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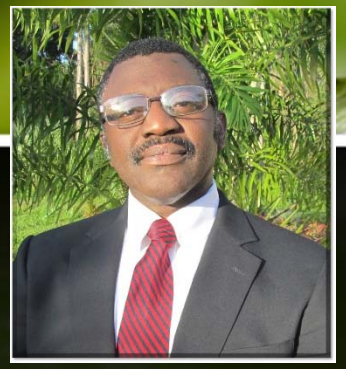
Expedited Action to Address High Water Conditions in WCA3-A and 8.5 SMA (Las Palmas Community)



Akintunde Owosina, P.E.
Bureau Chief
Hydrology and Hydraulics

South Florida Water Management District
Governing Board Meeting
December 10, 2020

12/10/2020

Modified Water Deliveries Project – Alternative 6D Seepage Management Features for 8.5 SMA

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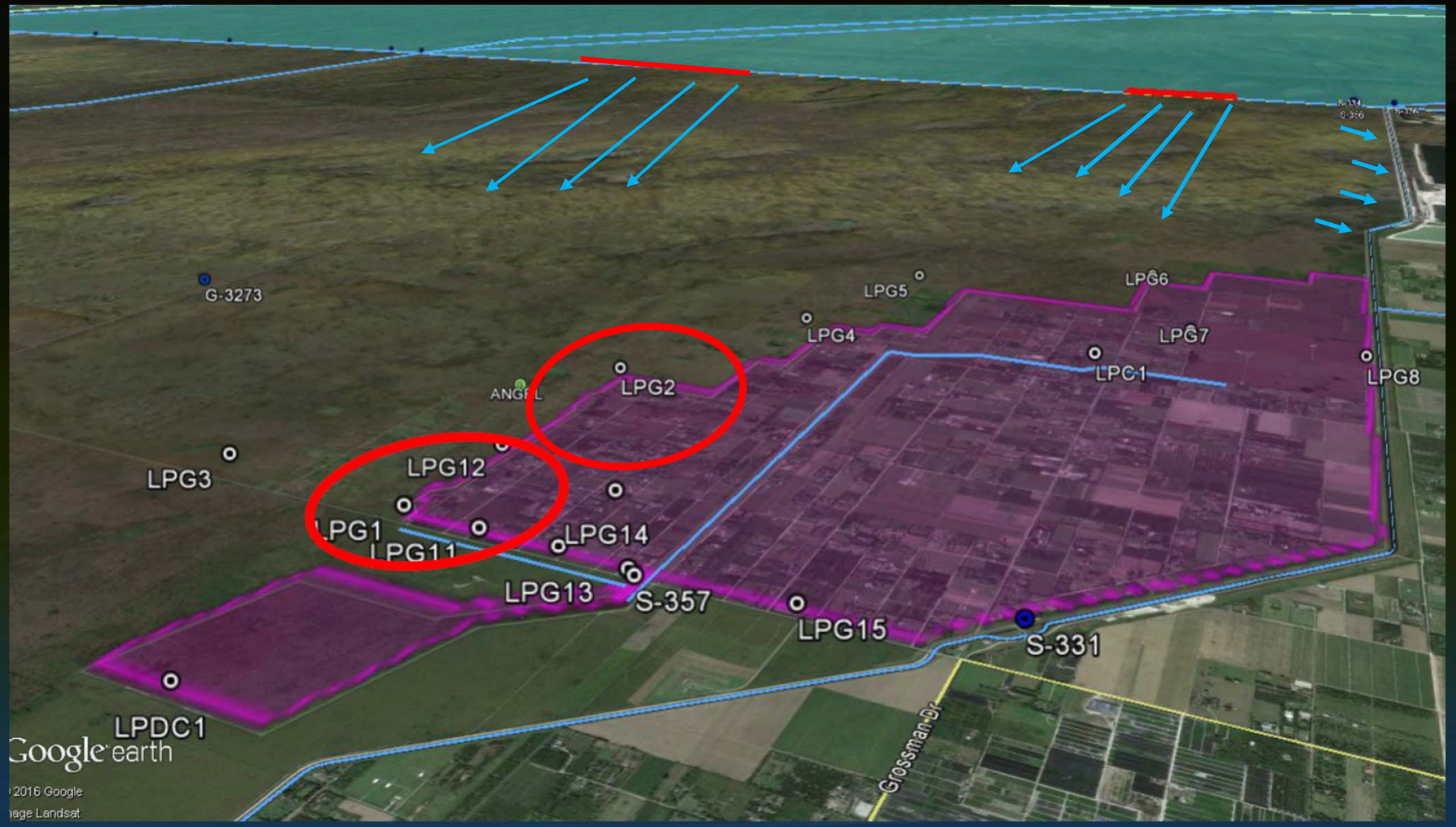

- L-357W – Levee separating the 8.5 SMA from ENP
- C-357 – Seepage collection canal inside the 8.5 SMA to capture and discharge seepage flows
- C-358 – Canal south and west of the 8.5 SMA to capture seepage
- S-357 N – Structure connecting C-358 to C-357
- S-357 – Pump station for moving recovered seepage into the 8.5 SMA Detention Cell
- 8.5 SMA Detention Cell – Detention area that discharges to the C-111 South Dade North Detention Area

Presenter: Akin Owosina

Potential Flow Paths During WCA-3A High Water Emergency (Example 2016 High Water event)

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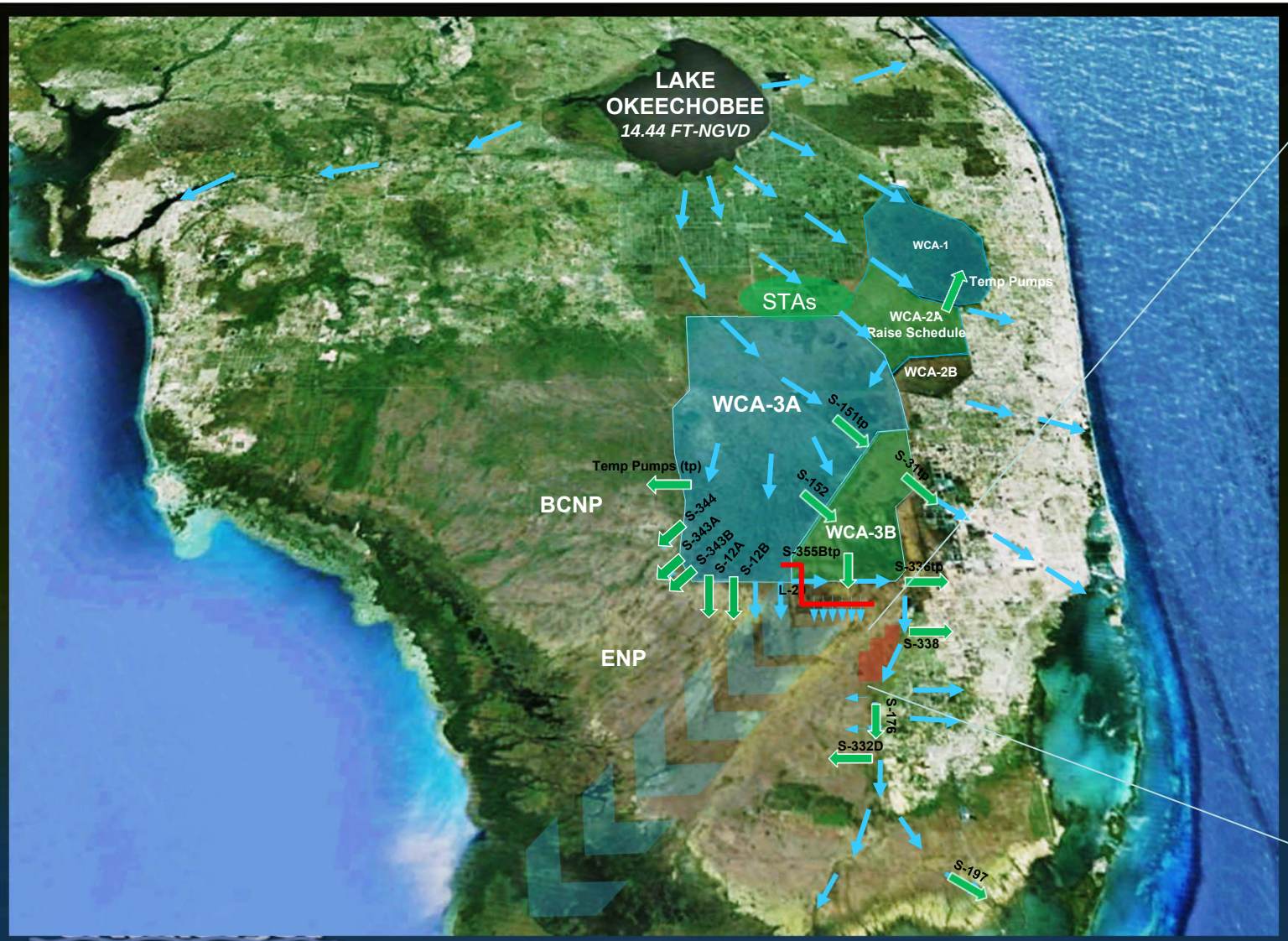

