

Supporting Technical Documentation

Modification of WUP No. 28-00349-W

April 23, 2018

A key aspect regarding the proposed use of SP-1 and SP-2 is the analysis of potential Surficial Aquifer System (SAS) drawdowns to nearby AGI-impounded (Category 2) wetlands. As presented in the pre-application meeting, the Permittee and PWR are of the opinion that the “Narrative Standard” (Applicants Handbook Section 3.3.4.A) be used, and the corresponding “No Harm” threshold be based upon Site Specific Considerations as allowed in Section 3.3.4.C. To support the use of a Narrative Standard a greater understanding of the permitted stormwater management system and associated hydrologic influences is necessary. PWR is a professional geology and engineering firm and the technical analyses described below are based on the review of permitted As-Built AGI drawings, site specific testing, and field observations.

Site Specific Testing

In order to test the potential yield, water quality and specific capacity of the SAS test well (SP-1), PWR conducted a Constant Rate Pump Test (CRPT) on July 13, 2017. The CRPT included the temporary installation of a Goulds 225H20-6, 20-horsepower, submersible pump attached to 84 feet of a threaded 3-inch diameter drop pipe. The pump intake depth was set at approximately 86 feet below land surface (bls), approximately 9 feet below the top of the PVC screened interval. The 3-inch diameter drop pipe extended back to land surface and was equipped with an analog flow meter and a 4-inch diameter PVC discharge pipe that directed withdrawals away from the testing area. A water quality grab sample was collected immediately prior to the termination of the CRPT. Laboratory results regarding SAS groundwater quality are provided in **Table 3**, below.

Table 3. Water Quality Data for Surficial Aquifer System Well SP-1

Sample Date	Compound	Results	Units
7/13/2017	Chloride	48.4	mg/l
7/13/2017	Sulfate	1.26	mg/l
7/13/2017	Bicarbonate Alkalinity (CaCO ₃)	266	mg/l
7/13/2017	Total Alkalinity (CaCO ₃)	266	mg/l
7/13/2017	Specific Conductance	670	umhos/cm
7/13/2017	Total Dissolved Solids	460	mg/l
7/13/2017	pH	7.34	units
7/13/2017	Iron	219	ug/l
7/13/2017	Sodium	35.2	mg/l

As shown above, the water quality exhibited by SP-1 is highly acceptable for citrus irrigation. Data collected during the CRPT was then analyzed and used in a subsequent SAS Maximum Month (90-day) withdrawal simulation as described below.

SP-1 Constant Rate Pump Testing

PWR, with assistance from Cannon, performed the CRPT on July 13, 2017. Initially, the CRPT was run at a rate of approximately 290 gpm to develop SP-1 and to gauge the well’s initial production and drawdown (specific

capacity), after which the pumping rate was quickly increased to approximately 340 gpm (a higher withdrawal rate than requested by this application). An In-situ, Inc., Rugged Troll 100 pressure transducer was used to collect automatic water level readings every 60 seconds and was complimented/verified by manual water level readings. The CRPT was run in excess of three (3) hours and was followed by the collection of full water level recovery data.

