



*SEMINOLE COUNTY*  
FLORIDA'S NATURAL CHOICE

# **Wekiva Watershed Management Plan**

**Final Presentation to  
Board of County  
Commissioners  
Presentation  
June 13, 2023**

# Presentation Outline

- Project History to Date
- Existing Conditions and Deficiency Summary
- Floodplain Summary
- Deficiency Areas Summary
- Proposed Improvement Projects Summary  
with Ranking and Costs

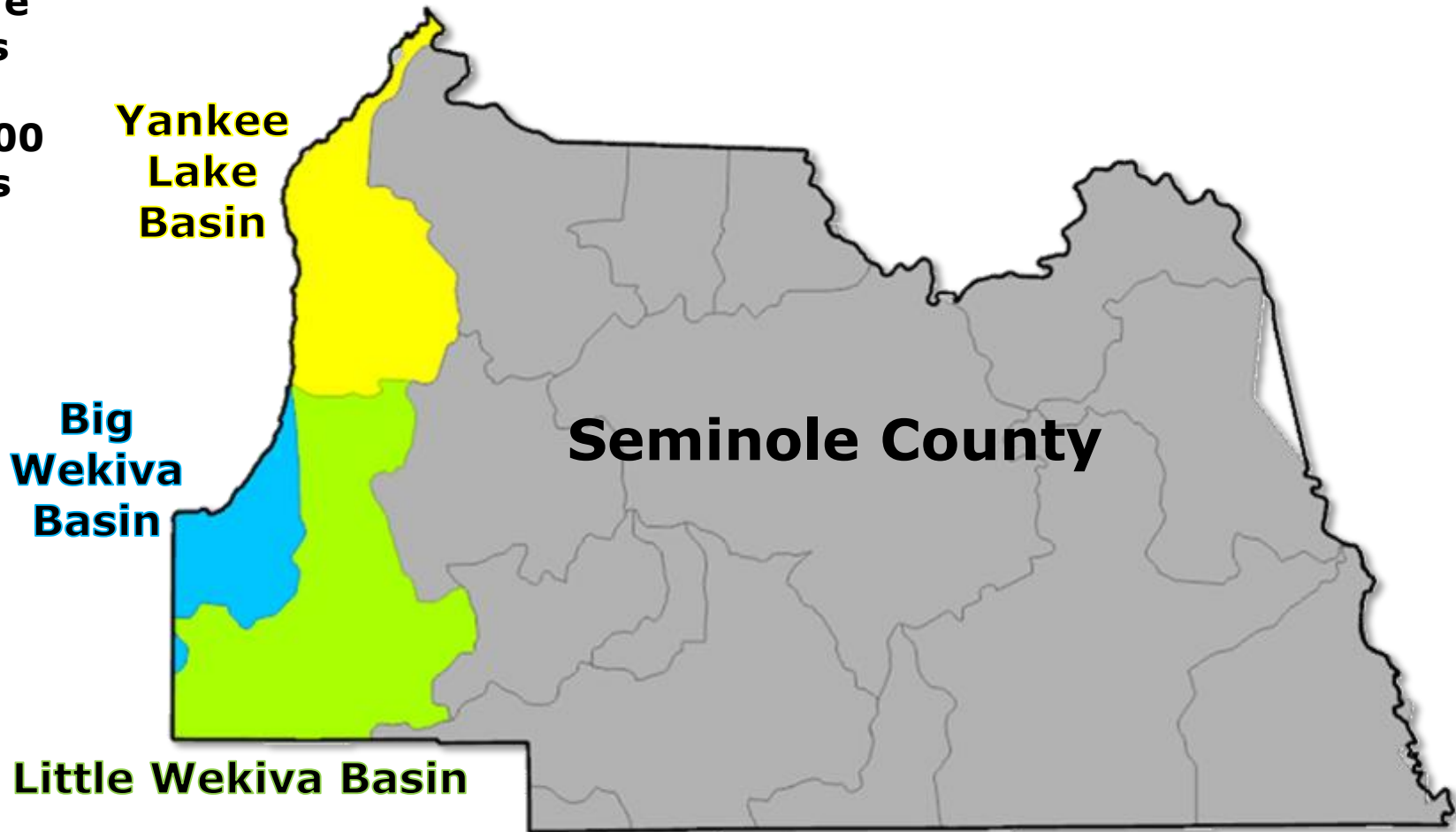
# Project History

- Watershed Management Plan Phase Commenced January 2022
- Initial Public Meeting – May 3, 2022
- Initial BCC Workshop – February 14, 2023
  - *Project Background*
  - *Existing Conditions Flooding Level of Service Results*
  - *Water Quality Pollutant Loading Results*
  - *Initial Floodplain Delineation Results*
  - *Initial Deficiency Area Identification and Prioritization*
  - *Recommendations for Priority Areas to Address with Improvement Concepts*
- Final Public Meeting March 9, 2023
- Draft Final Reports Submitted May 2023
- **Final BCC Presentation June 2023**

# Watershed Location

Total Area  
~56.2  
Square  
Miles  
or  
~36,000  
acres

## WEKIVA WATERSHED



# Scope of Work

- Project Initiation and Information
  - Data Compilation, Evaluation and Gap Analysis
  - Stakeholder Coordination
  - Existing Deficiency Identification
  - Field Reconnaissance, Investigation and Survey
- Existing Conditions Analysis
  - Existing Conditions Modelling
  - Infrastructure Level of Service Evaluation
  - Floodplain Delineation
  - Water Quality Assessment
- Alternative Analysis
  - Improvement Alternatives Analysis and Prioritization
  - Priority Project Concepts
- Draft, Draft-Final and Final Reports
- Public Meetings
- County Commission Workshop & Presentation



# Existing Conditions Analysis

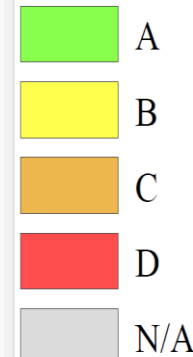
- Existing Conditions Model Assessment
  - Design Storms and Rainfall Depths
  - Hydrological Parameters (Surface Runoff Volumes)
  - Hydraulic Model Development (Conveyance and Storage)
  - Verification Storm to Calibrate Model – Irma & Ian
- Level of Service (LOS) Criteria Assignment and Evaluation
  - Develop Criteria Based on Infrastructure Type and Design Storm
    - Type – Storm Sewer / Culvert 10 Year Storm, Outfall Channel / Stormwater Pond 25 Year Storm
    - Road – Local 10 Year Storm, Collector 25 Year Storm, Evacuation 100 Year Storm
    - Habitable Structures – 100 Year Storm
- Floodplain Assessment
  - Evaluate Using Combination of 100 Year 24 and 96 Hour Storms
  - Assess Road and Structure Impacts
- Water Quality Assessment
  - Pollutant Load Hot Spot Analysis
  - Compare to Existing Surface and Ground Water Quality Data



# LOS Assessment Results

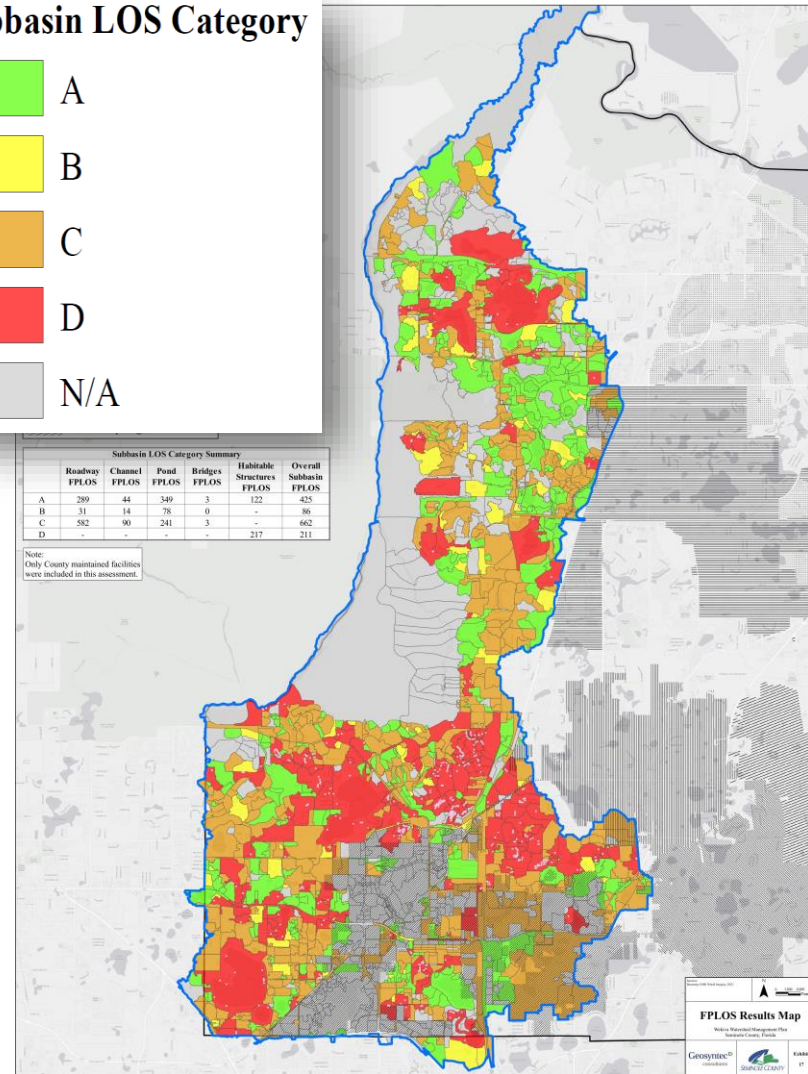
- Unincorporated Areas and County Maintained Roads
- Infrastructure
  - Roadways
    - Storm pipe systems
    - Local / Collector / Arterial
    - Evacuation Routes
  - Channels
  - Stormwater Ponds
  - Bridges
- LOS A, B, C, D Designations
  - Potential Structure Flooding = LOS D
  - LOS Grades of C & D Warrant Consideration for Improvements

