



Watershed Management Plan

May 4, 2011

ATKINS



Project Summary

- Cocohatchee – Corkscrew Watershed
 - Ditch blocks for restoration of hydrology
- Golden Gate Watershed
 - Diversion from GG to Rookery Bay
 - NGGE wetland mitigation area
 - Two (2) projects to reduce baseflow in finger canals
 - Wolfe Rd. stormwater treatment area

Project Summary

- Rookery Bay Watershed
 - North Bell Meade Spreader Swale (from Golden Gate)
 - South Bell Meade Spreader Swale
 - Off-line reservoir
 - Stormwater treatment area
- Faka Union, Fakahatchee and Okaloacoochee Watersheds
 - Eight (8) projects with ditch blocks for hydrologic restoration in isolated wetlands and sloughs

Project Ranking Procedure

- Calculate improvement based on Performance Measures
- Define Watershed Weighting Factors by Benefit Type
 - Watershed drainage area
 - Size of the receiving estuary
 - Land use distribution
- Normalize Benefit Type Scores
- Additional Weighting Based on Relative Importance
 - (Normalized Score of Water Discharges to Estuaries) * 2
 - (Pollutant Load and Watershed Hydrology) * 1

Project Summary

Combined Performance Measure Lift

| Performance Measure | Cocohatchee - Corkscrew | | Golden Gate - Naples Bay | | Rookery Bay | | Faka Union, Fakahatchee, Okaloacoochee | |
|-------------------------|-------------------------|-----------------|--------------------------|-----------------|---------------------|-----------------|--|-----------------|
| | Existing Conditions | Predicted Score | Existing Conditions | Predicted Score | Existing Conditions | Predicted Score | Existing Conditions | Predicted Score |
| Discharge to Estuaries | 5.43 | 5.43 | 1.56 | 2.96 | 4.35 | 6.54 | 5.64 | 5.69 |
| Wetland Hydrology | 2.58 | 2.61 | 6.21 | 6.32 | 3.76 | 3.98 | 5.81 | 5.87 |
| Water Quality | | | | | | | | |
| <i>Total Nitrogen</i> | 4.23 | 4.23 | 4.51 | 5.25 | 7.41 | 7.75 | 6.16 | 6.75 |
| <i>Total Phosphorus</i> | 5.13 | 5.13 | 3.75 | 4.02 | 6.73 | 6.80 | 5.76 | 7.23 |

Watershed Weighting Factors

- Weighting factors calculated per watershed by benefit-type
- Factors are calculated relative to the drainage area
 - Water Quantity: estuary area/drainage area
 - Water Quality: urban or agricultural area/drainage area
 - Natural Resources/Hydrology: existing inland wetland area/drainage area

Watershed Weighting Factors

| Watershed | Weighting Factor | | |
|------------------------------------|----------------------|---------------------------|---------------|
| | Discharge to Estuary | Wetland Hydrology/Habitat | Water Quality |
| Golden Gate/Naples Bay | 9.75 | 5.86 | 6.06 |
| Rookery Bay | 6.55 | 4.89 | 2.45 |
| FU-FA-OK/Ten Thousand Islands | 7.27 | 1.17 | 1.81 |
| Cocohatchee-Corkscrew/Wiggins Pass | 9.75 | 3.87 | 4.01 |

Discharge to Estuary Weighting Factor = $10 - (10 \times (\text{Receiving Estuary Area} / \text{Watershed Area}))$

Wetland Hydrology/Habitat Weighting Factor = $10 - (10 \times (\text{Non-Tidal Wetland Area} / \text{Watershed Area}))$

Water Quality Weighting Factor = $10 \times (\text{Urban} + \text{Agricultural Area} / \text{Watershed Area})$

Example Calculations

- North Belle Meade Spreader Swale

- Discharge to Estuary Benefit:

- Golden Gate: Performance Measure Lift of 0.89

- Rookery Bay: Performance Measure Lift of 1.25

- Weighted Score = 16.865

- $(0.89 * 9.75) + (1.25 * 6.55)$

Normalized Project Ranking

| RECOMMENDED PROJECT | DISCHARGE TO ESTUARY BENEFIT | | WATER QUALITY BENEFIT | | WETLAND HYDROLOGY/HABITAT BENEFIT | | Total Normalized Project Score |
|---|------------------------------|------------------|-----------------------|------------------|-----------------------------------|------------------|--------------------------------|
| | Weighted Score | Normalized Score | Weighted Score | Normalized Score | Weighted Score | Normalized Score | |
| North Belle Meade/Southern Horsepen Strand Rehydration ⁽¹⁾ | 16.865 | 8.5976 | 1.0658 | 2.579 | 0.1751 | 2.537 | 22.310 |
| North Golden Gate Estates Flowway Restoration Project ⁽¹⁾ | 0.0927 | 0.0472 | 4.1330 | 10.000 | 0.690264 | 10.000 | 20.094 |
| Henderson Creek Diversion Pump Station (100 cfs) ⁽¹⁾ | 19.616 | 10.0000 | 0.0000 | 0.000 | 0.0000 | 0.000 | 20.000 |
| South I-75 Canal Spreader Swale and Wetland Rehydration | 0.0000 | 0.0000 | 0.4304 | 1.041 | 0.5062 | 7.334 | 8.375 |
| Corkscrew Regional Ecosystem Watershed | 0.0000 | 0.0000 | 0.0000 | 0.000 | 0.1214 | 1.758 | 1.758 |
| Middle Okaloacoochee Slough Wetland Restoration | 0.0000 | 0.0000 | 0.5033 | 1.218 | 0.0180 | 0.261 | 1.479 |
| Henderson Creek Off-Line Storage Reservoir | 0.2351 | 0.1199 | 0.0581 | 0.141 | 0.0000 | 0.000 | 0.380 |
| Lower Okaloacoochee Slough Wetland Restoration | 0.0000 | 0.0000 | 0.1065 | 0.258 | 0.0028 | 0.040 | 0.298 |
| Fakahatchee Wetland Restoration - Area 1 | 0.0000 | 0.0000 | 0.0751 | 0.182 | 0.0001 | 0.002 | 0.183 |
| US HWY 41 Stormwater Treatment Area & Wetland Hydration | 0.0000 | 0.0000 | 0.0143 | 0.035 | 0.0076 | 0.110 | 0.144 |
| Fakahatchee Wetland Restoration - Area 2 | 0.0000 | 0.0000 | 0.0560 | 0.135 | 0.0001 | 0.001 | 0.137 |
| Wolfe Road Wetland Treatment System | 0.0000 | 0.0000 | 0.0462 | 0.112 | 0.0000 | 0.000 | 0.112 |
| Upper Okaloacoochee Slough Wetland Restoration | 0.0000 | 0.0000 | 0.0042 | 0.010 | 0.0005 | 0.007 | 0.017 |
| Okaloacoochee Wetland Restoration - Area 2 | 0.0000 | 0.0000 | 0.0000 | 0.000 | 0.0003 | 0.004 | 0.004 |
| Okaloacoochee Wetland Restoration - Area 3 | 0.0000 | 0.0000 | 0.0000 | 0.000 | 0.0003 | 0.004 | 0.004 |
| Okaloacoochee Wetland Restoration - Area 1 | 0.0000 | 0.0000 | 0.0000 | 0.000 | 0.0002 | 0.003 | 0.003 |
| Upper Golden Gate Estates Canal Weir Constuction | 0.0006 | 0.0003 | 0.0000 | 0.000 | 0.0000 | 0.000 | 0.001 |
| Orange Tree Canal Control Structure Installation | 0.0005 | 0.0003 | 0.0000 | 0.000 | 0.0000 | 0.000 | 0.001 |

(1) Weighted score considers benefit to both watersheds

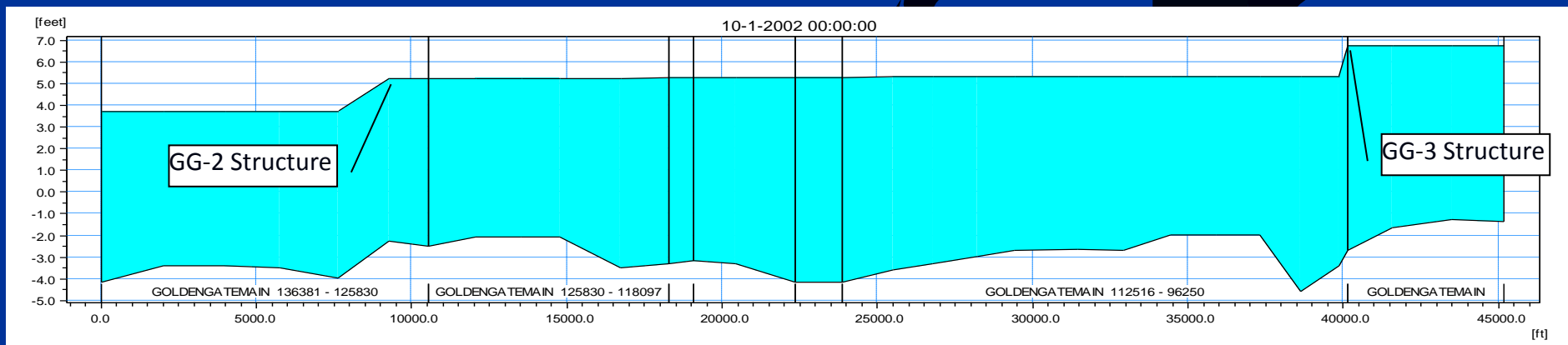


Conclusions

- Projects that divert water between watersheds will provide benefits that protect the estuaries
- Relatively inexpensive wetland restoration activities can provide significant hydrologic restoration benefits
- Non-structural and policy issues will have a significant role in managing water supply and quality in the future

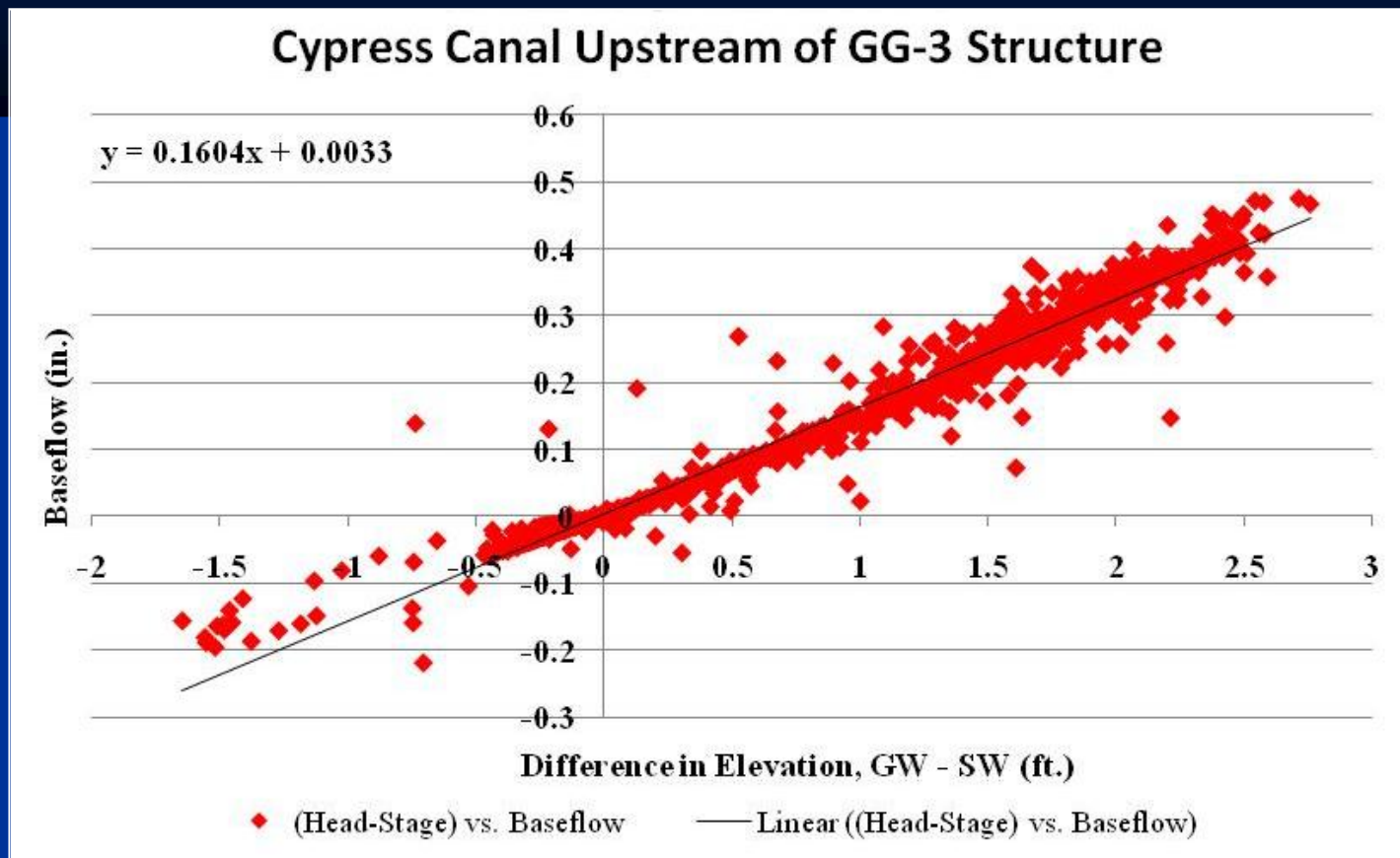
Structure Operations

- Two Primary Issues in Golden Gate Watershed
 - Reduce baseflow contributions
 - Direct water to other watersheds
- Currently wet season structure control elevations are below dry season control elevations



