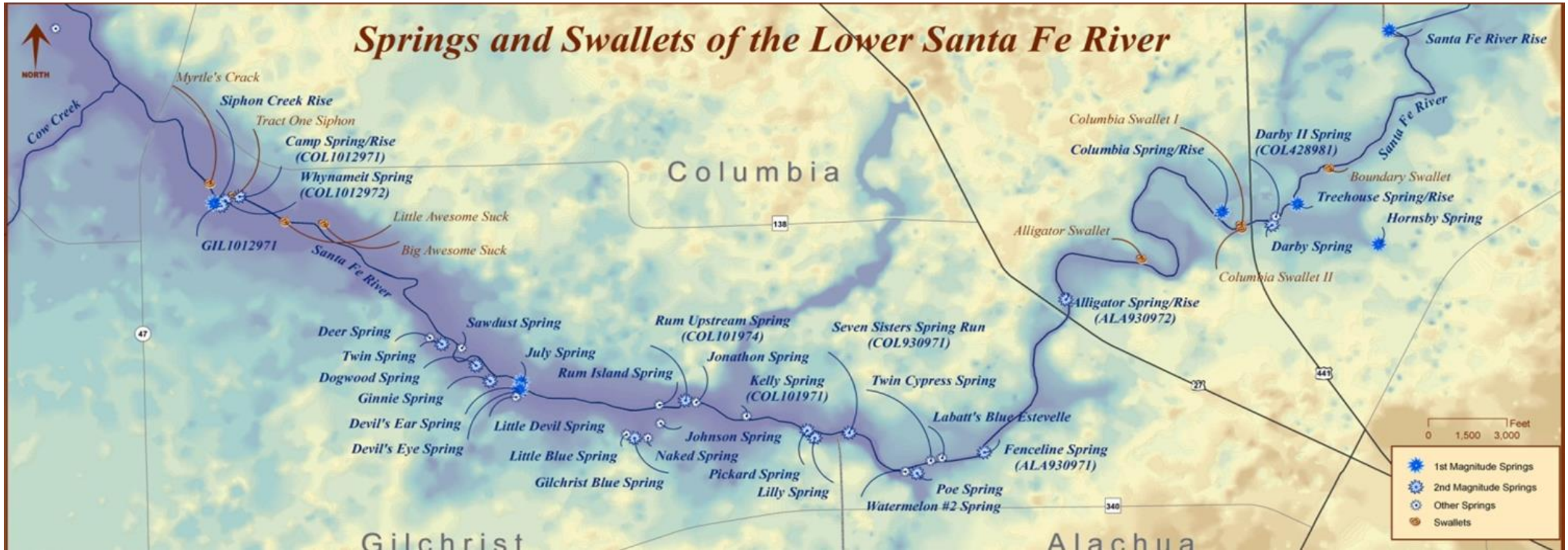
Protecting the Aquifer in the Vicinity of Mill Sink

Alachua County Environmental Protection Department

October 1, 2024

Santa Fe River and Springs

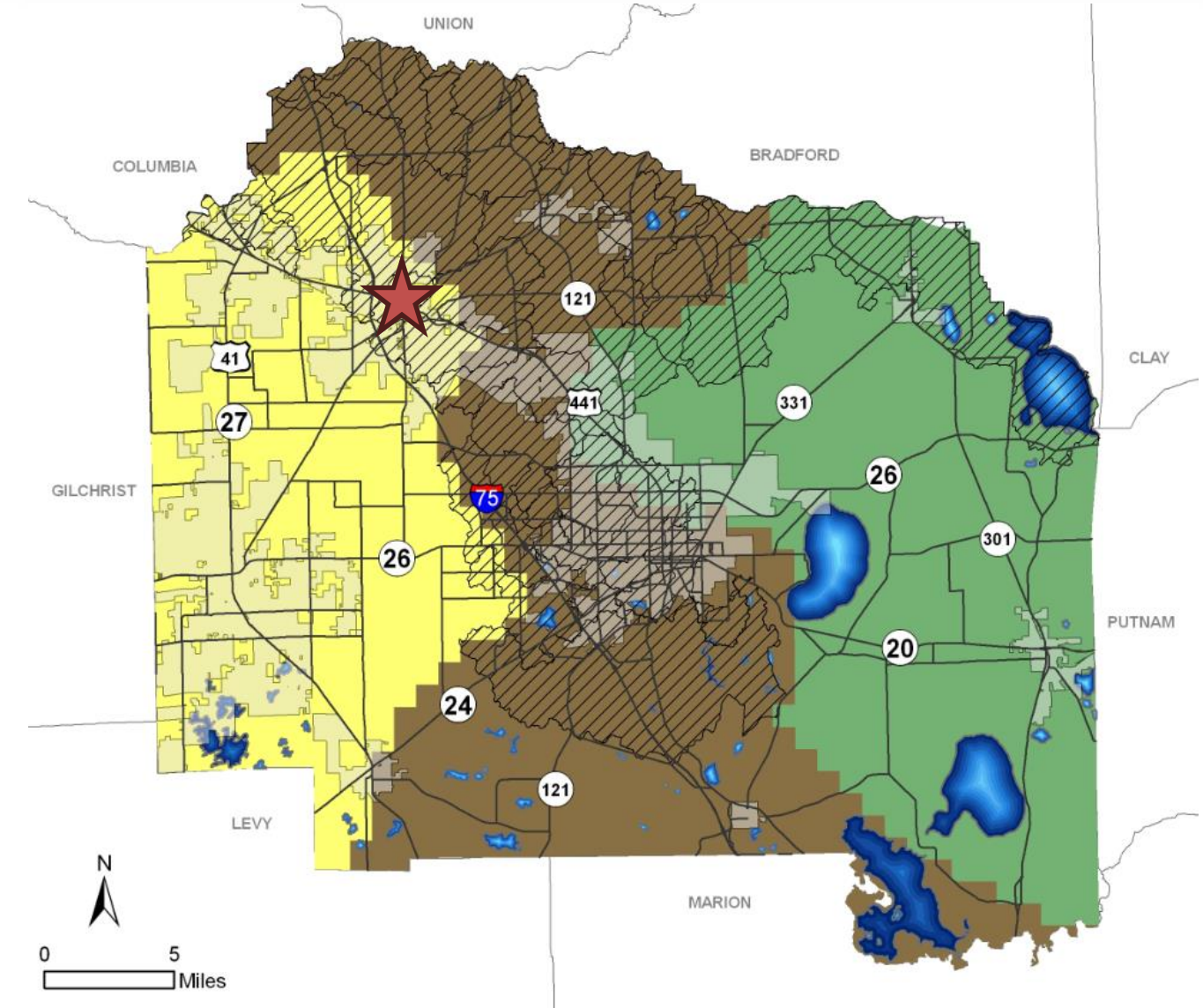
A 2013 study attributed $84 million (in recreation alone) to the Santa Fe Springs.



The Aquifer is Vulnerable to Pollution and Overpumping

Image from Wes Skiles "Waters Journey (Karst Productions)"

