



# Regional Stormwater Management

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## Agenda

- Past Practices
- Regional Treatment Solution
  - Environmental Benefits
  - ROW level of effort
- Design Examples



## Past Practices

- Design, Permit and Construct Off-site “Postage Stamp” Wet-Detention Ponds
- aka: **BURPs** – Big Ugly Rectangular Ponds
- Pros:
  - Typically easy to Permit
  - Relatively easy to maintain
  - Generates fill dirt
- Cons:
  - See next slide

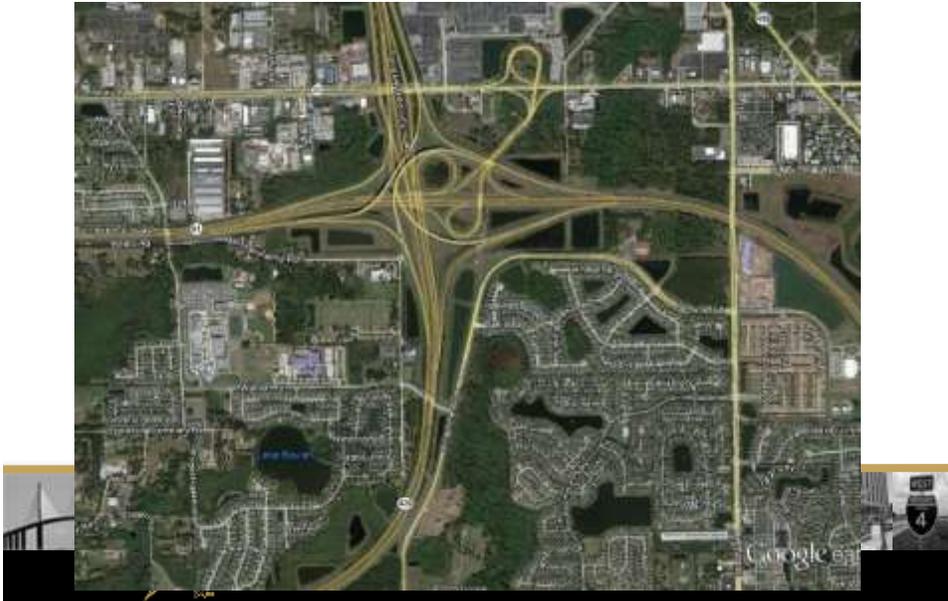


## Issues with “Postage Stamp” Ponds

- ROW acquisition is expensive.
- ROW adds 2-years to the schedule.
- Requires dealing with multiple property owners and each of their attorneys.
- Multiple stand-alone ponds are inefficient.
- Business damages.
- Cost of pond versus nutrient load reduction benefit is poor.
- Off-site ponds create additional wetland and species impacts (ie sand skink, panther) which costs more to mitigate.



## Multiple “Stand-Alone” Ponds - Turnpike and S.R. 429 Interchange



## Regional Treatment Solution

- Provide regional stormwater management in lieu of “Postage Stamp” ponds.
  - Work with Counties, Cities, WMDs, FDEP, WCDs & private land owners to identify projects.
  - Can provide treatment for previously untreated runoff including from non-roadway land uses which typically have higher nutrient concentrations.
  - HB 599 (2012) or 373.413(6) F.S. allows FDOT to treat off-site runoff where it may benefit FDOT (and the associated watershed).

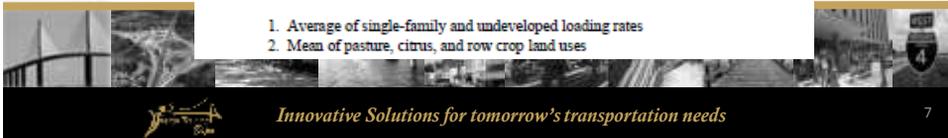


## EMC values

Table 3.4 Summary of Literature-based Runoff Characterization Data for General Land Use Categories in Florida

