Progress Energy

Serial: NPD-NRC-2009-166
July 29, 2009

10 CFR 52.79

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

LEVY NUCLEAR POWER PLANT, UNITS 1 AND 2
DOCKET NOS. 52-029 AND 52-030
SUPPLEMENT 3 TO RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING THE ENVIRONMENTAL REVIEW

References:

1. Letter from Douglas Bruner (NRC) to James Scarola (PEF), dated February 24, 2009, "Request for Additional Information Regarding the Environmental Review of the Combined License Application for the Levy Nuclear Power Plant, Units 1 and 2"
2. Letter from Garry D. Miller (PEF) to the U. S. Nuclear Regulatory Commission dated March 27, 2009, "Response To Request For Additional Information Regarding The Environmental Review", Serial NPD-NRC-2009-042
3. Letter from Garry D. Miller (PEF) to the U. S. Nuclear Regulatory Commission dated June 12, 2009, "Supplement 1 to Response to Request for Additional Information Regarding the Environmental Review", Serial NPD-NRC-2009-107
4. Letter from Garry D. Miller (PEF) to the U. S. Nuclear Regulatory Commission dated July 24, 2009, "Supplement 2 to Response to Request for Additional Information Regarding the Environmental Review", Serial NPD-NRC-2009-172

Ladies and Gentlemen:

Progress Energy Florida, Inc. (PEF) hereby submits a supplemental response to the Nuclear Regulatory Commission's (NRC) request for additional information provided in the referenced letter.

A revised response to four of the NRC questions is provided in the Enclosure 1. Enclosure 1 also identifies changes that will be made in a future revision of the Levy Nuclear Power Plant Units 1 and 2 Environmental Report. Enclosure 2 provides a list of files included on the attached CD; these files have been prepared in accordance with NRC electronic submittal guidance. A pre-flight report is included as Enclosure 3.

If you have any further questions, or need additional information, please contact Bob Kitchen at (919) 546-6992, or me at (919) 546-6107.

Progress Energy Florida, Inc.
P.O. Box 14042
St. Petersburg, FL 33733

D094
NRO

NRC022
June 26, 2012

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 29, 2009.

Sincerely,

Garry D. Miller
General Manager
Nuclear Plant Development

Enclosures/Attachment

cc: U.S. NRC Region II, Regional Administrator
Mr. Brian Anderson, U.S. NRC Project Manager

cc (with 3 copies):
Mr. Douglas Bruner, U S Environmental Project Manager

NRC Letter No.: ER-NRC

NRC Letter Date: February 24, 2009

NRC Review of Environmental Report

NRC RAI #: 5.2.2-3

Text of NRC RAI:

Discuss implementation of the DWRM2 TMR groundwater model. Discuss the predicted impacts of groundwater usage at LNP.

ER Section 5.2.2 stated that groundwater would be used for general plant operations. ER Section 5.2.1.4 stated that groundwater for operations would be obtained from on-site supply wells shown in ER Figure 4.2-1. During the site audit, the NRC staff became aware that the location of the supply wells had changed from those shown in ER Figure 4.2-1 and that PEF were using a groundwater model, DWRM2 TMR, to assess operational impacts of the groundwater withdrawal. Discuss implementation of the DWRM2 TMR groundwater model that is being used to assess impacts of LNP's groundwater withdrawals from the Floridan aquifer, including how surface recharge is implemented in the model and the impact associated with using projected future water use on a county-wide level (see ER Table 2.3-20) in the assessment. Discuss SWFWMD's process for managing groundwater resources.

Discuss the predicted impacts of LNP's groundwater usage on 1) the basin- or subbasin-scale water balance, 2) potentiometric heads within the aquifer, 3) wetlands, 4) discharge to springs and other surface water bodies, 5) other groundwater users, and 6) the potential for salt water intrusion.

PGN RAI ID #: L-0522

PGN Response to NRC RAI:

Under Chapter 373, Florida Statutes (F.S.), the Southwest Florida Water Management District (SWFWMD) regulates the withdrawal of groundwater to ensure that such withdrawals do not cause harm to the water resources or interference with legal users. The SWFMWD's regulations ensure that groundwater withdrawals, both individually and cumulatively, do not cause unacceptable impacts on wetlands and surface waters and do not result in saline water intrusion. The SWFWMD evaluated the LNP's proposed groundwater withdrawals against these criteria and concerns.

