

Creating a Roadmap for Resilience in your Community

PLANNING WITH A PURPOSE

ROAD TO RESILIENCE?

Resilience is the capacity....to adapt to changing conditions and to prepare for, withstand, and rapidly recover from disruptions to everyday life, such as hazard events.

ROAD TO RESILIENCE?

A critical connection exists between the impacts of natural hazards and the design and function of a community. Planners can mitigate the negative effects of natural hazards and improve resiliency in their community through a number of different tools. A resilient community:

- Makes proactive investment and policy decisions;
 - Communicates risk and vulnerability to all;
 - Builds public and private sector capabilities and partnerships;
- and
- Resumes normal operations and recovers rapidly after hazard events.

FEMA'

Vision of Resilience

- Resilient people with optimal health and wellbeing.
- Resilient society that has a robust sense of belonging and a high degree of trust.
- Resilient economies that support all members of society.
- Resilient built environment that supports a high quality of life that includes adequate, safe, secure, and humane housing, and critical infrastructure systems that are robust, adaptable, and support economic growth and innovation.
- Resilient natural environment with clean land, air, and water and healthy ecosystems that can withstand shocks and stressors.

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The flood gates are opening on more funding opportunities than ever before for stormwater projects.



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FEMA FMA: \$800M FY23

FEMA BRIC - \$1B FY23

Standard Plans



FEMA



FEMA Study

- Focus on regulating floodplain for NFIP
- 1% event
- Greater than 1 square mile
- Model streams, open channels and culverts
- Identify culvert capacity issues

EPA 319 Watershed Plan

- Nine watershed elements
- Water quality focused
- Typically high level GIS analysis



The Community-Focused Stormwater Plan

Water quantity for storms ranging from 2-year to 500-year

Water quality to address impairments or citizen concerns

Infrastructure condition and asset management strategies

Programmatic changes to ordinance and standards

Natural resource assessment and protection



The Community-Focused Stormwater Plan

Other local priorities

- Conservation of land
- Parks and greenways
- Regional solutions
- Managing future development impacts

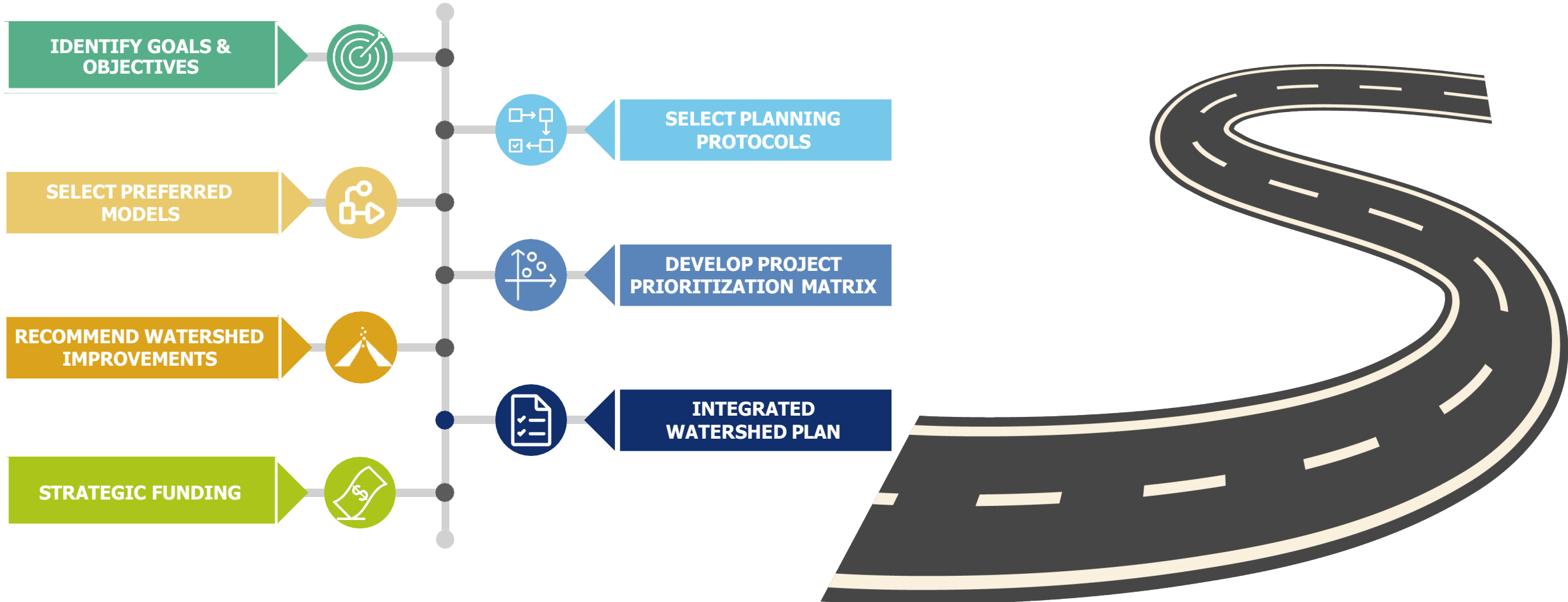
Funding strategies

- Grants
- Fees
- Public-private investments



Road Map to Implementation

Create a detailed plan



Defining Problems

Major flooding issues: life safety, road closures, business impacts

Nuisance flooding: public, private

Water quality: TMDLs and impairments, SSOs

Stream health: ecosystem restoration, bank stability, riparian buffers

Hard infrastructure: failures, sinkholes, capacity issues

Defining Acceptable Solutions



Capacity improvements/Upsize piped system



Retrofits of stormwater control measures



Natural systems solutions (stream restoration, riparian buffer)



Green Infrastructure



Mechanical treatment and control



Private property projects?

