

PMLevyCOLPEm Resource

From: Hambrick, Gordon A SAJ [Gordon.A.Hambrick@usace.army.mil]
Sent: Friday, July 29, 2011 2:23 PM
To: Bruner, Douglas
Subject: PEF PowerPoint Presentation - Part 1 (UNCLASSIFIED)
Attachments: Part 1 -Slides for PEF USACE Presentation 07282011 v2.pptx

Classification: UNCLASSIFIED

Caveats: NONE

Doug: I have split PEF's presentation into two parts to see if that will make it to you. FYI, the second time I sent the presentation to you yesterday, I cc'd Lance and Vince - I guess they got it since, I did not get an error message.

Don

Classification: UNCLASSIFIED

Caveats: NONE

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Levy Nuclear Plant

USACE/EPA/NRC Meeting
07-28-2011



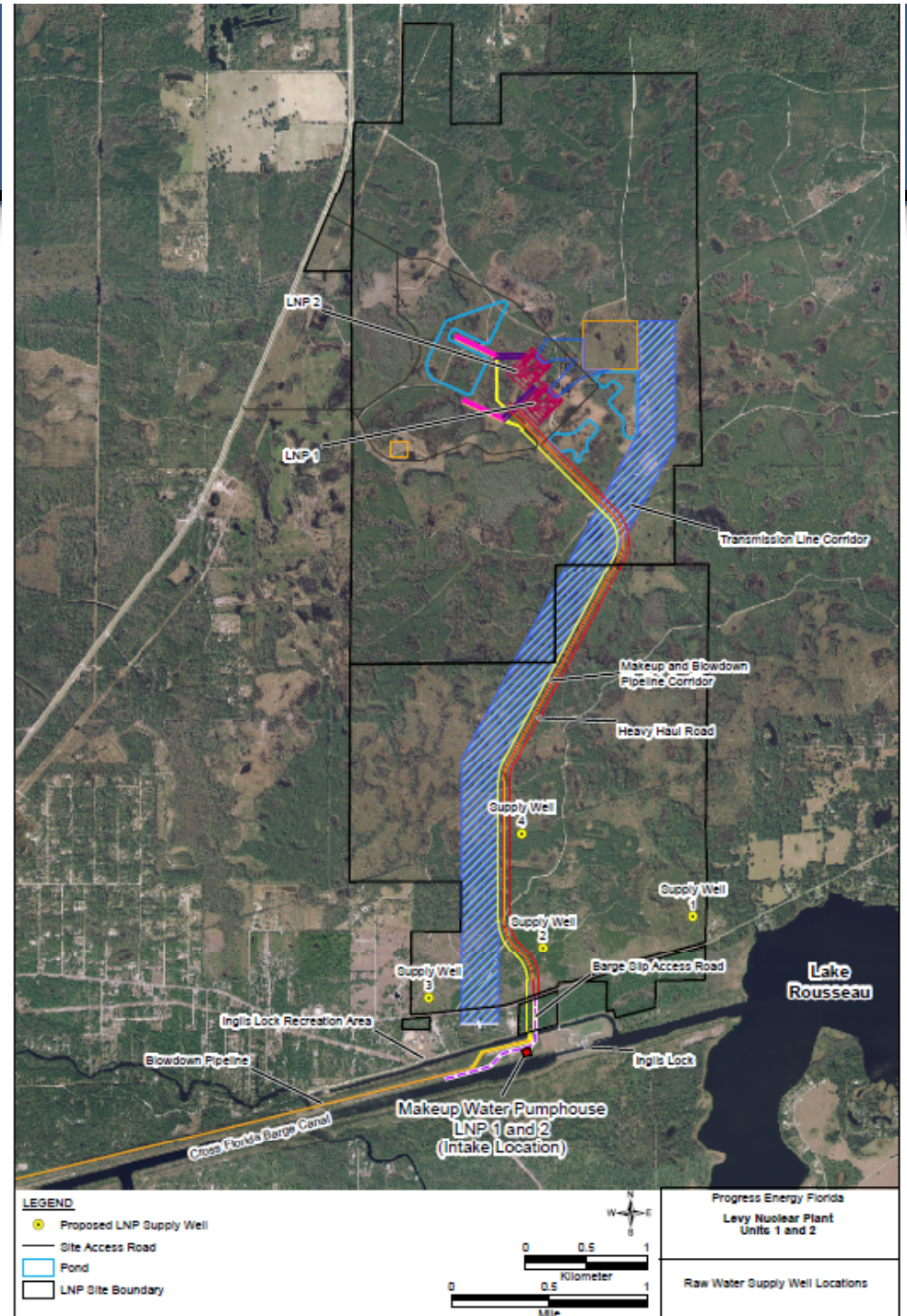
Meeting Objectives

- Review wellfield model evolution
- Summarize purpose of DWRM2 TMR model
- Compare results to Recalibrated model
- Evaluate Recalibrated model limitations
- Review USACE model comments
- Summarize conclusions

