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DUKE ENERGY

GROUNDWATER MONITORING PLAN – REVISION 1

Citrus Combined Cycle Plant

Prepared for

Duke Energy Florida, LLC
14385 N. Access Road
Crystal River, Florida 34428

Prepared by

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Tampa, Florida 33637

Project FR2729

April 2019

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1. INTRODUCTION

1.1 Terms of Reference

This document represents the Duke Energy Florida, LLC, (Duke) Groundwater Monitoring Plan (GWMP) for the proposed Citrus Combined Cycle Plant (CCCP) (Site) in support of the Site Certification Application (SCA) dated August 2014 and as required by the Florida Department of Environmental Protection (FDEP). This GWMP is prepared in accordance with Florida Administrative Code (F.A.C.) Rule 62-520.600 to ensure compliance with applicable groundwater quality standards at the Site.

1.2 Site Description

The Site is adjacent to the eastern boundary of Duke's existing Crystal River Energy Complex (CREC) located at 14385 North Access Road, Crystal River, (Citrus County) FL 34428 (**Figure 1**) and consists of approximately 400 acres. The Site is located in Section 22, Township 17 south, and Range 16 east, near latitude 28° 57' 54" N and longitude 82° 39' 50" W. The facility consists of two combined cycle generation units using a natural gas fuel source to produce approximately 800 megawatts each for a total of 1,600 megawatts.

1.3 Document Organization

The remainder of the GWMP is organized as follows:

- **Section 2 –** describes the site setting and process review;
- **Section 3 –** describes the regional geology, hydrogeology, and the Site physical setting;
- **Section 4 -** provides the rationale and construction details of the proposed Site groundwater monitoring locations and wells;
- **Section 5 –** describes and provides a rationale for the field and analytical procedures that will be utilized during routine groundwater sampling;
- **Section 6 –** provides the report summary.

2. SITE SETTING

2.1 Site Process Review

Construction activities for the CCCP began in early 2016. Commercial operation began in May 2018 for the first unit and December 2018 for the second unit. The power plant consists of two combined cycle generating units. Each unit consists of two advanced combustion turbine generators, two heat recovery steam generators, and one steam turbine generator (**Figure 2**). The condenser cooling system is a closed-loop, recirculating system consisting of a new mechanical draft cooling tower system for each combined cycle unit. Cooling tower makeup water consists of seawater withdrawn from the existing CREC intake canal through the existing Crystal River Unit 3 intake structure. Groundwater use is minimized through the use of seawater for cooling water. Cooling tower blowdown is discharged via the existing CREC discharge canal through a discharge structure. Process and potable freshwater needs for the Site include demineralized water for steam cycle makeup, plant service water, wash water, fire protection water, and potable water. The freshwater needs are provided through the current groundwater withdrawals using the existing water use permit (WUP) for the CREC.

Industrial wastewater (IWW) discharges include low-volume waste streams as defined in 40 CFR Part 423. These discharges include, but are not limited to, flows from plant service water systems and floor drains, blowdown from the heat recovery steam generators (HRSGs), raw water treatment filter backwash, neutralized condensate polisher regeneration wastes, and other residual waters from the demineralized water treatment systems. Discharges from these sources are treated, as appropriate, and discharged to the appropriately sized on-Site percolation pond. Except for cooling tower blowdown, IWWs are not discharged to surface waters. The percolation pond system will be designed in accordance with all applicable nonprocedural requirements for IWW percolation ponds (ECT, 2014).

The wastewater from floor and equipment drains throughout the plant may be exposed to oily products and, therefore, will be collected and treated through oil/water separators. Residual water from the demineralized water system is neutralized. Infrequent HRSG and pipe cleaning that produces metal cleaning wastes is collected and disposed off-Site by a licensed vendor (ECT, 2014). Sanitary wastewater is sent to an onsite, appropriately sized, package domestic wastewater treatment plant and the treated effluent is discharged to the proposed IWW pond.

A stormwater management system has been designed to handle and treat the 25-year, 24-hour storm event in accordance with all applicable nonprocedural requirements, including the requirements in Chapter 62-330, F.A.C. Potential contact stormwater runoff from the power block and equipment areas is treated through oil/water separators and routed to the on-Site IWW percolation pond system. Noncontact stormwater runoff is collected and routed to the stormwater detention ponds.

The Site also includes associated facilities, such as closed-cycle mechanical draft cooling towers, administration/warehouse building and parking, auxiliary boiler, emergency diesel generators, firewater pump, water treatment and storage tank facilities, switchyard, stormwater management system and detention ponds (ECT, 2014).

3. HYDROGEOLOGIC AND PHYSICAL SETTING

3.1 Regional Setting

3.1.1 Regional Geology

The Site lies within the Coastal Swamps physiographic region and near the boundary of the Gulf Coastal Lowland physiographic region (Knochenmus and Yobi, 2001). The general hydrogeologic units that form the hydrogeologic framework in the region include the discontinuous, siliciclastic Surficial Aquifer System (SAS) and the limestone and dolostone of the Upper Floridan Aquifer System (UFAS).

Sediments within the SAS are characterized as undifferentiated surficial deposits (USDs) and are comprised of a discontinuous veneer of sands, clayey sands, and shell. Thicknesses vary considerably due to the irregular surface of the underlying limestone (Spencer, 1984). A component of the USDs is comprised of residual and reworked Hawthorn Group sediments derived from the fluctuation of sea level (Faulkner, 1973).

Regionally, the UFAS is comprised of (in descending order) the Suwannee Limestone, the Ocala Group Limestone (including the Crystal River, Williston, and Inglis Formations), and the Avon Park Limestone (Spencer, 1984). A generalized regional cross-section is included in **Figure 3**.

3.1.2 Regional Hydrogeology

Groundwater in the area occurs in the unconsolidated SAS and porous limestone of the UFAS. In the vicinity of the CREC, the UFAS is unconfined due to the absence of well developed, low permeability sediments between the SAS and UFAS (Spencer, 1984). The predominant regional groundwater flow is generally from northeast to southwest toward the Gulf of Mexico with variability attributable to topography and lithology.

Regional groundwater quality data indicates that historic withdrawal of groundwater within the UFAS has resulted in saltwater intrusion along much of Florida's Gulf Coast (Guvanasen, 2000). Prior data from two USGS wells located at the CREC indicates that the upper transmissive zone of the Inglis Formation has a higher concentration of chlorides (200 to 1,800 milligrams per liter [mg/L]) than the lower transmissive zone (approximately less than 20 mg/L) (ESE, 1984) providing some evidence of saltwater encroachment near the CREC.

Elevated naturally-occurring radium levels have been widely reported along the west coast of Florida. Sources of radium include mineralization and mining of phosphate (Kaufmann and Bliss, 1977), the contribution of high mineral (enriched with chloride, sulfate, calcium and magnesium) sea water along the coast, with highest radium levels reported in the surficial groundwater (Miller and Sutcliffe, 1985), and geothermal springs (Fanning et al, 1980).

3.2 Site Setting

3.2.1 Site Topography and Soil Classifications

The site is located in the western portion of Citrus County in the Gulf Coastal Lowlands and Coastal Swamps. A detailed survey of the property was conducted by Southern Resource Mapping, Inc. in November 2013 and indicates that the Site topography ranges from 2 to 14 ft in elevation (**Figure 4**). Site elevation slopes from a high in the northeast to a low in the southwest along the coast. Generally, pre-construction surface water runoff would be expected to follow Site topography but based on the relatively flat topography and lack of surface water features draining the Site location, surface water runoff is expected to be negligible.

During Site construction, the facility footprint was raised by 8 to 9+ ft with compacted structural fill for flood protection. The final constructed plant footprint will direct Site stormwater to 5 stormwater detention ponds for infiltration (**Figure 2**). Stormwater flow in the areas outside of the plant footprint are expected to follow pre-construction flow-paths.

Soils at the Site are classified into five soil units under three soil series by the National Soil Characterization Survey (NSCS) (**Figure 5**). The principal soil unit at the Site is identified as Boca Series, which typically consists of 3 ft of sandy and loamy marine deposits over limestone. Additional soil units at the Site are the Broward Series, and Hallandale Series. The Broward Series is typically 3 ft of fine sand underlain by limestone bedrock. The Hallandale Series consists of a 1-ft thick surficial layer of fine sand on top of a hard limestone layer. A brief description of each series is provided below:

- The Boca Series is a fine sand to loamy sand moderately deep, poorly drained to very poorly drained, moderately permeable soils in low broad flats.

- The Broward Series consists of moderately deep, nearly level, somewhat poorly drained, rapidly permeable soils that formed in sandy marine deposits underlain by limestone bedrock.

- The Hallandale Series consists of shallow, nearly level, poorly drained, moderately permeable to moderately rapidly permeable soils that formed in sandy and loamy marine deposits underlain by limestone bedrock.

3.2.2 Site Geology

The geologic and hydrogeologic units, in order of increasing depth below land surface, at the Site are summarized below.

- *Undifferentiated Surficial Deposits (USDs)* - The USDs are comprised of brown to grey silty sands to sandy clays with muck ranging in thickness from 0 to 20 ft below land surface (BLS) (AMEC, 2013 and Terracon, 2015). The thickness of the USDs is variable as a result of the irregular surface of the underlying limestone. Due to the limited extent of the USDs, the SAS is only locally present at the Site where saturated unconsolidated sediments are present.

- *Inglis Formation of the Ocala Group* - Encountered between land surface and 20 ft BLS, this white, fossiliferous, and friable limestone is the uppermost hydrogeologic unit of the UFA. The Inglis Formation is cavernous with solution channels and cavities. Permeable zones within the Inglis Formation are present at depths of less than 30 ft BLS and between 40 and 60 ft BLS (the base of the Inglis Formation).

- *Avon Park Formation* – The top of the Avon Park Formation is encountered between 45 and 70 ft BLS. It is comprised of an occasionally dolomitized limestone and well indurated limestone (AMEC, 2013 and Spencer, 1984). The Avon Park Formation is the formation utilized for water supply for CREC operations.

Two geotechnical investigations were completed at the Site in November 2013, by AMEC and in October 2015 by Terracon. AMEC completed 25 standard penetration test (SPT) soil borings within the footprint of the proposed Site facilities that ranged in depths from 26 ft BLS to approximately 100 ft BLS (AMEC, 2013). **Figure 6** shows the locations of the completed SPTs along with the transects of three cross-sections prepared using lithologic information from the boring logs. The cross-sections are included as **Figures 7** through **9**. The report indicates several "weak" locations where the SPT was driven by the weight of the drilling rod without hammering. Most of the "weak" locations only occurred over an interval of several feet and can be attributed to weathered limestone lenses or small solution cavities. However, at boring B-15, a weak zone that was approximately 23 ft deep was encountered and the boring had to be abandoned due to unsafe drilling conditions.

Terracon completed several shallow SPT borings across the Site to evaluate the potential locations of several large diameter circulation water pipes and the IWW percolation pond. The borings were completed to depths of between 6 and 16 ft BLS and were logged for soil type and density. In addition, Geosyntec installed four IWW monitoring wells associated with the previous GWMP (Geosyntec, 2016). The reported lithologic logs are included in **Appendix A**. Lithologic descriptions are comparable to the AMEC report and similar geology is apparent across the Site.

3.2.3 Site Hydrogeology

The UFA and the SAS (where present) have similar flow patterns with groundwater predominantly flowing from northeast to southwest at the Site. Flow directions may vary due to the complex subsurface character of the UFA caused by solution cavities, tidal fluctuations, and surface water

features. A groundwater flow model was developed using GMS v. 10.2 which is a pre-processor for the USGS modular finite difference modeling program MODLFOW to evaluate groundwater mounding in response to IWW discharge to the proposed IWW percolation Pond. The finite-difference grid consists of 450 rows and 815 columns of computational cells. The largest cells were 2,000 ft by 2,000 ft in the distal areas and the smallest were 10 ft by 10 ft in the immediate vicinity of the Site. Groundwater elevations were measured during routine IWW quarterly sampling in November 2018. The IWW wells, installed in accordance with the previous GWMP (Geosyntec, 2016), were used to calibrate the groundwater flow model. The results of the model showed that groundwater mounding of up to 0.1 feet due to the presence of the IWW pond exists at distances up to 2,000 feet from the IWW pond. It showed similar mounding in the proposed IWW pond to be constructed immediately north of the current IWW pond. A detailed report describing the groundwater model is contained in **Appendix B**.

Groundwater contours generated by the model were used to develop a pre-construction groundwater flow map in the vicinity of the proposed Site. The pre-construction groundwater flow direction occurs from northeast to southwest across the Site (**Figure 10**). Post-construction groundwater flow under normal operating conditions (i.e. scenario 1 described above) is radial from the IWW percolation pond towards the Site boundaries (**Figure 11**). As groundwater flows away from the pond, it transitions back to a general northeast to southwest flow towards the receiving waters of the Gulf of Mexico.

Terracon completed several in-situ, down-hole permeability tests and double ring infiltrometer (DRI) tests during the geotechnical investigation in October 2015 (Terracon, 2015). The down-hole permeability tests were conducted by pumping the un-cased portion of a test boring and measuring the recovery time between two set water level indicators after the pump was shut off. The calculated permeabilities range from 0.3 feet per day (ft/day) to 51 ft/day with an average of 12.8 ft/day. A summary of the calculated permeabilities are included in **Table 1**. It should be noted that these permeabilities may be biased low due to the small volume of aquifer disturbed during the testing. Additional hydraulic conductivity data collected during previous evaluations at the CREC indicate that hydraulic conductivities range from 7.9 to 170 feet per day in the shallow part of the UFA (Geosyntec, 2017).

Two DRI tests were performed in the proposed stormwater retention area of the Site. The DRI test procedure consisted of installing a 12-inch diameter steel ring and a 24-inch diameter steel ring concentrically into the ground. Water was then added to a desired head level of approximately 12 inches in both casings and held constant. The amount of infiltration observed in the inner ring versus time was then recorded. The results of the DRI tests indicate an average infiltration rate of 4.9 inches per hour (Terracon, 2015).

Site background water quality is based on historical data collected from compliance well (MWC-12R) and background well (MWB-30R) that are associated with the CREC groundwater monitoring program (**Appendix C**). The wells are up-gradient of CREC site activities and provide

a general example of ambient groundwater quality prior to construction activities at the Site. The results of the quarterly groundwater monitoring samples for analytes found in Table 3 of the *FDEP Groundwater Monitoring Guidance, 2008* are included in **Table 2**. Graphical trends of select analytes (from monitoring wells MWC-12R and MWB-30B) including chloride, nitrate, sulfate, and total dissolved solids (TDS) from 2013 to present are included in **Appendix D**. Chloride concentrations are less than 100 mg/L in MW-12R. Chloride at MWB-30R was less than 100 mg/L and stable until 2017 when concentrations increased. Chloride concentrations increased until October 2017 and have decreased to less than 100 mg/L in January 2019. Nitrate concentrations in MWB-30R have generally remained higher than MWC-12R but both have remained stable over time. Sulfate concentrations have ranged between 10 to 30 mg/L and have slightly increased in both wells while remaining below 250 mg/L. TDS concentrations were occasionally detected above 500 mg/L in both MWB-30R and MWC-12R prior to 2017. In 2017 the TDS concentration in both wells followed the same pattern as chloride. Other analytical constituents were either below the laboratory method detection limit or were occasionally sampled.

Current groundwater quality at the CCCP is based on wells installed as part of the current GWMP. These IWW wells include MWB-1, MW-2, MW-3, and MW-4. Construction details for these wells are included in **Table 3** and their locations are shown in **Appendix C**. The results of the quarterly groundwater monitoring samples for analytes found in Table 3 of the *FDEP Groundwater Monitoring Guidance, 2008* are included in **Table 2**. Graphical trends of select analytes including chloride, nitrate, sulfate, and total dissolved solids (TDS) from 2017 to present (one pre-operational and 4 quarterly sampling rounds) are included in **Appendix D**. The chloride concentrations are variable in all but the CCCP IWW background well MWB-1. It should be noted that the concentrations of chloride in MW-3 and MW-4 were above 100mg/L in November 2017 prior to discharge to the IWW Pond. Nitrate concentrations are generally stable and are less than 10 mg/L. Sulfate concentrations have ranged from 20 to 60 mg/L and have been less than 250 mg/L. TDS concentrations in the three downgradient wells have exceeded 500 mg/L in August and/or November 2018. However, it should be noted that prior to IWW pond operation, the concentration of TDS in MW-4 already exceeded 500 mg/L.

3.2.4 Area Surface Waters and Classifications

The CCCP is located near several surface waters designated as Outstanding Florida Waters (OFW) (62-302.700, F.A.C.) (**Figure 12**). An Outstanding Florida Water classification determines that the waters designated are worthy of special protection because of their natural attributes and is intended to protect and maintain existing acceptable quality standards. Surface waters in the vicinity of the Site designated as OFWs include Lake Rousseau to the northeast, Crystal Bay and Crystal River to the south, the Gulf of Mexico to the east, the Withlacoochee River to the north.

No freshwater surface waters will be used for the operation of the CCCP. Marine surface water will be used for cooling tower makeup and flow augmentation. Marine surface water will be withdrawn and discharged back into the Gulf of Mexico via newly constructed connection to the existing CREC intake and discharge canals. The operation of the CCCP is not anticipated to cause

significant changes in hydrologic or water quality in the existing CREC canals or surrounding surface waters.

A survey was conducted to locate any springs within a 1 mile radius of the site as well as any on-site sinkholes. The survey was conducted using existing FDEP databases as well as an analysis of aerial images from the site. There were no springs identified within a one mile radius of the site (**Figure 12**).

3.2.5 Sinkholes

The site is located in the FDEP designated Area I sinkhole classification. The FDEP sinkhole Area I generally contains bare limestone at land surface or thinly covered limestone near surface. Sinkholes are few and are generally shallow and broad and develop gradually. Solution type sinkholes are dominant. A map including FDEP designated sinkhole areas and known sinkhole locations near the Site are included in **Figure 13.**

One anomaly and one sinkhole were identified during the geotechnical investigation by AMEC in 2013. The anomaly was encountered when completing SPT boring B-15 and later assessed with ground penetrating radar (GPR). A circular, water-filled sinkhole was observed during the geotechnical boring event, south of boring B-15 (**Figure 14**) which was later confirmed by AMEC during a GPR assessment. Both the anomaly and identified sinkhole displayed GPR reflections that are typical of karst features. The diameter of the anomaly is approximately 50 ft and the diameter of the identified sinkhole is approximately 20 ft. The total depth could not be determined in either potential karst features. The anomaly and the sinkhole are not located near the IWW percolation pond or near any proposed stormwater detention features.

Figure 14 also includes photolinear features mapped at the Site by AMEC during the geotechnical investigation. Not all photolinear features represent fracture traces, and karst features could be present in the subsurface at locations not associated with mapped photolinear features, as in the case of the anomaly and the observed sinkhole.

3.2.6 Potable Well Survey

A survey of permitted potable groundwater use wells was conducted using the SWFWMD and Florida Department of Health (FDOH) databases. The results of the well survey indicate that the only groundwater use well located downgradient of the Site is an industrial use well located at the CREC facility and that there are no permitted groundwater use wells within 500 ft of the Site (**Figure 15**). However, the figure does show the locations of groundwater wells identified in the Florida Department of Health data base that are upgradient and east of the Site.

4. GROUNDWATER MONITORING LOCATION RATIONALE

4.1 Program Objectives

A groundwater monitoring program will be developed to: i) monitor groundwater entering and leaving the proposed IWW pond area; and ii) to allow Duke to monitor trends in Site groundwater conditions associated with the discharge of IWW to the groundwater. However, the CCCP was not operational until approximately December 2018 and permanent well locations and designations could not be established at that time. Therefore, Duke is proposing augmentation of the monitoring well network based on the quarterly groundwater sampling during 2018 and subsequent groundwater modeling.

4.2 Monitoring Program Rationale

Well placements for groundwater monitoring are typically based on one or more of the following general criteria:

- Direction of groundwater flow and downgradient positioning between the Site and potential off-Site receptors;
- Historical groundwater conditions, and;
- Nearness and travel time (average linear flow velocity) to the IWW pond system.

Groundwater flow at the Site, as indicated by the groundwater flow model, will likely be influenced by the proposed IWW percolation pond. Model results indicate that groundwater will mound around the IWW percolation pond and that flow is generated radially outward from the pond towards the Site boundaries. Monitoring wells will be utilized to ensure that PEF will be able to document and address any changes in groundwater quality before compliance points are affected.

Rule 62-520.465 F.A.C., states that "the boundary of the zone of discharge shall be 100 feet from the site boundary or to the installation's property boundary, whichever is less." The Rule also allows the Department to establish a larger zone of discharge provided certain provisions are met. In an effort to establish an appropriate zone of discharge and monitoring well placement, Duke has implemented a groundwater monitoring program and performed groundwater modeling at the CCCP to establish permanent well locations and designations.

4.3 Proposed Groundwater Monitoring Program

Based on the results of the mounding analysis conducted for the proposed IWW percolation pond (**Appendix C**), proposed background well MWB-1 is located in the northeastern portion of the site. This location is up-gradient and outside of the radial influence of the IWW percolation pond and the proposed construction stormwater detention ponds. Proposed monitoring wells MW-2 and MW-3 were installed at a distance of 100 ft from the proposed percolation pond. Monitoring well MW-4 was installed approximately 300 ft downgradient of the pond. This distance was previously

beyond the modeled hydraulic influence of the IWW pond. However, since quarterly groundwater elevations in the CCCP IWW wells and surface water elevations from the IWW pond are available, the model was calibrated with Site specific information. Based on review of this recalibrated model, it is proposed that MWB-1 remain a background monitoring well, but the remaining wells (MW-2, MW-3, and MW-4) become intermediate wells. Since the use of the proposed northern IWW pond is predicted to cause mounding to the north, an intermediate well is proposed (MW-5) to be located no more than 100 feet north of the proposed northern IWW pond. Additionally, the groundwater mounding associated with the current IWW pond and the proposed northern IWW is predicted to cause groundwater mounding of 0.1 feet up to 2,000 feet downgradient of the current and IWW pond. Therefore, it is proposed that a well designed to monitor the edge of the ZOD (MW-6) be placed approximately 2,000 feet to the southeast of the IWW Ponds. The locations of the current and proposed groundwater monitoring wells are shown on **Figure 16** and well construction details are summarized in **Table 3**. All monitoring wells are located within the facility property and groundwater samples will be collected on a quarterly schedule.