Alachua County Floridan High Aquifer Recharge Map

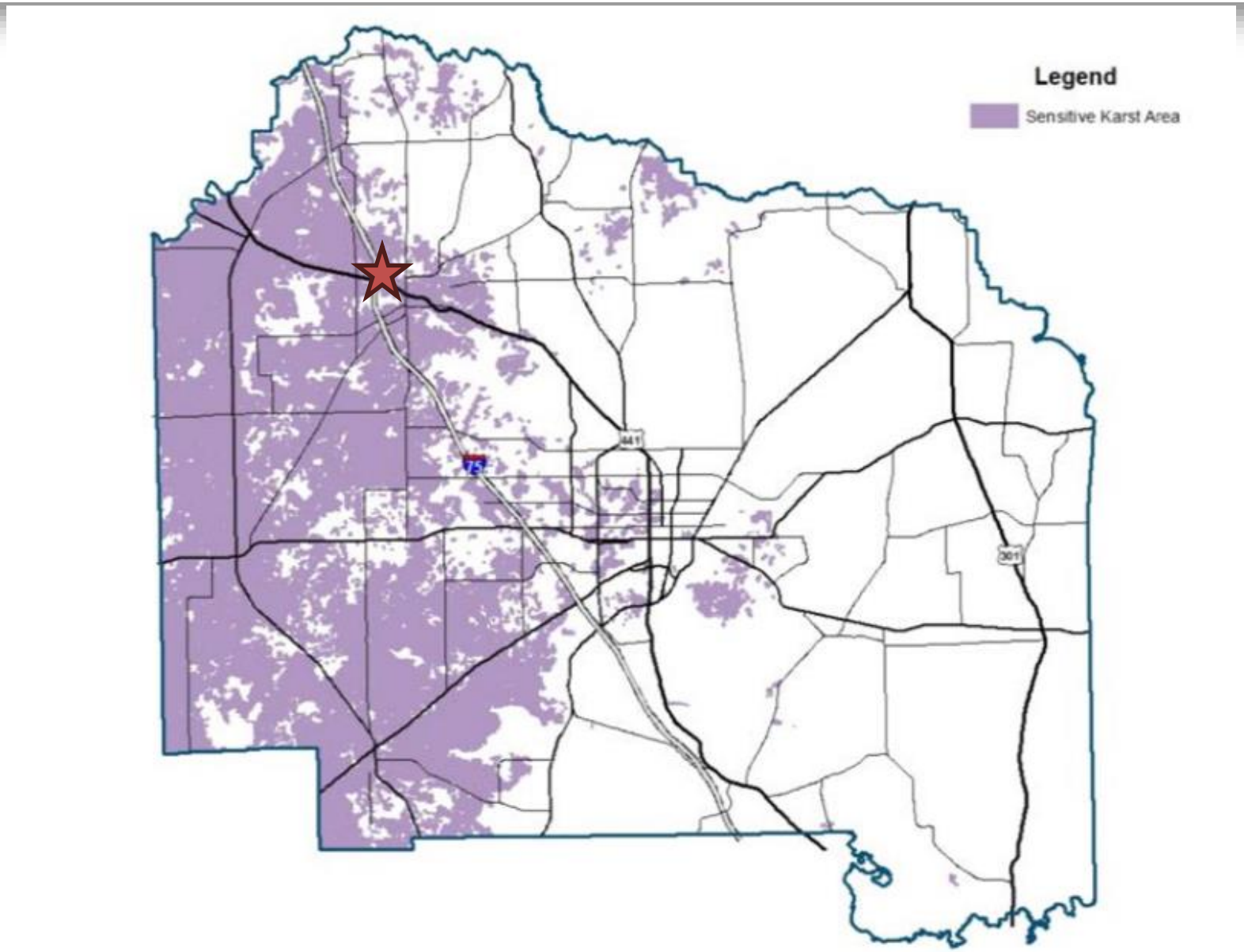


Legend

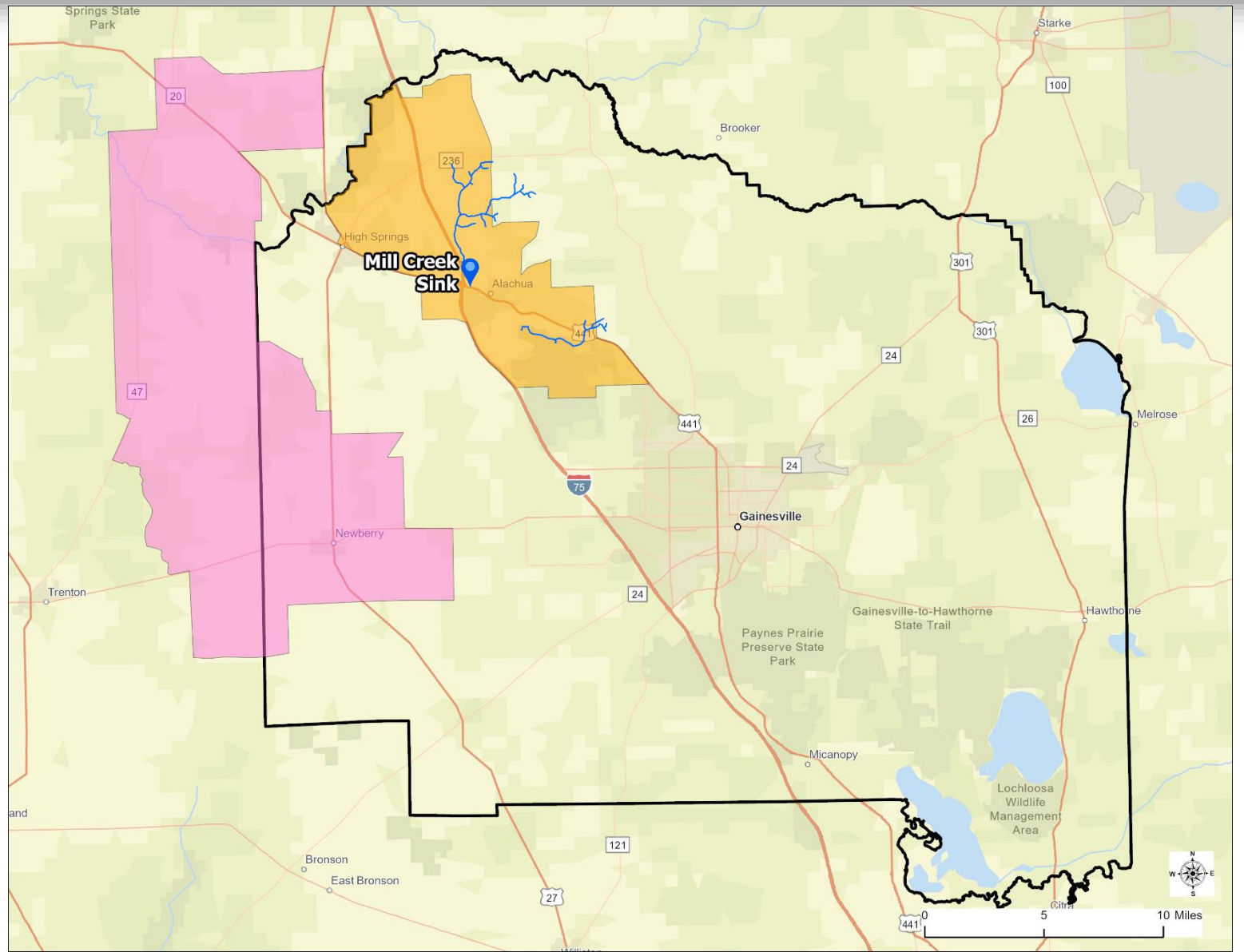
Generalized Vulnerability Rating

- Low Vulnerability
- Vulnerable
- High Vulnerability
- Stream-to-Sink Basins
- Municipalities
- Major Roads
- Lakes