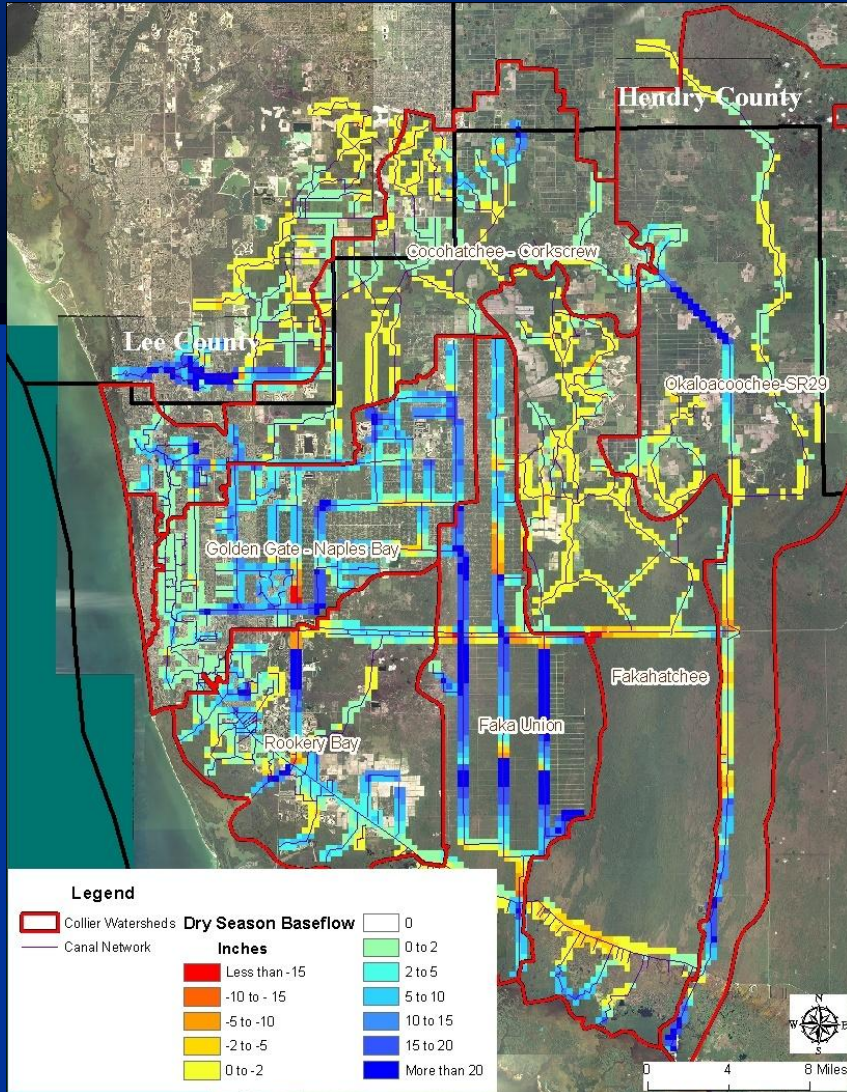
Water Control Structure Operations

- Difference between groundwater elevation and surface water elevation determines baseflow

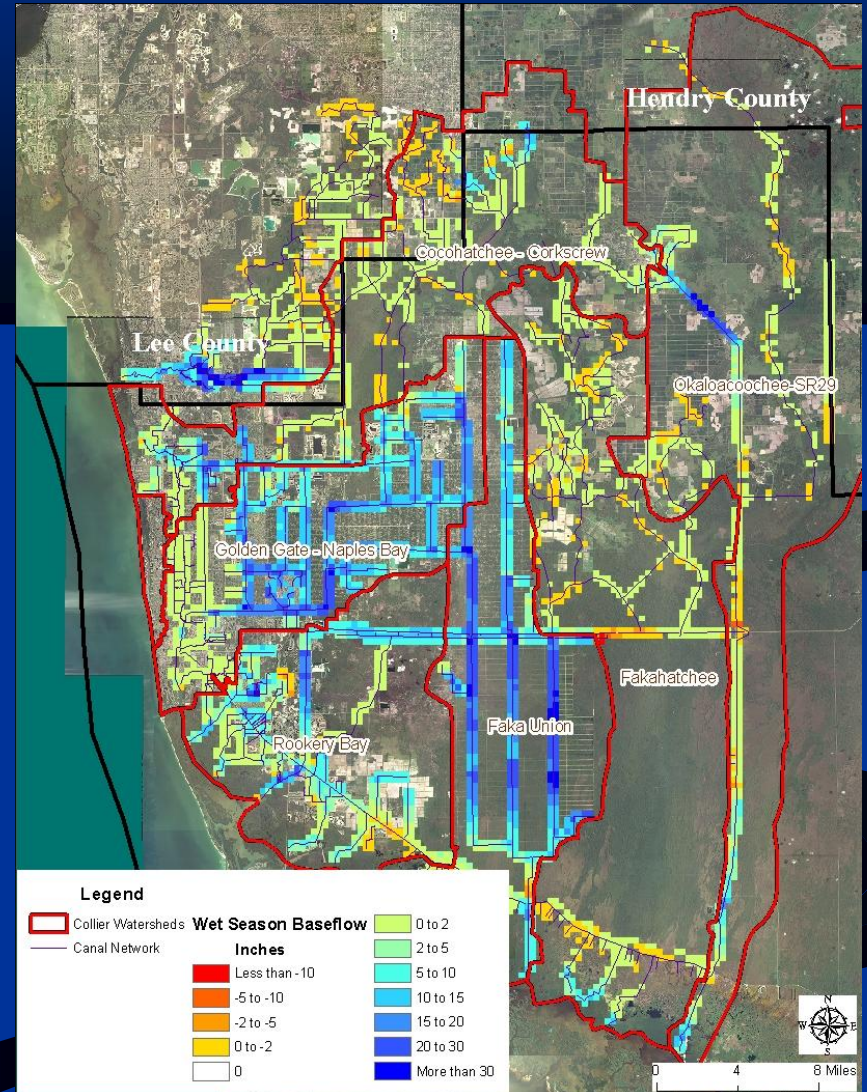


Water Control Structure Operations

Average Dry Season Baseflow



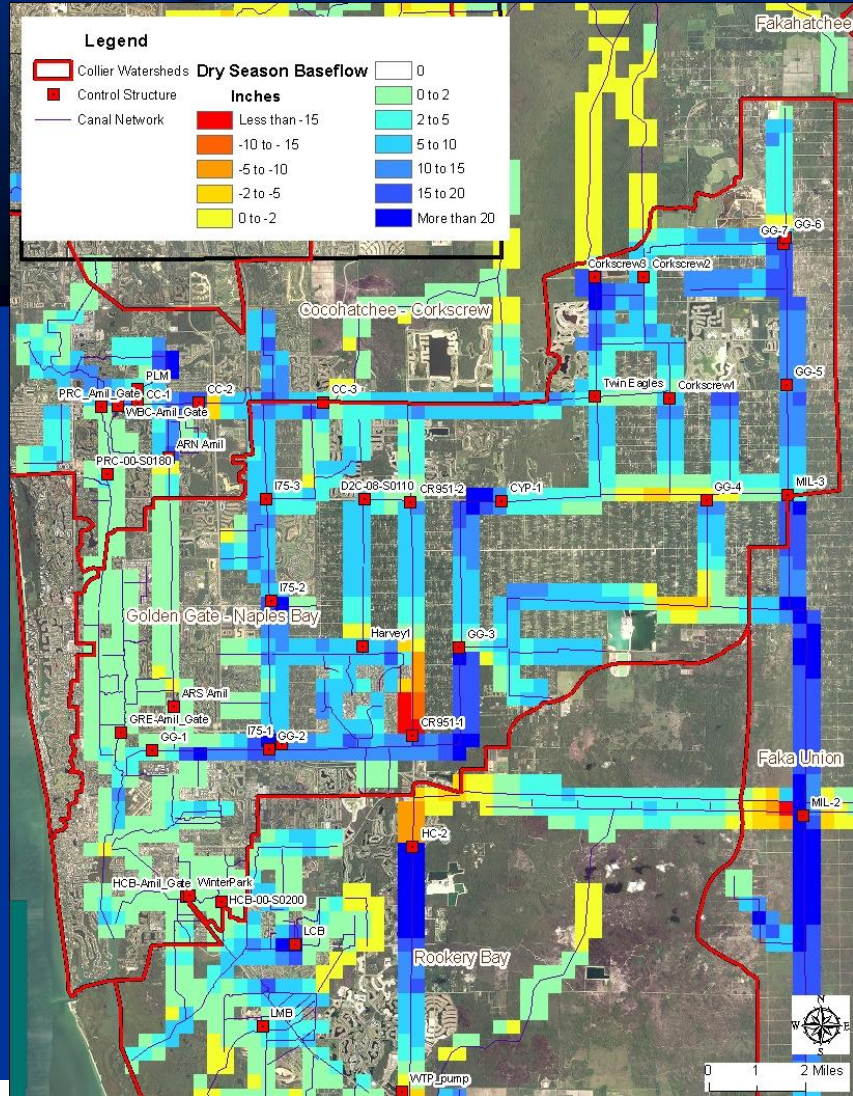
Average Wet Season Baseflow



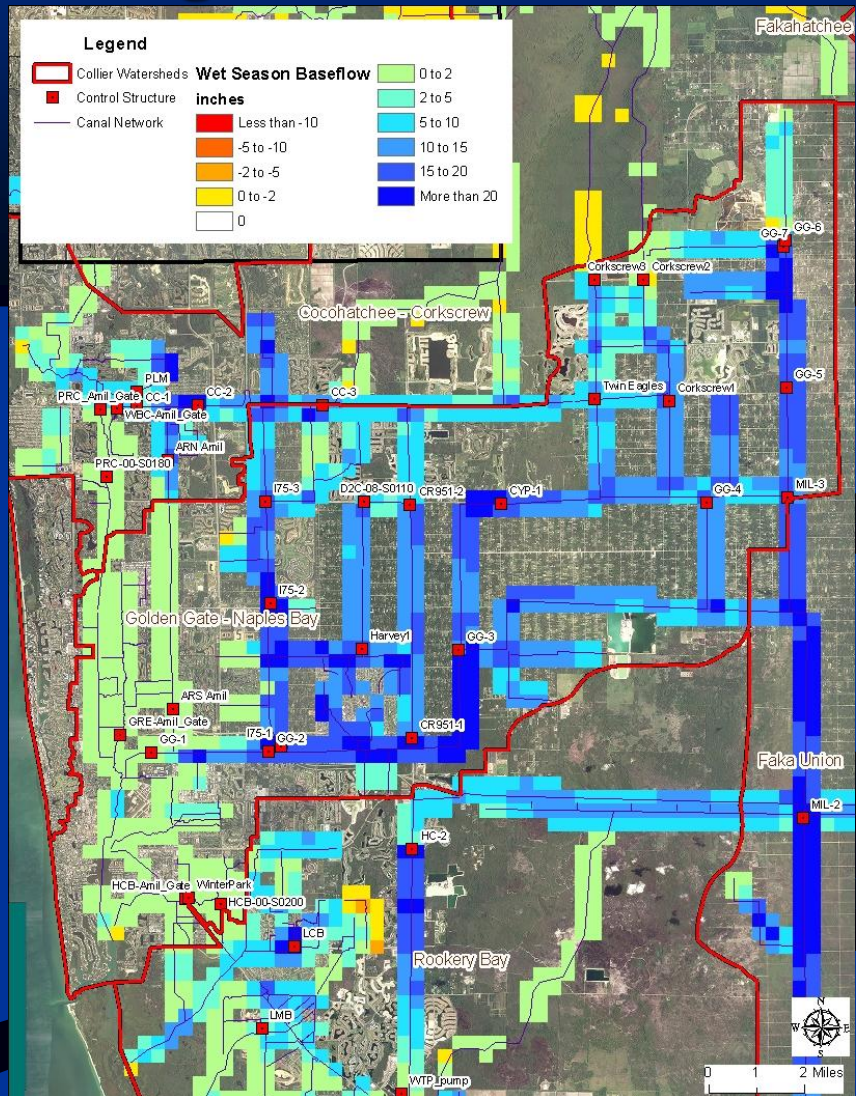
Water Control Structure Operations

Golden Gate Watershed

Average Dry Season Baseflow



Average Wet Season Baseflow



Structure Operations in the Golden Gate Watershed

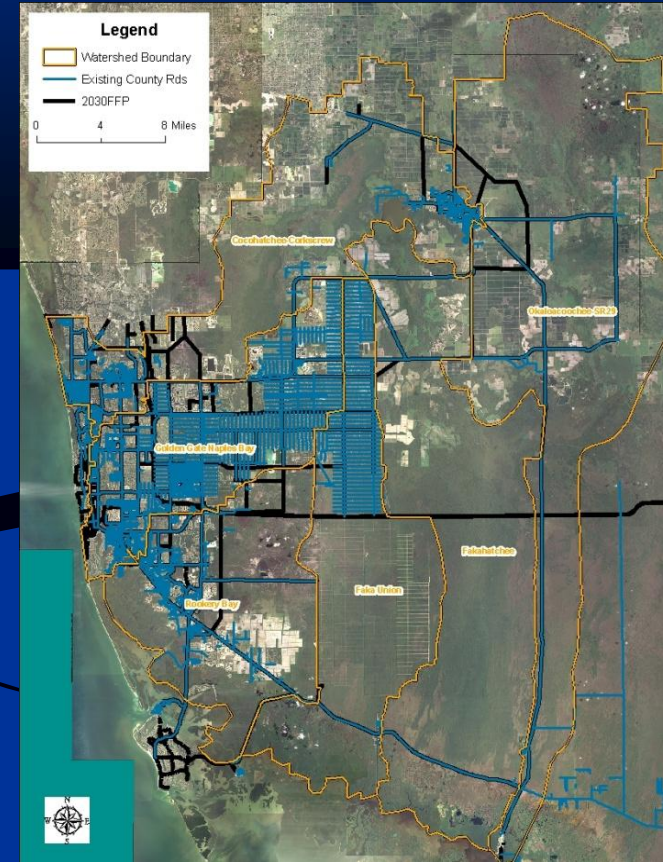
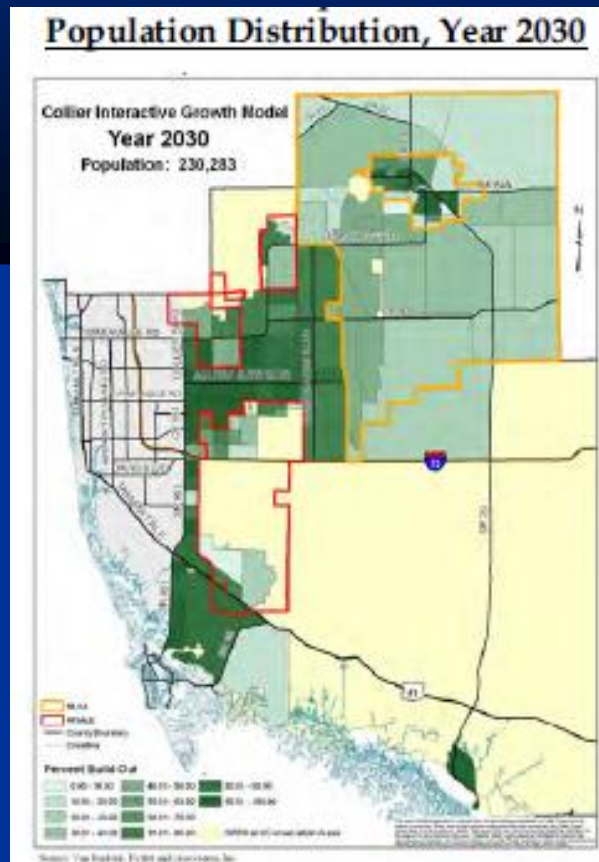
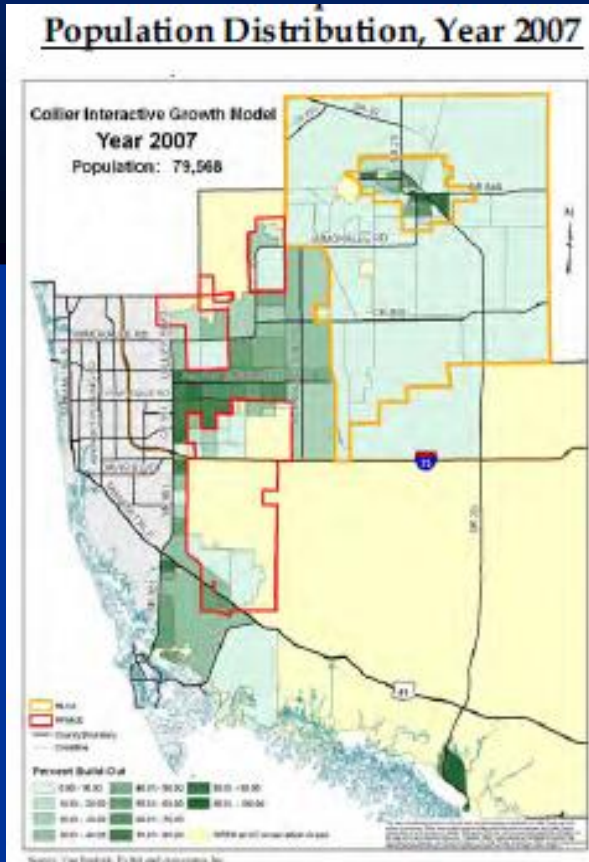
- Work with SFWMD to optimize structure operations so that canal stage more closely matches groundwater elevation
- More important in dry season than wet; but wet season can be adjusted to further reduce baseflow
- Coordinate with SFWMD to direct excess water to Faka Union watershed during rainy season (Miller 3 and C-1 Connector Canal)