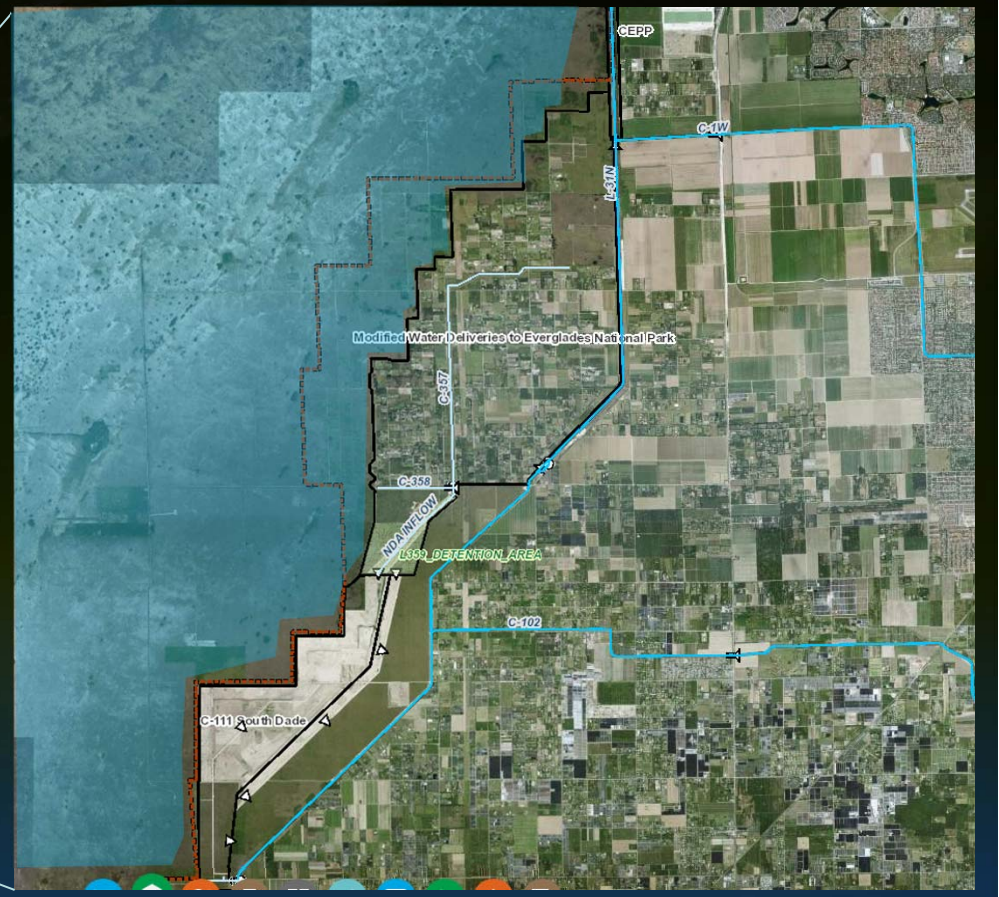

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8.5 SMA Challenges

- TS Eta reinforced the Challenge of the 8.5 SMA and recurring role it may have on limiting operation of the WCAs during high water events
- The challenges not only impact local hydrology but also can also influence regional operations (such as the opportunity to make releases from WCA3A during high water conditions).
- Staff was directed to explore potential viable structural options that can be part of a comprehensive long term solution.

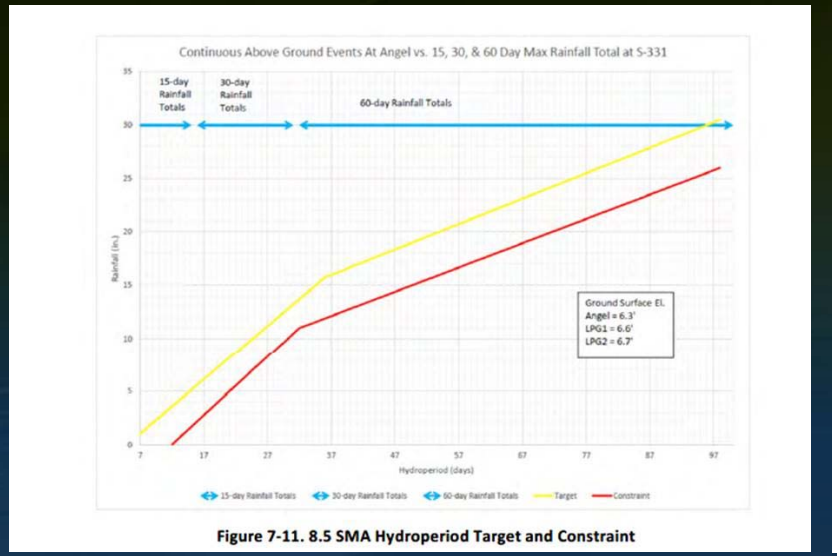
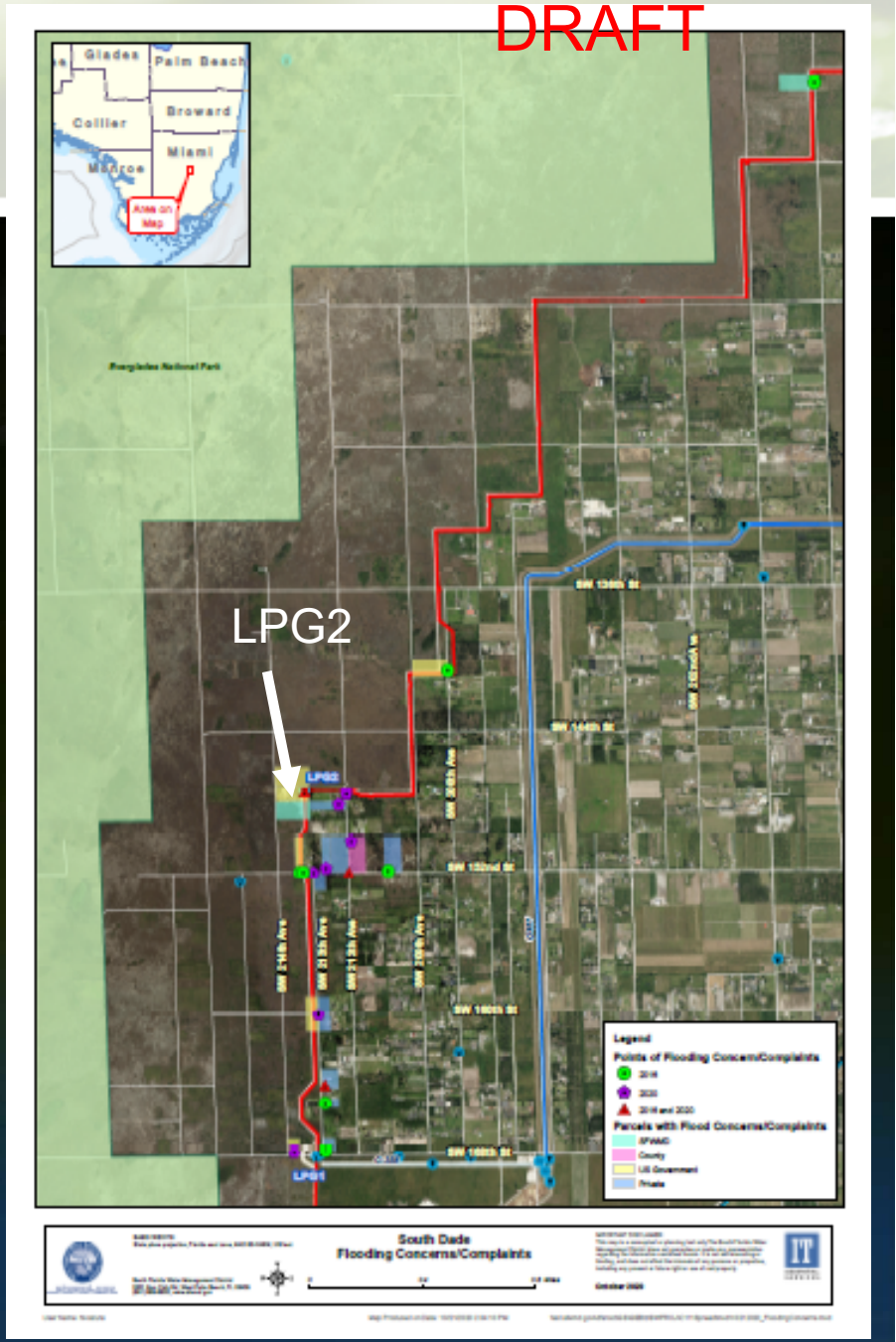


Figure 7-11. 8.5 SMA Hydroperiod Target and Constraint



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Meeting the Challenge - Putting The Pieces Together

- Potential solutions to removing the constraints to WCA-3A flows to NESRS during high water conditions were explored
- Options ranged from nonstructural alternative (acquisition) to structural alternatives requiring physical infrastructure
- Solutions need to meet current and future needs as projects to send more flows south come online