## Subbasin LOS Category



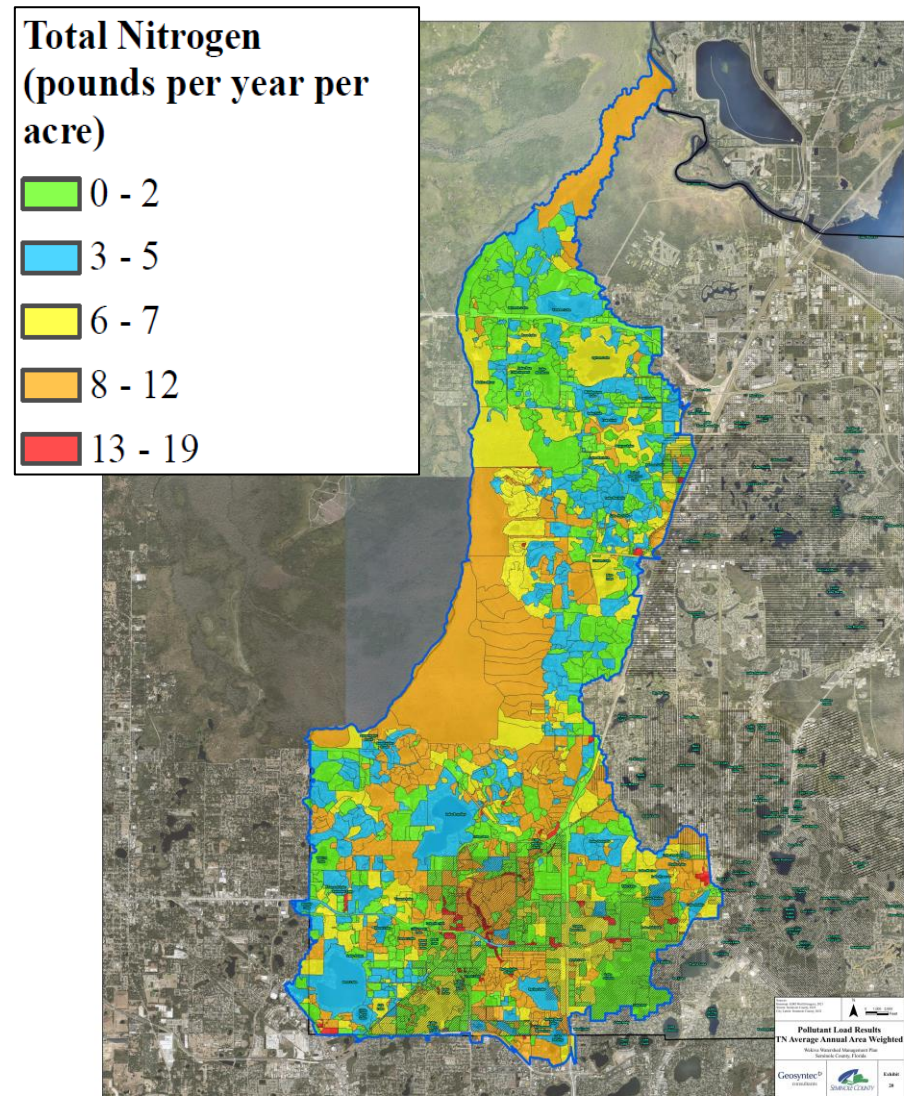
| Subbasin LOS Category Summary |                  |                  |               |                  |                                  |
|-------------------------------|------------------|------------------|---------------|------------------|----------------------------------|
|                               | Roadway<br>FPLOS | Channel<br>FPLOS | Pond<br>FPLOS | Bridges<br>FPLOS | Habitable<br>Structures<br>FPLOS |
| A                             | 289              | 44               | 349           | 3                | 122                              |
| B                             | 31               | 14               | 78            | 0                | -                                |
| C                             | 582              | 90               | 241           | 3                | -                                |
| D                             | -                | -                | -             | -                | 217                              |
|                               |                  |                  |               |                  | Overall<br>Subbasin<br>FPLOS     |
|                               |                  |                  |               |                  | 425                              |
|                               |                  |                  |               |                  | 86                               |
|                               |                  |                  |               |                  | 662                              |
|                               |                  |                  |               |                  | 211                              |

Note:  
Only County maintained facilities  
were included in this assessment.



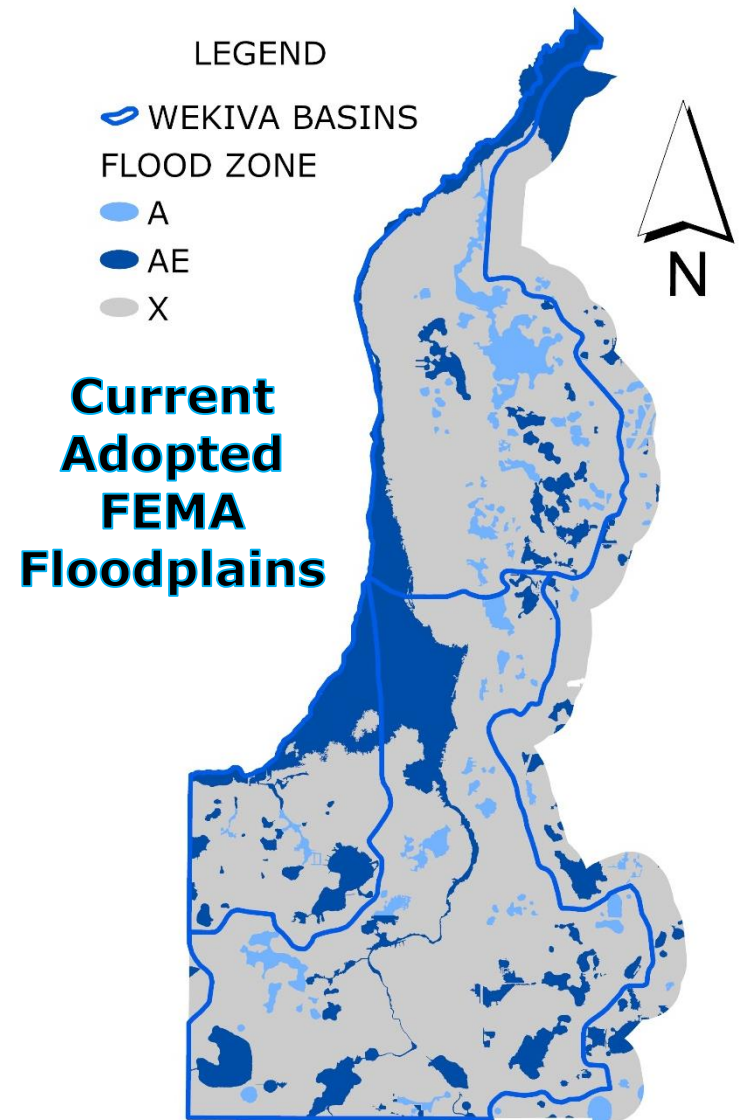
# Pollutant Load Assessment Results

- Annual Loading Model
- Identify Hot Spots for Pollutants [Nutrients]
- Spatial Comparison to Impaired and Sensitive Waters
- Supports Identification of Target Locations for Improvement Projects