Regulatory Review and Recommendations

Current Stormwater Management Approach



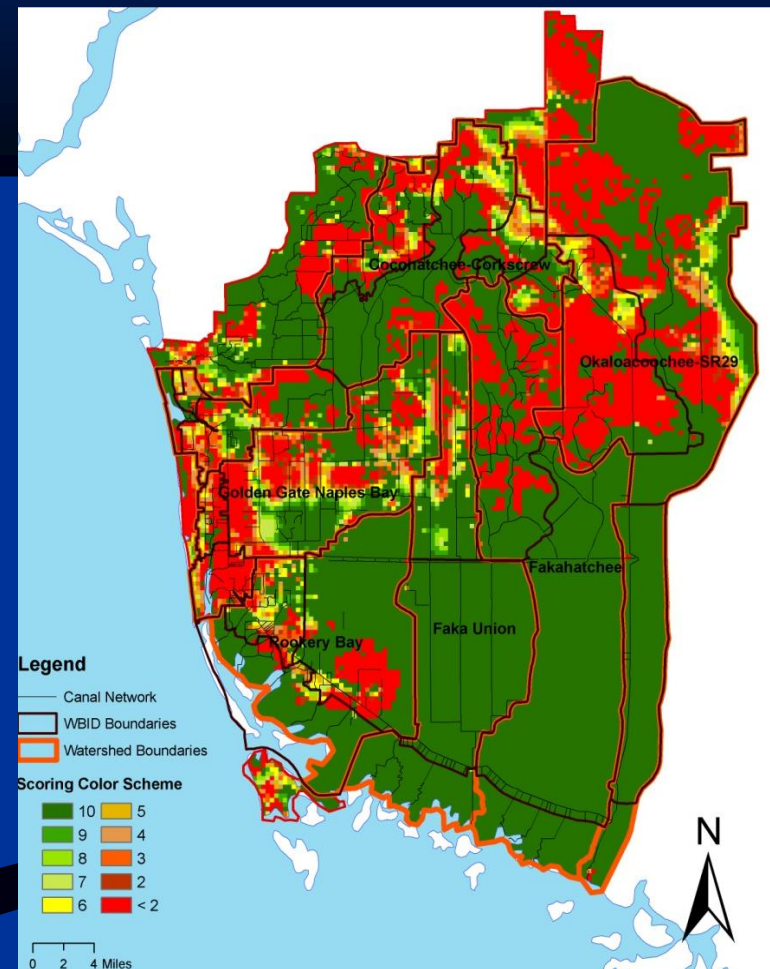
County Growth Projections



Water Quality and Pollution Load Issues

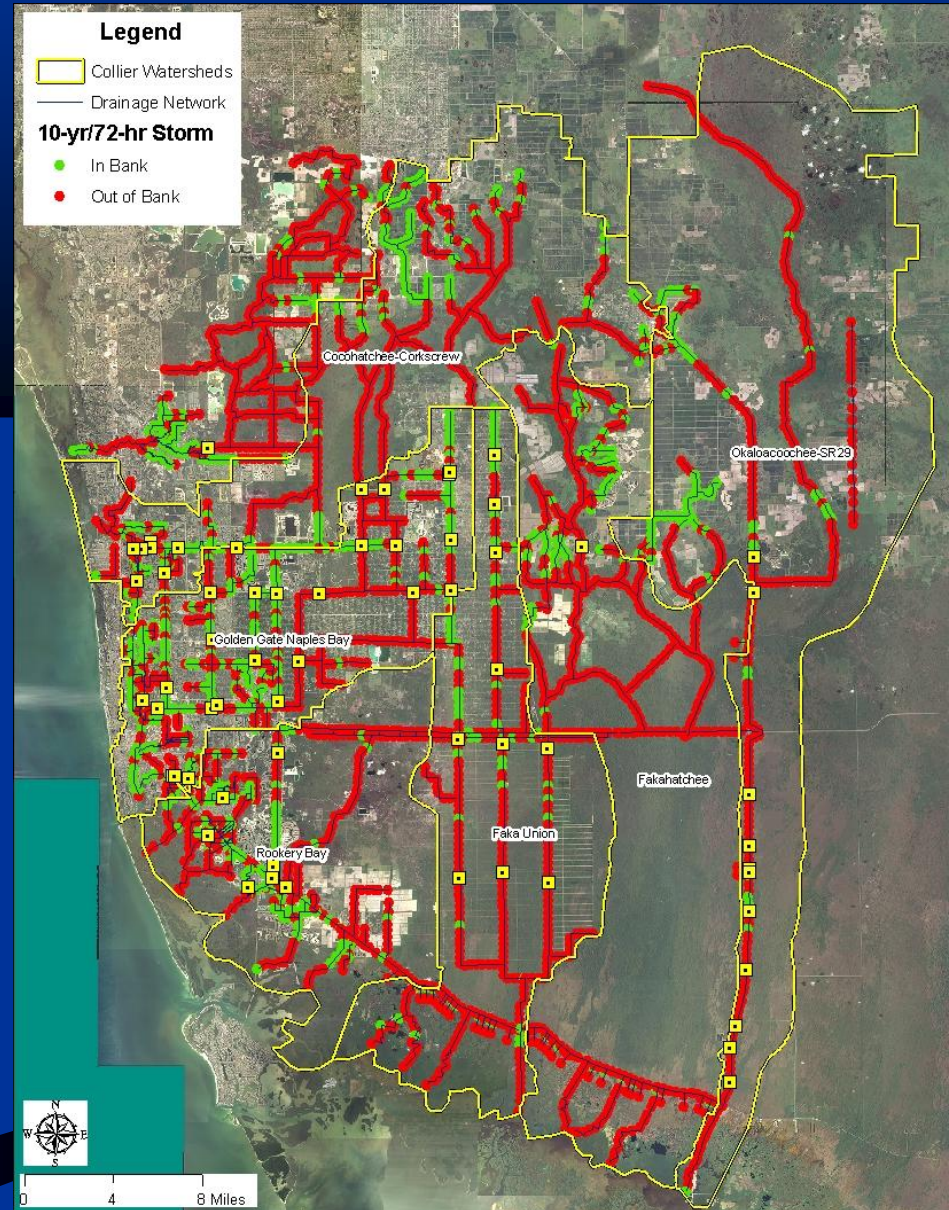
Total Nitrogen Load

- Several impaired water bodies
- Numerous areas with no runoff pollution control
- GMP Conservation and Coastal Element requires no increase in pollution load from pre-development



Current Canal Capacity

- Model results show limited conveyance capacity in numerous canal segments



Objective

- Help implement a Sustainable Stormwater Management Program
- The programs should aim to:
 - Promote more effective site planning to minimize anthropogenic impacts,
 - Promote preservation of the natural system
 - Help reduce development costs
 - Help reduce cost of future drainage system improvements

Water Quality Regulations Promote Low Impact Development (LID)

- LID promotes management of stormwater by:
 - Encouraging management of stormwater at the site
 - Minimize the extent of directly connected impervious areas.
 - Minimize site disturbance
 - Maintain or restore a site's natural hydrology
 - Maximize the site's assimilative capacity

Low Impact Development (LID)

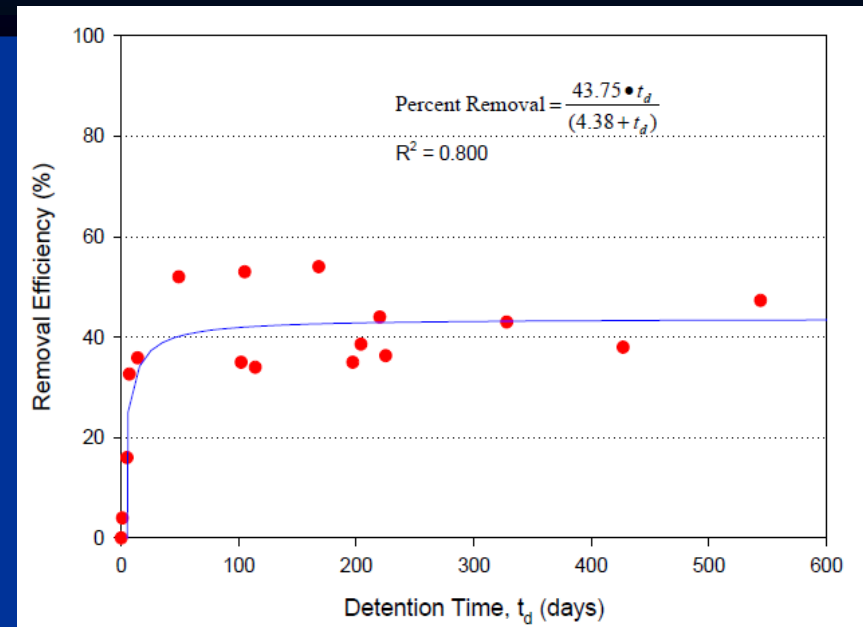


Water Quality Regulatory Issues

- Main Issue: How to provide water quality credits for development
- Not feasible under current State regulations. Feasible under proposed new stormwater rules.

Water Quality Treatment Requirement Growth Management Plan

All new development and redevelopment projects shall meet 150% of the water quality volumetric requirements of Section 5.2.1a of the Basis of Review for ERP applications (Ordinance 2008-10, 3.07.02 Interim Watershed Regulations)



Removal Efficiency of TN

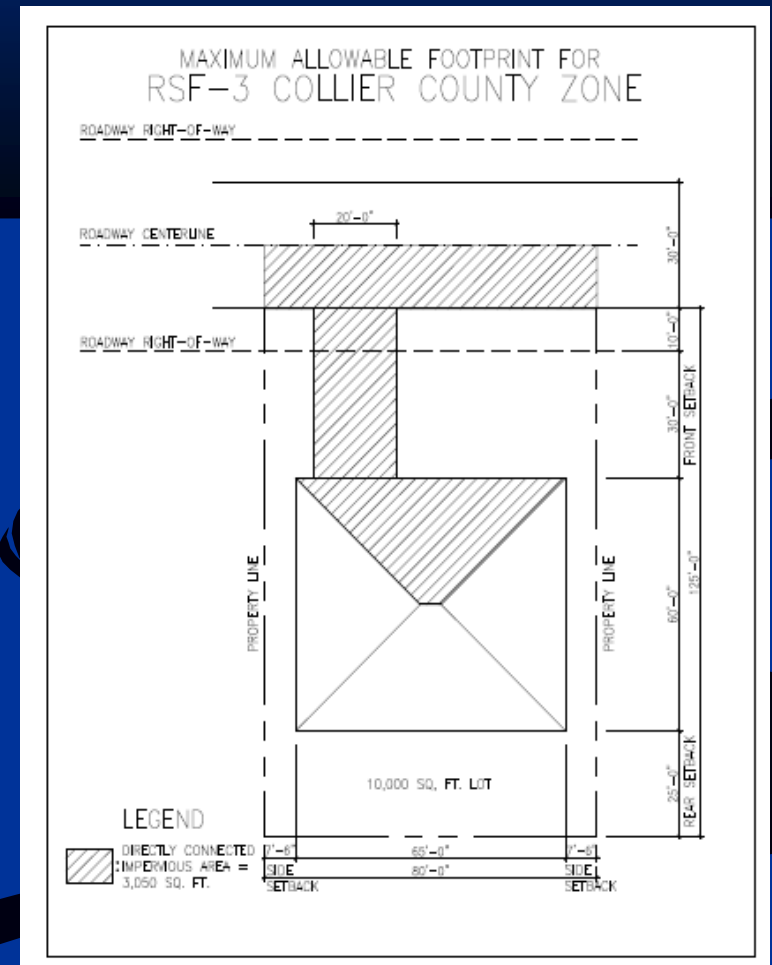
Recommendation

- Modify Land Development Code and Ordinance 2008-10 to require treatment by LID of 50% of ERP requirement (provide retention of pollutant load associated with the additional treated runoff volume)

Directly Connected Impervious Area (DCIA) Current Conditions

Current Code Design Standards:

- Impervious area in RSF-3 – RSF-6 is about 45%
- DCIA in RSF-3 to RSF-6 areas is about the same as impervious area