Land Use Category	Event Mean Concentration (mg/l)	
	Total Nitrogen	Total Phosphorus
Low-Density Residential <sup>1</sup>	1.50	0.18
Single-Family	1.85	0.31
Multi-Family	1.91	0.48
Low-Intensity Commercial	0.93	0.16
High-Intensity Commercial	2.48	0.23
Light Industrial	1.14	0.23
<b>Highway</b>	<b>1.37</b>	<b>0.17</b>
<u>Agricultural</u>		
Pasture	2.48	0.70
Citrus	2.31	0.16
Row Crops	2.47	0.51
General Agriculture <sup>2</sup>	2.42	0.46
Mining/Extractive	1.18	0.15

1. Average of single-family and undeveloped loading rates
2. Mean of pasture, citrus, and row crop land uses



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7

## Regional Treatment Benefits

- Work with single/fewer property owners.
- Replace ROW acquisition with agreements.
- Maximize nutrient removal efficiency by treating a larger, more polluted area such as agriculture.
- Stormwater management needs can be satisfied for the Ultimate Typical Section.
- Potential to allow others to maintain systems.
- Costs less.



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## Regional Treatment Hardships

- Finding “dance” partners
  - Ideal partner
    - Regional facility land already owned
    - Need construction funding assistance
    - Has resources to maintain constructed Regional SWM
- Legal Agreements
- Agency Permitting
  - Compensating Treatment
  - Banking excess water quality credits for future use
- Attenuation/Floodplain compensation Ponds may still be required.
- Location of facility in relationship to the FDOT roadway.



## Other Risks & Obstacles

- Lawsuits
- Permit Challenges
- Schedule
- Substantial Time Commitment



## District 1 Example Projects

- I-75 Bond Ranch
- SR 82 Joint Use Pond Agreements with ECWCD
- SR 710 Regional Treatment



SOUTH FLORIDA WATER MANAGEMENT DISTRICT

## Charlotte Harbor Flatwoods Initiative

### Hydrologic Restoration

Includes five watersheds totaling 90 square miles

- Yucca Pen Creek
- Durden Creek
- Greenwell Branch
- Longview Run
- Gator Slough



Bond  
Ranch



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## Charlotte Harbor Flatwoods Initiative Partners



South Florida Water Management District  
 South West Florida Water Management District  
 Charlotte County  
 Lee County  
 City of Cape Coral  
 Florida Department of Transportation  
 Florida Department of Environmental Protection  
 Charlotte Harbor State Park  
 Charlotte Harbor Aquatic Preserves  
 Florida Fish and Wildlife Commission  
 US Fish and Wildlife  
 US Geological Survey  
 Charlotte Harbor National Estuary Program  
 Seminole Gulf Railway

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## Project Objectives

- Sheet flow Restoration
- Restore more natural flows to Charlotte Harbor
- Water quality Improvement
- Ground water recharge
- Reduce high water levels/flooding
- Enhancement of fish and wildlife habitat



## I-75 from Lee County Line to Tuckers Grade – Bond Ranch



## I-75 from Lee County Line to Tuckers Grade – Bond Ranch

- Project originally proposed stormwater treatment and floodplain compensation within the median of I-75.
- No ROW project.
- Required impacting 48 acres of wetlands.
- Difficulty in permitting floodplain compensation.



## I-75 from Lee County Line to Tuckers Grade – Bond Ranch

- Working for almost 18 months to acquire the 670 acre Bond Ranch parcel.
- Able to eliminate median ponds by:
  - Removing the cows on Bond Ranch provides compensating water quality treatment.
  - Turning off the existing pumps provides attenuation and floodplain compensation.
- Reduced wetland impacts by **26 acres**.
- FDOT no longer has to maintain median ponds.



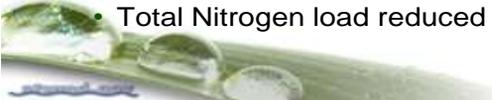
## I-75 from Lee County Line to Tuckers Grade – Bond Ranch

- Cost Savings:
  - **\$1.48 million** in construction cost savings from eliminating median ponds. (Negative SA from contractor)
  - Reduced wetland impacts saves approximately **\$715,000** in mitigation.
  - Savings from not maintaining median ponds over 20 years is estimated to be **\$1,782,000**.
  - FDOT contributed **\$1.48 million** toward acquisition of Bond Ranch Parcel by FDEP.