The SWFWMD developed the District Wide Regulation Model version 2 (DWRM2) and uses the DWRM2 model to evaluate groundwater behavior on a regional scale. The SWFWMD also recommended that a number of conditions be placed on the LNP State Certification to ensure that groundwater withdrawals are monitored and managed over the long term (see SWFWMD Agency Report in DEP Staff Analysis Report [January 12, 2009]). Finally, pursuant to section 373.0361, F.S., the SWFWMD conducts water supply planning for this area by evaluating projected groundwater needs over a 20-year horizon. Additional discussion of the SWFWMD's process for managing groundwater resources is provided in LNP ER NRC RAI 5.2.2-2.

The wellfield modeling was performed using information exported from the SWFWMD's DWRM2 and is described in Attachment 5.2.2-3A - Technical Memorandum (TM) 338884-TMEM-074, Rev. 1, "Revised Conceptual Wellfield Layout and Evaluation of Simulated Drawdown Impacts, Levy Nuclear Plant". This TM provides background information on the DWRM2 model and describes the general modeling procedures. The groundwater model was developed by using the telescopic mesh refinement (TMR) process from the DWRM2 regional model. The TMR process was used to refine the model cell sizes around the proposed wellfield and extract an area from the DWRM2 model centered around the wellfield. A number of wellfield locations were evaluated to assess potential drawdown impacts. A wellfield located in the southern part of the LNP property resulted in less drawdown in the Upper Floridan aquifer and the surficial aquifer system than other locations considered.

The primary reason for the reduced drawdown in the Upper Floridan aquifer with the southern wellfield is the assumed higher transmissivity of that area in the TRM model. Figure 1 - SWFWMD DWRM2 TMR Groundwater Model Transmissivity of Layer 4 – Upper Floridan Aquifer (Attachment 5.2.2-3B) shows that the transmissivity of the Upper Floridan aquifer varies from 20,184 to 81,809 square feet per day (ft^2/day) in the northern two thirds of the property and up to 144,967 to 241,309 ft^2/day in the vicinity of the proposed wellfield along the southern edge of the property. The assumed higher transmissivity in the area of the proposed wellfield acts to reduce the magnitude of the cone of depression around the wells, and subsequently there will be corresponding reductions in water level changes in the overlying surficial aquifer system. With less drawdown in the surficial aquifer system, any anticipated impacts to wetland areas would be minimized.

The TM, 338884-TMEM-074, Rev. 1 (Attachment RAI 5.2.2-3A), provides the predictions of the simulated hydrologic impacts associated with the proposed normal daily withdrawal of 1.58 mgd and 5.8 mgd peak withdrawal of groundwater from the Upper Floridan aquifer, as stated in ER Subsection 5.2.2.3. No changes to the model parameters were made other than the following:

- Two springs (Little King and Big King) were added to the model.
- Model cells that used MODFLOW's River (RIV) package to represent wetlands were changed to variable-head cells (i.e., the River package was not used to represent wetlands). This change was made based on SWFWMD staff concerns that MODFLOW's River package could provide an infinite source of water to the model and artificially limit simulated drawdowns. Model cells that used the RIV package to represent Lake Rousseau and the Withlacoochee River were not modified.
- The length of model Stress Period 3 was increased to 60 years to represent the expected operating life of the facility.

The revised wellfield layout is presented as Figure 2 - Raw Water Supply Well Locations (Attachment 5.2.2-3C). The original wellfield layout that was shown in ER Figure 4.2-1 is described and illustrated in the TM 338884-TMEM-074, Rev. 1 (Attachment RAI 5.2.2-3A). The revised layout includes four wells located on the southern portion of the LNP property. Two wells are located along County Road 40, with two wells located to the north on the east side of the heavy haul road. Exhibit 3 in the TM 338884-TMEM-074, Rev. 1 (Attachment RAI 5.2.2-3A) depicts the original and revised wellfield layouts.