Levy Nuclear Plant

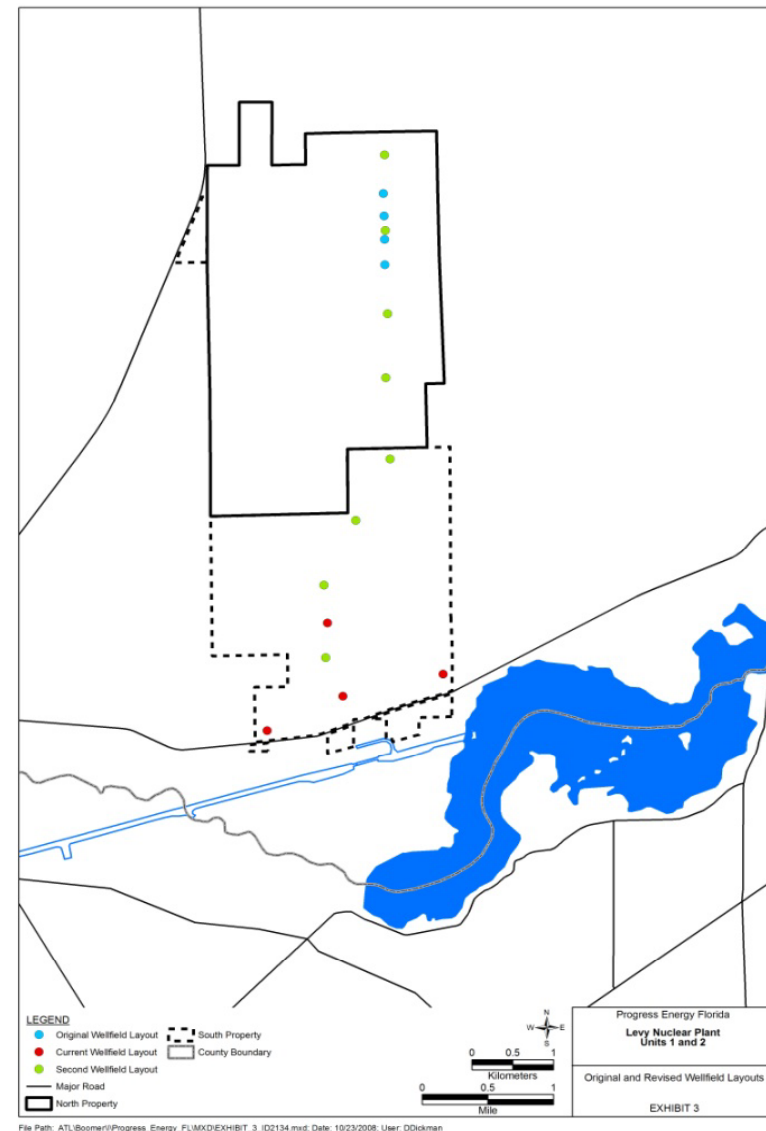


Site Plan and Wellfield Location

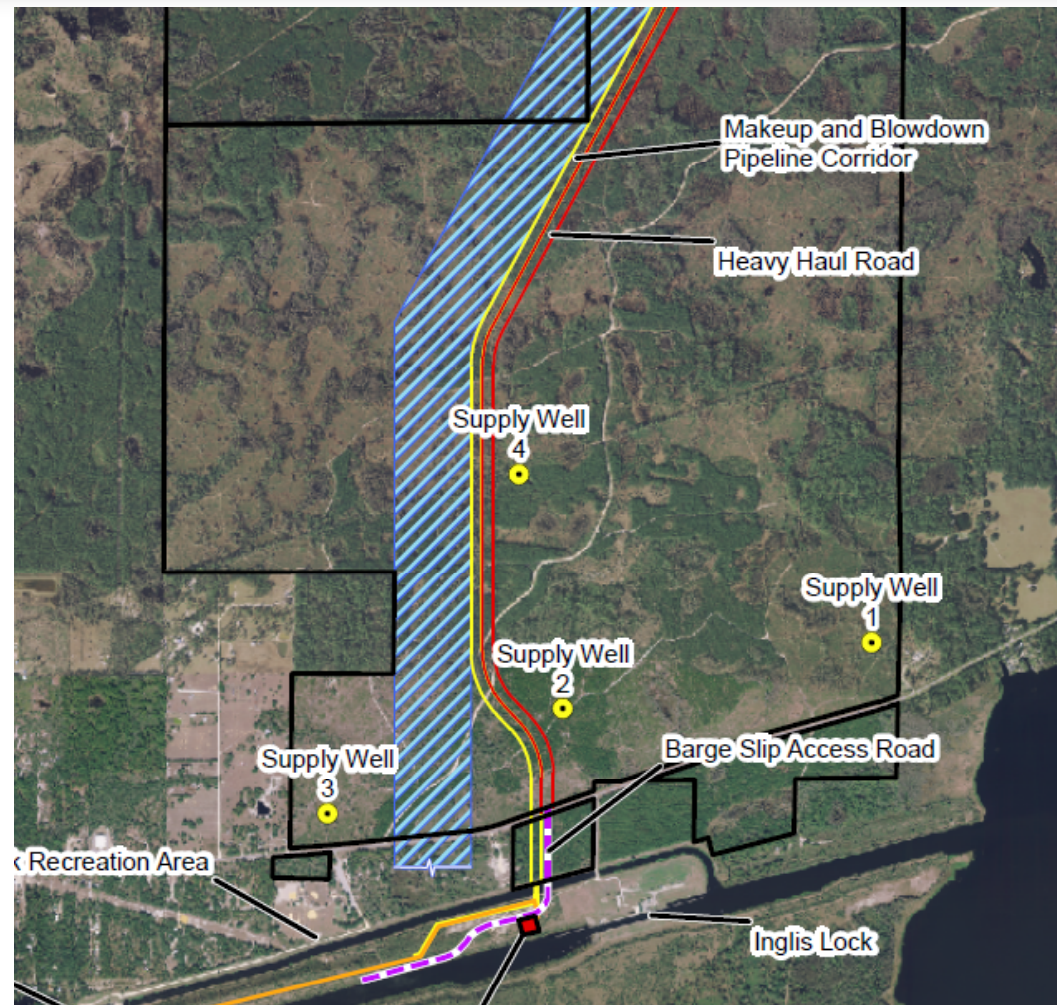


Evaluated Alternate Wellfield Layouts to Minimize Surficial Aquifer Drawdown

Number of wells, locations, and well spacing varied to minimize potential drawdown impacts to wetlands



Wells are Located >2,800 ft Apart to Minimize Drawdown



SWFWMD Responsible for Determining Level of Impacts from Groundwater Withdrawals

- Under Chapter 373, Florida Statutes the Southwest Florida Water Management District (SWFWMD) regulates the withdrawal of groundwater
- These regulations ensure that such withdrawals do not cause unacceptable impacts to water resources including wetlands
- The SWFWMD evaluated the PEF's proposed groundwater withdrawals with the primary focus on preventing wetland impacts

