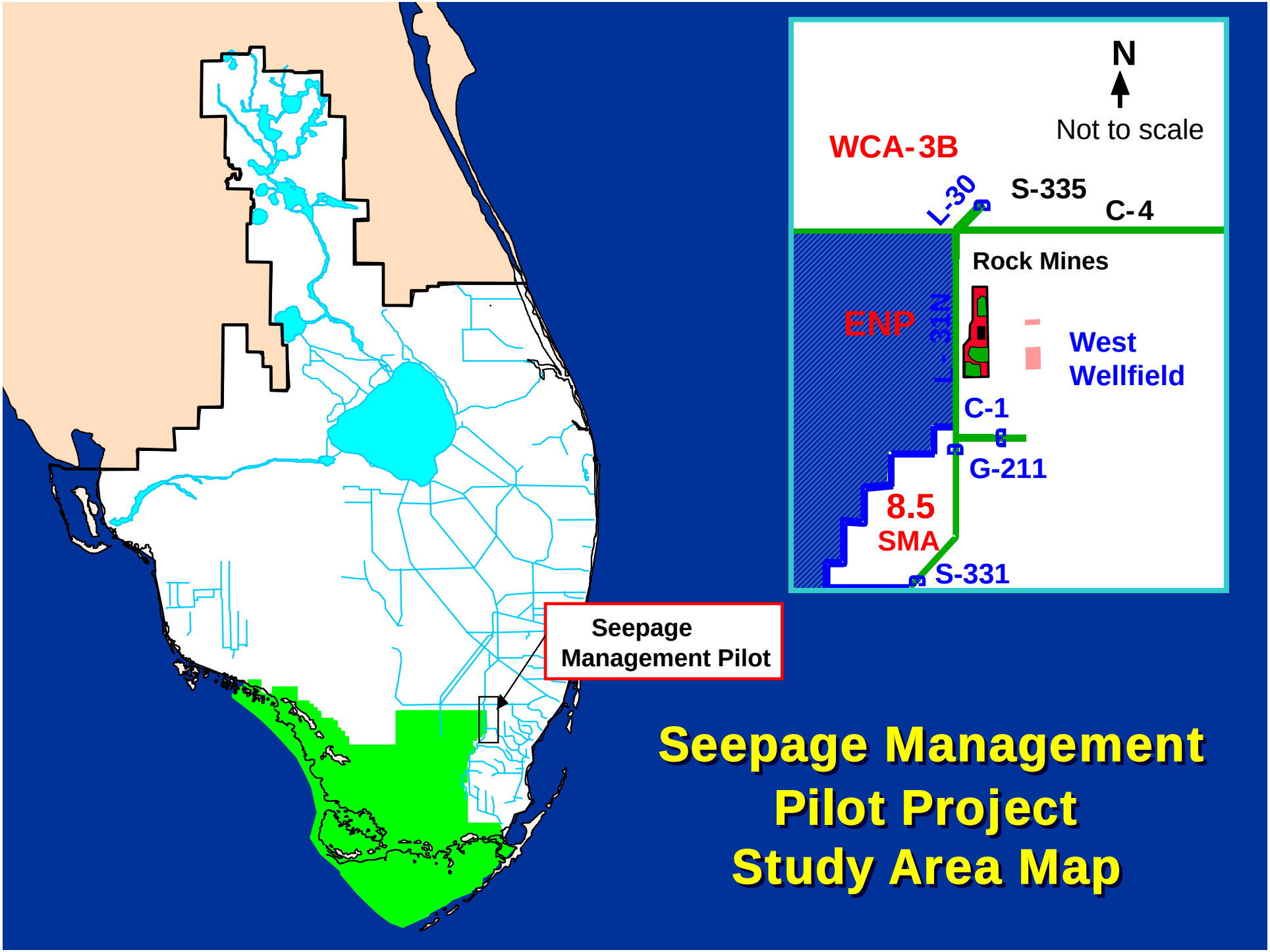
L-30 Seepage Management Pilot Project New Alternatives Key Engineering and Technical Data Post-QRB Brainstorming


N
Not to scale
WCA-3B
L-30
S-335
C-4
Rock Mines
ENP
L-31N
West
Wellfield
C-1
G-211
8.5
SMA
S-331
Seepage
Management Pilot
Seepage Management
Pilot Project
Study Area Map