Each well was simulated to pump at a constant rate of 0.395 mgd, for a total withdrawal of 1.58 mgd. The model simulation was run for the proposed 60-year operating life of the facility. The model includes three stress periods. Stress Period 1 is a steady-state stress period that represents pre-development conditions; there are no well withdrawals simulated from the model. Stress Period 2, also steady-state, includes all other users except LNP. It is intended to provide an assessment of currently permitted impacts. Stress Period 3 is the predictive phase of the simulation. In the SWFWMD's DWRM2 model, the default period length is 1 year. For this simulation, the stress period length was increased to 60 years to represent the expected life of the facility.

The model is constructed with 5 layers, each representing a regional aquifer system within the DWRM2 model domain. Vertical flow between each layer is represented by a leakance value in the model. Recharge is applied to the uppermost layer and is calculated as net recharge. The evapotranspiration (ET) function is not used. The model layers include:

- Layer 1 – Surficial aquifer system
- Layer 2 – Intermediate aquifer or confining bed (not present at the property)
- Layer 3 – Intermediate aquifer or confining bed (not present at the property)
- Layer 4 – Upper Floridan aquifer
- Layer 5 – Lower Floridan aquifer

Each layer in the DWRM2 model has boundary conditions that govern flow into and out of the layer. The surficial aquifer system is laterally bounded by constant head cells. The vertical boundary conditions vary in the surficial aquifer system using active, drain, and river cells to define the movement of water into the surficial aquifer system. The surficial aquifer system (Layer 1) varies from 30 to 70 feet thick in the TMR model domain. Figure 3 - SWFWMD DWRM2 TMR Groundwater Model Boundary Conditions Layer 1 – Surficial Aquifer System (Attachment 5.2.2-3D) shows the boundary conditions in the surficial aquifer system.

Most of the Layer 1 cells in the TMR model domain are drain cells. These cells allow water to exit the model at a set elevation. Drain cells are used to represent the high water table and groundwater discharge to land surface such as in wetlands and springs. River cells function in the same manner as drain cells but also allow water to enter the model if the simulated water level in the aquifer falls below the head of the river. River cells are used to represent surface water bodies like Lake Rousseau and the Withlacoochee River.

Layer 2 and 3 represent intermediate aquifers or confining beds in the DWRM2 model. In other areas of the SWFWMD, additional formations are present between the surficial aquifer system and Upper Floridan aquifer that function in some areas as confining beds and in other areas as minor aquifers. The two layers are bounded laterally by constant head conditions and are active cells as shown in Figure 4 SWFWMD DWRM2 TMR Groundwater Model Boundary Conditions Layer 2 – Intermediate 1 (Attachment 5.2.2-3E) and Figure 5 SWFWMD DWRM2 TMR Groundwater Model Boundary Conditions Layer 3 – Intermediate 2 (Attachment 5.2.2-3F).

Layer 4 is the Upper Floridan aquifer, which will be used as the source of fresh water in the wellfield. The Upper Floridan aquifer is bounded by constant head cells and all cells are active. Figure 6 - SWFWMD DWRM2 TMR Groundwater Model Boundary Conditions Layer

4 – Upper Floridan Aquifer (Attachment 5.2.2-3G) shows the boundary conditions for the Upper Floridan aquifer.

Layer 5 is the Lower Floridan aquifer. This layer represents the deeper intervals of the Floridan and in nearly the entire TMR model domain is a no-flow boundary. Lower Floridan aquifer cells are active only in the northeastern corner of the TMR model. Figure 7 - SWFWMD DWRM2 TMR Groundwater Model Boundary Conditions Layer 5 – Lower Floridan Aquifer (Attachment 5.2.2-3H) shows the Lower Floridan aquifer and boundary conditions. This layer is designated no-flow in this area to represent brackish groundwater.

The model parameters of Layer 1 (surficial aquifer system) and Layer 4 (Upper Floridan aquifer) were of particular interest during model development and review. The surficial aquifer system receives nearly all of the vertical recharge through rainfall and seepage from lakes and rivers. Figure 8 - DWRM2 TMR Model Water Budget (Attachment 5.2.2-3I) is a summary of the TMR model Water Budget, with LNP withdrawing 1.58 mgd. The TMR water budget shows that a significant volume of water enters the surficial aquifer system via rainfall recharge. It also shows there is an even larger volume of water moving in and out of the river cells representing Lake Rousseau and the Withlacoochee River.