PEF Used the DWRM2 Model Developed by the SWFWMD

- The SWFWMD developed the District Wide Regulation Model v2 (DWRM2) and uses the model to evaluate groundwater behavior on a local and regional scale
- PEF worked closely with the SWFWMD incorporating their guidance and preferences into the site specific model development
- SWFWMD determined that the withdrawal posed no adverse impacts to wetlands in the area
 - ▶ Results show no more than 0.4 ft draw-down in the surficial aquifer beneath wetlands near the wellfield after 60 yrs of pumping

NRC Requested a Single Purpose Recalibration to Match the USGS 2007 Potentiometric Map

- The NRC expressed concerns that the water levels in the DWRM2 model differed from the USGS water level map
- The primary purpose of the “Recalibrated” model was to simulate the USGS water level contours
- The “Recalibrated” model was forced to simulate the USGS water levels at the model boundaries and at the few reference wells in the model domain
- The resulting “Recalibrated” model is significantly different from the DWRM2 model, is not a better simulation, and should not be considered an equal tool

Differing Model Goals Make DWRM2 Model More Appropriate for Wetland Impact Evaluations

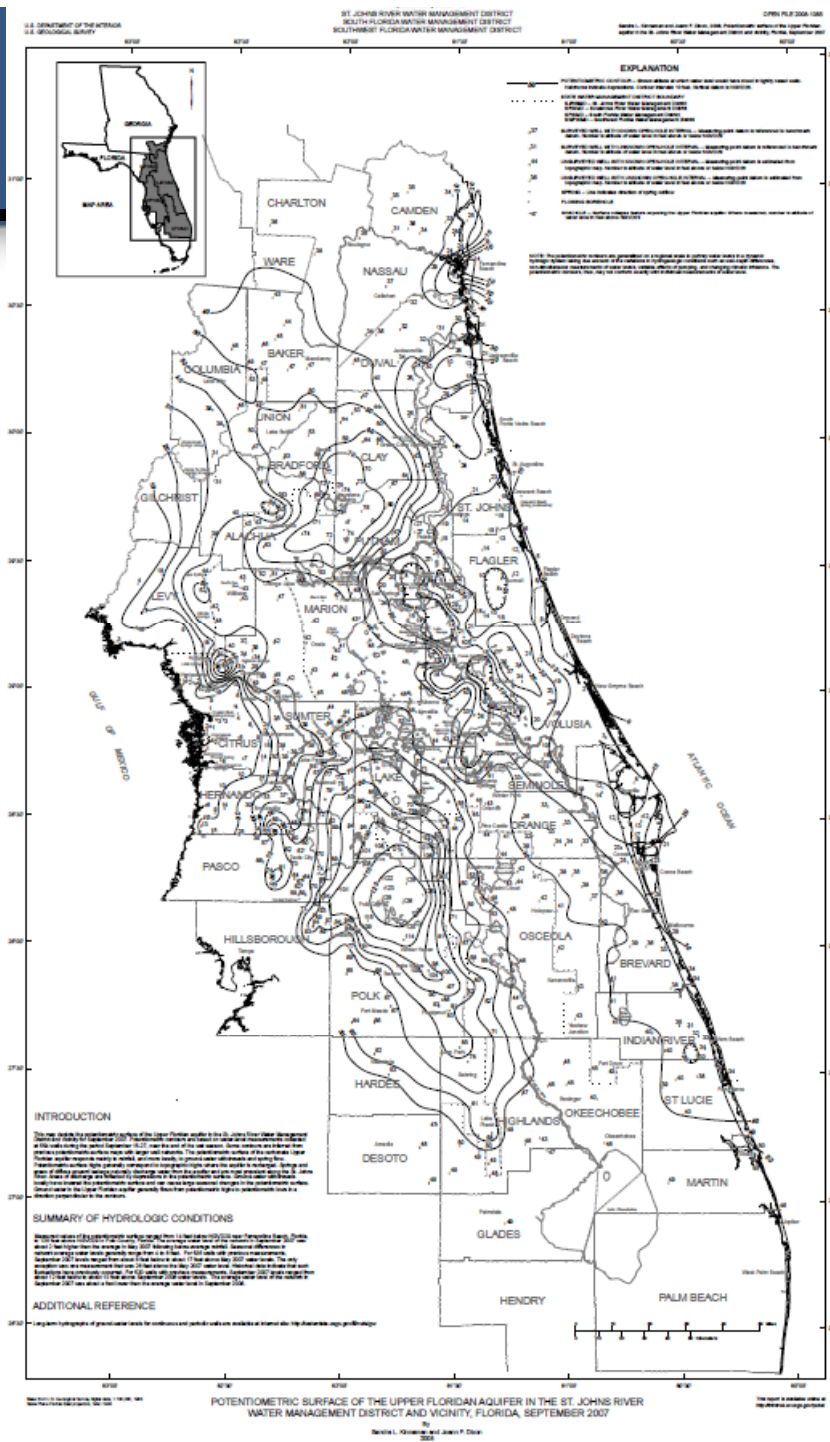
- The DWRM2 model is used routinely by the SWFWMD to evaluate potential wetland impacts from groundwater withdrawals
- The DWRM2 model is calibrated to measured water levels from over 1,500 wells, 80% of which are in the surficial and upper Floridan aquifers
- Aquifer performance test data (APT) from hundreds of wells are incorporated into the calibration
- The model was PEER reviewed by the USGS, University of South Florida, and professional consultants