Determining Priorities



Public safety

System capacity improvements

System operations & maintenance

Environmental protection

Public enhancement

Social justice

Public-private partnership

Stakeholder driven

Policy adoption or changes

Considering System Data



Hard asset inventory



Condition assessment of infrastructure



Natural asset inventory



Natural systems assessment



Detailed models: riverine, piped, water quality



Detailed monitoring: grab, continuous, anecdotal

Evaluate Pitfalls and Roadblocks



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LOCAL
POLITICAL
PRIORITIES



COMMUNITY
PRIORITIES



TIME



COMPLEXITY



MAINTENANCE
OF EFFORT

Ensuring Success

Do you need phasing and intermediate goals?

- Early wins
- Adequate local staff
- Stable local governance
- \$\$\$\$\$

Do you need to prioritize projects that leverage resources outside of your own department?

- Other department priorities or benefits to integrate
- Public-private or public-public partnerships

Goals and Objectives



Problems defined



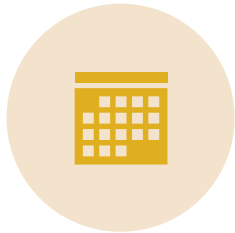
Priorities
established



System data needs
& use confirmed



Pitfalls and
roadblocks
identified



Phasing and
intermediate goals
determined



Collaboration
established outside
of department

Hendersonville NC

Comprehensive Stormwater Master Plan



- Old Mountain town in Western NC
- New stormwater utility fee and operation
- Detailed inventory for much of system
- Significant condition assessment data
- Some water quality projects ongoing
- Limited basin studies with specific focus (one quality, one infrastructure assessment)
- No capital improvement program

Hendersonville, NC

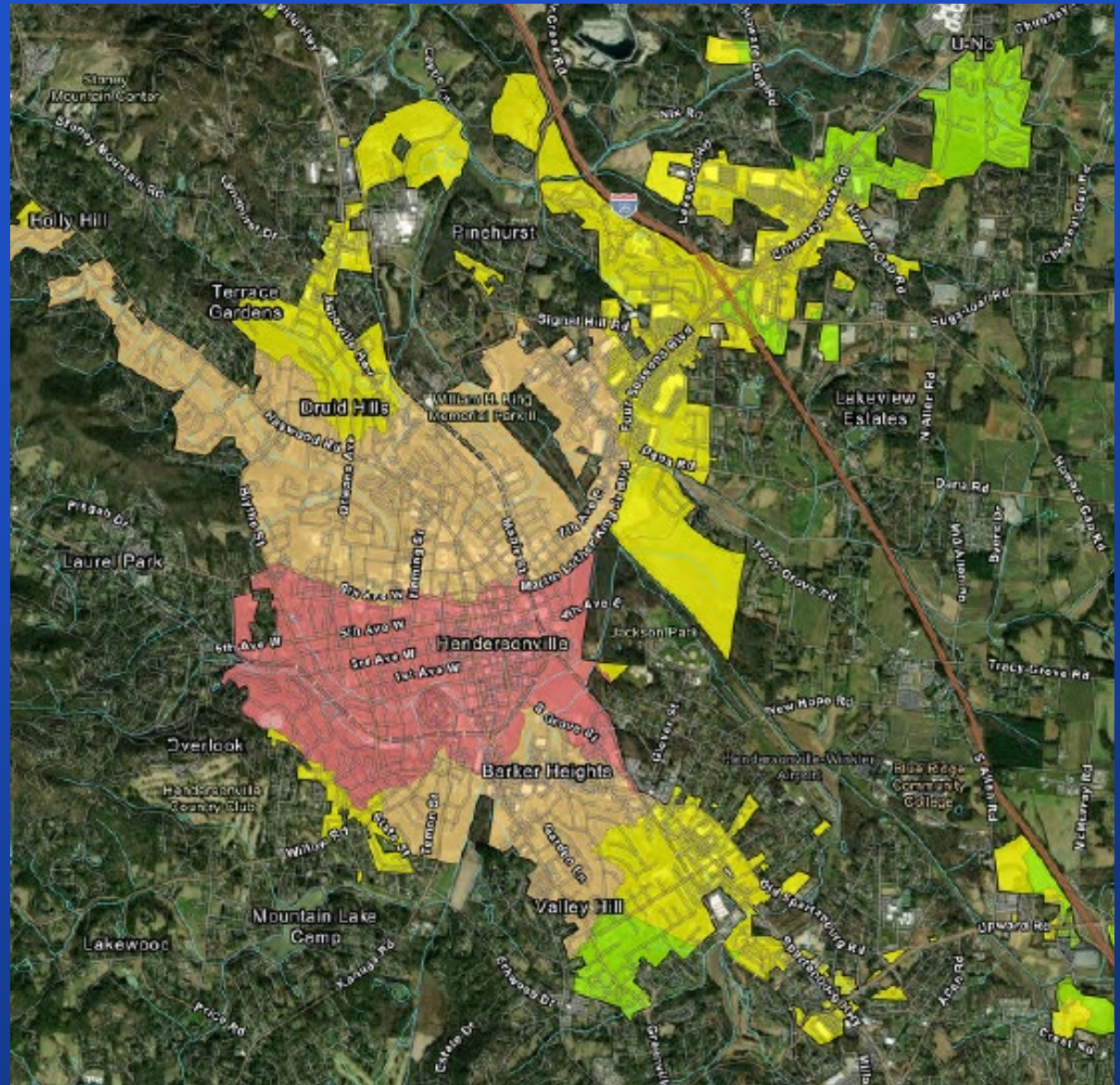
Comprehensive Stormwater Master Plan

Established Goals

- Integrate water quality and quantity analysis
- Develop standards for basin planning and prioritization of work
- Assess stream system
- Model hydraulic and hydrologic conditions including future
- Develop capital plans
- Prioritize capital and operational work

Project specific steps

1. Gap analysis of existing studies and data
2. Lessons learned workshop to assess previous work
3. Define and memorialize program goals
4. Develop comprehensive and holistic criticality for assets
5. Prioritize Subbasins for capital plan development
6. Establish modeling & assessment protocols
7. Establish project development parameters