Figure 9 - SWFWMD DWRM2 TMR Groundwater Model Recharge (Attachment 5.2.2-3J) shows the range of net recharge values in the TMR model domain. Over most of the property, net recharge ranges from 3.7 to 8.6 inches per year (in/yr). Higher recharge values occur in the southeastern corner of the property with 8.7 to 19.4 in/yr.

Figure 10 - SWFWMD DWRM2 TMR Groundwater Model Hydraulic Conductivity of Surficial Aquifer (Attachment 5.2.2-3K) is the Layer 1 hydraulic conductivity array in the model. Note how the hydraulic conductivity is decreasing from northwest to southeast across the property, with 19 to 20 feet per day (ft/day) in the northwest to 15 to 16 ft/day in the southeast.

The model simulations of drawdown are presented in the attached TM, 338884-TMEM-074, Rev. 1 (Attachment RAI 5.2.2-3A). Based on those simulations, the following was concluded:

- Simulated incremental and cumulative surficial aquifer system and Upper Floridan aquifer drawdown in the wellfield after 60 years of operation does not exceed 0.5 foot anywhere in the wellfield except in the immediate vicinity of some wells.
- There are no wetlands with either an incremental or cumulative drawdown of 0.5 foot or greater within the proposed wellfield's area of influence.
- Under Average Day conditions, the operation of the LNP wellfield was predicted to decrease the model-simulated surficial and Floridan aquifer discharge into river cells used to represent rivers and lakes by approximately 1.1 mgd or about 0.9 percent of the simulated total flux between the Floridan aquifer and river cells in the model.
- The simulated impacts to Lake Rousseau and the lower Withlacoochee River (measured at the Bypass Canal) of 1.1 mgd are insignificant compared with the 37-year recorded average daily discharge of 687 mgd through the Bypass Canal.

- Under Average Day conditions, the 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 flux.
- The operation of LNP's proposed wellfield is not expected to adversely impact adjacent permitted users of the Floridan aquifer. The model predicts less than 0.2 foot of additional drawdown at the location of the nearest other Upper Floridan aquifer user under Average Day conditions. The model simulation for Maximum Week withdrawals estimates an additional 0.1 to 0.2 foot of drawdown at the nearest Floridan aquifer well. Wetland impacts are not expected to occur during the short duration (1 week) of the maximum week withdrawal.
- Operation of the wellfield has a very low potential for causing lateral saltwater intrusion since the predicted drawdown from the wellfield is less than 0.3 foot beyond the property boundary. The Floridan aquifer gradient in the vicinity of the wellfield is toward the coast and the CFBC and remains virtually unchanged from pumping the LNP wellfield.
- The potential exists for vertical migration of saltwater from deeper intervals of the Floridan aquifer if present at the site. There is no direct information that identifies brackish water in deeper intervals but it can be expected to occur at some unknown depth. The potential for upward migration of lower quality water will be managed by wellfield operations that will rotate the use of the wells so no well is stressed for a long period of time. Water quality monitoring at the supply and monitoring wells will be designed to detect changes in water quality.

As shown in Attachment 5.2.2-3l (Model Water Budget), the total inflow and outflow in the model is about 450 mgd. The model area covers only a small portion of the three-county area surrounding the property. Attachment 5.2.2-3l contains a summary of the TMR model Water Budget with LNP withdrawing 1.58 mgd. Each layer of the model is shown with the total flow into and out of the layer for the horizontal and vertical boundaries. Inflows are highlighted in blue; outflows are highlighted in yellow. Total inflows are about 450 mgd and total outflows are 450 mgd. The LNP withdrawal comprises only about 0.4 percent of the total flux through the model.