The ground water monitoring data collected from these proposed wells for the CCCP for a period of one year following full operation status will be used by FDEP and Duke to develop the permanent monitoring well locations and designations and zone of discharge to be incorporated into Attachment H of the Site's conditions of certification (COC).

4.4 Monitoring Well Construction

Proposed monitoring wells will be installed by a water well contractor licensed by the State of Florida and according to Southwest Florida Water Management District requirements and water well construction standards described in Chapter 62-532.500 FAC. Proposed monitoring wells will be installed using either the hollow-stem auger or sonic drilling method. Initially, a nominal 6-inch diameter borehole will be drilled to a depth of approximately 20 ft bls. The monitoring well will be constructed with 10 ft of 2-inch diameter PVC casing attached to 10 ft of PVC, 0.010-inch slotted well screen set at a depth of 20 ft bls. The annular space between the borehole and the well casing and screen will be filled with a 20/30 grade filter sand to 1 foot above the well screen. A 30/65 grade fine sand seal will be placed in the borehole to approximately 2 feet above the filter pack, and the remaining annular space was filled with a neat grout to land surface. The monitoring wells will be completed approximately 3 ft above land surface in an aluminum, locking well housing placed in a 2 ft by 2 ft by 4-inch thick concrete pad and surrounded by protective bollards. A typical monitoring well construction diagram is shown on **Figure 17**.

5. FIELD PROCEDURES

The following field procedures and methods in this section are included to provide consistent groundwater sampling methods, analytical testing, and sample management which will aid in ensuring groundwater sample integrity. The procedures should be followed when sampling all site groundwater monitoring wells.

5.1 Monitoring Well Development and Field Testing

5.1.1 Water Level Measurements

Prior to sampling, depth to water will be measured in each well. Depth to water measurements will be used to calculate the appropriate volume of water to evacuate from each well prior to sampling. Groundwater elevation in each well will be determined by subtracting the depth to water measurement from the elevation of the surveyed reference point

5.1.2 Monitoring Well Sampling

All wells will be sampled using low-flow groundwater sampling techniques in accordance with FDEP Standard Operating Procedure (SOP) for Field Activities (SOP-FS2200). Geochemical field parameters (i.e., temperature, pH, specific conductivity, turbidity and dissolved oxygen (DO) will be allowed to stabilize to the following criteria for three consecutive readings prior to sampling:

- ±0.2 units for pH;
- ±5% for specific conductance;
- ±0.2 degrees Celsius (°C) for temperature;
- ±20 NTU for turbidity; and
- ±0.2 milligrams per liter mg/L for DO.

DO and turbidity tend to stabilize last and are better measures of sufficient purging. Drawdown will be minimized during purging and/or sampling, not exceeding 0.1 ft, if possible. Sampling equipment that will be used in other wells will be properly decontaminated before reuse. Decontamination procedures will be consistent with FDEP SOP FC1000.

5.1.3 Field Measurements

The results of all field/geochemical parameters will be on form FD 9000-24 as described in FDEP SOP FS 2200. Temperature, pH, specific conductance, and, DO will be collected until stabilization within FDEP SOP's is achieved.

5.2 Groundwater Analytical Testing

5.2.1 Initial and Routine Samples

Subsequent to well installation, groundwater samples have been collected from monitoring wells MWB-1, MW-2, MW-3 and MW-4 and will be collected from monitoring wells MW-5 and MW-6 and analyzed for the primary and secondary drinking water parameters included in Rule 62-550 F.A.C., Tables 1, 4, 5 and 6 (**Appendix E**), excluding asbestos, acrylamide, Dioxin, butachlor, epichlorohydrin, PCBs, and pesticides. This is a one-time event to establish baseline groundwater conditions at the site. Subsequent groundwater samples will be collected quarterly and analyzed for the parameters presented in Table 3 of the *FDEP Groundwater Monitoring Guidance, 2008* and summarized in **Table 4**. Sample analyses will be performed in accordance with Test Methods for Evaluating Solid Waste Physical/Chemical Methods, third edition (U.S Environmental Protection Agency [USEPA] Publication Number SW-846, 1986, as revised February, 2007).

5.2.2 Sample Containers and Labels

Samples will be collected directly into appropriate labeled sample containers with preservatives, as appropriate. Sample container labels will include information listed below.

- Well number and/or sample identification number;
- Analysis or analyses;
- Preservatives;
- Date and time; and
- Samplers.

5.3 Chain of Custody and Shipping

Upon collection, samples will be placed on ice in a cooler. Prior to shipping, the cooler will be sealed and shipped under chain of custody by overnight courier or transported directly to the analytical laboratory. The chain-of-custody record will document the samples shipped to the laboratory and the analyses requested. For each transfer of custody of the samples, the person relinquishing the samples and the person receiving the samples will sign the chain-of-custody with the date and time of the transfer of custody or the name of the common shipper.

5.4 Sampling Documentation

Field forms will be maintained which documents for each sample the well identification number, total well depth, evaluation of top of casing, water level, water color, well-evacuation procedures and equipment, date, time, weather conditions, sample identification numbers, field measurements (pH, specific conductance, etc.) and methods, name of collector, field observations, calculations of the standing-water volume in the well, and the total volume evacuated.

6. SUMMARY

This document represents the proposed revised GWMP for Duke's CCCP. It was prepared in accordance with Florida Administrative Code (F.A.C.) Rule 62-520.600 to ensure compliance with applicable groundwater quality standards at the Site. The document summarizes the following information.

- A description of the power plant and associated IWW makeup and disposal procedures;
- The hydrogeologic and physical setting of the facility and surrounding area including; the direction of groundwater flow and ambient ground water characteristics, permeability data for the shallow sediments and upper portion of the receiving aquifer, Site lithology, topography, soil information, and surface water drainage surrounding the site;
- The locations of surface water and their classification in the vicinity of the Site;
- The location and use of wells within 500 feet of the Site;
- Rationale for proposed background, intermediate and compliance monitoring well locations, including well installation and construction details; and
- A summary of groundwater sampling protocols and proposed groundwater monitoring parameters.

Please note that, while the previously proposed IWW pond currently exists, the proposed northern percolation pond configuration and location considered during the preparation of this GWMP is currently conceptual. If the design details of the proposed pond are revised prior to construction, some details associated with this GWMP, including proposed monitoring well locations may change.

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TABLES

Table 1: Hydraulic Conductivity Summary

Citrus Combined Cycle Plant
Crystal River, FL

Boring No.	Trial No.	k (cm/sec)	k (ft/day)
FP-01	1	7.70E-03	21.8
	2	7.10E-03	20.1
	3	7.40E-03	21.0
FP-02	1	3.80E-04	1.1
	2	2.70E-04	0.8
	3	3.30E-04	0.9
	4	3.60E-04	1.0
FP-03	1	4.00E-03	11.3
	2	4.00E-03	11.3
	3	4.10E-03	11.6
FP-04	1	5.00E-04	1.4
	2	5.60E-04	1.6
	3	5.10E-04	1.4
FP-05	1	1.70E-02	48.2
	2	1.80E-02	51.0
	3	1.60E-02	45.4
FP-06	1	5.90E-03	16.7
	2	5.80E-03	16.4
	3	6.20E-03	17.6
FP-07	1	5.80E-03	16.4
	2	5.90E-03	16.7
	3	5.70E-03	16.2
FP-08	1	8.50E-03	24.1
	2	7.50E-03	21.3
	3	7.80E-03	22.1
FP-09	1	9.60E-05	0.3
	2	1.80E-04	0.5
	3	2.30E-04	0.7
	4	2.80E-04	0.8
	5	2.50E-04	0.7
FP-10	1	1.50E-04	0.4
	2	1.80E-04	0.5
	3	1.80E-04	0.5
Geometric Mean		**1.6E-03**	**4.6**

Notes:
No. = number
k = Hydraulic Conductivity
cm = centimeter
sec = second
ft = feet
Source: Geotechnical Engineering Report, Terracon Consultants, Inc., 2015

Table 2: Preconstruction Groundwater Quality Data

Citrus Combined Cycle Plant
Crystal River, FL

Location	Date	pH (S.U.)	Temp (°C)	Specific Conductance (µmhos/cm)	Turbidity (NTUs)	Chloride (mg/L)		Nitrate (mg/L)		Sulfate (mg/L)	TDS (mg/L)	Arsenic (ug/L)		Cadmium (ug/L)		Chromium (ug/L)		Lead (ug/L)	
	Compliance Limit	6.5 - 8.5	Report	Report	Report	250		10		250	500	10		5		100		15	
MWC-12R	4/24/2013	7.04	21.70	893	5.14	68.2		0.120	U	17.3	393	5	U	0.5	U	2.5	U	5	U
	7/16/2013	6.60	24.01	720	1.34	72.7		0.025	U	19.0	592	5	U	0.5	U	2.5	U	5	U
	10/2/2013	7.03	23.04	787	1.37	79.4		0.043	U	17.1	401	5	U	0.5	U	2.5	U	5	U
	1/10/2014	6.60	21.53	832	1.17	81.7		0.059		17.8	350	5	U	0.5	U	2.5	U	5	U
	4/17/2014	6.56	20.20	791	1.67	86.4		0.450		17.1	466	5	U	0.5	U	2.5	U	5	U
	7/17/2014	5.93	23.10	802	0.34	87.4		-		20.6	454	5	U	0.5	U	2.5	U	5	U
	10/10/2014	5.80	22.68	821	0.82	87.5		0.025	U	20.1	435	5	U	0.5	U	2.5	U	5	U
	4/10/2015	7.04	21.16	806	0.67	87.6		0.025		19.5	485	5	U	0.5	U	2.5	U	5	U
	7/15/2015	6.66	19.85	825	0.17	88.4		0.050	U	19.7	416	5		0.5	U	2.5	U	5	U
	10/9/2015	6.41	21.46	896	0.9	91.5		0.050	U	28.2	441	5	U	0.5	U	2.5	U	5	U
	1/14/2016	7.03	18.05	844	0.58	85.5		0.050	U	23.5	425	5	U	0.5	U	2.5	U	5	U
	4/8/2016	7.11	18.67	975	0.76	87.6		0.027	I	25.6	465	5	U	0.5	U	2.5	U	5	U
	7/11/2016	6.72	21.95	808	0.33	89.1		0.050	U	25	414	5	U	0.5	U	2.5	U	5	U
	10/11/2016	7.56	23.01	811	1.4	85.5		0.050	U	26.7	430	5	U	0.5	U	2.5	U	5	U
	1/10/2017	7.01	21.57	739	0.33	86.5		0.043		26.1	438	5	U	0.5	U	2.5	U	5	U
	4/5/2017	7.08	22.76	746	0.69	84.1		0.031	J	26.6	476	5	U	0.5	U	2.5	U	5	U
	7/12/2017	6.81	24.25	741	1.24	88.6		0.025	U	30.3	438	5	U	0.5	U	2.5	U	5	U
	10/13/2017	-	-	-	-	84.8		0.025	U	25.6	391	5	U	0.5	U	2.5	U	5	U
	1/5/2018	7.07	19.3	733	1.11	84		0.041	J	24.8	424	5	U	0.5	U	2.5	U	5	U
	4/12/2018	6.91	22.9	759	3.52	85.7		0.042	J	27.5	476	5	U	0.5	U	2.5	U	5	U
	10/8/2018	7.04	24.4	792	6.38	88.2		0.025	U	26.5	436	0.62		0.33	U	1.7	U	0.5	U
	1/7/2019	7.12	22.1	838	0.41	86.9		0.026	J	31.4	469	0.78		0.33	U	1.7	U	0.5	U

Table 2: Preconstruction Groundwater Quality Data

Citrus Combined Cycle Plant
Crystal River, FL

Location	Date	pH (S.U.)	Temp (°C)	Specific Conductance (µmhos/cm)	Turbidity (NTUs)	Chloride (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Arsenic (ug/L)	Cadmium (ug/L)	Chromium (ug/L)	Lead (ug/L)
	Compliance Limit	6.5 - 8.5	Report	Report	Report	250	10	250	500	10	5	100	15
MWB-30R	4/24/2013	7.56	20.05	637	2.59	5.9	0.560	11.3	520	5 U	0.5 U	2.5 U	5 U
	7/17/2013	6.27	23.55	494	1.03	5.4	0.590	13.6	252	5 U	0.5 U	2.5 U	5 U
	10/16/2013	7.79	22.26	715	0.65	8.2	0.560	-	176	5 U	0.5 U	2.5 U	5 U
	1/10/2014	7.30	20.73	393	0.63	5.4	0.230	13.1	219	5 U	0.5 U	2.5 U	5 U
	4/17/2014	7.52	18.56	346	0.52	6.8	0.330	11.2	178	5 U	0.5 U	2.5 U	5 U
	7/17/2014	7.12	21.16	320	0.29	7.2	-	10.8	155	5 U	0.5 U	2.5 U	5 U
	10/10/2014	6.99	22.13	356	0.71	7.0	0.320	11.5	189	5 U	0.5 U	2.5 U	5 U
	1/13/2015	6.84	18.31	378	0.25	5.5	0.140	-	185	5 U	0.5 U	2.5 U	5 U
	1/29/2015	6.84	16.29	363	0.16	-	-	-	-	-	-	-	-
	4/10/2015	7.58	18.21	329	0.45	7.2	0.410	9.2	196	5 U	0.5 U	2.5 U	5 U
	7/15/2015	6.82	20.29	367	0.29	6.7	0.37	10.9	187	5 U	0.5 U	2.5 U	5 U
	10/9/2015	7.42	20.61	362	0.69	7	0.39	9.4	150	5 U	0.5 U	2.5 U	5 U
	1/14/2016	7.52	18.58	359	0.44	7.1	0.36	10.3	184	5 U	0.5 U	2.5 U	5 U
	4/8/2016	7.66	17.4	685	0.93	6.2	0.25	13.9	197	5 U	0.5 U	2.5 U	5 U
	7/11/2016	6.94	19.92	344	0.33	6.6	0.29	13	171	5 U	0.5 U	2.5 U	5 U
	10/11/2016	7.55	24.49	352	1.5	5	0.13	15.1	183	5 U	0.5 U	2.5 U	5 U
	1/10/2017	7.26	23.14	328	0.27	5.1	0.19	14.1	207	5 U	0.5 U	2.5 U	5 U
	4/5/2017	7.77	22.66	491	0.42	23.8	0.17	15.5	282	5 U	0.5 U	2.5 U	5 U
	7/10/2017	6.3	25.19	1160	0.79	254	0.12	21.9	658	5 U	0.5 U	2.5 U	5 U
	8/17/2017	6.78	25.69	1186	0.83	221	0.12	21.9	702	5 U	0.5 U	2.5 U	5 U
	10/13/2017	7.2	25.9	1418	0.42	281	0.11	23.6	722	5 U	0.5 U	2.5 U	5 U
	1/5/2018	7.15	22.9	903	0.53	170	0.11	23.9	476	5 U	0.5 U	2.5 U	5 U
	4/12/2018	7.14	22.2	806	0.54	153	0.14	22.5	525	5 U	0.5 U	2.5 U	5 U
	7/13/2018	7.2	24.3	686	0.61	104	0.42	21.6	454	5 U	0.5 U	2.5 U	5 U
	10/8/2018	7.18	25.1	1090	4.53	194	0.13	20.2	631	0.5 U	0.33 U	1.7 U	0.5 U
	1/7/2019	7.33	22.6	699	0.12	97.2	0.31	17.7	402	0.5 U	0.33 U	1.7 U	0.5 U

Table 2: Preconstruction Groundwater Quality Data

Citrus Combined Cycle Plant
Crystal River, FL

Location	Date	pH (S.U.)	Temp (°C)	Specific Conductance (µmhos/cm)	Turbidity (NTUs)	Chloride (mg/L)		Nitrate (mg/L)		Sulfate (mg/L)	TDS (mg/L)	Arsenic (ug/L)		Cadmium (ug/L)		Chromium (ug/L)		Lead (ug/L)	
	Compliance Limit	6.5 - 8.5	Report	Report	Report	250		10		250	500	10		5		100		15	
MWB-1	11/1/2017	6.88	24.4	587	16.09	12.1		0.200	U	16.2	356	3.9		0.2	U	1	U	1	U
	2/27/2018	7.12	22.7	765	2.4	7.3	I	0.010	U	14.0	266	6.3		0.2	U	1	U	1	U
	5/17/2018	6.91	22.9	550	7.51	8.2		0.010	U	20.8	272	6.6		0.2	U	1.2	I	1	U
	8/27/2018	7.35	24.9	621	3.3	8.4		0.010	U	29.3	346	7.9		0.2	U	1	U	1	U
	11/13/2018	7.07	24.8	684	5.15	8.9		0.010	U	34.8	762	6.5		0.2	U	1	U	1	U
MW-2	11/1/2017	6.85	25.7	791	17.74	68.9		0.200		19.9	438	7.88		0.2	U	1	U	1	U
	2/27/2018	6.97	22.8	710	11.58	45.4		0.011	I	24.9	366	10.9		0.2	U	2		1	U
	5/17/2018	6.93	23.4	837	8.24	73.6		0.010	U	31.2	438	13.2		0.2	U	2.4		1	U
	8/27/2018	7.24	26.0	1,091	7.49	156.3		0.010	U	54.7	608	13.9		0.2	U	1.2	I	1	U
	11/13/2018	7.18	29.4	806	12.83	78.5		0.010	U	37.6	808	23.7		0.2	U	2.2		1	U
MW-3	11/1/2017	6.73	25.3	1,302	13.78	215.1		0.200	U	39.2	790	3.9		0.2	U	1	U	1	U
	2/27/2018	6.85	23.6	1,268	3.77	182.5		0.010	U	34.0	692	1	U	0.2	U	1	U	1	U
	5/17/2018	6.83	23.3	1,150	14.29	145.9		0.049		34.9	578	2.6		0.2	U	1.9	I	1	U
	8/27/2018	7.08	24.8	1,289	3.96	186.3		0.010	U	45.5	702	5.2		0.2	U	1.1	i	1	U
	11/13/2018	6.92	26.2	1,136	1.78	132.5		0.011	I	57.2	556	7.6		0.2	U	1	U	1	U
MW-4	11/1/2017	6.94	25.2	834	19.33	110.5		0.200	U	23.1	506	2.3		0.2	U	1	U	1	U
	2/27/2018	7.02	22.7	765	4.47	77.1		0.010	U	20.4	414	15.1		0.2	U	1	U	1	U
	5/17/2018	7.00	22.9	838	4.14	86.5		0.010	U	26.0	446	10.1		0.2	U	1.3	I	1	U
	8/27/2018	7.29	24.9	888	7.09	105.8		0.010	U	27.2	502	4		0.2	U	1	U	1	U
	11/13/2018	7.10	25.0	974	8.14	117.7		0.010	U	35.7	502	4.3		0.2	U	1	U	1	U
CCCP IWW Pond	2/27/2018	9.22	20.3	475	1.58	8.6		0.055		32.4	252	4.7		0.2	U	1	U	1	U
	5/17/2018	7.52	26.6	298	6.85	10.1		0.0362		21.6	224	9.5		1.1	U	2.7		1.1	U
	8/27/2018	7.78	31.0	766	9.27	13.9		0.010	U	31.8	340	7.8		0.2	U	1	U	1	U
	11/13/2018	8.08	36.1	1,224	5.92	194.0		0.014	I	59.1	598	10.1		0.2	U	1.1	I	1	U

Notes:
S.U. = Standard units
°C = degrees Celsius
NTU = Nephelometric Turbidity Unit
µmhos/cm = micromhos per centimeter
mg/L = milligrams per liter
ug/L = micrograms per liter
TDS = Total Dissolved Solids

Table 3: Monitor Well Construction Details

Citrus Combined Cycle Plant
Crystal River, FL

Well ID	Designation	Diameter (in)	Total Depth (ft bls)	Screen Interval (ft bls)
MWB-1	Background	2	25	15 - 25
MW-2	Monitoring	2	20	10 - 20
MW-3	Monitoring	2	20	10 - 20
MW-4	Monitoring	2	25	15 - 25
MW-5*	Monitoring	2	20	10 - 20
MW-6*	Monitoring	2	20	10 - 20

Notes:
in = inches
ft = feet
bls = below land surface
* = Proposed monitoring well

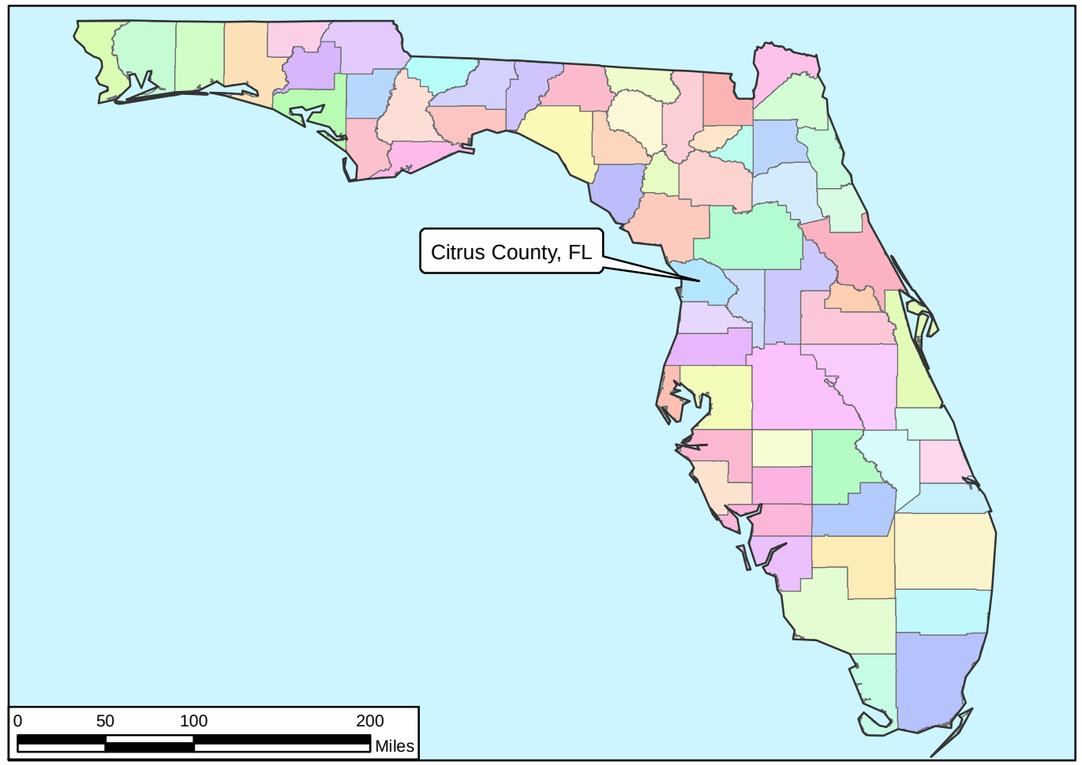
Table 4: Proposed Groundwater Monitoring Parameters