Brainstorming Exercise

L-30 Seepage Management Technologies

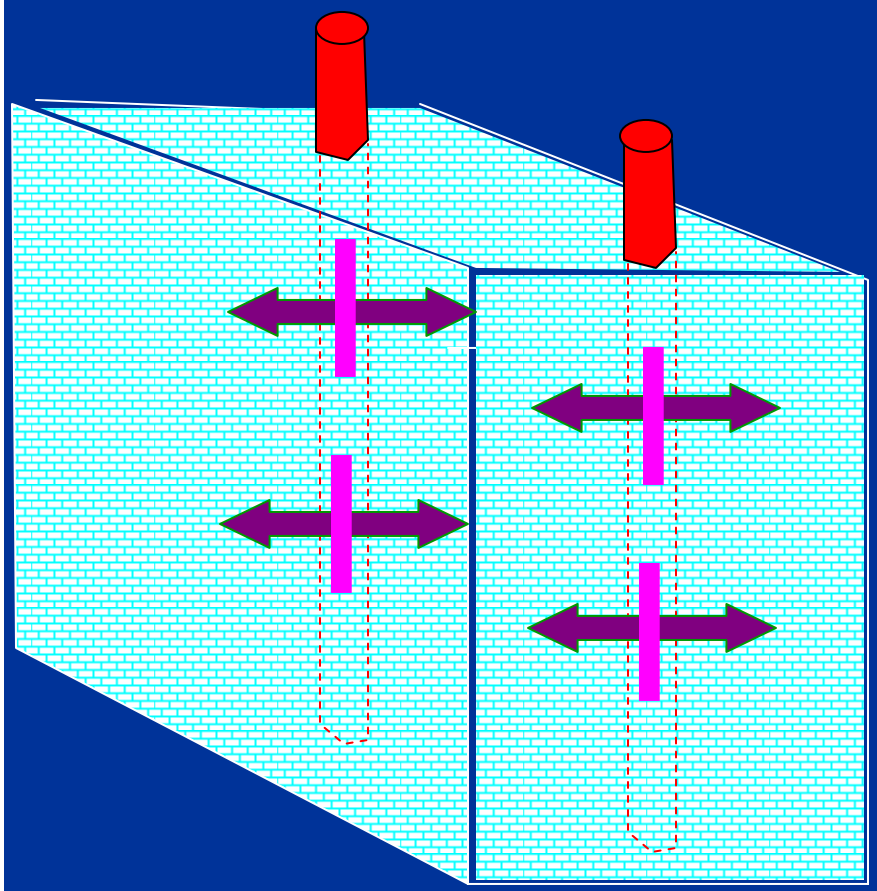
Alt. 1 – Steel Sheetpile

Alt. 2 – S-C-B Wall

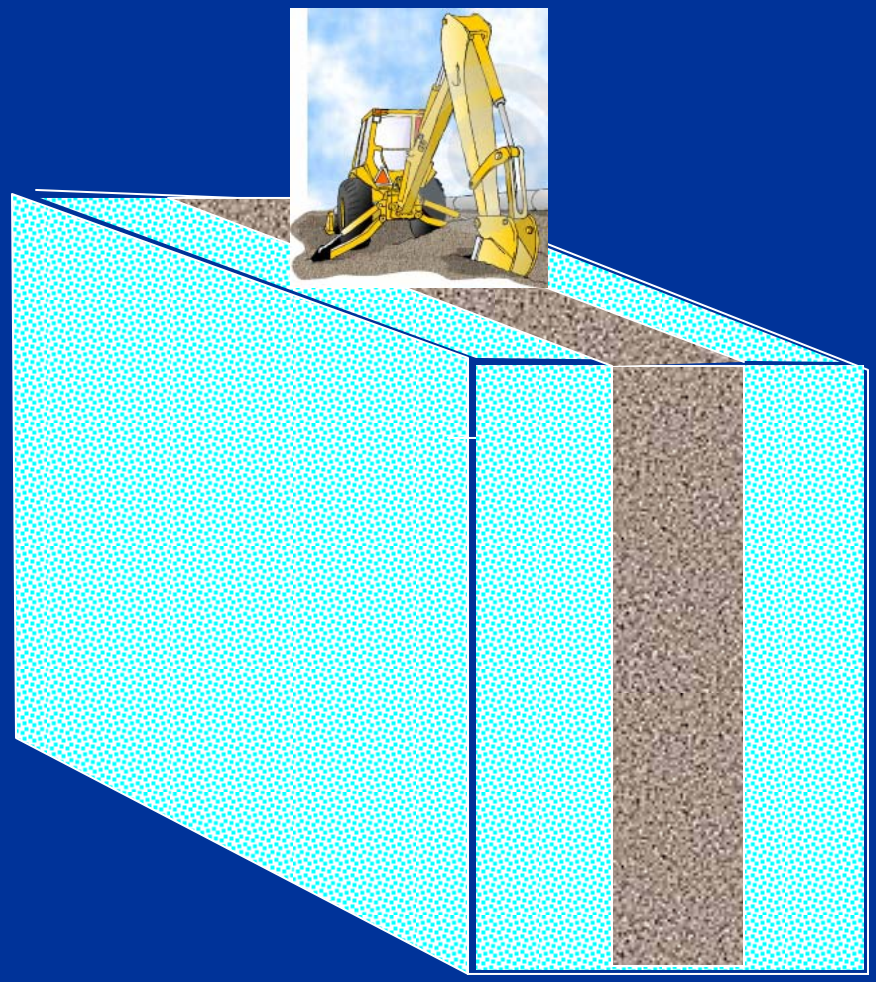
Alt. 3 – Canal Lining w/ Wells & Pumps

Alt. 4 – S-C-B Wall & Shallow Sheet Pile Window w/ Wells & Pumps (i.e. Hybid Alternative)

Soil-Cement-Bentonite Wall
Constructed through “blasted slot”



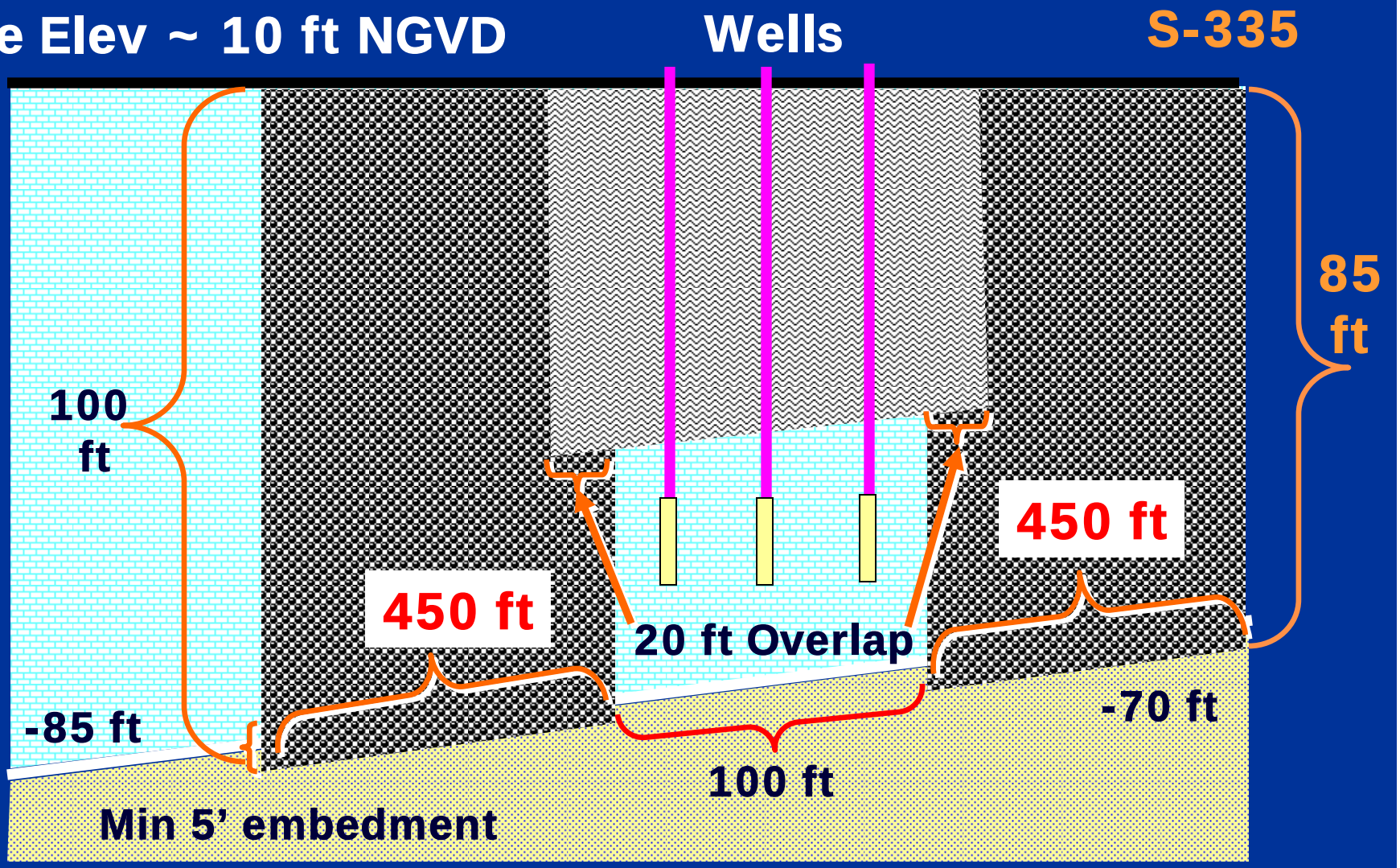
Drill holes, insert charges,
Blast 6’ wide slot



