls for Walnut, Middle, & Crabtree Creek Watersheds	Water Quality	Engineering	All	Reduces pollution, reduces erosion and sedimentation, increases public awareness	Ordinance to comply with NPDES Phase II Permit	NPDES Phase II Permit
7.4	Soil Erosion and Sedimentation Control	E&SC	Engineering	All	Reduces sedimentation of streams and ponds, reduces property and soil loss	Regulates land disturbing activities to control erosion and sedimentation.	State Erosion Control Act and NPDES Phase II Permit
7.5	Flood Damage Prevention	- Flooding - Runoff Quantity	Engineering	All**	Reduces flooding potential and property loss	Minimizing the amount of obstructions in a floodplain	Public protection and FEMA
8.1.4	Subdivision and Site Plan General Provisions (C) Storm Drainage	E&SC	- Engineering - Planning	All	Reduces flooding potential and property loss	Provide adequate storm runoff conveyance systems	Public protection and FEMA
11.3 11.4 11.5	Violations, Remedies and Penalties, Enforcement Procedures	Enforcement	- Engineering - Planning - Inspections and Permits	All	Assures compliance with ordinances	To provide means to require compliance with ordinances	All of the above

* Different aspects of rule apply based on watershed

** For sites greater than 50 acre

Ordinances by Target

Water Quality		Flooding/Runoff	
4.4.6	Watershed Protection Overlays	3.12	Development in Flood hazard area
7.2.8	Screening Stormwater Device	7.3	Stormwater Management
7.3	Stormwater Management	7.3.3	Peak Runoff Control
7.3.2	Nutrient Reduction	7.5	Flood Damage Prevention
7.3.4	Allowable SCMs		
7.3.5	SCM Maintenance		
7.3.6	IDDE		
7.3.7	Post Construction		
Erosion & Sediment Control		Urban Transition Buffer	
3.13	Grading Permit	3.17	Vested Rights
7.4	Soil Erosion & Sediment Control	3.22	Tree Clearing Cert
8.1.4	Site & Sub General Provisions	3.22.4	Buffers & Vegetation Protection Area
		7.2.5	Tree Protection Construction
		7.2.14	Urban Transition Buffer
Enforcement			
3.15	Certificate of Occupancy		
11.3	Violations		
11.4			
11.5			

Ordinance Considerations

Level of Service

- Design Standards

Extent of Service

- Public –vs- Private and Public Purpose

Peak Flow

- Add 100-yr
- Move from 7.3 to 7.5

Stormwater Impact Analysis

- Town –vs- Development
- Rezoning
- Extent of Regulation

Policy Amendments

Green Infrastructure

Exempt Lot Subdivision

Ordinance - Action Items

- Peak Flow
 - 100-year mitigation / Stormwater Impact Analysis
 - Floodplain Management - CRS