Development Incentives by Changes to Land Development Code

4.02.01 Dimensional standards for principle uses

1. Allow 18-ft width on local roads having an ADT of 400 trips (36 single family homes) when using cluster development standards

4.04.00 Transportation System Standards

1. Allow design of swales on local roads having an ADT of 400 trips

6.05.01 Stormwater management system requirements

1. Allow in--ground percolation type retention systems to achieve water quality retention if designed per LID manual requirements

Development Incentives by Changes to Land Development Code

4.05.02 Parking design standards

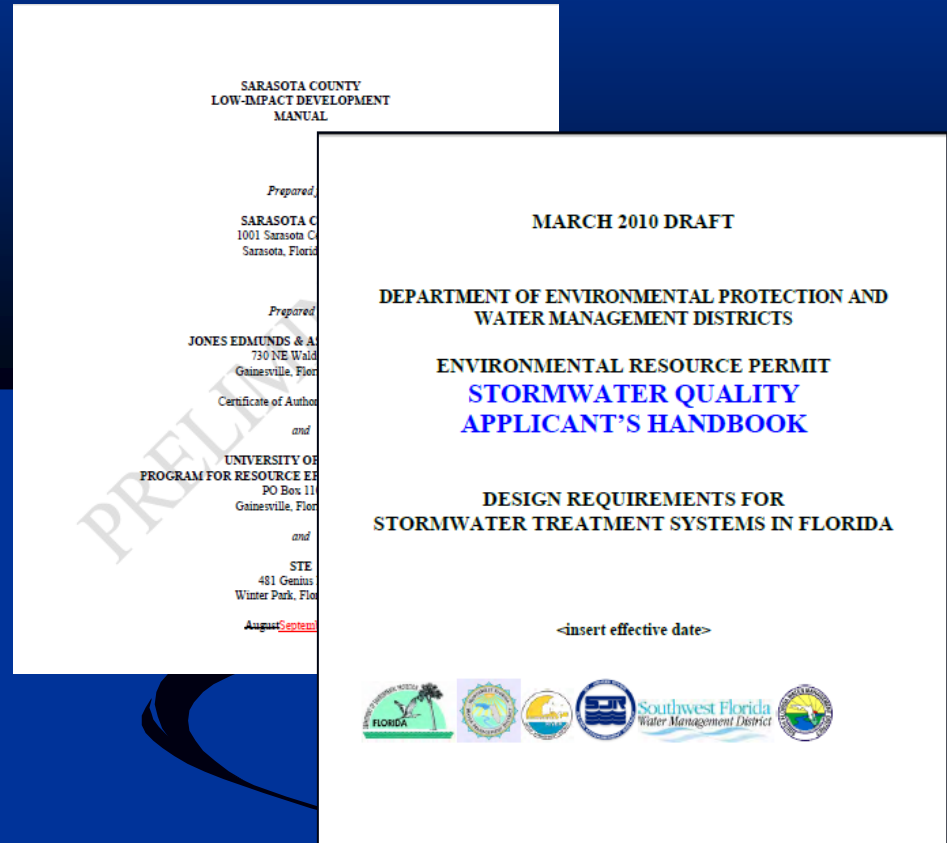
1. Aisle width reduced by 2' except for parallel parking
2. Allow grassed swale dividers along opposing parking spaces. Parking space depth reduced from 18' to 16.5' if wheel stop is located 0.5' from edge of swale

4.06.03 Landscaping requirements for vehicular use areas and rights-of-way

1. Allow use of depressed landscape islands to be used for water retention
2. Allow rows of parking spaces to contain 20 spaces, instead of 10, between islands if drainage is directed to grassed swale dividers
3. Allow swale divider area to count as part of the off-parking interior vegetated areas
4. Allow parking stalls to be up to 100 ft away from a tree. Allow one tree for every 500 ft² on interior landscaped area

LID Design Standards

- Adopt standards in the Draft Proposed Stormwater Rule.
- Adopt by reference Sarasota County LID Manual



<http://dep.state.fl.us/water/wetlands/erp/rules/stormwater/index.htm>

<http://www.scgov.net/EnvironmentalServices/Water/SurfaceWater/LowImpactDevelopment.asp>

Incentives by Modifications to Stormwater Utility

- Ordinance 2008-80 creates the Stormwater Capital Improvement Fund – 0.15 mills of ad valorem tax revenues
- Change the focus of the County's Stormwater Utility to a fee structure based on discharged runoff volume
- Should help developers market areas where the assessment is lower

Retrofit Program

- Dedicate funds exclusively to retrofit projects
- Identify locations where retrofit is possible, i.e. parking lots in government buildings and schools



Retrofit of Public Facilities

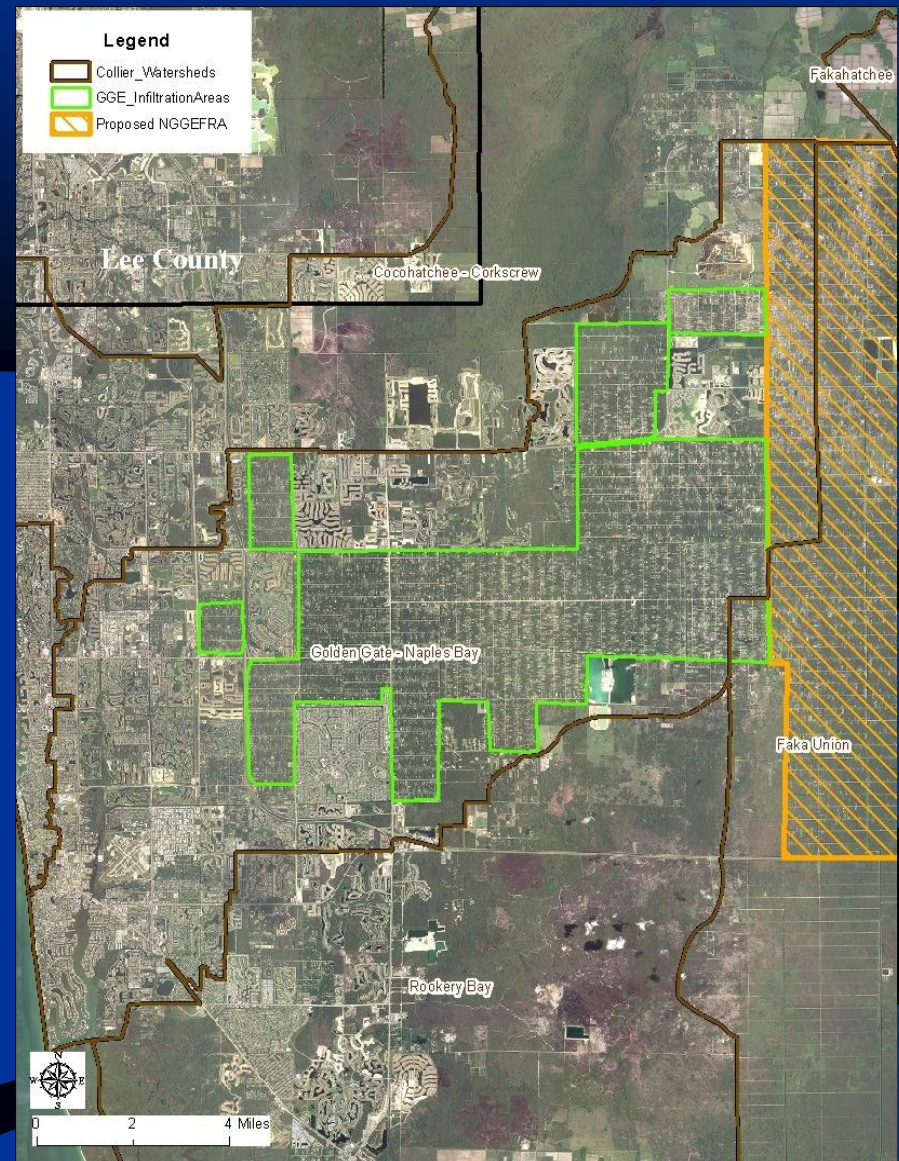
Potential Retrofits



- Utilize islands as infiltration basins
- Install pervious pavement in low traffic areas
- Install rain gardens to capture roof runoff

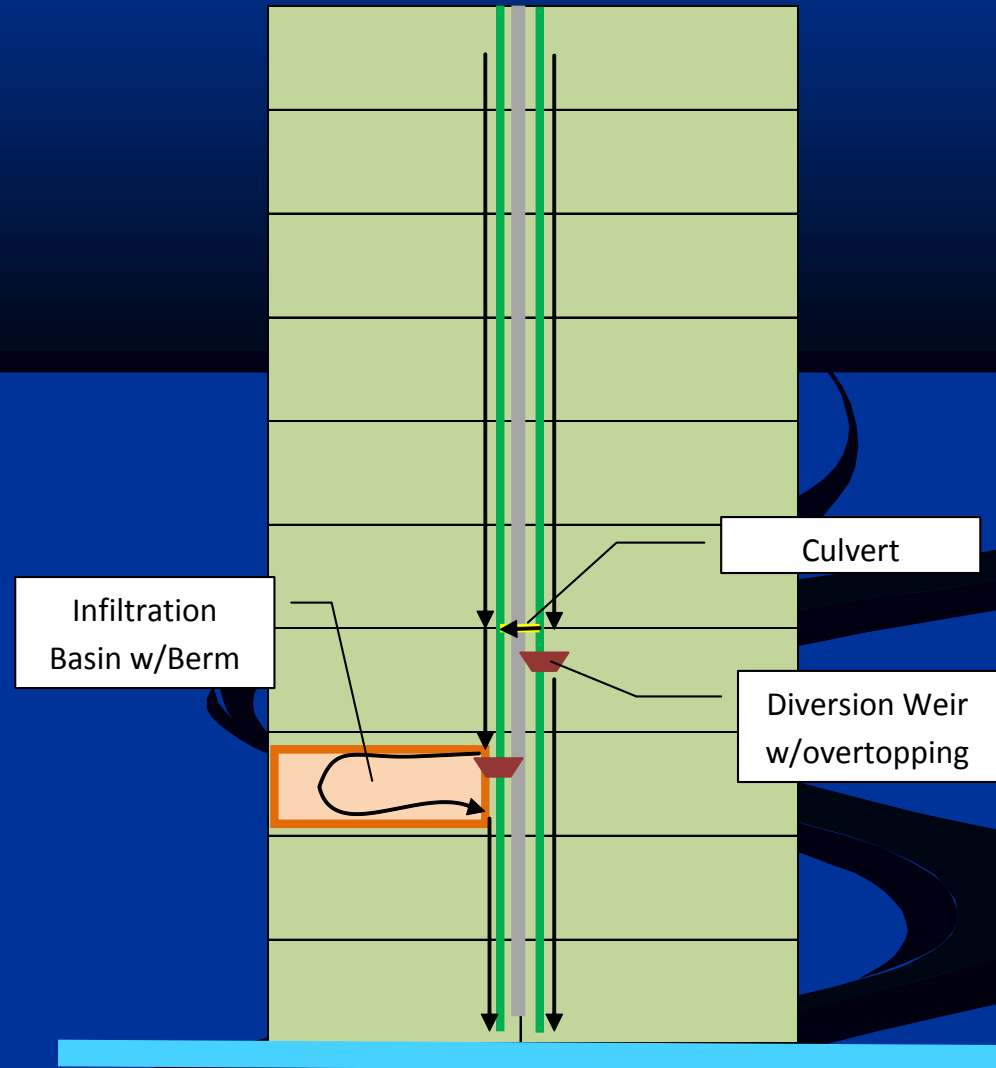
Retrofit Local Treatment Systems

- Golden Gate Estates Stormwater Management
 - Road side swales and canals comprise current stormwater management
 - More than 400 residential streets in GGE that dead end at a canal



Retrofit Local Treatment Systems

- Golden Gate Estates Retrofits
 - Develop a program to purchase 5-acre lots on as many streets as possible
 - Develop infiltration basins
 - Typical Drainage Area is approximately 70 acres
 - Treats approximately 60% of total runoff
 - Maintenance required



Retrofit of Private Property

- Incentives through stormwater utility
- Promote LID redesign through MSTUs



Flood Risk and Level of Service

- GMP Drainage Sub-Element Policy 1.2:
 - “County drainage system capital facility planning shall be designed to implement procedures and projects in a manner to ensure adequate stormwater management facility capacity available at the time a development permit is issued”

Flood Risk

- Issue: Current regulations focus on control of peak discharge
- Recommendation 1:
 - Require volume control for the 25-year/24-hour design event (allow control of peak, volume and timing of stormwater discharges)

| Percent of Site Needed to Control Additional Volume | |
|---|-----------------|
| DCIA for Developed Area* | % of Built Area |
| 50 | 14.07 |
| 40 | 12.1 |
| 30 | 9.87 |
| 25 | 8.89 |
| 20 | 7.9 |
| 15 | 6.66 |

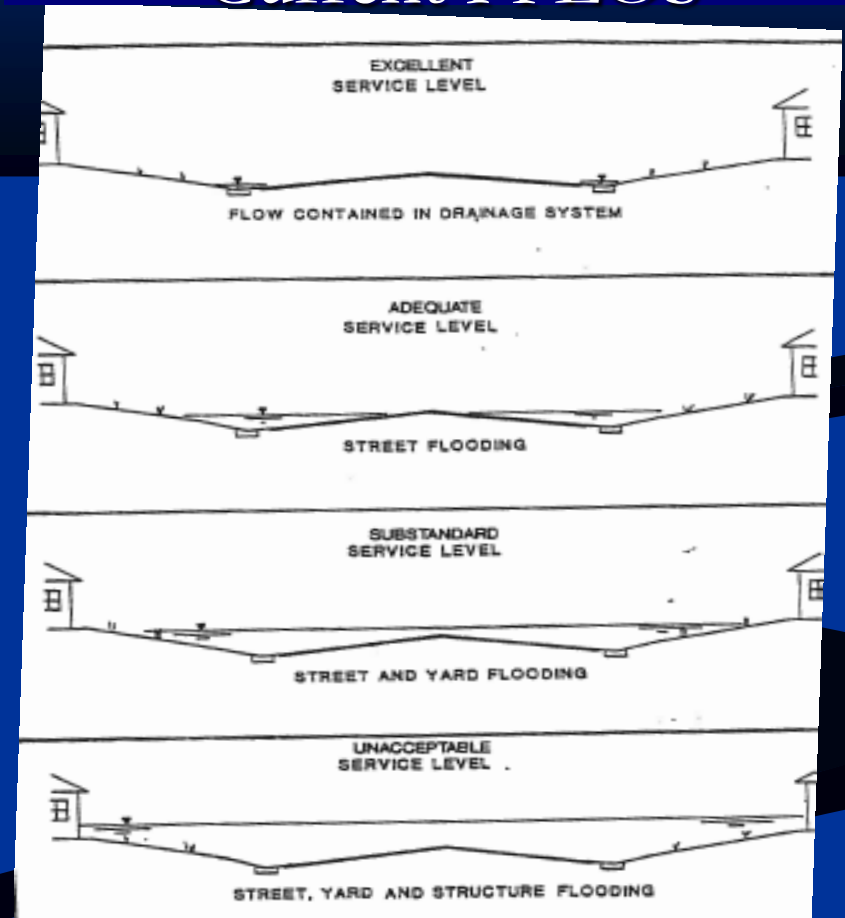
Flood Risk

- Issue: Peak control at a site does not guarantee no downstream impacts
- Recommendation 2:
 - No increases in 100-year/72 hour flood elevations upstream or downstream