Excavate S-C-B Wall
Through new unconsolidated materials

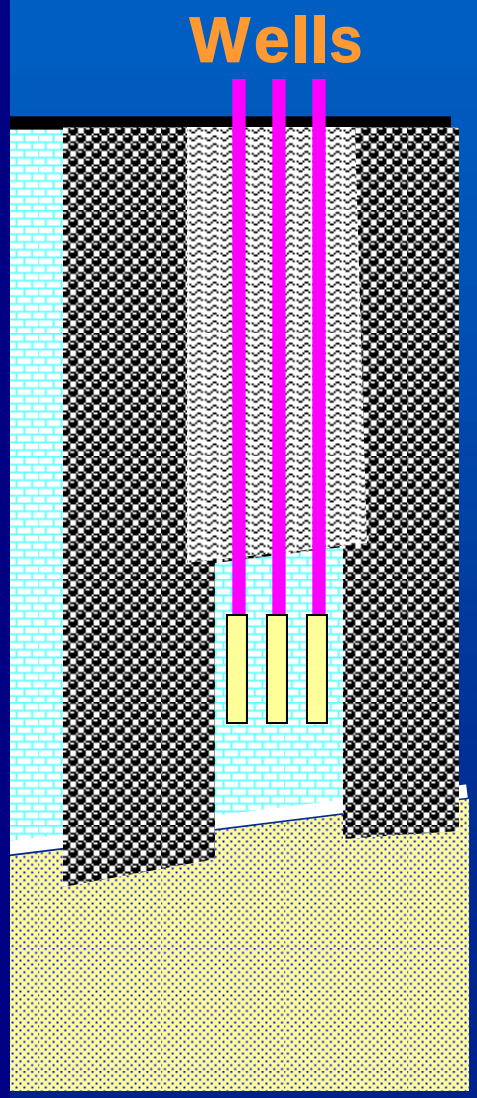
Alternative 4 – Soil-Cement-Bentonite/Sheet Pile Wall

Cost for 1,000 feet ~ $2.8 M ~ afford 2,200 ft



Team Recommendation – Alt 4

- Hybrid Option Alternative # 4
- Constructed in phases in order to maximize knowledge gained for investment made
- Alternative includes three out of four technologies considered by team and provides same function with more knowledge gained than other options
- Based upon unit cost for 1,000 feet section, the team recommends a total length of up to 2,200 feet, which is within the cost containment cap

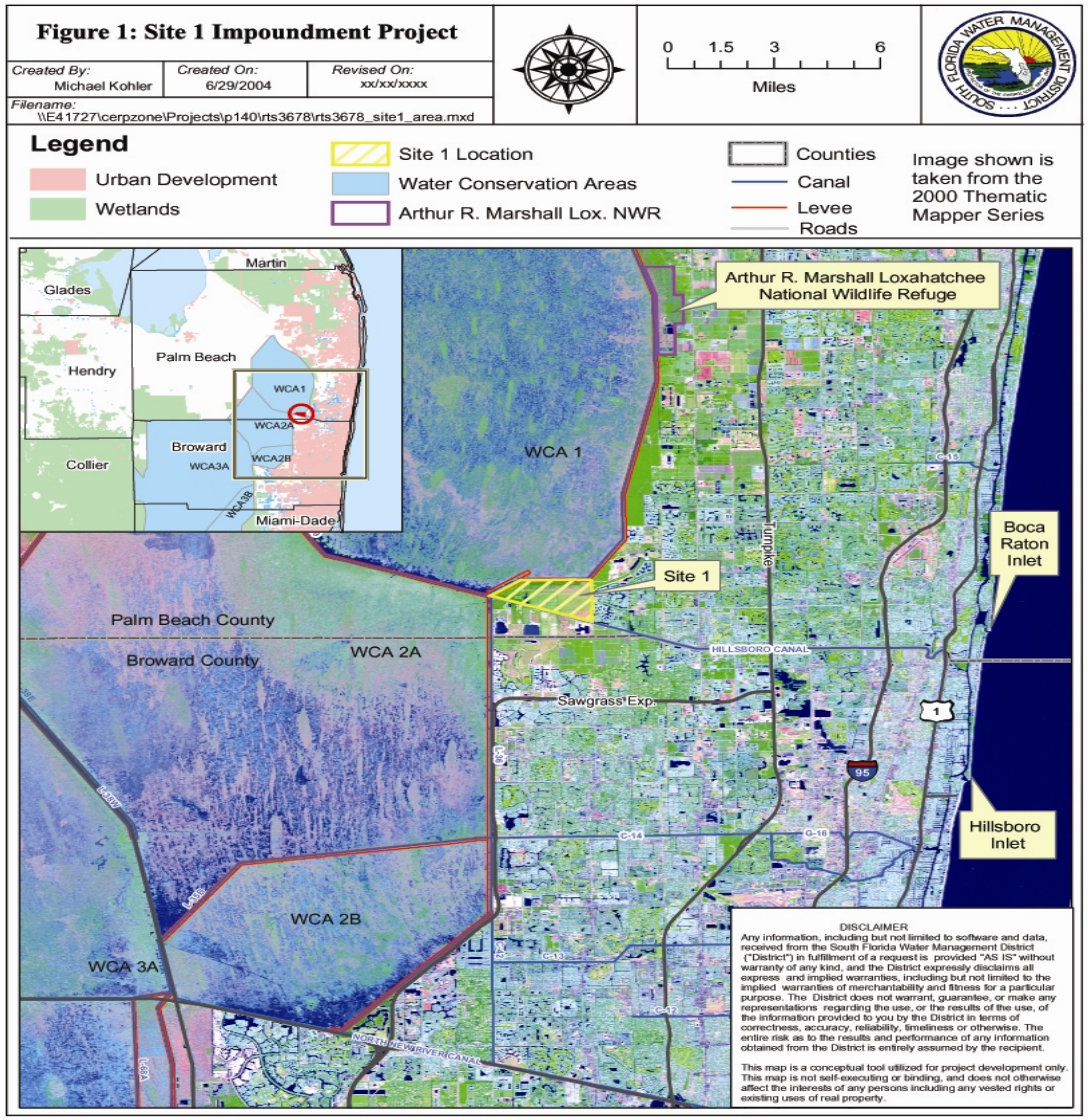


Project Status

- Draft Project Management Plan (PMP) comment period expired 21 Dec 05
- Project Team's incorporating comments received into the PMP
- Anticipate Final PMP Approval Jan/early Feb 06
- Technical Review Conference with SAD/HQ - Summer 2006