Alachua County Sensitive Karst Areas



Hornsby Springs Priority Focus Area



Mill Creek Sink

Mill Creek

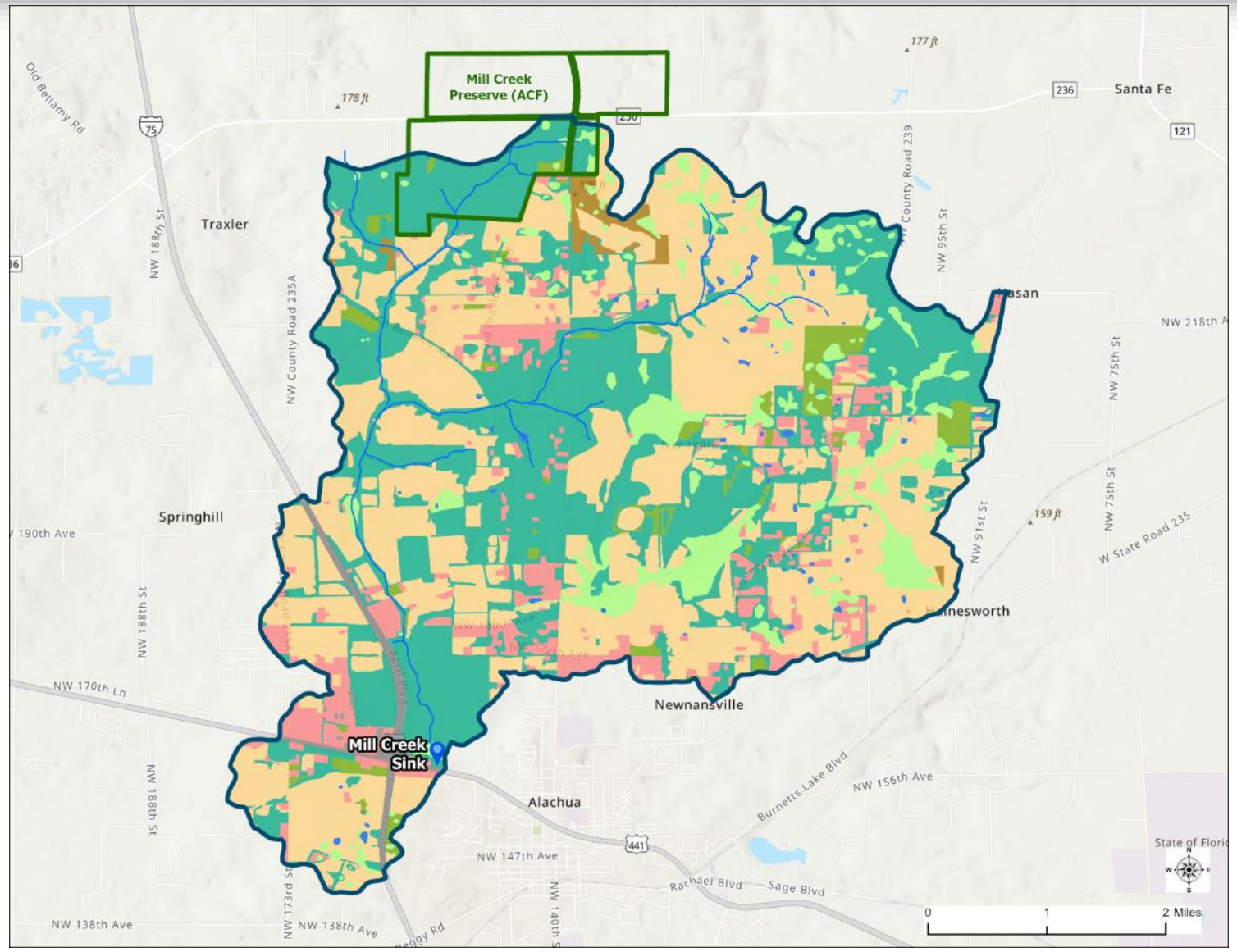
PFA

Devil's Spring

Hornsby Spring

County Boundary

Mill Creek Watershed



Mill Creek Sink

Mill Creek

Mill Creek Preserve (ACF)

Mill Creek Watershed

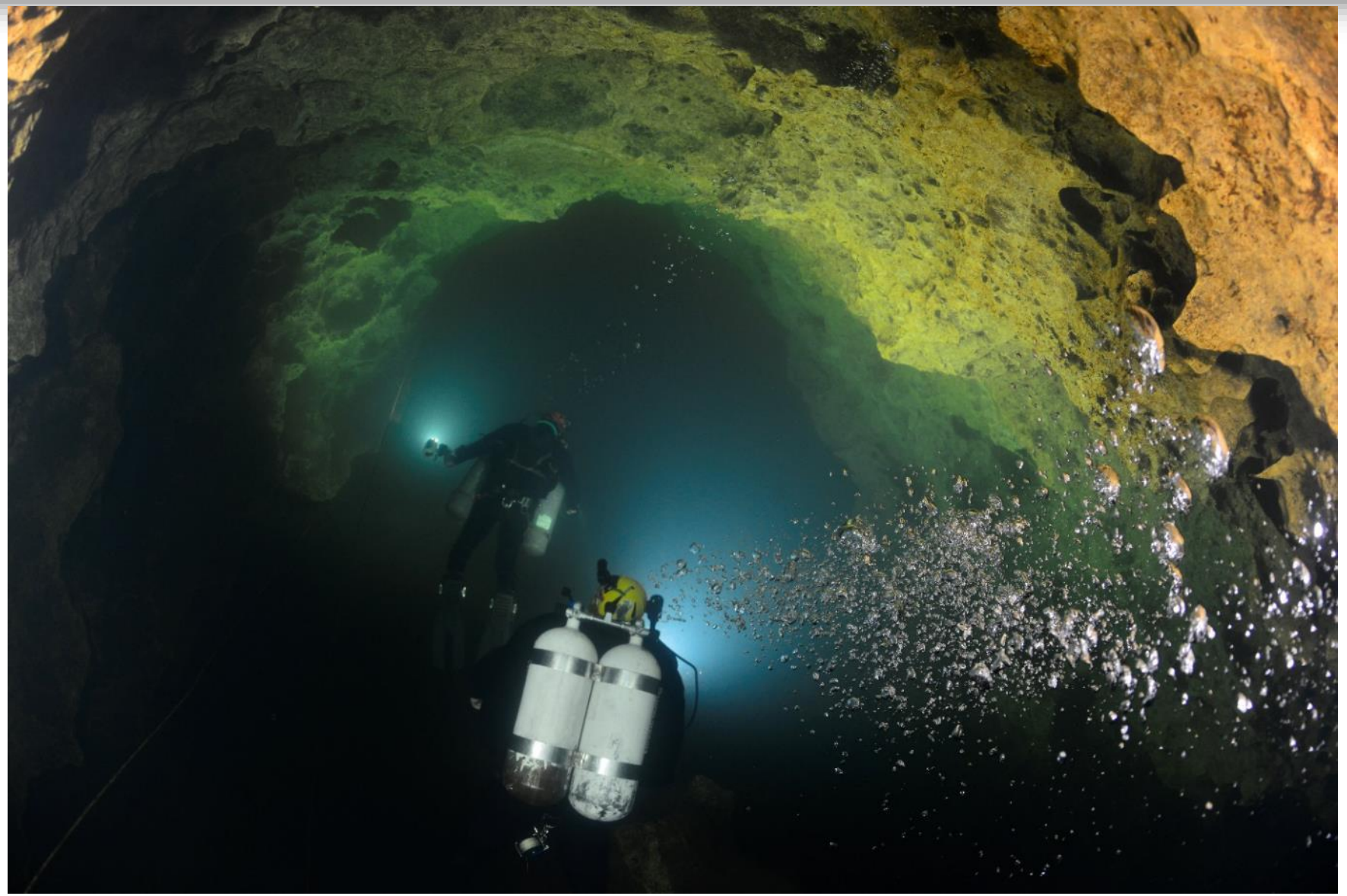
Land-Use Type

- Agriculture
- Barren Land
- Rangeland
- Transportation, Communication, and Utilities
- Upland Forest
- Urban and Built-Up
- Water
- Wetlands

Mill Creek Sink

- Terminus of Mill Creek and Townsend Branch
- Part of an ancient drainage system, connected to Hornsby Spring and the Santa Fe River
- Hundreds of feet of mapped cave, several large rooms, and complex system of conduits extending to depths up to 215 feet