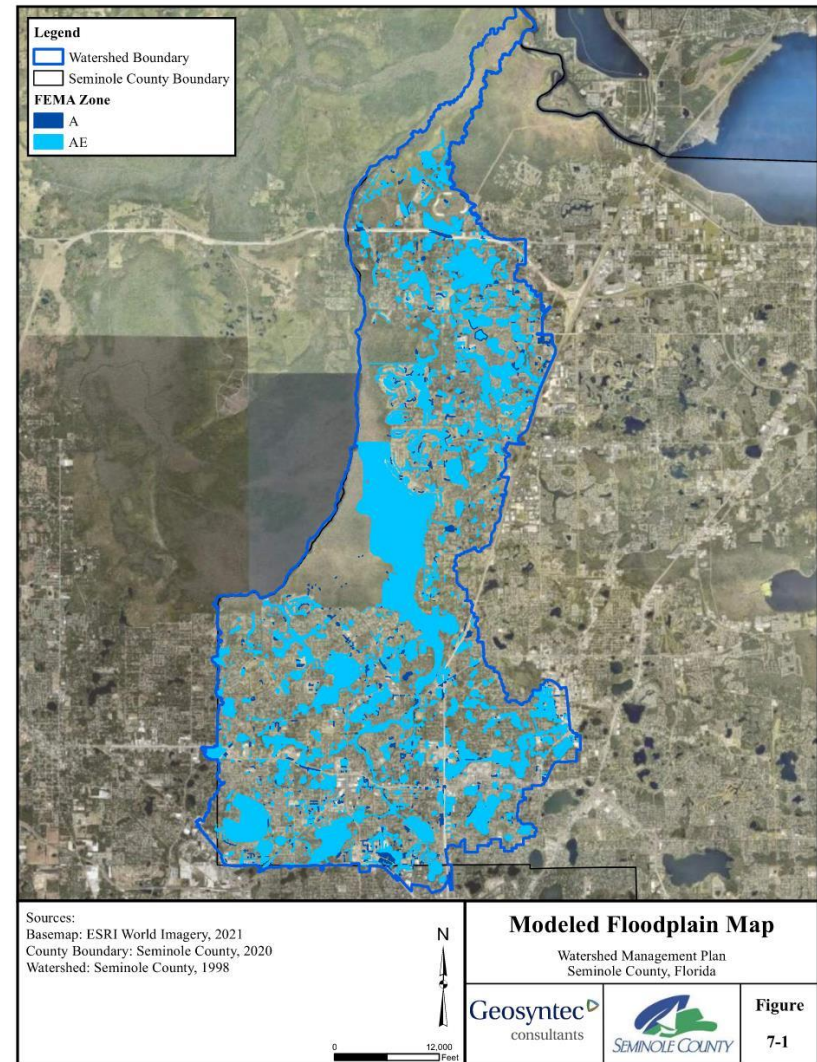
# Watershed Characteristics - Floodplains

- FEMA Floodplains
- Used for Flood Insurance
- 2007 Most Recent Mapping
- Flood Hazard Zones
  - A = No Base Flood Elevation Determined*
  - AE = Base Flood Elevations Determined*
  - X = Areas Outside 1% Annual Chance (100 Year) Flood*
- Floodplains Currently Focused on main conveyances (Little Wekiva River, etc.), lakes and larger depressional areas
- Many Flood Prone Areas Not Currently Mapped



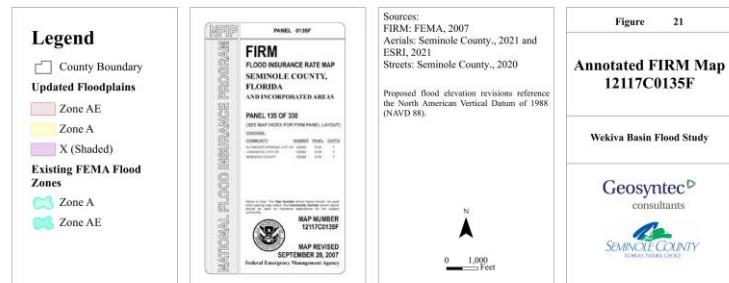
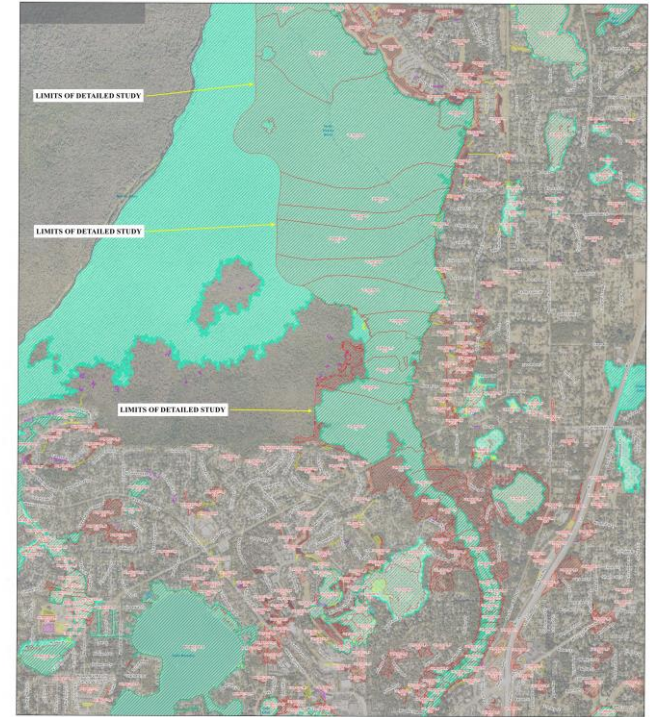
# Floodplain Assessment Results

- Updated based on more recent and detailed data
  - Topography
  - Survey Data
  - Detailed Modeling
  - New Development
- Modeling Based on 100 Year / 96 Hour Storm Event Simulation
- Determined base flood elevations
- Floodplain Area Comparison
  - Modeled 8,311 acres
  - Existing FEMA = 6,561 areas
  - 26.7% Increase



# FEMA Letter of Map Revision Package

- Package Containing Data Necessary to Submit to FEMA for Floodplain Map Revisions for Watershed
- Requires Sign-off from Cities where shared Floodplains
- BCC Approval to Move Forward with FEMA Submittal
- Requires Public Notice



# Impact of New Floodplains

| Floodplain Change Impact Statistic | Unincorp. Parcels* | Unincorp. Buildings**                               | City Parcels* | City Buildings**                                  |
|------------------------------------|--------------------|-----------------------------------------------------|---------------|---------------------------------------------------|
| Total in Watershed                 | 29,863             | 26,453                                              | 14,625        | 7,912                                             |
| Total Existing FEMA Floodplains    | 3,827              | ~928<br>~915 residential<br>~13 commercial/other    | 1,175         | ~274<br>~181 residential<br>~93 commercial/other  |
| Total Proposed New Floodplains     | 6,618              | ~1,111<br>~1063 residential<br>~48 commercial/other | 2,687         | ~612<br>~491 residential<br>~121 commercial/other |
| Added with New Floodplains         | 3,386              | ~784<br>~742 residential<br>~42 commercial/other    | 1,743         | ~448<br>~375 residential<br>~73 commercial/other  |
| Removed from FEMA Floodplains      | 595                | ~601<br>~595 residential<br>~6 commercial/other     | 231           | ~110<br>~65 residential<br>~45 commercial/other   |

\* Based on any portion of GIS parcel intersecting a floodplain

\*\* Based on GIS building footprint extent intersecting floodplain, not confirmed by finished floor elevation