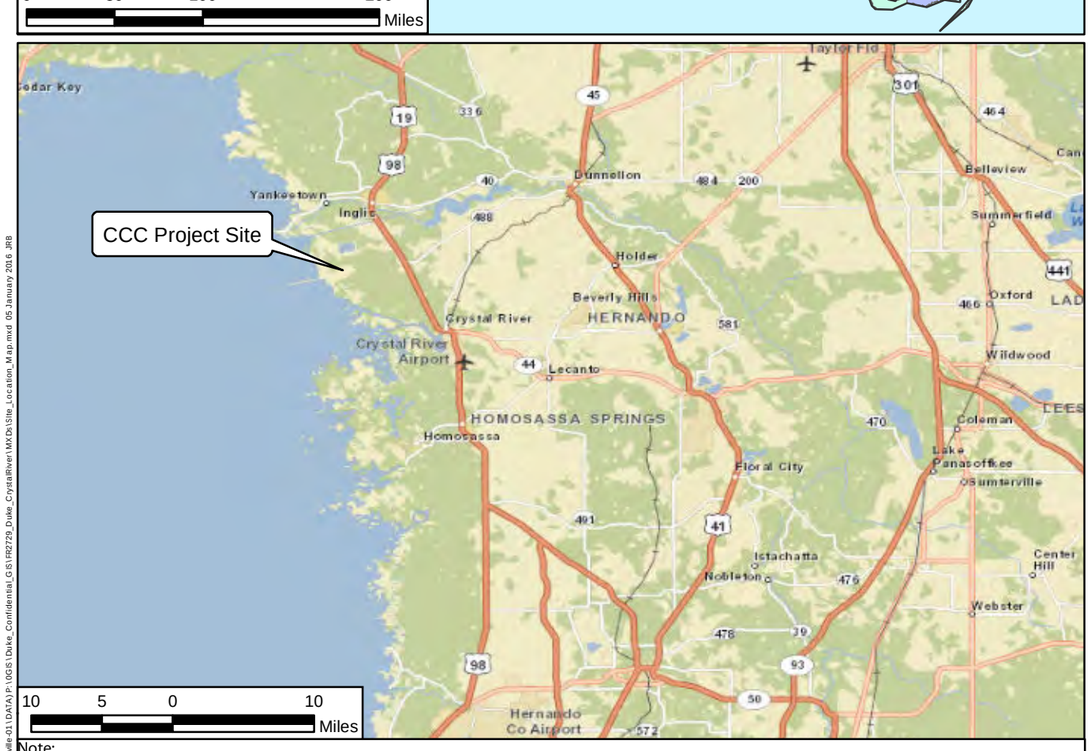
Citrus Combined Cycle Plant
Crystal River, FL

Parameters	Compliance Well Limit	Units	Sample Type	Monitoring Frequency
Turbidity	Report	NTU	In-situ	Quarterly
Specific Conductance	Report	umho/cm	In-situ	Quarterly
pH	Report	S.U.	In-situ	Quarterly
Temperature (C), Water	Report	°C	In-situ	Quarterly
Oxygen, Dissolved (DO)	Report	mg/L	In-situ	Quarterly
Water Level Relative to NGVD	Report	ft	In-situ	Quarterly
Solids, Total Dissolved (TDS)	500	mg/L	Grab	Quarterly
Chloride (as Cl)	250	mg/L	Grab	Quarterly
Nitrogen, Nitrate, Total (as N)	10	mg/L	Grab	Quarterly
Sulfate, Total	250	mg/L	Grab	Quarterly
Lead, Total Recoverable	0.015	mg/L	Grab	Quarterly
Arsenic, Total Recoverable	10	ug/L	Grab	Quarterly
Cadmium, Total Recoverable	5	ug/L	Grab	Quarterly
Chromium, Total Recoverable	100	ug/L	Grab	Quarterly
Coliform, Fecal	4	#/100mL	Grab	Quarterly

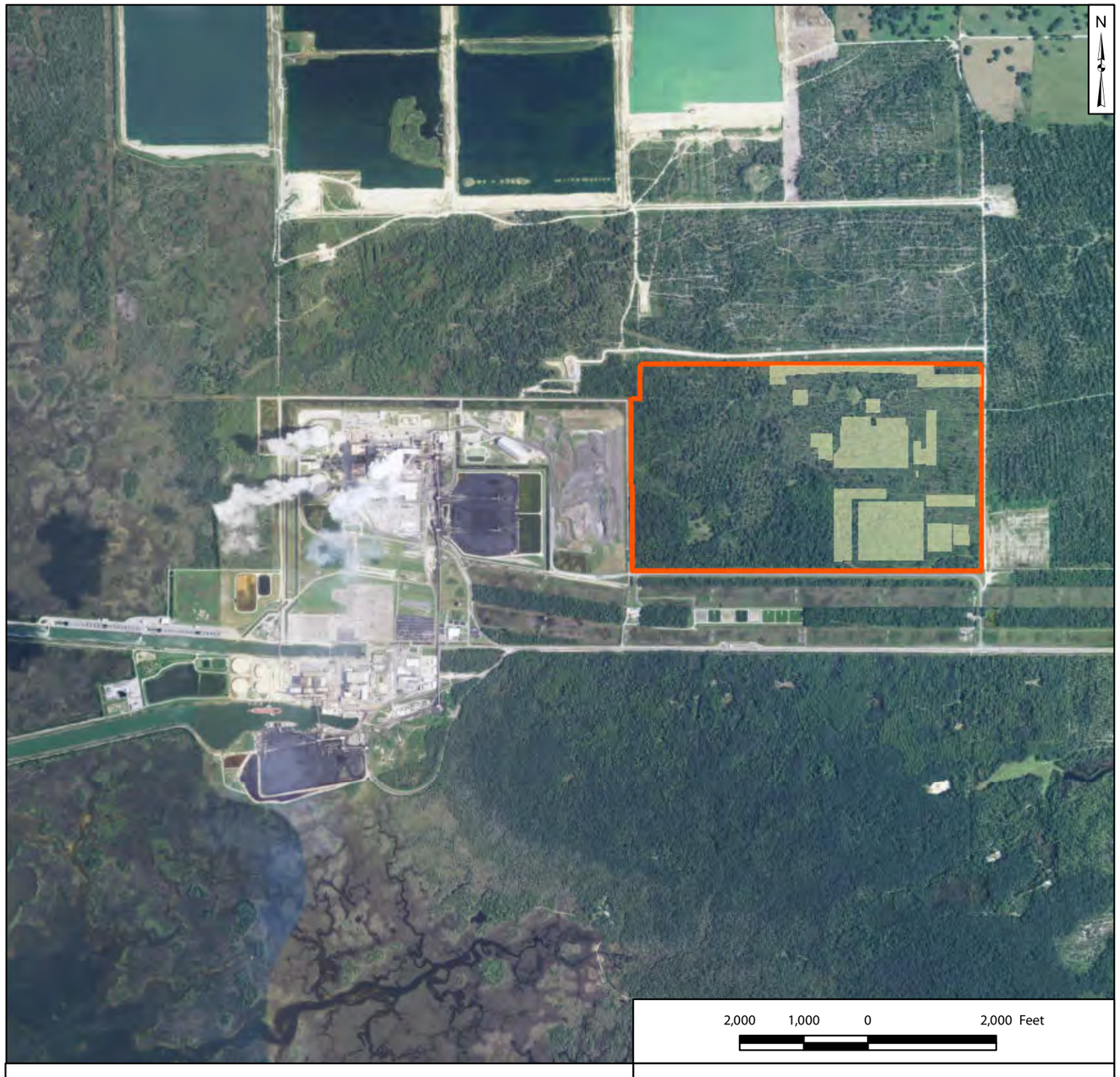
Notes:
S.U. = Standard units
°C = degrees Celsius
NTU = Nephelometric Turbidity Unit
µmhos/cm = micromhos per centimeter
mg/L = milligrams per liter
ug/L = micrograms per liter
mL = milliliters
NGVD = National Geodetic Vertical Datum
ft = feet

FIGURES





Note:
World Street Map Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.



Legend

CCC Project Footprint

CCC Project Site

Notes:
1. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2013 World Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Site Location Map

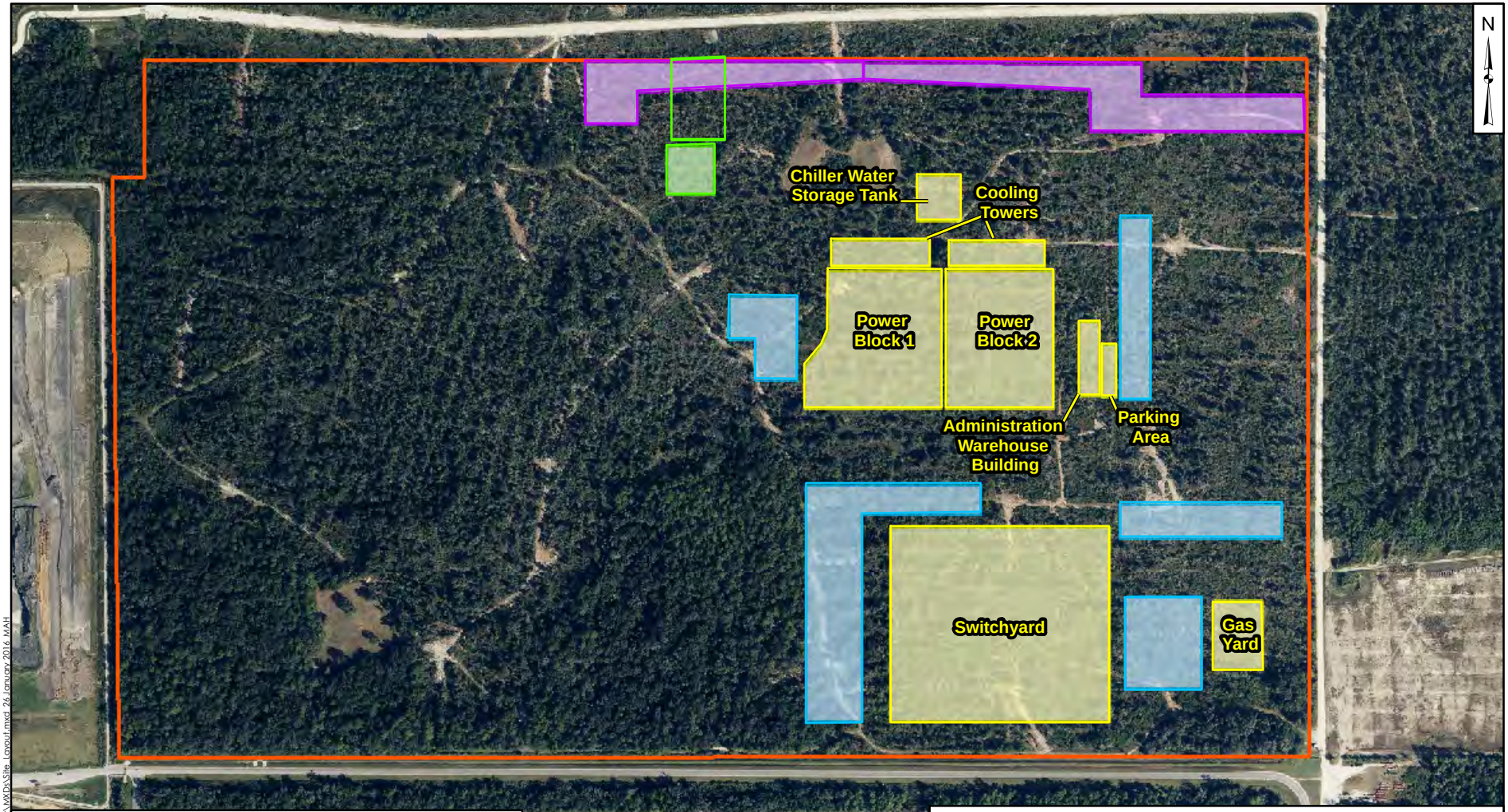
Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

Geosyntec consultants

Tampa, FL | January 2016

Figure 1

Path: (\tasvfile-01\DATA)P:\OGS\Duke_Confidential_GIS\R2729_Duke_CrystalRiver\MXDs\Site_Location_Map.mxd 05 January 2016 JRB



Legend

- Construction Stormwater Detention Pond
- Stormwater Detention Ponds
- Current IWW Percolation Pond
- Facility Layout
- CCC Project Site
- Proposed IWW Percolation Pond

Notes:
1. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2014 aerial image source: Florida Department of Transportation, Office of Surveying and Mapping website.

700 350 0 700 Feet

Proposed Site Layout

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

Geosyntec consultants

Tampa, FL | March 2019

Figure **2**

Path: \\tlusville-01\DATA1\P:\OGIS\Duke_Confidential GIS\FR2729_Duke_CrystalRiver\MXDs\Site_Layout.mxd 26 January 2016 MAH

	Era	System	Series	Formation
Surface Beds	Cenozoic	Quaternary	Recent	Sand, peat and clay, unnamed
			Pleistocene	Lake Flirt marl, of late Wisconsin glacial stage
				Pamlico formation, of Peorian age
				Wicomico formation, of Sangamon age
				Okefenokee formation, of Yarmouth age
				Coharie formation, of Aftonian age
		Tertiary	Miocene	Alachua formation (Terrestrial) ? ? Hawthorn formation (Marine)
			Oligocene	Suwannee limestone
			Eocene	Ocala limestone, of Jackson age
				Moodys Branch formation, Jackson age: Williston member
				Moodys Branch formation, Jackson age: Inglis member
				Avon Park limestone, of Claiborne age
				Lake City limestone, of Claiborne age
				Oldsmar limestone, of Wilcox age
			Paleocene	Cedar Keys formation, of Midway age
Sub-Surface Beds	Mesozoic	Cretaceous	Gulf	Lawson limestone, of Navarro age
				Beds of Taylor age
				Beds of Austin age
				Atkinson formation: Beds of Eagle Ford age
				Atkinson formation: Beds of Woodbine age
			Comanche?	Undifferentiated shale and sand, "red beds"
		Triassic?		Quartz diabase, possible sill?
	Paleozoic	Lower Devonian or Upper Silurian ? ? ? Lower Ordovician		Possible fault contact

Vernon, R.O. 1951. Geology of Citrus and Levy Counties, Florida. US Geological Survey Bulletin No. 33:17, 186-224.

System	Series	Stratigraphic Unit	General Lithology	Hydrogeologic Unit	
Quaternary	Holocene and Pleistocene	Alluvium and terrace deposits	Sands and clays	Surficial aquifer system	
Tertiary	Pliocene	Alachua Formation	Phosphatic sands and clays	(Of limited areal extent in study area)	
	Miocene	Hawthorn Group[1]	Phosphatic sands, and clays		
	Eocene	Ocala Limestone	Limestone, fossiliferous to micritic	Floridan aquifer system	Upper Floridan aquifer (S)
		Avon Park Formation	Upper part, limestone and dolostone		
			Lower part, dolomite with intergranular gypsum; some bedded gypsum, peat and chert		Middle confining unit
		Oldsmar Formation	Limestone and dolomite; some evaporites and chert		Lower Floridan aquifer (D)
	Paleocene	Cedar Keys Formation	Dolomite with evaporites		

[1] Based on nomenclature of Scott (1988)

S Typical open intervals of shallow (S) and deep (D) wells

Sacks, L.A. 1995. Geochemical and Isotopic Composition of Ground Water with Emphasis on Sources of Sulfate in the Upper Floridan Aquifer in Parts of Marion, Sumter, and . Citrus Counties, Florida. US Geological Survey Water-Resources Investigations Report 95–4251.

Regional Hydrogeologic Framework

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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Figure 3

Tampa, FL | December 2015

Path: [Tlusville-01\DATA] I:\GIS\Duke_Confidential_GIS\FR2729_Duke_CrystalRiver\MXDs\Regional_Hydro.mxd 11 December 2015 JR8

Notes:
1. Topographic survey conducted by Southern Resource Mapping, Inc. in November 2013.
2. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
3. 2014 aerial image source: Florida Department of Transportation, Office of Surveying and Mapping website.

Detailed 1-Foot Topographic Contours

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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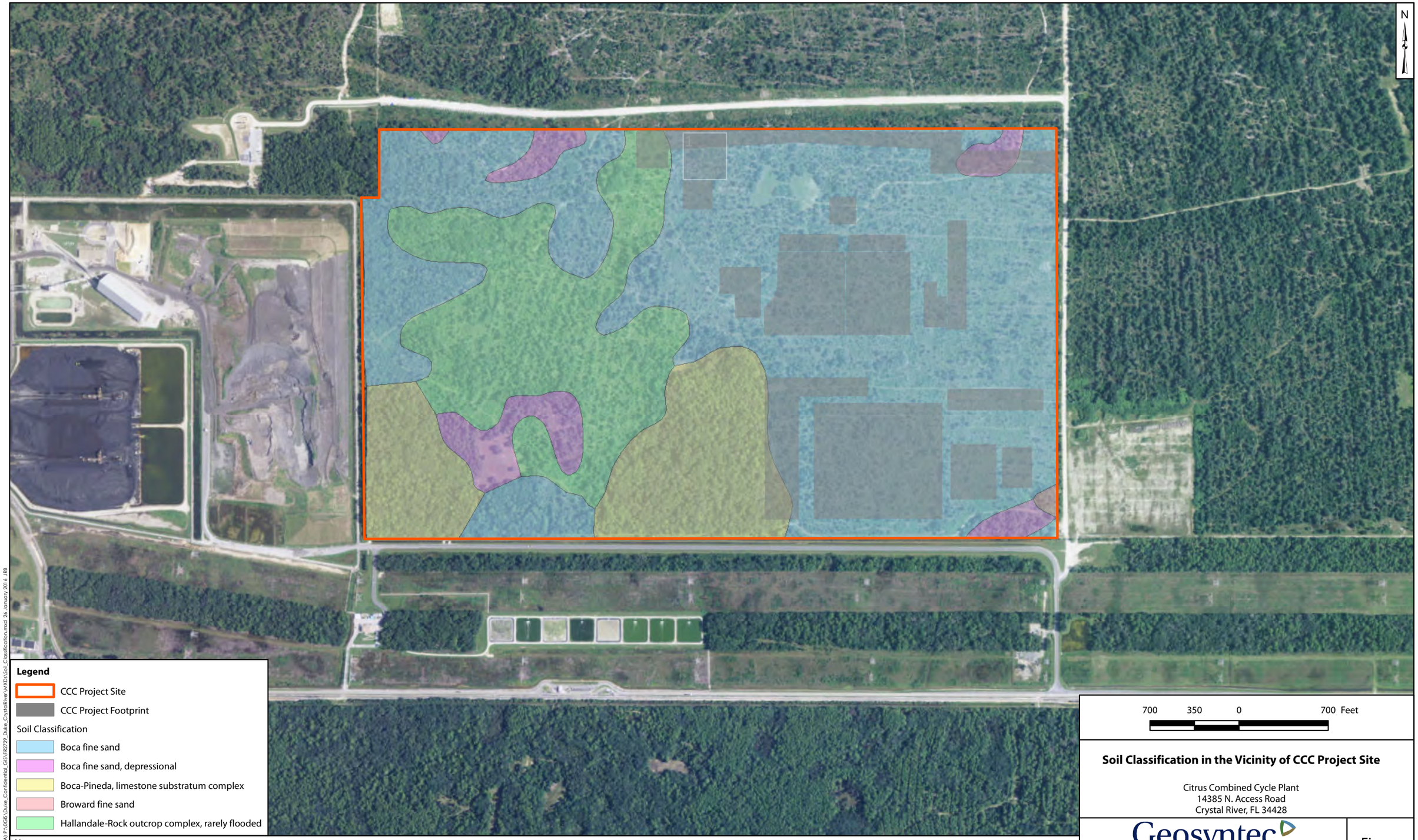
Figure 4

Path: \\tlusville-01\DATA1\P:\GIS\Duke_Confidential_GIS\FR2729_Duke_CrystalRiver\MXDs\Topographic_Contours.mxd 26 January 2016 JRB



Notes:
1. Source of soil classification shapefile: Southwest Florida Water Management District website.
2. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
3. Property boundary obtained from the Citrus County Property appraiser's office.
4. 2013 World Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Soil Classification in the Vicinity of CCC Project Site

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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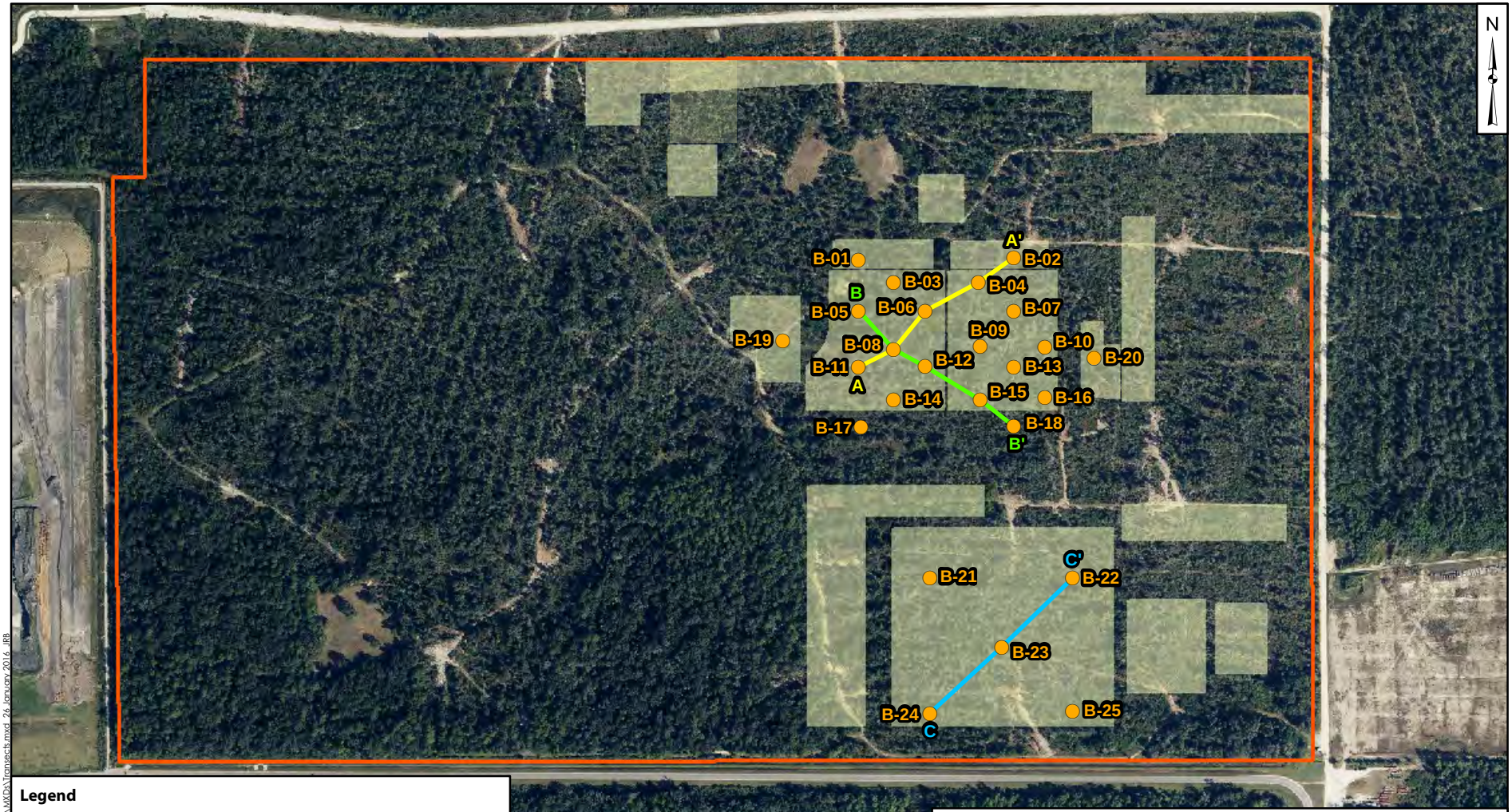
Figure 5

Path: [Tlusville01 \DATA] P:\GIS\Duke_Confidential_GIS\182729_Duke_CrystalRiver\MXDs\Soil_Classification.mxd 29 January 2014 JRB



Legend

- Soil Boring Location
- A-A' Transect
- B-B' Transect
- C-C' Transect
- CCC Project Footprint
- CCC Project Site

Notes:

1. CCC Project footprint and soil boring locations obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2014 aerial image source: Florida Department of Transportation, Office of Surveying and Mapping website.