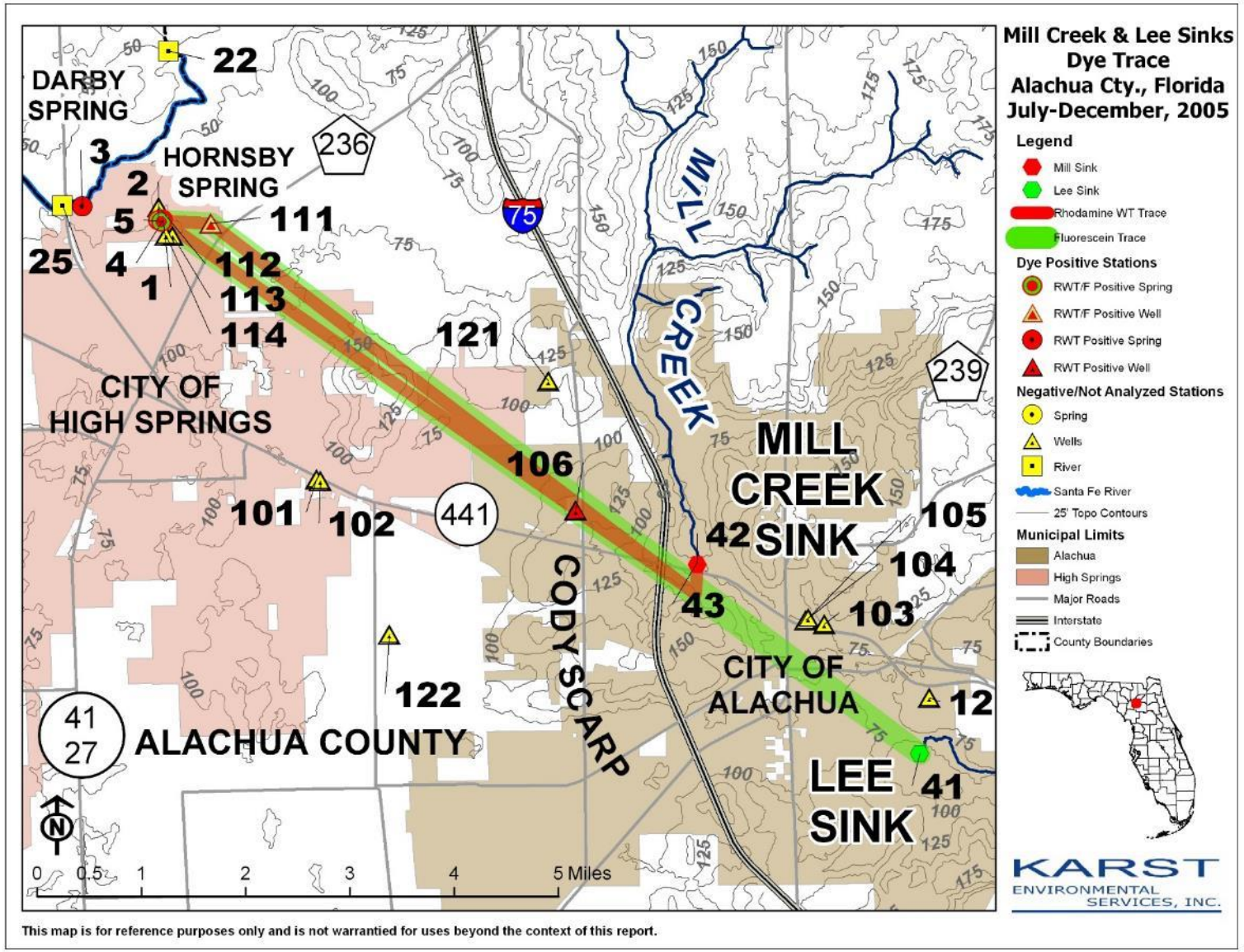
Mill Creek Sink Cave



Mill Creek Sink Dye Trace

- 2005 study hydrologically linked Mill Creek Sink to Hornsby Spring and Santa Fe Hills.
  - Dye was deployed at the sink and detected 6 miles away at Hornsby Springs within 12 days.
  - Detections also reported at Santa Fe Hills Well (1.27 miles away) and Darby Spring (6 miles).
  - Dye was detected up to as late as 154 days later at Hornsby Spring.

Mill Creek Sink Dye Trace



Mill Creek Sink Biological Survey

- ACEPD and Karst Environmental completed a 2022 survey for Troglobitic Species (cave adapted).
- Over 30 cave adapted isopods and amphipods were recorded, 1st ever recording of such species in this location.
- One cave adapted crayfish, *Procambarus pallidus* (Florida endemic species) was identified.

Mill Creek Sink Survey

Pallid Cave Crayfish (*Procambarus pallidus)*

Mill Creek Sink Water Quality Improvement Project

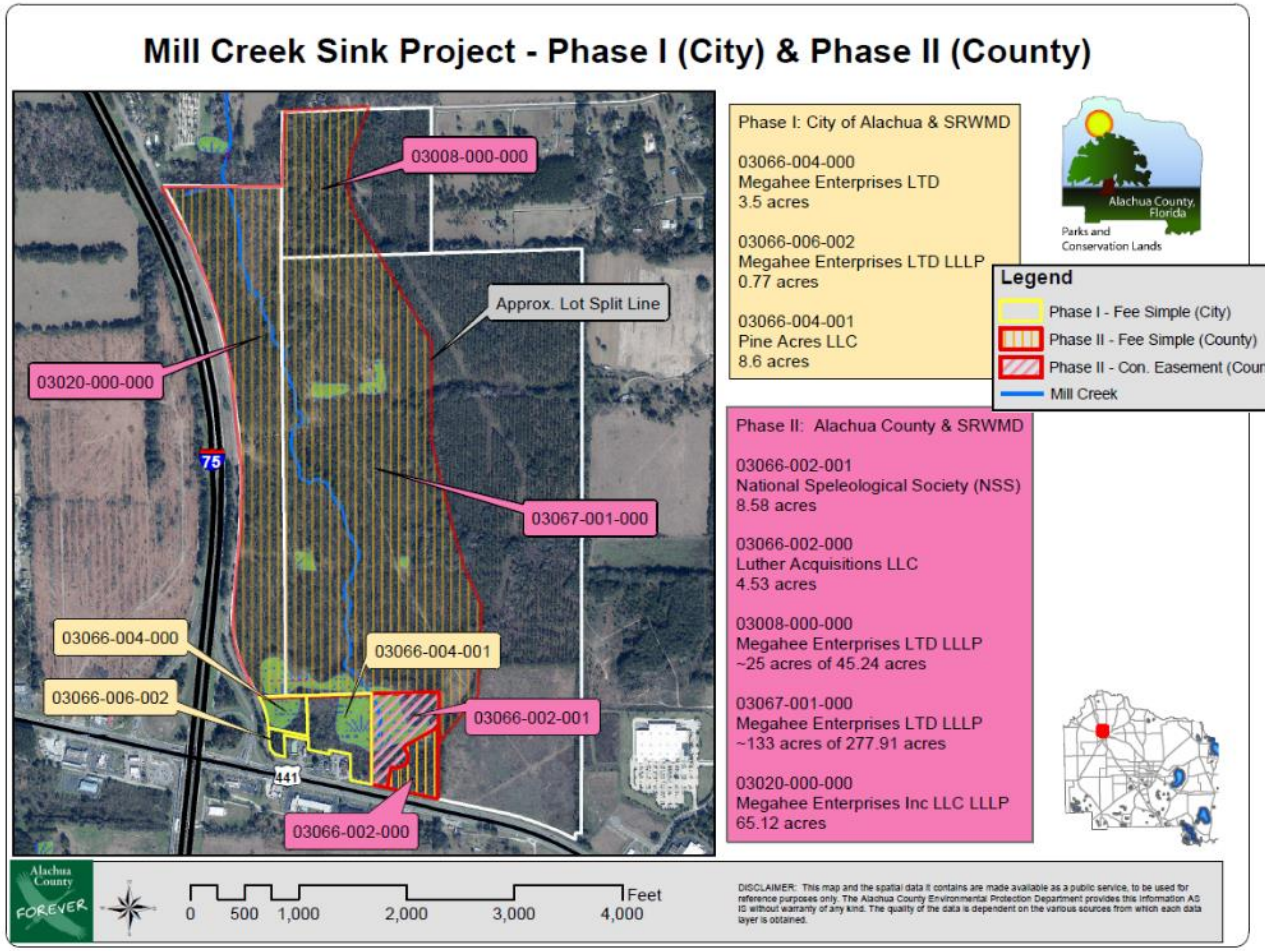
$2M project implemented by the City of Alachua funded by SRWMD and FDEP (Phase I of Mill Creek Sink Project grant).

Mill Creek Sink Water Quality Improvement Project

- Primary goal to reduce nitrogen loading to the Santa Fe River Basin, which is listed as impaired for nitrogen.
- Also intended to remove other pollutants such as heavy metals, polycyclic aromatic hydrocarbons, and suspended solids.

Land Conservation

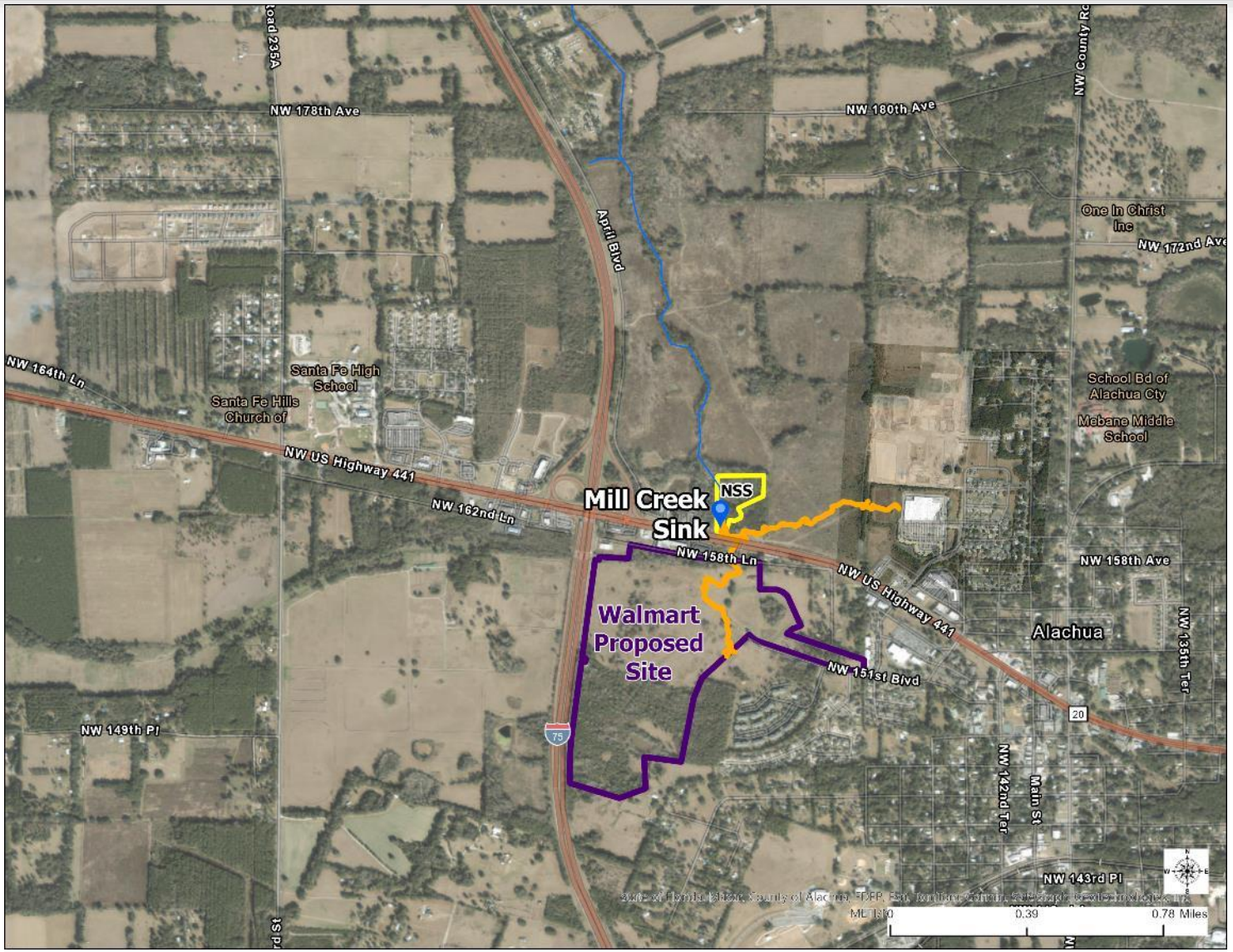
- Portions of the property were added to the County Active Acquisition List in 2018.
- ACEPD received acquisition funding from SRWMD and FDEP. (Phase II of Mill Creek Sink Project grant).
- County staff were not able to negotiate an agreement with the current landowner.



