GSSHA MODELING FOR ANALYSIS OF FLOOD DESIGN FEATURES AT THE PICAYUNE STRAND RESTORATION PROJECT

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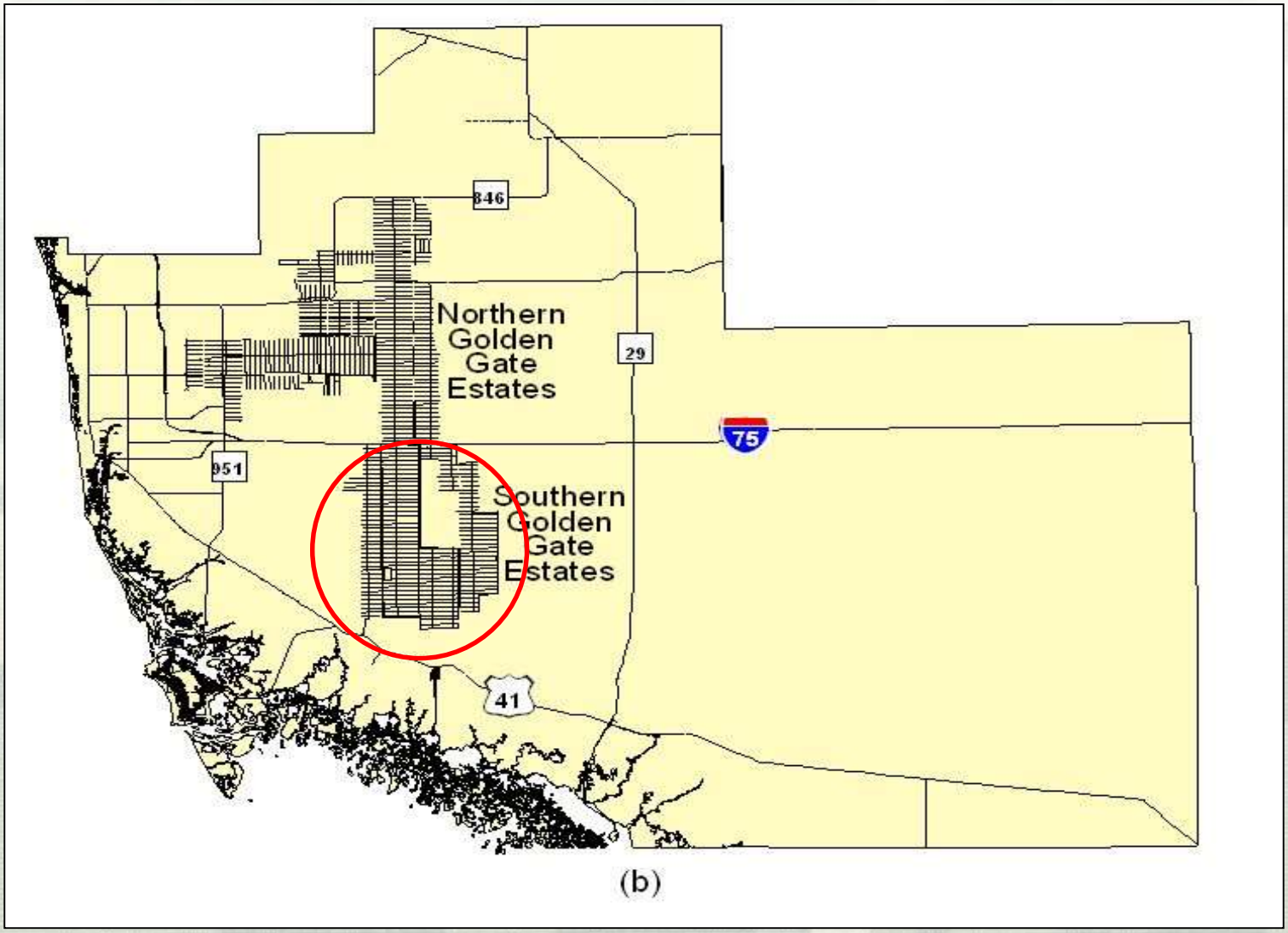
Golden Gate Estates

Map showing grid of roads and bisection of GAC holdings by I-75 into Northern Golden Gate Estates and Southern Golden Gate Estates



Chicago Tribune (circa 1967)

Advertisement

Gulf American Corporation

a growing giant

YOU have read what Gulf American has accomplished to date. You have learned how, starting with a single piece of undeveloped property in 1957, the company has become the largest marketer of land of its kind in the world.

And, now, other dreams are beckoning . . . dreams encompassing far wider horizons. Far from having attained full maturity, the Gulf American Corporation is still flexing its corporate muscles, still accelerating its ever increasing diversification to include new fields and embrace new opportunities. Far from being a giant come of age, Gulf American today is a giant still growing.

Today, Gulf American is consuming hours . . . not only individual residences, but apartments, cooperatives and condominiums, one . . . it provides . . . insurance protection . . . Kinsh and is active in . . . businesses, as well . . .

Obviously, the Gulf . . . Corporation has much . . . many people. For some . . . dents of its Florida com . . . the company make . . . able to live and work . . . their families, or to ret . . . of America's fastest gro . . . joy states. To others . . . who are investing in . . . at River Ranch Acres or . . . Ranch Estates (see . . . page 6) . . . Gulf Amer . . . reveals a chance to . . . combining growth poten . . . the immediate enjoyment . . . door living at its best . . . still others . . . mere . . . investment in becoming . . . the Gulf American org . . . itself . . . the compan . . . network of subsidiaries . . . opportunity to share . . . size of a dynamic you . . . nation, which has el . . . enthusiasm . . . flourishing economy . . . party dedicated to buil . . . worlds for a better to . . .

As of April 1, 1967 . . . .

FACT . . . The Gulf American Corporation's worldwide land holdings total 573,580 acres (896.3 square miles).

FACT . . . The Gulf American Corporation has contributed $1.1 billion to the economy of the State of Florida.

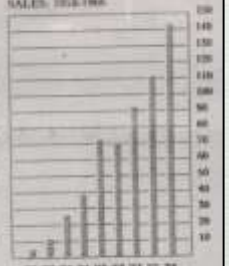
FACT . . . The Gulf American Corporation and its subsidiaries employ a total of 3,000 people.

FACT . . . The Gulf American Corporation has completed a total of 251 road miles of streets and boulevards.

FACT . . . The Gulf American Corporation has dredged and deepened 168 miles of canals and waterways.

FACT . . . The Gulf American Corporation has completed construction of 3,142 buildings of all types . . . with 101 additional under construction.

SALES: 1958-1966



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Advertisement

Golden Gate

FOR LIVING AND INVESTMENT ON THE GOLDEN GULF COAST

The community of Golden Gate, Florida, is a fine place to visit . . . and live

THE COMMUNITY of Golden Gate began with a master plan. It provided for much that is here about the Florida way of life. It included wide, palm-bordered boulevards and sparkling waterways; areas set aside for residential and commercial use; homes offering virtually every modern convenience at prices everyone can afford.

First . . . the sun was selected. Land was chosen to best meet the requirements of people who choose Florida . . . as a place to live and work and raise their families, to retire or to invest. Land so situated that it can fill thousands of Floridians today . . . and tomorrow, too.

The plan was implemented. All the know-how and experience gained at Cape Coral were put to work. Model homes were built, and facilities installed to provide for the wonderful life that Florida has made famous.

Now did Gulf American stop there. The community had to . . . ing available anywhere . . . ible by families of . . . means. A country club . . . started . . . one of the . . . the entire country!

. . . TIES ARE SUPERB . . . who play here for the . . . are delighted to dis . . . the nine-hole Golden . . . one is unparalleled in . . . appearance and chal . . . and will be pleased to . . . a second "nine" will . . . ready for play. This . . . additional course has al . . . in the area of impro . . . tion) improvements. All facilities, locker rooms, pro shop, etc., are, of course, completely up-to-date and the finest of their type available.

Immediately adjacent to the Golden Gate Country Club is the magnificent new Golden Gate Inn. Combining the best and most beautiful elements of Colonial architecture with every convenient modern comfort and convenience, it is truly one of the handsomest hostelries in the world. Inside, you'll discover all the magnificent touches that do so much to recreate the warmth and charm of a more leisurely age. A perfectly appointed dining room, the Country Squire, offers exquisite cuisine and superb service, and the more intimate Rose Restaurant Room is available for cocktails. The Empire Roll Room, on the second level, features a special innovation to the form of a movable parquet dance floor, and can accommodate hundreds of guests for special functions.

A wide variety of clubs assures Golden Gate residents of being able to pursue their hobbies with others whose special interests are similar to their own. And a constant, varied of social events scheduled throughout the year make an active social life possible for people of all ages. Truly, to live is to enjoy life . . . at lovely Golden Gate.

PRACTICALLY EVERY NEED WAS PROVIDED FOR

Plans were made for the most practical aspects of life in one of America's fastest growing major states. Provision was made for a central water system, a sewerage treatment plant, telephone and power lines.