Site 1 Impoundment
Revised Draft PIR/EA

Site 1 Impoundment Project Area

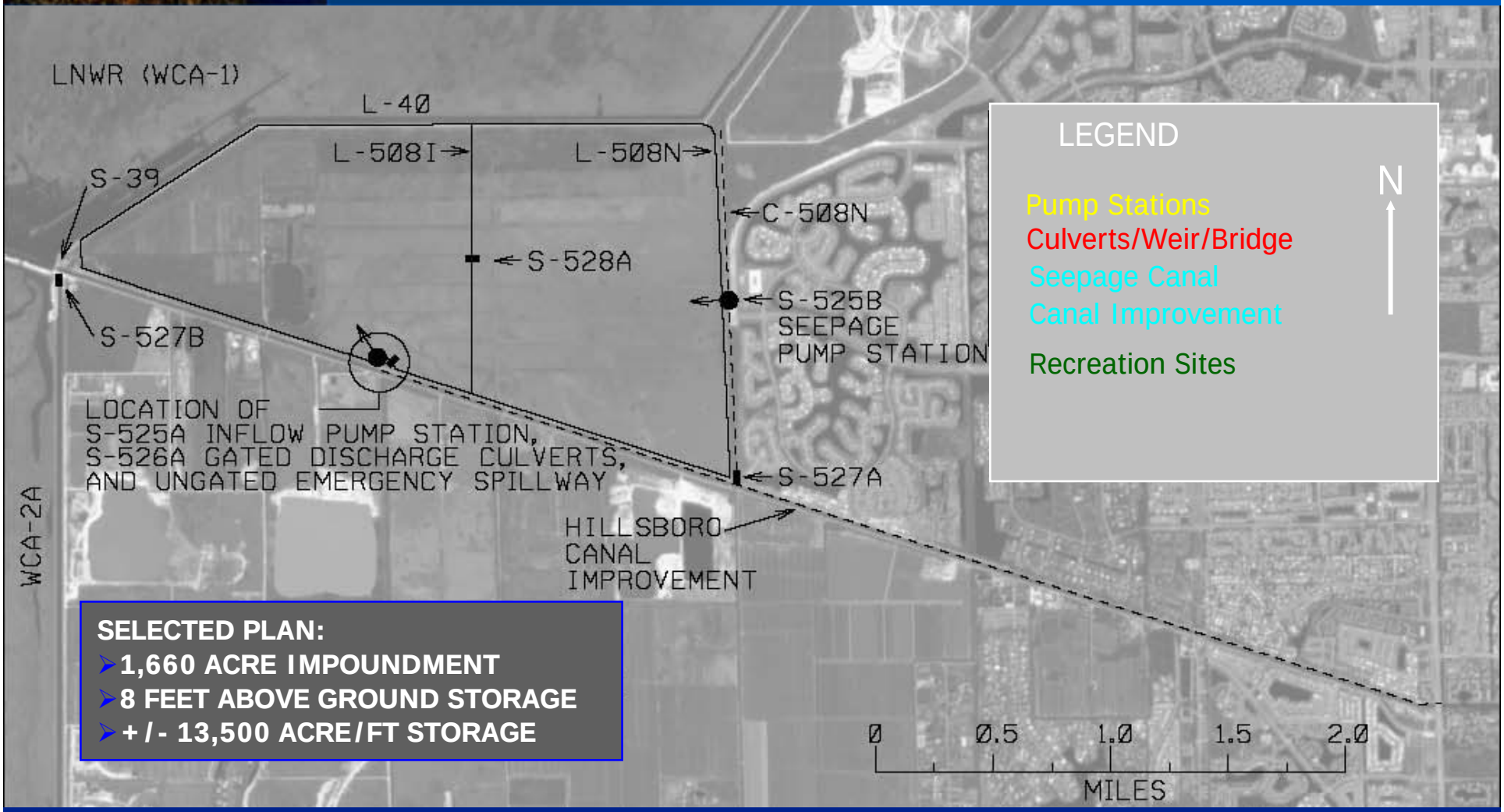


Site 1 Impoundment
Recommended Plan

Project Features:

- **An 1,800 acre project footprint**
- **1,660-acre interior impoundment approximately 8 ft. deep**
- **Project Cost: $50,046,000**

Site 1 Impoundment Recommended Plan



SELECTED PLAN:

- **1,660 ACRE IMPOUNDMENT**
- **8 FEET ABOVE GROUND STORAGE**
- **+/- 13,500 ACRE/FT STORAGE**

Site 1 Impoundment
Project Status

- Revised Draft Project Implementation Report + Environmental Assessment (EA) (PIR) for Public Review: January 2006
- Public Review: Jan 2006-Feb 2006
- Final PIR: May 2006

Site 1 Impoundment Project Status continued

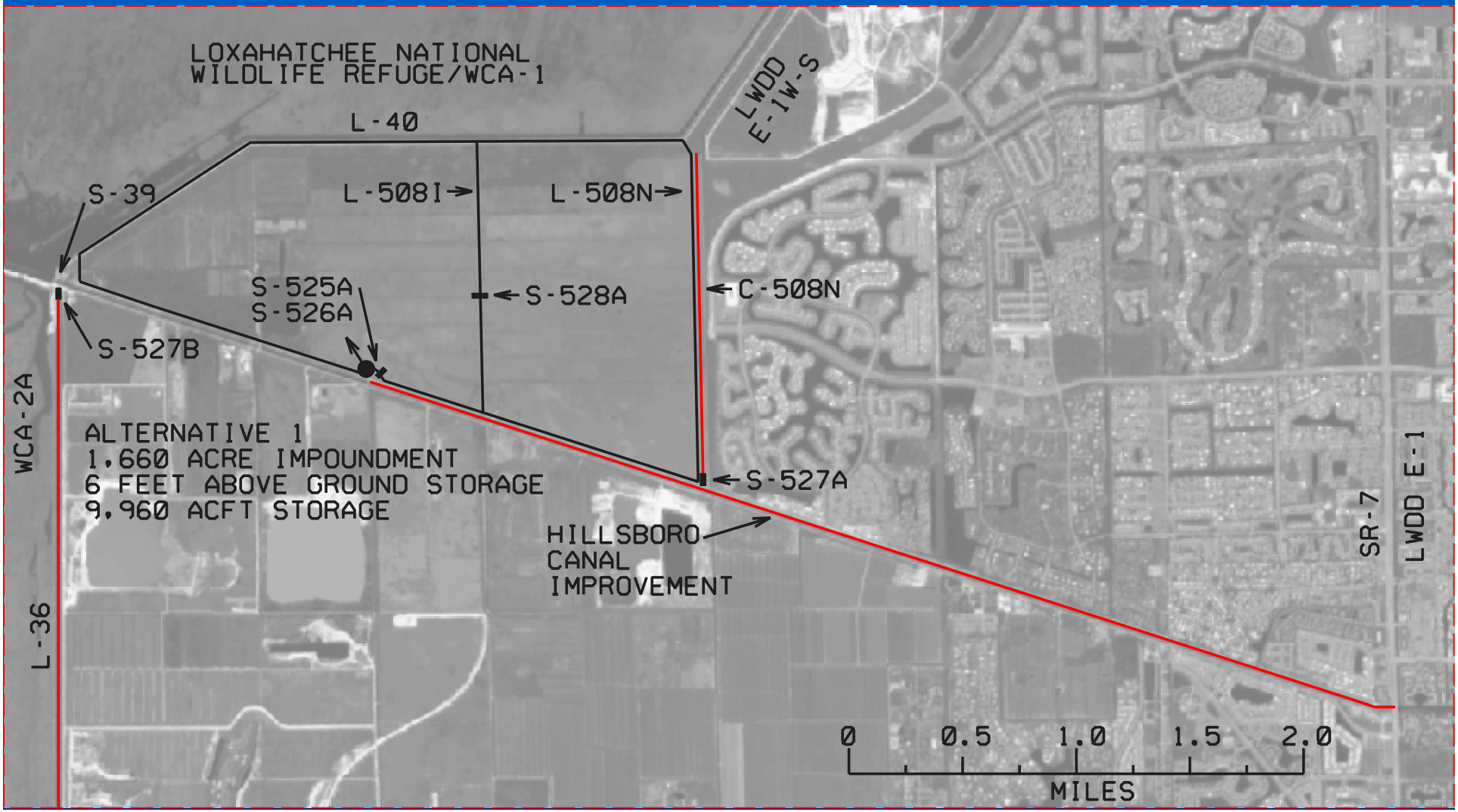
- Pre-construction Engineering and Design Activities have commenced on the Site 1 Impoundment features have commenced in accordance with the Acceler8 program
- Construction scheduled to begin on the Site 1 Impoundment in the Summer of 2006

Site 1 Impoundment Comparison of Alternatives

- The Site 1 Impoundment compared 3 different alternatives through plan formulation
- Alternative A: No Action
- Alternative B: Impoundment of 1660 acres, maximum depth of 6 ft. of water
- Recommended plan, Alternative C: Impoundment of 1660 acres at a maximum depth of 8 ft. of water