# Project Ranking Prioritization Criteria

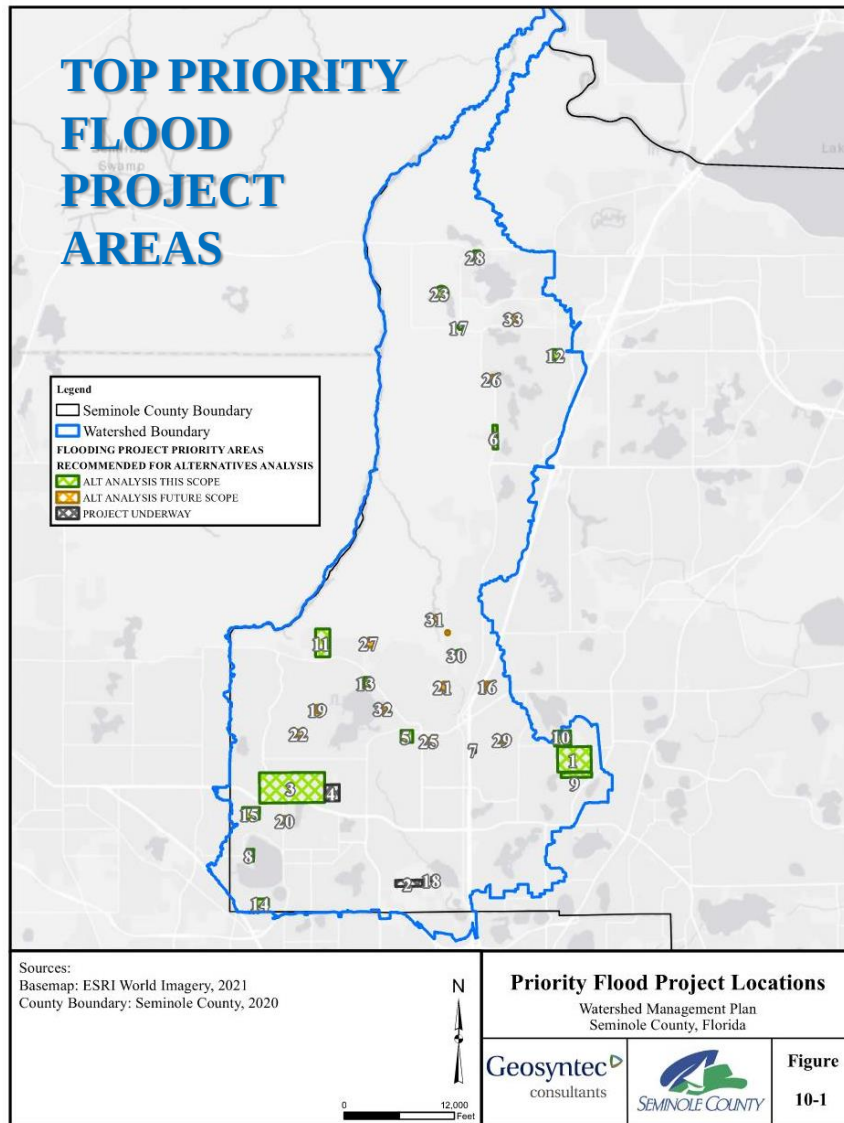
- Flooding Projects Ranked by:
  - *County Staff Input on Observed Problem Areas (incl. Irma & Ian)*
  - *Public Input on Observed Problem Areas*
  - *Flood Assessment Model Results*
    - LOS Grade from Hydrological & Hydraulic Modeling
    - Proximity to Delineated Floodplains
    - Apparent Structure Impacts from Modeling
  - *Documented Problem Areas*
    - 2018 County Stormwater Master Plan
    - Identified Complaint
    - Reported Storm Impact (Fay, Irma, Ian)
- Water Quality Project Ranked by:
  - *Proximity to Impaired Waters or Sensitive Water Resources*
  - *Results of Pollutant Load Assessment*
  - *Areas without Current Water Quality Treatment*
  - *2018 County Stormwater Master Plan*

# Improvement Project Alternatives Analysis

- Improvement Alternatives Analysis
  - *Prepare Improvement Concepts*
    - Model Evaluation for Flood Reduction and Water Quality Improvements
  - *Prepare Cost-Benefit Projections*
  - *Implementation Feasibility Considerations*
    - Met with SJRWMD to Determine Permitting Requirements
    - Constructability
    - Easements / Right-of-Way
    - Maintenance Burden
    - Water Quality Benefit
    - Public Acceptance
  - *Support Future Next Steps*
    - Seek Grant Funding
    - Final Design Permitting



# Final Ranked Flood Projects



| CONSOLIDATED PROJECT NAME                          | FINAL PROJECT PRIORITY | # PROBLEMS IN CONSOLIDATED PROBLEM AREA |
|----------------------------------------------------|------------------------|-----------------------------------------|
| SANLANDO SPRINGS - NORTH STREET TO LAKE FLORIDA    | 1                      | 14                                      |
| HILLVIEW DRIVE                                     | 2                      | 9                                       |
| TRIBUTARY C - HUNT CLUB TO LAKE BRANTLEY           | 3                      | 9                                       |
| TRIBUTARY C -LAKE HARRIET ESTATES                  | 4                      | 9                                       |
| MOBILE MANOR                                       | 5                      | 6                                       |
| MARKHAM WOODS RD NEAR TIMBERBROOK & BRIDGEWATER    | 6                      | 5                                       |
| OLIVER AVE, BAKER ST, ARTHUR ST - SANLANDO SPRINGS | 7                      | 4                                       |
| CECELIA DRIVE AT BEAR LAKE                         | 8                      | 4                                       |
| MAGNOLIA STREET 427 TO LAKE FLORIDA                | 9                      | 4                                       |
| ROLLING HILLS                                      | 10                     | 4                                       |
| RIVERBEND BOULEVARD AND SWEETWATER BOULEVARD AREA  | 11                     | 4                                       |
| BANANA LAKE ROAD                                   | 12                     | 4                                       |
| CUTLER ROAD                                        | 13                     | 3                                       |
| BEAR LAKE WOODS                                    | 14                     | 3                                       |
| BEL AIRE HILLS                                     | 15                     | 3                                       |
| LAKE OAKS BLVD                                     | 16                     | 3                                       |
| MARKHAM RD AT LAKE MARKHAM RD                      | 17                     | 2                                       |
| SPRING VALLEY LOOP                                 | 18                     | 2                                       |
| AZALEA DRIVE                                       | 19                     | 2                                       |
| BEVERLY TERRACE                                    | 20                     | 2                                       |
| WOODSTEAD CIRCLE                                   | 21                     | 2                                       |
| COLYER DR                                          | 22                     | 2                                       |
| LAKE MARKHAM EVALUATION                            | 23                     | 1                                       |
| DELK ROAD AND IBIS ROAD                            | 24                     | 1                                       |
| OAK STREET                                         | 25                     | 1                                       |
| OAK KNOLL (PRIVATE PARCELS)                        | 26                     | 1                                       |
| HORNBEAM DRIVE                                     | 27                     | 1                                       |
| LAKE SYLVAN EVALUATION                             | 28                     | 1                                       |
| PRESSVIEW AVE                                      | 29                     | 1                                       |
| BILTMORE PT                                        | 30                     | 1                                       |
| MICHAEL DRIVE (PRIVATE PARCELS)                    | 31                     | 1                                       |
| SHADOWBAY                                          | 32                     | 1                                       |
| SANDY LANE RV PARK                                 | 33                     | 1                                       |

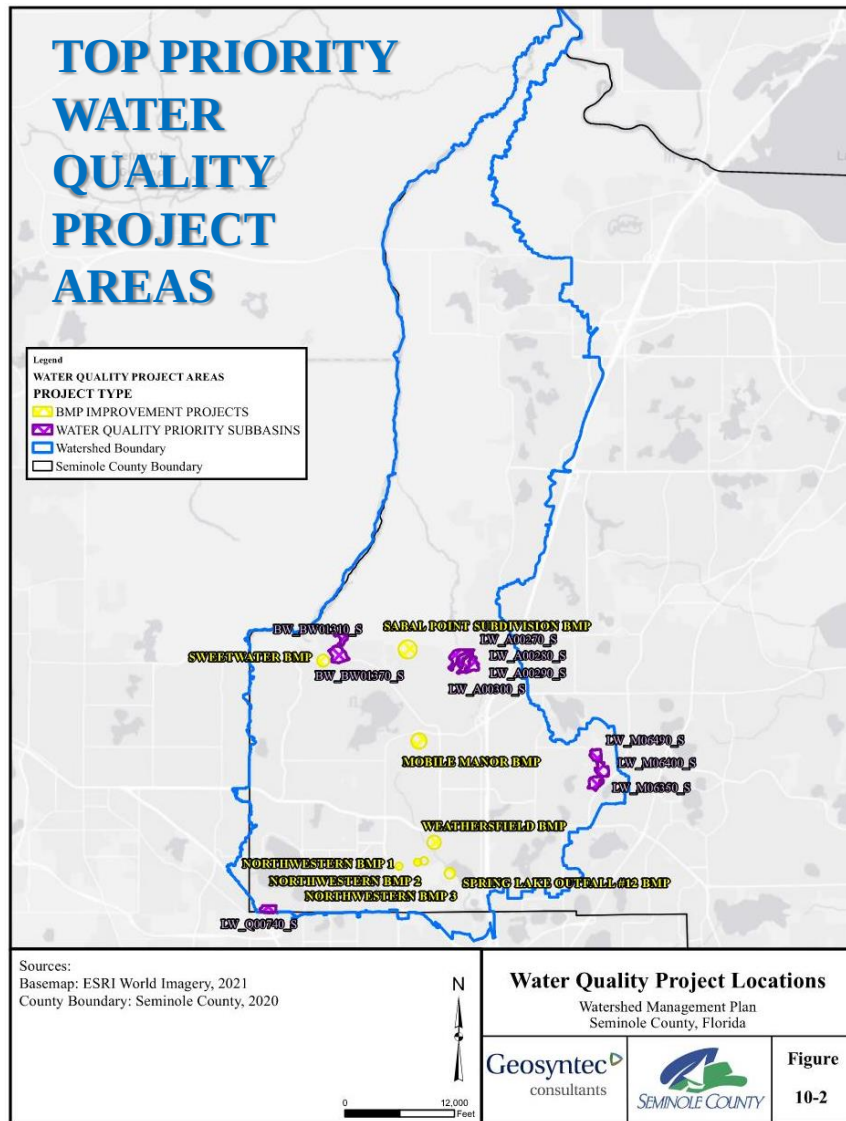
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|--|---------------------------------------------|
|  | DETAILED CONCEPT ANALYSIS - THIS SCOPE      |
|  | DETAILED CONCEPT ANALYSIS - FUTURE SCOPE    |
|  | SPECIAL EVALUATION PROJECT - THIS SCOPE     |
|  | SPECIAL DESIGN CONCEPT PROJECT - THIS SCOPE |
|  | PROJECT CURRENTLY UNDERWAY BY COUNTY        |