## Why is the Land Acquisition a Critical Component?

- Location, location, location:
  - The Bond farm prevents natural flows from Babcock/Webb WMA west to Yucca Pens and tidal waters
  - The result is damaged oak hammocks in Babcock/Webb
  - Restoration of natural westward flows is much more difficult and expensive without the acquisition
- Converting a portion of the Bond Farm to a water storage area reduces nutrient loads to the C-43 Estuary and Charlotte Harbor. Reductions:
  - Total Phosphorus load reduced by 10,345 Kg/yr
  - Total Nitrogen load reduced by 41,400 Kg/yr



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## Why is the Bond Farm a Critical Component, continued?

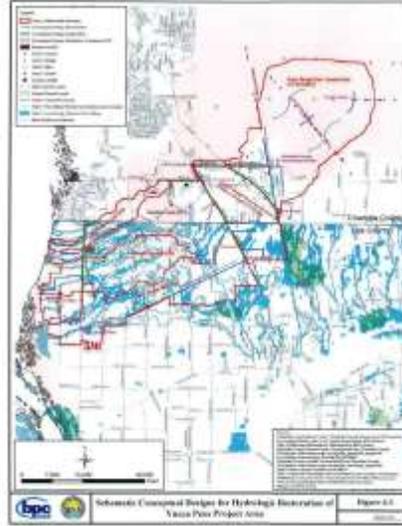
- Cost of nutrient reduction if a wetland treatment system would be used: \$3,500,000
- The storage facility will store 2,400 acre-feet of water during the wet season
- Cost of to construct an equivalent water storage facility: \$4,000,000
- Stored water will be directed to Yucca Pens WMA at the right time. Result:
  - improved wetland function in Yucca Pens
  - Improved habitat for quail in Babcock/Webb



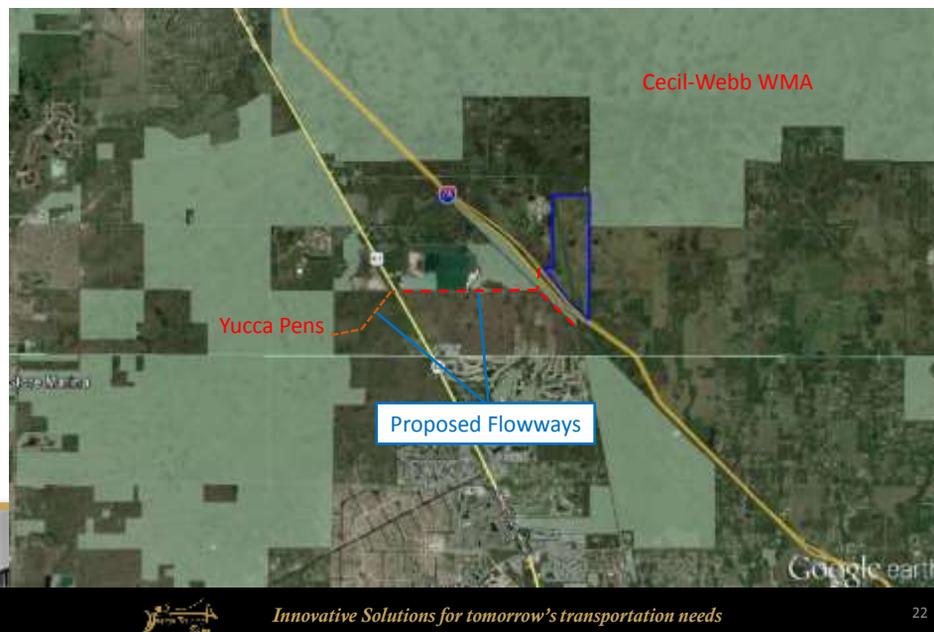
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## Charlotte Harbor Flatwoods Initiative Recommendations