Flood Protection Levels of Service (FPLOS)

- Issue: Current flood protection levels of service (FPLOS) define conditions from Levels A–D
- Most County roads meet only Level D

Current FPLOS

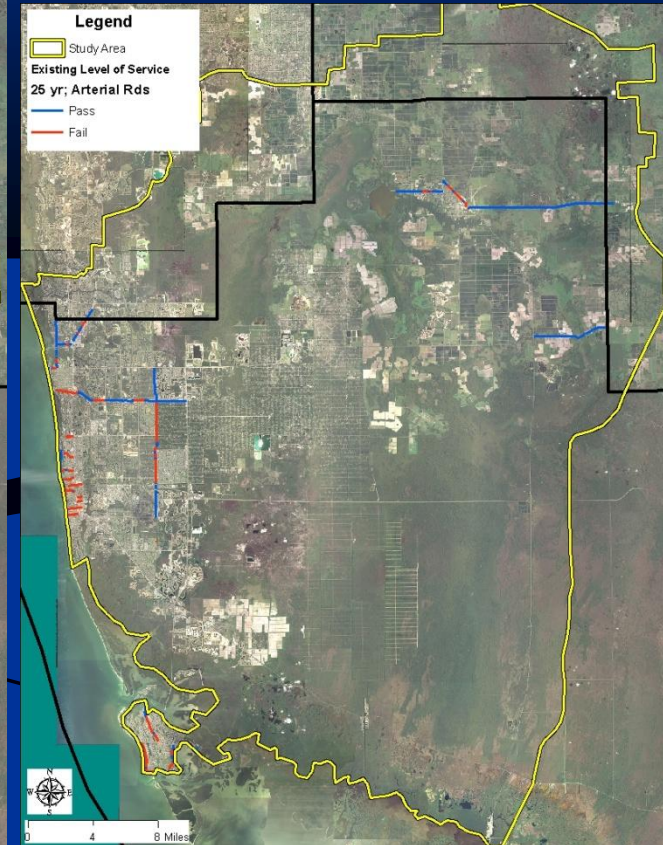
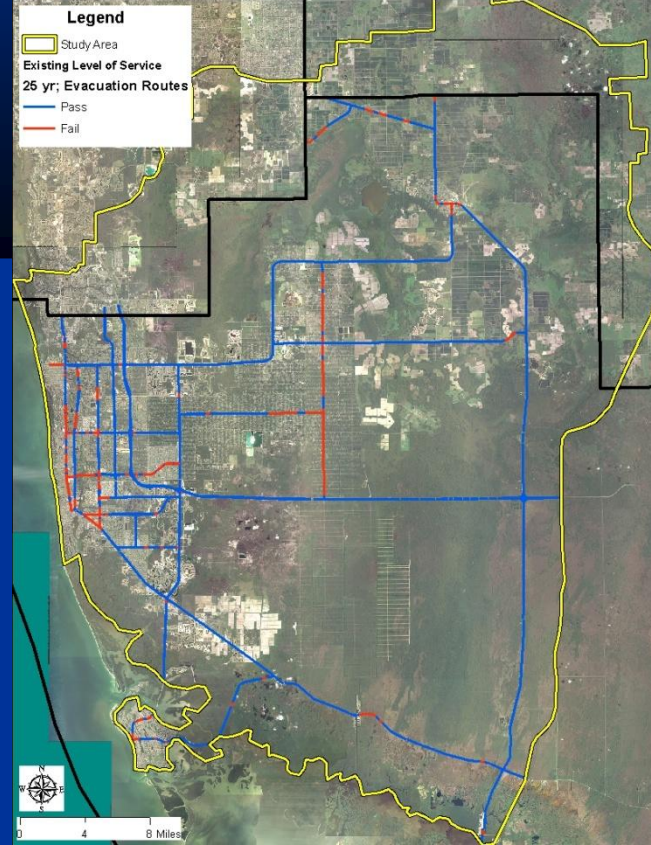
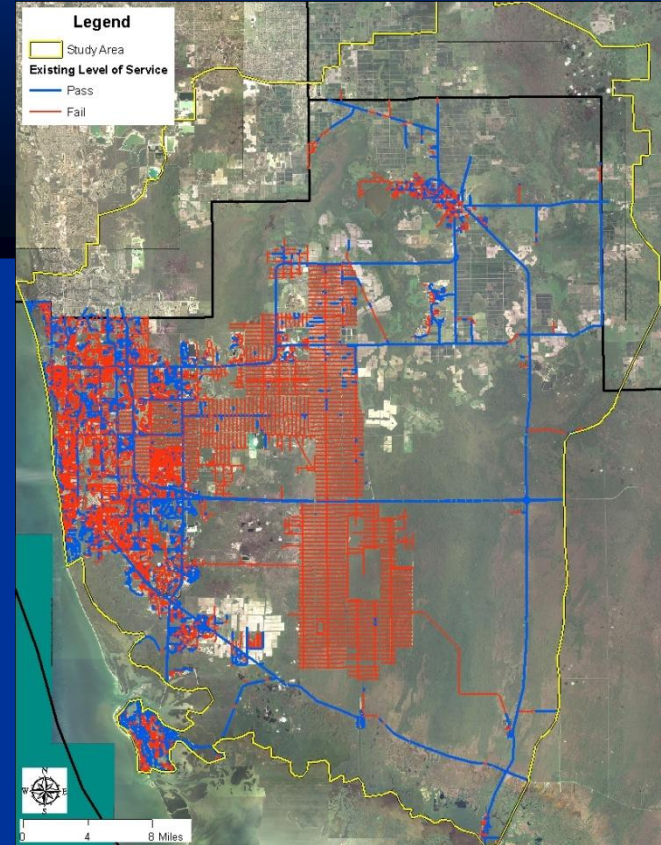


Existing FPLOS

All Roads

Evacuation Routes

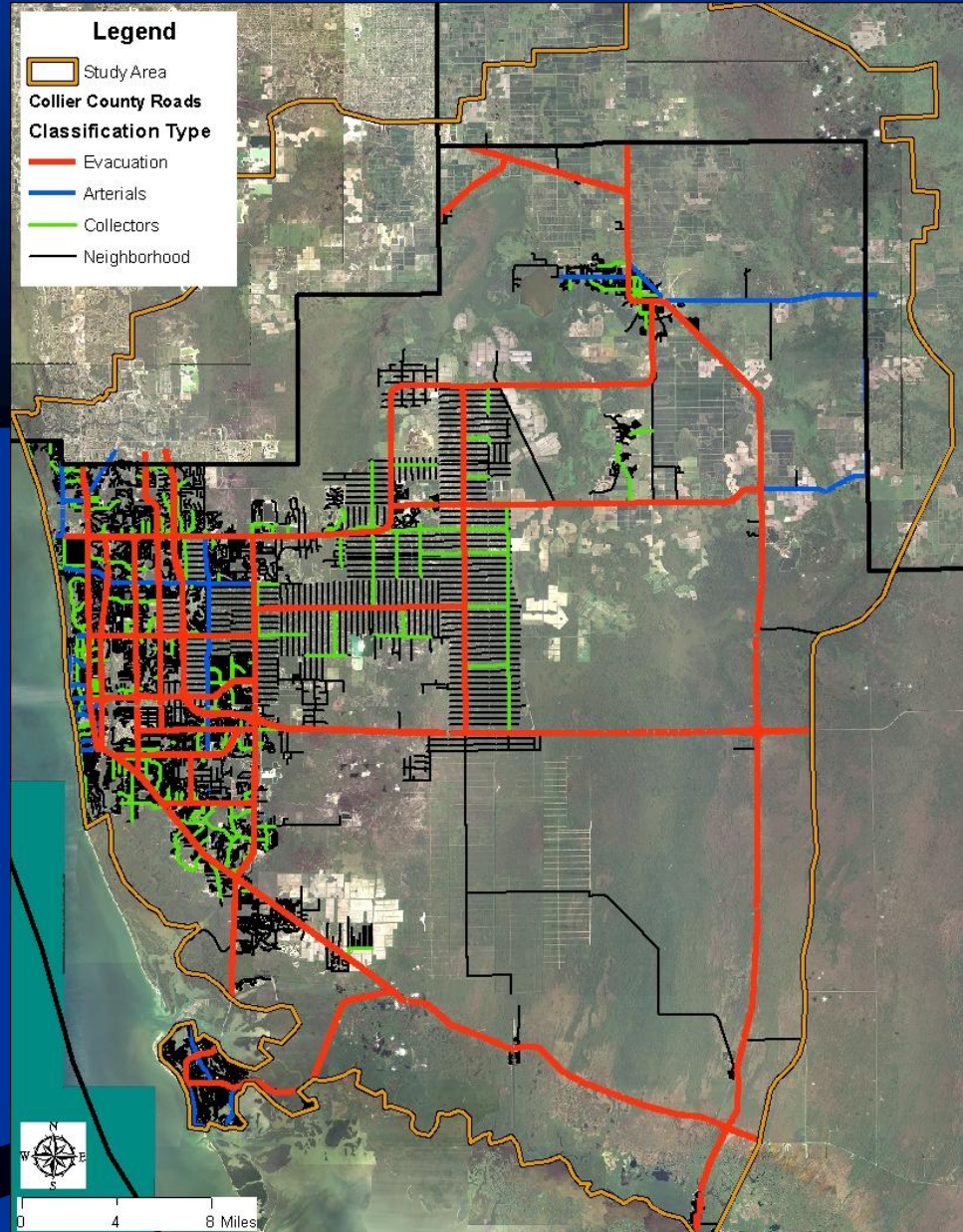
Arterial Roads



Proposed FPLOS

Proposed FPLOS

| Roadways | Storm Return Period (years) | | |
|---|-----------------------------|----------|-----------|
| | 10 | 25 | 100 |
| A. Evacuation Routes | None | None | None |
| B. Arterials | None | None | 6 inches |
| C. Collectors | None | 6 inches | 9 inches |
| D. Neighborhood | 6 inches | 9 inches | 12 inches |
| Open Space | | | |
| Flooding of open space is acceptable if it does not compromise public health and safety | | | |

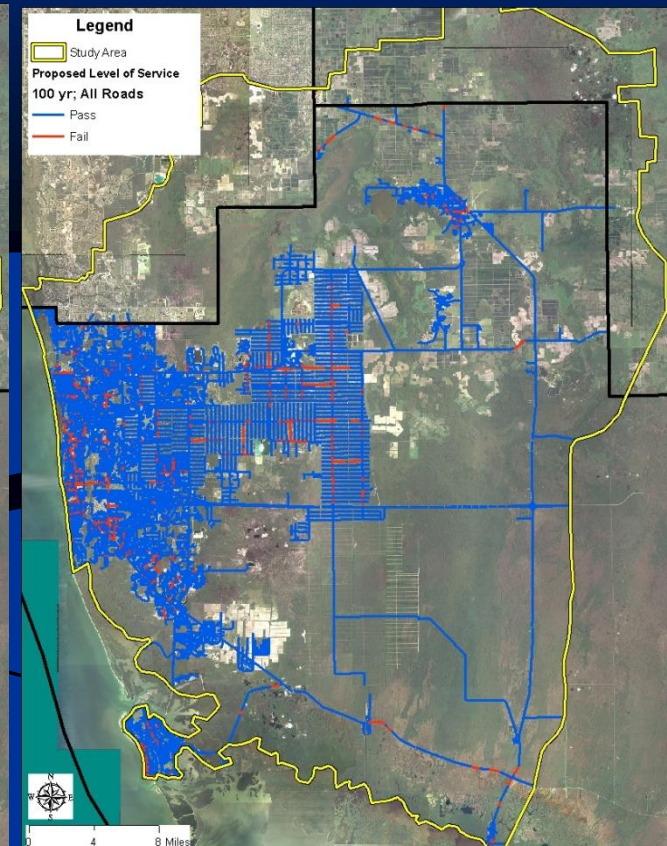
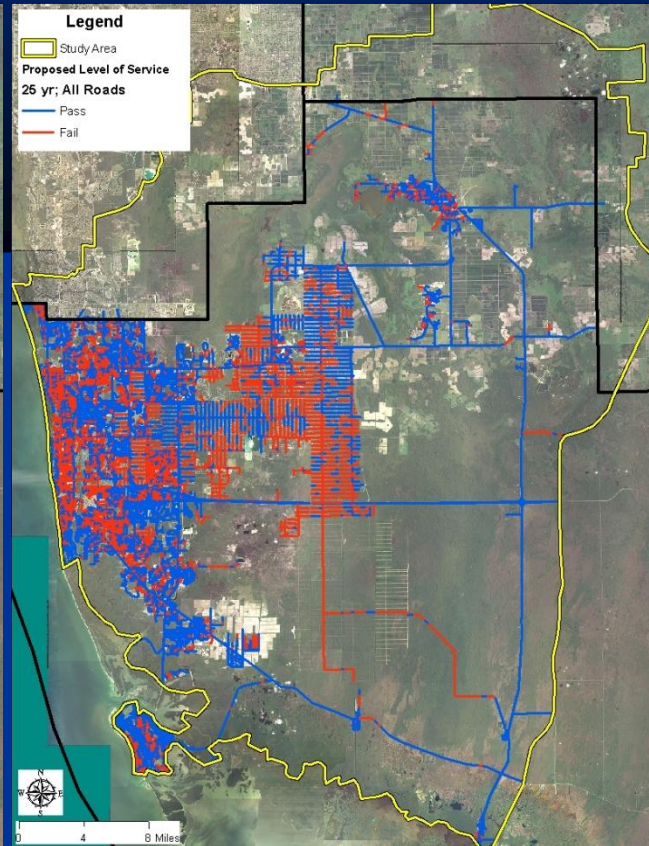
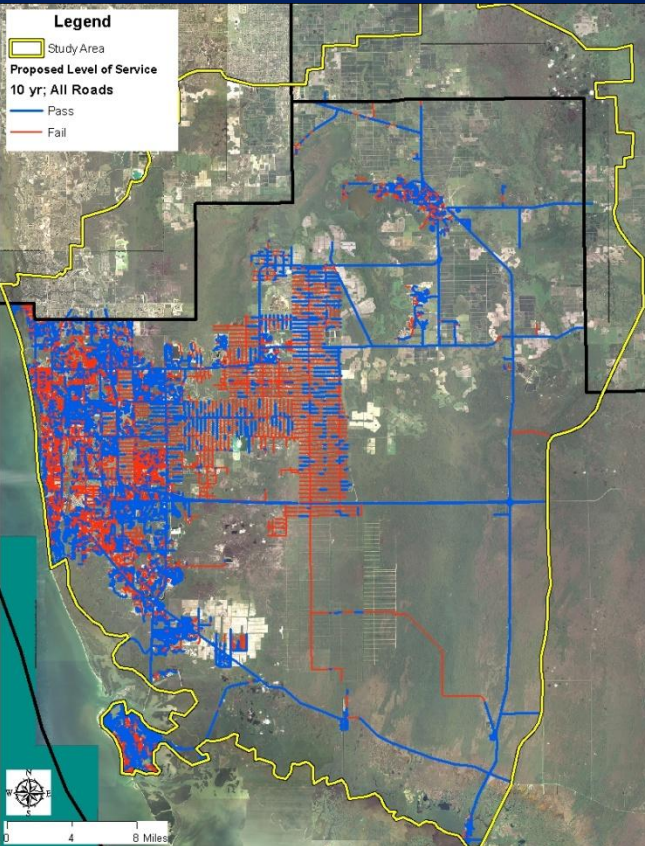