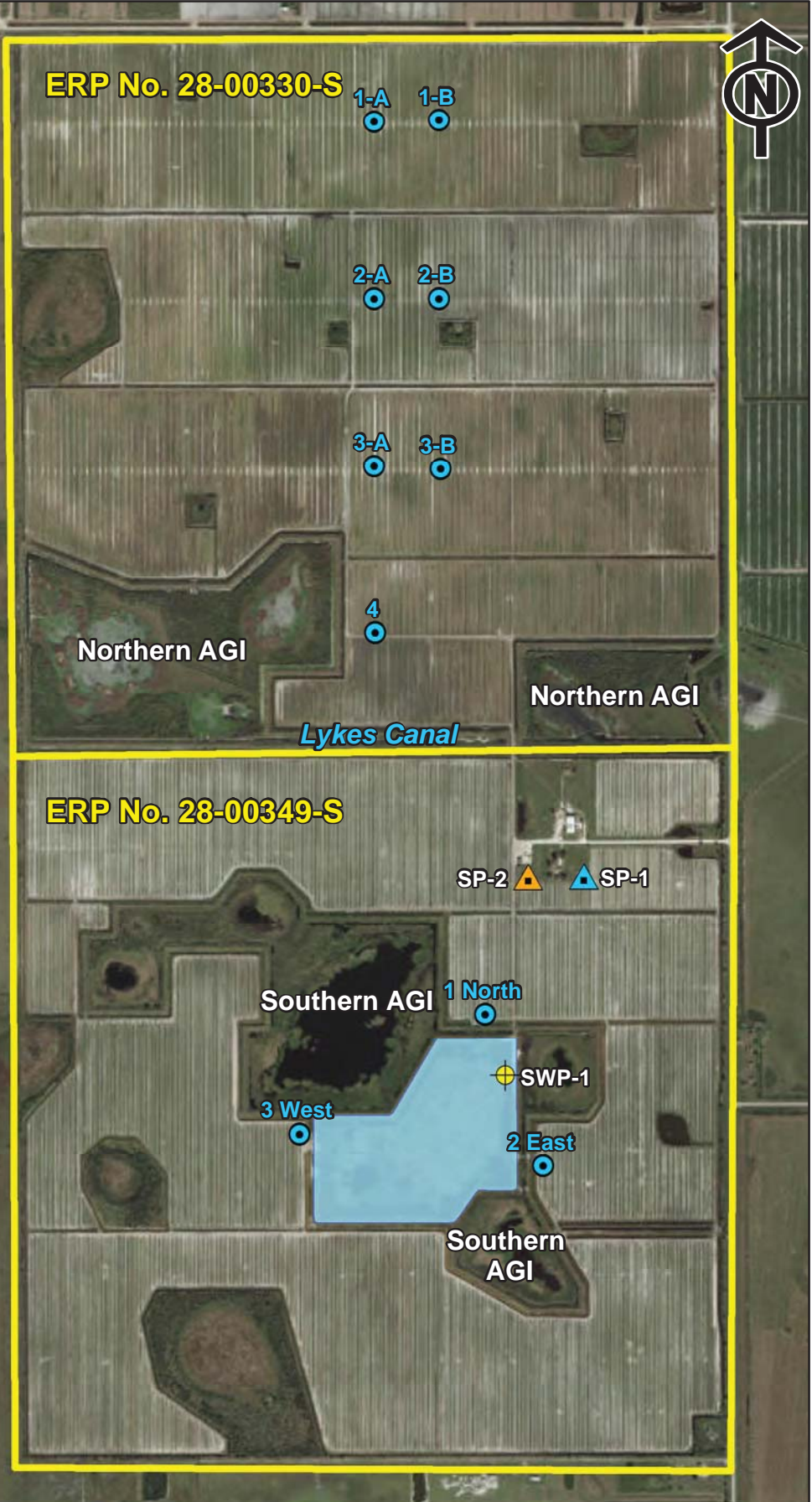
Once the CRPT was completed, PWR staff used the In-Situ software (Win-Situ v.5.6.25) to download and process the data. The processed data was imported into AQTESOLV Version 4.5 to post-process the drawdown data. Please note that the CRPT analysis requires both the full vertical extent and saturated thickness of the tested aquifer system. The SAS thickness was estimated to be approximately 300 feet, based on PWR's extensive drilling experience on a large citrus redevelopment project located to the north of the Indian Prairie Grove. The SAS saturated thickness was determined by using the observed static water level in SP-1 at the start of the CRPT (i.e., approximately 5 feet bls). Using AQTESOLV, two separate transmissivity values were calculated using the Theis and Moench equations and the results averaged to a resultant value of 4,843.8 Ft²/day. A hydraulic conductivity of 16.146 feet/day (i.e., 4,843.8 Ft²/day / 300 feet = 16.146 feet/day) was used for Layer 1, and a Transmissivity value of 4,682 Ft²/day was assigned to Layer 2 (16.146 feet/day x 290 feet = 4,682 Ft²/day).

Groundwater Flow Modeling

To simulate the proposed use of the two (2) SAS wells (SP-1 and SP-2), an uncalibrated numeric MODFLOW model was developed in accordance with the modeling specifications stated in South Florida Water Management District's (SFWMD's) Applicant Handbook Section 3.1.2 (A). The Handbook states that the use of numeric models such as MODFLOW without calibration is acceptable under the following conditions: 1) the model represents the aquifer or aquifer system being simulated and has no more than two layers; 2) each model layer uses a single value for transmissivity/permeability, storage/storativity and a single value is used for leakance between the layers; 3) the simulation timeframe is 90 days with no recharge; and 4) surface water recharge features are not represented. The numerical model created to support the proposed modification was developed using SAS hydrogeologic data sources including the site-specific CRPT data described above, hydrogeologic data from a nearby agency monitoring well, and default aquifer values specified by District staff.

In accordance with the Handbook guidelines, PWR created a 2-layer numeric model that divided the SAS into two (2) unconfined layers, with the first layer set to a thickness of 10 feet with a top elevation of 36.7 feet (ft.) NGVD29 (derived from a LiDAR land surface elevation) and bottom elevation of 26.7 ft. NGVD29. The thickness of the model's layer 1 was based on the approximate depth of the onsite ditches and the Irrigation Reservoir's internal belowground sump. Layer 2 was set to be 290 feet thick with a top elevation of 26.7 ft. NGVD29 and a bottom elevation of -263.3 ft. NGVD29. As described above, the total vertical thickness of the SAS was determined to be approximately 300 feet based on an extensive drilling project that PWR has been participating on, located to the north of Indian Prairie Grove.