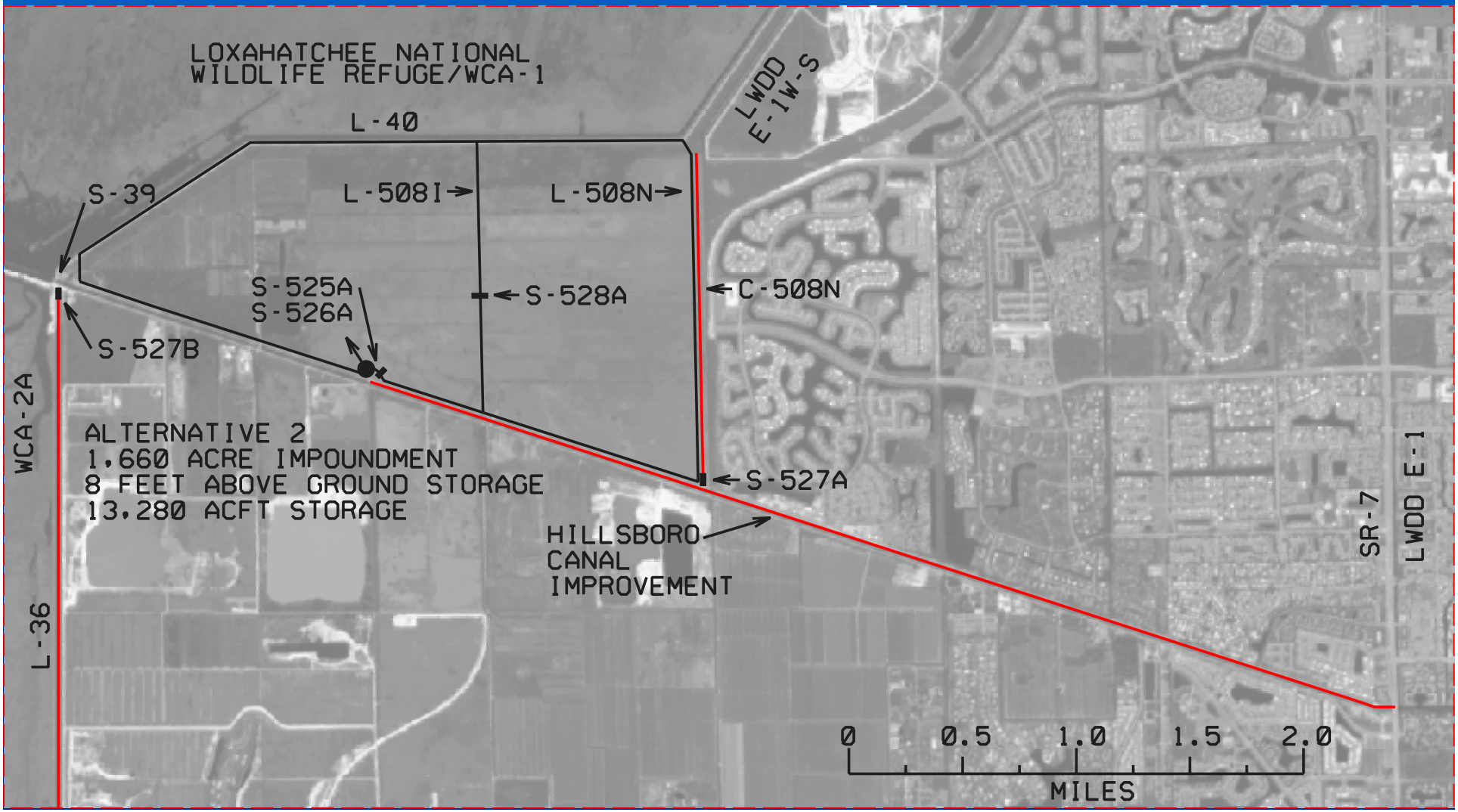
Final Array of Alternatives

Alternative B



Final Array of Alternatives

Alternative C



Site 1 Impoundment
Why Alternative C was Selected

- Alternative C best achieves the majority of the objectives for the proposed Site 1 Impoundment
- Creates the most beneficial ecological effects on both the natural system and the estuarine portions of the Hillsboro Canal and Intracoastal Waterway
- Cost effective and is considered the “best buy” after performing an incremental cost analysis
- provides for the most cost efficient plan that would be effective in meeting the goals and objectives for the proposed project

Site 1 Impoundment
Restudy vs. PIR

- Restudy Conceptual Plan (1999)- 2460 ac @ 6’ deep
- Draft WPA Feasibility Study (2001) modified impoundment footprint to exclude seepage canals, levees and mining pits - 2246 ac @ 6’ deep
- Site 1 Impoundment PIR (2005) Selected Alternative Plan – 1660 ac @ 8’ deep (reduction of 196 ac-ft storage)

Site 1 Impoundment
Restudy vs. PIR (Costs)

Restudy Plan

(Oct 2004 price levels)

- Cost - $50,148,000
- Components:
  - Reservoir Impoundment (2,460 acres at 6 feet deep)

PIR Plan

(Oct 2004 price levels)

- Cost - $50,046,000
- Components:
  - Reservoir Impoundment (1660 acres at 8 feet deep)

Site 1 Impoundment
What does Site 1 Impoundment do for the Everglades system?

- Relief from drought conditions by water retained in the system in LNWR and WCA-2A
- Potential minimal impacts to WCA-2A from high water stages in wet season and increase in flow

Site 1 Impoundment
What does Site 1 Impoundment do for the Everglades system? (continued)

- Existing low quality habitats replaced with impoundment
- Environmental features of project, such as deep water refugia, littoral shelves, and levees will provide some habitat and foraging area for bird and fish species
- Wading bird habitat improved and expanded

Site 1 Impoundment
Project Assurances + Savings Clause

- Identified beneficial water in Refuge and Everglades National Park
- Identified water to meet the other water related needs of the region
- Reduces water withdrawn from the Refuge
- No adverse effect on existing legal sources of water
- No adverse effect on the level of service for flood protection

Lake Okeechobee
Watershed

Lake Okeechobee Watershed

ROM Update & Coordination of LOER Schedule and Review of Design Deliverables

South Florida Ecoystem Restoration 2006

Project Status Reminder

1. Identify Problems and Opportunities
2. Inventory and Forecast Conditions
3. Formulate Alternative Plans
4. Evaluate Alternatives
5. Compare Alternative Plans
6. Select Preferred Plan

Today's Topics of Discussion

- ROM cost estimates for Revised LOW Top Ten Alternatives
- Coordination between LOW and LOER projects

LOW Cost Containment Cap Issues

- Initial set of top ten project alternatives encompassed a wide range of costs/scales, BUT
- ROM cost estimates for many alternatives were significantly higher than the CCC ($622 million)
- QRB members expressed concern over costs

QRB Directive to LOW Team

- Re-look at Top 10
- Look for potential cost savings, efficiencies
- Re-present your Top 10 to QRB

What LOW Team Has Done

- **Reservoir Depth Analysis**
  - Reduce acres, cost and evapotranspiration
- **STA Re-Sizing and Efficiency Analyses**
  - Increase efficiency, reduce acres, cost and evapotranspiration
- **Operations Analysis**
  - Ensure most efficient operation of STAs and Reservoirs

What LOW Team Has Done
continued

- **Alternative Treatment Technology Update**
  - Review of technologies and selection of potential measures to improve efficiency
- **Revised Real Estate Cost Estimates**
  - Ensure use of most up-to-date real estate costs
- **Revised Fisheating Creek Basin Features**
  - Avoid resource impacts and increase efficiency