Proposed FPLOS

10-yr; 72-hr Storm

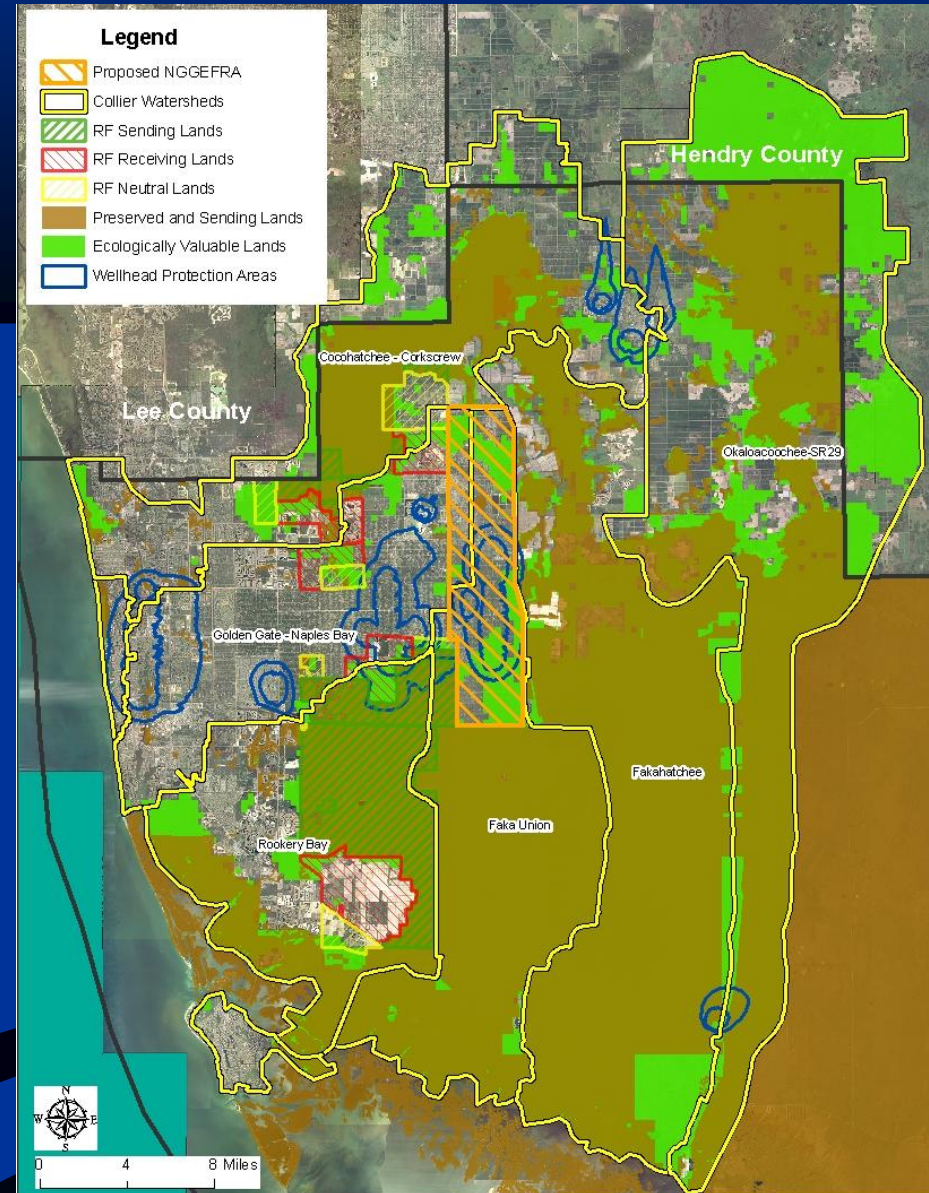
25-yr; 72-hr Storm

100-yr; 72-hr Storm



Recommended TDR Program for Golden Gate Estates

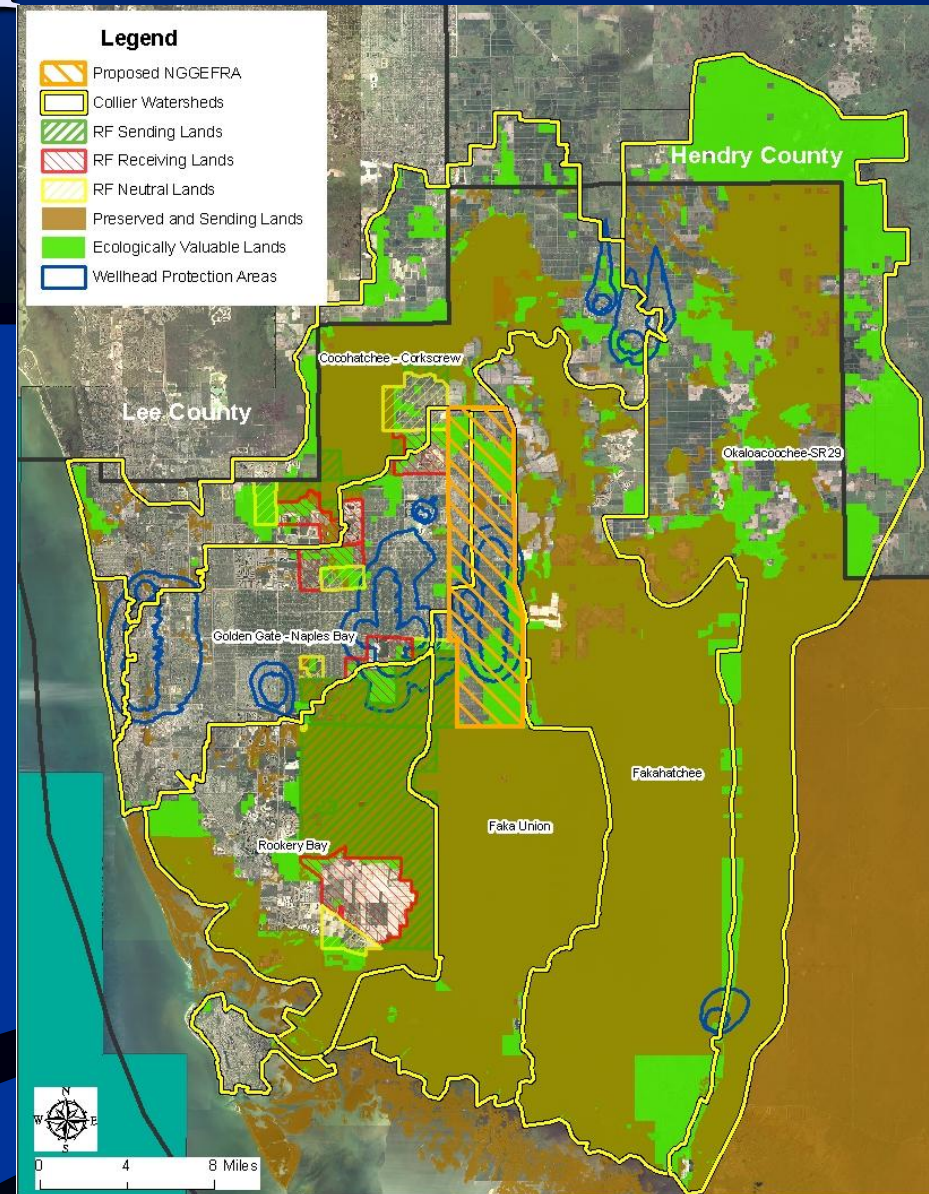
- Recommended Area includes valuable Ecological lands
- Wellhead protection area



TDR Program for GGE

Key Components

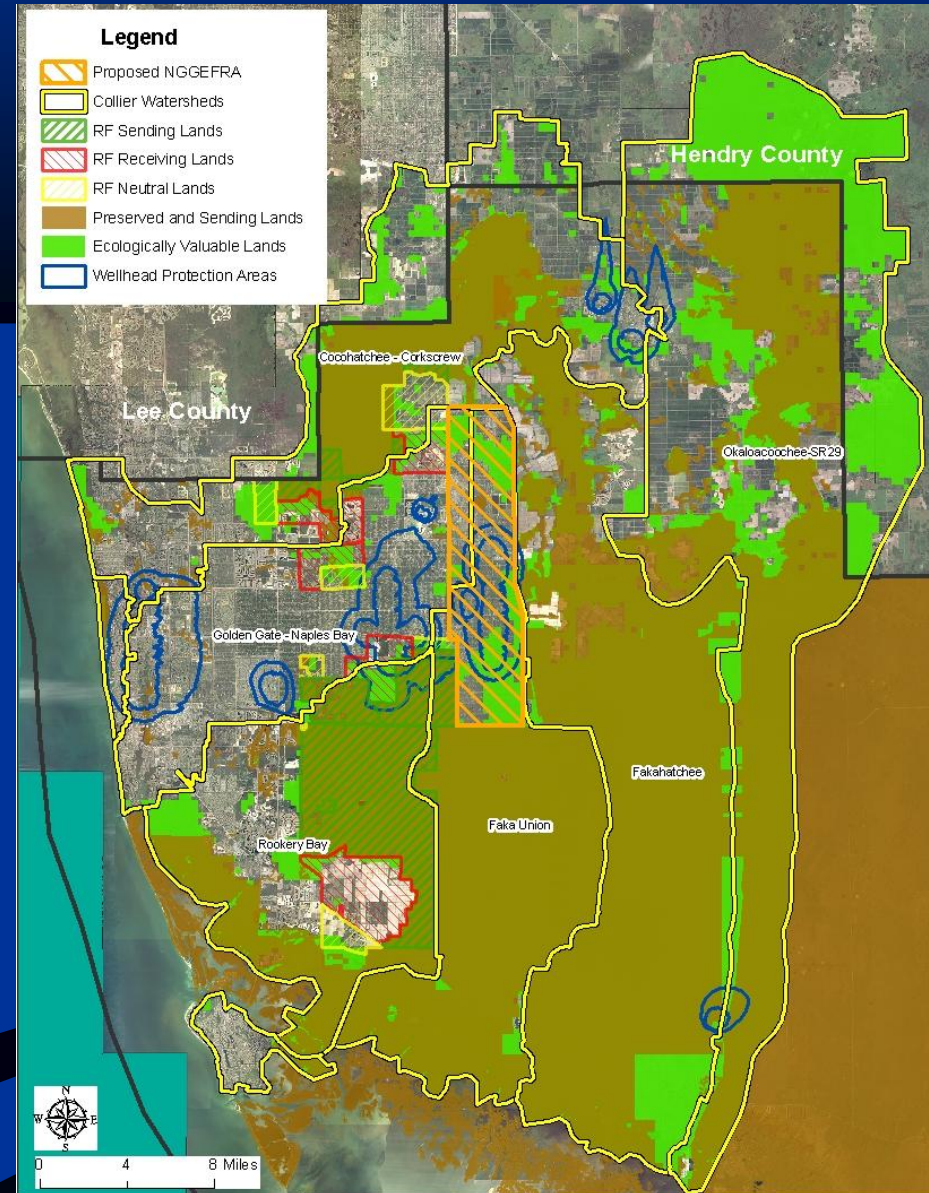
- Distinct from existing TDR programs that have been ineffective
- Goal is to provide sufficient market attraction
- Utilize existing receiving lands