Project specific steps

6. Conduct detailed H&H models and spatial analysis
7. Conduct ecological assessments and evaluations
8. Apply criticality to identify project focus areas
9. Develop project list & conceptual estimates
10. Develop strategic funding plan

Johns Creek, GA

'New' community in Atlanta region

New stormwater utility

Relatively new development

Lots of useful life in hard infrastructure

Streams and natural systems stressed by rapid development

Focus on water quality impairments

Limited funding available for master plan

Desire for EPA 319 funding

Johns Creek, GA

Primary goal: water quality (fecal coliform and sediment impairment)

Watershed-wide desktop screening process
(no H&H modeling)

Prioritization of the top candidate locations

Limited field investigation

Developed to include other improvements related to quantity control, stream stabilization and asset management

Geographical distribution of capital projects
(10 per zone)

Johns Creek Scale of Investigation

Over 280 neighborhoods, 1,200 stormwater outfalls, 430 existing BMPs, 15,000 pipes and 26,000 parcels analyzed

Identified and prioritized sites for potential BMP improvements

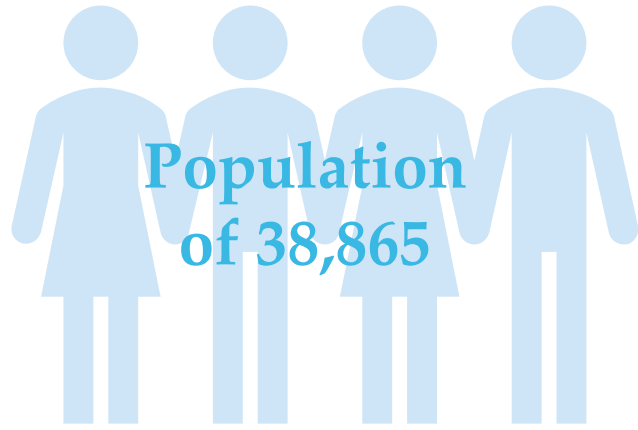
Field assessment of top 75 candidate sites

The water quality projects typically include BMP results in settling, filtration, ultraviolet (UV) exposure, and microbial predation.

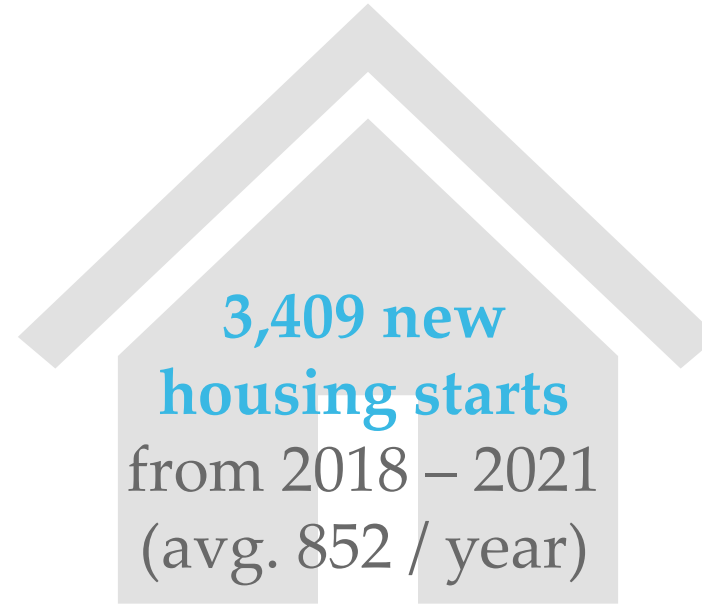
18-month timeline to complete entire City plan (three phases)

Outcome: Citywide Master Plan focused Green Infrastructure completed in less than 18 months with Capital Projects totaling \$48 million

City of Greer, SC

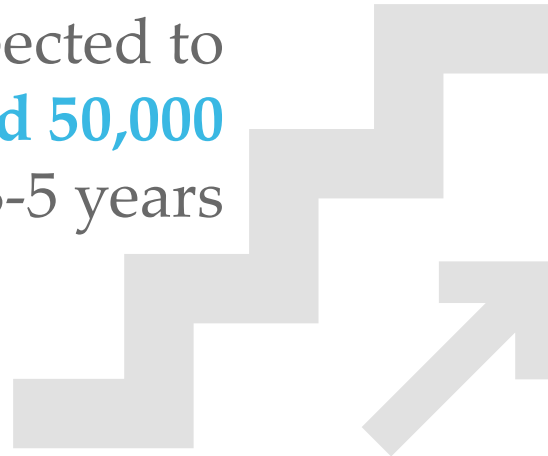


Population
of 38,865



3,409 new
housing starts
from 2018 – 2021
(avg. 852 / year)

Expected to
exceed 50,000
in 3-5 years



SC's 2nd
fastest
growing
city

Growth predominantly through annexation

Plan for Managing Stormwater System: Asset Management or Stormwater Master Plan?

“ “
What assets do we
have and what
condition are they in?

“ “
Do we have
capacity to grow?

“ “
Where do we
focus?