Regional water use was summarized in ER Subsection 2.3.2.4.1 for Levy County, Subsection 2.3.2.4.2 for Citrus County, and Subsection 2.3.2.4.3 for Marion County. The total groundwater use for the three counties was 59 mgd in 2005 and is projected to be about 80 mgd in 2025. As shown in Attachment 5.2.2-3l, the model groundwater budget, which includes only a small portion of the area of these three counties, is approximately 450 mgd. This is over 5.5 times the projected water use in these three counties. Therefore, the LNP withdrawal of 1.58 mgd is insignificant compared with the total model flux and the regional groundwater resources.

The NRC requested the following additional information during a conference call on April 29, 2009:

- Confirm that the last sentence of the description for Layer 5 is worded correctly. Based on Figure 7, the northeast corner of the model is designated as an active or constant head boundary condition, which would be consistent with implementing brackish groundwater upwelling at this boundary.
- The model uses 2001 data to define withdrawals for adjacent permitted users. The RAI response provides the projected usage increases for Levy, Citrus, and Marion Counties (combined) between 2005 and 2025, but it is unclear how these data should be used to

project increased usage for wells within the TMR model domain. Can either of the following usage amounts be provided: 1) combined three county usage for 2001; or 2) well usage within the TMR model domain for 2005?

The SWFWMD's DWRM2 model (Reference RAI 5.2.2-3 01) (used to create the TMR model submitted with the application) is based on the United States Geological Survey's (USGS's) groundwater flow model, also known as the "Mega-Model" (Reference RAI 5.2.2-3 02). The Mega-Model documentation states that:

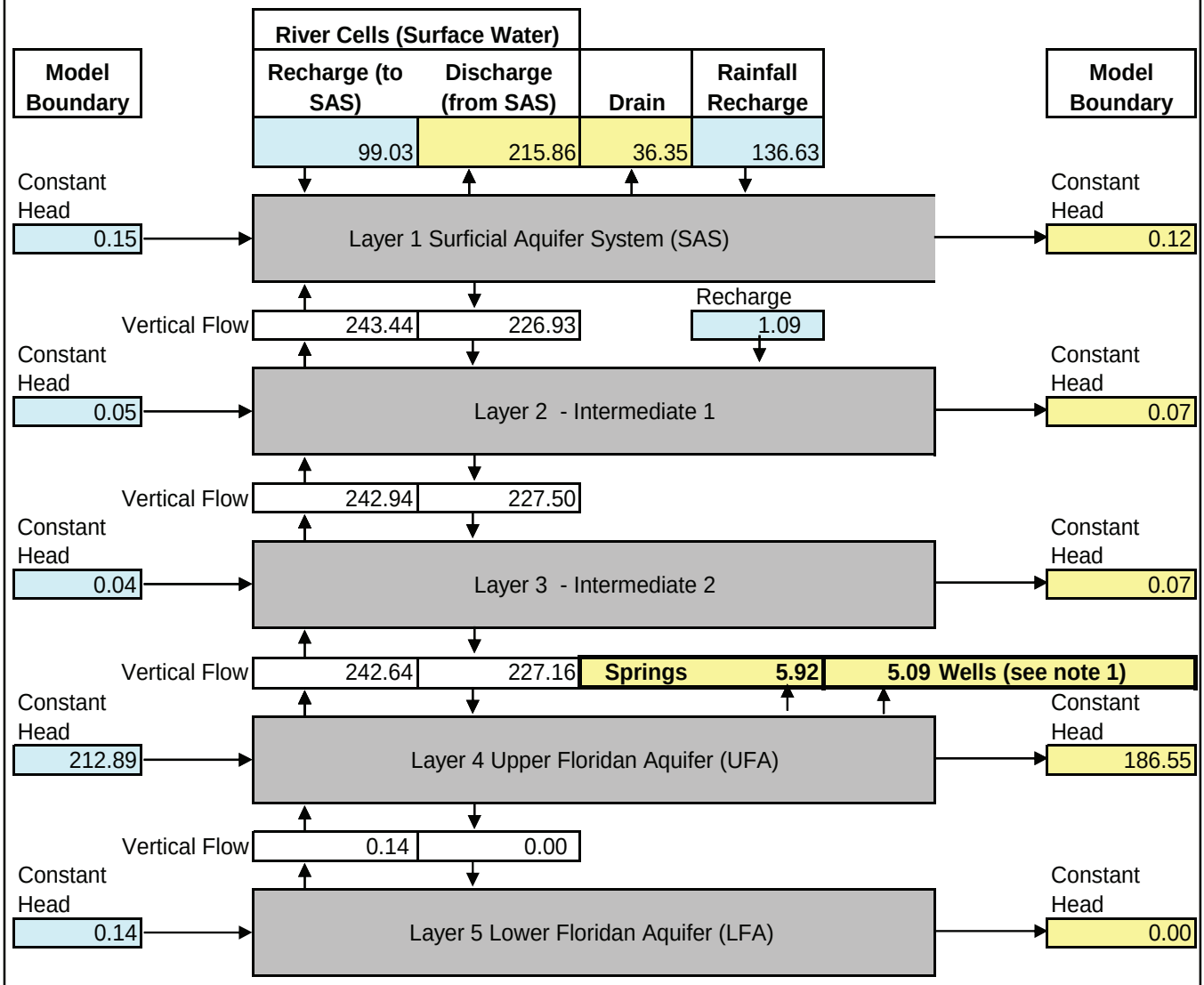
> *Because this model is restricted to simulating the movement of freshwater within aquifers, areas where the intermediate aquifer system (IAS), the upper Floridan aquifer (UFA), and the lower Floridan aquifer (LFA)... contain water with chloride concentrations exceeding 5,000 mg/L are considered inactive, thus minimizing potential errors introduced by simulating aquifer areas containing water of variable density....*
>
> *... The saltwater part of the Floridan aquifer System (FAS) was not included in the model because the interface is relatively sharp and movement of the interface is assumed to have little or no effect on simulated heads.... The assumption was made that a sharp freshwater-saltwater interface occurs laterally and that flow across this interface is negligible. This sharp interface determined which model areas were considered active.*