# Recommended Priority Flood Projects

- Final Priority Projects for Alternatives Analysis and Concept Development
- Other Projects from Ranked List to be Conceptualized Under Future Efforts
- Note: Sanlando Springs Area, Rolling Hills Area, and Magnolia Street Area are Combined into One Consolidated Project Area Due to Proximity and Interconnectivity

| PROJECT NAME                                       |
|----------------------------------------------------|
| SANLANDO SPRINGS - NORTH STREET TO LAKE FLORIDA*   |
| TRIBUTARY C - HUNT CLUB TO LAKE BRANTLEY           |
| MOBILE MANOR*                                      |
| MARKHAM WOODS RD NEAR TIMBERBROOK & BRIDGEWATER    |
| CECELIA DRIVE AT BEAR LAKE*                        |
| MAGNOLIA STREET 427 TO LAKE FLORIDA*               |
| ROLLING HILLS*                                     |
| RIVERBEND BOULEVARD AND SWEETWATER BOULEVARD AREA  |
| BANANA LAKE ROAD                                   |
| CUTLER ROAD                                        |
| BEAR LAKE WOODS*                                   |
| BEL AIRE HILLS                                     |
| MARKHAM RD AT LAKE MARKHAM RD                      |
| BILTMORE PT                                        |
| * PROJECT ALSO INCORPORATES WATER QUALITY ELEMENTS |

# Recommended Priority Water Quality Projects



| Water Quality Priority Project Recommendation Summary |                                                                                |                         |
|-------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------|
| #                                                     | Water Quality Problem Area                                                     | Problem Source          |
| 1                                                     | SABAL POINT SUBDIVISION BMP                                                    | PROBLEM AREA ASSESSMENT |
| 2                                                     | MOBILE MANOR BMP*                                                              |                         |
| 3                                                     | NORTHWESTERN BMP 1                                                             |                         |
| 4                                                     | NORTHWESTERN BMP 2                                                             |                         |
| 5                                                     | NORTHWESTERN BMP 3                                                             |                         |
| 6                                                     | WEATHERSFIELD BMP                                                              |                         |
| 7                                                     | SPRING LAKE OUTFALL #12 BMP                                                    |                         |
| 8                                                     | SWEETWATER BMP                                                                 |                         |
| 9                                                     | BEAR LAKE WOODS *<br>BASIN LW_Q00740_S                                         | POLLUTANT LOAD MODELING |
| 10                                                    | SPRING LANDING<br>BASINS LW_A00270_S, LW_A00280_S,<br>LW_A00290_S, LW_A00300_S |                         |
| 11                                                    | SANLANDO SPRINGS *<br>BASINS LW_M06490_S, LW_M06400_S                          |                         |
| 12                                                    | MAGNOLIA STREET*<br>BASIN LW_M06350_S                                          |                         |
| 13                                                    | SWEETWATER BMP 1, 2, 3<br>BASINS BW_BW01310_S, BW_BW01370_S                    |                         |
| * ASSOCIATED WITH FLOODING PROJECT                    |                                                                                |                         |

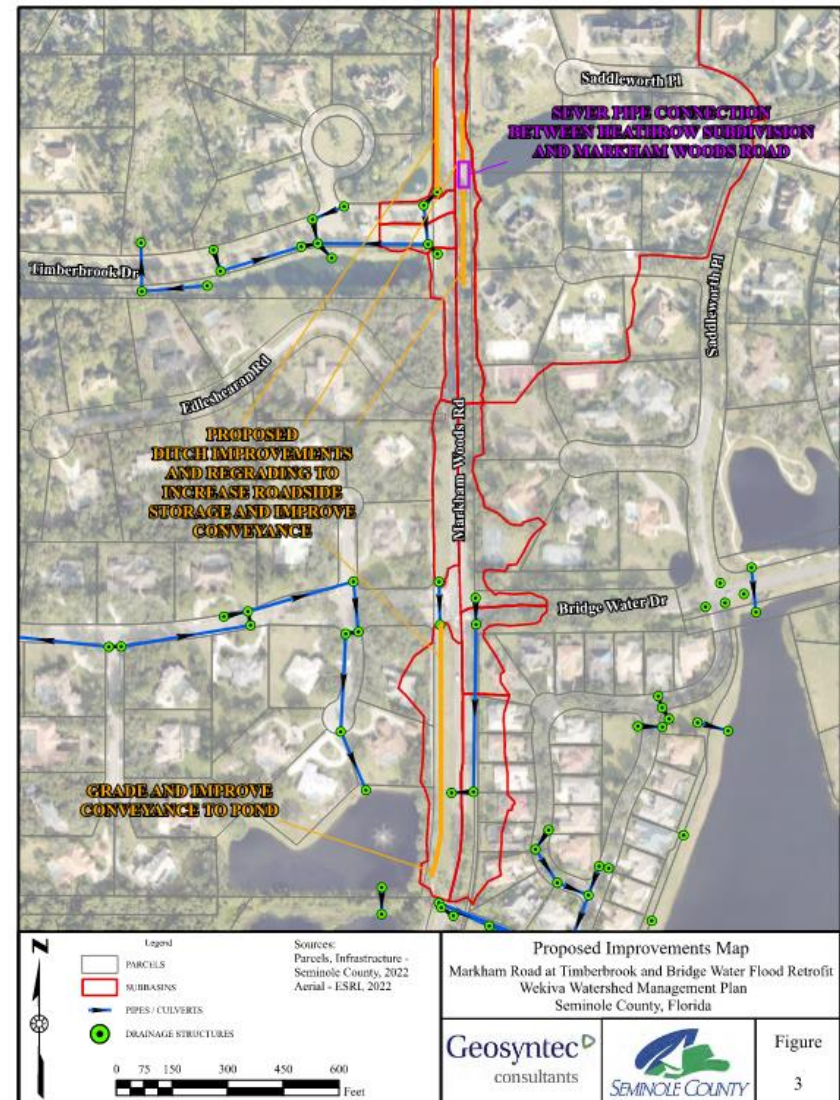
# Recommended Priority Projects Costs

- Priority Projects Classified by Type and Consolidated by Area
  - *Construction Cost based on Preliminary Engineers Estimate of Probable Costs*
  - *Implementation Constraints Considered*
  - *SJRWMD Consulted*
  - *Right of Way / Easement Acquisition Accounted*
  - *Contingency Included*
  - *Each will Require Design and Permitting to Implement*
- Total of \$35+ million
  - *2023 Dollars*
  - *Includes Design, Permitting, CEI*
  - *Includes Land Cost Projection*
  - *Includes Contingency*
- Priority Projects will be Included in Countywide Stormwater Master Plan