The “Recalibrated” Model Input is Very Limited

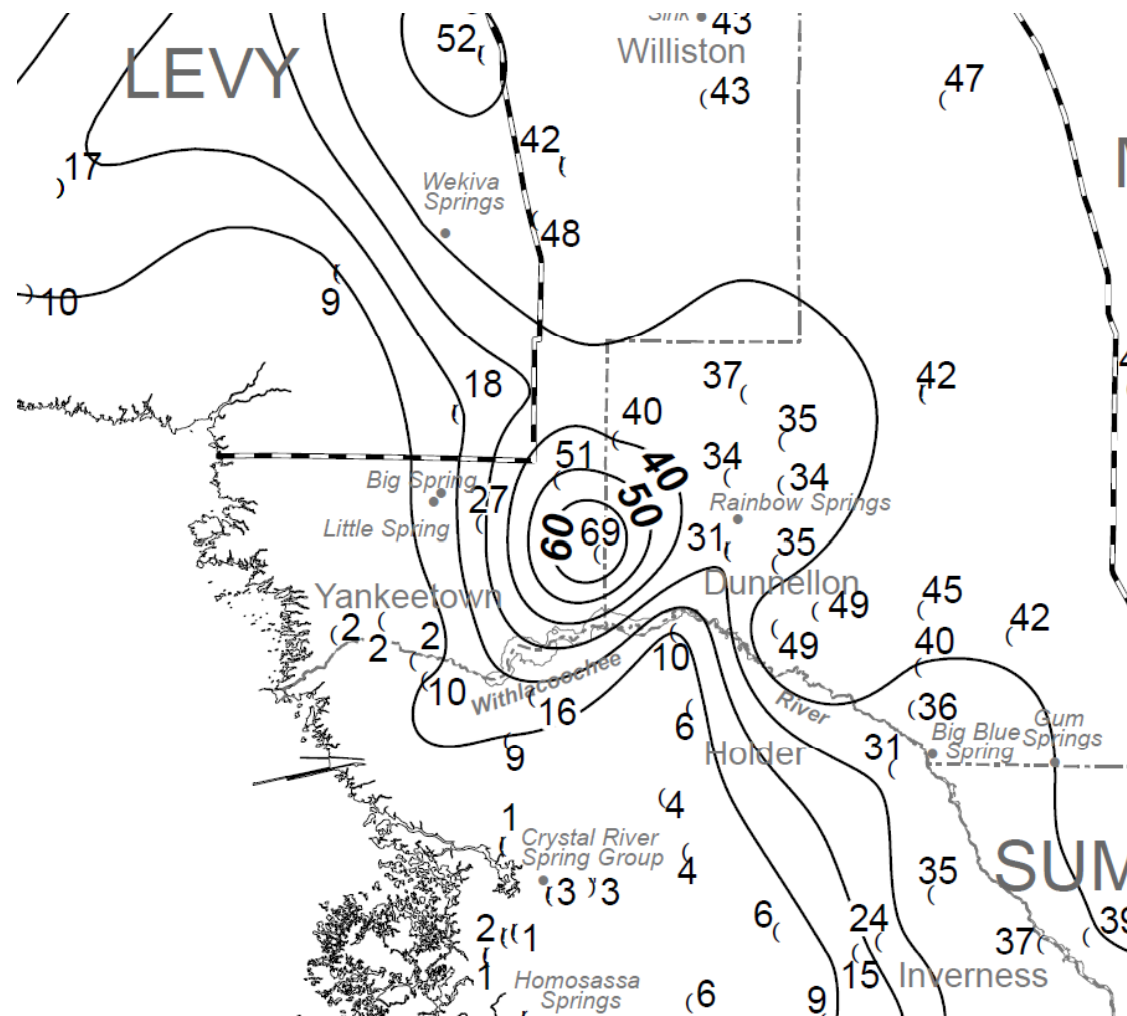
- The SWFWMD stated that the DWRM2 model was the best representation of the area and declined to review the “Recalibrated” model
- The “Recalibrated” model is calibrated to USGS water level contours at the model boundaries and the few supply wells and monitoring wells in the area
- No actual APT aquifer values were used to constrain the “Recalibrated” model
- The “Recalibrated” model required significant changes to the model parameters:
 - ◆ horizontal and vertical hydraulic conductivity
 - ◆ leakance between model layers
 - ◆ boundary heads
 - ◆ drain and river cells
 - ◆ transmissivity

2007 USGS Potentiometric Surface Map

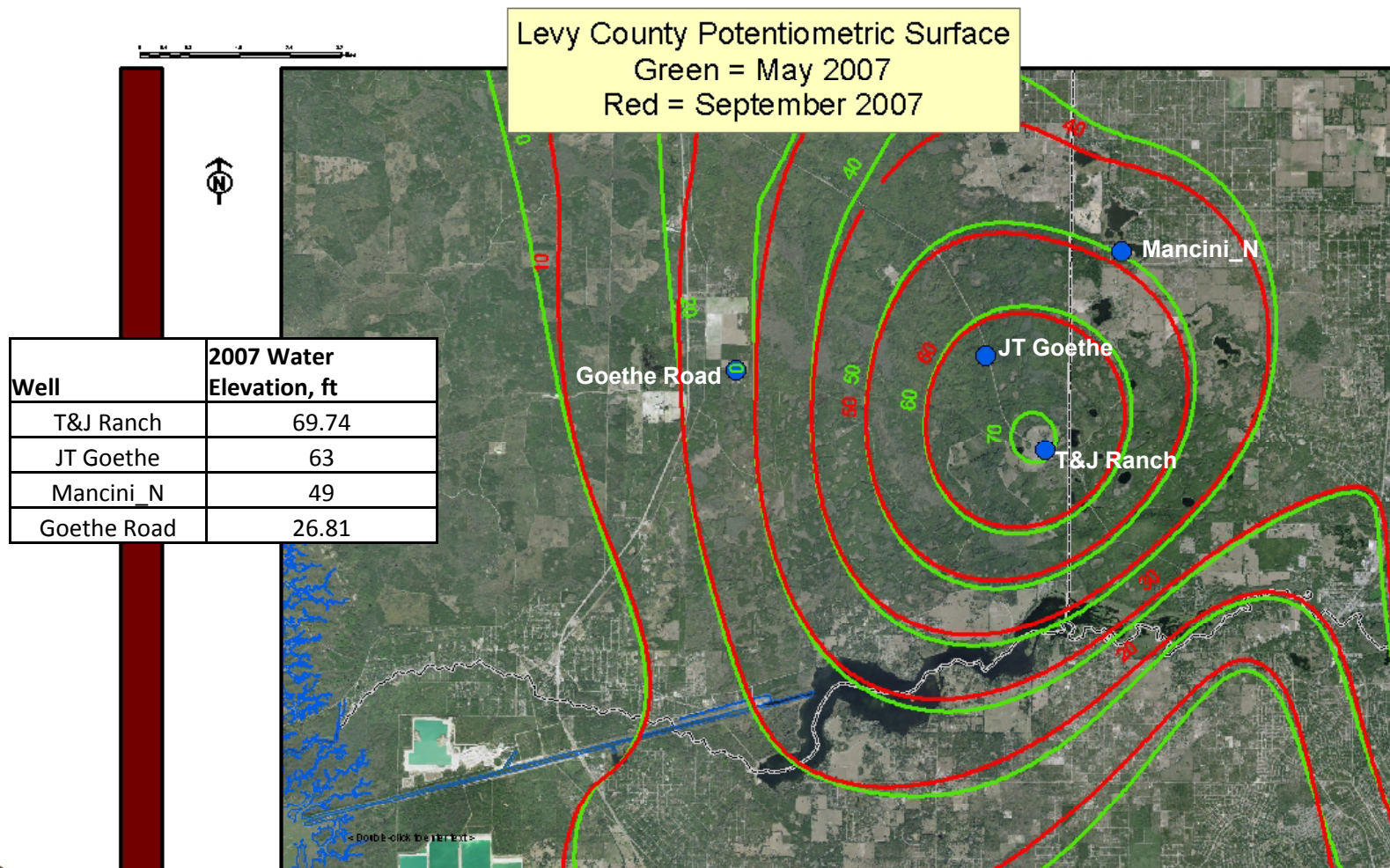
Regional contour map used for
water level targets in the
Recalibrated model