TDR Program for GGE

Benefits

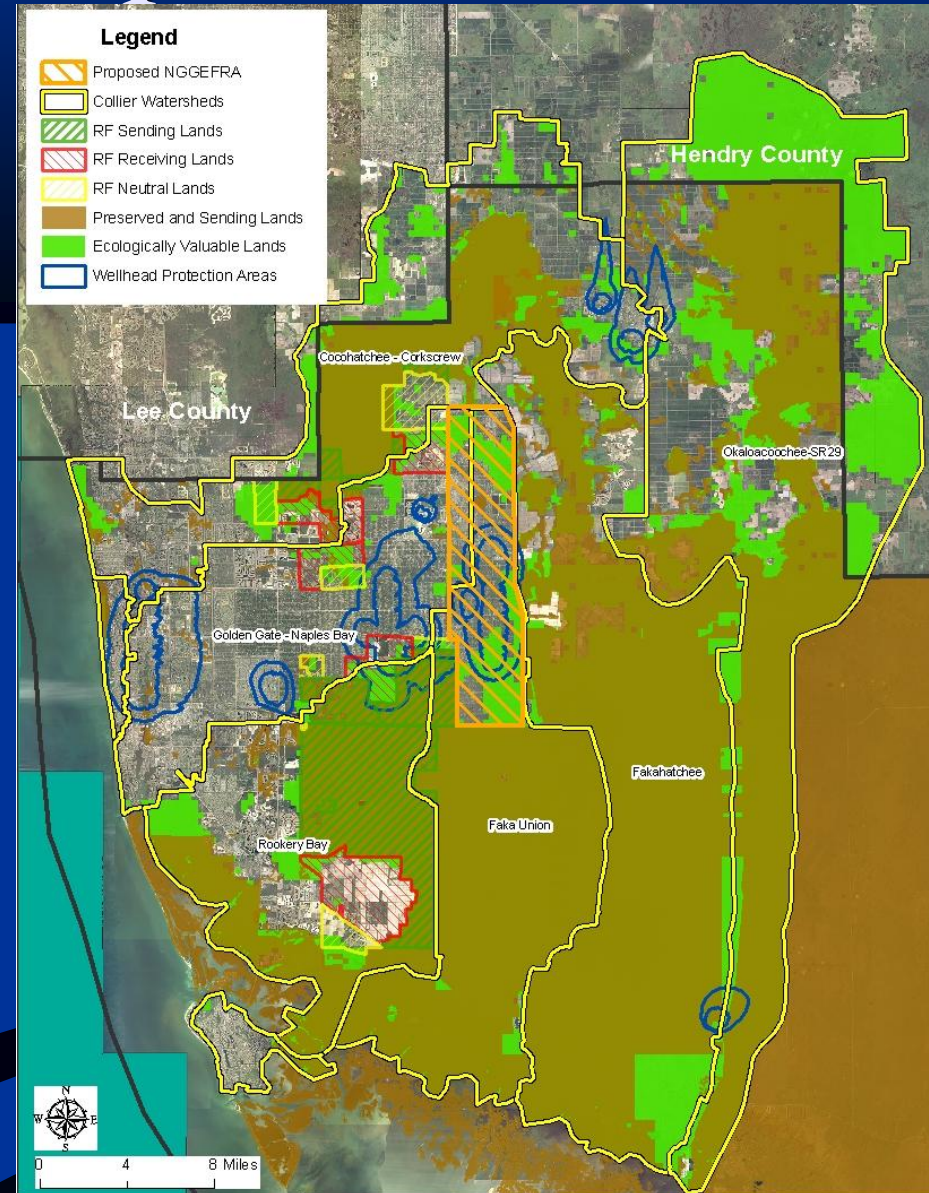
- Allow transfer for urban infill
- Program is voluntary – with incentives
- Use incentives to encourage aggregation of parcels
- Used for mitigation within the NGGE



TDR Program for GGE

Next Steps

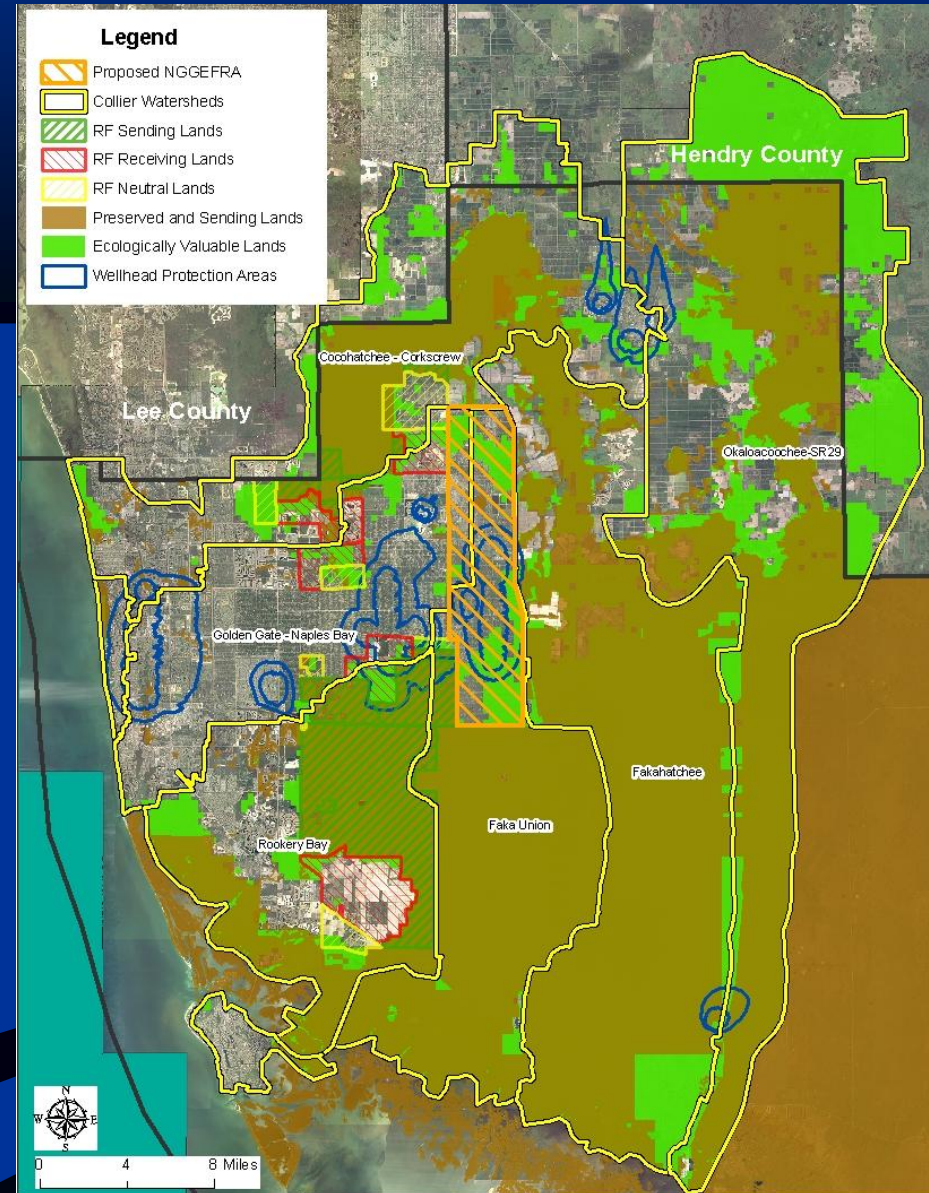
- Establish 9 person Oversight Committee to develop specifics of the program
- Quantify the number of nonconforming and conforming parcels



TDR Program for GGE

Key Issues to be Resolved

- Extent of the Protection Area
- Economics and Relationship to Existing TDR Program
- Receiving Lands
- Funding



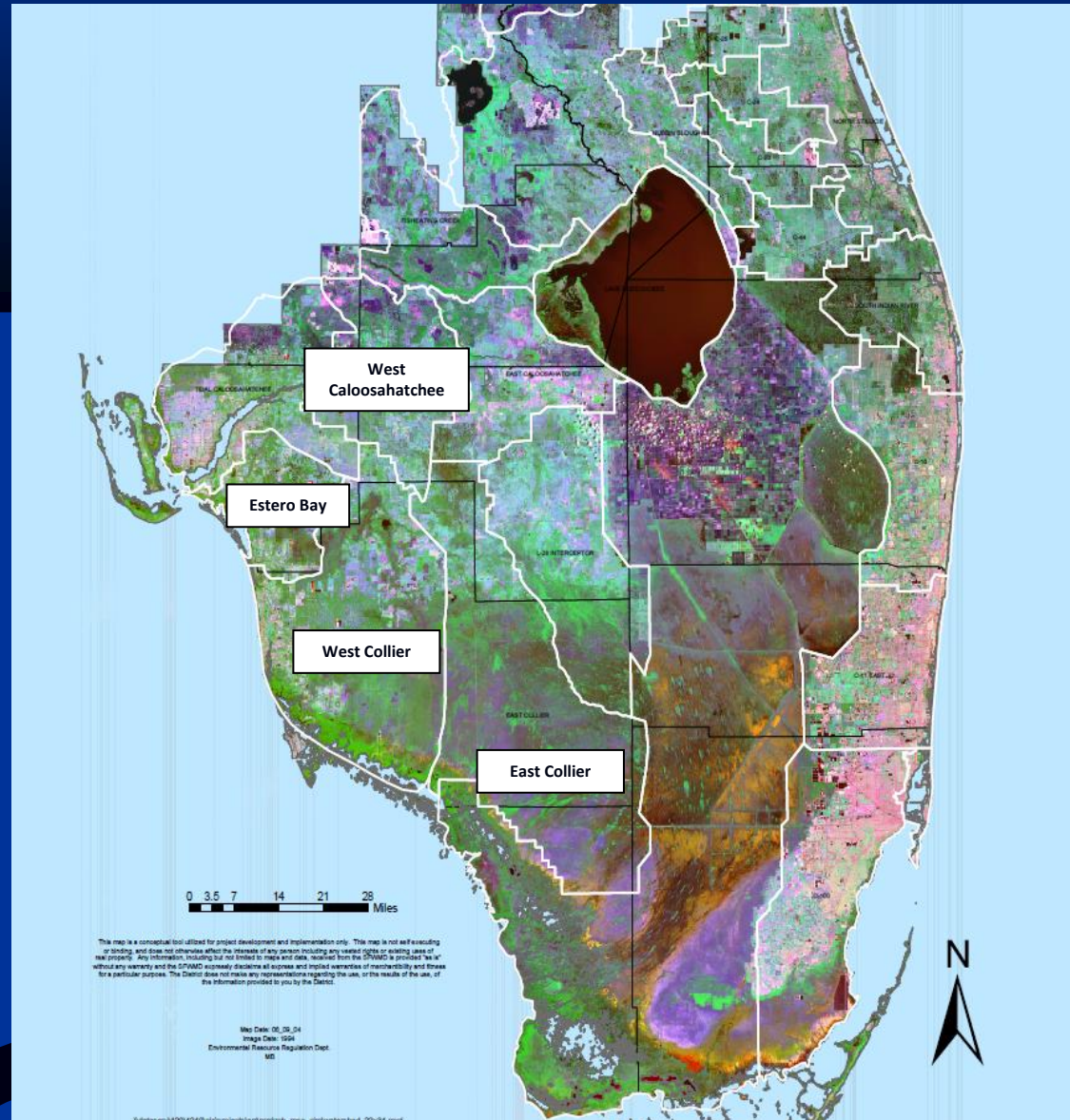
Regulatory Revisions Conceptual Timeline

| Task | Days to Complete |
|--|------------------|
| Policy Discussion Regarding Proposed Watershed Plan and related GMP and LDC amendments (before EAC, CCPC, and BCC) | 90 |
| Creation of TDR Oversight Committee and Committee Work Period* | 250 |
| Preparation of final draft GMP amendments for public hearings before EAC, CCPC, BCC (Transmittal Hearings) and Transmittal Hearings | 150 |
| DCA Review and issuance of Objection Recommendation and Comment (ORC) Report (issued 60 days after completion determination) | 70 |
| County review of ORC and Adjustments to address Objections (and Recommendations and Comments) (Note: Rule requires the adoption to occur within 60 days after receipt of ORC, but typically this is not accomplished within 60 days (given process requiring hearings before the EAC, CCPC and BCC) and DCA has been tolerant providing the County is working to address issues. Assuming Objections are not too substantial, the County will simultaneously begin preparing LDC amendments. | 120 |
| DCA issues Notice of Intent (NOI) to find Plan Amendments in Compliance (or not) - within 45 days of receipt of a complete adopted plan amendment | 50 |
| LDC Amendment Final Preparation and hearings (again, EAC, CCPC, BCC) | 100 |
| Total Estimated Time for Completion (Including TDR Oversight Committee Review Period) | 830 |
| Total Estimated Time for Completion (Excluding TDR Oversight Committee Review Period) | 580 |

Oversight Committee as proposed is limited in Scope (to TDR Program) thus other proposed amendments may not be subject the Committee Review Period (250 days as projected).

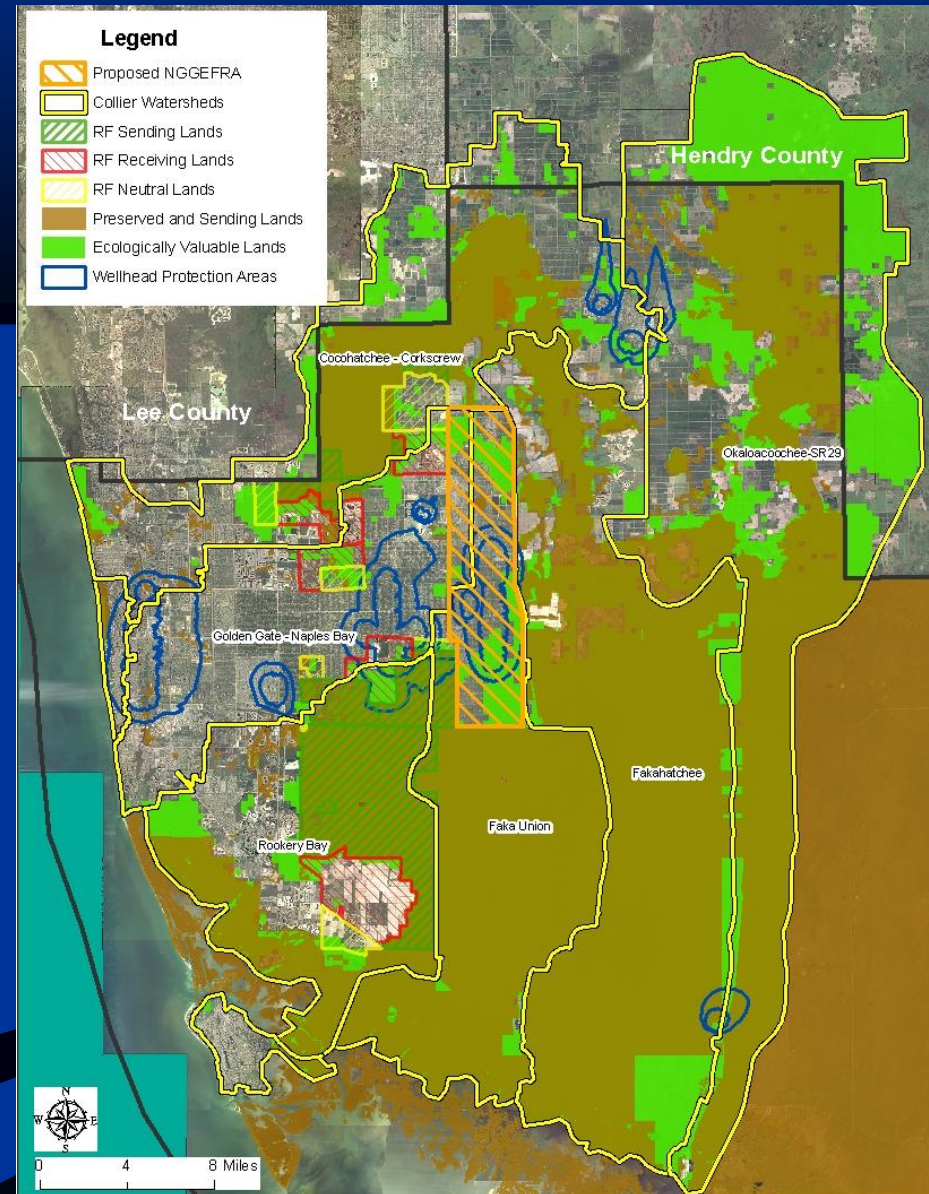
Mitigation Issues

- No regulatory mechanism to require mitigation within a functional watershed
- Economics determine where mitigation occurs