Planning Analysis: Focused on System Data & Determining Priorities

Asset Management Framework

- Establish Stormwater focused plan for infrastructure management
- Scalable to other assets and departments
- Defined by level of service and extent of service policies

GIS Inventory

- Evaluate stormwater inventory data sets
- Review and revise workflows
- CMMS compatibility
- Future needs analysis

Greer's Stormwater Management Program Strategy

Phase 1

- Define system assets
- Extent of service
- Level of service

Phase 2

- O&M and data mgt strategies
- Asset inventory development
- Basin criticality

Phase 3

- Risk based capital planning by basin
- Project implementation strategies
- Funding analysis

Operations and Maintenance Strategies

Current O&M Strategies

- Workflows for maintaining the assets and capturing information
 - Street sweeping
 - Leaf and yard debris removal
 - Jet-vac cleaning
 - Detention pond maintenance
 - Ditch maintenance

O&M Strategies to Develop

- Short-term strategies
 - Implement CMMS
 - Update GIS inventory
 - Conduct a pilot watershed study
- Long-term strategies
 - Conduct watershed studies on remaining basins
 - Prioritize CIP needs with CMMS and condition assessment data

Stormwater Funding

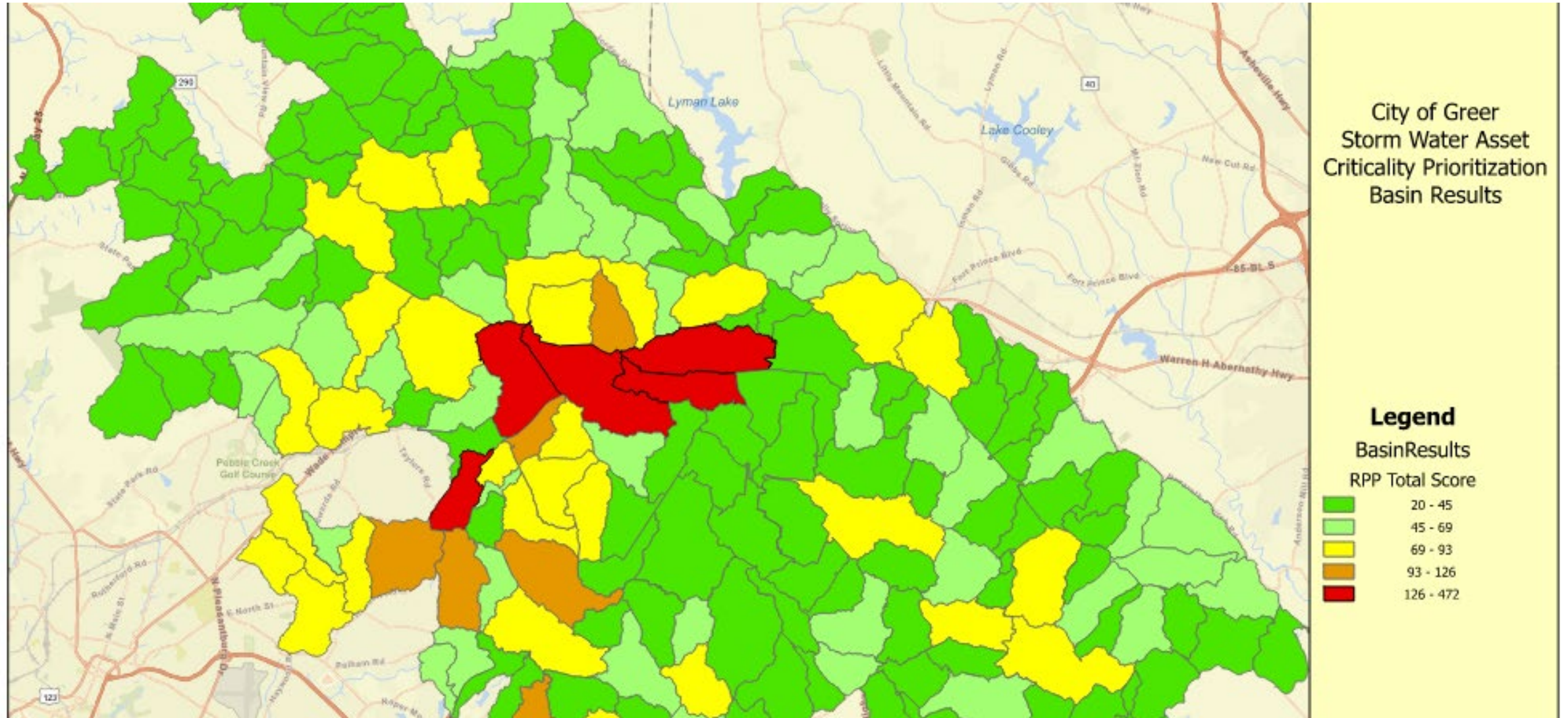
Current Funding Strategies

- Stormwater fee
- Appropriation from general fund
- Revenue bonds
- Potential grant funding