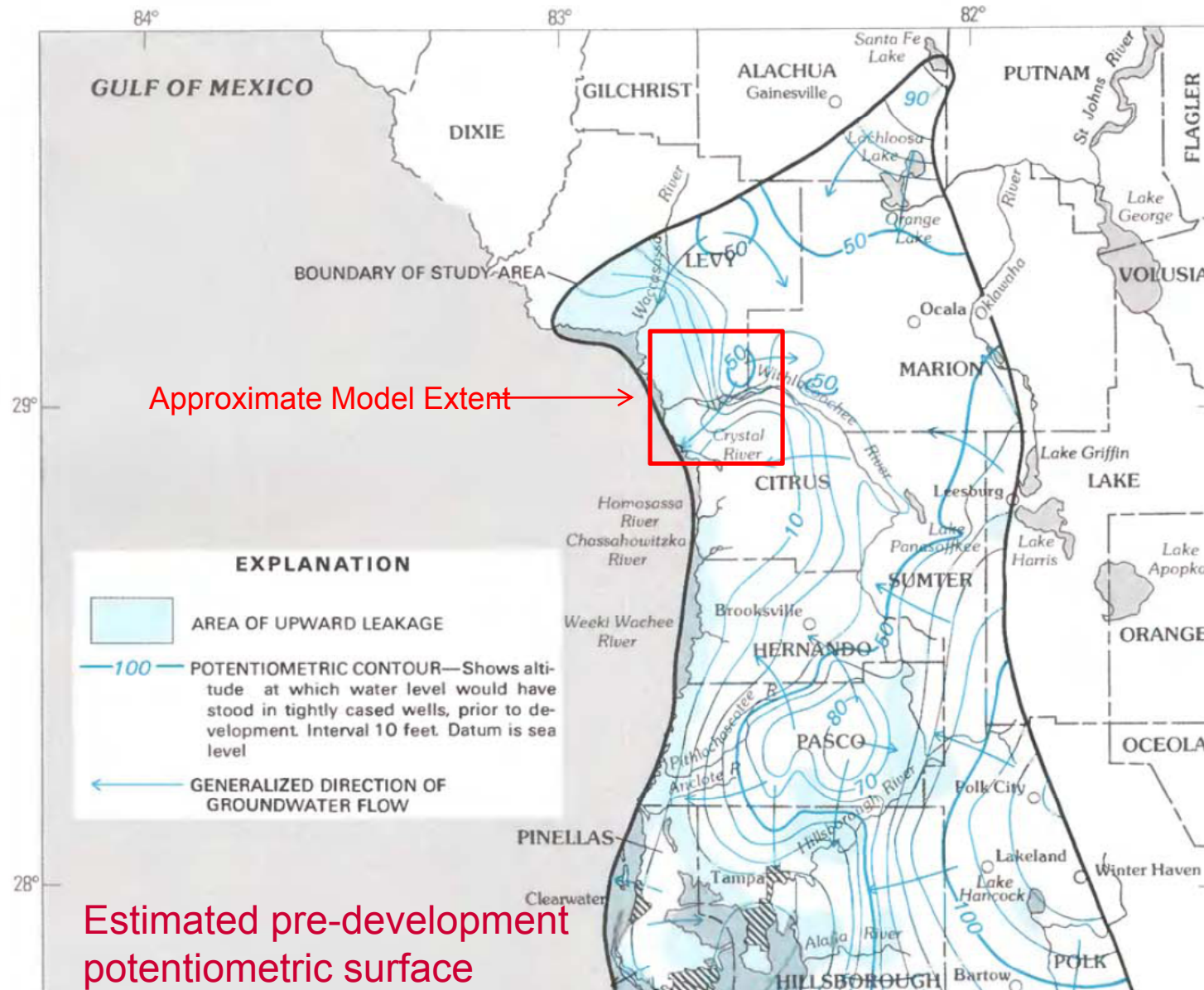
Close-up of USGS Potentiometric Surface Map Showing Steep Gradient Forced by Unusual Water Level in One Well