Recommendations to Establish Mitigation Area in NGGE

- Regional Offsite Mitigation Area located within proposed NGGE TDR area
- Phase I:
 - Permitted by FDEP for single family mitigation
 - Acquisition funded through TDR, grants, sale of credits, or direct County funding



Recommendations to Establish Mitigation Area in NGGE

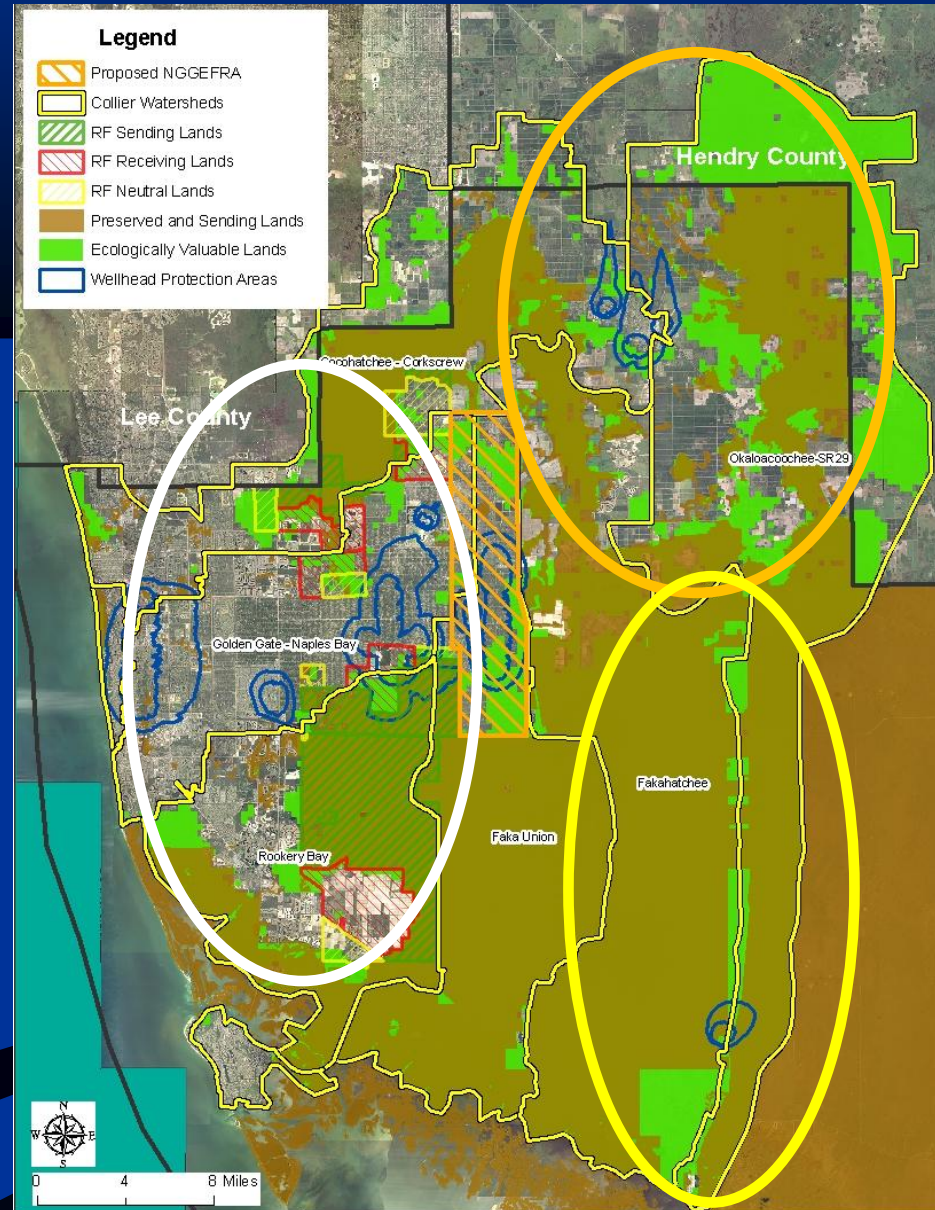
- Phase 2:
 - Permitted by SFWMD for public works projects
 - Funded by internal sale of credits (Collier County to Collier County)

Factors that Favor Mitigation Within the NGGE

- Reduction in mitigation costs
- Serves wetland restoration and stormwater attenuation goals
- A regulatory precedent exists (Lee County)
- Pending statewide rules affect water quality criteria and allow credit-trading

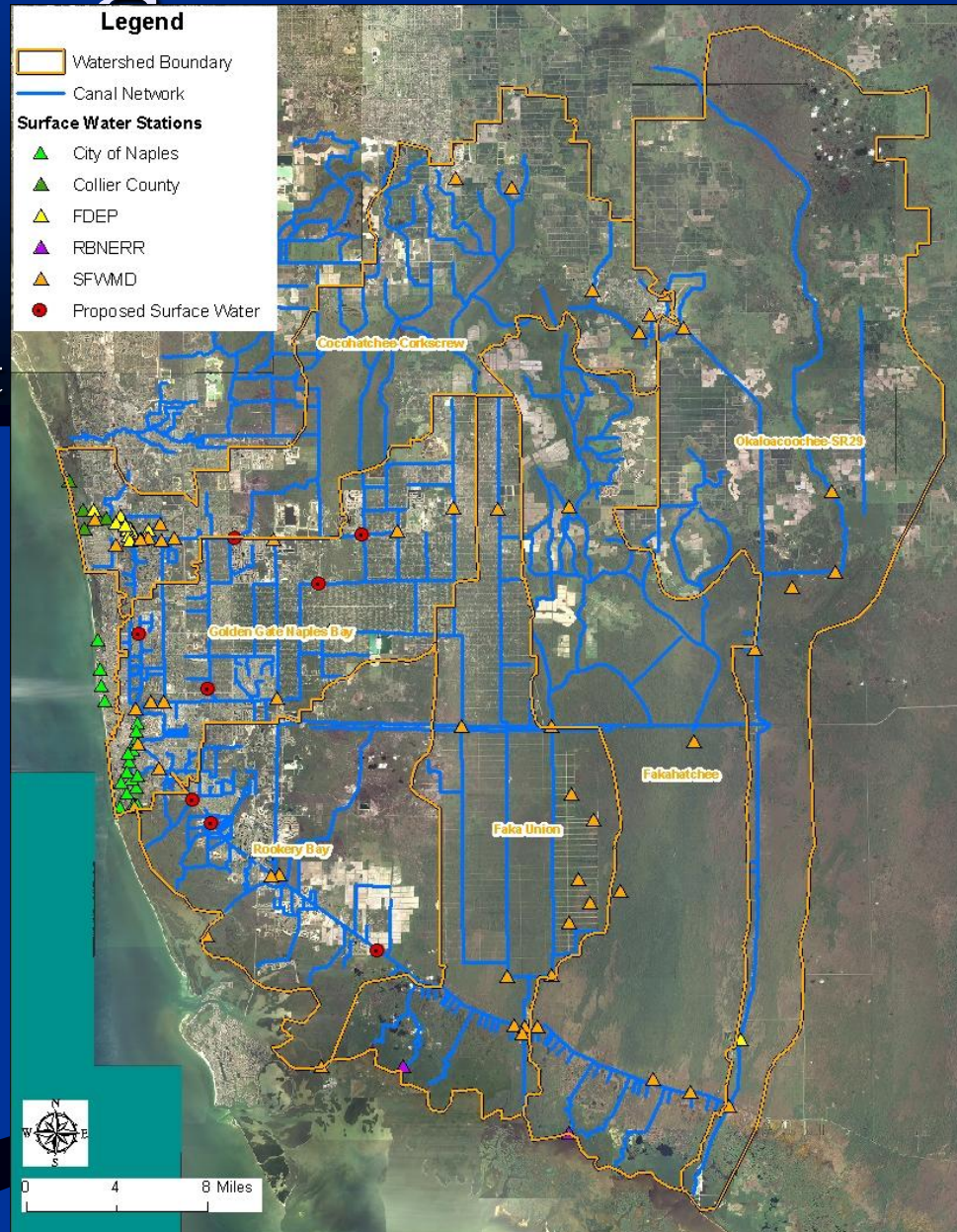
Recommended Additional Protection Areas

- Areas of localized restoration efforts
- Recyclable Water Containment agricultural areas
- Areas recommended for State acquisition



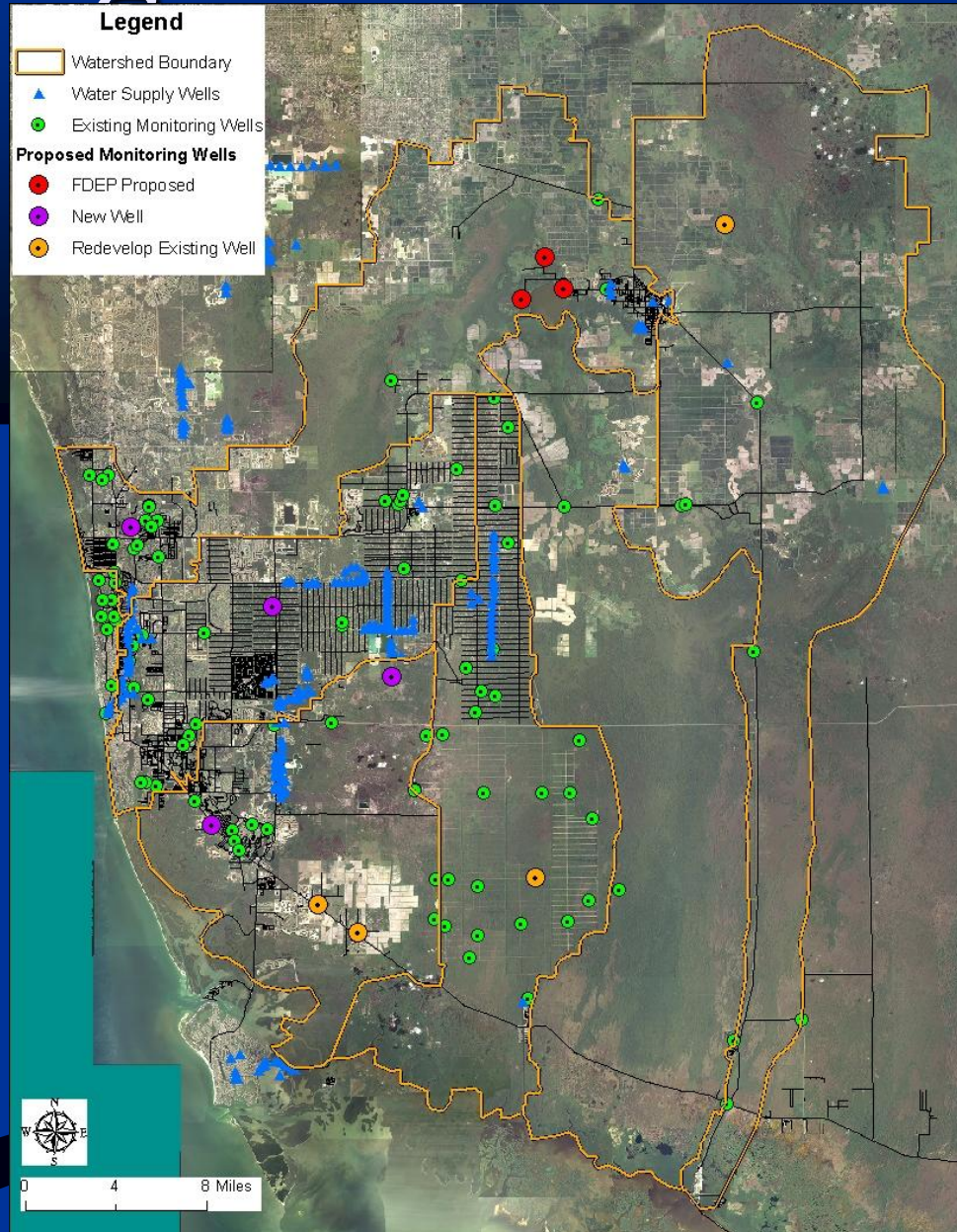
Monitoring Plan

- Surface Water Monitoring
 - Identify sources of pollutant load
 - Eight (8) additional permanent monitoring stations
 - Wet weather monitoring program



Monitoring Plan

- Groundwater Monitoring
 - Confirm extent of estimated pollutant concentrations
 - Coordinate with SFWMD for more regular sampling of wells in Picayune Strand and Okaloacoochee Slough



Monitoring Plan

Estimated Cost

| Monitoring Component | Assumptions | Estimated Annual Cost |
|--|--|--|
| Surface Water Monitoring | <ul style="list-style-type: none"> • 8 new permanent stations at existing structures • Quarterly sampling • Analyzed for nutrients and metals | \$32,000 |
| Storm Event Monitoring (4 month wet season) | <ul style="list-style-type: none"> • 6 temporary monitoring stations • 10 samples per site • Automated samplers are rented • Analyzed for nutrients and metals | \$150,000 (Equipment Rental = \$55,000) |
| Groundwater Monitoring | <ul style="list-style-type: none"> • Monitoring wells in Surficial and Lower Tamiami • FDEP constructs 3 new monitoring wells • County constructs 4 new monitoring wells • County redevelops 4 existing wells • Quarterly sampling • Analyzed for nutrients and metals | \$55,000 (Install = \$15,000) |

Wrap Up

- If you didn't sign in, please do so
 - Include your E-mail address and Phone Number
- Comments via E-Mail

machatcher@colliergov.net

- Formal position papers
 - Please mail to Mac Hatcher