700 350 0 700 Feet

Soil Borings and Geologic Cross Section Transects

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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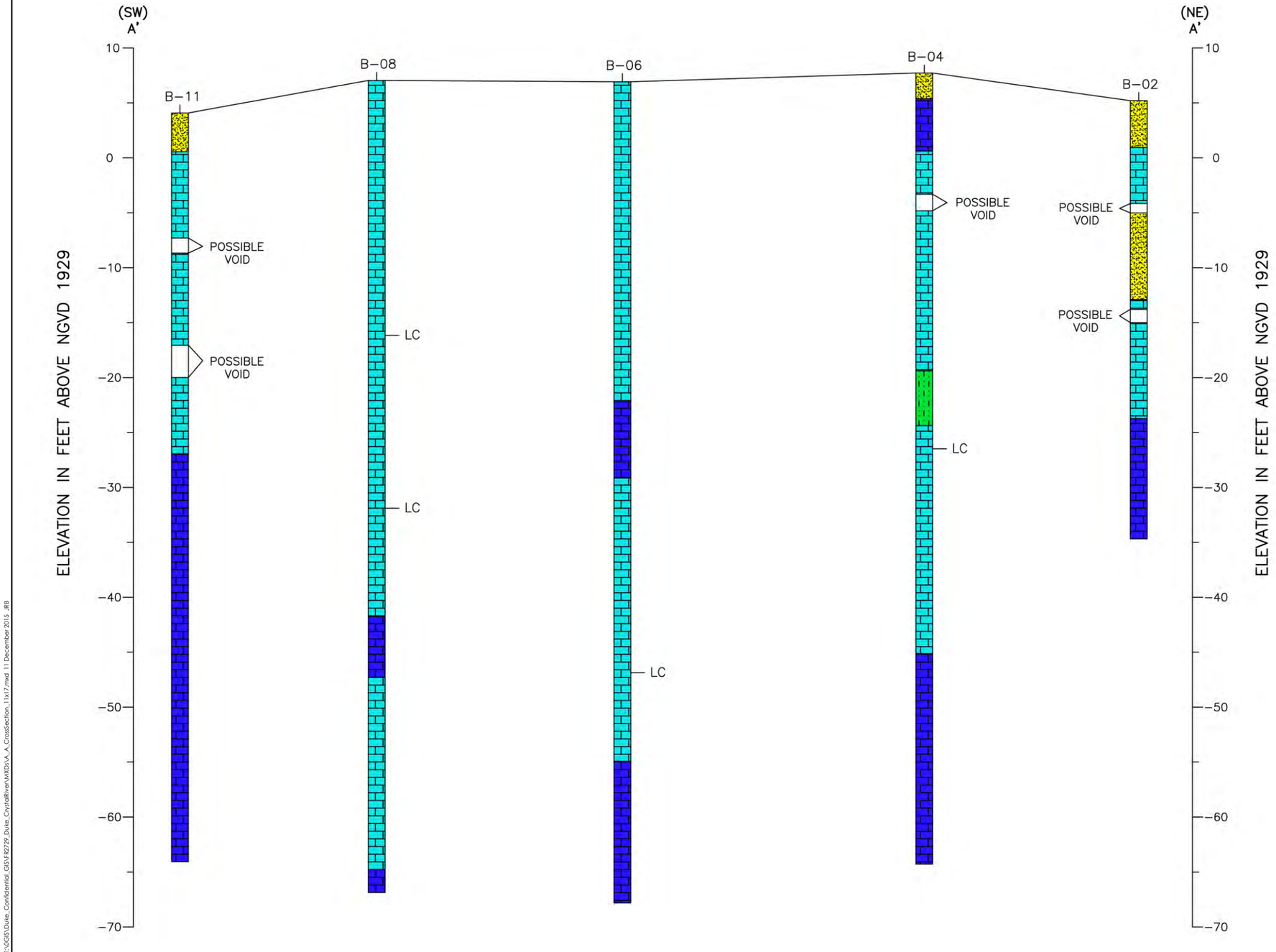
Figure 6

Path: \\tlusville-01\DATA1\P:\OGIS\Duke_Confidential GIS\FR2729_Duke_CrystalRiver\MXD\Transects.mxd 26 January 2016 JRB



LEGEND

- SAND
- LIMESTONE – WEATHERED –POORLY TO MODERATELY INDURATED
- LIMESTONE – WELL INDURATED – MODERATELY TO WELL INDURATED
- SILT

LC = LOSS OF CIRCULATION OF DRILLING FLUID

HORIZONTAL SCALE: 1"=100'
VERTICAL SCALE: 1"=10'

Obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.

Geologic Cross Section A-A' (Southwest - Northeast)

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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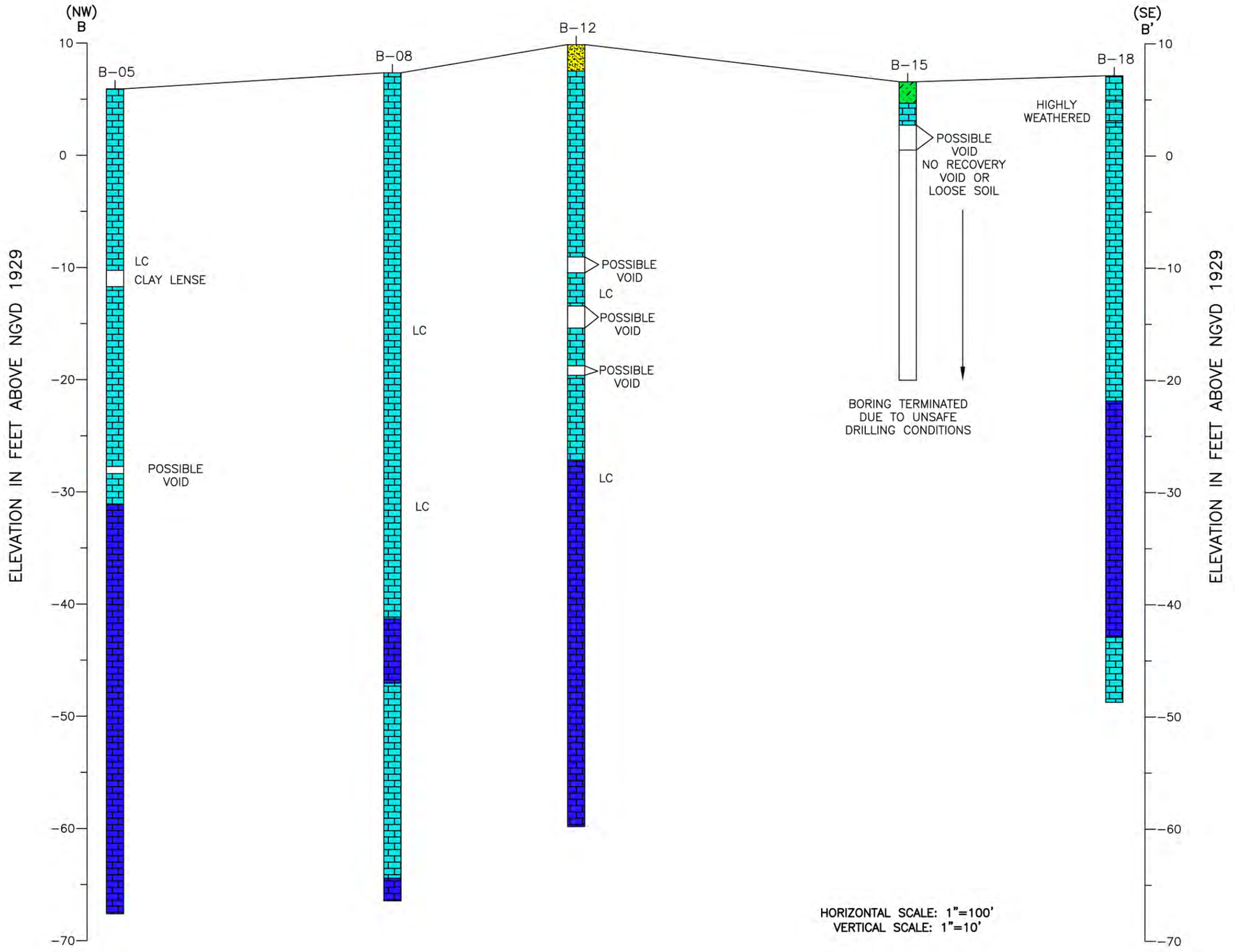
Figure 7

Path: (Tallahassee-01\DATA1:\GIS\Duke_Confidential_GIS\FP2729_Duke_CrystalRiver\MXDs\A_A_CrossSection_11x17.mxd 11 December 2015 JRB



LEGEND

- SAND
- LIMESTONE – WRED –POORLY TO MODERATELY INDURATED
- LIMESTONE – WELL INDURATED – MODERATELY TO WELL INDURATED
- SILT
- CLAYEY–SILTY SAND

LC = LOSS OF CIRCULATION OF DRILLING FLUID

WRED = WEATHERED

Obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.

Geologic Cross Section B-B' (Northwest - Southeast)

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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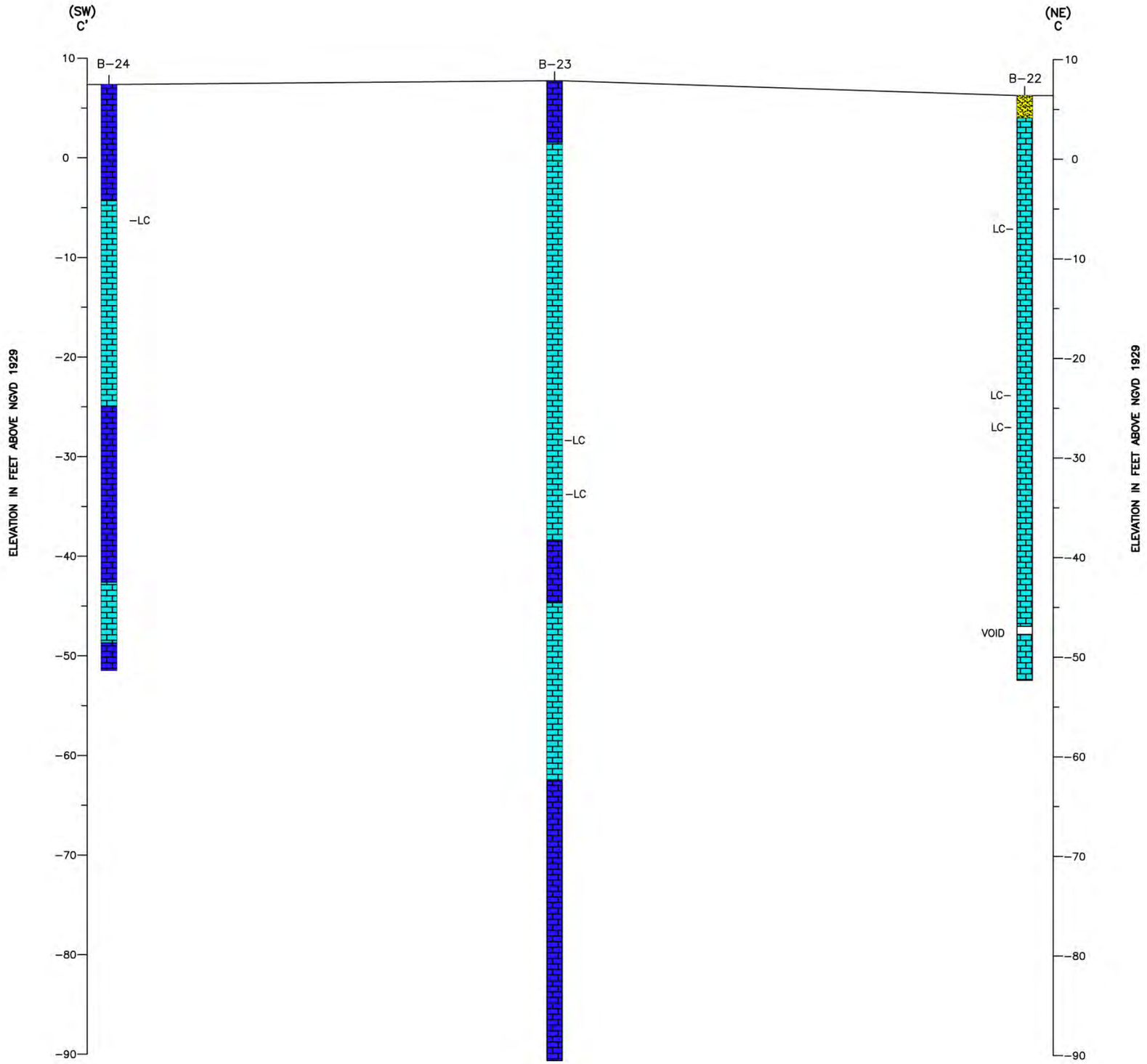
Tampa, FL | December 2015

Figure 8

Path: [tltuxville-01\DATA] T:\GIS\Duke_Confidential_GIS\FR2799_Duke_CrystalRiver\MXDs\B_B_CrossSection_11x17.mxd 11 December 2015 JRB



LEGEND

- SAND
- LIMESTONE – WEATHERED –POORLY TO MODERATELY INDURATED
- LIMESTONE – WELL INDURATED – MODERATELY TO WELL INDURATED

LC = LOSS OF CIRCULATION OF DRILLING FLUID

HORIZONTAL SCALE: 1"=130'
VERTICAL SCALE: 1"=10'

Obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.

Geologic Cross Section C-C' (Southwest - Northeast)

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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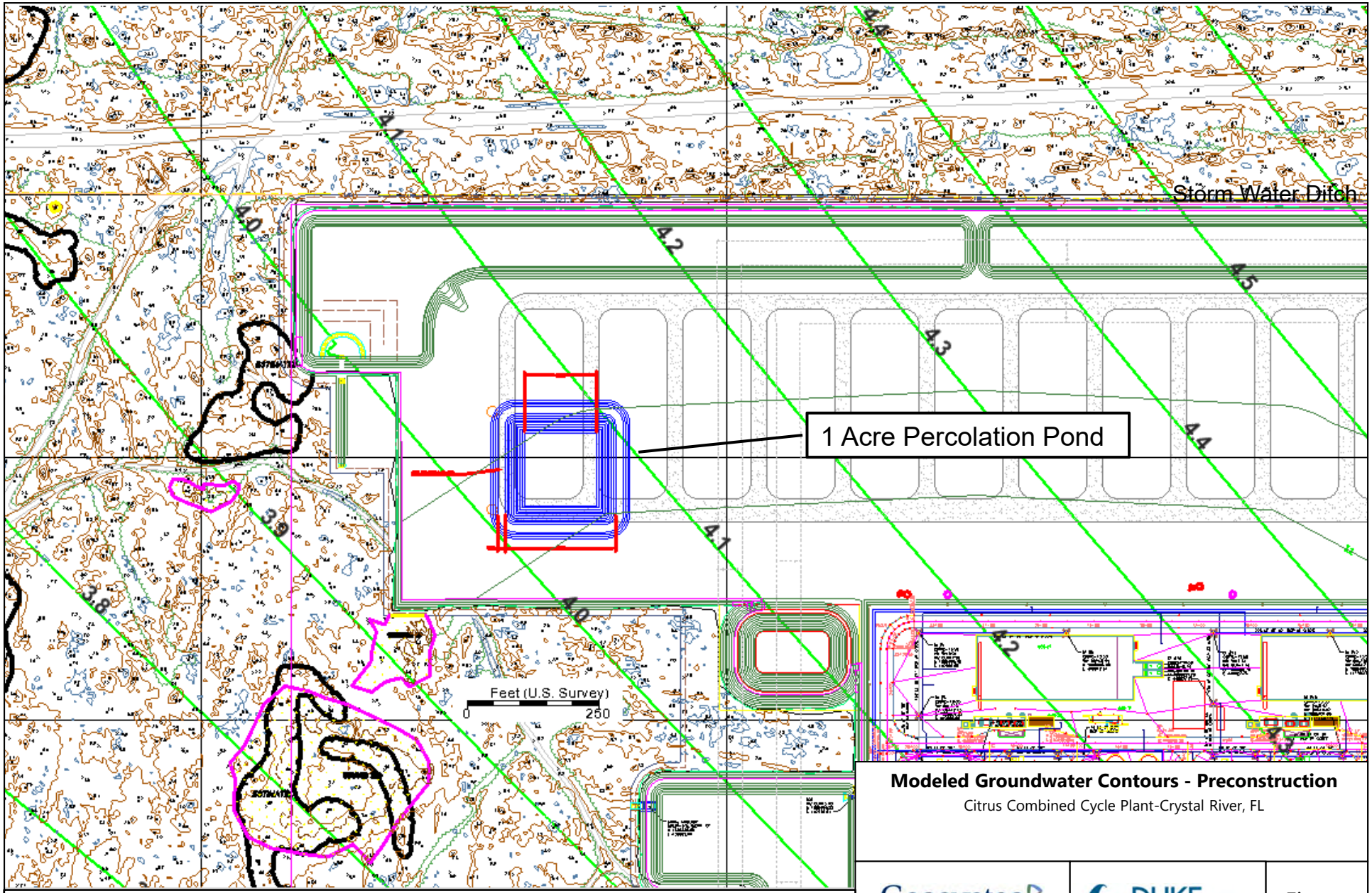
Tampa, FL | December 2015

Figure 9

Path: [Tfrusville-01\DATA] T:\GIS\Duke_Confidential_GIS\FR2729_Duke_CrystalRiver\MXDs\C_C_CrossSection_11x17.mxd 11 December 2015 JR8



Modeled Groundwater Contours - Preconstruction

Citrus Combined Cycle Plant-Crystal River, FL

Legend:

- Groundwater Mounding (ft)
- Ground Surface Elevation with 1 Foot Contour Interval (NGVD29)
- [Note: Crest of Berm at 15 ft]

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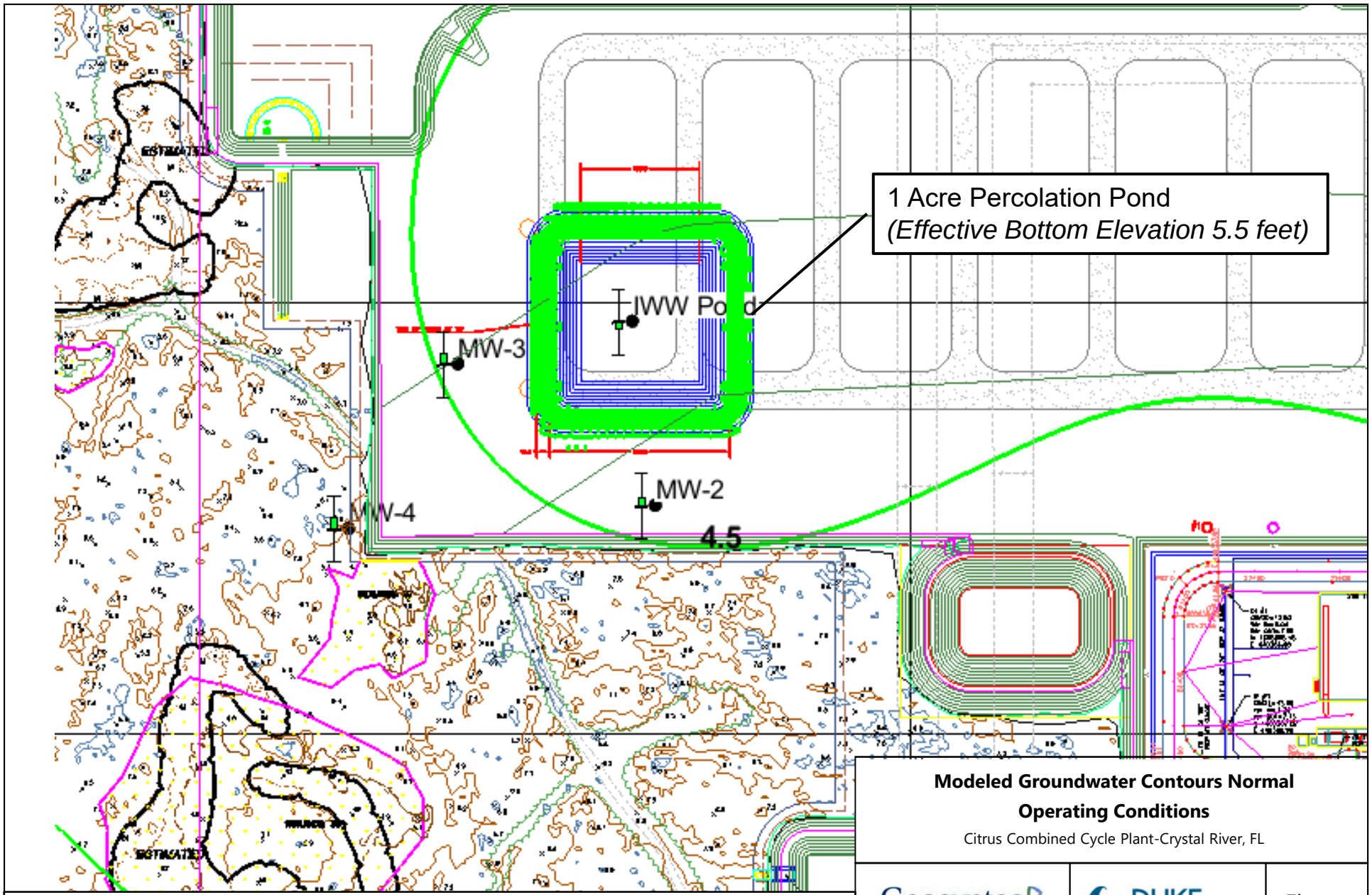
DUKE ENERGY