| Priority Project                                        | Project Type               | Estimated Total Cost |
|---------------------------------------------------------|----------------------------|----------------------|
| Sanlando Springs - Magnolia Street – Rolling Hills Area | Flooding and Water Quality | \$3,089,000 Phase 1  |
|                                                         |                            | \$3,077,000 Phase 2  |
|                                                         |                            | \$3,948,000 Phase 3  |
|                                                         |                            | \$6,298,000 Phase 4  |
|                                                         |                            | \$1,657,000 Phase 5  |
| Bear Lake Woods                                         | Flooding and Water Quality | \$1,873,000          |
| Mobile Manor                                            | Flooding and Water Quality | \$1,526,000          |
| Cecelia Drive                                           | Flooding and Water Quality | \$1,599,000          |
| Tributary C – Hunt Club to Lake Brantley                | Flooding                   | \$711,000            |
| Markham Road at Timberbrook and Bridge Water            | Flooding                   | \$263,000            |
| Bel Aire Estates                                        | Flooding                   | \$2,501,000          |
| Cutler Road                                             | Flooding                   | \$798,000            |
| Riverbend Boulevard                                     | Flooding                   | \$791,000            |
| Banana Lake Road                                        | Flooding                   | \$279,000            |
| Biltmore Point                                          | Flooding                   | \$271,000            |
| Markham Road at Lake Markham                            | Flooding                   | \$1,920,000          |
| Northwestern BMP 1                                      | Water Quality              | \$395,000            |
| Northwestern BMP 2                                      | Water Quality              | \$395,000            |
| Northwestern BMP 3                                      | Water Quality              | \$395,000            |
| Spring Lake Outfall #12 BMP                             | Water Quality              | \$484,000            |
| Weathersfield BMP                                       | Water Quality              | \$540,000            |
| Sabal Point BMP                                         | Water Quality              | \$481,000            |
| Spring Landing BMP                                      | Water Quality              | \$644,000            |
| Sweetwater BMP 1                                        | Water Quality              | \$472,000            |
| Sweetwater BMP 2                                        | Water Quality              | \$371,000            |
| Sweetwater BMP 3                                        | Water Quality              | \$788,000            |
| TOTAL:                                                  |                            | \$35,566,000         |

# Example Flood Control Project

- Markham Road at Timberbrook and Bridge Water
- Road and Sidewalk Flooding During Extreme Storm Events
- Flooding Persists after Storms
- Proposed Project
  - *Restore Roadside Drainage Grading and storage*
  - *Improve Conveyance to Outfalls*



# Example Water Quality Project

- Older Development with No Water Quality treatment
- Discharges Directly into Little Wekiva River
- Proposed Project
  - *Retrofit Existing Outfall Pipe System*
  - *Install Baffle Box with Filter Media for Treating Nutrients*

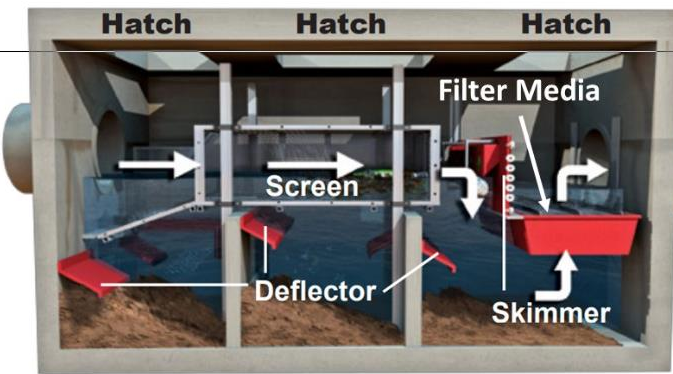
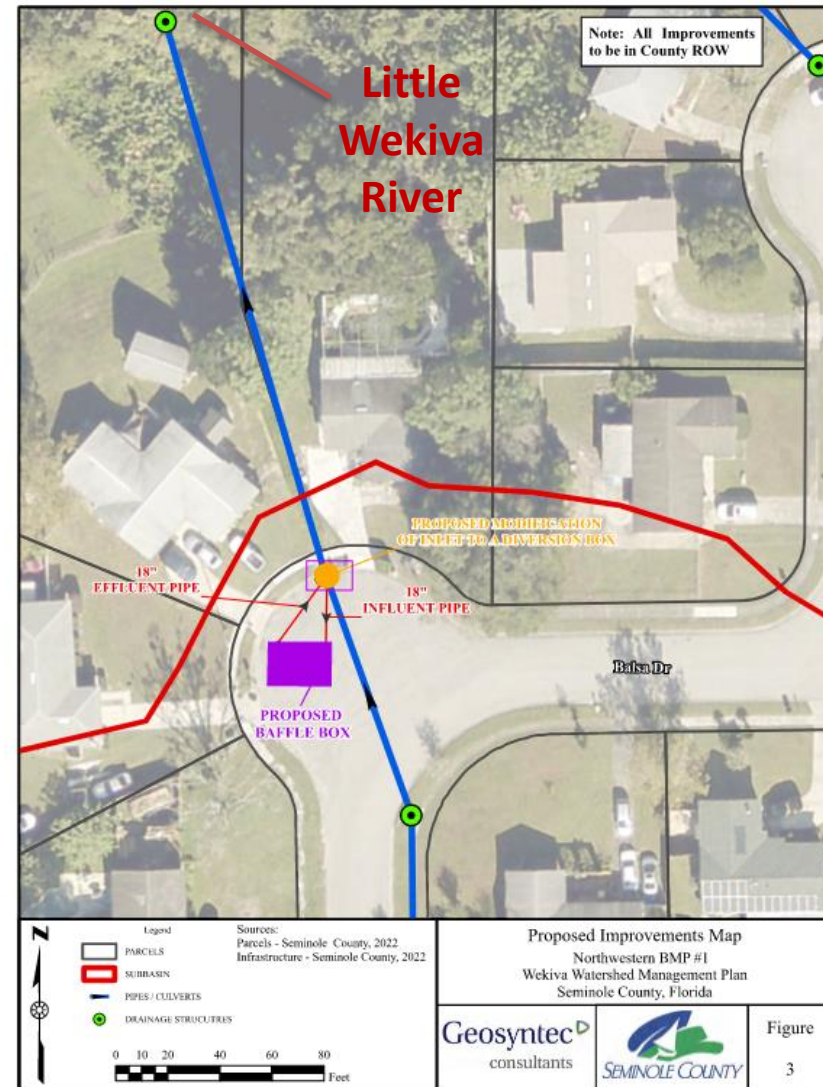


Photo 5: NSBB with Upflow Media Filter Concept (image from Oldecastle Infrastructure)



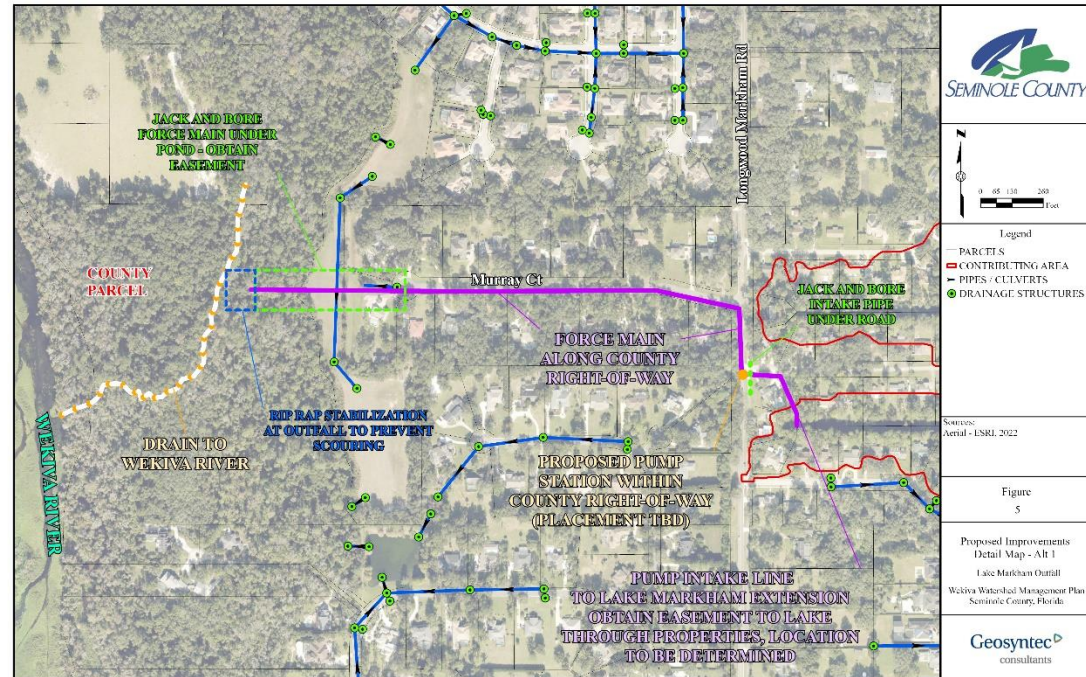
# Example Flood & Water Quality Project

- Older Development Inconsistent and Mismatched Drainage, Limited Outfalls
- No Designed Water Quality Treatment
- Proposed Project
  - *Re-establish Swales to Attenuate Flooding and Treat Runoff*
  - *Install Additional Outfalls Through Obtained Easements*