Basin Model Pilot

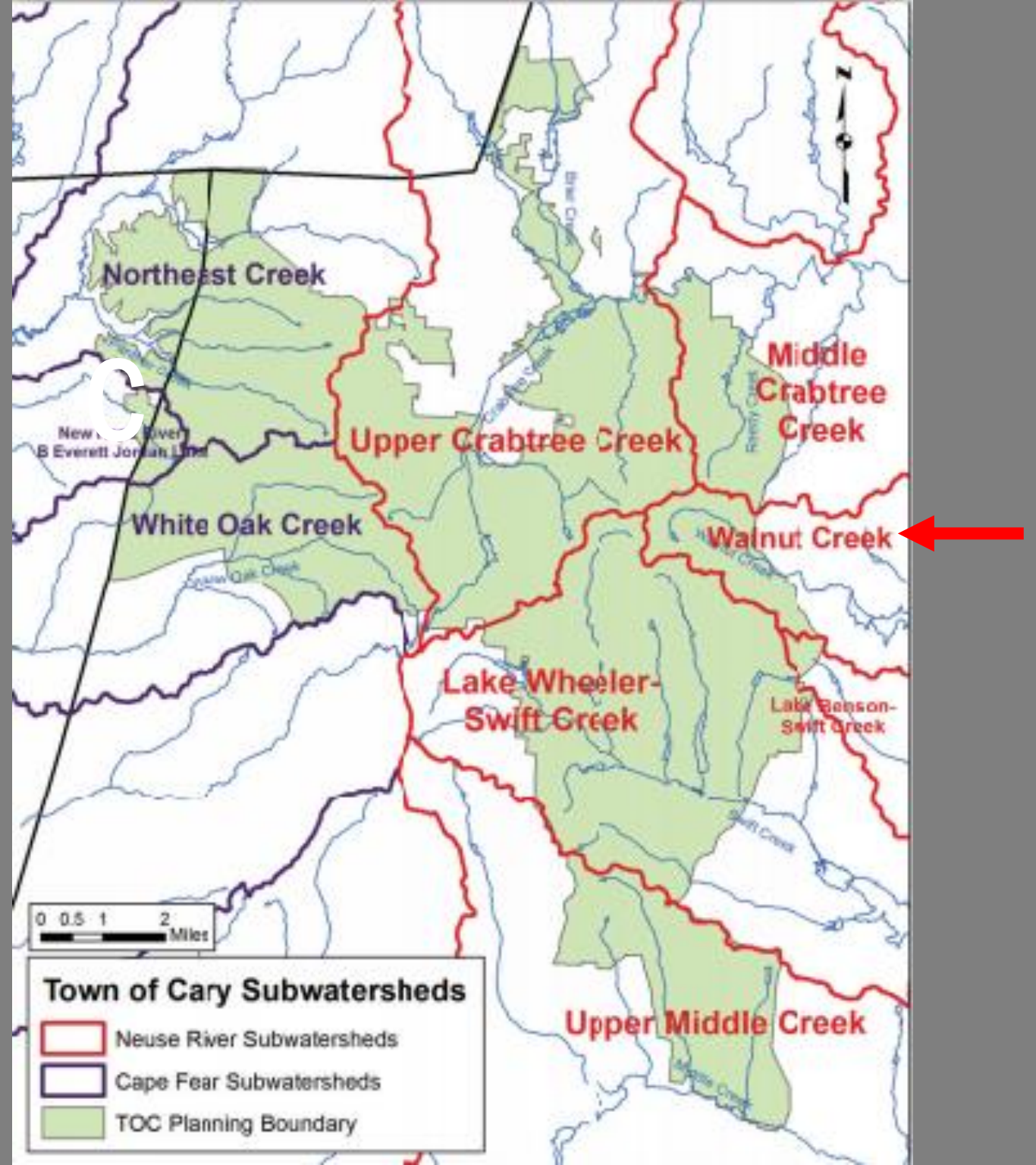
Multiple Watersheds

River Buffers: 100 Feet

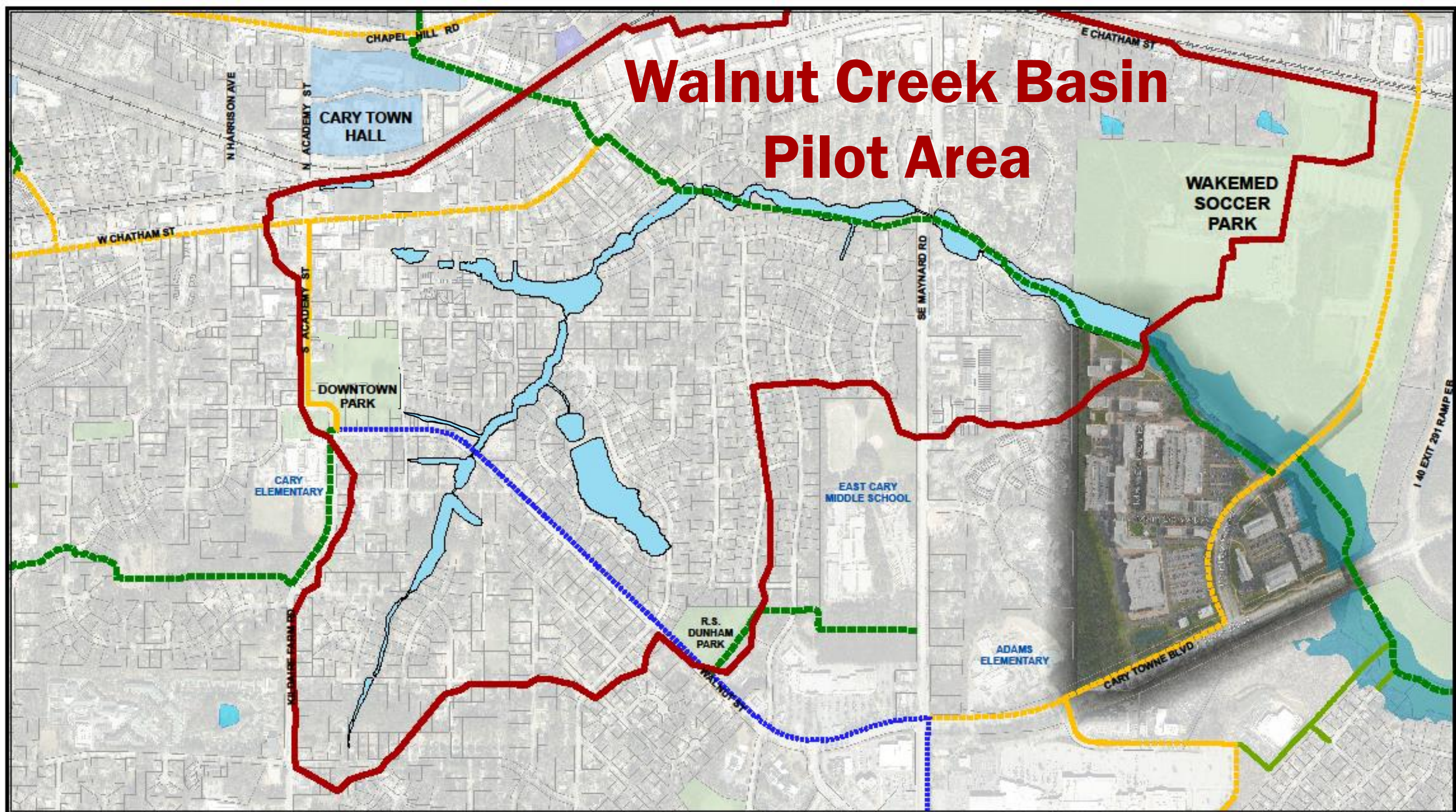
Buffer Size	100 Feet
River Basin	NEUSE
Watershed	Walnut Creek
Data Source	USGS - Wake hydro
County	Wake
Data Date	2002
Field Verified	F
Verified Date	
Verified By	