There . . . and only then . . . the property was offered for sale.

All these things the Gulf American Corporation has done at Golden Gate, just eleven road miles northeast of lovely Naples and one mile north of the intersection of State Highway 858 and the new Everglades Parkway, scheduled for completion late in the summer of 1967.

Forget your weather worries in the year 'round Florida sunshine

Golden Gate Estates

IMPROVED ACREAGE . . . WITH GROWTH POTENTIAL

AND Gulf American has made provision for additional land investment in adjoining Golden Gate Estates. Here, on improved acreage only thirteen road miles from Naples, the company has made available some 164 square miles of land specifically to investors who recognise the potential inherent in Florida land investment and are anxious to share in that potential.

At Golden Gate Estates, investors enjoy the opportunity to purchase larger units of land improved with access roads and drainage facilities only . . . at a cost commensurately lower than that of fully developed properties. Gulf American is convinced that the combination of the dynamic growth of the lower Gulf Coast, the excellent location of the property (Golden Gate Estates is bisected by the Everglades Parkway) and the development activities of the company itself make Golden Gate Estates a most attractive investment possibility at this time.

Properties at Golden Gate and Golden Gate Estates are not offered for sale in the State of New York at this time.

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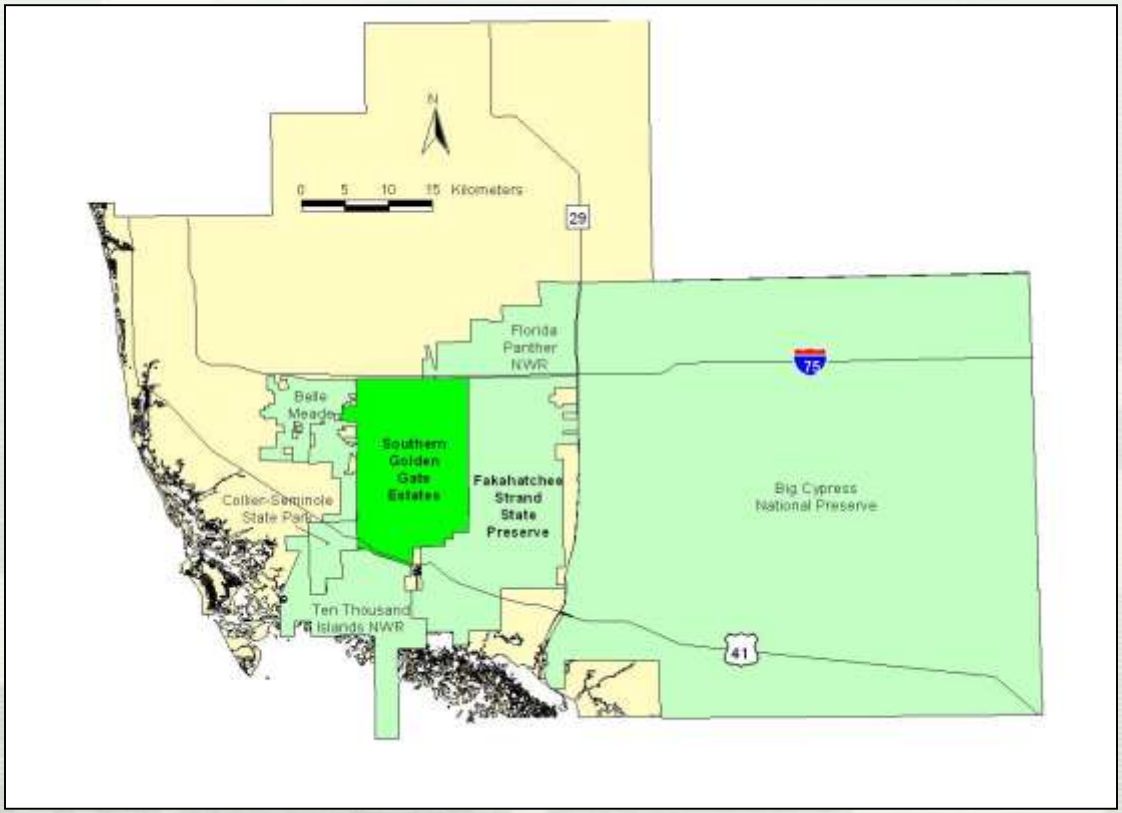
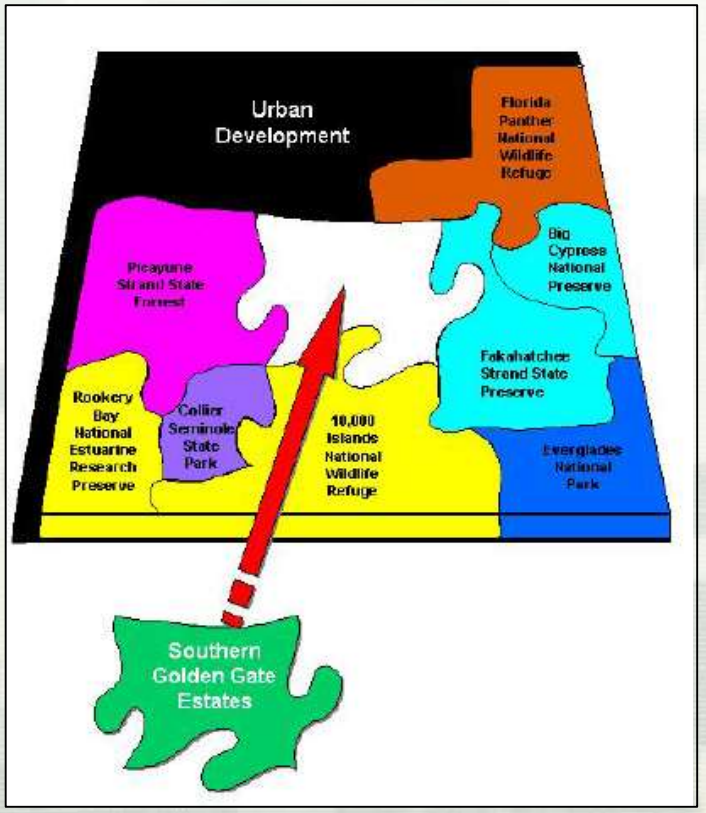
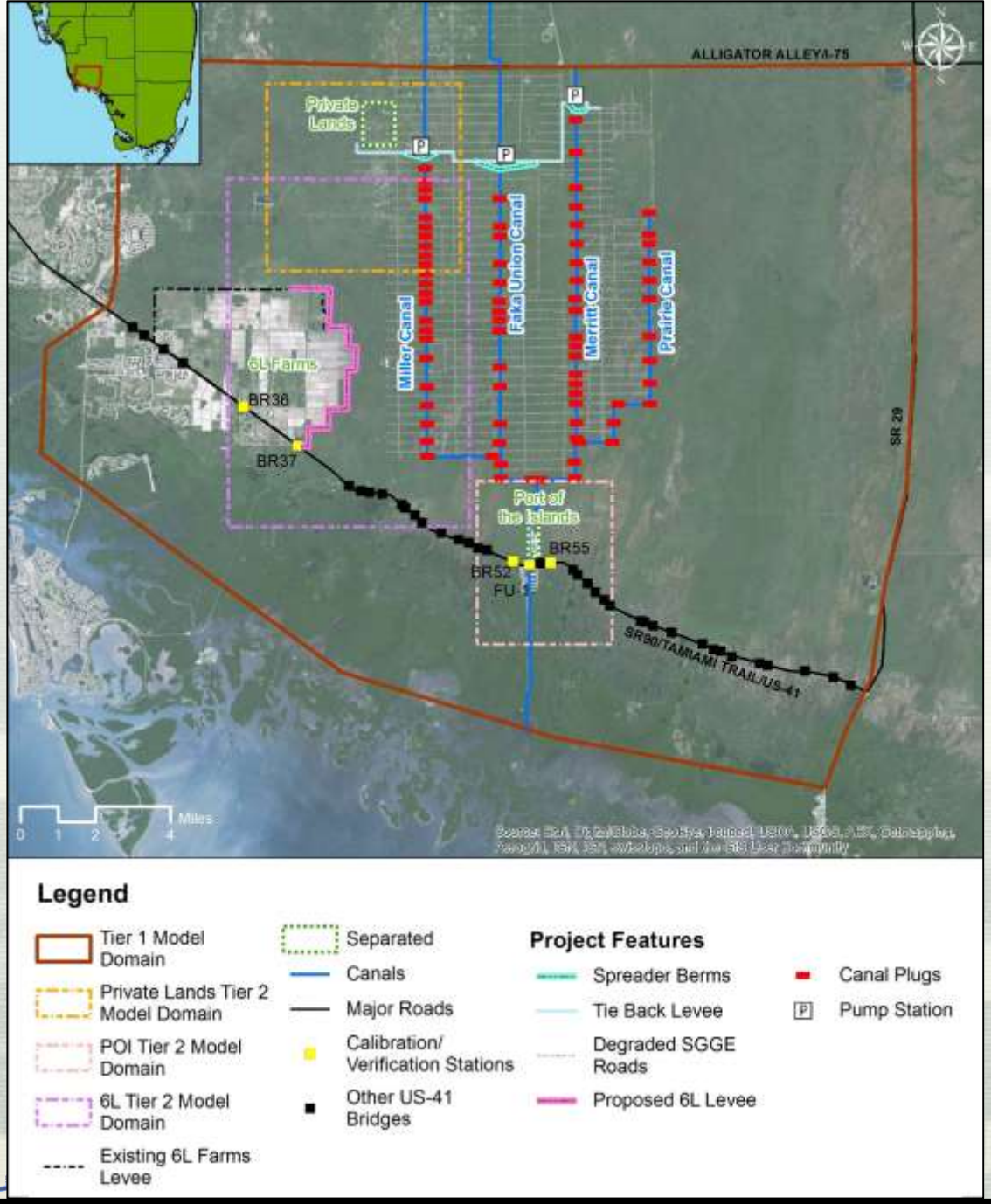
Miller Blvd. (wet Season)

Picayune Strand Restoration





- one of the first Comprehensive Everglades Restoration Plan (CERP) projects under construction
- Restores 55,000 acres of native Florida wetlands and uplands at the site of the failed Southern Golden Gate Estates development.