Figure **10**

Tampa, FL

March 2019

FR2288, 1/22/15, MJG



Legend:

Groundwater Elevation (ft., NGVD29)

Ground Surface Elevation with 1 Foot Contour Interval November 2018 (NGVD29)[Note: Crest of Berm at 15 ft]

Modeled Groundwater Contours Normal Operating Conditions

Citrus Combined Cycle Plant-Crystal River, FL

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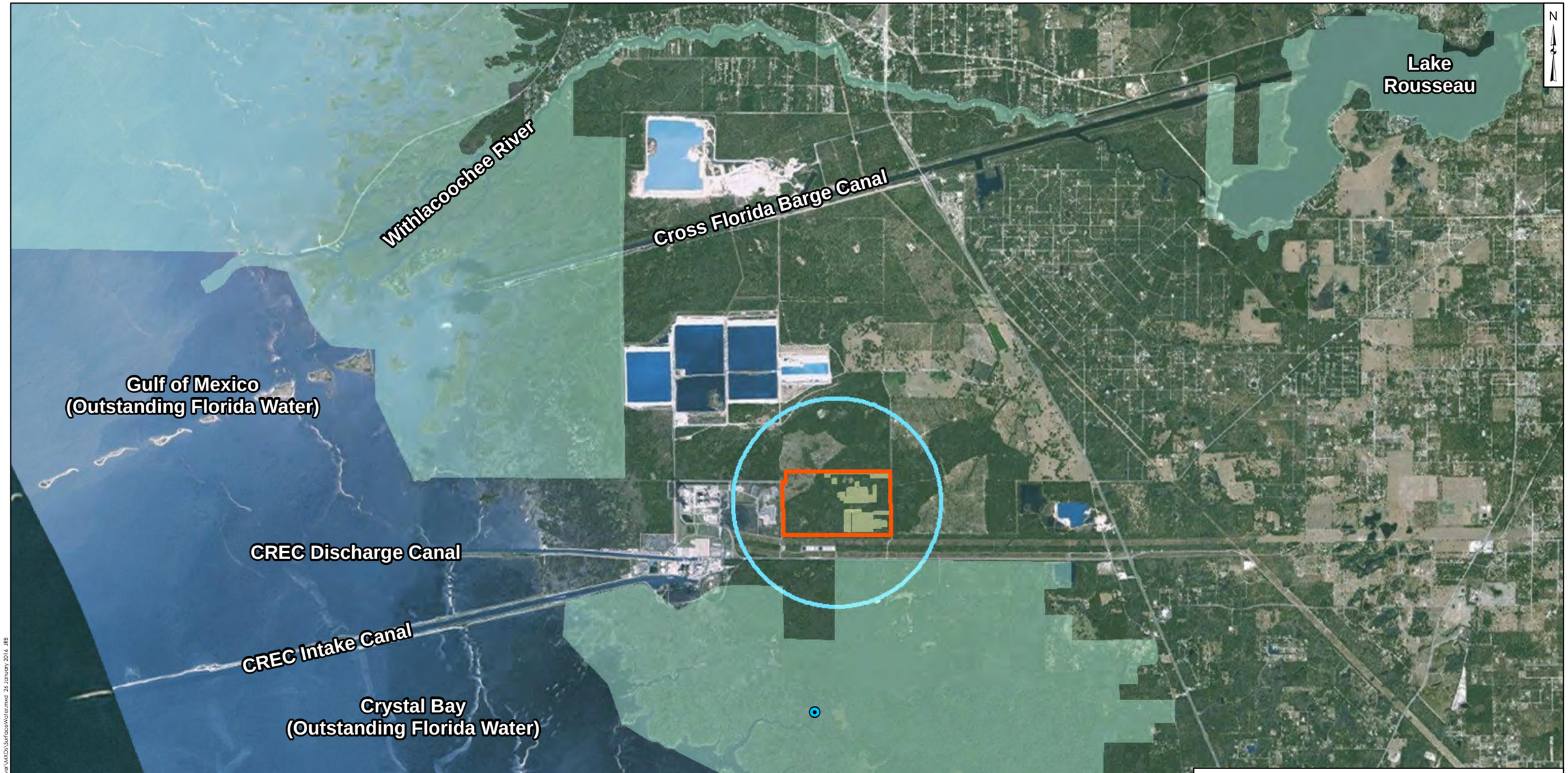
DUKE ENERGY

Figure **11**

Tampa, FL

March 2019

FR2288, 1/22/15, MJG



Notes:
1. Spring location shapefile (2011) was obtained from the FDEP website.
2. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
3. Property boundary obtained from the Citrus County Property appraiser's office.
4. 2013 World_Imagery - Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Surface Waters in Vicinity of CCC Project Site

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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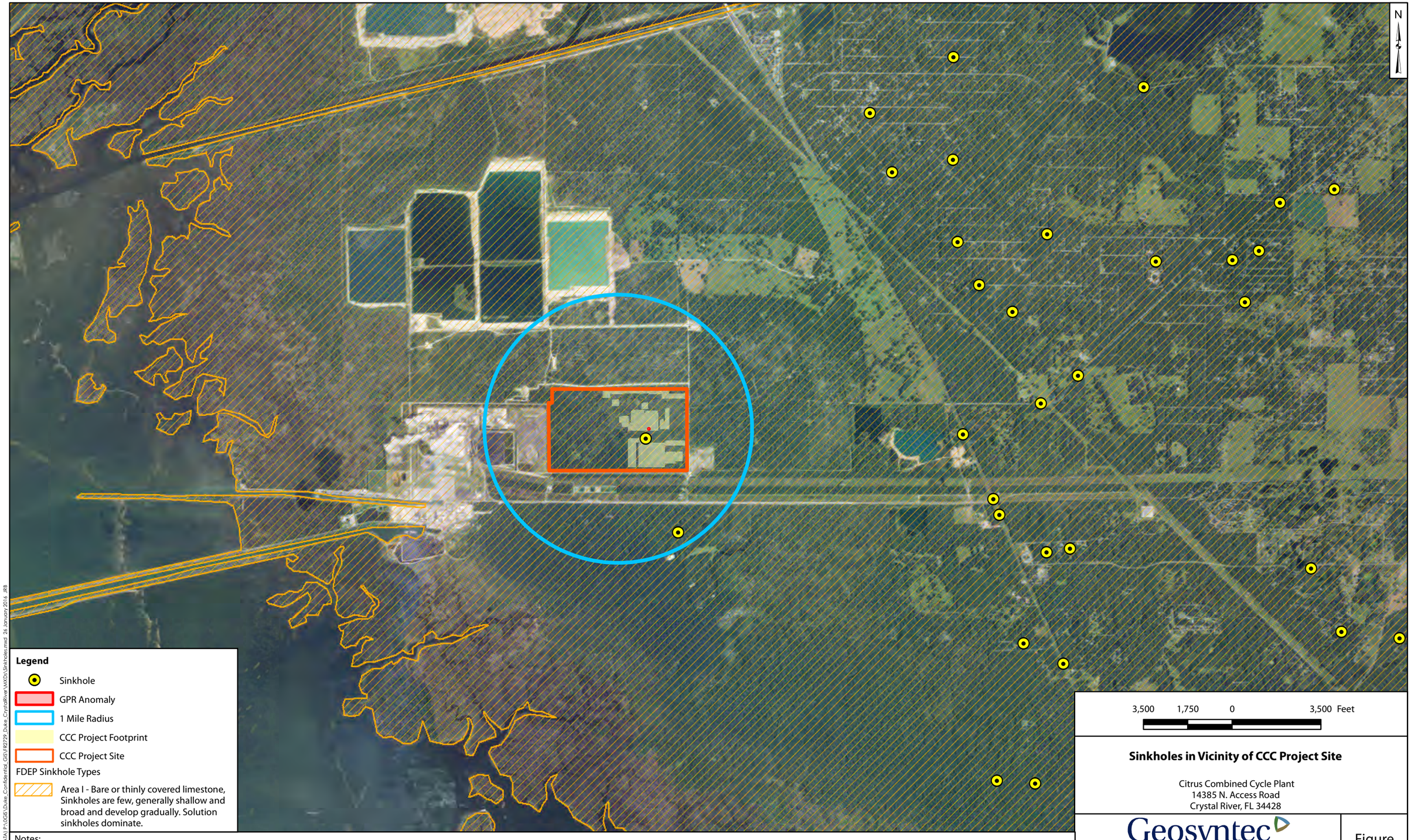
Tampa, FL | January 2016

Figure 12

Path: [tlusville-01\DATA] P:\GIS\Duke_Confidential_GIS\FB729_Duke_CrystalRiver\MXDs\SurfaceWater.mxd 26 January 2016 JRB



Notes:
1. Source of FGS subsidence incidents shapefile: FDEP website.
2. CCC Project footprint and sinkholes within property boundary obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2013 World Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Sinkholes in Vicinity of CCC Project Site

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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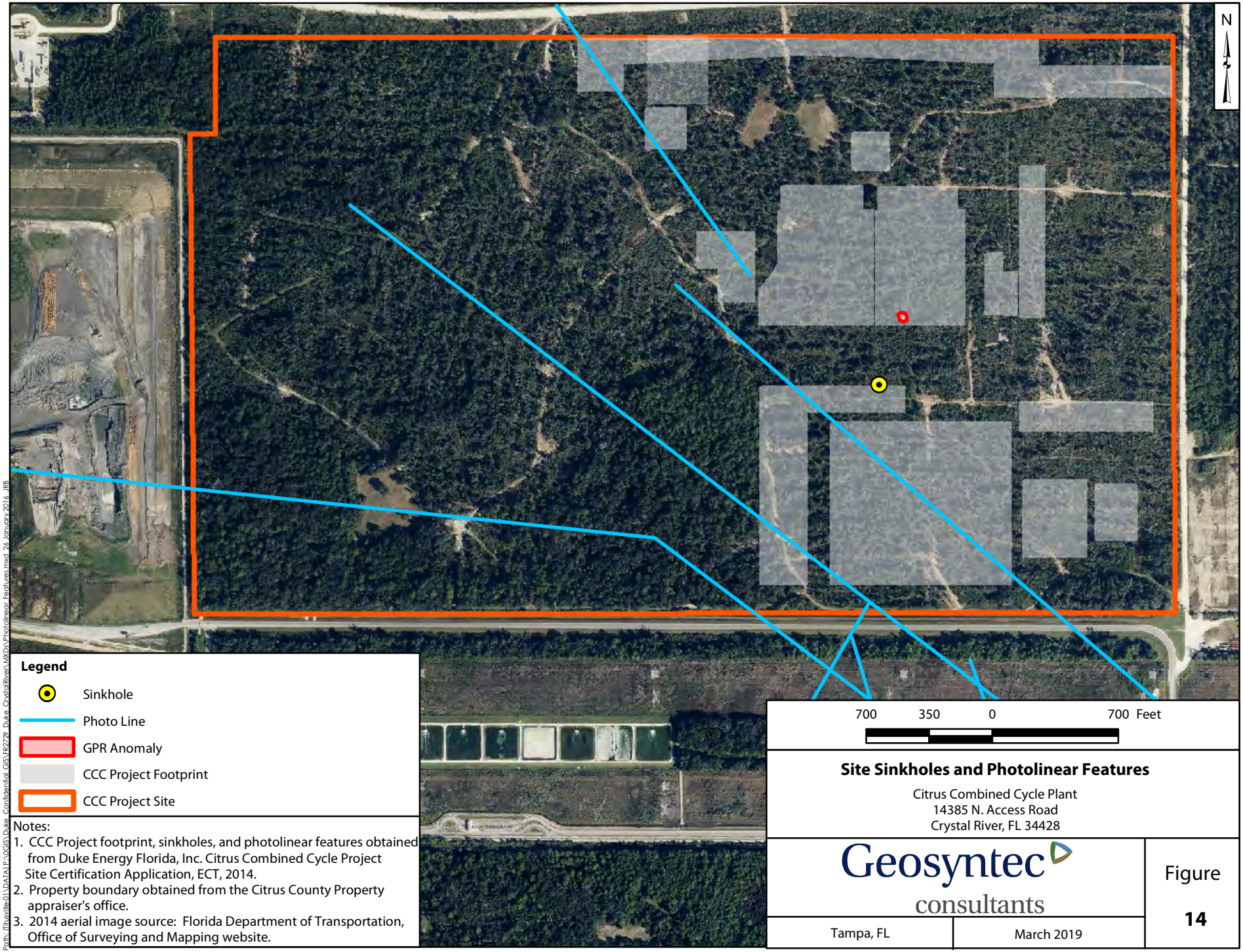
Tampa, FL | January 2016

Figure 13

Path: [Tfluxville-01\DATA] P:\GIS\Duke_Confidential_GIS\FR2729_Duke_CrystalRiver\MXDs\Sinkholes.mxd 26 January 2016 JRB



Notes:
1. CCC Project footprint, sinkholes, and photolinear features obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2014 aerial image source: Florida Department of Transportation, Office of Surveying and Mapping website.

Site Sinkholes and Photolinear Features

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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Tampa, FL | March 2019

Figure **14**

Path: \\tlusvlle-01\DATA1\P:\GIS\Duke_Confidential GIS\FR2729_Duke_CrystalRiver\MXDs\Photolinear_Features.mxd 26 January 2016 IRB

N

Legend

- SWFWMD WUP Location
- FLDOH Well Location
- CCC Project Site
- CCC Project Footprint

3,500 1,750 0 3,500 Feet

Well Survey in Vicinity of CCC Project Site

Citrus Combined Cycle Project
14385 N. Access Road
Crystal River, FL 34428

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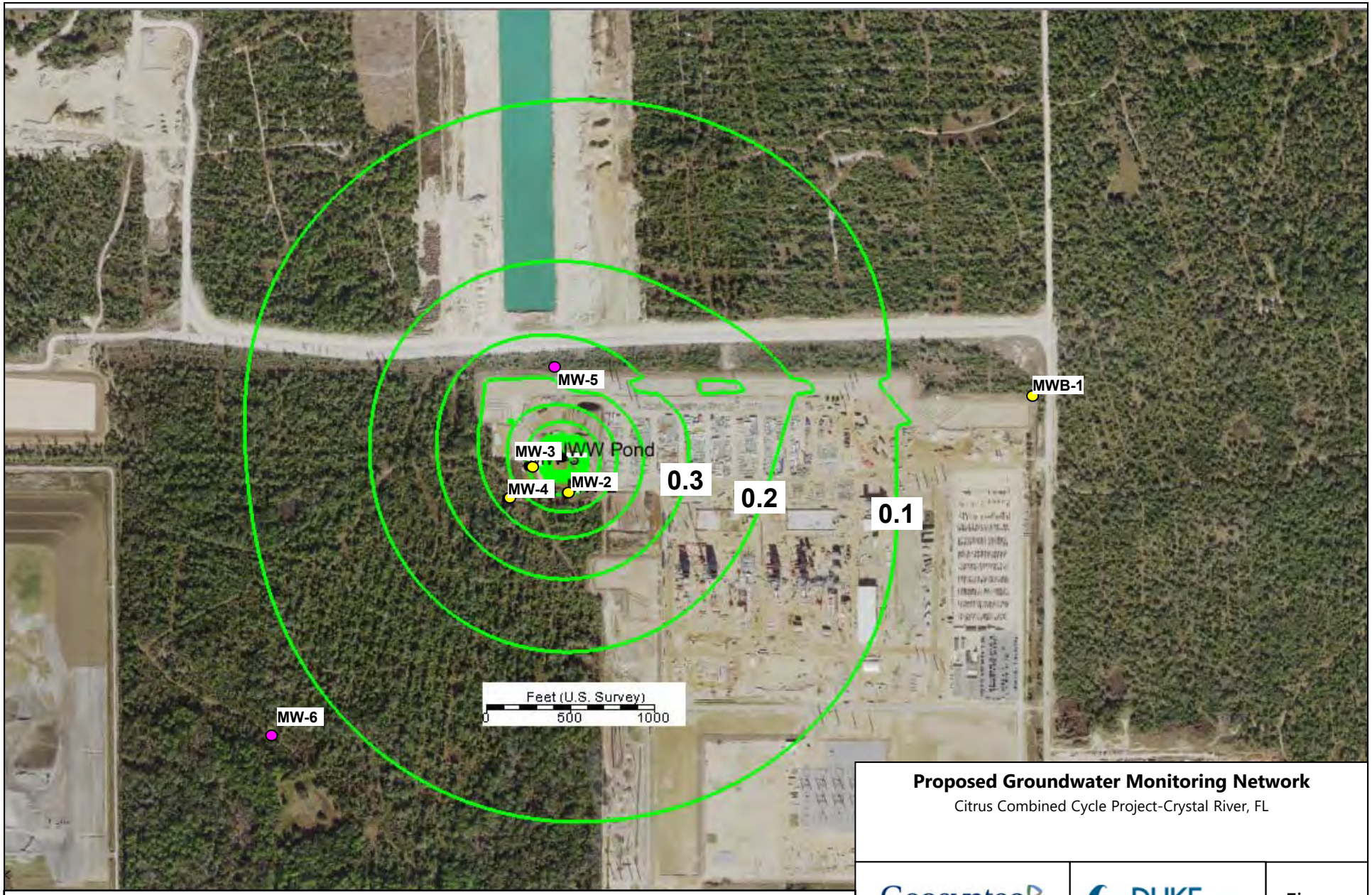
Tampa, FL | January 2016

Figure **15**

Notes:
1. Well locations were obtained from the Florida Department of Health (FLDOH) well surveillance database [12 Oct. 2015] and the Southwest Florida Water Mangement District (SWFWMD) water use permit (WUP) [23 Oct. 2015] and consumptive use permit [5 Feb. 2013] shapefiles.
2. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
3. Property boundary obtained from the Citrus County Property appraiser's office.
4. 2013 World Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Path: [Tallahassee01.\DATA] P:\GIS\Duke_Confidential_GIS\182729_Duke_CrystalRiver\MXDs\Well_Survey.mxd 26 January 2016 JRB



Legend:

- Groundwater Mounding (ft)
- Proposed Monitoring Well
- Existing Monitoring Well

Proposed Groundwater Monitoring Network

Citrus Combined Cycle Project-Crystal River, FL

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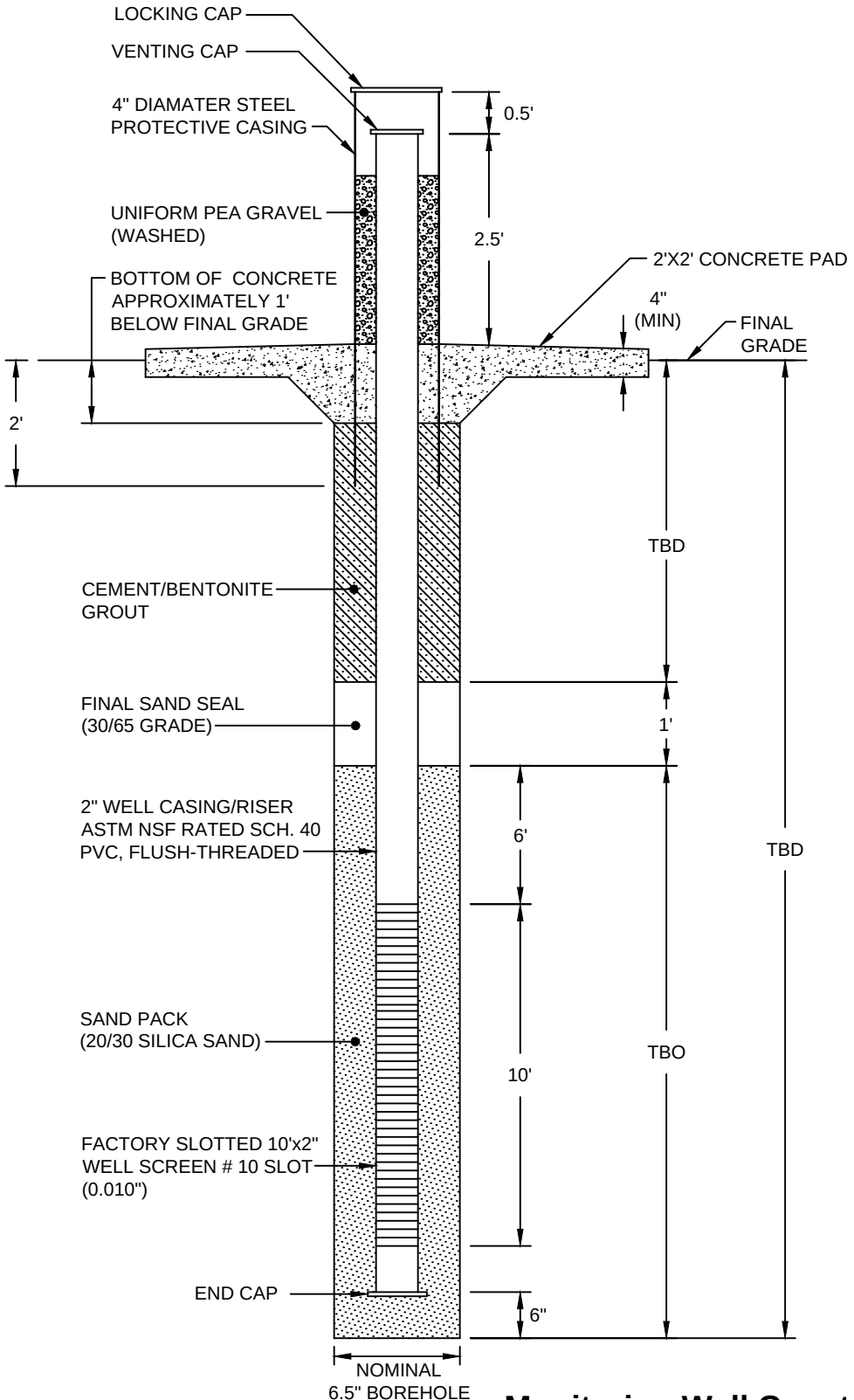
DUKE ENERGY