The specific yield value for Layer 1 (unsaturated) was assigned a value of 0.2 which was approved by SFWMD modeling staff. The storage value of 0.00161 for Layer 2 (saturated) was taken from a Southwest Florida Water



Legend

- ERP Boundary
- Irrigation Reservoir
- + Surface Water Irrigation Withdrawal
- Floridan Irrigation Wells

Surficial Aquifer Withdrawals

- ▲ SP-1 (Existing)
- ▲ SP-2 (Proposed)

Scale: 1:14,500

4/23/2018

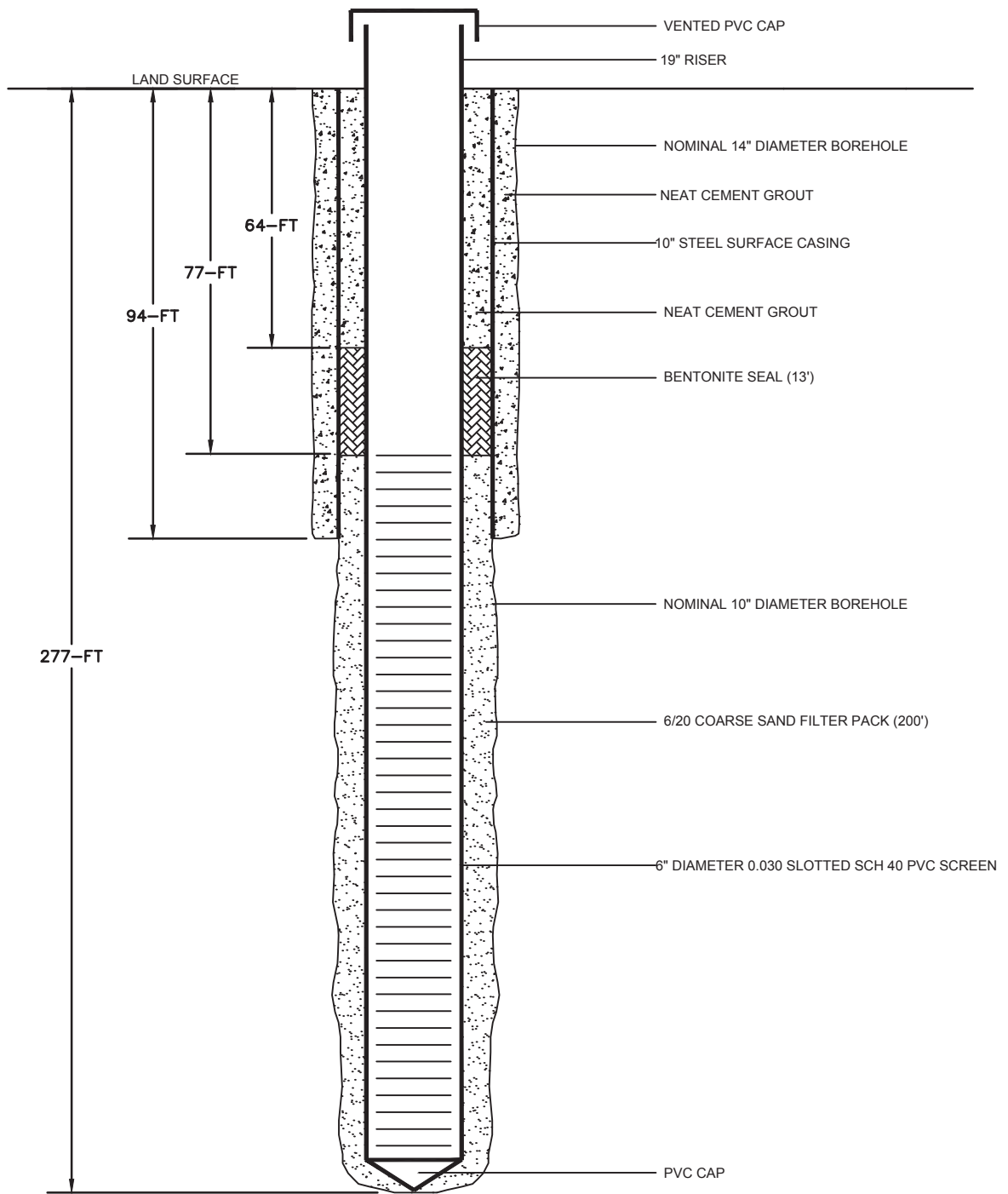
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0 625 1,250 2,500 Feet

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Figure 1
 Indian Prairie Grove
 Tamiami Citrus, LLC
 Highlands County, Florida





NOT TO SCALE

Figure 2
 As-Built SP-1 Test Well
 Tamiami Citrus - Indian Prairie Grove
 Highlands County, FL