Consequently, any portion of the LFA that is active in the TMR model is not considered to be salt water. For this reason, the statement that portions of Layer 5 are designated no-flow in the study area to represent brackish groundwater is correct.

Cumulative (permanent plus transient) population projections for the 16 km (10-mile) area surrounding the facility for the years 2000 through 2080 were compiled in Table 2.1.3-201 and Table 2.1.3-202 of the LNP FSAR. These data were used to interpolate population estimates for 2001, 2002, 2003, 2004 and 2071 through 2079 as shown in Table 1. The 10-mile radius encompasses the majority of the area covered by the extracted model (See Attachment 5.2.2-3L (Figure 11 - TMR Model Grid, Adjacent Users, and 10-Mile Buffer). The rate of population increase was used to specify the pumpage for wells in the TMR model domain as it is assumed that water demand will increase at the same rate as the population growth.

The LNP facility is expected to start up in 2018 and operate for 60 years, until 2078. The population increase between 2001 (the baseline agreed to on the May 14, 2009 teleconference with the NRC); and 2078, is 77,501; a 293 percent growth. Figure 12 – Simulated Surficial Aquifer and Upper Floridan Aquifer Water Levels, Stress Period 2 (2001 Baseline Conditions) (Attachment 5.2.2-3M) presents the water levels simulated for 2001. Figure 13 - Simulated SAS and UFA 2078 Water Levels (Attachment 5.2.2-3 N) depicts the simulated 2078 surficial aquifer system (SAS) and UFA water levels for currently permitted groundwater users. This figure was prepared by taking the 2001 base pumping model file and increasing all other groundwater users pumping rates by 293%. As shown, the 2001 and 2078 simulations are nearly identical since the increase in pumping is very small relative to the total groundwater flux in the model.