Figure **16**

Tampa, FL

March 2019

FR2288, 1/22/15, MJG



Monitoring Well Construction Detail

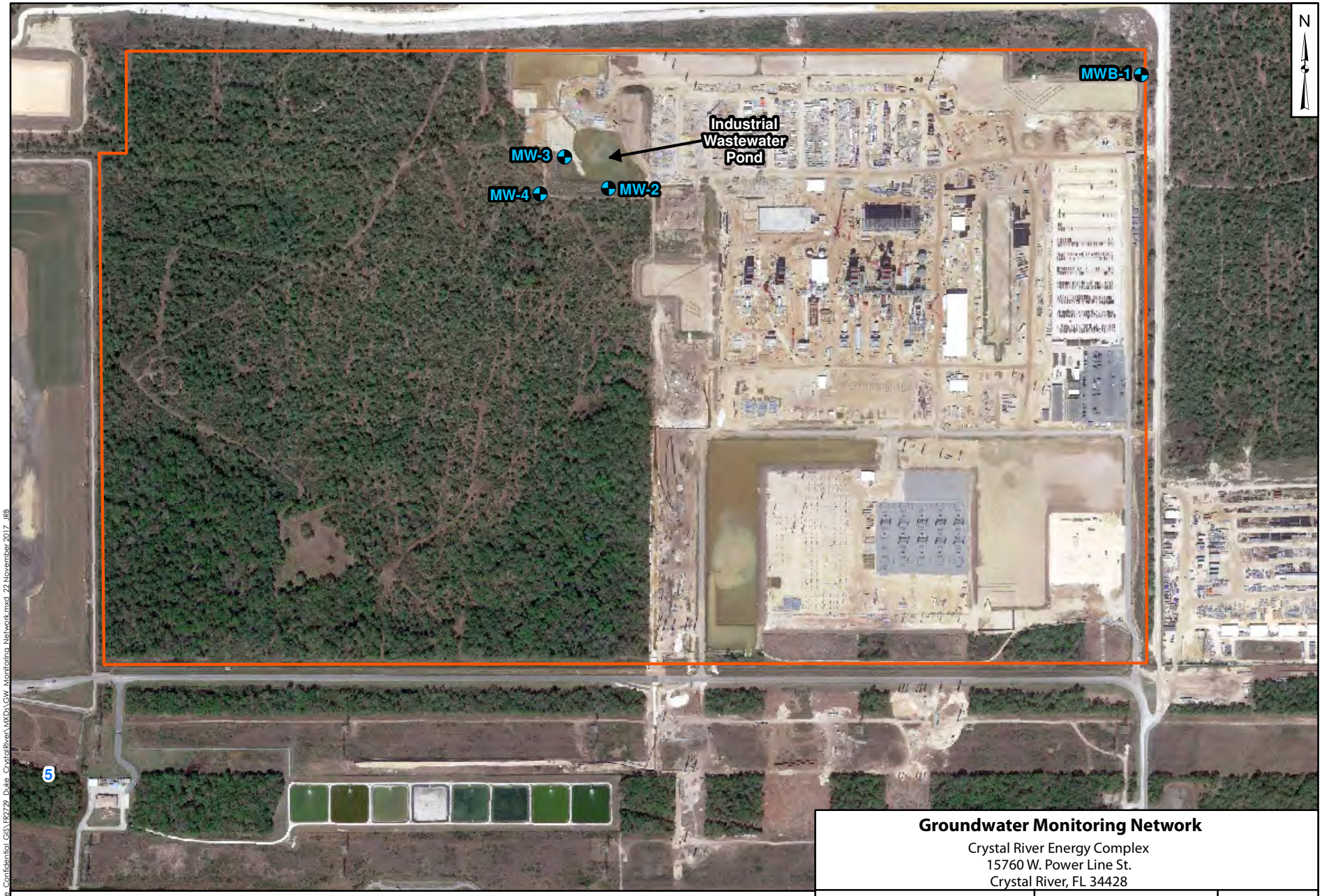
Geosyntec consultants

TAMPA, FL

DATE: December 2015	FILE NO.
PROJECT NO. FR2729.01	FIGURE NO. 17

I:_CADD (STANDARDS)\WELL LOGS\AS-BUILT-WELL-TEMP.DWG (11 December 2015) cvickers

APPENDIX A
Lithologic Borings



Groundwater Monitoring Network

Crystal River Energy Complex
15760 W. Power Line St.
Crystal River, FL 34428

Legend

- Monitoring Well Location
- CCC Project Site

Notes:
1. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2017 aerial image source: Google Earth Pro.

Geosyntec consultants | DUKE ENERGY PROGRESS | Figure 1

Tampa, FL | November 2017

Path: \\tlusville-01\DATA1\Duke_Confidential\GIS\FR2729_Duke_CrystalRiver\MXDs\GW_Monitoring_Network.mxd 22 November 2017 JRB

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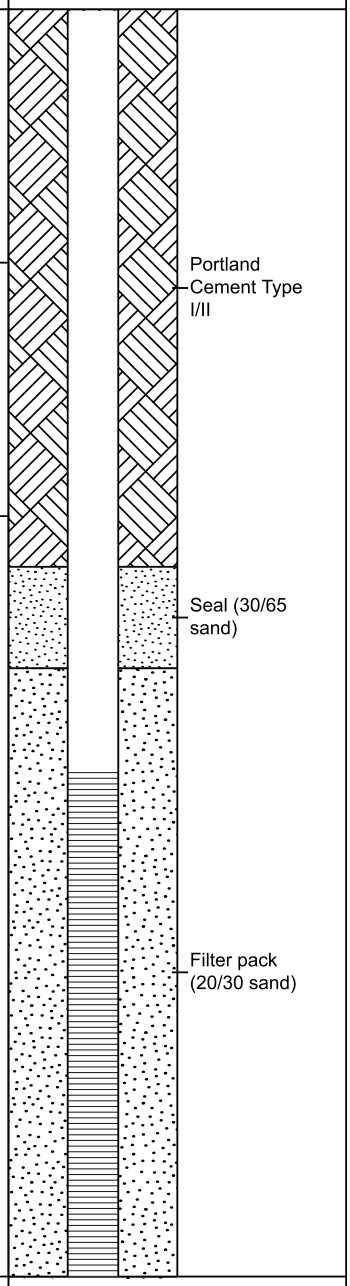
BORING LOG MWB-1

PROJECT NUMBER FR3131/02/02	**DRILLING DATE** 10/30/2017	**COORDINATES** 28.971029, -82.668276
PROJECT NAME Crystal River CCCP	**TOTAL DEPTH** 25 ft bls	**COORD SYS** NAD83
CLIENT Duke Energy Florida	**DIAMETER** 2"	**COMPLETION** Above-ground
DRILLING COMPANY Cascade Drilling	**CASING** Schedule 40 PVC	**SURFACE ELEVATION** 9.4
DRILLERS C. Turner	**SCREEN** Schedule 40 PVC w/ 0.010" slot	**WELL TOC** 12.24

COMMENTS Hand augered up to 5 ft BLS, remainder with rota-sonic drill rig with 4-inch core barrel followed by 6-inch temporary steel casing.

LOGGED BY M. Noto
CHECKED BY C. Cannon

Depth (ft)	Material Description	Run/Recovery
1	Fill SAND with limestone, 7.5YR 5/4, brown, well-sorted, with limestone chunks (1/4 - 1/8"), dry	60/60
4	SAND, fine-grained quartz, 10YR 6/1, gray, very well-sorted, subrounded, dry	
5	LIMESTONE, 10YR 8/1, white, weathered limestone with iron oxidation staining, moist	60/50
7 ▽	Same as above- wet, less weathered	
10	Same as above- more competent limestone	
15	Same as above	
20	Same as above- fossiliferous very competent limestone, bivalves and gastropods	
23	Calcareous mud- clayey weathered limestone, wet, 10YR 6/6	
25	Termination Depth at: 25 ft	



Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 12 Dec 2017

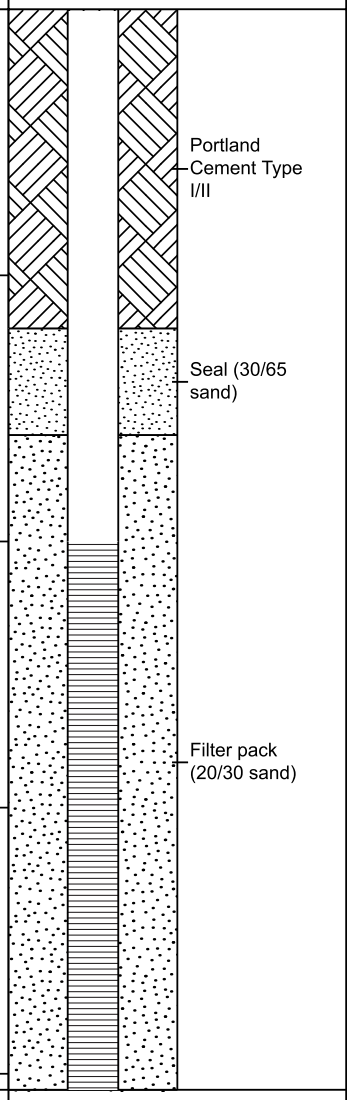
BORING LOG MW-2

PROJECT NUMBER FR3131/02/02	**DRILLING DATE** 9/24/2017	**COORDINATES** 28.969353, -82.676960
PROJECT NAME Crystal River CCCP	**TOTAL DEPTH** 20.3 ft bls	**COORD SYS** NAD83
CLIENT Duke Energy Florida	**DIAMETER** 2"	**COMPLETION** Above-ground
DRILLING COMPANY EDS	**CASING** Schedule 40 PVC	**SURFACE ELEVATION** 11.4
DRILLERS K. Rogers	**SCREEN** Schedule 40 PVC w/ 0.010" slot	**WELL TOC** 14.57

COMMENTS Hand augered up to 5 ft BLS, remainder with rota-sonic drill rig with 4-inch core barrel followed by 6-inch steel temporary casing.

LOGGED BY M. Noto
CHECKED BY C. Cannon

Depth (ft)	Material Description	Run/Recovery
0	SAND/fill, 10YR 4/4, dark yellowish brown, fine-grained, well-sorted, dry, loose	60/60
1	Fill SAND, 10YR 2/2, very dark brown, very fine-grained, subrounded, dry, loose, quartz sand with 15-20% (1/4 - 1/8") gravel	
2		
3		
4		
5	Same as above	60/42
6		
7	▽	
8	SAND, 10YR 5/6, yellowish brown, moist, very well-sorted, firm, sub-rounded, fine-grained quartz sand	
9		
10	Same as above- wet	60/42
11	LIMESTONE, 10YR 8/1, white, wet, moderately friable, fossiliferous (bivalves), moderately competent; drilling slowed, more water used, less weathered competent rock	
12		
13		
14		
15	SAND, 10YR 5/6, yellowish-brown, wet, loose, well-sorted, rounded fine-grained quartz sand with 40% calcareous (bivalve) shell fragments	60/51
16		
17		
18	LIMESTONE, 10YR 8/11, white, wet, follliliferous (bivalves), very competent	
19	Sandy LIMESTONE with clay, 10YR 8/1, white, low plasticity, limestone mud, with competent limestone gravel, 8" size; increased drilling speed	
20		
21	Termination Depth at: 20.3 ft	
22		
23		
24		



produced by ESlog.ESdat.net on 12 Dec 2017

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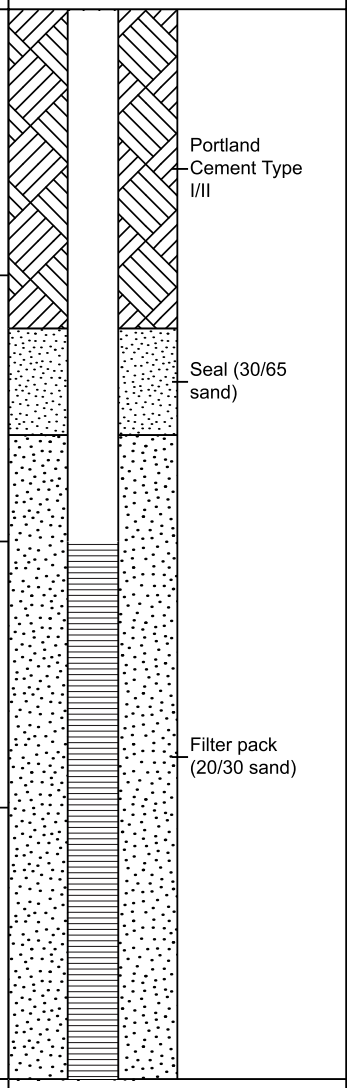
BORING LOG MW-3

PROJECT NUMBER FR3131/02/02	**DRILLING DATE** 9/24/2017	**COORDINATES** 28.969802, -82.677681
PROJECT NAME Crystal River CCCP	**TOTAL DEPTH** 20.1 ft bls	**COORD SYS** NAD83
CLIENT Duke Energy Florida	**DIAMETER** 2"	**COMPLETION** Above-ground
DRILLING COMPANY EDS	**CASING** Schedule 40 PVC	**SURFACE ELEVATION** 10.5
DRILLERS K. Rogers	**SCREEN** Schedule 40 PVC w/ 0.010" slot	**WELL TOC** 13.52

COMMENTS Hand augered up to 5 ft BLS, remainder with rota-sonic drill rig with 4-inch core barrel followed by 6-inch steel temporary casing.

LOGGED BY M. Noto
CHECKED BY C. Cannon

Depth (ft)	Material Description	Run/Recovery
0	Fill SAND with gravel, 10YR 3/4, dry, poorly sorted, fine-grained sand with gravel (1/4-4")(20-25%) limestone (weathered), very soft	60/60
3	Fill SAND, 10YR 3/4, with limestone, 60-70% limestone, friable, with bivalves (fossils)(7-8")	
4	Silty SAND, 10YR 2/2, very dark brown, loose, fine-grained, dry, with 5% gravel (1/4")	
5	LIMESTONE, 10YR 8/2, very pale brown, saturated/wet, friable, with fossils	60/44
6	▽	
8	Same as above, 10YR 8/1, white	
10	Sandy LIMESTONE, same as above, 10YR 8/2; increased drilling speed (more weathered limestone)	60/37
13	LIMESTONE, 10YR 8/1, white, same as above; decreased drilling speed	
15	Same as above, more competent	60/40
16	Void	
18	Sandy LIMESTONE, moist, increased friability, 10YR 8/1, white	
20		
21	Termination Depth at: 20.1 ft	



produced by ESlog.ESdat.net on 12 Dec 2017

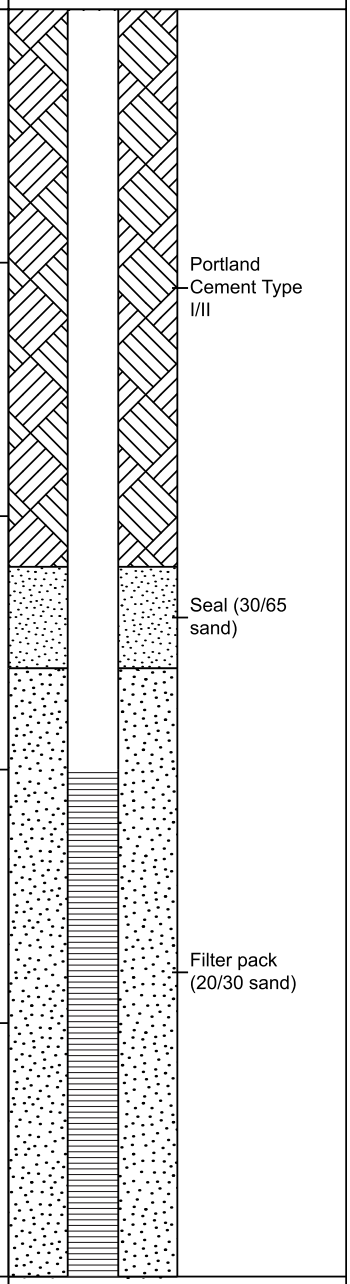
BORING LOG MW-4

PROJECT NUMBER FR3131/02/02	**DRILLING DATE** 10/31/2017	**COORDINATES** 28.969273, -82.678076
PROJECT NAME Crystal River CCCP	**TOTAL DEPTH** 25 ft bls	**COORD SYS** NAD83
CLIENT Duke Energy Florida	**DIAMETER** 2"	**COMPLETION** Above-ground
DRILLING COMPANY Cascade Drilling	**CASING** Schedule 40 PVC	**SURFACE ELEVATION** 8.5
DRILLERS C. Turner	**SCREEN** Schedule 40 PVC w/ 0.010" slot	**WELL TOC** 11.26

COMMENTS Hand augered up to 5 ft BLS, remainder with rota-sonic drill rig with 4-inch core barrel followed by 6-inch steel temporary casing.

LOGGED BY M. Noto
CHECKED BY C. Cannon

Depth (ft)	Material Description	Run/Recovery
1	Fill SAND, 10YR 4/4, well-sorted, dry, soft fine-grained quartz sand, not natural, fill on pad	60/36
2		
3	LIMESTONE, 10YR 8/1, white, very weathered friable limestone	
4		
5	Same as above, wet at 5'	60/24
6		
7		
8		
9		
10	Same as above, saturated	60/48
11		
12		
13		
14		
15	Same as above	60/60
16		
17	SAND, 5YR 3/3, dark reddish brown, fine-grained, well-sorted, wet quartz sand, sub-rounded	
18	SAND, 10YR 8/1- 5YR 7/6, white to reddish brown, extremely fine sand with veins of reddish brown fine-grained iron-stained sand, extremely well-sorted	
19		
20	Same as above, moist	
21		
22		
23	GLEY, Gley 5/1, greenish gray with iron staining, dry, with >2" ribbons	
24	Sandy SILT, 10YR 8/6, yellow, very fine, well-graded, dry silt with rounded grains <5% throughout, chalky texture	
25	Termination Depth at: 25 ft	
26		



Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 12 Dec 2017

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	CMA
Drawn by:	CJH
Checked by:	SCK
Approved by:	SCK

Project No.	H4155013
Scale:	AS SHOWN
File Name:	CAD
Date:	10/12/2015

Terracon
504 E. Tyler St.
Tampa, FL 33602

EXPLORATION PLAN

Citrus County Combined Cycle Project
15760 W Power Line Street
Crystal River, FL

Exhibit

A-1

BORING LOG NO. FP-01

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9675687° Longitude: -82.6716731°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		POORLY GRADED SAND WITH SILT(SP-SM), fine grained, reddish-brown, loose				
1.0		**HIGHLY WEATHERED LIMESTONE**, light brown				1-2-12-21 N=14
2.0		**LIMESTONE**, light brown				50/4"
		white	5			50/4"
						50/3"
8.0		**WEATHERED LIMESTONE**, white	10			23-33-39-47 N=72
						41-27-20-17 N=47
						17-25-20 N=45
13.5		***Boring Terminated at 13.5 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater intitially observed at a depth of 2.85'.