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Non-structural Option: Acquisition

Acquisition Process Willing Seller

- Identify target properties
- Complete title work
- Contact Property owner inquire as to interest in selling property
- Negotiate right of entry to conduct appraisal, environmental and cultural resource assessments.
- Negotiate Purchase and Sales Agreement.
- Obtain Governing Board Approval
- Close purchase

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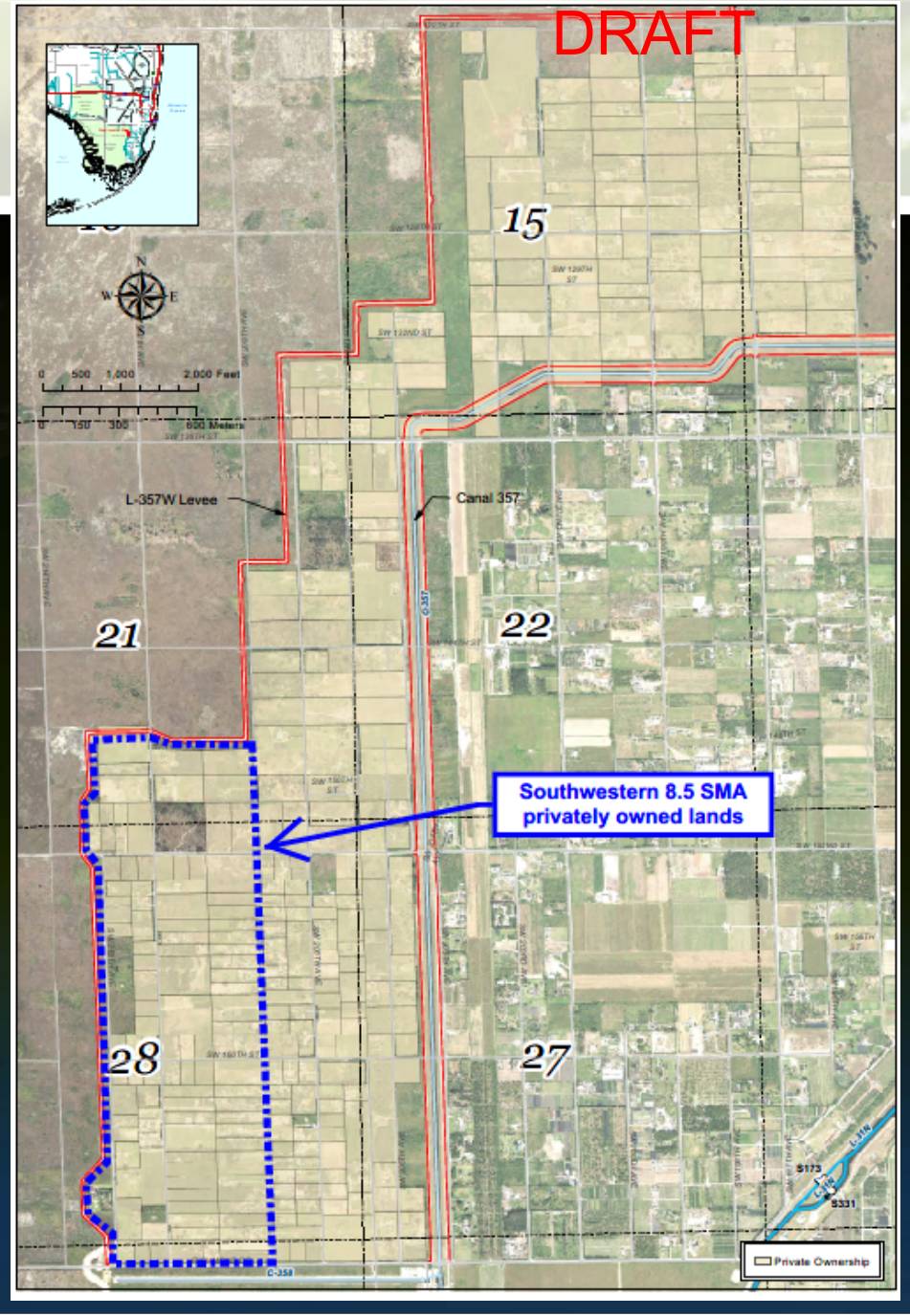
Non-structural Option: Acquisition

Willing Seller Process Experience

- 66% acquired on a willing seller basis
- Acquired at 190% of Appraised value
  - Inclusive of Attorneys fees and costs
- 15 months to acquire all willing seller interests

Non-structural Option: Acquisition

- Willing Seller program
- Can be scaled up or down
- 119 properties shown including 18 homes
- Property Appraiser “Market” Value $12.4 Million
- Purchase values will likely be significantly greater than the “Market” Value



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Structural Options

- COP confirmed that the western-most portion of the 8.5 SMA is most vulnerable to seepage impacts from the ENP
- Two recent projects in the region, Modified Water Deliveries and the Miami Dade Limestone Products Association seepage wall projects, evaluated and demonstrated effective seepage management concepts
- The data acquired as part of the ongoing curtain wall study authorized by SFWMD GB present an opportunity to re-examine these concepts and their potential to help mitigate flooding in western 8.5 SMA
    1. A second seepage collection canal
    2. A curtain wall
    3. A combination of both

Explaining the Seepage Collector Canal and Curtain Wall Concept

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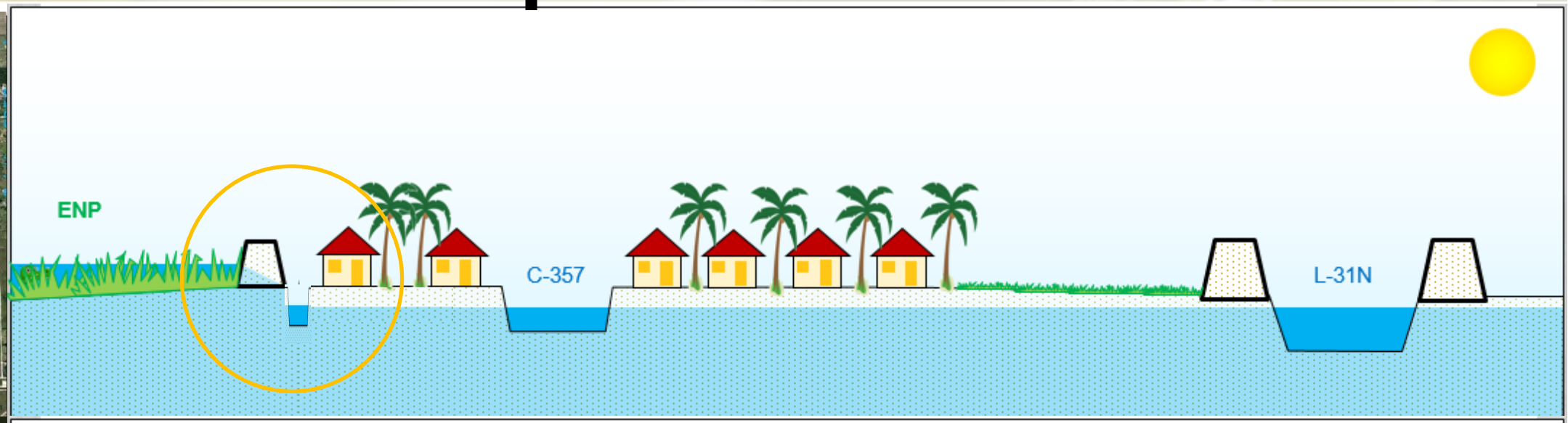