Additional figures were requested by the NRC on several teleconference calls. Those figures include the 2001 and 2078 water level contours discussed above and several figures contained in the modeling TM 338884-TMEM-074, Rev. 1 (Attachment RAI 5.2.2-3A). The requested model figures are included separate from the TM for clarity and include:



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

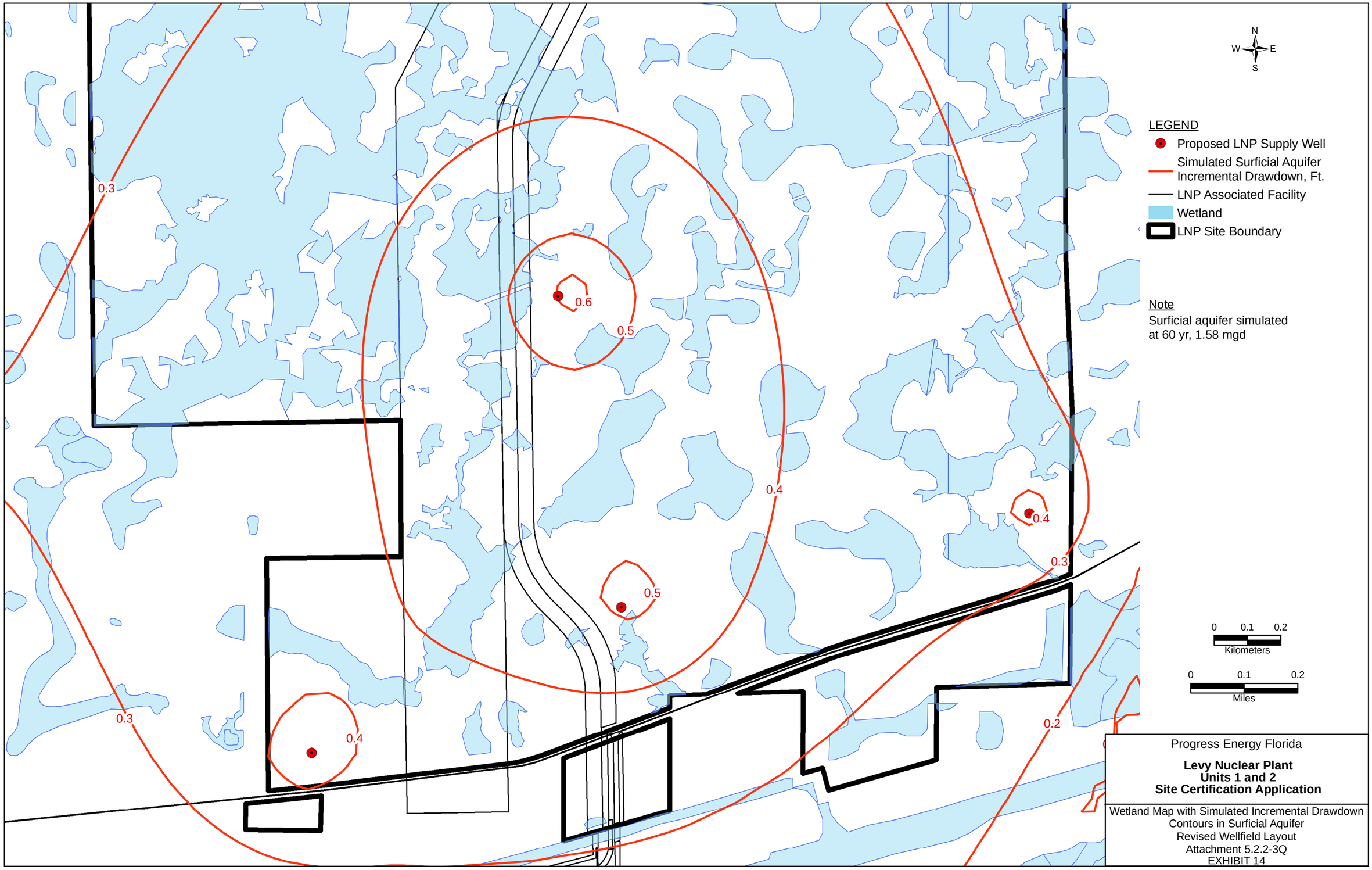
Inflow	Outflow	Difference	% Difference
450.03	450.03	0.00	0.00%

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
Attachment 5.2.2-3I
Figure 8



Progress Energy Florida

Levy Nuclear Plant
Units 1 and 2
Site Certification Application

Wetland Map with Simulated Incremental Drawdown Contours in Surficial Aquifer
Revised Wellfield Layout
Attachment 5.2.2-3Q
EXHIBIT 14