TCAP Floodplain: Walnut Creek

Basin Name	Walnut Creek
ID	1
Grid Code	1



Walnut Creek Basin Pilot Area



Town of Cary

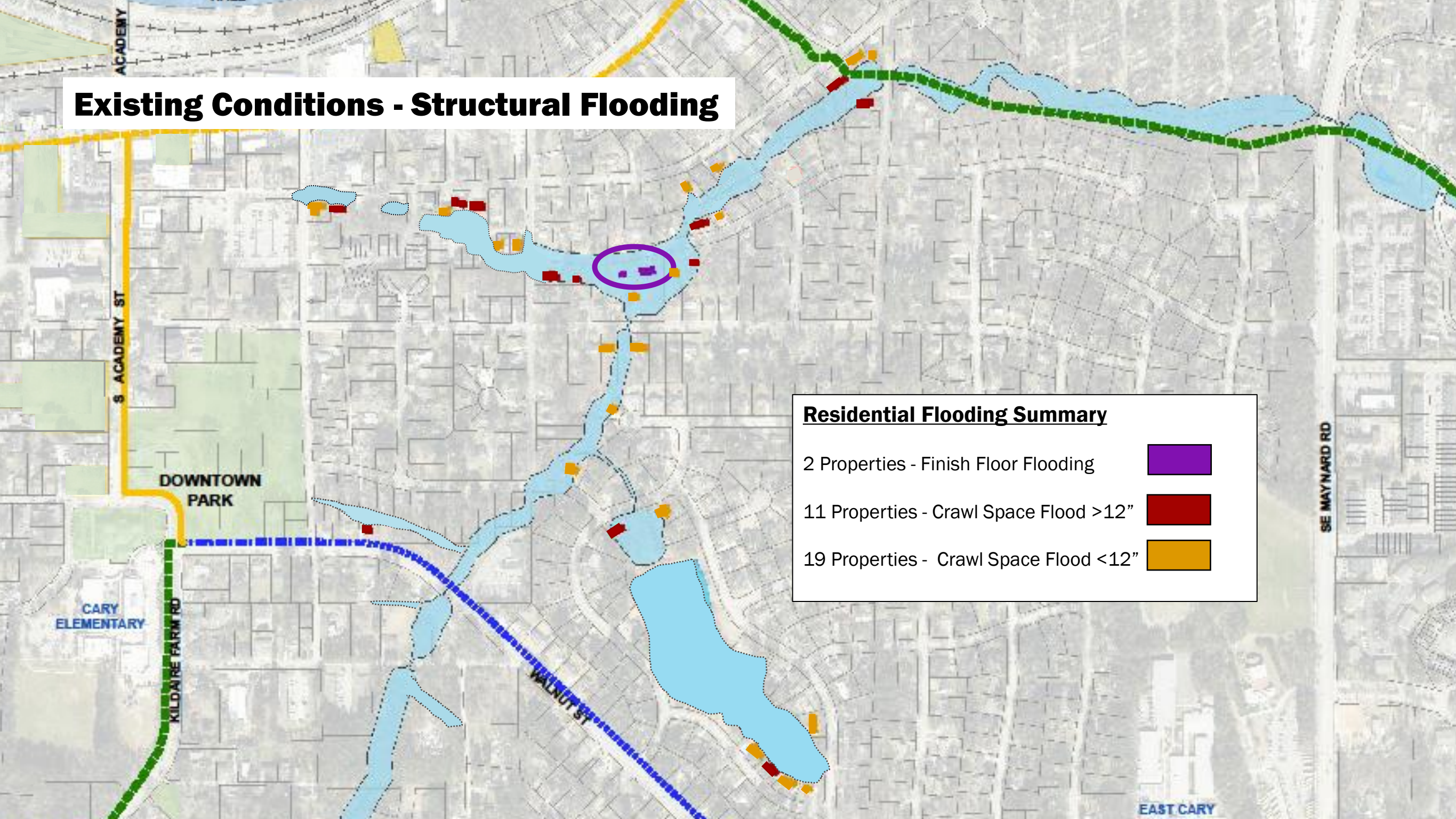
100-yr storm

7 ½ inches

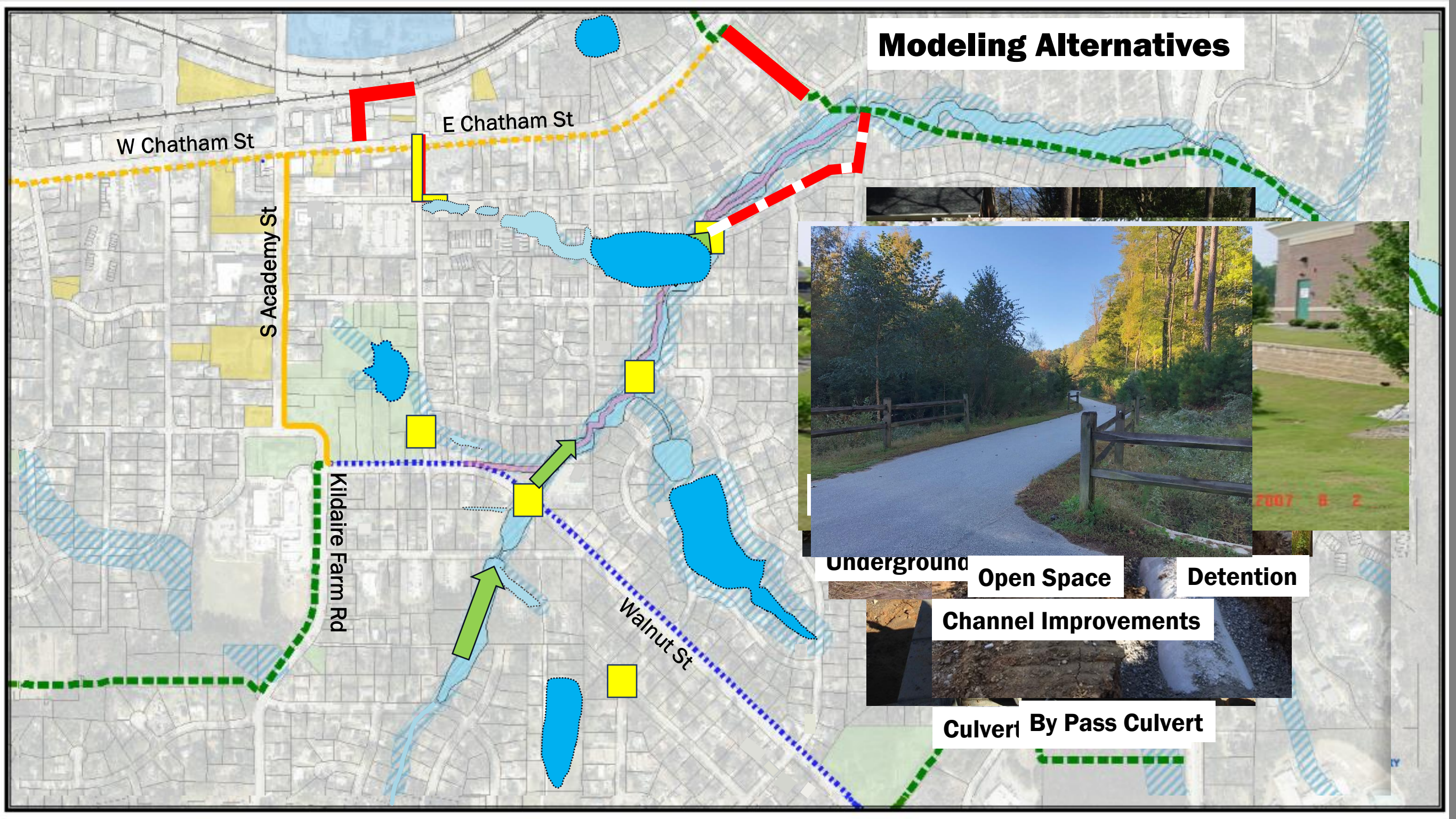
in 24 hours



Existing Conditions - Structural Flooding