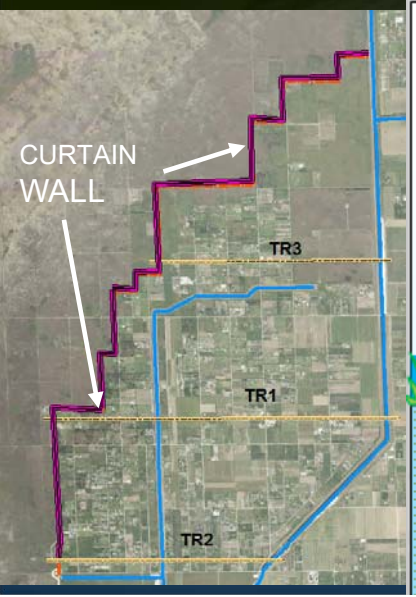

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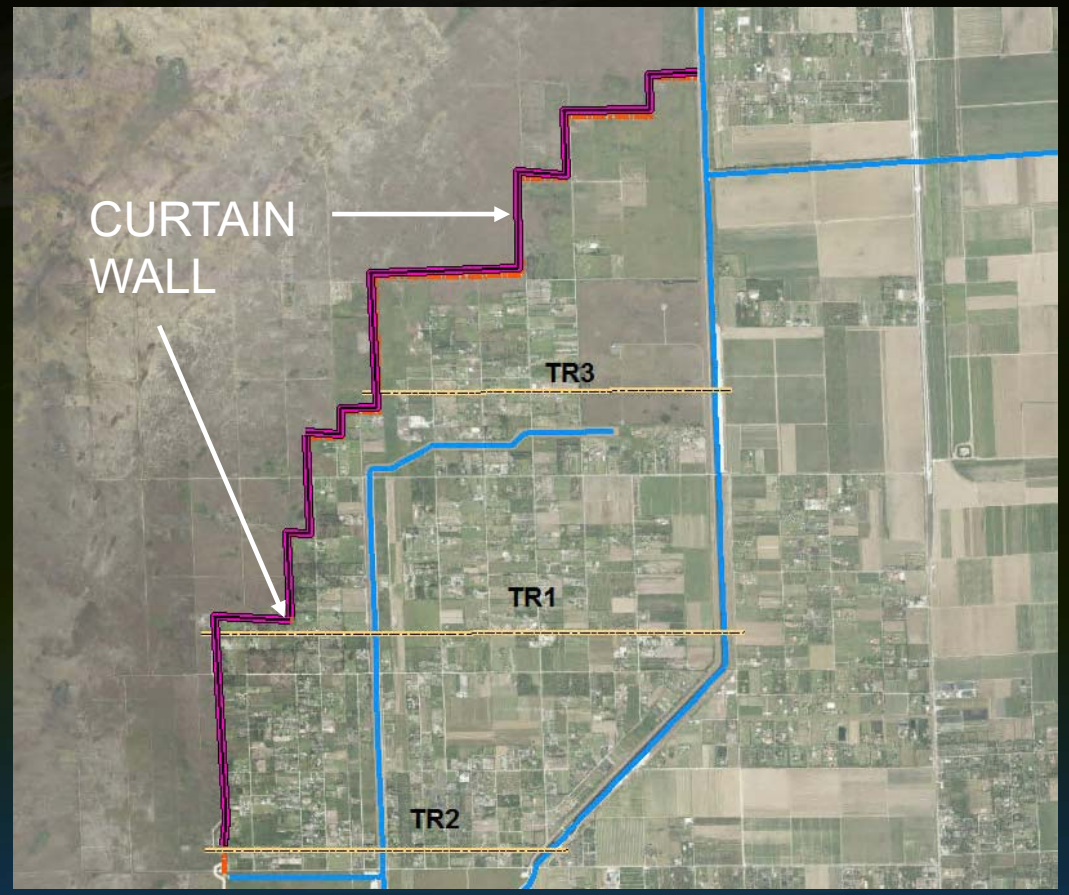
Curtain Wall Concept

- Placement of a semi permeable material such as bentonite slurry in the path of seepage flows, slowing down or reducing the rate of seepage or forcing a longer seepage path
- Currently being explored as part of a comprehensive seepage management strategy in the region
- Two recent examples of successful implementation in the region
- Can be completely relatively quickly within existing right of way



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Comparison Modeling Scenarios

- Two reference baseline conditions are illustrated:
  - 83BASE = USACE defined reference for 8.5SMA flood consideration
  - CBASE = Current Base (Combined Operations Plan)

- In order to compare canal, wall and combined options, the following scenarios are illustrated:
  - SCANAL = “Shortest” Canal and Pump (ALT3R)
  - SWALL = “Shortest” Wall (ALT1)
  - SWALLC = Combine “Shortest” Wall with Canal and Pump

- Other concepts may also be explored through subsequent modeling analysis over time and with incorporation of improved data (e.g., hydrogeology, flexibility on land acquisition, etc...)

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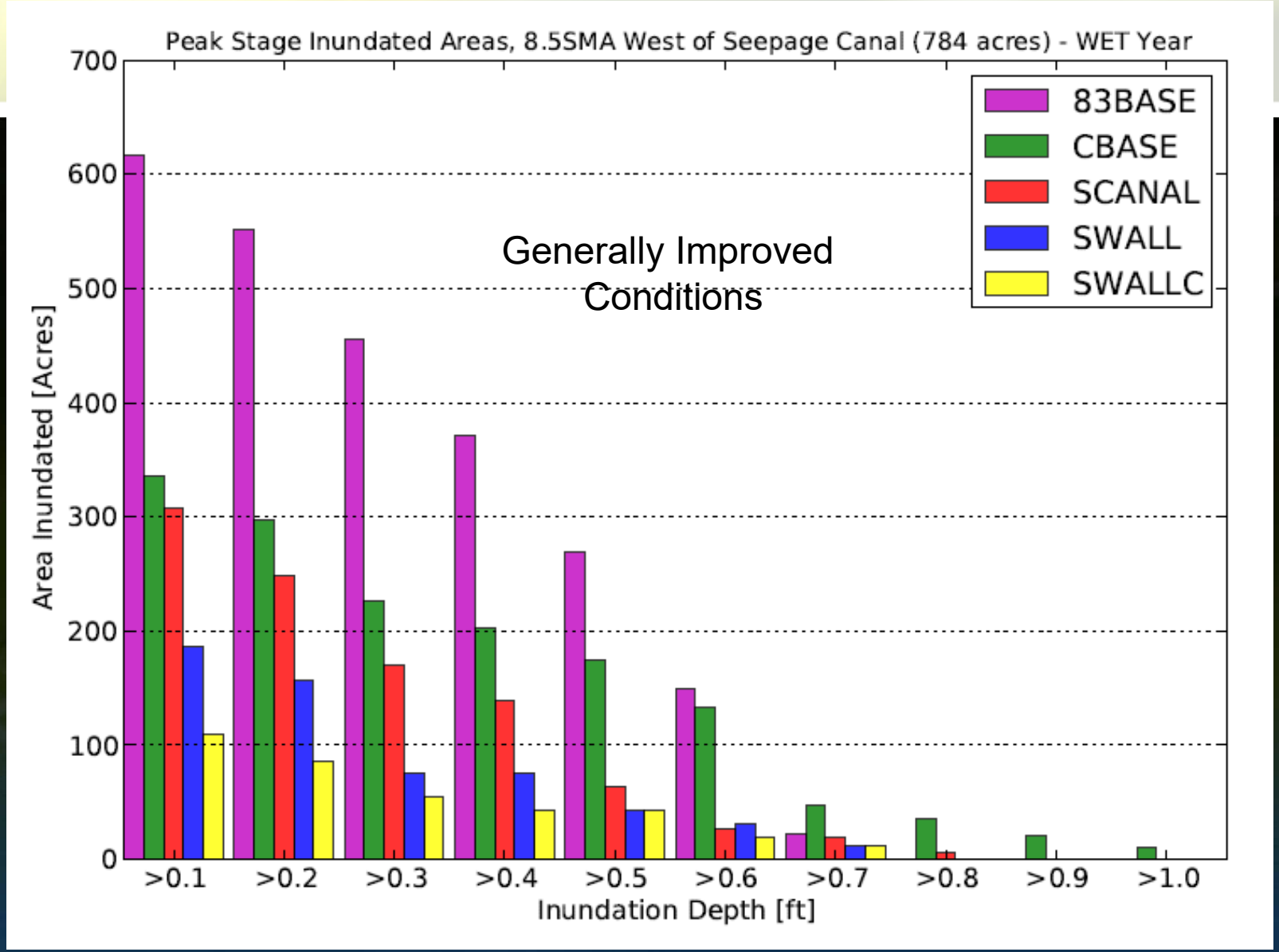