Project Features

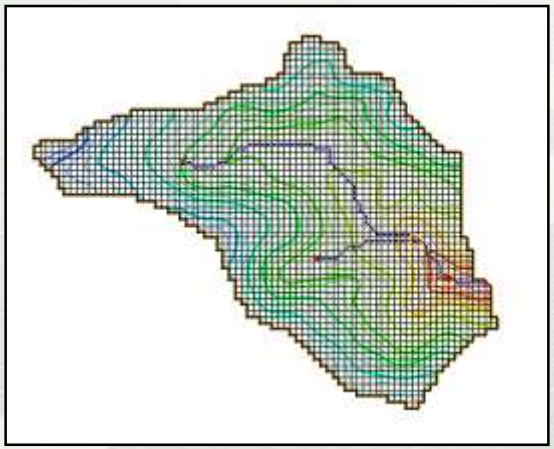
- 3 spreader canals
- 3 pump stations:
  - Merritt
  - Faka Union
  - Miller
- Plugging 48 miles of canals (with more than 100 plugs)
- Removing and degrading 260 miles of roads

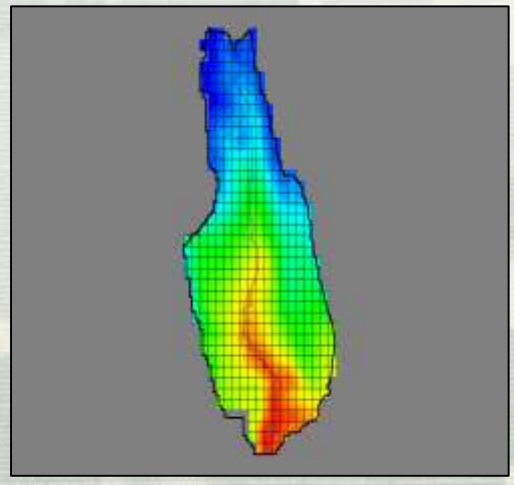
Study Purpose and Design

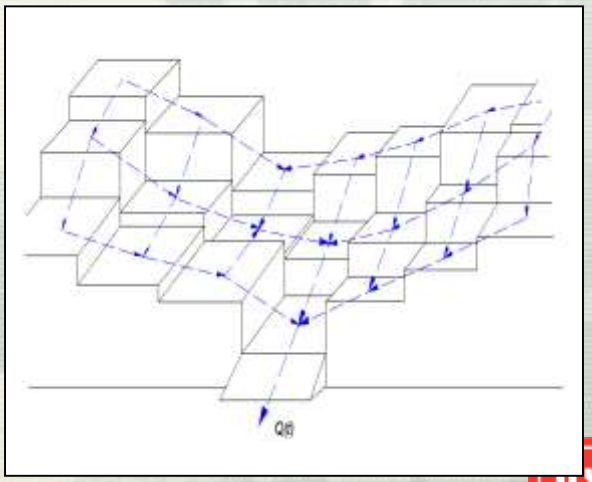
- **Refinement proposed flood control features per**
  - EMs 1110-2-1619
  - 1110-2-1913
  - ER 1105-2-101)
- **Multi-tiered modeling approach.**
  - MIKESHE → Tier 1 GSSHA → Tier 2 GSSHA models for the three privately owned areas.

What is GSSHA?

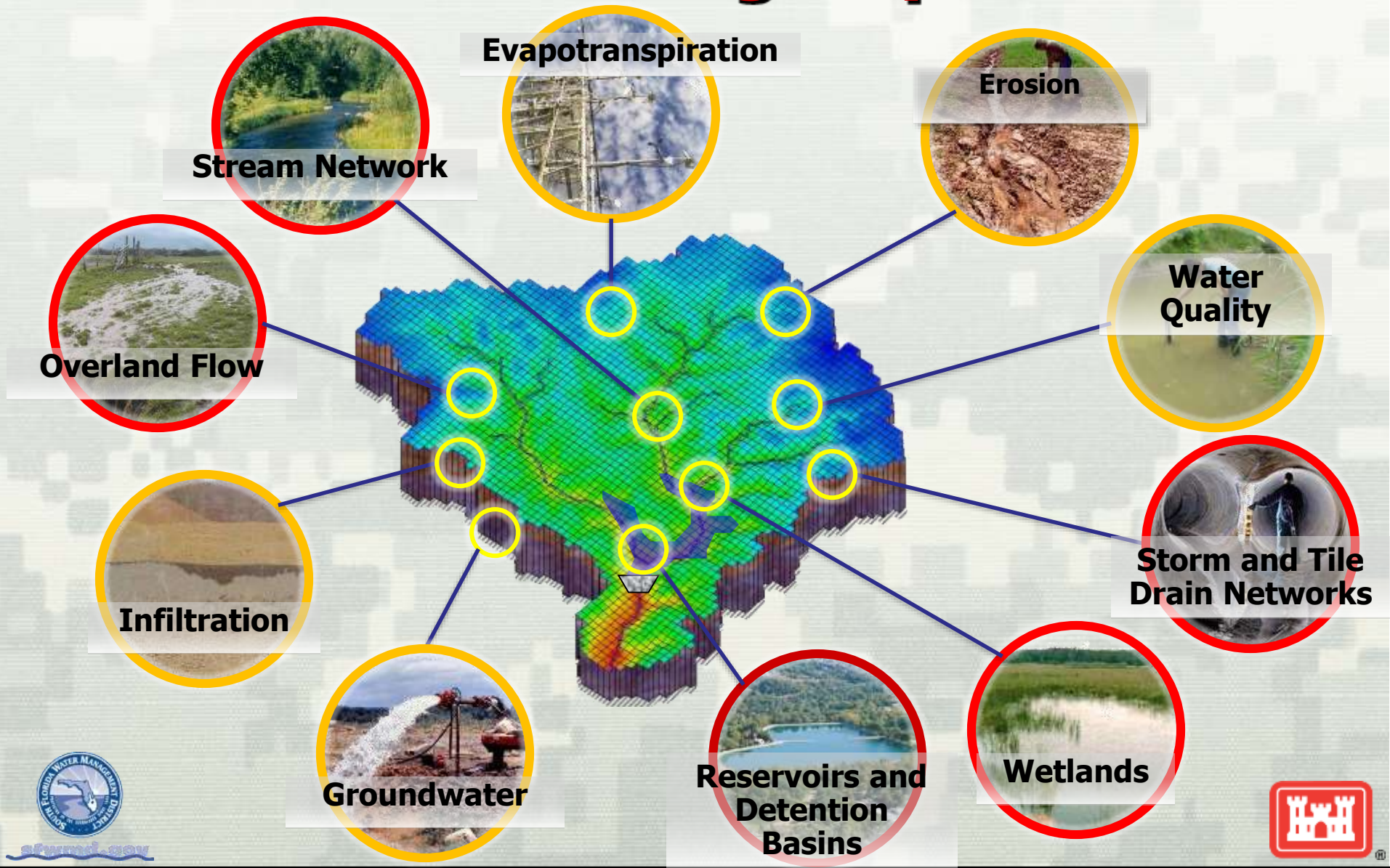
- **Watershed simulation and management**
  - Hydrologic
  - Hydraulic
  - Sediment and water quality simulation
- **Fully distributed, physics based**
- **Finite Difference regular grid**
- **US Army ERDC Product (www.gsshawiki.com)**
  - Maintained
  - Supported
  - Distributed