History of Mill Creek Sink Issues and County Involvement

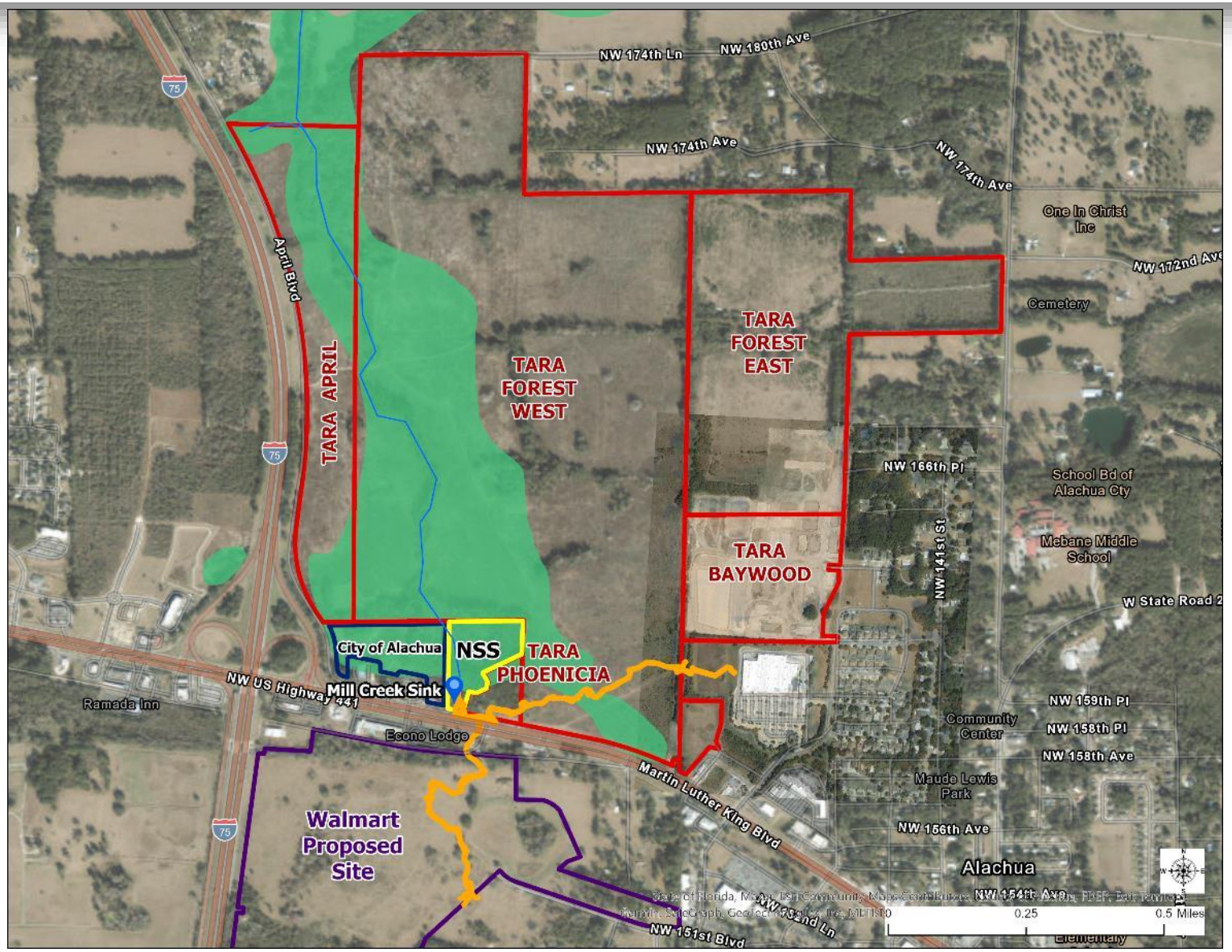
- Walmart 2006 Agreement
- 2015 Settlement Agreement and deed restrictions
- These discussions played a part in the adoption of Countywide regulations for improved stormwater treatment and an Advanced Stormwater Treatment Manual

2006 Walmart Proposal



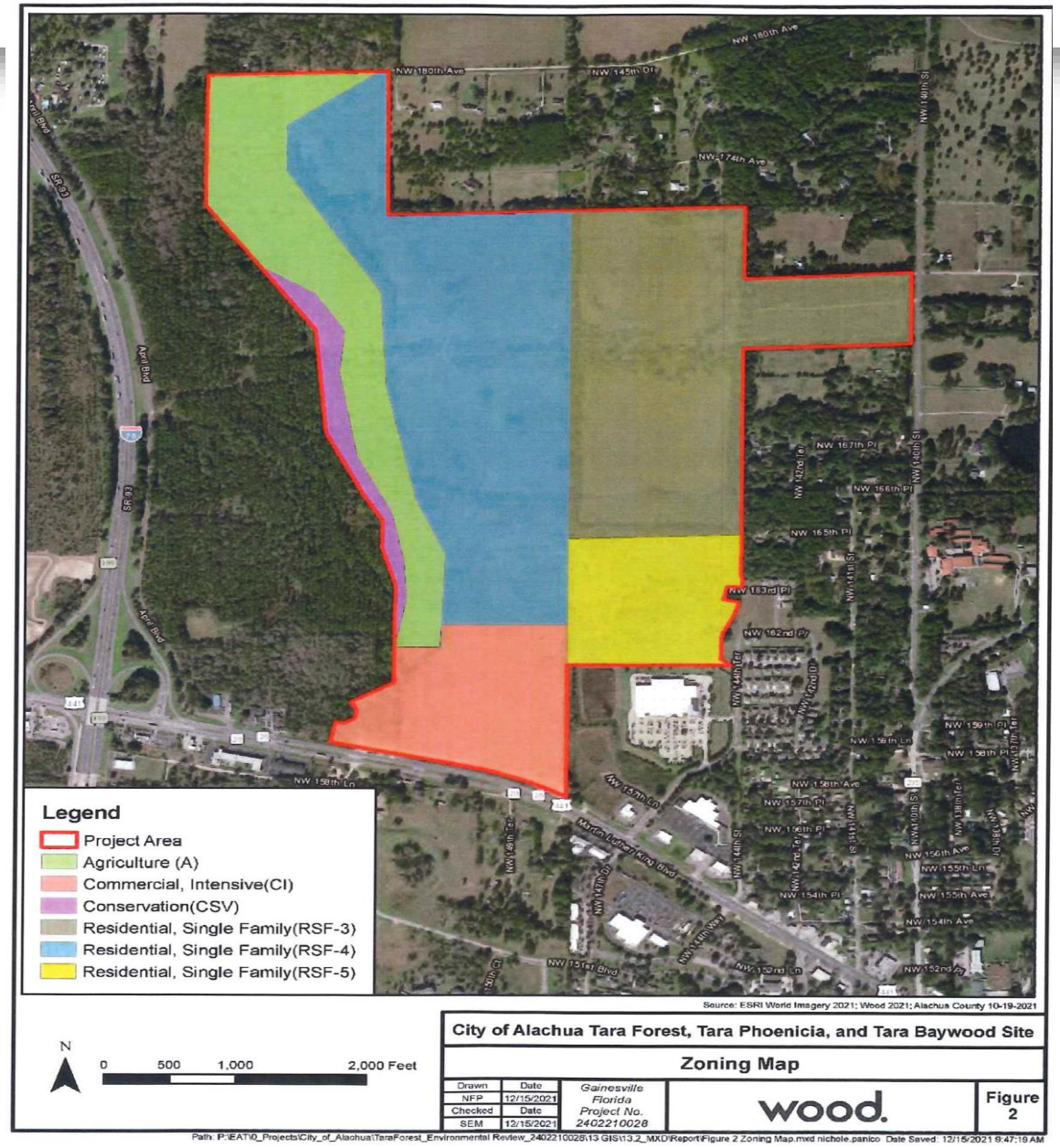
- Mill Creek Sink
- Mill Creek
- 2016 Mill Creek Sink Cave System
- Mill Creek Sink Nature Preserve (NSS)
- Walmart Proposed Site