Reservoir Depth Analysis Results

- Cost continued to decrease with increasing depths
- Incremental cost change (% cost reduction for each 2 ft increase in depth) was used as the primary criterion to select depths
- Incremental cost changes were significant at the shallower depths, but diminished as depths increased

Reservoir Depth Analysis Results

- Once the incremental cost change fell to roughly 5%, subsequent incremental changes became very small, and there was no significant cost advantage for increasing reservoir depths beyond that point
- Therefore, reservoir depths were selected based on incremental cost changes criteria of 5%

TCNS02/03 (T26)

Depth ft.	Cost	Incremental Change in Cost
8	$ 137,730,036	
10	$ 119,502,706	13%
12	$ 106,475,717	11%
14	$ 97,807,937	8%
16	$ 92,917,043	5%
18	$ 88,053,322	5%
20	$ 84,719,905	4%
22	$ 83,050,705	2%
24	$ 81,830,557	1%
26	$ 81,128,275	1%

Reservoir Depth Analysis Results

Reservoir	Selected Depth (ft)
KISS(E)	18
KISS1 (W)	14
KISS2 (W)	16
KISS3 (W)	16
KISS4 (W)	18
KISS5 (W)	16

Reservoir	Selected Depth (ft)
T33	14
T30A	12
T30C	14
T26	18
T30B	14
T30D	14

Reservoir	Selected Dept (ft)
ISTOK01 (I17)	14
ISTOK02 (I17)	16
ISTOK03 (I17)	16
ISTOK04 (K04)	14
ISTOK05 (K05)	18

STA Re-sizing and Efficiency Analysis

- **Focused on**
  - Cut and Fill
  - Size vs. p-load removal efficiency
  - operations

STA Cut and Fill Analysis

- Objective was to evaluate current STA design configurations with respect to the extent of cut and fill that would be required for each individual STA facility
- Depending upon the site topography and cell configuration, each STA is likely to require some amount of cut and fill to ensure uniform flow within each cell and across different cells
- Reducing earthwork without significantly lowering the performance of the STA, can mean considerable cost savings

Cut and Fill Analysis Results

STA ID	Pre Cut & Fill Analyses		Post Cut & Fill Analyses		Cost Savings ($)
	Total Volume (CY)	Total Cost ($)	Total Volume (CY)	Total Cost ($)	
TCNS01-03 (T01)	3,283,093	$ 11,490,826	8,343,899	$ 29,203,646	$17,712,820
TCNS04-05 (T01)	3,283,093	$ 11,490,826	6,972,858	$ 24,405,003	$12,914,177
ISTOK01-05 (I01)	15,078,323	$ 52,774,130	2,898,418	$ 10,144,463	$42,629,667
ISTOK01-02, 04-05 (K05s)	31,963,715	$111,873,002	14,963,957	$ 52,373,849	$59,499,153
ISTOK03 (K05s)	30,907,878	$ 108,177,573	12,251,821	$ 42,881,373	$65,296,199

STA Size Analysis

- Objective of the STA Size Analysis
  - To determine impact on load reduction caused by incrementally reducing the size of STA's down to 50% of its original size
  - Available flows and phosphorus loads and concentrations were not reduced with decreasing sizes
- Observations
  - Generally as the size of an STA was reduced, its efficiency improved, but the total phosphorus load reduction decreased, and
  - As the size of an STA was reduced, it was possible to maintain hydraulic loading rates (HLR's) at more efficient levels for a larger percentage of the time

STA Size Analysis

- TCNS Basin
  - STA phosphorus removal efficiencies fairly high. Team determined TCNS sizes should be maintained
- ISTOK Basin
  - K05N STA inherently inefficient with realistic operating rules. STA was eliminated
  - Developed two additional sets of configurations for all other ISTOK STA's
  - All three sets; original, ISTOK A, and ISTOK B were added to the PAA pool
  - New set of WA's were selected based on modified criteria
- FEC Basin
  - STA size reduced

STA Operations Analysis

- Current improvements
  - Increased STA inflow rates to best maintain optimum hydraulic loading rate
  - Removed concept of “resting STA” during planning – designed to avoid overload
  - Lowered critical depth to 15 cm to match operating targets
- Future Potential Improvements
  - Utilize SAV in STAs with TP<150 ppb
  - Split-leaf outlet gates with lower crest at 40 cm
  - Design seepage collection/return system to provide supplemental water supply to minimize dry out
  - Utilize DMSTA2

Alternative Water Quality Treatment Technologies Update

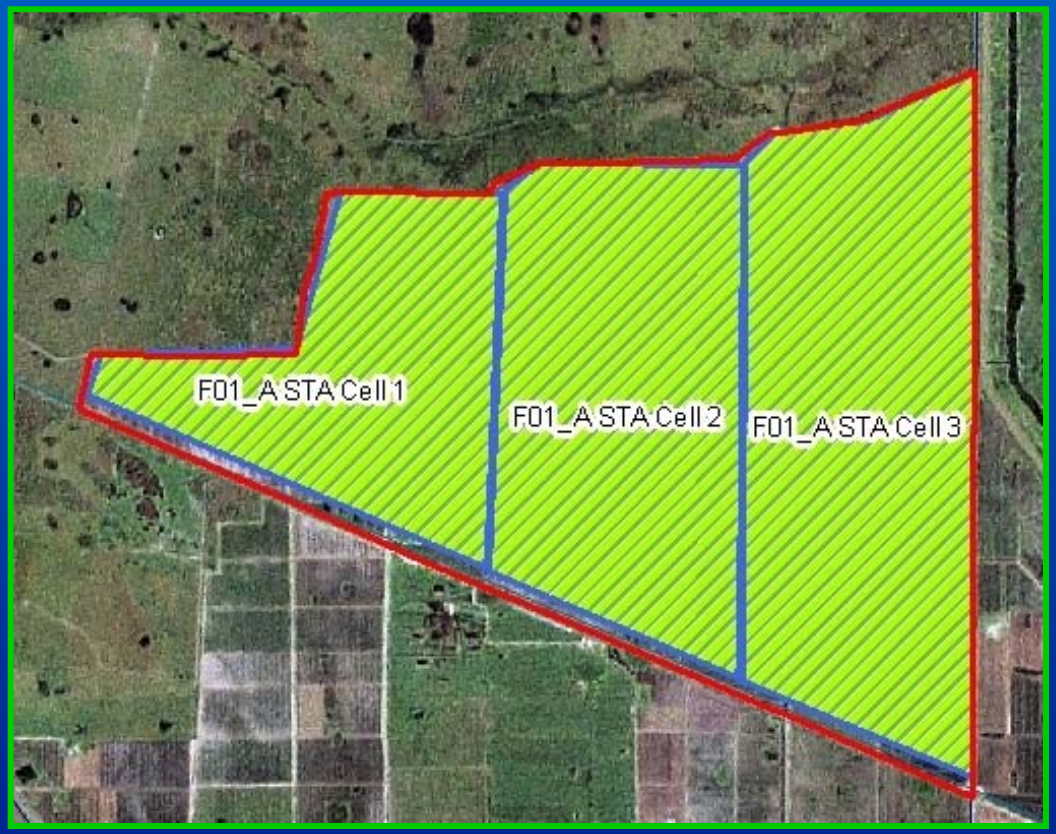
- Focus on 2 potential technologies
  - Submerged Aquatic Vegetation STA
  - Managed Aquatic Plant Systems
- Analysis Ongoing