Calibration Target Potentiometric Surface for the Recalibrated Model



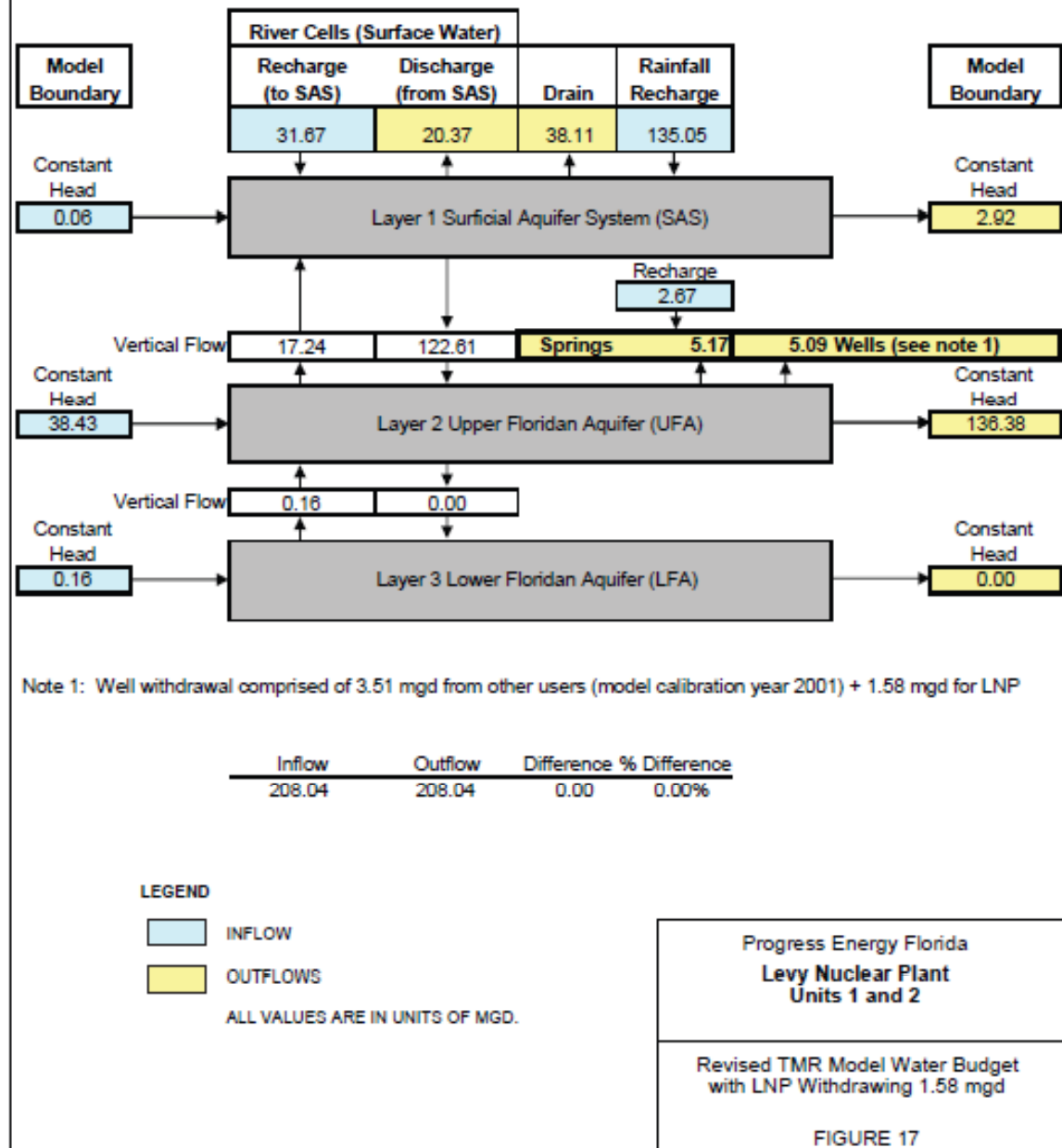
HYDROLOGY OF THE FLORIDAN AQUIFER SYSTEM IN WEST-CENTRAL FLORIDA



Map from Ryder, P.D., 1985. Hydrology of the Floridan Aquifer System in West-Central Florida. USGS Professional Paper 1403-F.

Water Budget for “Recalibrated” Model

- Unrealistic magnitude of flow in/out of UFA
- Unrealistic principal source of water to the UFA (net 75% from SAS)
- Inadequate vertical flow from the UFA to the SAS to reasonably represent observed spring discharge