Modeling Alternatives



Underground

Open Space

Detention

Channel Improvements

Culvert By Pass Culvert

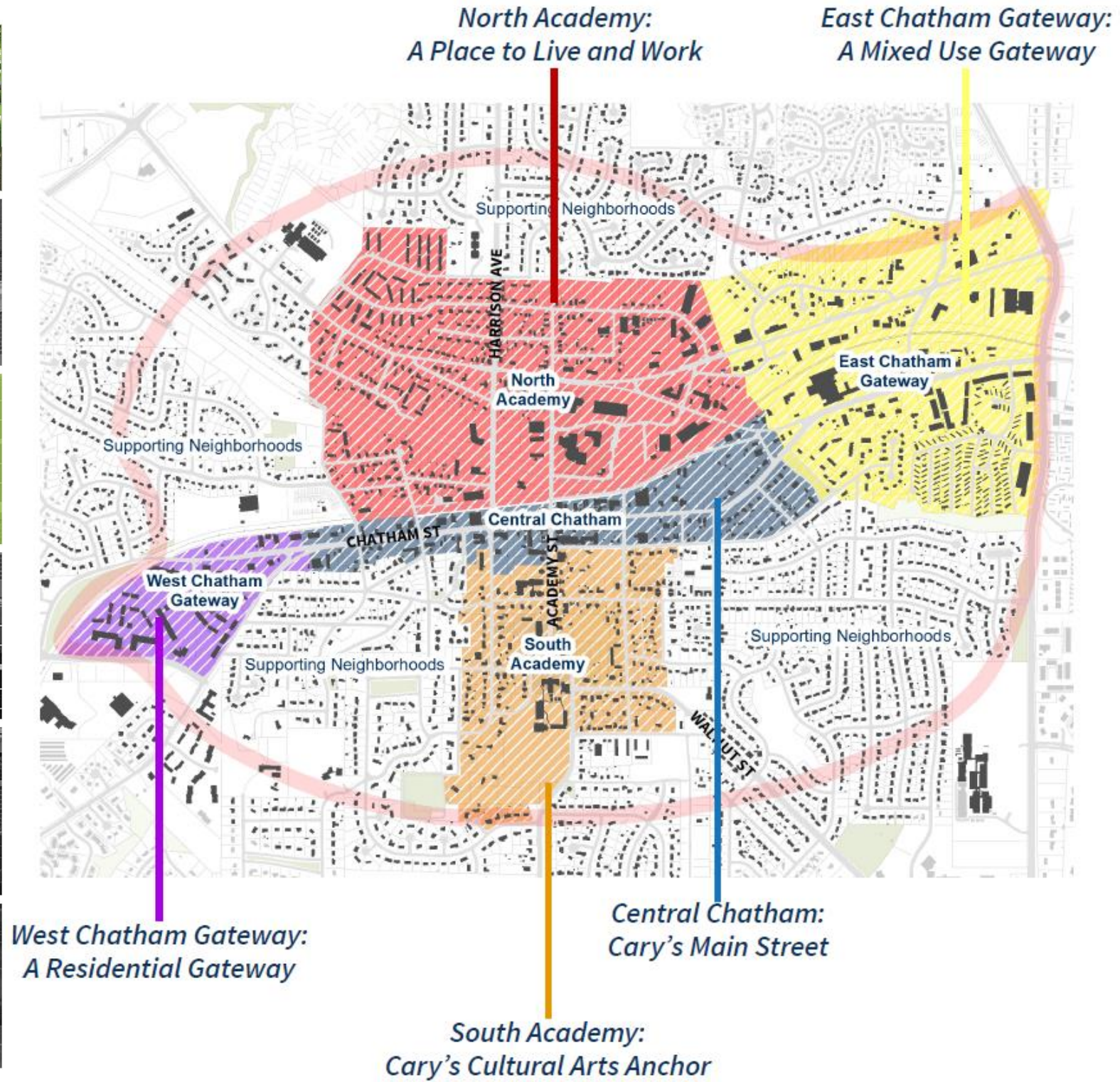


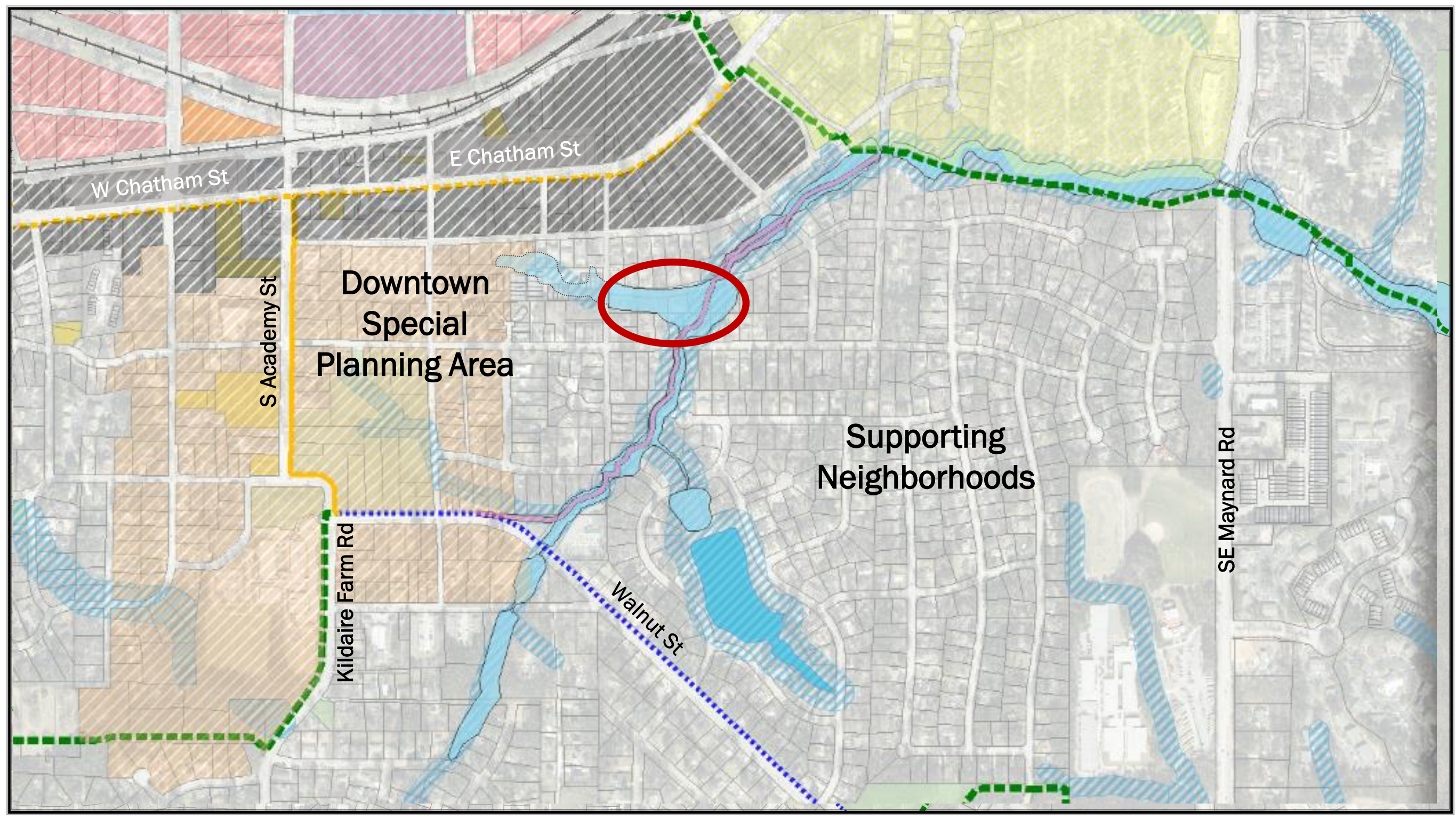
Open Space

THE CARY 2040 COMMUNITY PLAN

THE COMPREHENSIVE PLAN FOR THE TOWN OF CARY