# Lake Markham Alternative

- Feasibility for Providing Engineered Positive Outfall
  - Gravity Pipe Outfall not Feasible
  - Pumped Outfall Feasible
  - Outfall to Wekiva River (Closer) or Yankee Lake
  - 122 Private Properties to Benefit
- Design Constraints
  - Right of Way / Easements from Private Property
  - Utility Impacts
- Permitting Considerations
  - Downstream Flooding
  - Water Quality Impacts
  - Lake Conservation Easements

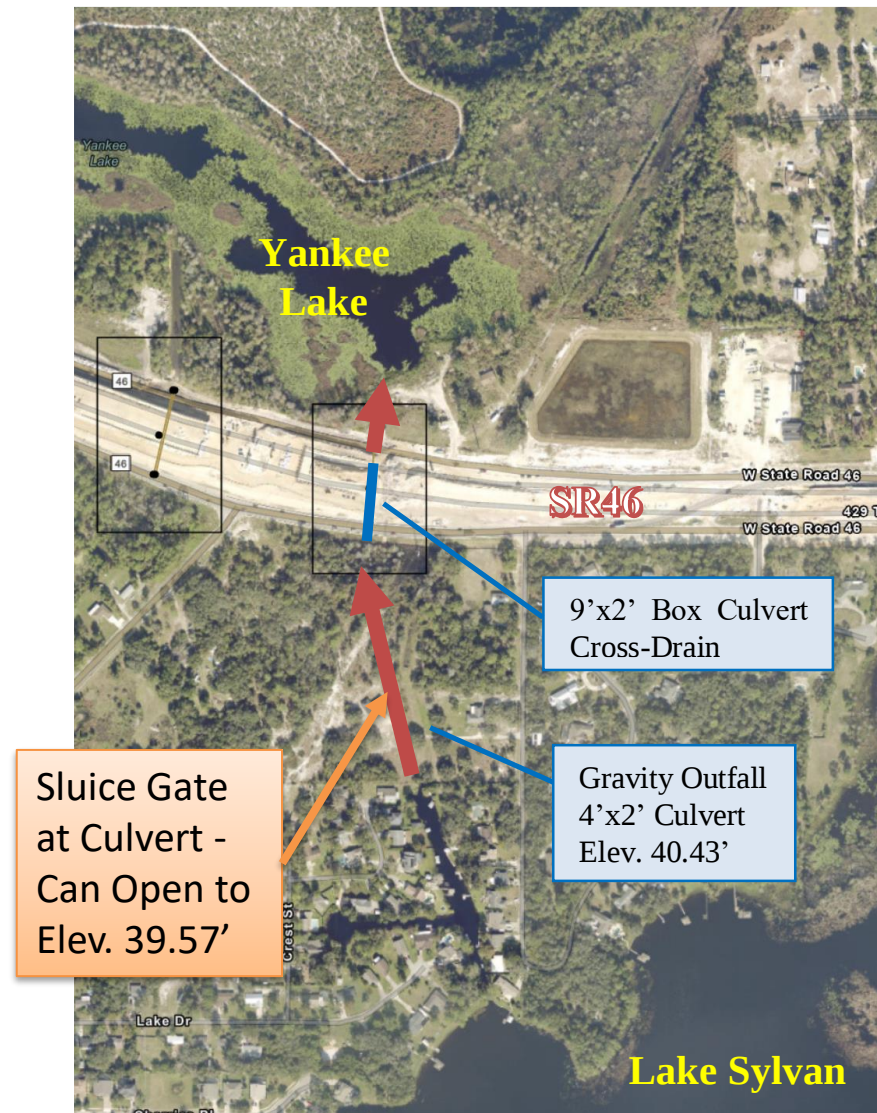


## Proposed Pump Station Solution to Address Impacts

- ~62.5 cfs pump station pumping to Wekiva River to provide flood protection for design storms
- Eliminates flood impacts for up to the 10 year design storm
- 1' peak stage reduction for 100 Year / 96 Hour design storm, full recovery of stages within 3 days
- Leverage pump station to maintain a consistent maximum lake control level of ~42.5'
- \$14.8+ Million Estimated for Implementation (design, permitting, construction)
- Consider Project Costs versus Benefit to Number of Properties versus Frequency of Need

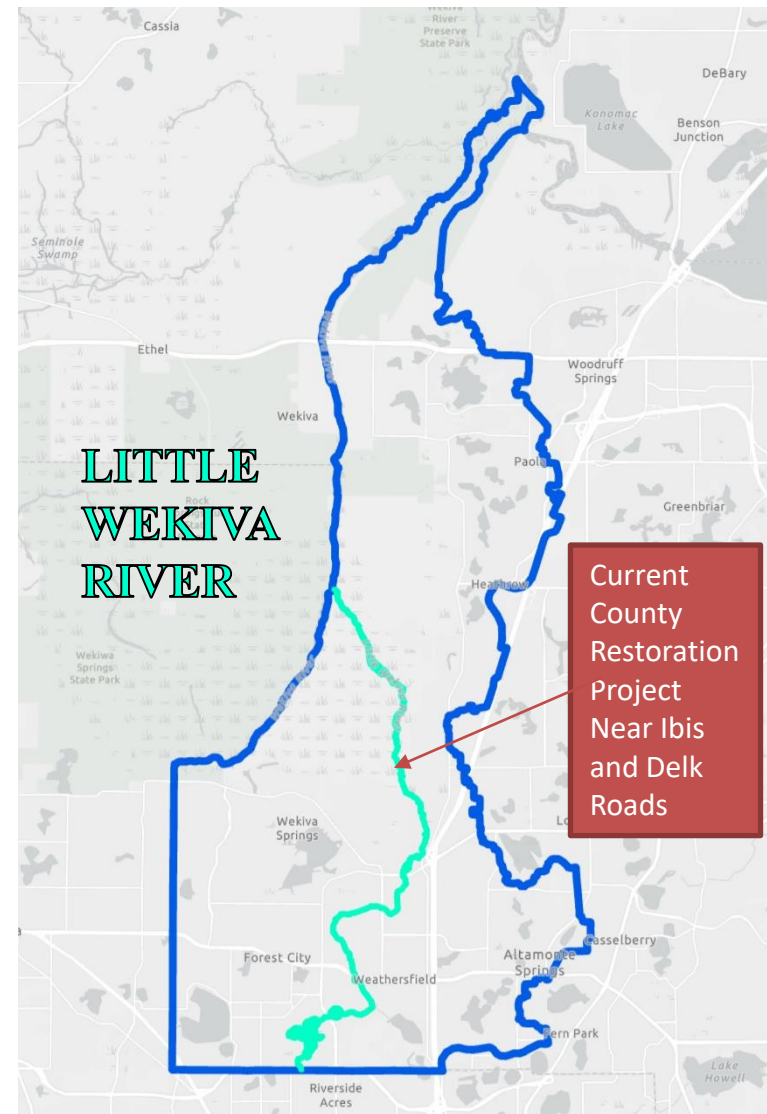
# Lake Sylvan Alternative

- Need for Active Operation Schedule for Outfall Structure
  - *Sluice Gate Controls Discharge through Outfall Culvert*
  - *Existing Normal Elevation 40.43'*
  - *Emergency Authorization Level 39.57'*
- Propose Operating Schedule that has normal operation at the lower limit of range
- County Controls the Operation
- Permitting Considerations
  - *Downstream Impacts*
  - *Water Quality*
  - *Conservation Areas*