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/1/2015 Boring Completed: 10/1/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-3

BORING LOG NO. FP-02

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9680172° Longitude: -82.6716759°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		POORLY GRADED SAND WITH CLAY (SP-SC), fine grained, reddish-brown, loose, with limestone				2-4-3-2 N=7
		brown		▽		WOH/6"-1-2-5 N=3
4.0		**HIGHLY WEATHERED LIMESTONE**, yellowish-brown	5			2-7-11-19 N=18
6.0		**WEATHERED LIMESTONE**, light brown				32-34-43-28 N=77
		white				20-19-21-14 N=40
10.0		**HIGHLY WEATHERED LIMESTONE**, white	10			9-7-8-9 N=15
12.0		**WEATHERED LIMESTONE**, white				8-19-7 N=26
13.5		***Boring Terminated at 13.5 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 3.34'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/1/2015 Boring Completed: 10/1/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-4

BORING LOG NO. FP-03

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9684646° Longitude: -82.6716788°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
0	**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine grained, reddish-brown, loose, with roots			1-2-2-1 N=4
2.0	**WEATHERED LIMESTONE**, yellowish-brown	▽		6-16-21-21 N=37
	light brown			27-23-33-27 N=56
5				20-24-14-19 N=38
	white			21-16-20-23 N=36
10				5-10-17-50/5" N=27
				21-48-19-29 N=67
14.0	***Boring Terminated at 14 Feet***			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 2.81'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 9/30/2015 Boring Completed: 9/30/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-5

BORING LOG NO. FP-04

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9689126° Longitude: -82.671701°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		POORLY GRADED SAND (SP), fine grained, brown, loose		▽		WOH/6"-1-2-2 N=3
		very loose				1/12"-1/12" N=1
4.0		**HIGHLY WEATHERED LIMESTONE** yellowish-brown	5			1-3-1-1 N=4
6.0		**CLAYEY SAND (SC)**, fine grained, brown, loose, calcareous, with limestone				1-2-3-3 N=5
8.0		**POORLY GRADED SAND (SP)**, fine grained, white, loose, calcareous				2-1-2-2 N=3
10.0		**HIGHLY WEATHERED LIMESTONE** white	10			4-11-7 N=18
11.5		***Boring Terminated at 11.5 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 0.50'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 9/30/2015 Boring Completed: 9/30/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-6

BORING LOG NO. FP-05

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9675612° Longitude: -82.6733594°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
0					
1.0	**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine grained, brown, medium dense				2-5-16-47 N=21
2.0	**HIGHLY WEATHERED LIMESTONE**, light brown		▽		
	LIMESTONE, white				50/3"
4.0	**HIGHLY WEATHERED LIMESTONE**, yellowish-brown				2-4-3-7 N=7
	white	5			9-14-15-13 N=29
					6-8-9-11 N=17
		10			2-6-8 N=14
					11-8-12 N=20
13.0	***Boring Terminated at 13 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 1.77'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/1/2015 Boring Completed: 10/1/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-7

BORING LOG NO. FP-06

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9680088° Longitude: -82.6733623°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		WEATHERED LIMESTONE, light brown				
						3-6-23-20 N=29
		white		▽		17-15-16-22 N=31
			5			19-26-20-13 N=46
		yellowish-brown				8-14-18-24 N=32
	8.0	**HIGHLY WEATHERED LIMESTONE** light brown				3-5-7-17 N=12
			10			10-7-10 N=17
						15-9-10 N=19
	13.0	***Boring Terminated at 13 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 2.80'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/2/2015 Boring Completed: 10/2/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-8

BORING LOG NO. FP-07

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9684561° Longitude: -82.6733652°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
0	**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine grained, brown, loose			
1.0	**HIGHLY WEATHERED LIMESTONE** light brown	▽		1-4-6-7 N=10
				5-4-1-3 N=5
	yellowish-brown			6-13-7-7 N=20
5				10-14-8-5 N=22
	white			24-8-2-13 N=10
10				22-7-3-10 N=10
12.0	***Boring Terminated at 12 Feet***			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 1.95'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/1/2015 Boring Completed: 10/1/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-9

BORING LOG NO. FP-08

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9689042° Longitude: -82.6733951°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		POORLY GRADED SAND WITH CLAY (SP-SC), fine grained, orange-brown, loose		▽		
1.0		**HIGHLY WEATHERED LIMESTONE**, white				1-6-7-4 N=13
						2-11-5-6 N=16
4.0		**WEATHERED LIMESTONE**, white	5			7-21-17-13 N=38
6.0		**LIMESTONE**, light brown				15-31-50/5"
8.0		**WEATHERED LIMESTONE**, white				16-32-9-18 N=41
10.0		**HIGHLY WEATHERED LIMESTONE**, light brown	10			9-10-13 N=23
11.5		***Boring Terminated at 11.5 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 0.62'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/1/2015 Boring Completed: 10/1/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-10

BORING LOG NO. FP-09

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9697239° Longitude: -82.6774241°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
0.3		**POORLY GRADED SAND WITH SILT(SP-SM)**, fine grained, brown, loose				
		HIGHLY WEATHERED LIMESTONE, light brown		▽		2-6-8-5 N=14
						4-6-9-12 N=15
4.0		**WEATHERED LIMESTONE**, yellowish-brown	5			9-8-21-11 N=29
6.0		***Boring Terminated at 6 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 1.67'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 9/29/2015 Boring Completed: 9/29/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-11

BORING LOG NO. FP-10

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9702368° Longitude: -82.6774275°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
	0.8	**POORLY GRADED SAND WITH SILT(SP-SM)**, fine grained, orange-brown, very loose				WOH/6"-2-19-16 N=21
	2.0	**HIGHLY WEATHERED LIMESTONE**				
		WEATHERED LIMESTONE, light brown	5	▽		11-6-23-17 N=29
						17-20-22-22 N=42
	7.5					16-17-9 N=26
		Boring Terminated at 7.5 Feet				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 2.30'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 9/30/2015 Boring Completed: 9/30/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-12

BORING LOG NO. PB-01

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9699906° Longitude: -82.6774259°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		POORLY GRADED SAND WITH SILT(SP-SM), fine grained, brown, loose				
1.0		**HIGHLY WEATHERED LIMESTONE** light brown				1-2-12-14 N=14
2.0		**WEATHERED LIMESTONE**, light brown		▽		23-10-23-10 N=33
		white	5			14-27-20-12 N=47
6.0		**HIGHLY WEATHERED LIMESTONE** white				20-7-8-5 N=15
						WOR/18"=2 N=0
10.0		**WEATHERED LIMESTONE**, white	10			7-22-41-28 N=63
						8-30-35-28 N=65
			15			14-11-16-11 N=27
16.0		***Boring Terminated at 16 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 2.40'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 9/30/2015 Boring Completed: 9/30/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-13

APPENDIX B
Groundwater Modeling Evaluation
Citrus Combined Cycle Plant

Prepared for

Duke Energy Florida, Inc.
Citrus Combined Cycle Project
14385 N. Access Road
Crystal River, FL 34428

GROUNDWATER MODELING EVALUATION-REVISION 1

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL

Prepared by

12802 Tampa Oaks Boulevard, Suite 151
Tampa, Florida 33637

April 2019

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1. EXECUTIVE SUMMARY

Geosyntec Consultants (Geosyntec) performed groundwater modeling to evaluate the groundwater flow around the current and proposed percolation pond for the Citrus Combined Cycle Plant (CCCP). The modeled groundwater flow was used to estimate the placement of intermediate, compliance, and background monitoring wells per the requirements of the groundwater monitoring plan being prepared according to Florida Administrative Code (F.A.C.) Rule 62-520.600. The model was used to assess the mounding associated with use of the current pond, the proposed northern pond, and the current pond and proposed pond utilized concurrently.

Geosyntec utilized previously reported geotechnical and hydrogeologic information to evaluate the pond area. This information included soil borings, lithology, hydraulic conductivity, and infiltrometer testing data. Additionally, it was necessary to use data and maps provided by governmental sources (United States Geologic Society (USGS), Southwest Florida Water Management District (SWFWMD), etc.). Geosyntec used the information to develop a three-dimensional, finite difference groundwater flow model. The model was calibrated to groundwater and surface water elevations collected during the industrial waste water (IWW) quarterly sampling in November 2018 associated with the currently operating IWW percolation pond. The model was used to evaluate mounding associated with the current percolation pond and proposed northern percolation pond when they are operating separately at maximum capacity (3 feet of freeboard). Also, the model was used to evaluate the mounding associated with the current and proposed percolation ponds are operating half full of water concurrently.

Simulation results indicate that groundwater flow in the proposed percolation pond area prior to construction is generally to the southwest. Additionally, the modeling indicates that groundwater mounding of 0.1 foot could be expected to occur approximately 2,000 feet downgradient of the IWW percolation pond when it is operated at maximum capacity.

2. INTRODUCTION

2.1 Terms of Reference

This groundwater modeling contained in this report has been completed in support of the Groundwater Monitoring Plan (GWMP) for the proposed Duke Energy Florida, Inc. (Duke) Citrus Combined Cycle Plant ("CCCP" or "Site"). The GWMP was prepared in accordance with Florida Administrative Code (F.A.C.) Rule 62-520.600 to ensure compliance with applicable groundwater quality standards at the Site.

2.2 Objectives

The objective of the Groundwater Modeling Evaluation is to perform a hydraulic mounding analysis of an appropriately sized industrial wastewater (IWW) percolation pond proposed for the CCCP. The model was used to evaluate mounding associated with the current percolation pond and proposed northern percolation pond when they are operating separately at maximum capacity (3 feet of freeboard). Also, the model was used to evaluate the mounding associated with the current and proposed percolation ponds are operating half full of water concurrently. These scenarios were then used to select locations for intermediate, compliance, and background monitoring wells.

2.3 Report Organization

The Groundwater Modeling Evaluation is organized as follows:

- **Section 3** - identifies the site location and planned operations at the CCCP;
- **Section 4** - briefly describes the regional geology and hydrogeology near the CCCP and create the regional conceptual model;
- **Section 5** - briefly describes the site geology and hydrogeology of the CCCP used to create the site conceptual model;
- **Section 6** - provides a summary of the groundwater model input parameters, model domain creation, model calibration, parameter sensitivity analysis, and results.

3. SITE DESCRIPTION

3.1 Site Location

The Site is adjacent to the eastern boundary of Duke's existing Crystal River Energy Complex (CREC) located at 14385 North Access Road, Crystal River, (Citrus County) FL 34428 (**Figure 1**) and consists of approximately 400 acres. The Site is located in Section 22, Township 17 south, and Range 16 east, near latitude 28° 57' 54" N and longitude 82° 39' 50" W. The facility consists of two combined cycle generation units using a natural gas fuel source to produce approximately 800 megawatts each for a total of 1,600 megawatts.

3.2 Site Process Review

Construction activities for the CCCP began in early 2016. Commercial operation began in May 2018 for the first unit and December 2018 for the second unit. The power plant consists of two combined cycle generating units. Each unit consists of two advanced combustion turbine generators, two heat recovery steam generators, and one steam turbine generator (**Figure 2**). The condenser cooling system is a closed-loop, recirculating system consisting of a new mechanical draft cooling tower system for each combined cycle unit. Cooling tower makeup water consists of seawater withdrawn from the existing CREC intake canal through the existing Crystal River Unit 3 intake structure. Groundwater use is minimized through the use of seawater for cooling water. Cooling tower blowdown is discharged via the existing CREC discharge canal through a discharge structure. Process and potable freshwater needs for the Site include demineralized water for steam cycle makeup, plant service water, wash water, fire protection water, and potable water. The freshwater needs are provided through the current groundwater withdrawals using the existing water use permit (WUP) for the CREC.

Industrial wastewater (IWW) discharges include low-volume waste streams as defined in 40 CFR Part 423. These discharges include, but are not limited to, flows from plant service water systems and floor drains, blowdown from the heat recovery steam generators (HRSGs), raw water treatment filter backwash, neutralized condensate polisher regeneration wastes, and other residual waters from the demineralized water treatment systems. Discharges from these sources are treated, as appropriate, and discharged to the appropriately sized on-Site percolation pond. With the exception of cooling tower blowdown, IWWs are not discharged to surface waters. The percolation pond system will be designed in accordance with all applicable nonprocedural requirements for IWW percolation ponds (ECT, 2014).

The wastewater from floor and equipment drains throughout the plant may be exposed to oily products and, therefore, will be collected and treated through oil/water separators. Residual water from the demineralized water system is neutralized. Infrequent HRSG and pipe cleaning that produces metal cleaning wastes is collected and disposed off-Site by a licensed vendor (ECT, 2014). Sanitary wastewater is sent to an onsite, appropriately sized, package domestic wastewater treatment plant and the treated effluent is discharged to the proposed IWW pond.

A stormwater management system has been designed to handle and treat the 25-year, 24-hour storm event in accordance with all applicable nonprocedural requirements, including the requirements in Chapter 62-330, F.A.C. Potential contact stormwater runoff from the power block and equipment areas is treated through oil/water separators and routed to the on-Site IWW percolation pond system. Noncontact stormwater runoff is collected and routed to the stormwater detention ponds.

The Site also includes associated facilities, such as closed-cycle mechanical draft cooling towers, administration/warehouse building and parking, auxiliary boiler, emergency diesel generators, firewater pump, water treatment and storage tank facilities, switchyard, stormwater management system and detention ponds (ECT, 2014).

4.0 REGIONAL GEOLOGY AND HYDROGEOLOGY

Historical documents provided by Duke were reviewed to evaluate regional and site-specific geologic and hydrogeologic features. These documents were used to develop the site conceptual model and to develop the model domain.

4.1 Regional Geology

The Site lies within the Coastal Swamps physiographic region and near the boundary of the Gulf Coastal Lowland physiographic region (Knochenmus and Yobi, 2001). The general hydrogeologic units that form the hydrogeologic framework in the region include the discontinuous, siliciclastic Surficial Aquifer System (SAS) and the limestone and dolostone of the Upper Floridan Aquifer System (UFAS).

Sediments within the SAS are characterized as undifferentiated surficial deposits (USDs) and are comprised of a discontinuous veneer of sands, clayey sands, and shell. Thicknesses vary considerably due to the irregular surface of the underlying limestone (Spencer, 1984). A component of the USDs is comprised of residual and reworked Hawthorn formation derived from the fluctuation of sea level (Faulkner, 1973).

Regionally, the UFAS is comprised of (in descending order) the Suwannee Limestone, the Ocala Group Limestone (including the Crystal River, Williston, and Inglis Formations), and the Avon Park Limestone (Spencer, 1984). A generalized regional cross-section is included in **Figure 3**.

4.2 Regional Hydrogeology

Groundwater in the area occurs in the unconsolidated SAS and porous limestone of the UFAS. In the vicinity of the CCCP, the UFAS is unconfined due to the absence of well developed, low permeability sediments between the SAS and UFAS (Spencer, 1984). The predominant regional groundwater flow is generally from northeast to southwest toward the Gulf of Mexico with variability attributable to topography and lithology.

Regional groundwater quality data indicates that historic withdrawal of groundwater within the UFAS has resulted in saltwater intrusion along much of Florida's Gulf Coast (Guvanasen, 2000). Prior data from two USGS wells located at the CREC indicates that the upper transmissive zone of the Inglis Formation has a higher concentration of chlorides (200 to 1,800 milligrams per liter [mg/L]) than the lower transmissive zone (approximately less than 20 mg/L) (ESE, 1984) providing some evidence of saltwater encroachment near the CREC.

5.0 SITE GEOLOGY AND HYDROGEOLOGY

5.1 Site Geology

The geologic and hydrogeologic units, in order of increasing depth below land surface, at the Site are summarized below.

- *Undifferentiated Surficial Deposits (USDs)* - The USDs are comprised of brown to grey silty sands to sandy clays with muck ranging in thickness from 0 to 20 ft below land surface (BLS) (AMEC, 2013 and Terracon, 2015). The thickness of the USDs is variable as a result of the irregular surface of the underlying limestone. Due to the limited extent of the USDs, the SAS is only locally present at the Site where saturated unconsolidated sediments are present.

- *Inglis Formation of the Ocala Group* - Encountered between land surface and 20 ft BLS, this white, fossiliferous, and friable limestone is the uppermost hydrogeologic unit of the UFA. The Inglis Formation is cavernous with solution channels and cavities. Permeable zones within the Inglis Formation are present at depths of less than 30 ft BLS and between 40 and 60 ft BLS (the base of the Inglis Formation).

- *Avon Park Formation* - Encountered between 45 and 70 ft BLS, the Avon Park Formation is comprised of an occasionally dolomitized limestone and well indurated limestone (AMEC, 2013 and Spencer, 1984). The Avon Park Formation is the formation utilized for water supply for CREC operations.

Two geotechnical investigations were completed at the Site in November 2013, by AMEC and in October 2015 by Terracon. AMEC completed 25 standard penetration test (SPT) soil borings within the footprint of the proposed Site facilities that ranged in depths from 26 ft BLS to approximately 100 ft BLS (AMEC, 2013). **Figure 4** shows the locations of the completed SPTs along with the transects of three cross-sections prepared using lithologic information from the boring logs. The cross-sections are included as **Figures 5** through **Figure 7**. The report indicates several "weak" locations where the SPT was driven by the weight of the drilling rod without hammering. Most of the "weak" locations only occurred over an interval of several feet and can be attributed to weathered limestone lenses or small solution cavities. However, at boring B-15, a weak zone that was approximately 23 ft deep was encountered and the boring had to be abandoned due to unsafe drilling conditions.

Terracon completed several shallow SPT borings across the Site to evaluate the potential locations of several large diameter circulation water pipes and the proposed percolation pond. The borings were completed to depths of between 6 and 16 ft BLS and were logged for soil type and density. In addition, Geosyntec installed four IWW monitoring wells associated with the previous GWMP (Geosyntec, 2016). The reported lithologic logs are included in **Appendix A**. Lithologic descriptions are comparable to the AMEC report and similar geology is apparent across the Site.

5.2 Site Hydrogeology

The UFA and the SAS (where present) have similar flow patterns with groundwater predominantly flowing from northeast to southwest at the Site. Flow directions may vary due to the complex subsurface character of the UFAS caused by solution cavities, tidal fluctuations, and surface water features.

Terracon completed several in-situ, down-hole permeability tests and double ring infiltrometer (DRI) tests during the geotechnical investigation in October 2015 (Terracon, 2015). The down-hole permeability tests were conducted by pumping the un-cased portion of a test boring and measuring the recovery time between two set water level indicators after the pump was shut off. The calculated permeabilities range from 0.3 feet per day (ft/day) to 51 ft/day with an average of 12.8 ft/day. A summary of the calculated permeabilities are included in **Table 1**. It should be noted that these permeabilities may be biased low due to the small volume of aquifer perturbed during the testing. Additional hydraulic conductivity data collected during previous evaluations at the CREC indicate that hydraulic conductivities range from 7.9 to 170 feet per day in the shallow part of the UFA.

Two DRI tests were performed in the proposed storm water retention area of the Site. The DRI test procedure consisted of installing a 12-inch diameter steel ring and a 24-inch diameter steel ring concentrically into the ground. Water was then added to a desired head level of approximately 12 inches in both casings and held constant. The amount of infiltration observed in the inner ring versus time was then recorded. The results of the DRI tests indicate an average infiltration rate of 4.9 inches per hour (Terracon, 2015).

6.0 GROUNDWATER MODELING

The sections below document the design of the groundwater model.

6.1 Model Development

The model was conceptualized as a nine layer equivalent porous media flow system. The model layers and corresponding stratigraphy are described below. Parameter values assigned to the model layers are presented in **Table 2**.

- Layer 1: Surficial aquifer system (land surface extending to midpoint between land surface and UFA). It should be noted that the land surface in the area of the proposed percolation pond was altered to reflect a proposed berm crest height of 15.0 feet NGVD 29 with a 1 foot vertical to 4 feet horizontal berm slope. The effective base of the current percolation pond was set at an elevation of 5.5 ft NGVD 29, the bottom of the proposed northern percolation pond was set to 6.5 feet NGVD, and the bottom of the storm water ditch located north of the percolation pond was set at an elevation of 6.5 ft NGVD29.
- Layer 2: Surficial aquifer system (midpoint between land surface and UFA and UFA)
- Layer 3: higher hydraulic conductivity zone of Ocala Limestone (top of UFA to -20 ft NGVD 29)
- Layer 4: lower hydraulic conductivity zone of Ocala Limestone (-20 to -30 ft NGVD29)
- Layer 5: higher hydraulic conductivity zone of Ocala Limestone (-30 to -50 ft NGVD 29)
- Layer 6: lower hydraulic conductivity zone of Avon Park formation (-50 to -60 ft NGVD29)
- Layer 7: higher hydraulic conductivity zone of Avon Park formation (-60 to -130 ft NGVD 29)
- Layer 8: higher hydraulic conductivity zone of Avon Park formation (-130 to -200 ft NGVD 29)
- Layer 9: lower hydraulic conductivity zone of Avon Park formation (-200 to -590 ft NGVD29)

The model was constructed in GMS v. 10.2 which is a pre-processor for the USGS modular finite difference modeling program MODLFOW (McDonald and Harbaugh,

2005). The finite-difference grid consists of 450 rows and 815 columns of computational cells. The largest cells were 2,000 ft by 2,000 ft in the distal areas and the smallest were 10 ft by 10 ft in the immediate vicinity of the ponds, near the coal combustion residual materials at the CREC and near Site production wells[1].

Several types of boundary conditions were utilized in the simulation to constrain the numerical solution along the periphery of the model domain. Dirichlet-type (constant head) boundaries set to a specified head of -1.98 ft NGVD29 were placed along the western domain edge to simulate the Gulf of Mexico shoreline and hydraulically connected intake and discharge canals as reported on 16 October 2012 at low tide (Saltwater Tides, 2012). Additional constant head boundary conditions were placed at the CREC facility based on staff gauge measurements, where available, and LIDAR data (FGDL, 2015). Constant head type boundary conditions were also placed along various streams, rivers, and quarry surfaces as indicated by USGS topographic maps and LIDAR (FGDL, 2015). **Figure 8** presents the location of the boundary conditions and **Figure 9** presents the model grid.

The von Neumann-type (specified flux) boundaries of recharge were applied across the model domain within the ranges estimated by the Southwest Florida Water Management District (SWFWMD) data set (FGDL 2015). This resulted in three recharge zones. Closest to the coast there was no recharge as groundwater generally discharges in these areas. Further inland, the recharge was set at 5 inches per year and furthest to the east, the recharge was set at 7.5 inches per year. Additionally, several industrial and commercial water extraction wells are present within the model domain. **Figure 10** shows the location of the recharge zones and extraction wells in the model domain and **Table 3** summarizes the locations and extraction rates of individual wells.

The current and proposed percolation ponds were simulated at steady state conditions and at maximum capacity of three feet of freeboard (i.e. elevation 12 feet NGVD29). This was accomplished through the use of a constant head boundary condition.

6.2 Simulations

Groundwater and surface water elevations collected during 2017 and 2018 near the current IWW percolation pond are shown in **Table 4**. The original IWW percolation pond was not operational until 2018. The locations of these wells are shown on **Figure 11**. The modeled November 2018 groundwater and surface water elevations were compared against those computed in the model as shown on **Table 5**.

[1] It should be noted that this groundwater model was initially developed for the CREC and modified to evaluate the CCCP. The model developed for the CREC was properly calibrated and will be documented in a separate report.

The average daily discharge to the IWW percolation pond plus the average daily precipitation directly to the percolation pond were simulated as recharge to the pond to simulate the conditions in November 2018. The measured groundwater and surface water elevations at the site ranged from 3.97 to 11.40 feet NGVD29. The normalized root mean square error (NRMSE) was approximately 5.8%. Typically, it is desirable for the NRMSE to be less than 10%. As derived from **Table 5**, the average residual is -0.29 feet. This indicates the model is reasonably well calibrated in the vicinity of the current CCCP IWW percolation pond. The modeled groundwater flow field from the November 2018 sampling event is shown on **Figure 12**.

6.3 Results

The calibrated groundwater model simulations indicate that prior to development of the CCCP facility, groundwater flow is to the southwest. This is the same as was reported in Section 4.2. Additionally, simulations were performed to show the steady state groundwater mounding associated with keeping three feet of freeboard in the current percolation pond (**Figures 13 and 14**) and proposed northern percolation pond (**Figure 14**) separately. Another simulation was conducted to evaluate the groundwater mounding associated with operating both ponds half full of water (**Figure 15**). The results of the model showed that groundwater mounding of up to 0.1 feet due to the presence of the IWW pond exists at distances up to 2,000 feet from the IWW pond. It showed similar mounding in the proposed IWW pond to be constructed immediately north of the current IWW pond.

Current groundwater quality at the CCCP is based on wells installed as part of the current GWMP. These IWW wells include MWB-1, MW-2, MW-3, and MW-4. Based on review of this recalibrated model, it is proposed that MWB-1 remain a background monitoring well, but the remaining wells (MW-2, MW-3, and MW-4) become intermediate wells. Since the use of the proposed northern IWW pond is predicted to cause mounding to the north, an intermediate well is proposed (MW-5) to be located no more than 100 feet north of the proposed northern IWW pond. Additionally, the groundwater mounding associated with the current IWW pond and the proposed northern IWW is predicted to cause groundwater mounding of 0.1 feet approximately 2,000 feet downgradient of the current and IWW pond. Therefore, it is proposed that a well designed to monitor the edge of the ZOD (MW-6) be placed approximately 2,000 feet to the southeast of the IWW Ponds. The locations of the current and proposed groundwater monitoring wells are shown on **Figure 14** and well construction details are summarized in **Table 6**.