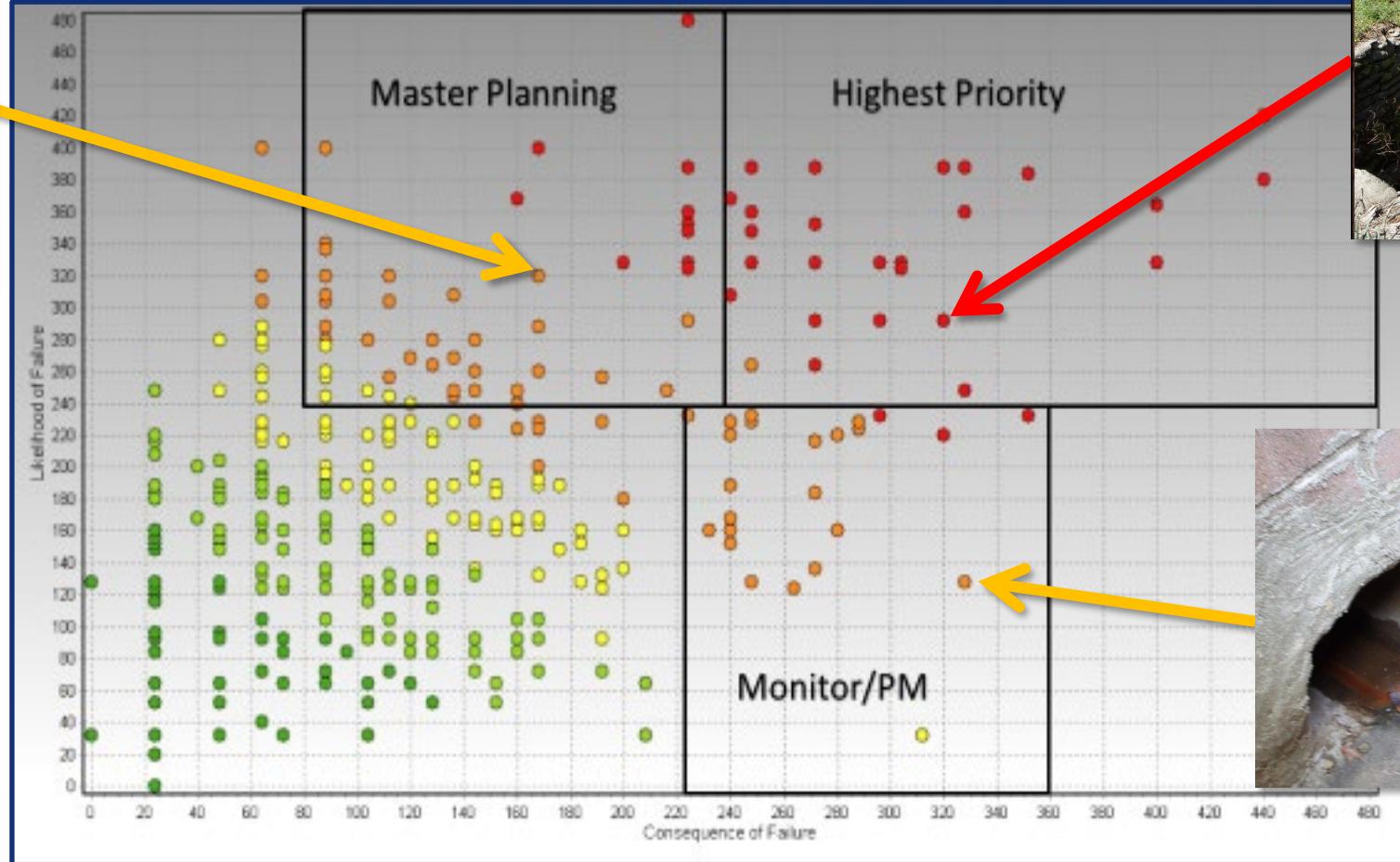
Future Funding Needs

- Capital improvement projects
- Operations and maintenance
- Staffing
- Equipment
- Training

Prioritized Basins for Modeling & Watershed Plans



Where to Focus



Durham County, NC



As of the 2020 census, the population was 324,833, making it the sixth-most populous county in North Carolina

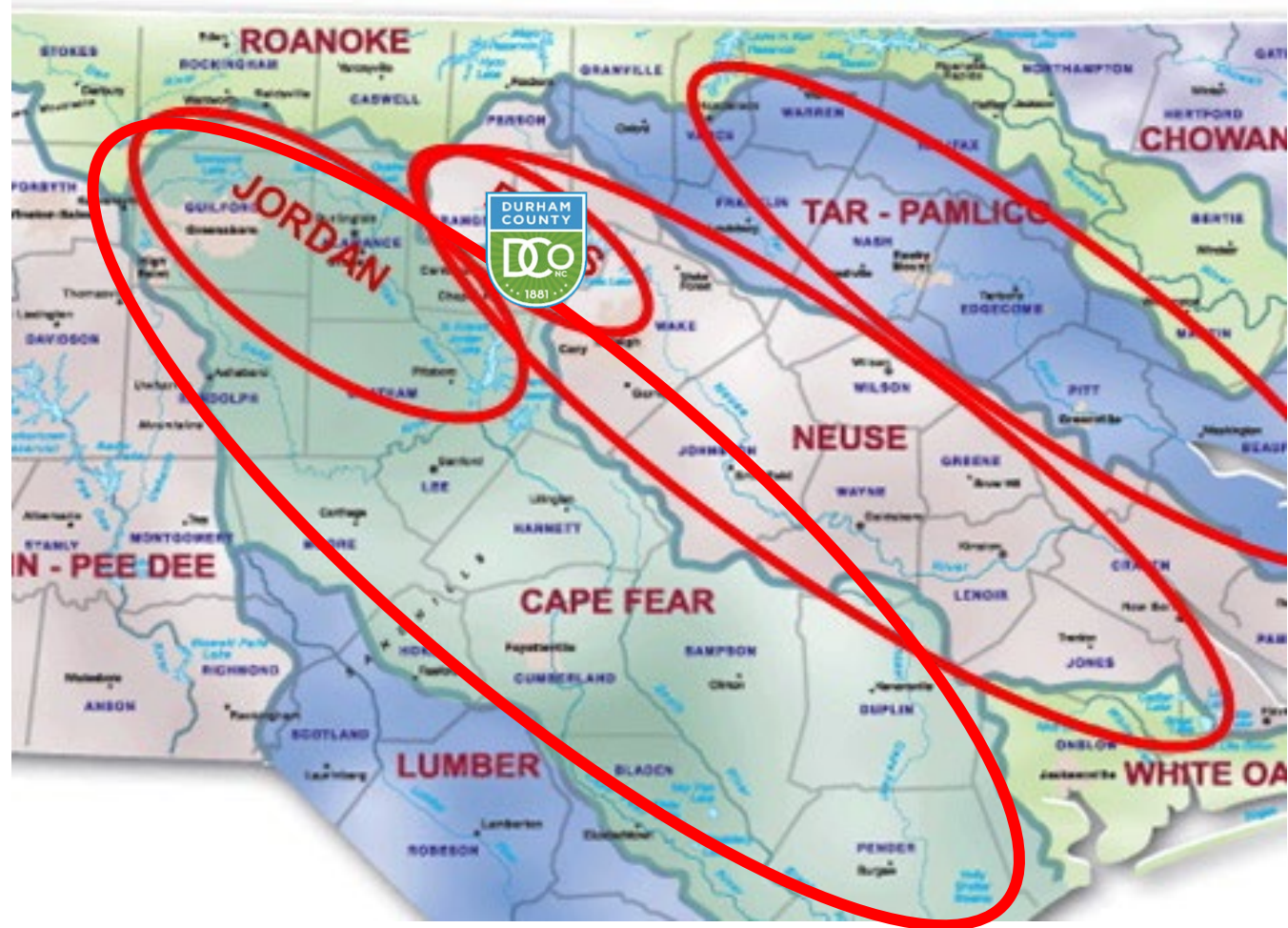
New Stormwater Utility Funding established in last five years