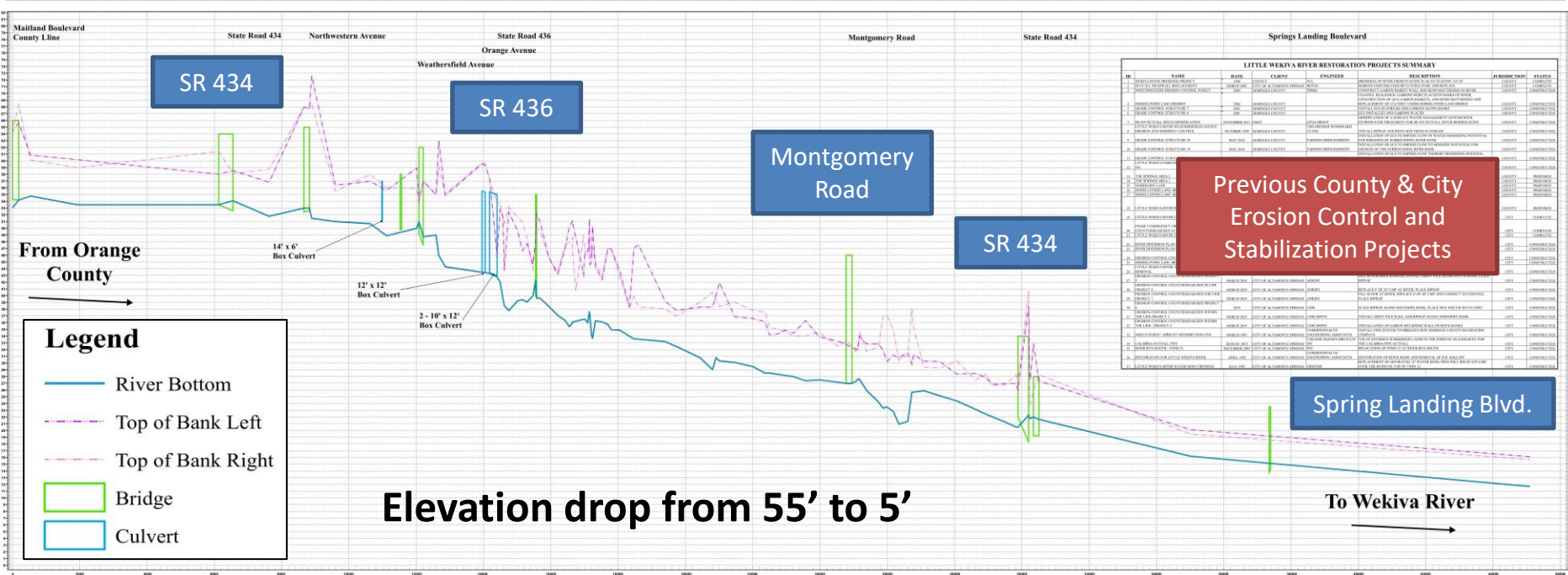
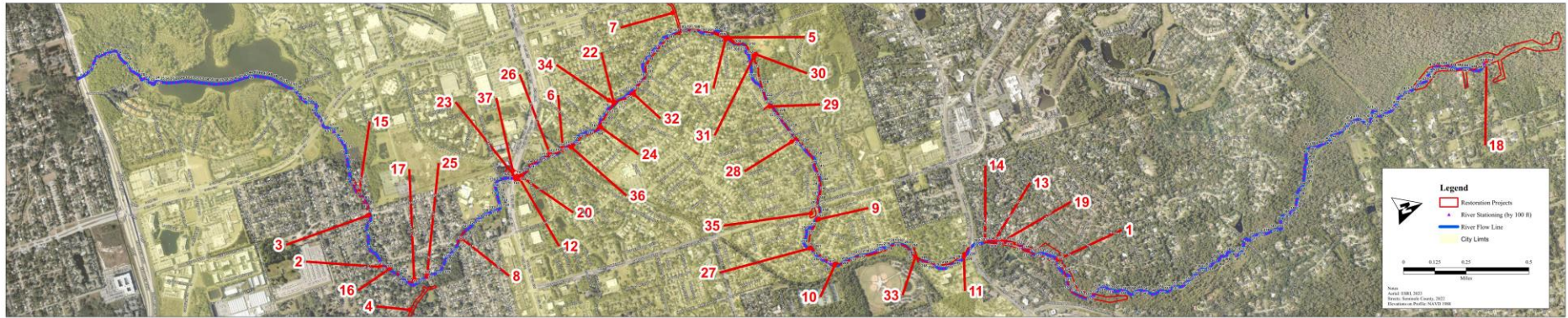


# Little Wekiva River Evaluation

- Primary Drainage Feature in Southern Part of Watershed to the Wekiva River
- Flashy River Segments with High Velocities During Extreme Storms
- History of Erosion and Sedimentation and Water Quality Concerns
- Large Contributing Area from Orange County
- Numerous Previous Erosion and Sedimentation Control Projects Implemented by the County and Others
- Current County Restoration Project Near Ibis and Delk Roads



# Little Wekiva River Projects



Wekiva Watershed Management Plan  
Seminole County, Florida

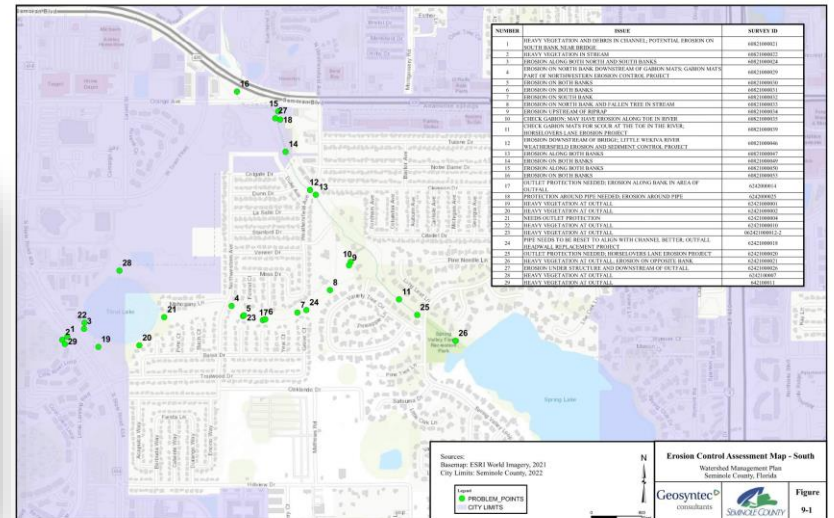
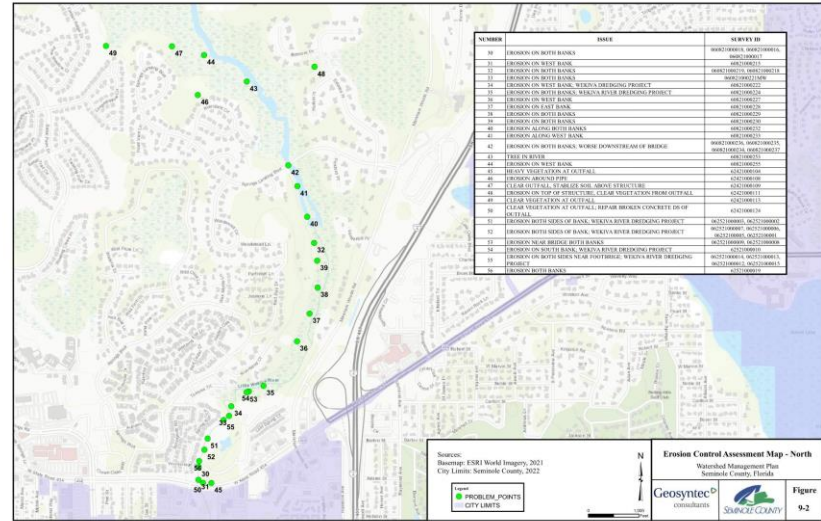
Little Wekiva River Plan and Profile with Project Locations

Exhibit 26

Geosyntec  
consultants

# Little Wekiva River Improvements

- Inventory of County Portions of the River
- Identify Erosion and Sedimentation Issues
- Review Previous Projects
- Recommendations for Maintenance and Corrective Action



# Project Schedule

| Study Task                              | 2022 |   |   |   |   |   |   |   |   |   |   |   | 2023 |   |   |   |   |   |   |  |
|-----------------------------------------|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|--|
|                                         | J    | F | M | A | M | J | J | A | S | O | N | D | J    | F | M | A | M | J | J |  |
| Inventory and Problem Identification    |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| Engineering Drainage Assessment         |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| Water Quality Assessment                |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| Initial Public Meeting                  |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| Draft Existing Conditions Report        |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| Improvement Project Area Prioritization |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| County Comissioner Workshop             |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| Improvement Alternative Analysis        |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| Final Public Meeting                    |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| Final Reports                           |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| Final Commissioner Presentation         |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |
| Final Reports - Project Closeout        |      |   |   |   |   |   |   |   |   |   |   |   |      |   |   |   |   |   |   |  |

# Requested Board Action

- Accept Watershed Study
- Direction on whether or not to move forward with FEMA Letter of Map Revision

# Acknowledgments & Contacts

## Seminole County Staff

Jean Jreij, PE – Public Works Director

Shannon Wetzel – Project Manager – Watershed Management Division Manager

Kim Ornberg, PE – Director Environmental Services

Tony Nelson, PE, CFM – Public Works – Deputy Public Works Director

Dino Lucarelli, PE – Chief Design Engineer - Public Works

Jeff Sloman, PE – Professional Engineer - Public Works

Owen Reagan, PE – Professional Engineer - Public Works – Roads / Stormwater

## Project Contact

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# **Wekiva Watershed Management Plan**

**Final Presentation to  
Board of County  
Commissioners  
Presentation  
June 13, 2023**