GSSHA Modeling Capabilities



Model Purpose

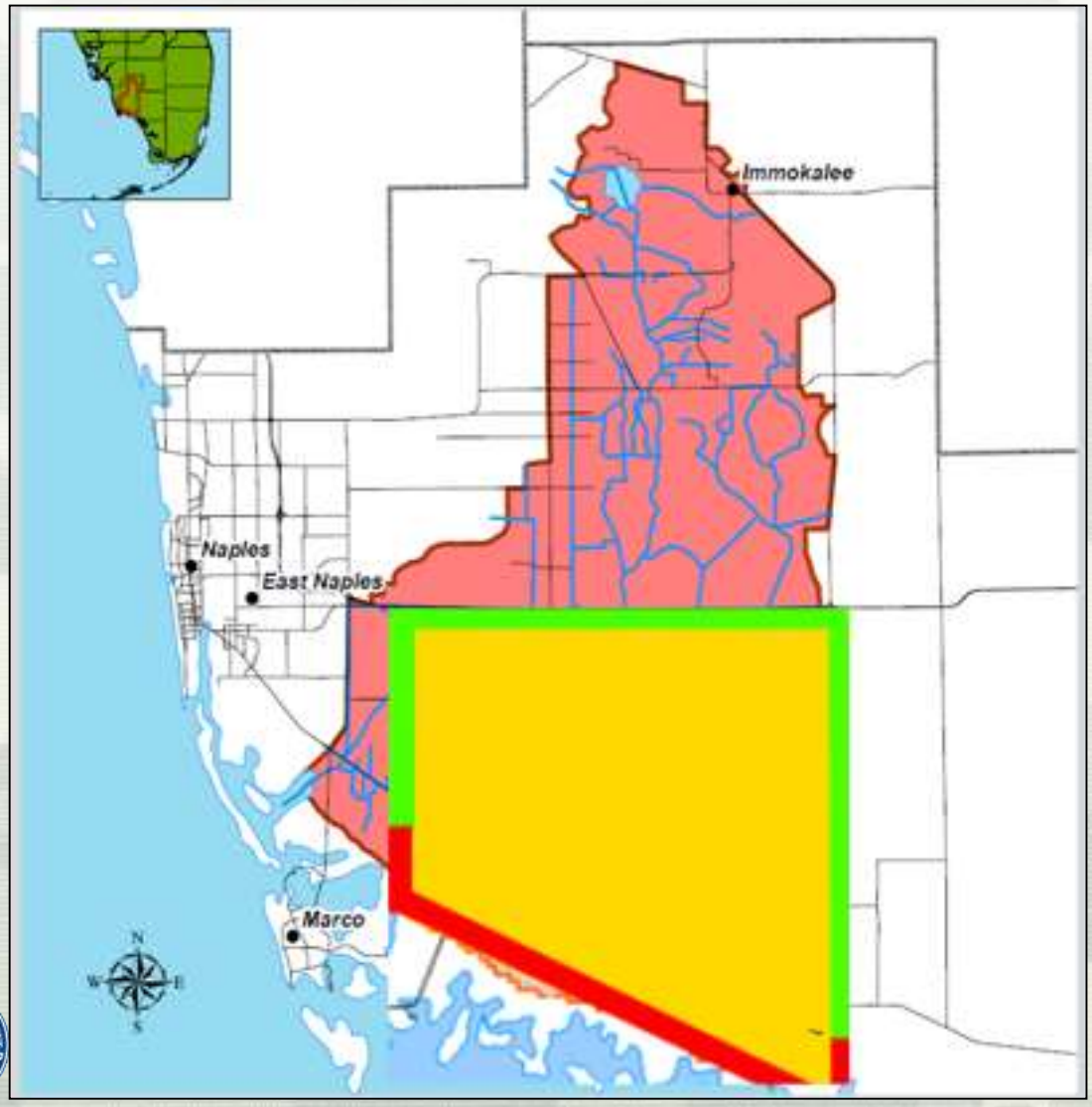
Determine hydraulic design criteria for the protective features per the new ER's-EM's-ETL's

- **Port of the Islands**
- **Private Lands**
- **6L's**

Modeling Approach

1. **Model Migration**
   - Existing Mike She/Mike 11 Models (PIR Models)
   - Gridded Surface Subsurface Hydrologic Analysis (GSSHA)
2. **Develop Tier 1 Models**
   - Low resolution, large domain
   - Calibration: 1995 Storm Event (Tropical Storm Jerry)
   - Develop existing and “with” project conditions
3. **Develop Tier 2 Models**
   - High resolution/ small domain
   - High level of detail wrt Tier 1 models
   - Design criteria