Adopted on January 24, 2017





W Chatham St

E Chatham St

S Academy St

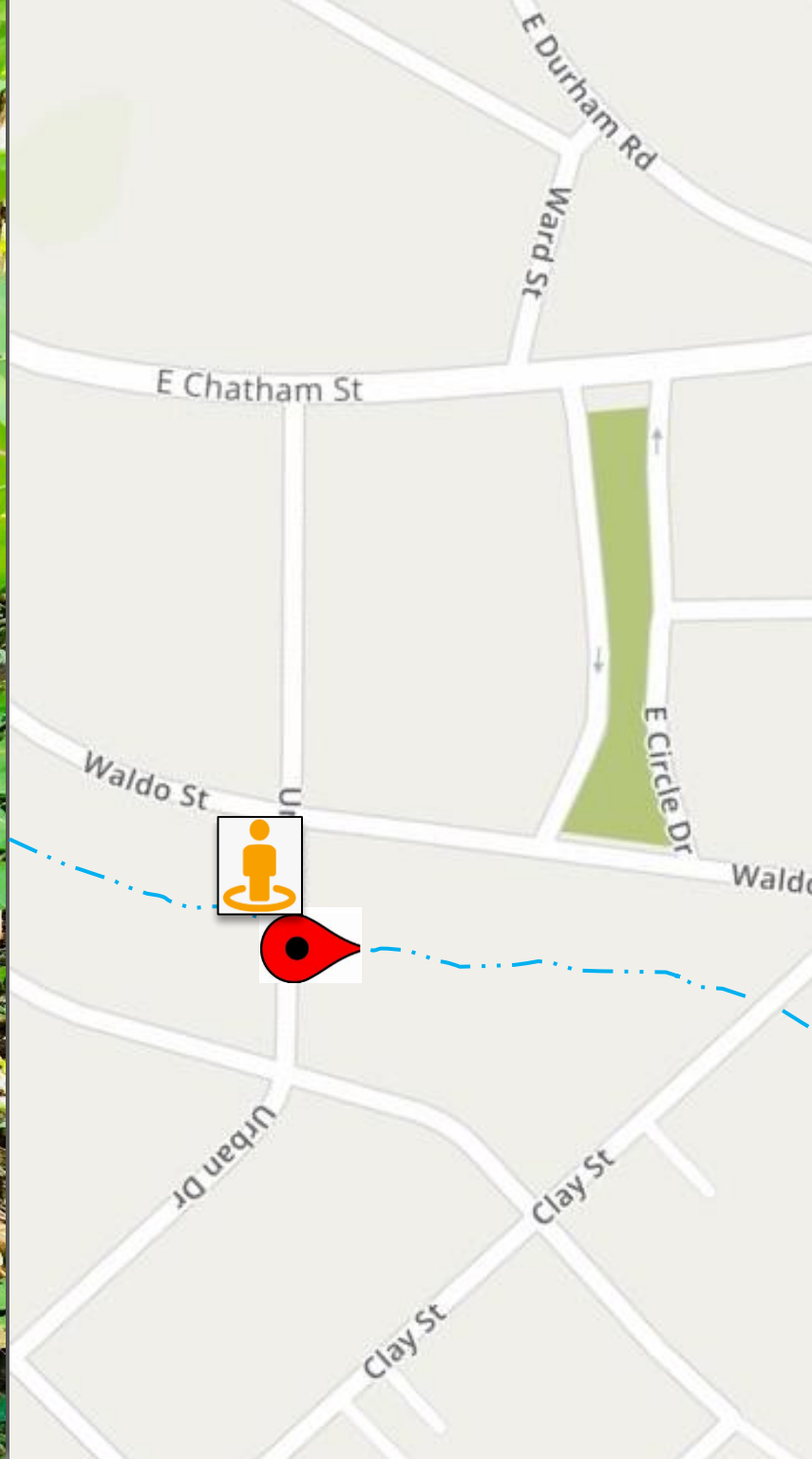
**Downtown
Special
Planning Area**

Kildaire Farm Rd

Walnut St

**Supporting
Neighborhoods**

SE Maynard Rd





Stormwater Maintenance



Stormwater Condition Assessment & Rehabilitation Program



Priority Maintenance



Pilot Area Maintenance

Footage Inspected and Cleaned



Total footage inspected – 10,000 feet
Footage needed cleaning – 4,200 feet

Pilot Program

■PW Tasks

- Confirm / identify infrastructure asset
- Take pictures of structure
- Clean if needed
- CCTV