- Storage and treatment east of I-75
- Re-establish sheet flow east of US 41
- Reduce Flooding and extend hydro-periods
- Water storage and treatment west of US 41
- Enhance sheet flow across Yucca Pens
- Restore flow under Burnt Store Road
- Implemented monitoring network but hope to expand efforts



### Future Flow-ways



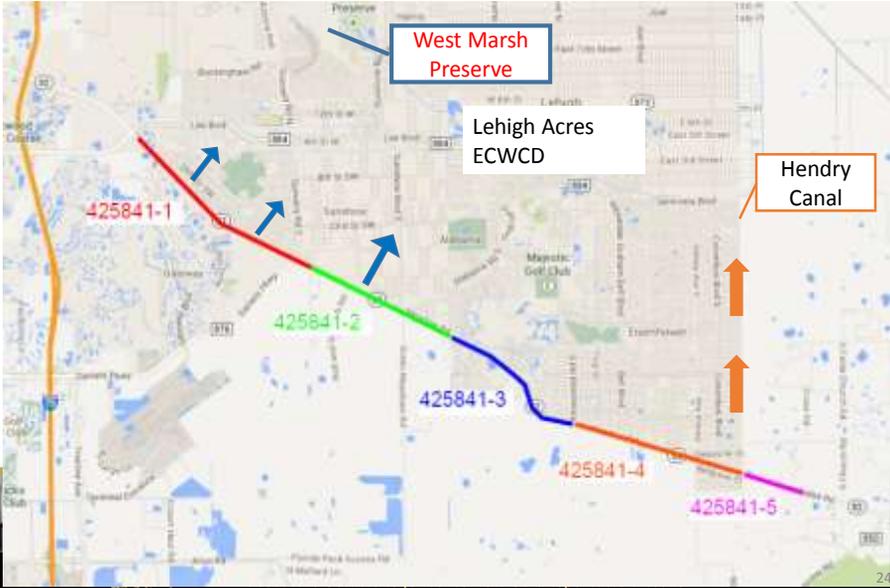
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## Innovative Flow-Way Easement



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## SR 82 Projects



West Marsh Preserve

Lehigh Acres ECWCD

Hendry Canal

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425841-2

425841-3

425841-4

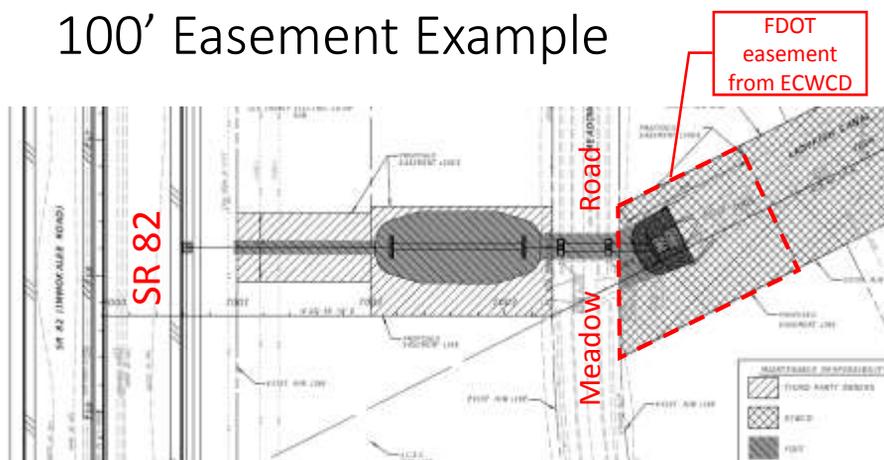
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## SR 82 Regional Treatment

- Eliminate Off-site Postage Stamp Ponds and provide stormwater management within ECWCD's existing canal system.
- Requires Joint Use Pond Agreements (JUPA) with ECWCD.
- FDOT will acquire 100' easements within nine of ECWCD's canals.
- ECWCD will construct the SW Weirs project which will provide significant water quality and flood control improvements to the region.