Migration of MSHE/M11 (PIR) model to GSSHA

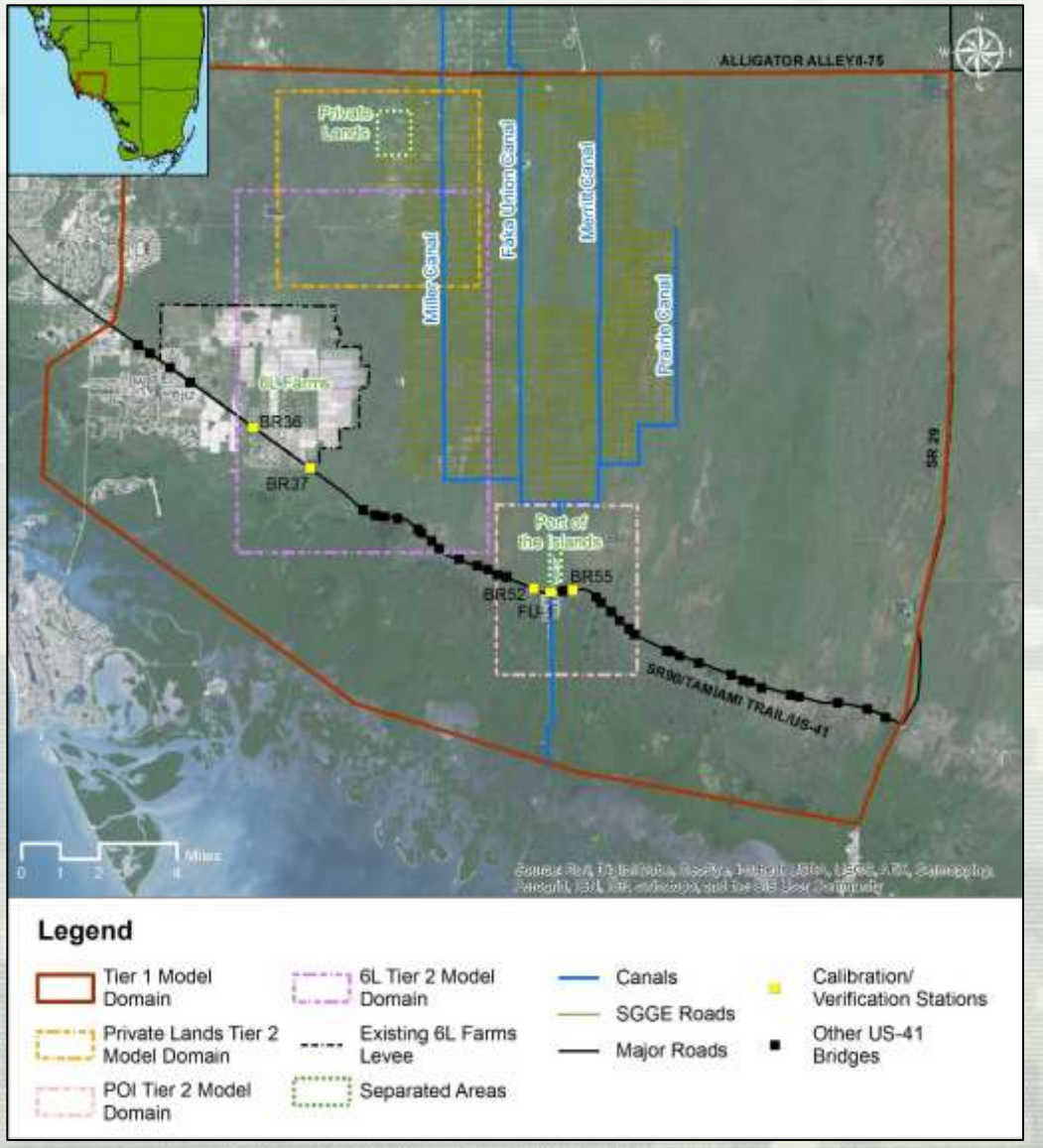


Key

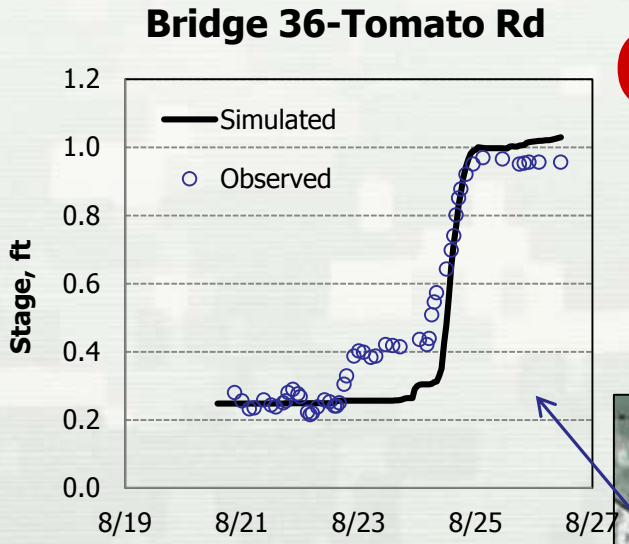
Approximate extent of previous models

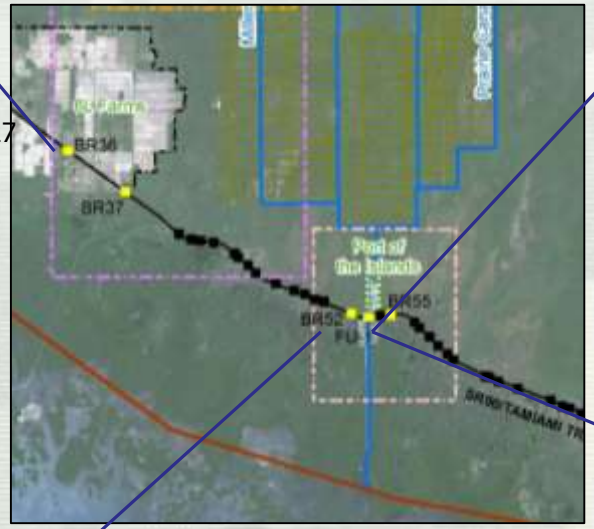
Approximate extent of planned Tier 1 model/s