Proposed Tara Developments



- Mill Creek Sink
- Mill Creek
- 2016 Mill Creek Sink Cave System
- Mill Creek Sink Nature Preserve (NSS)
- Tara Subdivisions
- City of Alachua
- Walmart Proposed Site
- Flood Hazard Area

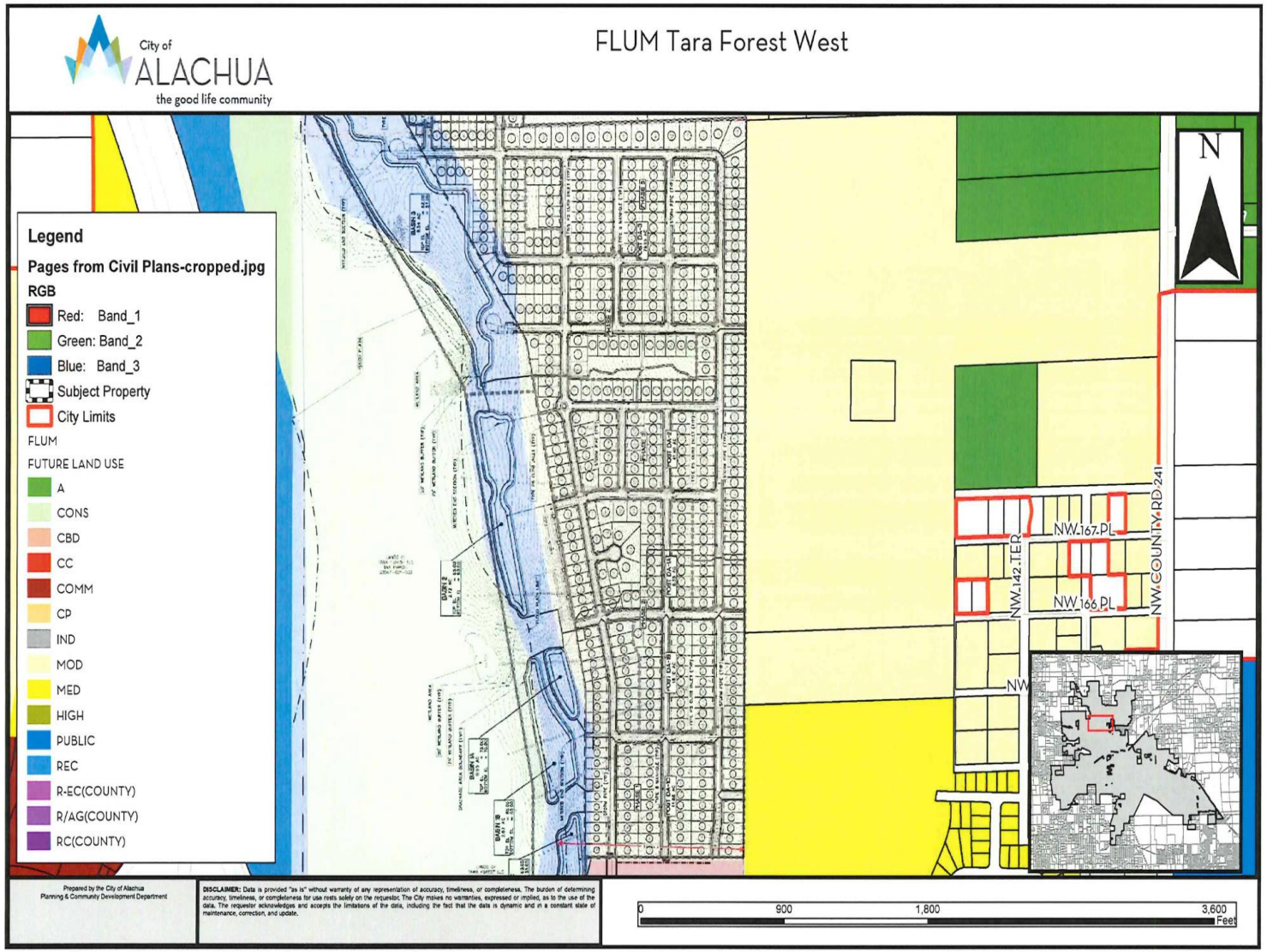
Proposed Tara Developments



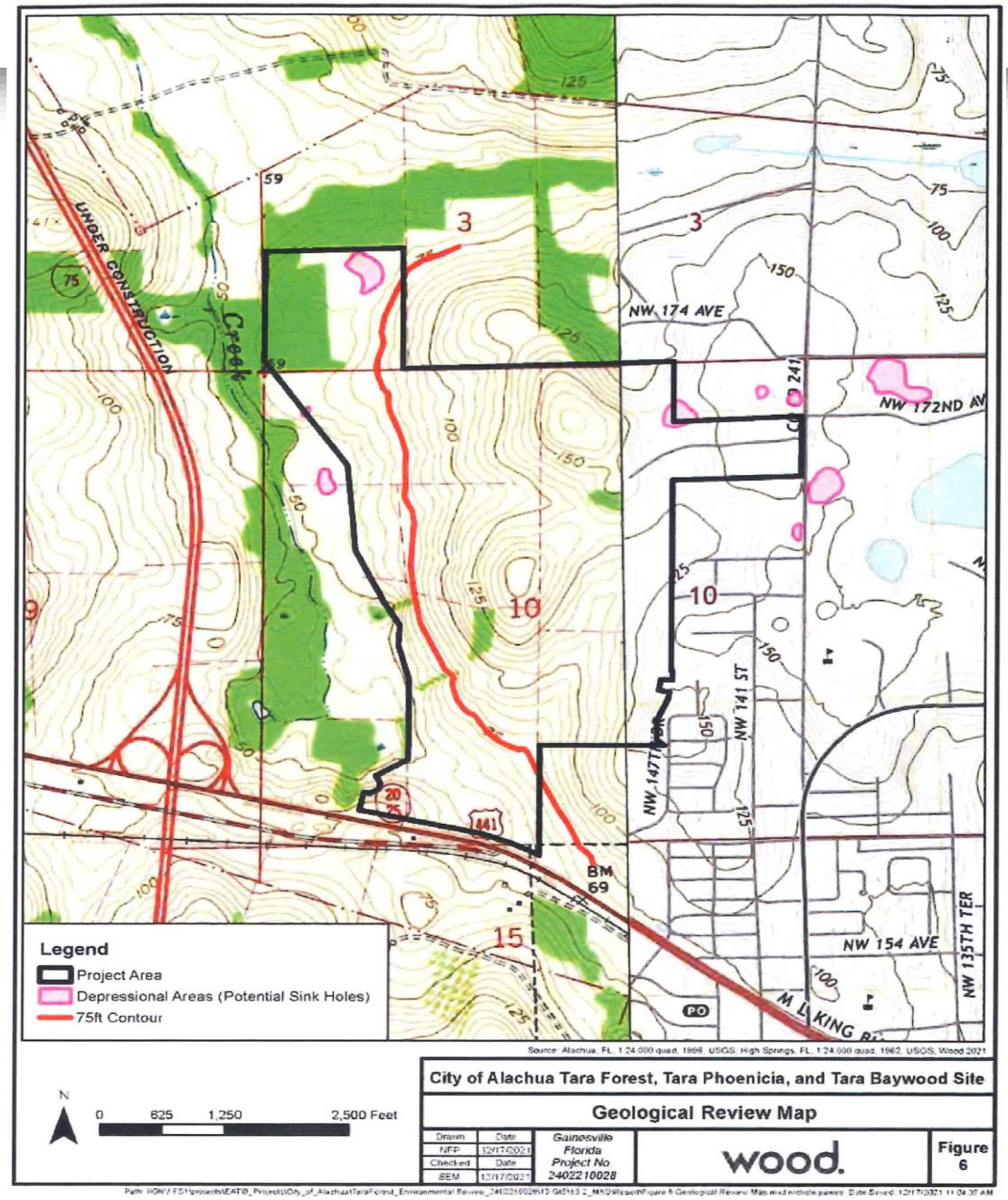
Proposed Tara Developments

Name	Acreage	Proposed Land Use & # Lots	Status
Tara Baywood	36 Ac.	Residential- Townhomes 211 lots	Final Plat Approved (Ph. 2) July, 2024 Under Construction
Tara Forest East	148 Ac.	Residential 340 Lots	Final Plat Approved (Ph. 2) July, 2024
Tara Forest West	395 Ac.	Residential 540 Lots	Preliminary Plat Approved July, 2024
Tara April	Included w/TFW	SW & Floodplain Infrastructure for TF West	Awaiting Public Hearing
Tara Phoenicia	Included w/TFW	Commercial	Under Review

Proposed Tara Developments



Proposed Tara Developments



Mill Creek Sink – Development Concerns

- Developing within karst geology increases chances of sinkholes.
  - Sinkholes can damage property and create a direct conduit for pollutants to contaminate drinking water and springs.
- Proposed development patterns result in high water use for landscapes.
  - Manicured landscapes also contribute to nitrogen pollution from fertilizers.