Significant regulatory drivers for water quality improvements

Does not have responsibility for roads

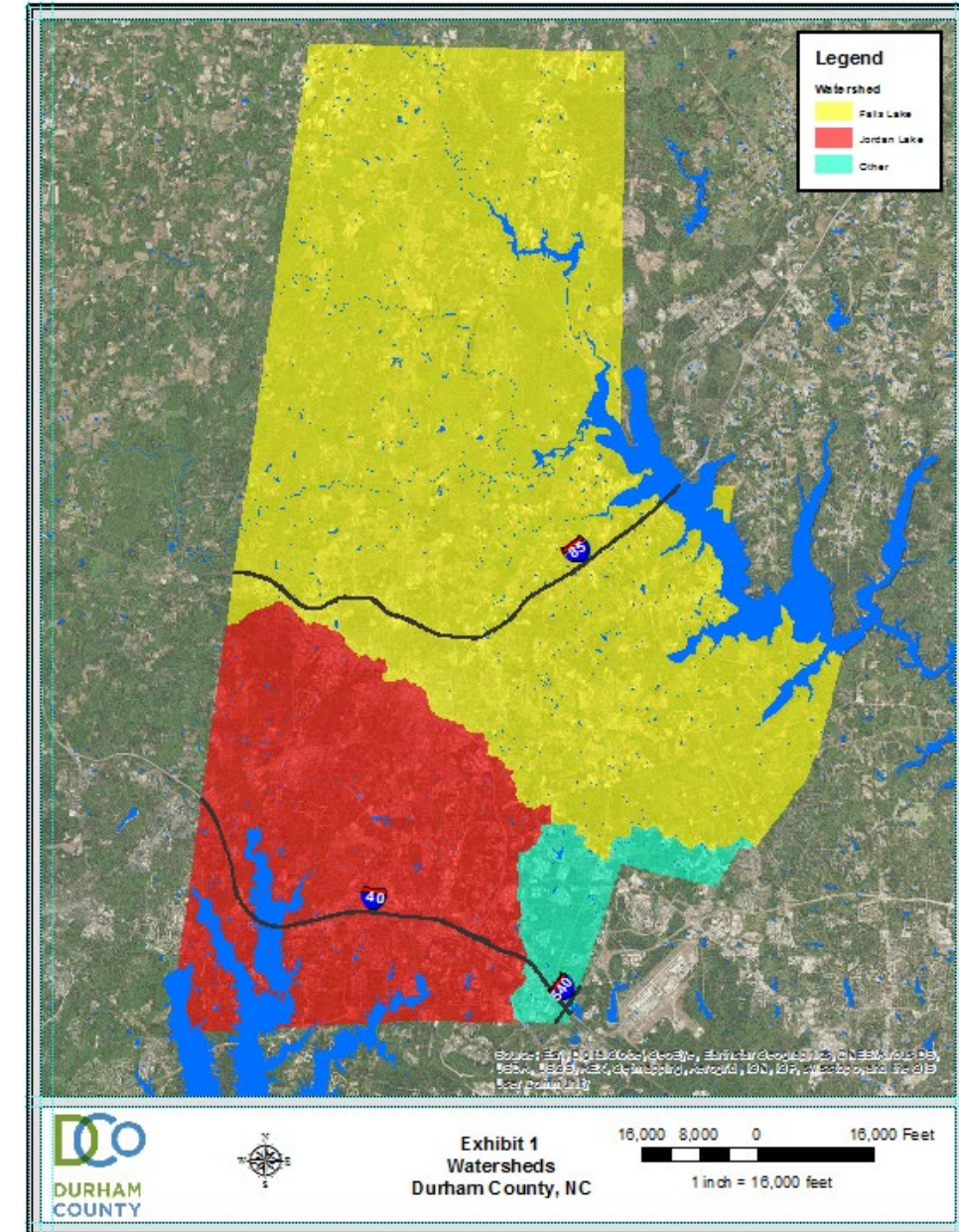
Location, Location, Location

- Durham County split between two major river basins
- **Cape Fear River Basin** (Southern Durham County)
- **Neuse River Basin** (Northern and Southeastern Durham County)



Nutrient Sensitive Water and Special Watershed Programs

- Nutrient Sensitive Water Management Strategies are adopted legislation
- Local municipalities and counties are required by law to comply with the nitrogen and/or phosphorous reductions required by the State
- Durham County must comply with three separate rules:
 - ★ Neuse River Basin Nutrient Strategy
 - ★ Falls Lake Nutrient Management Rules
 - ★ Jordan Lake Nutrient Management Rules



Stormwater Program Priorities

Rules Compliance

Durham County's ultimate goal is to be in compliance with the Falls and Jordan Rules

Resiliency

The County will seek out opportunities to address not only water quality but the effects of climate change and flooding



Efficiency

Recognizing these are taxpayer dollars, we will seek to get the best bang for your buck.

Environmental Justice

Where possible, the County will prioritize underserved areas and populations for projects to improve watershed health.