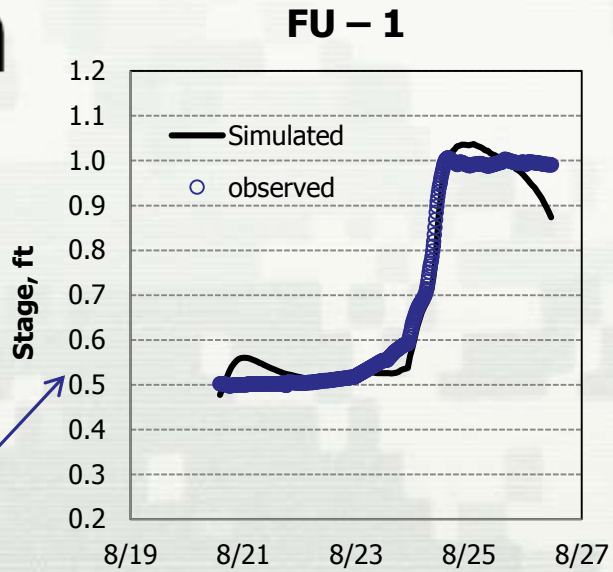
Tier 1 Existing Condition

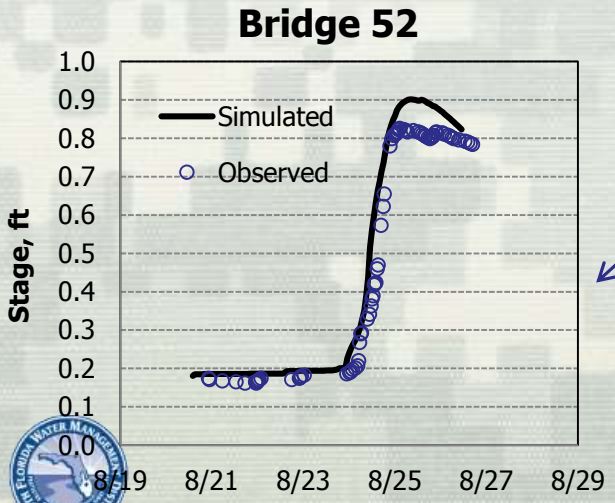


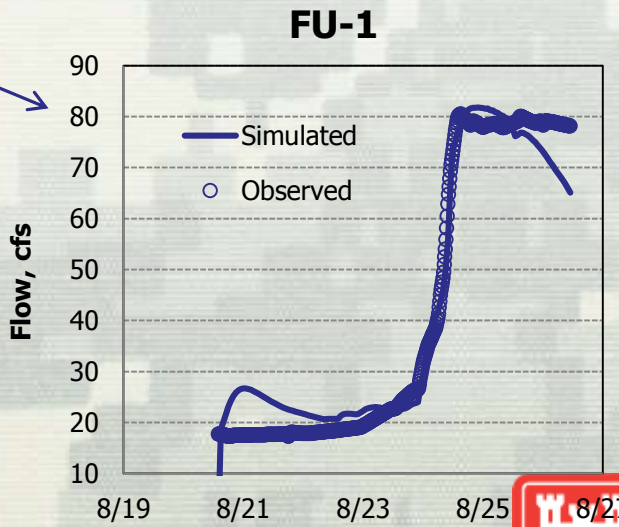
Calibration



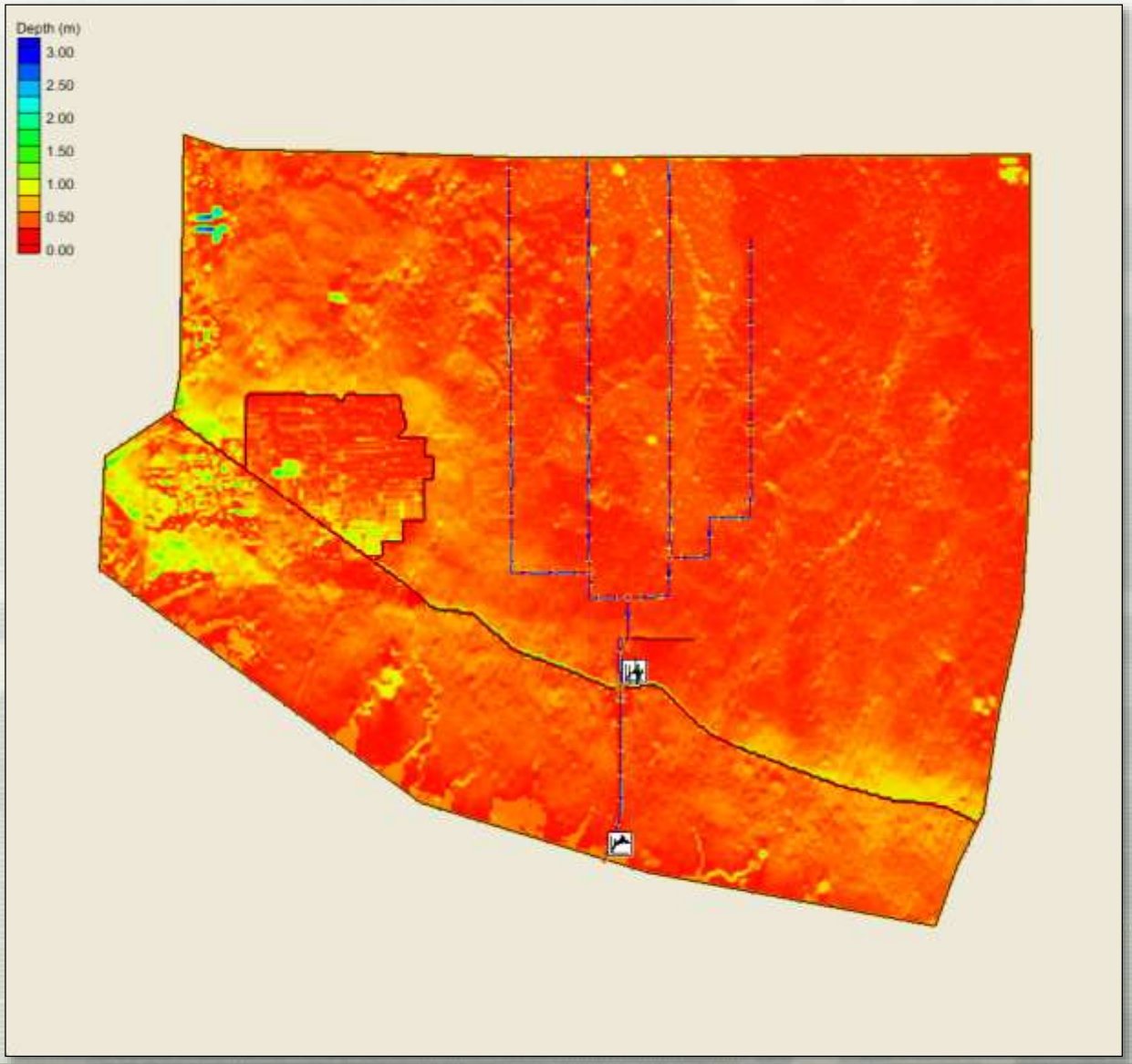






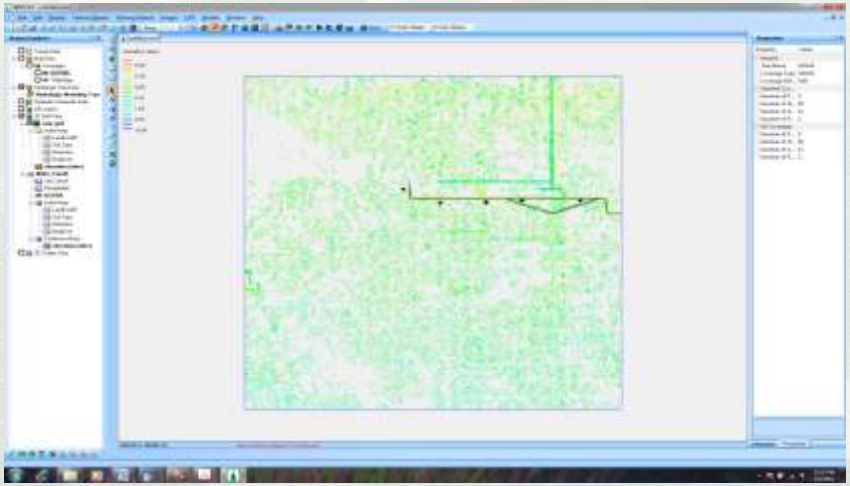


Peak Flooding Extent

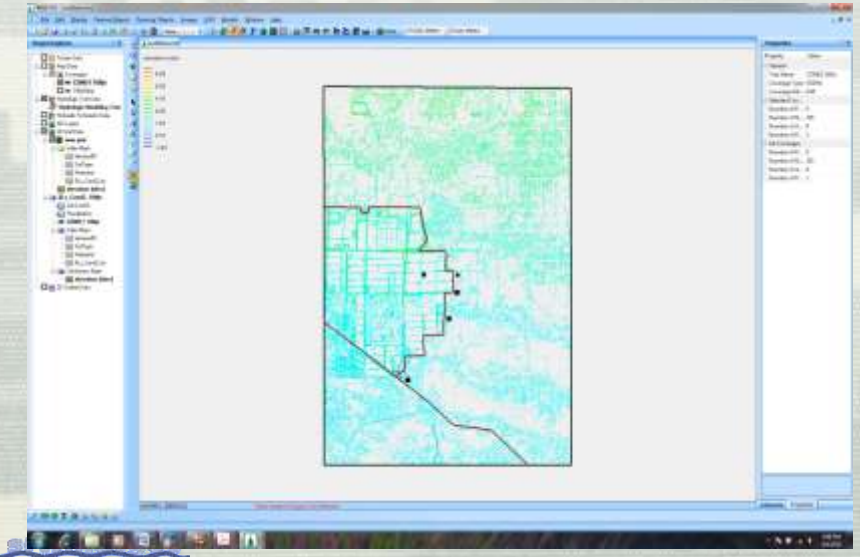


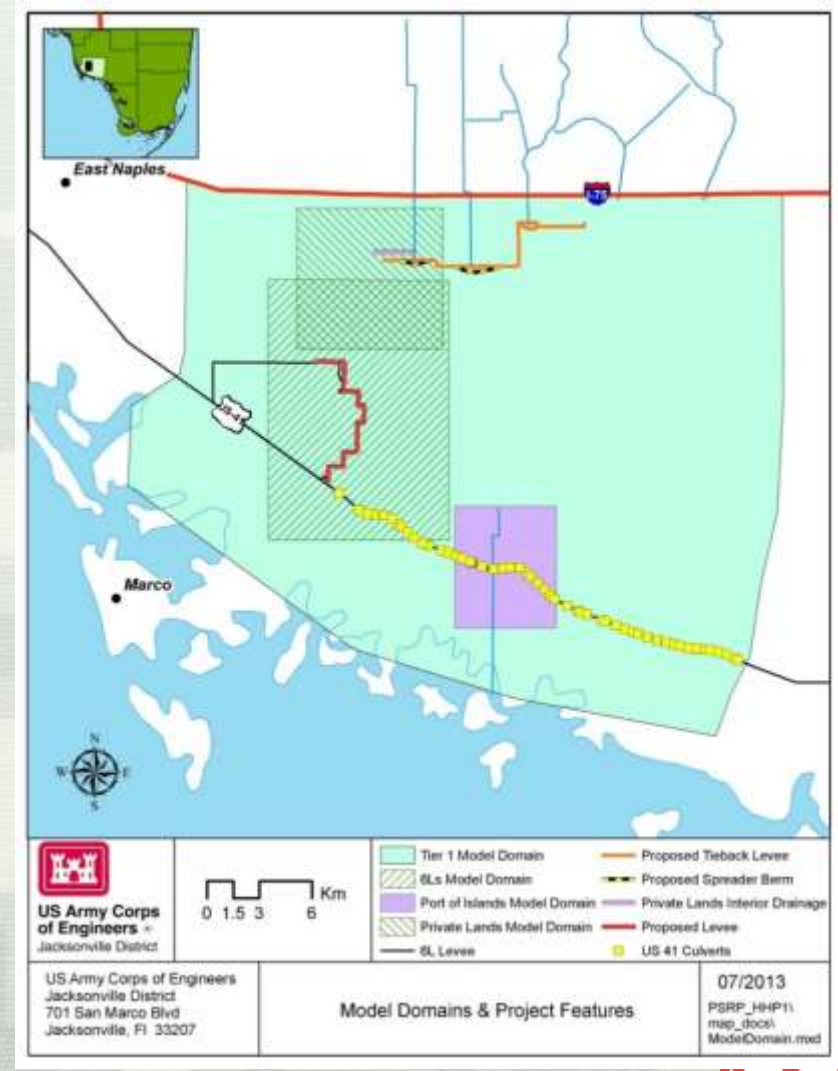
Tier 2 With Project Models

Private Lands



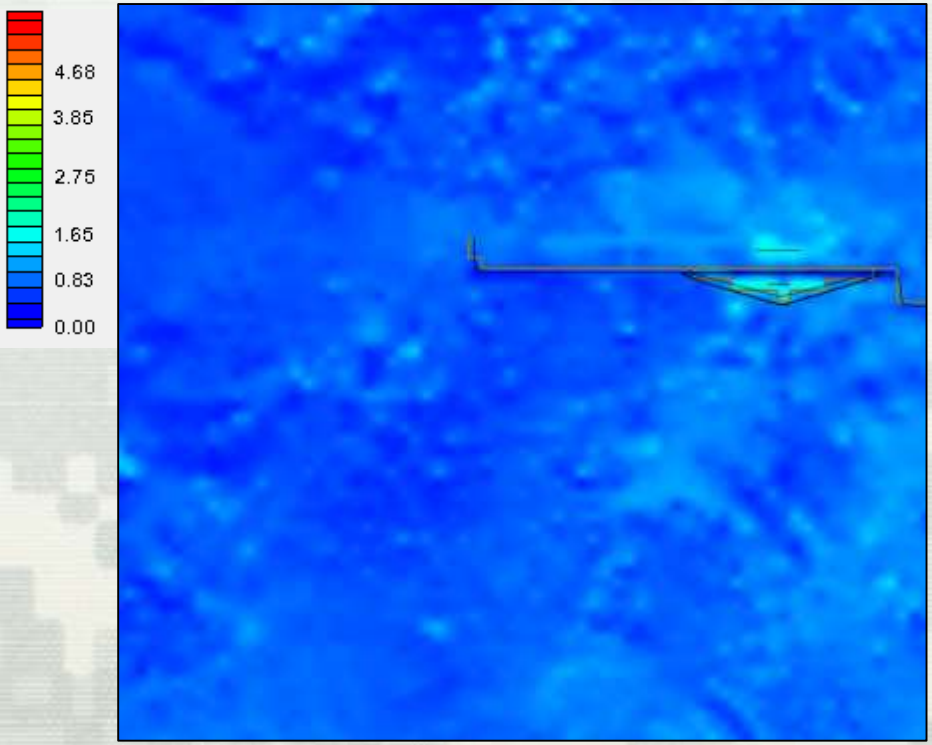
6Ls



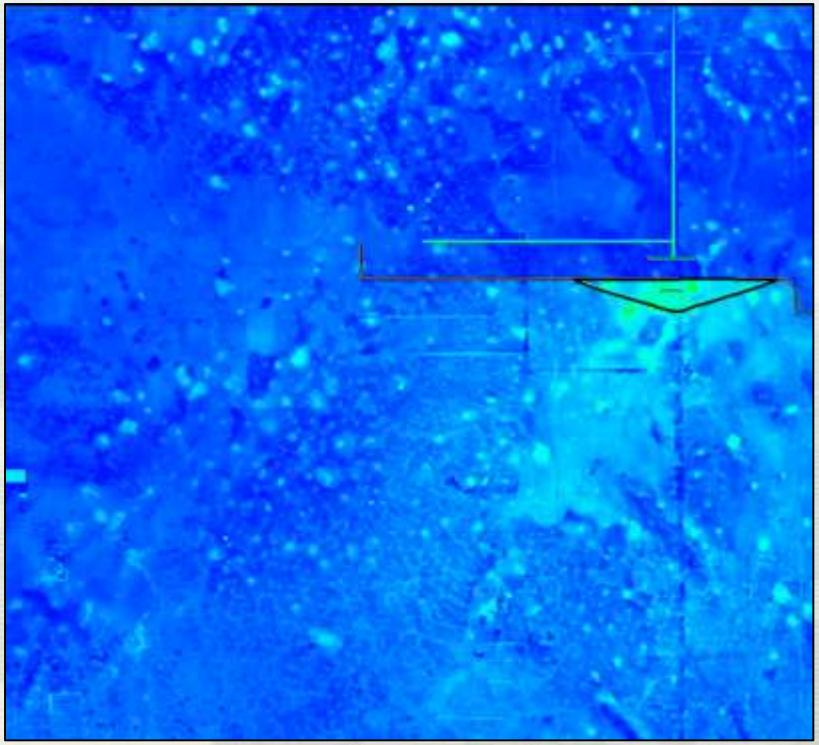