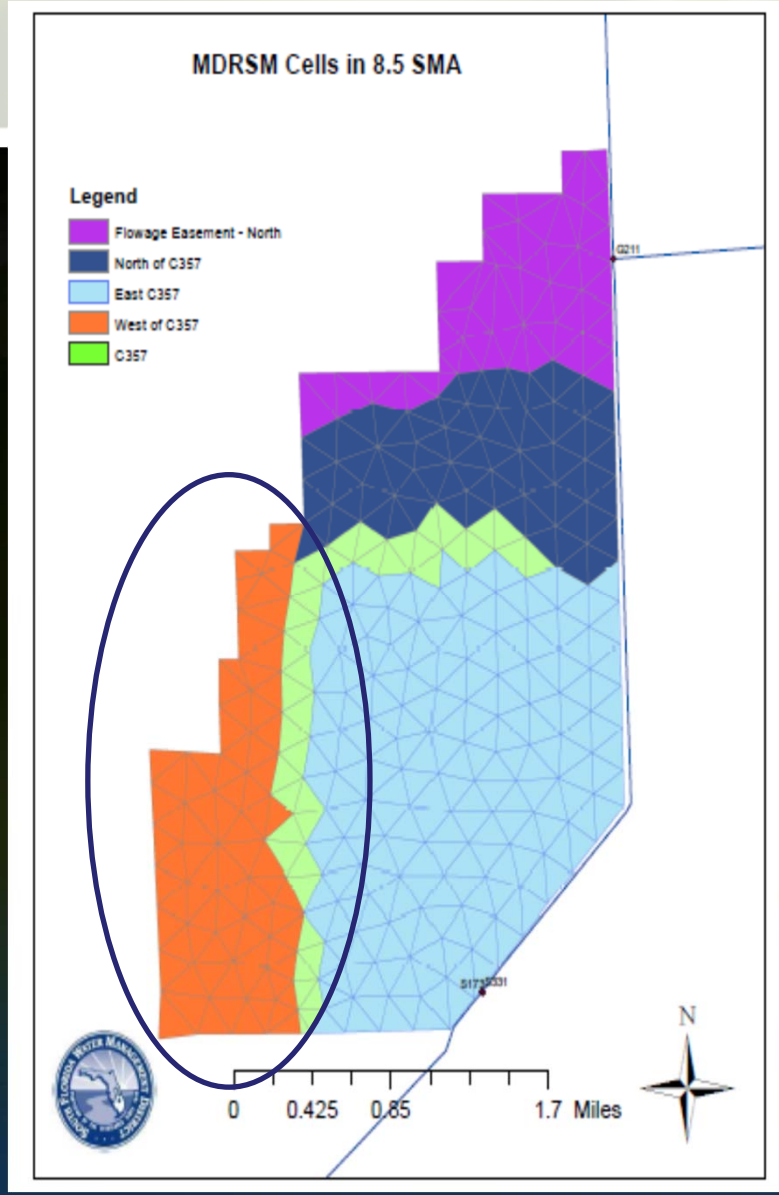

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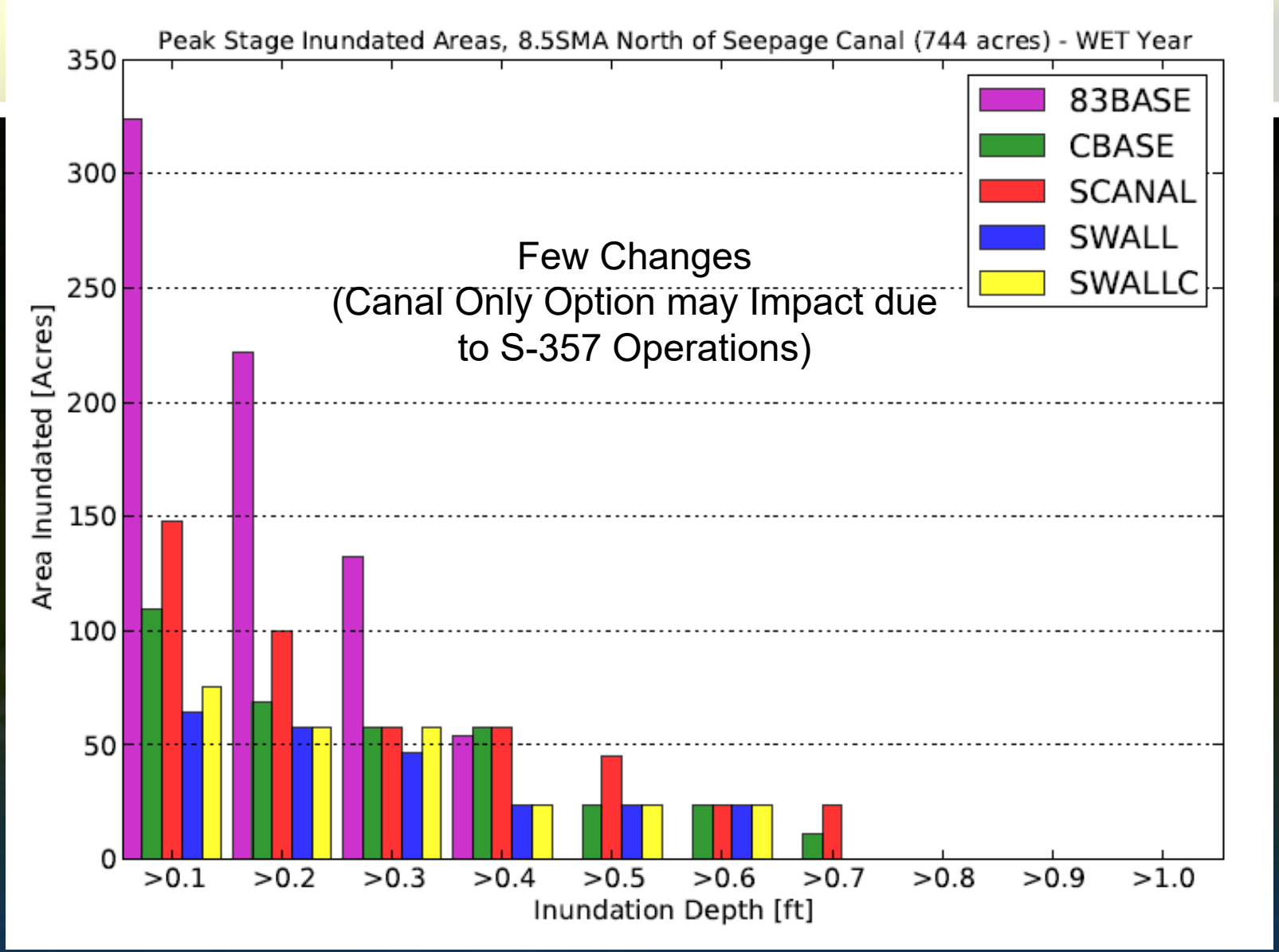