Durham County Resilience Driver

Reduce nutrients entering waterways

Prioritized solutions

Require new development to meet nutrient rules on-site

Design and construct stormwater control measures to help treat runoff before entering the stormwater system

Purchase undeveloped land for conservation

Retrofit old stormwater measures to function better for water quality

Nutrient Management Study



Desktop/GIS analyses to identify high priority watersheds for implementation



Develop prioritization rubric in alignment with four program priorities



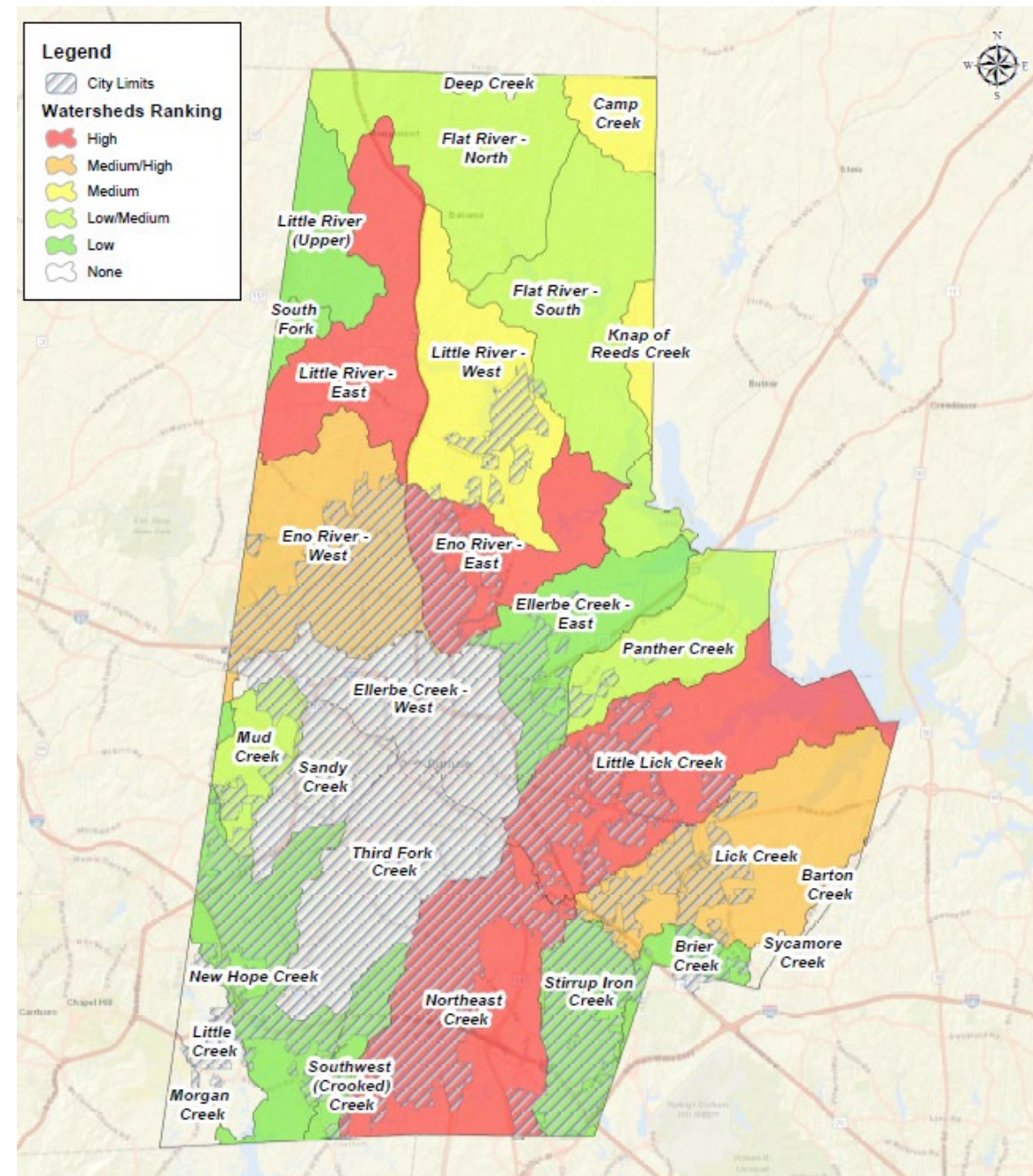
Identify structural nutrient management projects for near-term implementation