Scale Effects – Private Lands

120m Model, Flood Depth

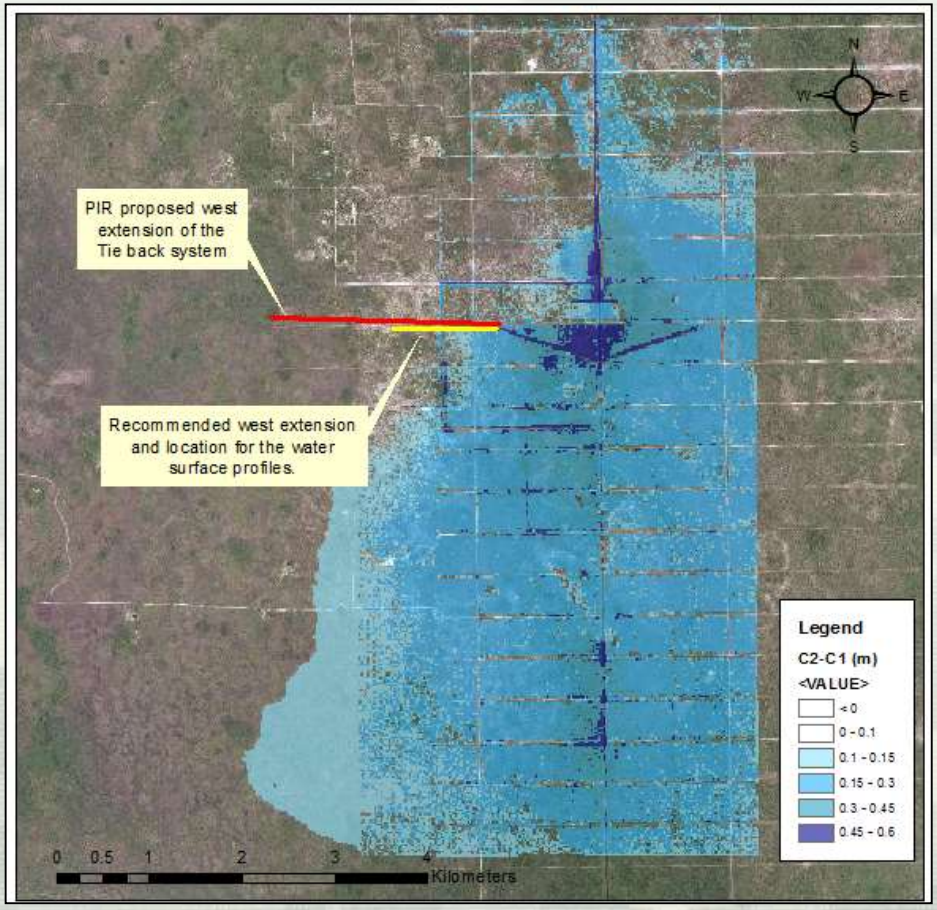


20m Model, Flood Depth



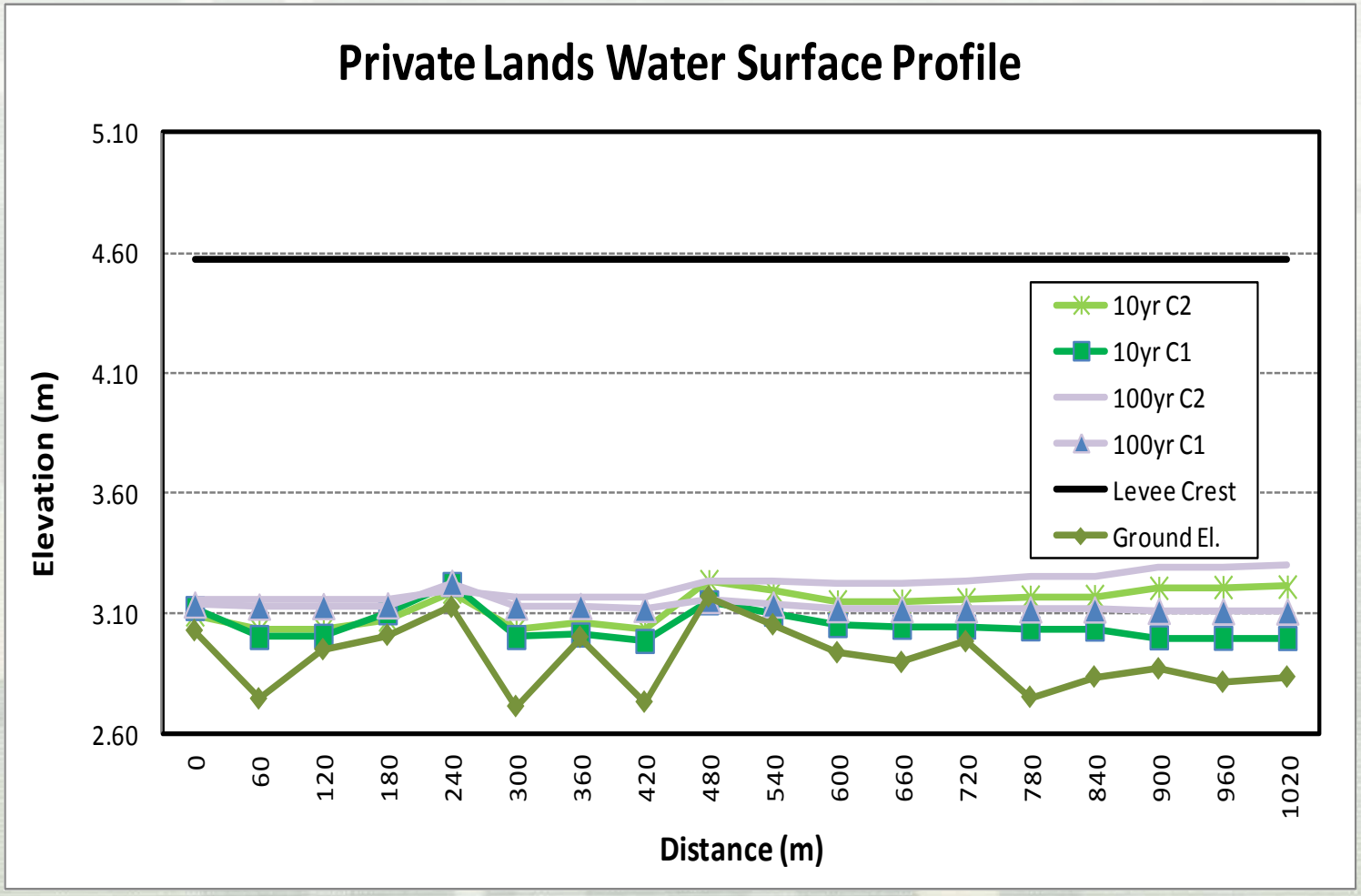
Pre/Post Project Comparisons

Private Lands

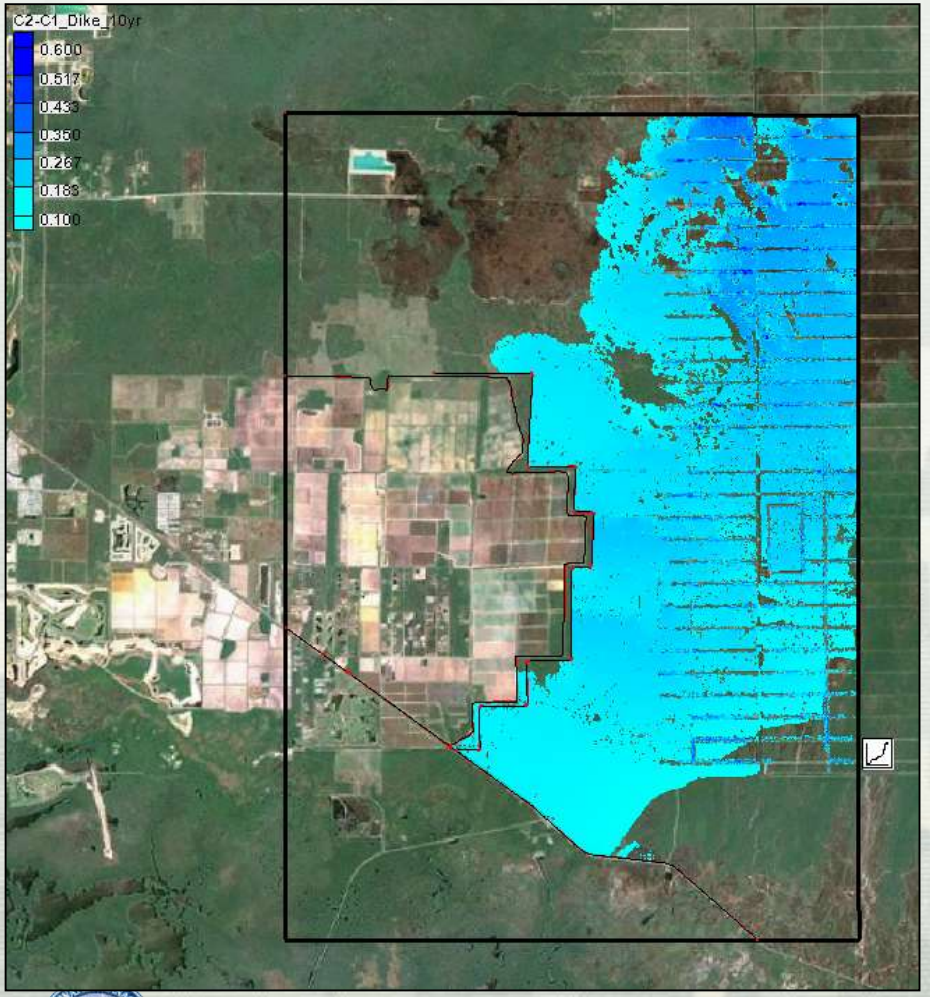


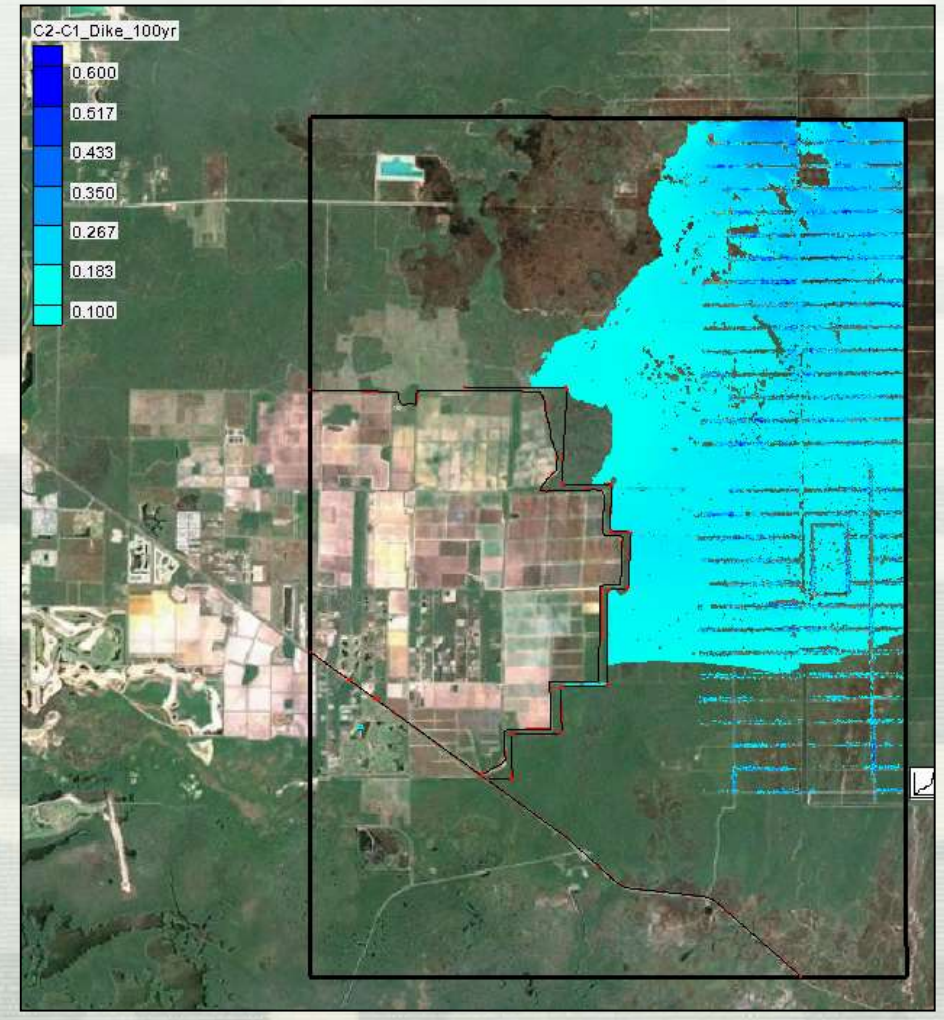
Port of the Island

Private Lands Levee Crest Design Criteria

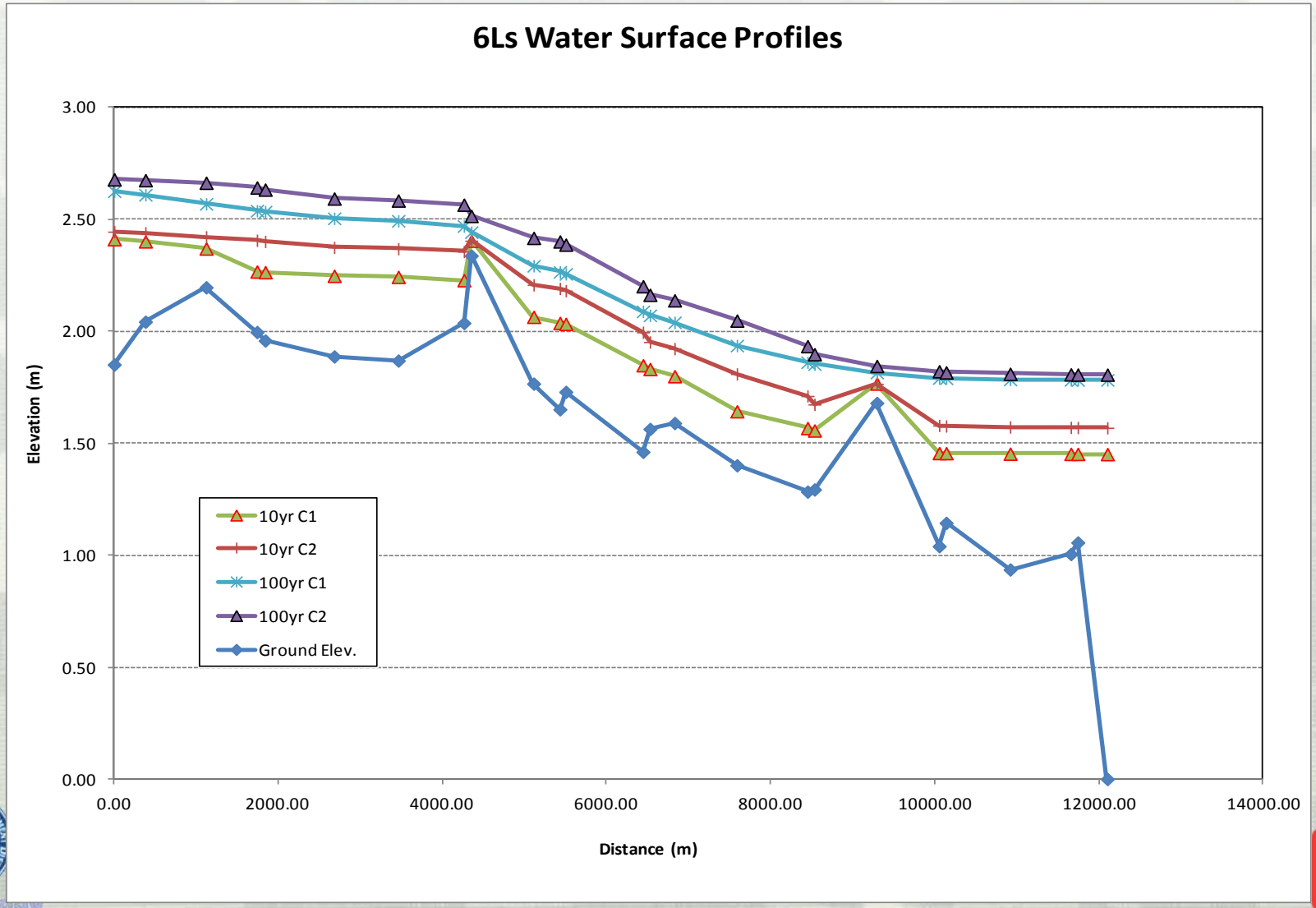


6Ls Tier 2 Model





6L's Farms Levee Crest Design Criteria



Conclusions

- levee originally envisioned to be constructed to protect the Port of the Islands areas from potential flooding is not necessary.

- Protective levee just south of the Miller pump station and extending to the west, could be shortened to almost half of what it was originally envisioned in the PSRP PIR.

- The outcome of this modeling work represented approximately $40M in construction cost savings to the USACE Jacksonville District and the South Florida Water Management District.