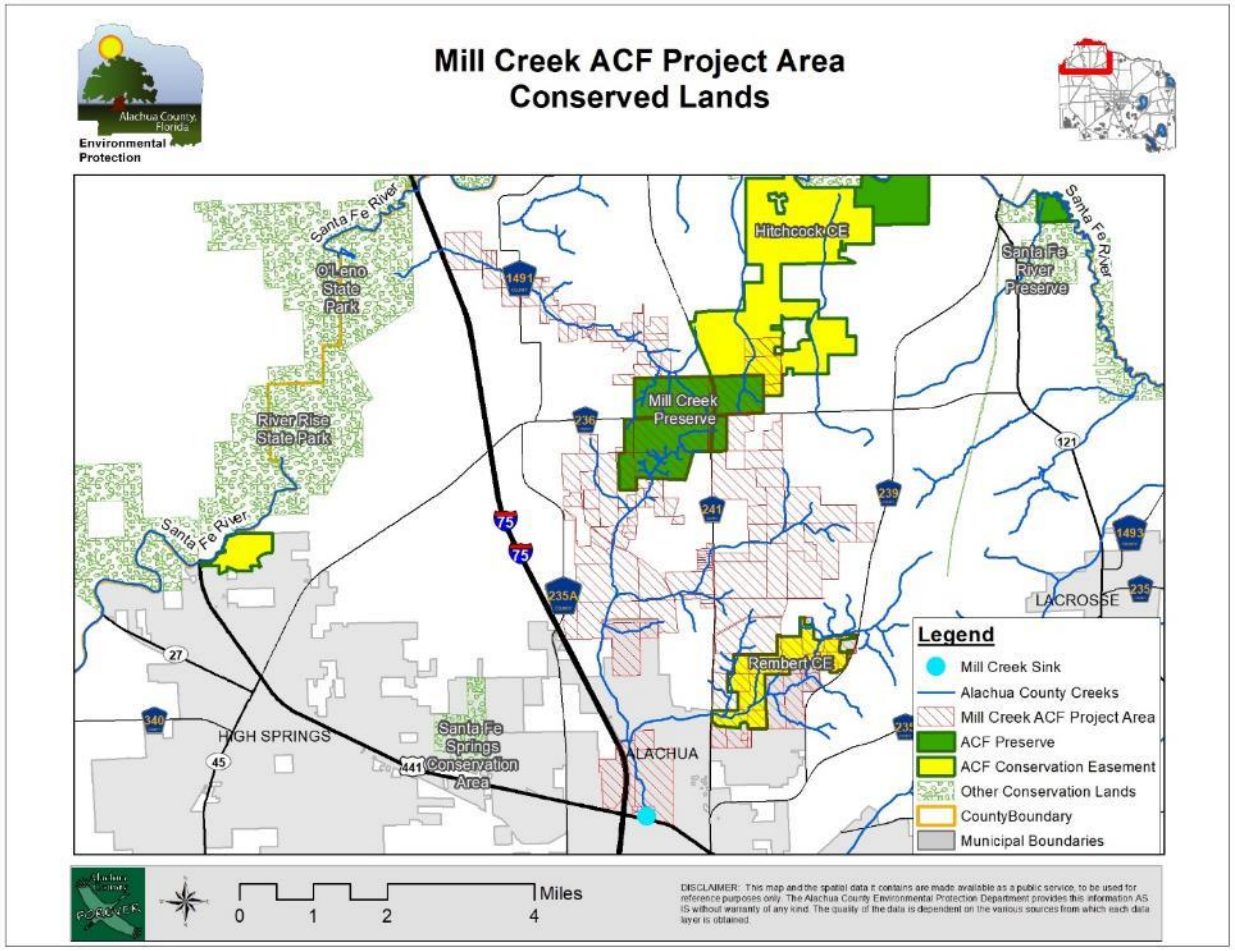
Actions to Protect the Watershed

- Creating a conservation area is the most protective option.
- If the area is developed, low impact development techniques should be in place.
- Monitoring wells should be installed to demonstrate protection of the Floridan aquifer.

Land Conservation

Mill Creek ACF Project Area

- Mill Creek Preserve
- Rembert Conservation Easement
- Hitchcock Ranch Conservation Easement



Low Impact Development (LID)

LID is most successful when incorporated into earliest stages of planning.

Avoidance (LID)

- Map natural infrastructure
- Preserve open spaces, natural areas, trees and native soils
- Retain natural hydrologic and topographic features in site plan

Minimization (LID)

- Limit and disconnect impervious surfaces
- Mimic and maximize pre-developmet hydrologc processes
- Integrate practices that provide co-benefits and multifunctional areas

Mitigation (GSI)

- Implement runoff source control measures
- Employ natural processes to treat and retain stormwater
- Provide treatment and attenuation in multiple areas across the site

Low Impact Development Best Management Practices (BMPs)

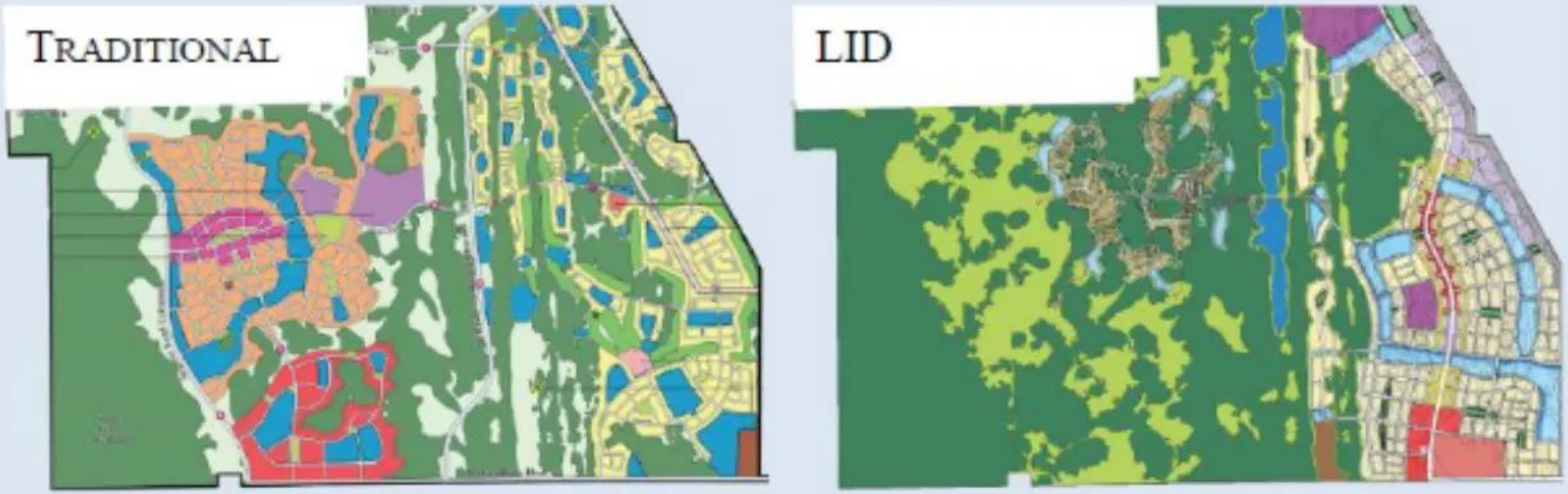
Site Planning (Avoidance)

- Inventory site assets (hydrology, topography, soils, vegetation, structures)
- Protect surface waters, wetlands and groundwater
- Preserve open space
- Retain tree canopy and native landscapes
- Cluster design and maximize gross density
- Minimize building footprint
- Minimize total impervious area
- Minimize directly-connected impervious area
- Eliminate curbs and implement curb cuts

Low Impact Development

Site Planning

LID DESIGN FOR A FLORIDA DEVELOPMENT OF REGIONAL IMPACT: *RESTORATION*



In this example of a planned development in East Central Florida, the LID master plan protects sensitive wetlands and hydrologic features while significantly reducing impervious area. LID design strategies used include preserving open spaces, clustering, building vertically, minimizing new landscaped area requiring supplemental inputs, and nonpotable water for irrigation needs.