Develop framework for identification and prioritization of future projects

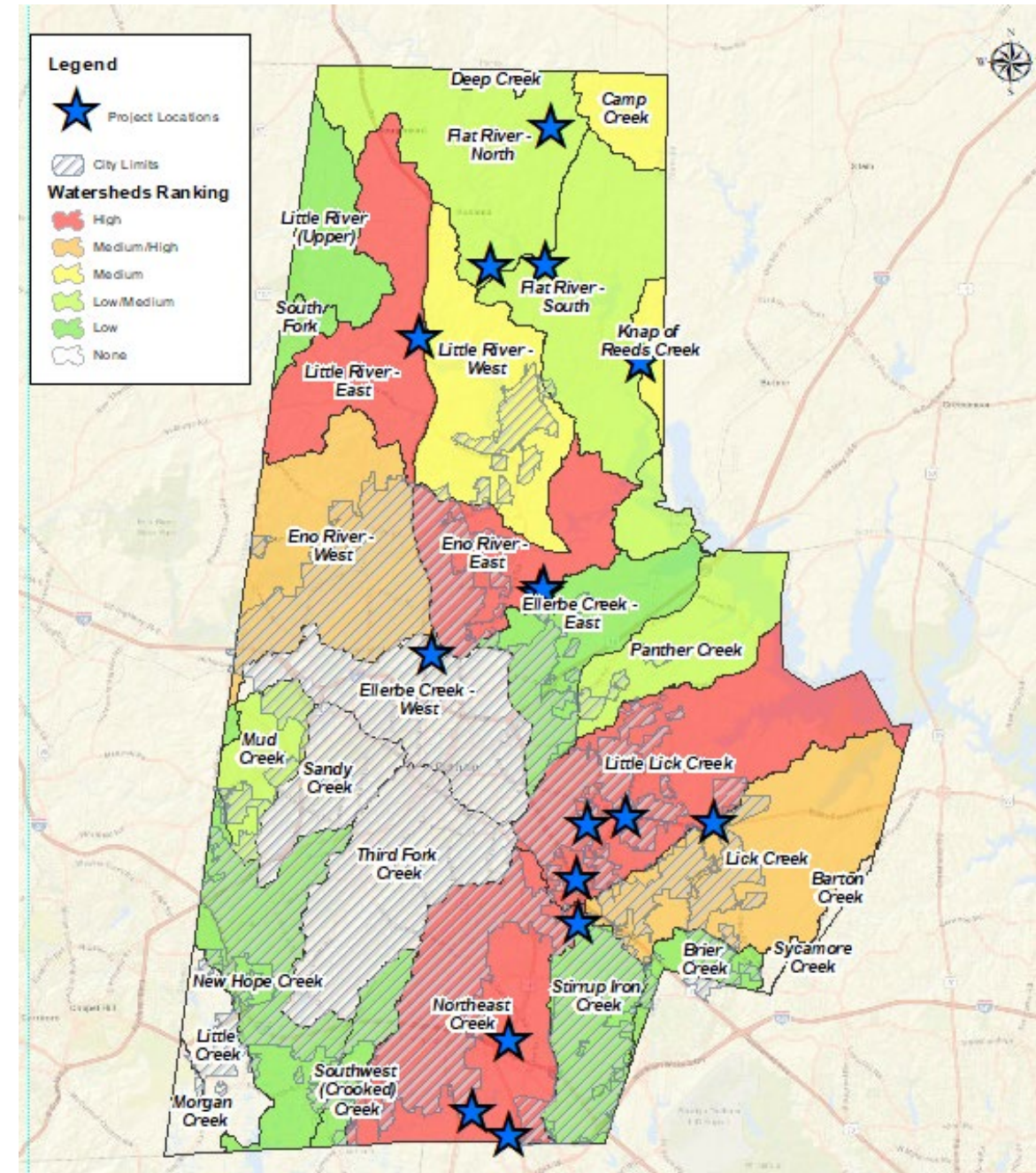
Countywide Desktop Analyses

- Project Solution Analyses
 - Floodplains
 - Impervious area
 - Riparian corridor
 - Stormwater control measures (SCMs)
 - Land conservation
 - Property ownership
- Watershed prioritization



Project Identification

- 15 desktop identified projects
- Focus in high-priority watersheds
- Distribute projects throughout County
- Include variety of nutrient management strategies
 - New SCMs
 - Retrofit SCMs
 - Stream enhancement and floodplain connection
 - Riparian buffer and stream restoration



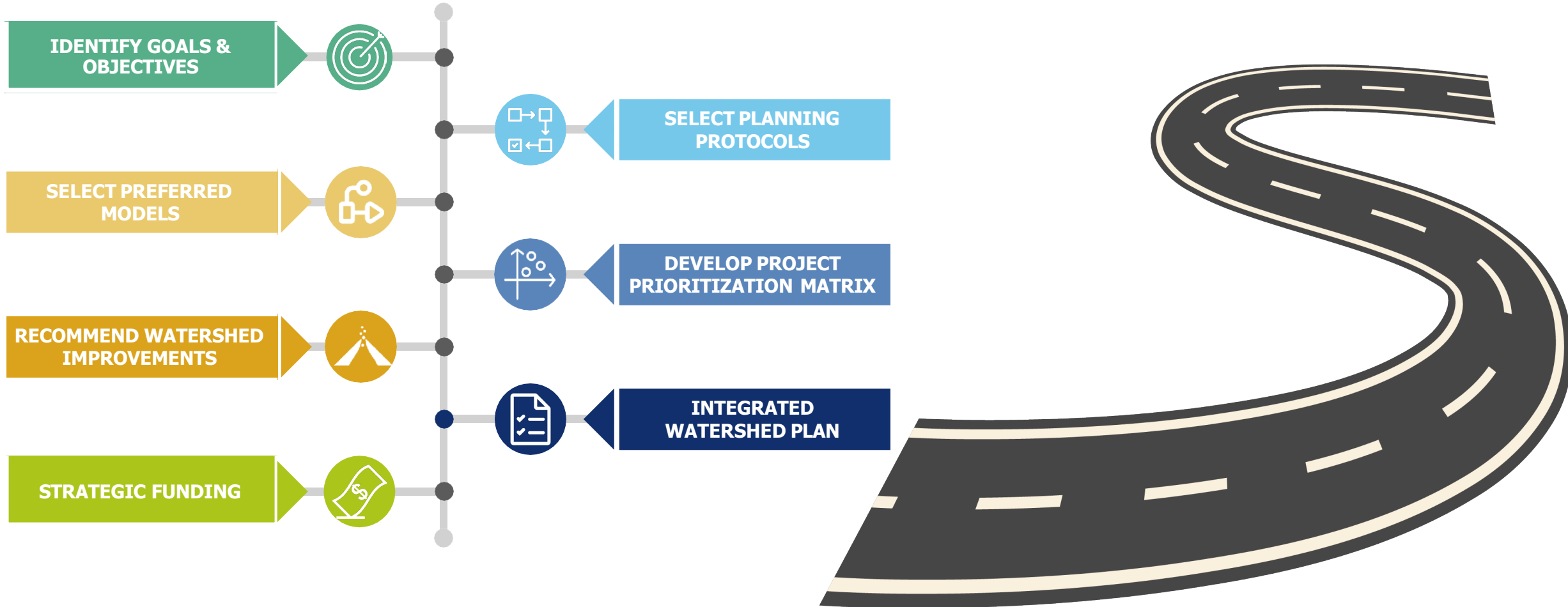
Project Selection to Ensure Success

- Focus on visible projects for community
- Ground-truth projects for feasibility
- Identified 6 sites for near-term implementation
 - Concept design
 - Cost estimate
 - Nutrient reduction (SNAP tool)
 - Rubric scoring



Road Map to Implementation

Create a detailed plan



PLANNING WITH A PURPOSE

Thank you!

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