### 100' Easement Example



## Why Joint Use Pond?

- PSR off-site pond cost estimate = **\$13.7 million**
- ECWCD option (including \$3.1 million payment to ECWCD) = **\$12.2 million**
- **Savings = \$1.5 million**
- PLUS...
  - Reduced drainage pipe sizes = **\$2.05 million**
  - Eliminated long term maintenance = **\$1.08 million**
- **Total Estimated Savings = \$4.6 million**



## Earthwork

- By eliminating the “Postage Stamp” ponds FDOT lost its source of “cheap” fill.
- To solve this FDOT has agreed to construct the **West Marsh Preserve** project as a “goes with” project.
- ECWCD will provide design and permits for the West Marsh Preserve project.
- Plans will be submitted concurrently with SR 82 ERC reviews.
- Plans shall include phasing to accommodate each segment of SR 82 independently.



## West Marsh Preserve Concept Plan

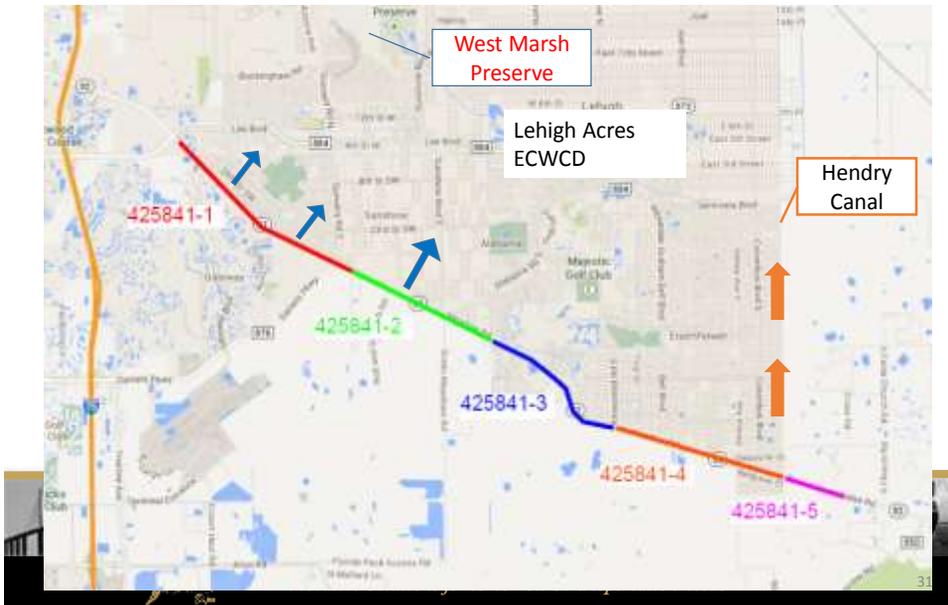


## West Marsh Preserve

- Assisting with construction of West Marsh Preserve:
  - Provides fill source for Segments 1 and 2 of SR 82.
  - Offset FDOT's stormwater needs for segment 3 of SR 82.
  - Eliminates FDOT's long term maintenance responsibilities for the "postage stamp" ponds within Segment 3.
  - Deal with fewer property owners for ROW acquisition.
  - Provides greater nutrient removal within the watershed.
- Separate MOA executed with Lee County who owns the property.