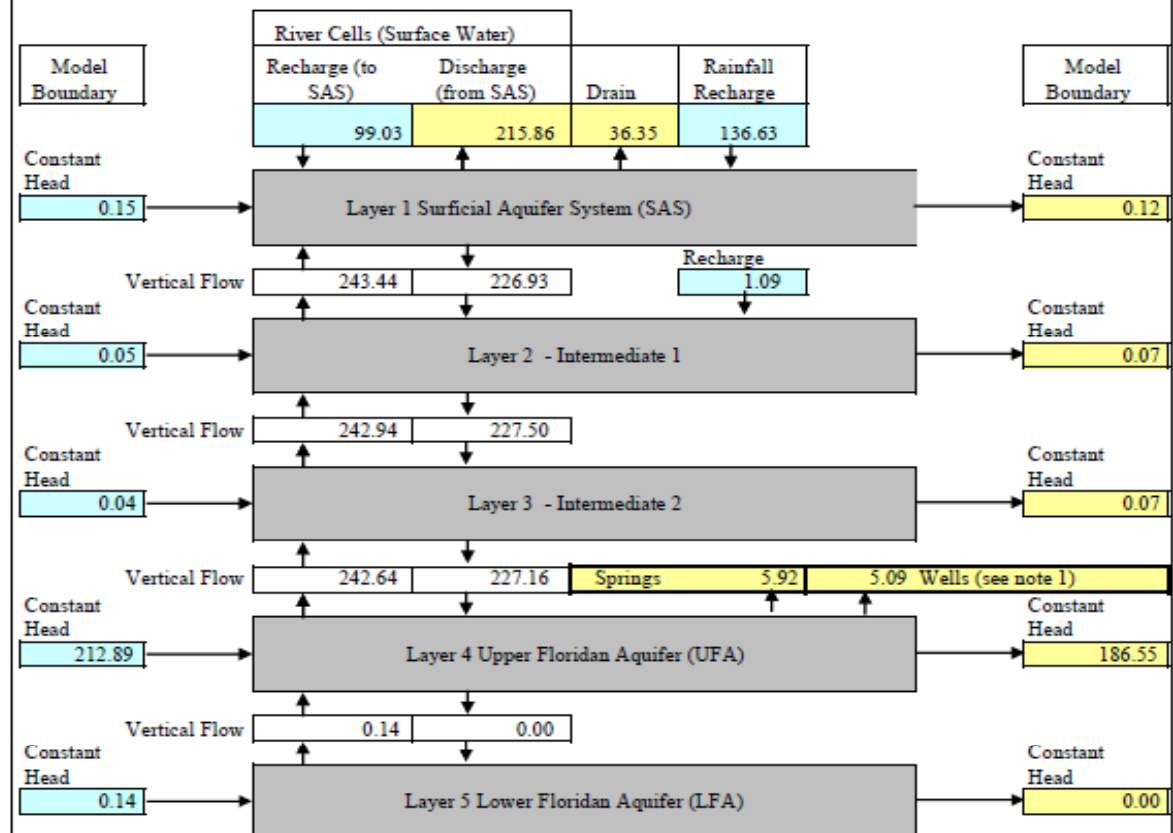


Recalibrated Model Water Budget Has Unrealistic Values That Differ from Observed Groundwater Conditions

- “Recalibrated” model does not reflect realistic values in the following areas:
 - ▶ Horizontal flow in the upper Floridan aquifer
 - ▶ Vertical flow from the Floridan to the surficial aquifer and surface water
 - ▶ Groundwater gradients in the upper Floridan
 - ▶ Simulation of the upper Floridan as a net recharge layer in the model
 - ▶ Unrealistic distribution of transmissivity values
- These values in the “Recalibrated” model are not consistent with the hydrologic conditions of the area

Water Budget for DWRM2 TMR Model

- Realistic magnitude of flow in/out of UFA
- Adequate vertical flow from the UFA to reasonably represent observed spring discharge



Note 1: Well withdrawal comprised of 3.51 mgd from other users (model calibration year 2001) + 1.58 mgd for LNP

Inflow	Outflow	Difference	% Difference
450.03	450.03	0.00	0.00%

NOTE: ALL VALUES MGD

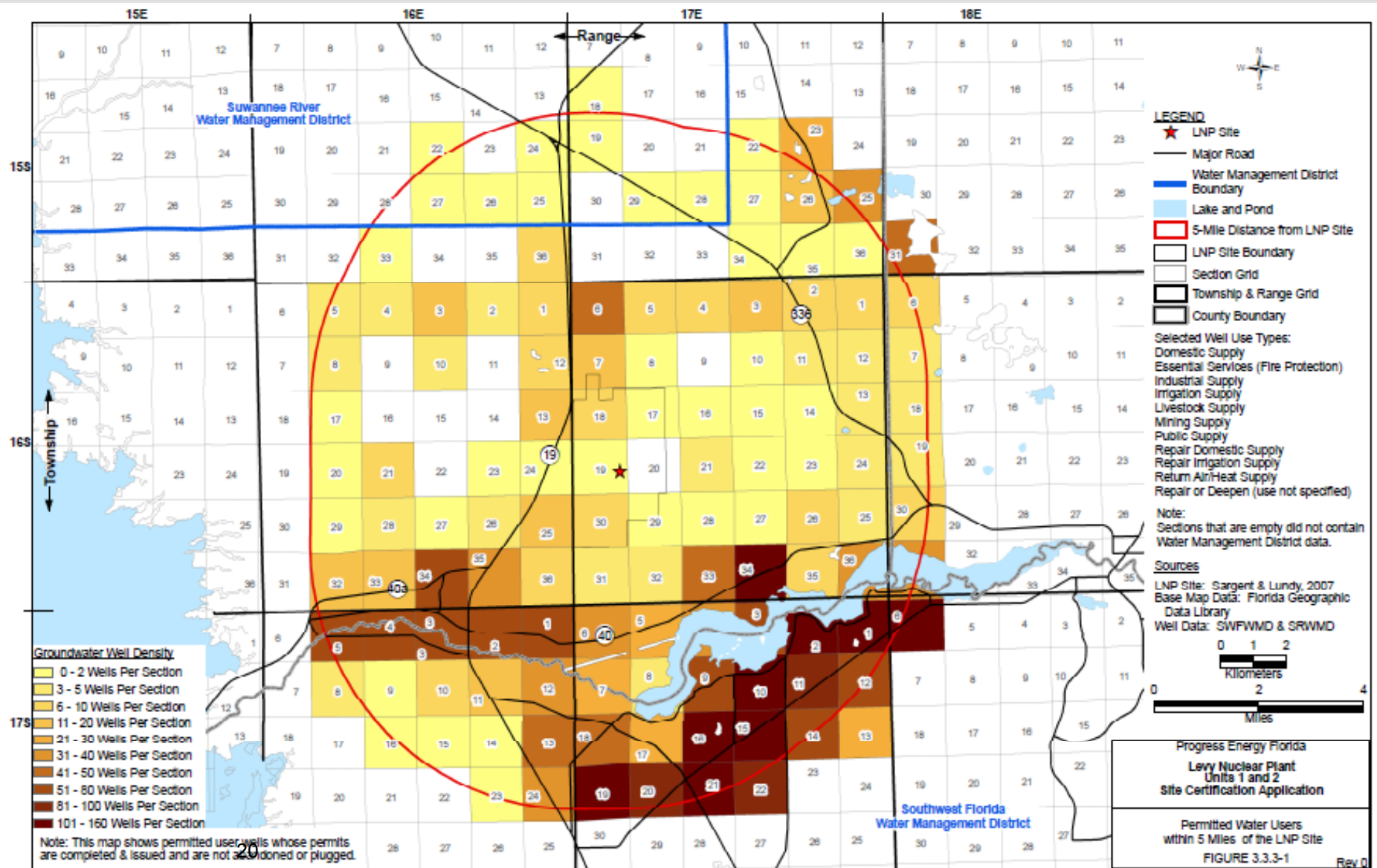
Progress Energy Florida
Levy Nuclear Plant
Units 1 and 2