Revised Real Estate Cost Estimates

- Updated real estate cost estimates, based on more recent (2005) sales data
- Included estimates and contingencies for Corps and SFWMD real estate administrative costs, relocations and other requirements

STA Size Analysis - FEC Basin

- Size reduced from 21,000 ac to 6,000-7,000 acres to avoid impacts
- Evaluated options to achieve basin p-load reduction target
  - EMA/SAV combination STA
  - MAPS - evaluation on-going



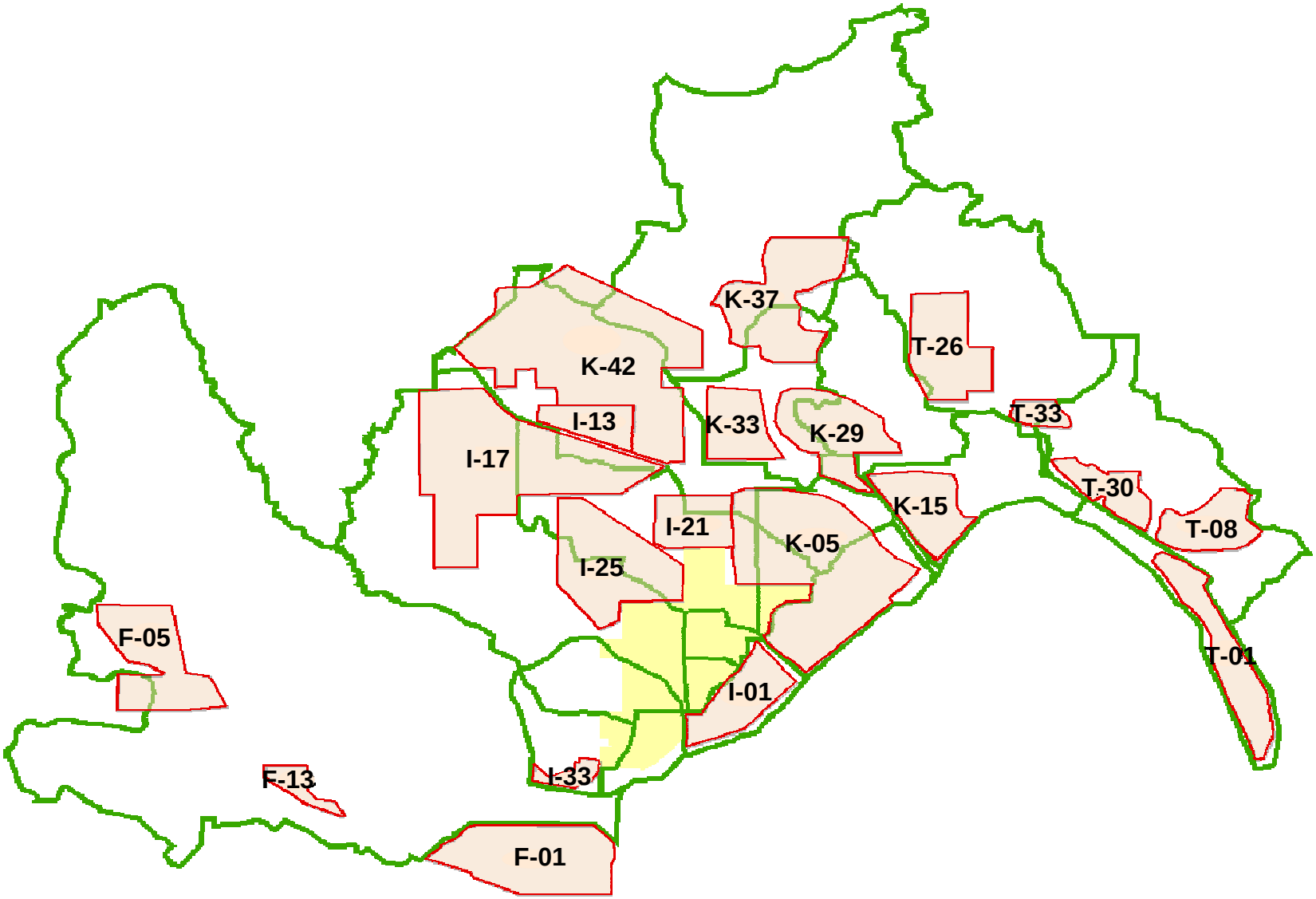
Bottom Line

- Analyses led to modified features, costs and operations
- Some features were eliminated
- Team re-combined features in IWR-Plan and re-selected Top Ten Alternatives
- Team added a Yellow Book alternative to Top Ten for comparison purposes

Top Ten Watershed Alternatives - REVISED

New WA ID#	P-Load Reduction Compared To Target (=130 Mtons/yr)	Storage Compared To Target (286,000 AF)	Cost Compared To CCC ($622 Million)	WA Components	P reduced (Mtons)	Storage (1,000 AF)	Cost* ($1,000,000)	Cost including design and Construction supervision, permitting etc. ($1,000,000)
WA01				Yellow Book	68	286	$ 995	$ 1,064
WA02	-	-	meets	K4 I03B	62	240	$ 627	$ 683
WA03	-	-	meets	I03B F1	87	80	$ 530	$ 578
WA04	65% achieved (84 mtons)	65% achieved (186K AF)	-	K1 I03B F1	93	153	$ 712	$ 777
WA05	65% achieved (84 mtons)	65% achieved (186K AF)	-	T2 K1 I04A F1	128	121	$ 1,207	$ 1,314
WA06	Less than	meets	-	T4 K4 I03B F1	125	288	$ 1,126	$ 1,229
WA07	-	Most cost effective	-	K5 I03B	66	279	$ 713	$ 777
WA08	meets	less than	-	T2 I04A F1	123	48	$ 1,026	$ 1,114
WA09	meets	less than	-	T2 K4 I01A F1	137	218	$ 1,324	$ 1,444
WA10	meets	meets	-	T5 K4 I01A F1	145	274	$ 1,437	$ 1,565