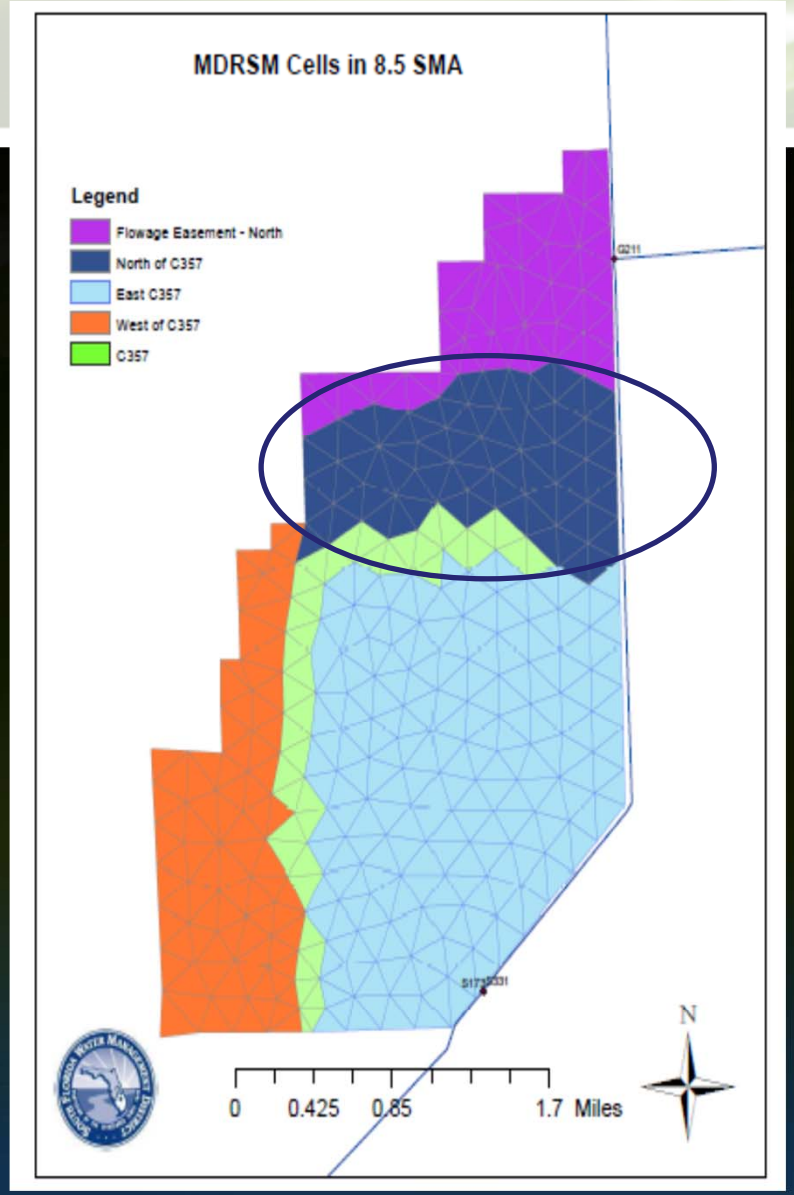

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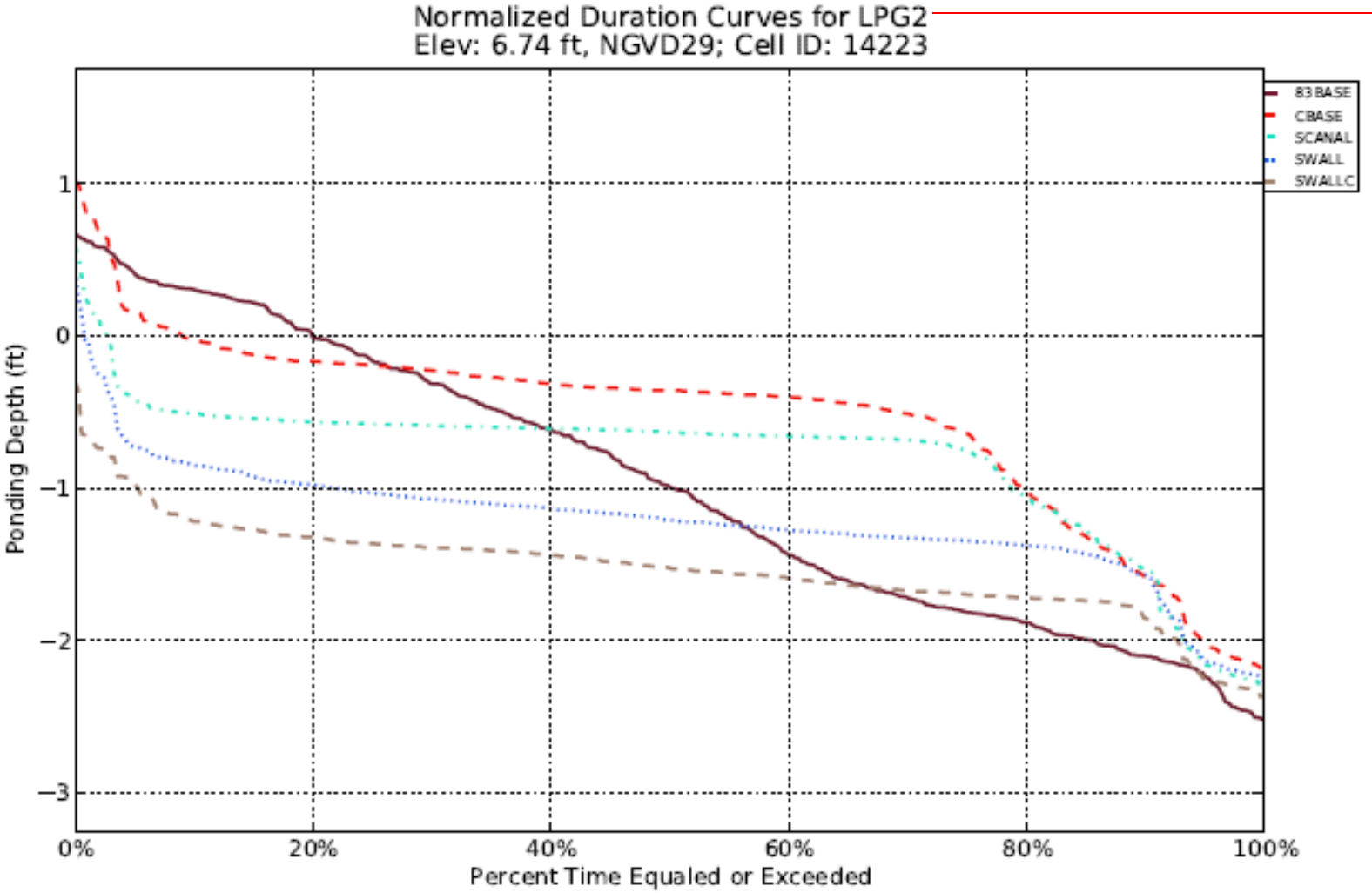

- All evaluated scenarios reduce duration of time LPG2 Cell inundated compared to 83 Base
- Groundwater however remain closer to land surface suggesting loss of soil storage
- Localized low spots within a model cell could experience inundation condition if the elevation is low enough to intercept the groundwater table

Note: Many Complaints for Areas Lower than AVG Ground Surface

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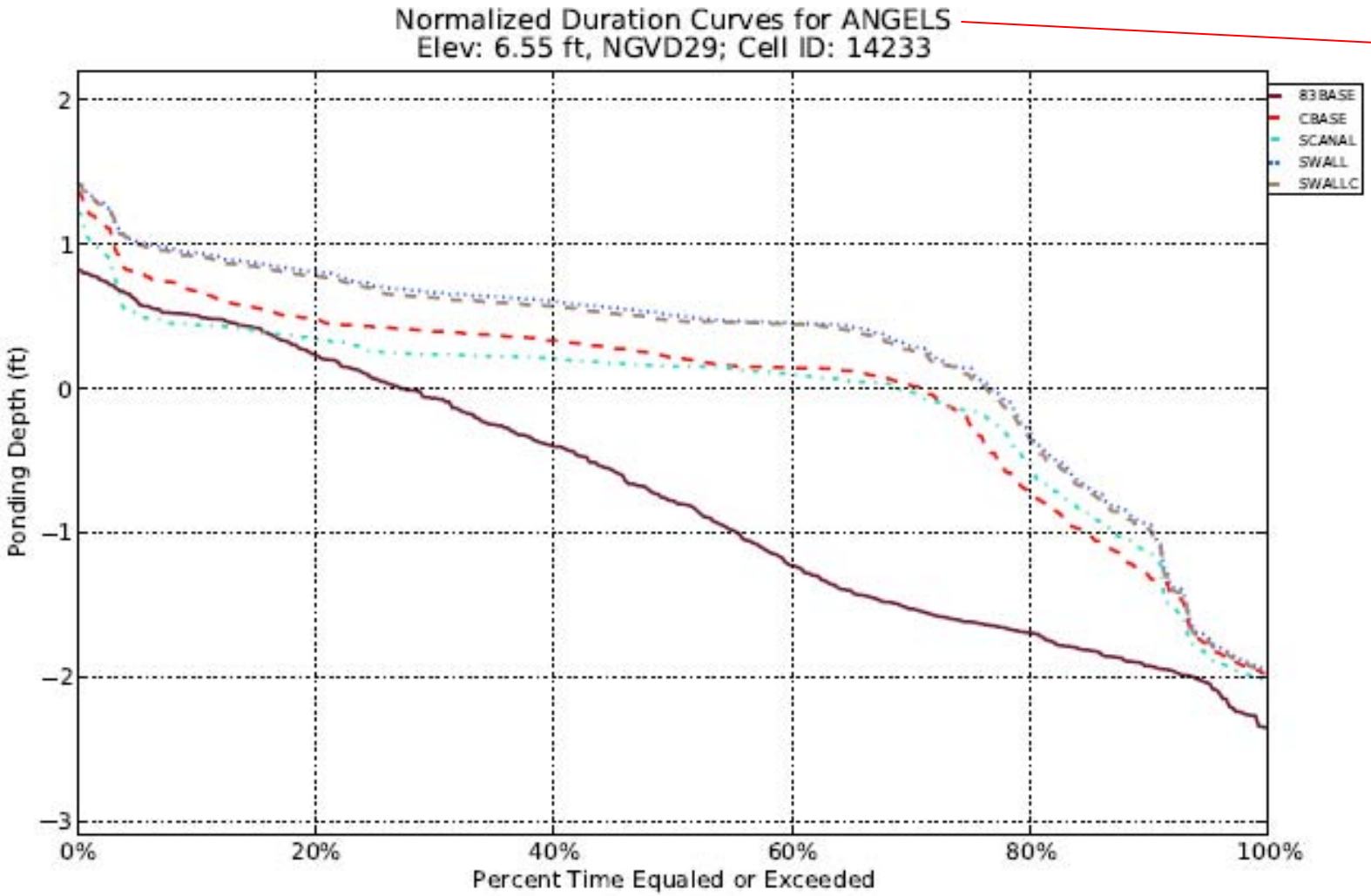

- All evaluated scenarios increased hydroperiod at the Cell representing ANGELS well compared to 83 Base
- Canal only option results in slight reduction in inundation depth compared to COP
- Curtain wall options generally show longer hydroperiod and depth of inundation