Catch basin filled with debris



Catch basin vacuumed out



Moving Forward

- Refine policies and programs for developed areas
- Develop open space acquisition criteria
- Pursue infrastructure improvement opportunities
- Advance the community conversation

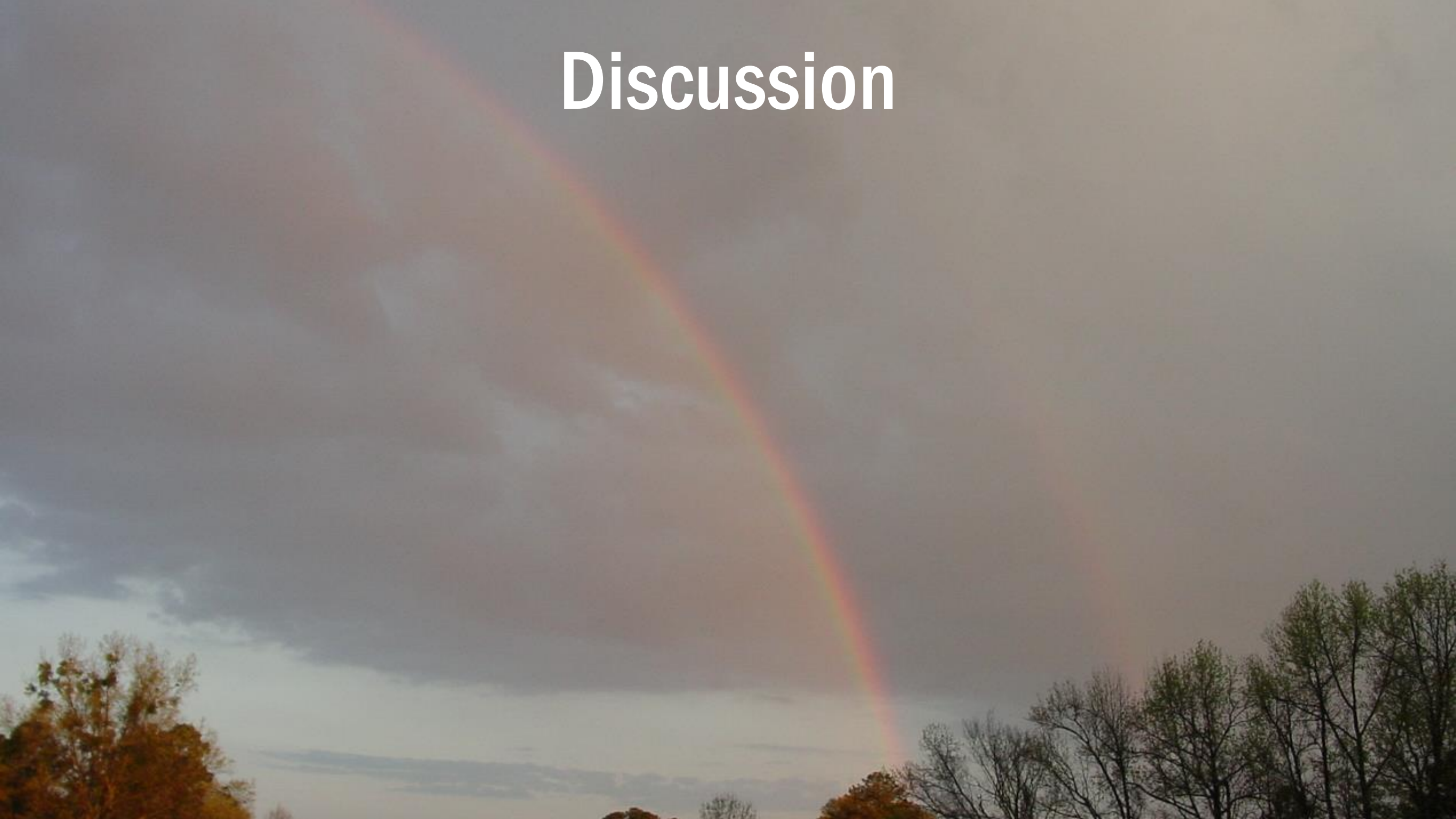
Adaptive Stormwater Objectives

Open Space Restoration

Flood Mitigation

Reduce Losses

Discussion



Categories of Flooding