*Costs for RASTAs, not Including approx. $50 million for wetland restoration


K-37
T-26
K-42
I-13
K-33
K-29
T-33
I-17
T-30
K-15
I-21
K-05
T-08
I-25
F-05
T-01
I-01
I-33
F-13
F-01

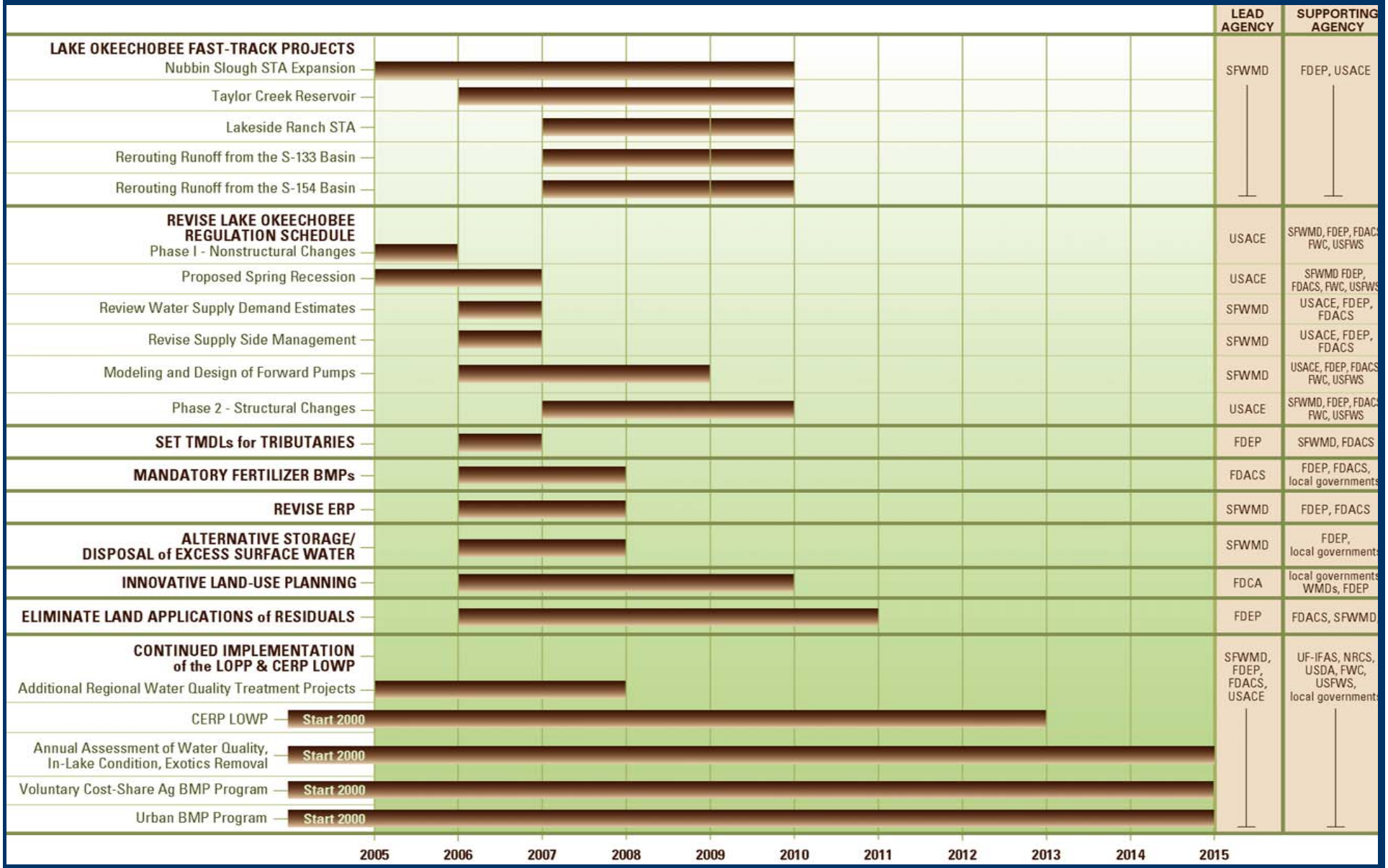
Comparison to Last Top Ten

- More alternatives near or below CCC
- Cost of alternative that meets both targets significantly reduced (by $79 million)
- For a given $$ amount, alternatives produce more P-load reduction and storage
- Alternatives that come close to or meet both targets are still over CCC
- **Yellow Book Alternative is significantly over CCC**

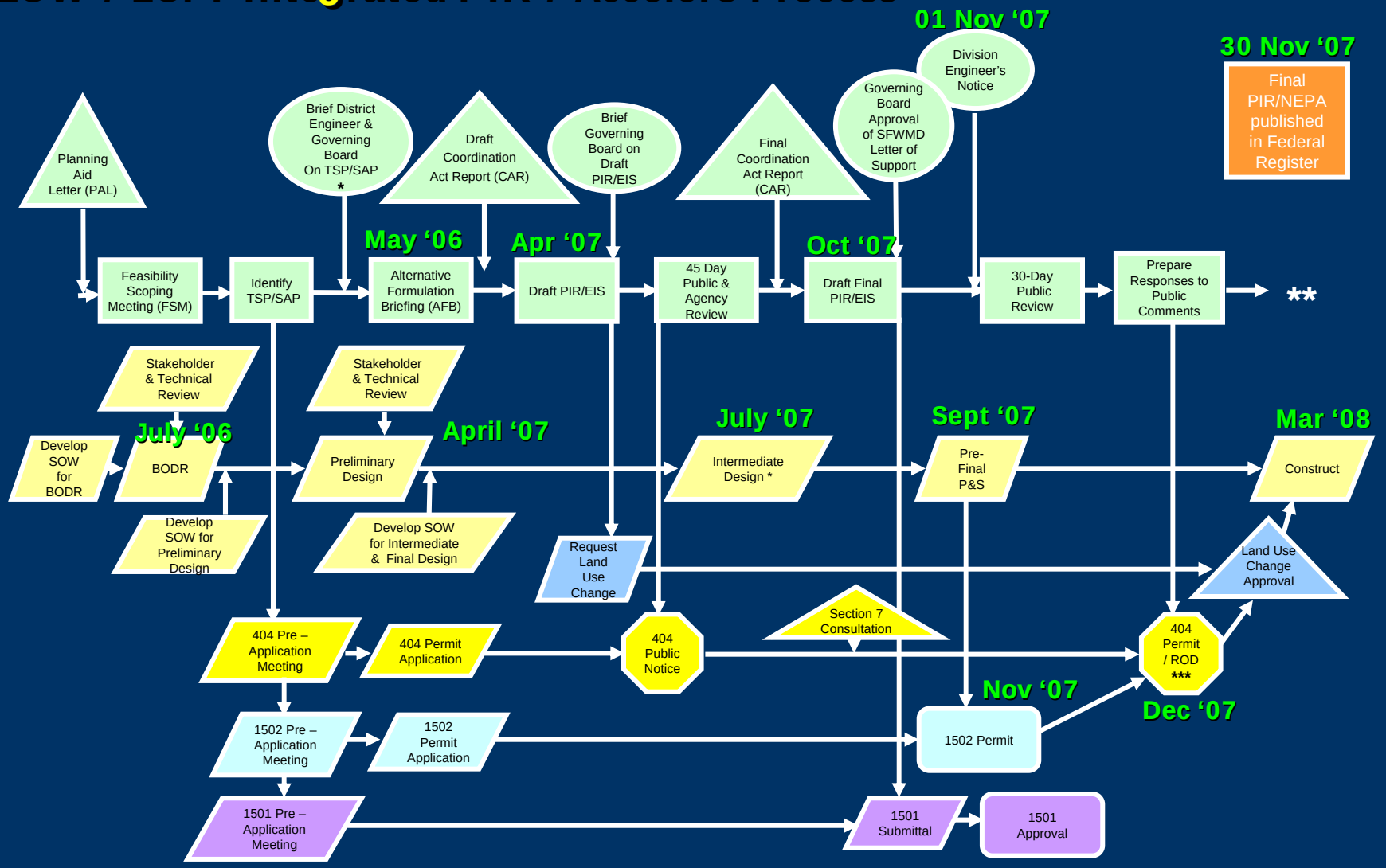
LOER Coordination

- LOER PM, Mark Long, contractor working for CDM, SFWMD's JMJV
- PIR Team will coordinate with LOER PM through David Unsell, PIR PM
- Team awaiting detailed schedule for LOER

LOER Schedule



LOW / LOFT Integrated PIR / Acceler8 Process



Legend:

* District Engineer approval of TSP/SAP is required prior to initiating intermediate design.

** PIR Process will continue beyond the "Prepare Responses to Public Comment", leading to a separate ROD for the PIR and a Chief's Report.

*** For Projects with an EA + Statement of Findings (e.g., Acme Basin, Site 1), a 404 Permit can be issued after the 45-day Public Review following the Draft PIR/EIS

6 January 2005