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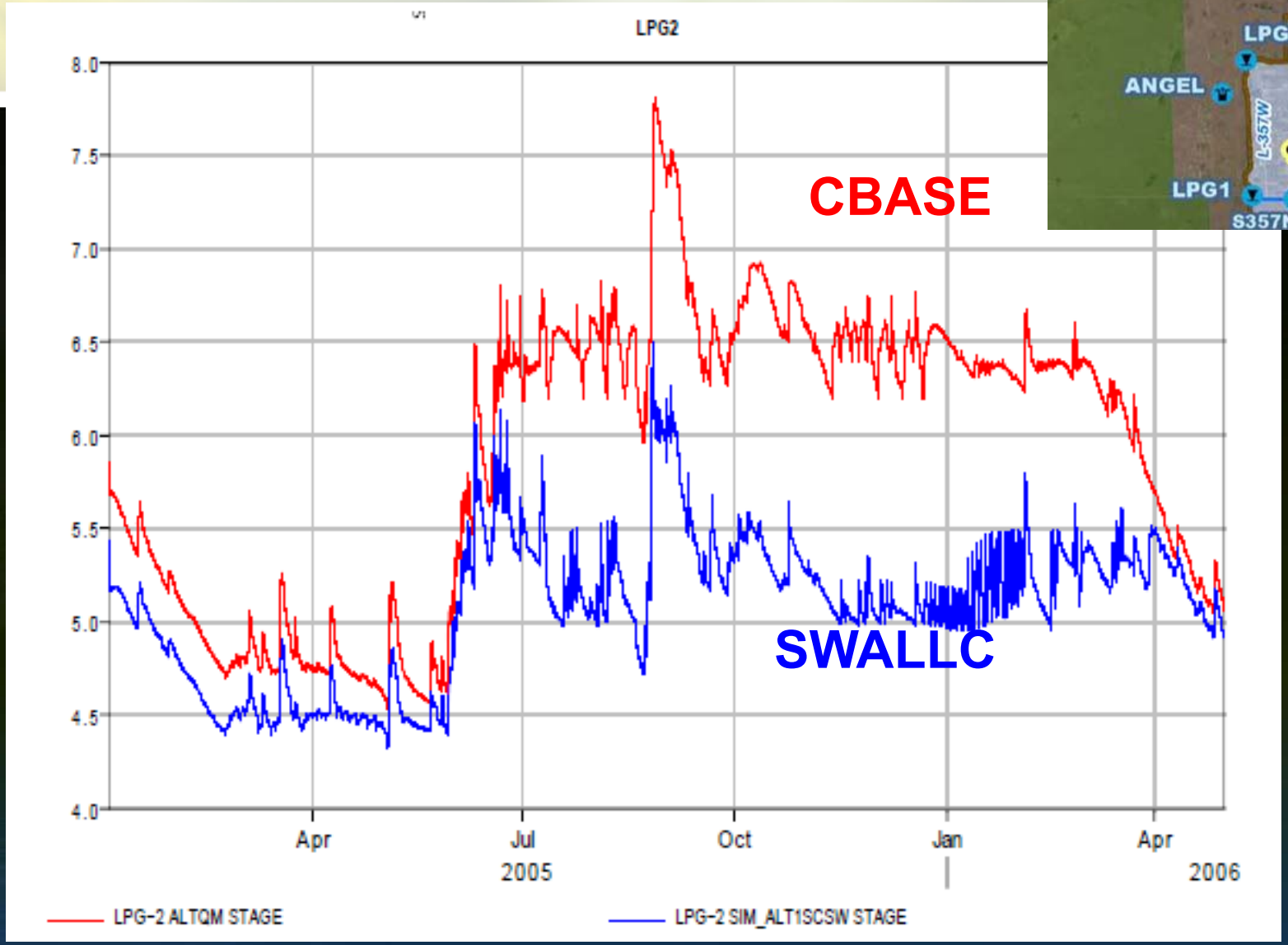

The Red trace (ALTQm) represents COP performance

Simulated High Water Stage (90th Percentile) Along Transect 1 (TR1)

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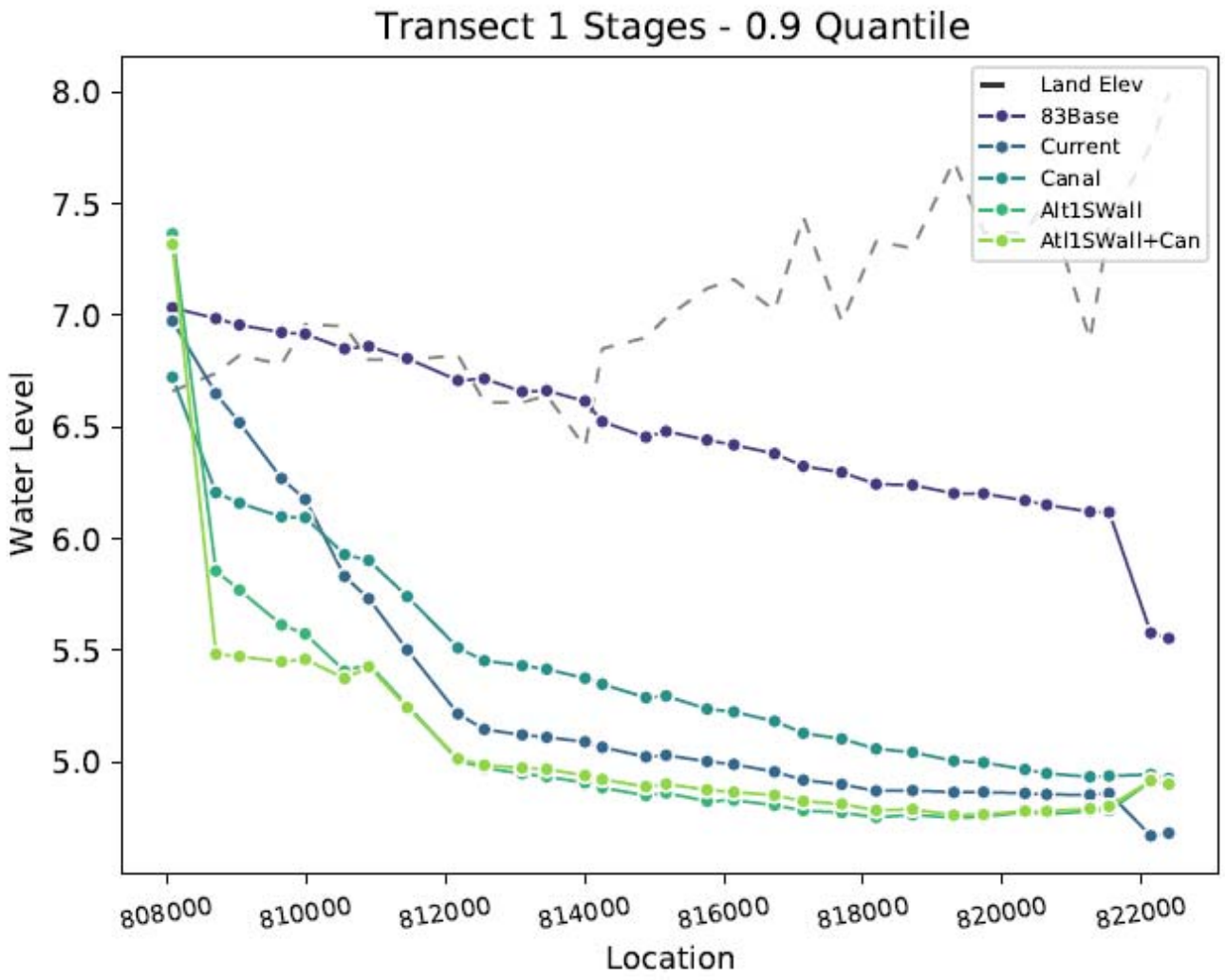
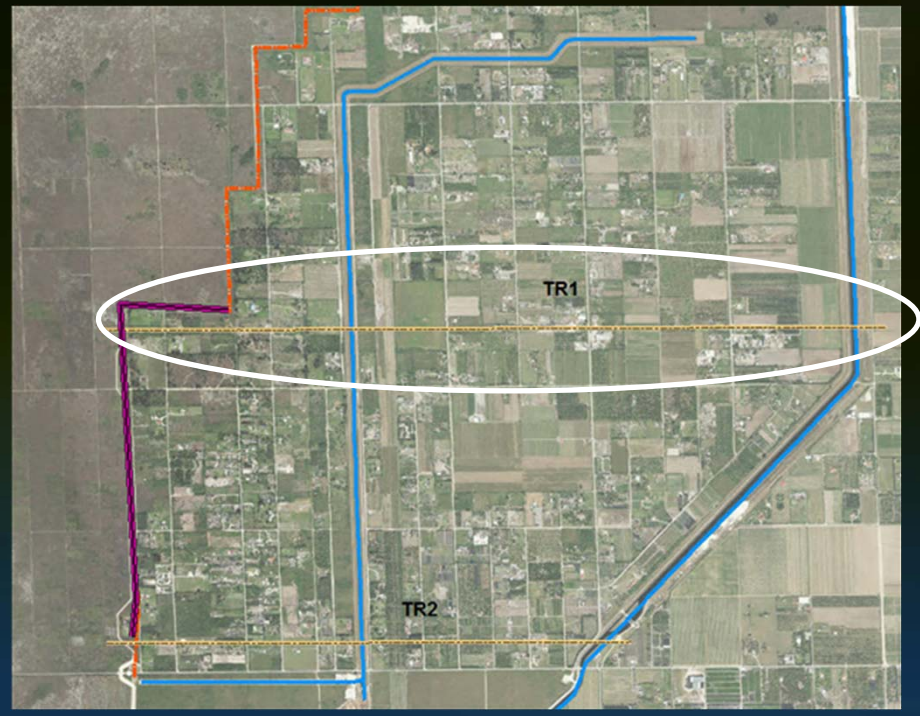


Model simulated high water stages (90th percentile wet) along Transect 1 for the base conditions and scenarios