SWFWMD DWRM2 TMR
TMR Model Water Budget
with LNP Withdrawing 1.58 mgd
FIGURE 8

The LNP Withdrawal is Insignificant Compared to the Magnitude of the Regional Groundwater Flow

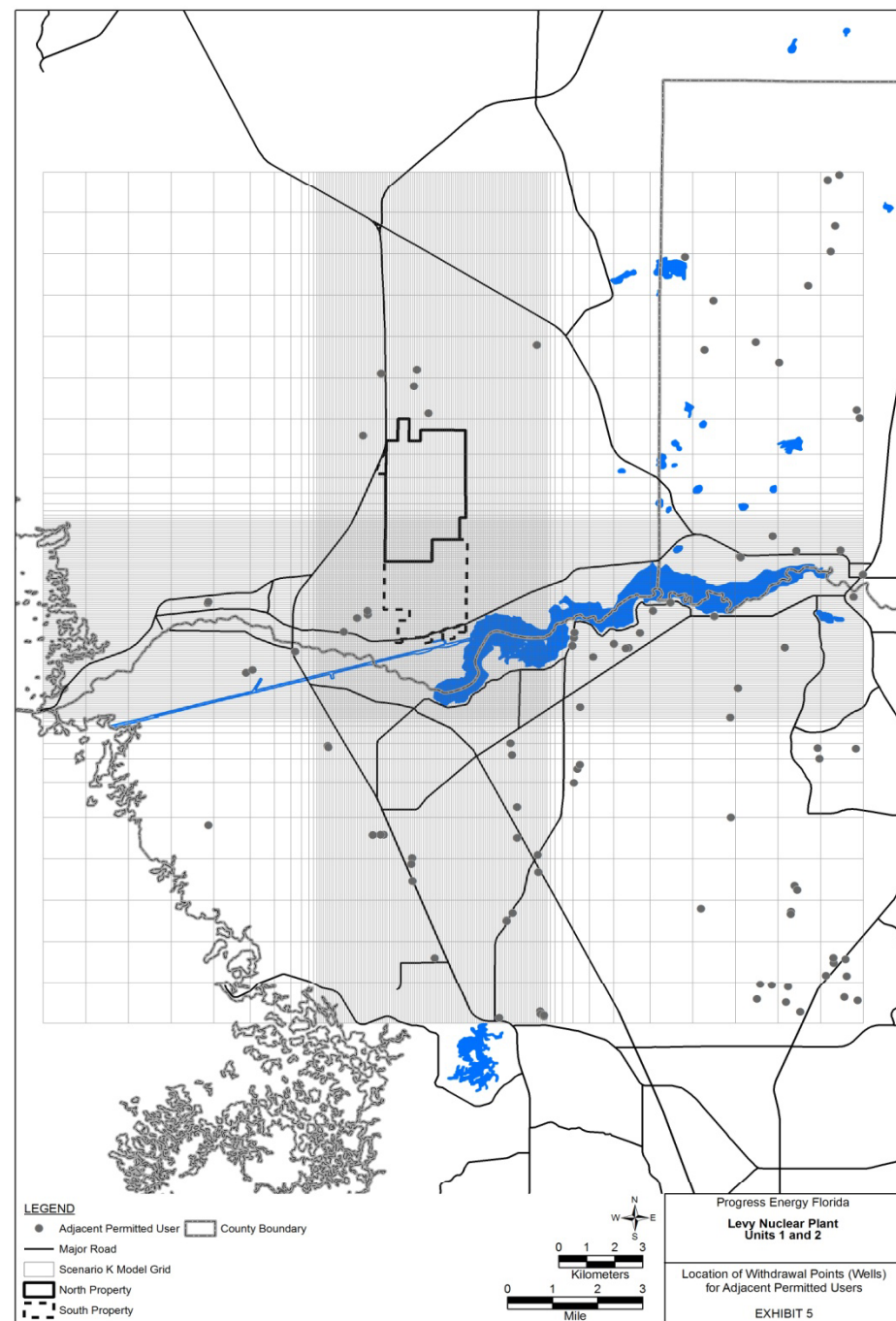
- The DWRM2 model water budget has a total inflow and outflow of 450 mgd - the model area covers only a small portion of the three counties surrounding the property
- The LNP withdrawal comprises only about 0.4 percent of the total flow through the model
- Therefore, the LNP withdrawal of 1.58 mgd is insignificant compared with the total model flow and the regional groundwater resources

Several Thousand Domestic and Irrigation Wells in the Area Demonstrate Extent of Groundwater Resources



Large Withdrawals from Floridan Aquifer is a Common Practice

Over 100 wells meet the withdrawal criteria requiring a SWFWMD CUP permit (>100,000 gpd or \geq 6-in diameter casing) within 10 miles of the site



Results of DWRM2 Model Support Requested Withdrawal

- SAS and UFA drawdown after 60 years is less than 0.4 ft beneath the nearest wetlands to the wellfield
- At 1.58 mgd withdrawal, the model-simulated SAS and UFA discharge into river cells used to represent rivers and lakes is reduced by approximately 1.1 mgd
- That amount is about 0.9 percent of the simulated total flux between the Floridan aquifer and river cells in the model

Results of DWRM2 Model Support Requested Withdrawal

- 1.1 mgd is an insignificant amount compared with the 37-year recorded average daily discharge of 687 mgd through the Withlacoochee River Bypass Canal
- Operation of the LNP wellfield decreased the model simulated discharge from the drain cells representing Big King and Little King springs by approximately 0.01 mgd or about 0.3 percent of their total simulated flow
- Operation of the wellfield results in drawdown of about 0.2 foot at the nearest UFA well - this amount is insignificant in a pumping well

SAS Regional Drawdown after 60 yrs

The SAS modeled drawdown is limited to the immediate vicinity of the pumping wells and 0.5 ft of drawdown occurs only within several hundred feet of the wells