## SR 82 Projects

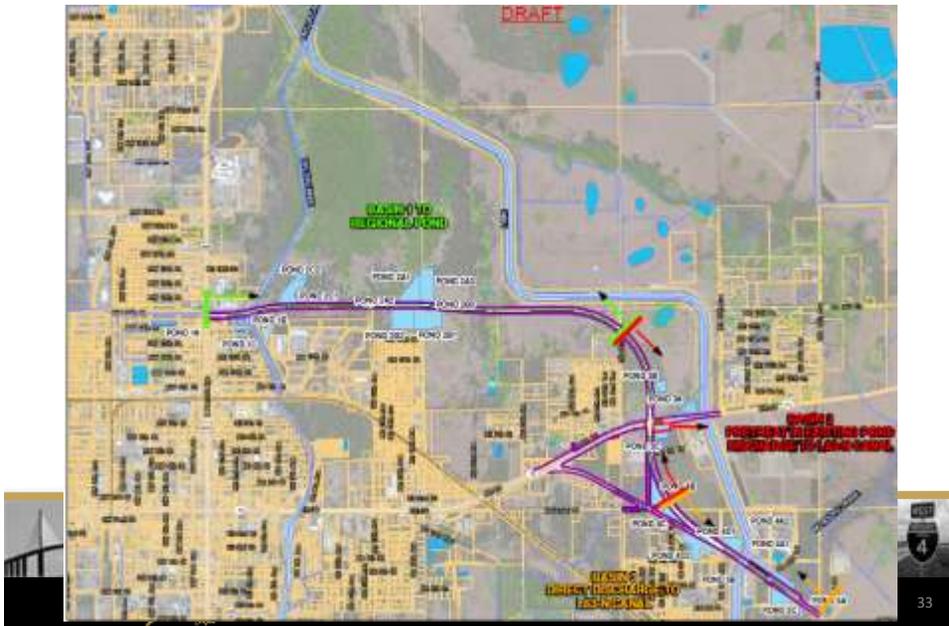


## Hendry Canal Widening

- Assisting with construction of Hendry Canal Widening:
  - Provides fill source for Segments 3 and 4 of SR 82.
  - Offset FDOT's attenuation needs for segments 3 & 4 of SR 82.
  - Deal with fewer property owners for ROW acquisition.
  - Helps ECWCD achieve a regional flood control improvement.



## SR 710 – New Alignment



## SR 710 Regional Treatment

- Construction is not funded.
- Lake Okeechobee is severely polluted.
- Suspended the pond siting efforts to check regional treatment feasibility.
- Coordinating with FDEP, SFWMD, FDACS, locals, & other stakeholders.
- Conducting feasibility study to look at two options:
  - Regional Treatment – **FDOT only**
  - Stormwater Treatment Area (STA) – **multi-party** agreement



# SR 710 Regional Treatment

26 Acre Regional Treatment Ponds provides compensating treatment for entire SR 710 project, plus.

FDOT can design, acquire, and construct independently of any other stakeholder involvement.

Reduced  
Schedule Risk  
Option



# SR 710 – STA Option



Multi-agency coordination required.

FDOT would likely pay FDEP or SFWMD to acquire, design, and maintain.

FDOT needs fill material for roadway embankment so may participate in construction.



## SR 710 Regional Treatment

Alternative	Estimated TP Removal (kg/yr)
Postage Stamp Ponds	12
Regional Pond (26 ac)	500
STA (60 ac)	700

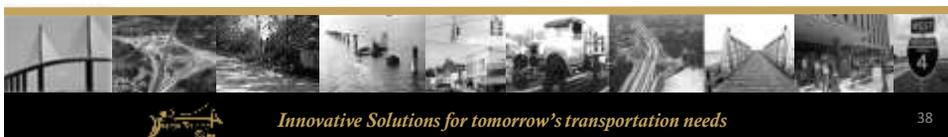
The regional treatment and STA options provide significantly more nutrient reduction above roadway requirements.

Helps satisfy FDOT's Lake Okeechobee Basin Management Action Plan (BMAP) requirements.



## SR 710 Regional Treatment

- ROW and construction costs of postage stamp ponds to be applied toward regional treatment pond.
- Fewer property owners.
- Much Better for the Environment.



## Regional Treatment Summary

- Recommend all projects proposing ROW acquisition look at a Regional Treatment option.
- **Environmental Look Aounds (ELAs) are now required per the 2015 Drainage Manual.**
- Opportunities to improve water quality in the watershed.
- Potential for:
  - Cost savings
  - Reduced ROW acquisition
  - Delegated maintenance responsibilities
  - Favorable publicity



## Going Forward

- Watershed “Wise” Thinking
  - Practical
  - Permittable
  - Cost Effective
  - Ecological Driven Solutions
- Don't let **fear** dictate your drainage design.



# Questions?