Note depth to water table on eastern half of the transect for 83Base and CBASE



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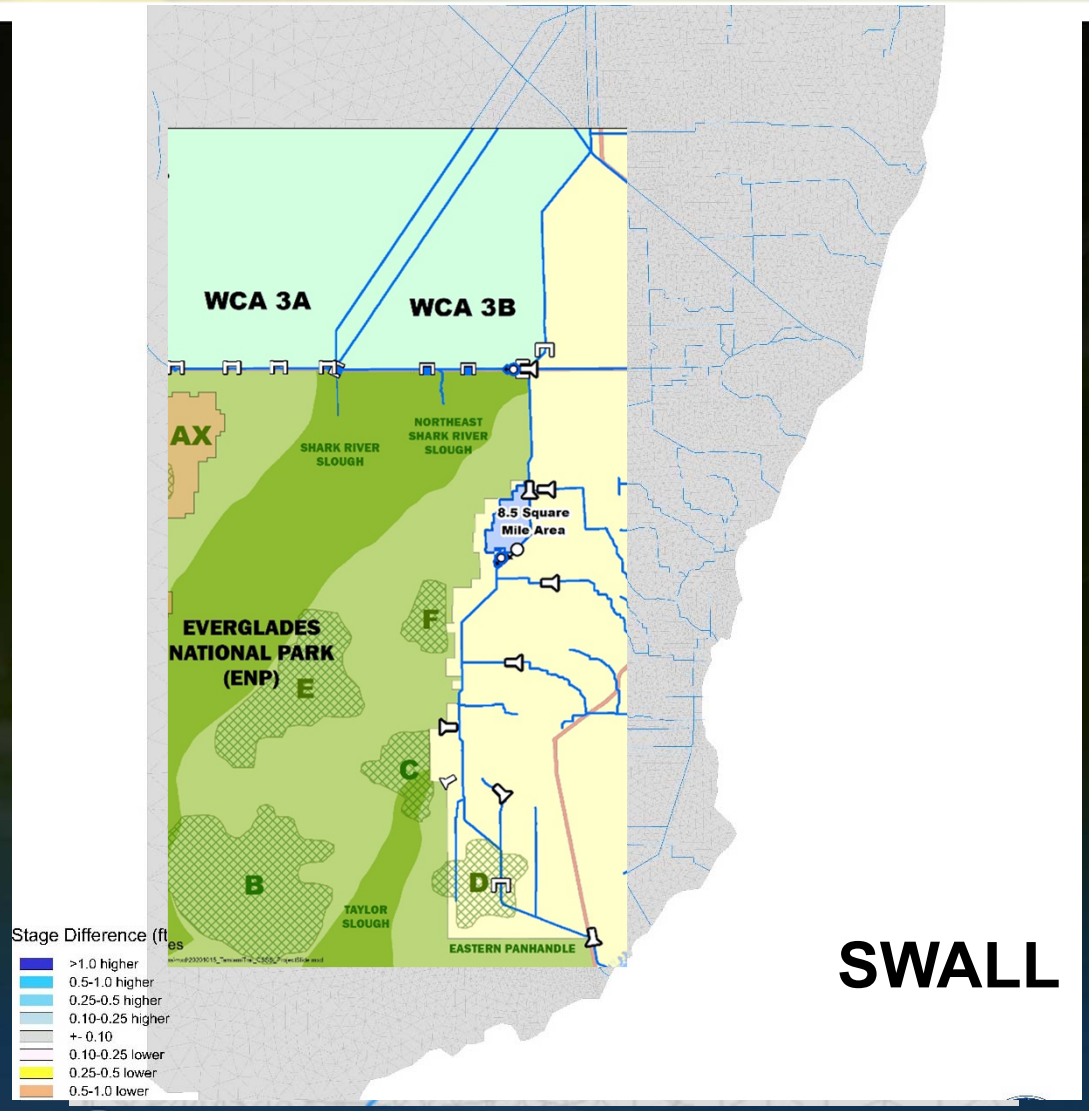
October Difference Map Compared to CBASE



SWALL

Alternatives illustrate the potential to reduce groundwater levels in target 8.5 SMA areas while maintaining or increasing depths in ENP

These spatial and seasonal trends are heavily influenced by current S-357 operations and “edge of wall” effects, typically causing a wetter 8.5SMA in areas not currently impacted

Presenter: Akin Owosina

Wet April Stage Difference

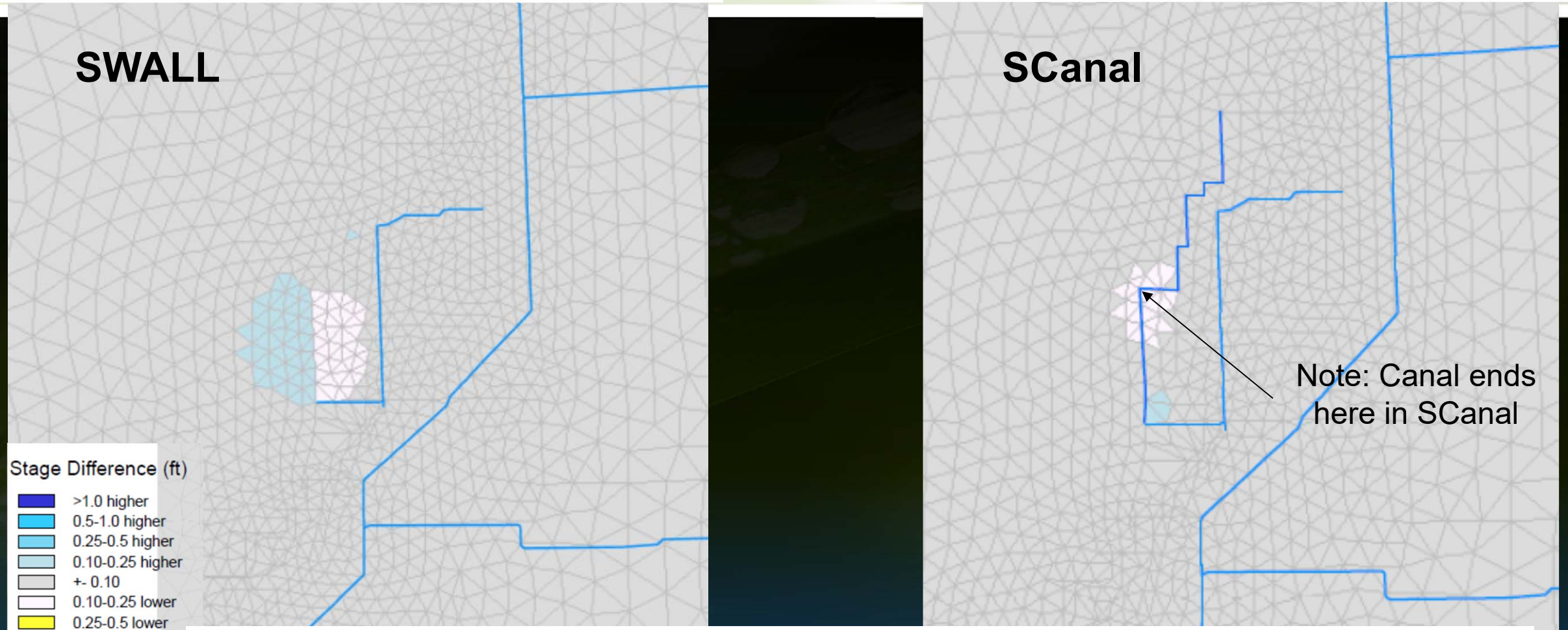
April 2006

Wet April Stage Difference

April 2006

SWALL

SCanal



Canal only alternatives illustrate the potential to extend drawdown influences into ENP during drier times (the effect is less pronounced with a pump); Seepage Wall scenarios avoid this condition

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Summary and Findings

- Multiple options to improve water levels within and in the vicinity of the 8.5 SMA were evaluated and modeled
- Evaluated scenarios successfully lower water levels in the vicinity of LPG2
- Important takeaways include:
  1. Seepage walls need to be sufficiently deep to realize desired outcomes
  2. Canal options have the potential to create drawdowns outside 8.5 SMA
  3. Some areas in 8.5 SMA may experience slightly wetter conditions
- Important Findings:
  - Short Curtain Wall configuration was effective at managing flood risk
  - Curtain walls paired with the existing infrastructure performed equivalent to the curtain wall with new additional seepage collection canal and pump station.
  - Refinements during design of curtain wall and operations adjustments at S-357 will further improve performance

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Preliminary Estimated Project Costs

Land Acquisition

- 119 Parcels, 18 Homes
- Market = $12.4M
- Purchase = $24M
- (190% over
  Fees(2%+)= $500K+
- Total cost = $25.5M

Note: Includes only the parcels within 0.4-mile east of levee and west of SW 200th Ave

Seepage Collection Canal with Pump Station

- Construction = $18M
- Design = $2.1M
- CMS/EDC = $3.6M

Total cost = $23.7M

- 15-24 Months

Note: DOES NOT INCLUDE LAND COST – *additional land may not be needed*

Limited Curtain Wall

- Construction= $10-14M
- Design = $0.25M
- CMS/EDC = $1.15M

Total cost = $11.4 -15.4M

- 12-18 Months

Note: DOES NOT INCLUDE LAND COST – *additional land may not be needed*

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Next Steps

- Immediate
  - Finalize design with project specific details
  - Develop and implement procurement and regulatory strategy to achieve quick start
  - Execute construction contract to ensure expeditious implementation
- Longer Term
  - Continue ongoing evaluation of regional Curtain Wall (including the limited 8.5 SMA section)
  - Evaluate future conditions including restoration conditions at L-29 and Sea Level Rise

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Recommended Action

- Staff recommends Board direction to expedite implementation of a limited curtain wall along the western edge of 8.5 SMA as part of a comprehensive strategy to address high water conditions in the region