Image source: Marine Resource Council

Low Impact Development Best Management Practices (BMPs)

Source Control (Minimization)

- Retain natural landscape depressions
- Minimize clearing and grading
- Minimize soil disturbance and compaction
- Build with landscape slope
- Retain native landscapes at the lot level
- Florida-friendly landscapes
- Rainfall interceptor trees
- Minimize/eliminate fertilizer & irrigation
- Community and home-owner education

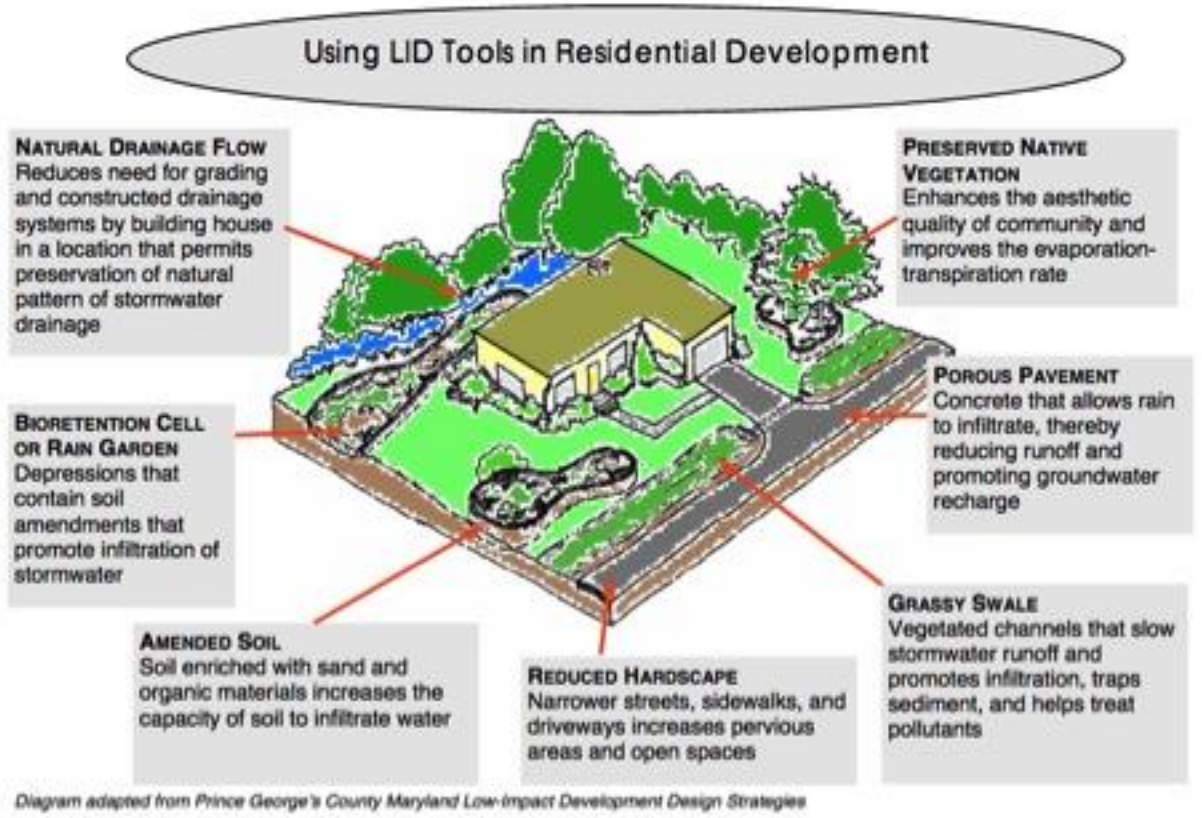


Diagram adapted from Prince George's County Maryland Low-Impact Development Design Strategies

Low Impact Development Best Management Practices (BMPs)

Structural (Mitigation)

- Retention basin
- Exfiltration trench
- Underground storage and retention
- Rain gardens
- Bioswales
- Vegetated buffers
- Permeable pavements
- Green roofs
- Stormwater harvesting
- Wet detention systems
- Filter systems
- Managed aquatic plant systems
- Biofiltration systems

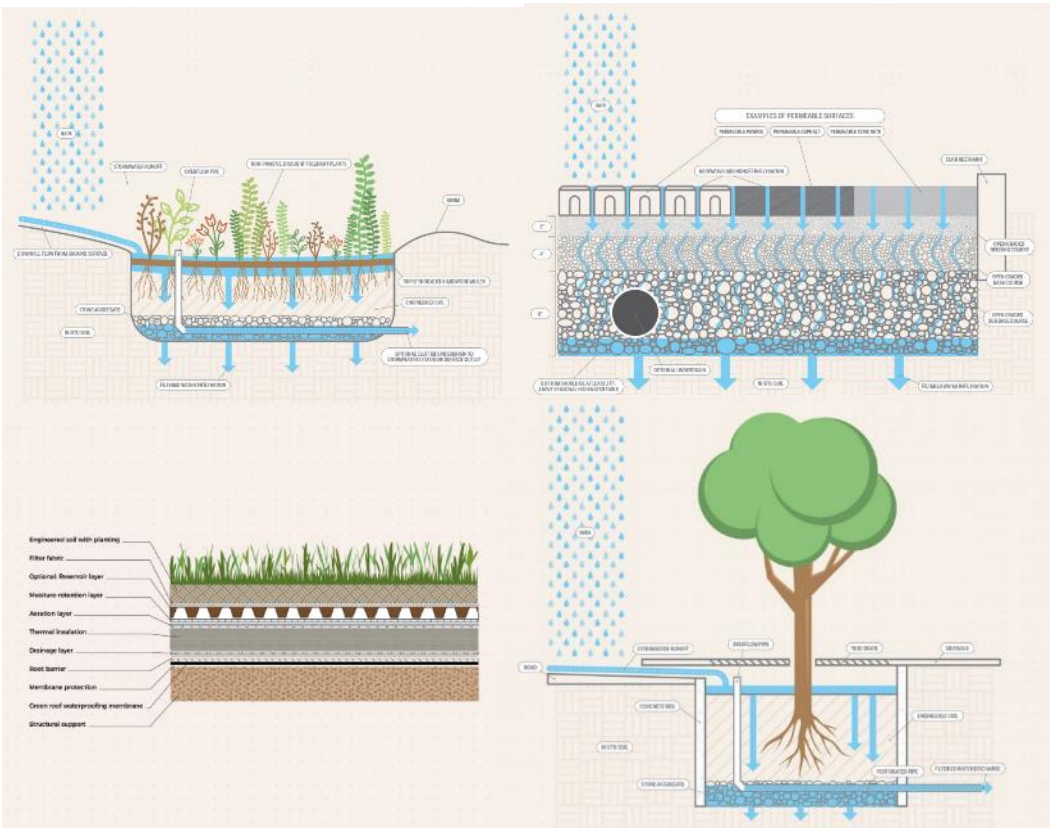


Image source: FDEP

Low Impact Development Best Management Practices (BMPs)

- For the lowest impact, site planning BMPs should be prioritized.
- Second priority should be given to source control BMPs.
- Finally, as a last resort and considered more of a retrofit, structural BMPs should be implemented.

Low Impact Development- Landscaping and Irrigation

Through Covenants Codes and Restrictions (CCR) or Utility Use Agreements on lots and common areas:

- Prohibit permanent landscape irrigation
- Prohibit irrigation wells
- Require native and/or Florida Friendly Landscaping™
- Require Soil amendments

Next Steps

- Attend future City of Alachua public meetings and hearing related to any of the mentioned development projects to retain affected party status
- Meet with City staff to discuss concerns and propose strategies to address these concerns with existing applications
- Meet with development representatives when appropriate
- Provide updates to the BOCC on status of projects moving forward

Looking Ahead

- Evaluate effectiveness of Stormwater Code (Article IV of Water Quality Code) to identify opportunities for improvement.
- Continue assessing properties in the watershed for acquisition.
- Improve collaboration with municipalities to involve staff earlier in project development.
  - Formal agreement (interlocal agreement, etc.)?