A sensitivity analysis was performed on the steady-state simulation. The horizontal hydraulic conductivity of the first four layers (i.e. those representing the surficial aquifer system and UFA) were increased. The ability of the model to match the surface water in the pond was greatly dependent on the hydraulic conductivity of the material directly

beneath the pond in layer 2. The ability to match the groundwater elevations in the IWW wells (MWB-1, MW-2, MW-3, and MW-4) was most sensitive to the hydraulic conductivities in layers 3 and 4 (UFA). from 14.2 to 75 feet per day and the horizontal hydraulic conductivity to vertical hydraulic conductivity ratio was maintained at three. The greater than 5 time increase in hydraulic conductivity lowered the predicted steady state stage of the proposed percolation pond during normal operations from 7.3 ft to 6.9 ft NGVD29.

6.4 Conclusions

The results of the model showed that groundwater mounding of up to 0.1 feet due to the presence of the IWW pond exists at distances up to 2,000 feet from the IWW pond. It showed similar mounding in the proposed IWW pond to be constructed immediately north of the current IWW pond. Based on this the current wells surrounding the IWW percolation pond should be considered intermediate wells, an additional intermediate well should be placed north of the proposed northern percolation pond, and a compliance well should be placed at the edge of the ZOD approximately 2,000 feet downgradient of the proposed percolation ponds.

7.0 REFERENCES

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TABLES

Table 1: Hydraulic Conductivity Summary

Citrus Combined Cycle Plant
Crystal River, FL

Boring No.	Trial No.	k (cm/sec)	k (ft/day)
FP-01	1	7.70E-03	21.8
	2	7.10E-03	20.1
	3	7.40E-03	21.0
FP-02	1	3.80E-04	1.1
	2	2.70E-04	0.8
	3	3.30E-04	0.9
	4	3.60E-04	1.0
FP-03	1	4.00E-03	11.3
	2	4.00E-03	11.3
	3	4.10E-03	11.6
FP-04	1	5.00E-04	1.4
	2	5.60E-04	1.6
	3	5.10E-04	1.4
FP-05	1	1.70E-02	48.2
	2	1.80E-02	51.0
	3	1.60E-02	45.4
FP-06	1	5.90E-03	16.7
	2	5.80E-03	16.4
	3	6.20E-03	17.6
FP-07	1	5.80E-03	16.4
	2	5.90E-03	16.7
	3	5.70E-03	16.2
FP-08	1	8.50E-03	24.1
	2	7.50E-03	21.3
	3	7.80E-03	22.1
FP-09	1	9.60E-05	0.3
	2	1.80E-04	0.5
	3	2.30E-04	0.7
	4	2.80E-04	0.8
	5	2.50E-04	0.7
FP-10	1	1.50E-04	0.4
	2	1.80E-04	0.5
	3	1.80E-04	0.5
Geometric Mean		**1.61E-03**	**4.6**

Notes:
No. = number
k = permeability
cm = centimeter
sec = second
ft = feet
Source: Geotechnical Engineering Report, Terracon Consultants, Inc., 2015

Table 2: Preconstruction Groundwater Quality Data

Citrus Combined Cycle Plant
Crystal River, FL

Location	Date	pH (S.U.)	Temp (°C)	Specific Conductance (µmhos/cm)	Turbidity (NTUs)	Chloride (mg/L)		Nitrate (mg/L)		Sulfate (mg/L)	TDS (mg/L)	Arsenic (ug/L)		Cadmium (ug/L)		Chromium (ug/L)		Lead (ug/L)	
	Compliance Limit	6.5 - 8.5	Report	Report	Report	250		10		250	500	10		5		100		15	
MWC-12R	4/24/2013	7.04	21.70	893	5.14	68.2		0.120	U	17.3	393	5	U	0.5	U	2.5	U	5	U
	7/16/2013	6.60	24.01	720	1.34	72.7		0.025	U	19.0	592	5	U	0.5	U	2.5	U	5	U
	10/2/2013	7.03	23.04	787	1.37	79.4		0.043	U	17.1	401	5	U	0.5	U	2.5	U	5	U
	1/10/2014	6.60	21.53	832	1.17	81.7		0.059		17.8	350	5	U	0.5	U	2.5	U	5	U
	4/17/2014	6.56	20.20	791	1.67	86.4		0.450		17.1	466	5	U	0.5	U	2.5	U	5	U
	7/17/2014	5.93	23.10	802	0.34	87.4		-		20.6	454	5	U	0.5	U	2.5	U	5	U
	10/10/2014	5.80	22.68	821	0.82	87.5		0.025	U	20.1	435	5	U	0.5	U	2.5	U	5	U
	4/10/2015	7.04	21.16	806	0.67	87.6		0.025		19.5	485	5	U	0.5	U	2.5	U	5	U
	7/15/2015	6.66	19.85	825	0.17	88.4		0.050	U	19.7	416	5		0.5	U	2.5	U	5	U
	10/9/2015	6.41	21.46	896	0.9	91.5		0.050	U	28.2	441	5	U	0.5	U	2.5	U	5	U
	1/14/2016	7.03	18.05	844	0.58	85.5		0.050	U	23.5	425	5	U	0.5	U	2.5	U	5	U
	4/8/2016	7.11	18.67	975	0.76	87.6		0.027	I	25.6	465	5	U	0.5	U	2.5	U	5	U
	7/11/2016	6.72	21.95	808	0.33	89.1		0.050	U	25	414	5	U	0.5	U	2.5	U	5	U
	10/11/2016	7.56	23.01	811	1.4	85.5		0.050	U	26.7	430	5	U	0.5	U	2.5	U	5	U
	1/10/2017	7.01	21.57	739	0.33	86.5		0.043		26.1	438	5	U	0.5	U	2.5	U	5	U
	4/5/2017	7.08	22.76	746	0.69	84.1		0.031	J	26.6	476	5	U	0.5	U	2.5	U	5	U
	7/12/2017	6.81	24.25	741	1.24	88.6		0.025	U	30.3	438	5	U	0.5	U	2.5	U	5	U
	10/13/2017	-	-	-	-	84.8		0.025	U	25.6	391	5	U	0.5	U	2.5	U	5	U
	1/5/2018	7.07	19.3	733	1.11	84		0.041	J	24.8	424	5	U	0.5	U	2.5	U	5	U
	4/12/2018	6.91	22.9	759	3.52	85.7		0.042	J	27.5	476	5	U	0.5	U	2.5	U	5	U
	10/8/2018	7.04	24.4	792	6.38	88.2		0.025	U	26.5	436	0.62		0.33	U	1.7	U	0.5	U
	1/7/2019	7.12	22.1	838	0.41	86.9		0.026	J	31.4	469	0.78		0.33	U	1.7	U	0.5	U

Table 2: Preconstruction Groundwater Quality Data

Citrus Combined Cycle Plant
Crystal River, FL

Location	Date	pH (S.U.)	Temp (°C)	Specific Conductance (µmhos/cm)	Turbidity (NTUs)	Chloride (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Arsenic (ug/L)	Cadmium (ug/L)	Chromium (ug/L)	Lead (ug/L)
	Compliance Limit	6.5 - 8.5	Report	Report	Report	250	10	250	500	10	5	100	15
MWB-30R	4/24/2013	7.56	20.05	637	2.59	5.9	0.560	11.3	520	5 U	0.5 U	2.5 U	5 U
	7/17/2013	6.27	23.55	494	1.03	5.4	0.590	13.6	252	5 U	0.5 U	2.5 U	5 U
	10/16/2013	7.79	22.26	715	0.65	8.2	0.560	-	176	5 U	0.5 U	2.5 U	5 U
	1/10/2014	7.30	20.73	393	0.63	5.4	0.230	13.1	219	5 U	0.5 U	2.5 U	5 U
	4/17/2014	7.52	18.56	346	0.52	6.8	0.330	11.2	178	5 U	0.5 U	2.5 U	5 U
	7/17/2014	7.12	21.16	320	0.29	7.2	-	10.8	155	5 U	0.5 U	2.5 U	5 U
	10/10/2014	6.99	22.13	356	0.71	7.0	0.320	11.5	189	5 U	0.5 U	2.5 U	5 U
	1/13/2015	6.84	18.31	378	0.25	5.5	0.140	-	185	5 U	0.5 U	2.5 U	5 U
	1/29/2015	6.84	16.29	363	0.16	-	-	-	-	-	-	-	-
	4/10/2015	7.58	18.21	329	0.45	7.2	0.410	9.2	196	5 U	0.5 U	2.5 U	5 U
	7/15/2015	6.82	20.29	367	0.29	6.7	0.37	10.9	187	5 U	0.5 U	2.5 U	5 U
	10/9/2015	7.42	20.61	362	0.69	7	0.39	9.4	150	5 U	0.5 U	2.5 U	5 U
	1/14/2016	7.52	18.58	359	0.44	7.1	0.36	10.3	184	5 U	0.5 U	2.5 U	5 U
	4/8/2016	7.66	17.4	685	0.93	6.2	0.25	13.9	197	5 U	0.5 U	2.5 U	5 U
	7/11/2016	6.94	19.92	344	0.33	6.6	0.29	13	171	5 U	0.5 U	2.5 U	5 U
	10/11/2016	7.55	24.49	352	1.5	5	0.13	15.1	183	5 U	0.5 U	2.5 U	5 U
	1/10/2017	7.26	23.14	328	0.27	5.1	0.19	14.1	207	5 U	0.5 U	2.5 U	5 U
	4/5/2017	7.77	22.66	491	0.42	23.8	0.17	15.5	282	5 U	0.5 U	2.5 U	5 U
	7/10/2017	6.3	25.19	1160	0.79	254	0.12	21.9	658	5 U	0.5 U	2.5 U	5 U
	8/17/2017	6.78	25.69	1186	0.83	221	0.12	21.9	702	5 U	0.5 U	2.5 U	5 U
	10/13/2017	7.2	25.9	1418	0.42	281	0.11	23.6	722	5 U	0.5 U	2.5 U	5 U
	1/5/2018	7.15	22.9	903	0.53	170	0.11	23.9	476	5 U	0.5 U	2.5 U	5 U
	4/12/2018	7.14	22.2	806	0.54	153	0.14	22.5	525	5 U	0.5 U	2.5 U	5 U
	7/13/2018	7.2	24.3	686	0.61	104	0.42	21.6	454	5 U	0.5 U	2.5 U	5 U
	10/8/2018	7.18	25.1	1090	4.53	194	0.13	20.2	631	0.5 U	0.33 U	1.7 U	0.5 U
	1/7/2019	7.33	22.6	699	0.12	97.2	0.31	17.7	402	0.5 U	0.33 U	1.7 U	0.5 U

Table 2: Preconstruction Groundwater Quality Data

Citrus Combined Cycle Plant
Crystal River, FL

Location	Date	pH (S.U.)	Temp (°C)	Specific Conductance (µmhos/cm)	Turbidity (NTUs)	Chloride (mg/L)		Nitrate (mg/L)		Sulfate (mg/L)	TDS (mg/L)	Arsenic (ug/L)		Cadmium (ug/L)		Chromium (ug/L)		Lead (ug/L)	
	Compliance Limit	6.5 - 8.5	Report	Report	Report	250		10		250	500	10		5		100		15	
MWB-1	11/1/2017	6.88	24.4	587	16.09	12.1		0.200	U	16.2	356	3.9		0.2	U	1	U	1	U
	2/27/2018	7.12	22.7	765	2.4	7.3	I	0.010	U	14.0	266	6.3		0.2	U	1	U	1	U
	5/17/2018	6.91	22.9	550	7.51	8.2		0.010	U	20.8	272	6.6		0.2	U	1.2	I	1	U
	8/27/2018	7.35	24.9	621	3.3	8.4		0.010	U	29.3	346	7.9		0.2	U	1	U	1	U
	11/13/2018	7.07	24.8	684	5.15	8.9		0.010	U	34.8	762	6.5		0.2	U	1	U	1	U
MW-2	11/1/2017	6.85	25.7	791	17.74	68.9		0.200		19.9	438	7.88		0.2	U	1	U	1	U
	2/27/2018	6.97	22.8	710	11.58	45.4		0.011	I	24.9	366	10.9		0.2	U	2		1	U
	5/17/2018	6.93	23.4	837	8.24	73.6		0.010	U	31.2	438	13.2		0.2	U	2.4		1	U
	8/27/2018	7.24	26.0	1,091	7.49	156.3		0.010	U	54.7	608	13.9		0.2	U	1.2	I	1	U
	11/13/2018	7.18	29.4	806	12.83	78.5		0.010	U	37.6	808	23.7		0.2	U	2.2		1	U
MW-3	11/1/2017	6.73	25.3	1,302	13.78	215.1		0.200	U	39.2	790	3.9		0.2	U	1	U	1	U
	2/27/2018	6.85	23.6	1,268	3.77	182.5		0.010	U	34.0	692	1	U	0.2	U	1	U	1	U
	5/17/2018	6.83	23.3	1,150	14.29	145.9		0.049		34.9	578	2.6		0.2	U	1.9	I	1	U
	8/27/2018	7.08	24.8	1,289	3.96	186.3		0.010	U	45.5	702	5.2		0.2	U	1.1	i	1	U
	11/13/2018	6.92	26.2	1,136	1.78	132.5		0.011	I	57.2	556	7.6		0.2	U	1	U	1	U
MW-4	11/1/2017	6.94	25.2	834	19.33	110.5		0.200	U	23.1	506	2.3		0.2	U	1	U	1	U
	2/27/2018	7.02	22.7	765	4.47	77.1		0.010	U	20.4	414	15.1		0.2	U	1	U	1	U
	5/17/2018	7.00	22.9	838	4.14	86.5		0.010	U	26.0	446	10.1		0.2	U	1.3	I	1	U
	8/27/2018	7.29	24.9	888	7.09	105.8		0.010	U	27.2	502	4		0.2	U	1	U	1	U
	11/13/2018	7.10	25.0	974	8.14	117.7		0.010	U	35.7	502	4.3		0.2	U	1	U	1	U
CCCP IWW Pond	2/27/2018	9.22	20.3	475	1.58	8.6		0.055		32.4	252	4.7		0.2	U	1	U	1	U
	5/17/2018	7.52	26.6	298	6.85	10.1		0.0362		21.6	224	9.5		1.1	U	2.7		1.1	U
	8/27/2018	7.78	31.0	766	9.27	13.9		0.010	U	31.8	340	7.8		0.2	U	1	U	1	U
	11/13/2018	8.08	36.1	1,224	5.92	194.0		0.014	I	59.1	598	10.1		0.2	U	1.1	I	1	U

Notes:
S.U. = Standard units
°C = degrees Celsius
NTU = Nephelometric Turbidity Unit
µmhos/cm = micromhos per centimeter
mg/L = milligrams per liter
ug/L = micrograms per liter
TDS = Total Dissolved Solids

Table 2: Preconstruction Groundwater Quality Data

Citrus Combined Cycle Plant
Crystal River, FL

Table 2: Preconstruction Groundwater Quality Data

Citrus Combined Cycle Plant
Crystal River, FL

Table 2: Preconstruction Groundwater Quality Data

Citrus Combined Cycle Plant
Crystal River, FL

Table 3: Extraction Well Location and Pumping Rates

Citrus Combined Cycle Plant
Crystal River, FL

Well Name	Easting (ft)	Northing (ft)	Flow Rate (ft^3/d)	Top of Screen Interval (ft)	Bottom of Screen Interval (ft)
WELL #1	455,520.23	1,678,840.60	-133.68	3.59	-166.41
SEVEN RIVERS WELL # 2	456,817.65	1,679,542.82	-13,769.14	5.63	-171.37
SEVEN RIVERS WELL	455,737.13	1,680,057.98	-1,470.49	4.27	-341.73
WELL #5	451,539.56	1,682,267.69	-38,099.09	-24.83	-61.83
WELL #4	452,687.92	1,682,376.04	-38,099.09	-26.89	-114.89
WELL #3	453,718.28	1,682,366.51	-50,798.78	-25.00	-79.00
WELL #1	454,780.28	1,682,413.94	-57,602.95	-24.50	-189.50
WELL #2	455,288.84	1,682,428.32	-57,602.95	-36.05	-189.05
WELL #3	455,792.07	1,682,462.02	-57,602.95	-50.50	-190.50
WELL #4	456,291.60	1,682,461.56	-57,602.95	-31.07	-190.07
WELL #5	456,791.82	1,682,469.83	-57,602.95	-24.78	-189.78
WELL #6	457,288.77	1,682,466.12	-57,602.95	-39.96	-189.96
WELL #7	457,812.43	1,682,493.19	-57,602.95	-40.23	-190.23
WELL #8	458,316.39	1,682,485.46	-57,602.95	-39.20	-189.20
WELL #9	458,810.22	1,682,496.34	-57,602.95	-37.94	-187.94
WELL #10	459,313.25	1,682,491.17	-57,602.95	-39.58	-189.58
PW-1A1B	432,532.33	1,683,279.58	-6,684.03	2.17	-32.66
SPRINGHORN W S WELL	459,293.18	1,680,724.03	-200.52	5.92	-186.08
CAST AWAYS WELL #1	457,277.39	1,675,125.20	-133.68	3.42	-166.58
CEDAR LAKE ESTATES WELL	458,080.71	1,676,009.34	-200.52	2.82	-72.18
THUNDERBIRD MHP WELL #1	460,392.60	1,669,256.71	-2,205.74	2.41	-32.59
SHAMROCK INDUSTRIAL PARK	473,052.70	1,682,401.82	-1,470.49	17.61	-152.39
CITRONELLE DOLLAR GENERAL	474,364.33	1,688,949.18	-133.68	21.68	-148.32
J & D TEXACO FOOD MART	474,698.58	1,688,441.40	-133.68	17.15	-152.85
CITRONELLE PARK	475,141.89	1,688,670.91	-133.68	15.35	-154.65
WELL #1	475,946.12	1,690,832.48	-200.52	17.05	-107.95

Notes:
Data retrieved from WMIS database (www18.swfwmd.state.fl.us/erp/erp/search/ERPSearch.aspx)
Pumping rates for CREC production wells (Well #1 through #10 and PW-1A1B provided by Duke)

Table 4: Measured Surface Water and Groundwater Elevations

Citrus Combined Cycle Plant
Crystal River, FL

Dates	Water Elevations (ft., NGVD29)				
	MWB-1	MW-2	MW-3	MW-4	IWW Percolation Ponds
11/1/2017	4.16	3.95	3.88	3.81	-
2/27/2018	4.58	4.13	4.03	4.00	-
5/17/2018	3.17	2.91	2.87	2.87	-
8/27/2018	6.60	6.04	5.86	5.61	10.17
11/13/2018	4.19	4.31	4.20	3.97	12.20
2/14/2019	6.10	5.79	5.74	5.41	10.90

Table 5: Observed and Computed Groundwater Elevations at CCCP 13 November 2018

Citrus Combined Cycle Plant
Crystal River, FL

Monitoring Well Location	Observed Groundwater Elevation (ft)	Computed Groundwater Elevation (ft)	Residual (ft)	Absolute Residual (ft)
MWB-1	4.19	4.96	-0.78	0.78
MW-2	4.31	4.55	-0.25	0.25
MW-3	4.20	4.53	-0.33	0.33
MW-4	3.97	4.31	-0.35	0.35
IWW Percolation Pond	11.40	11.18	0.23	0.23

Notes
Min. measured value = 3.97 ft
Max. measured value = 11.40 ft
Root mean squared error =0.43
Normalized root mean square error = 0.058
Average absolute residual = 0.39 ft
Elevations are referenced to NGVD29

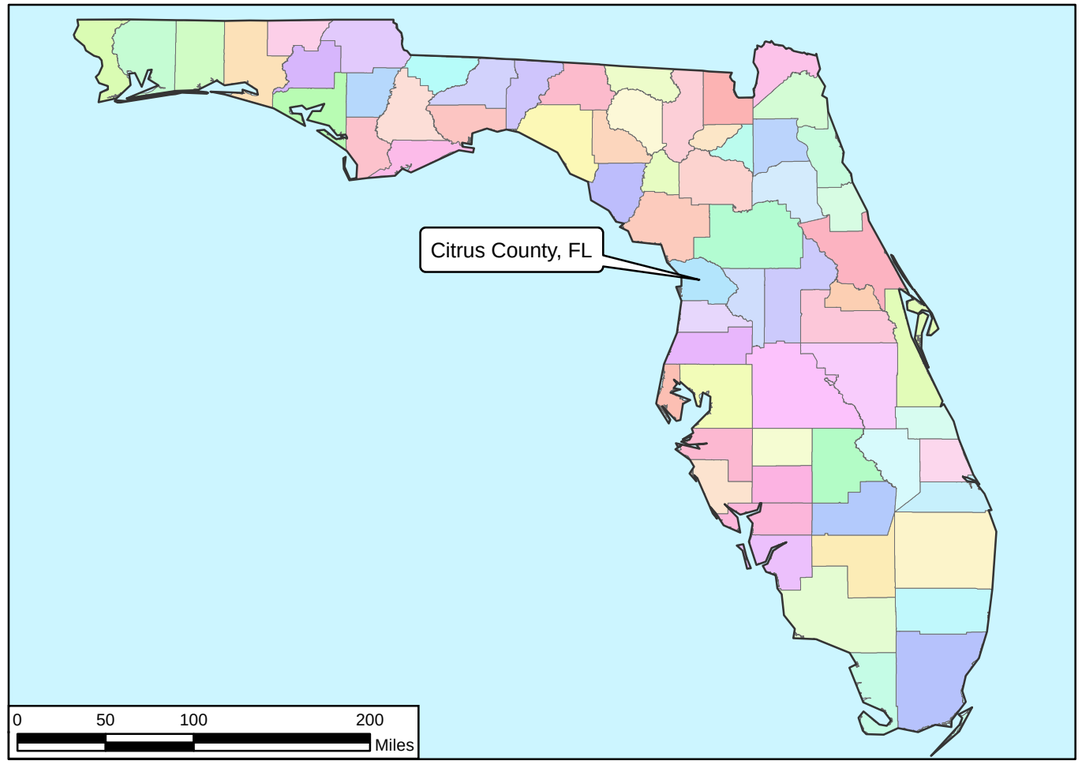
Table 6: Monitor Well Construction Details

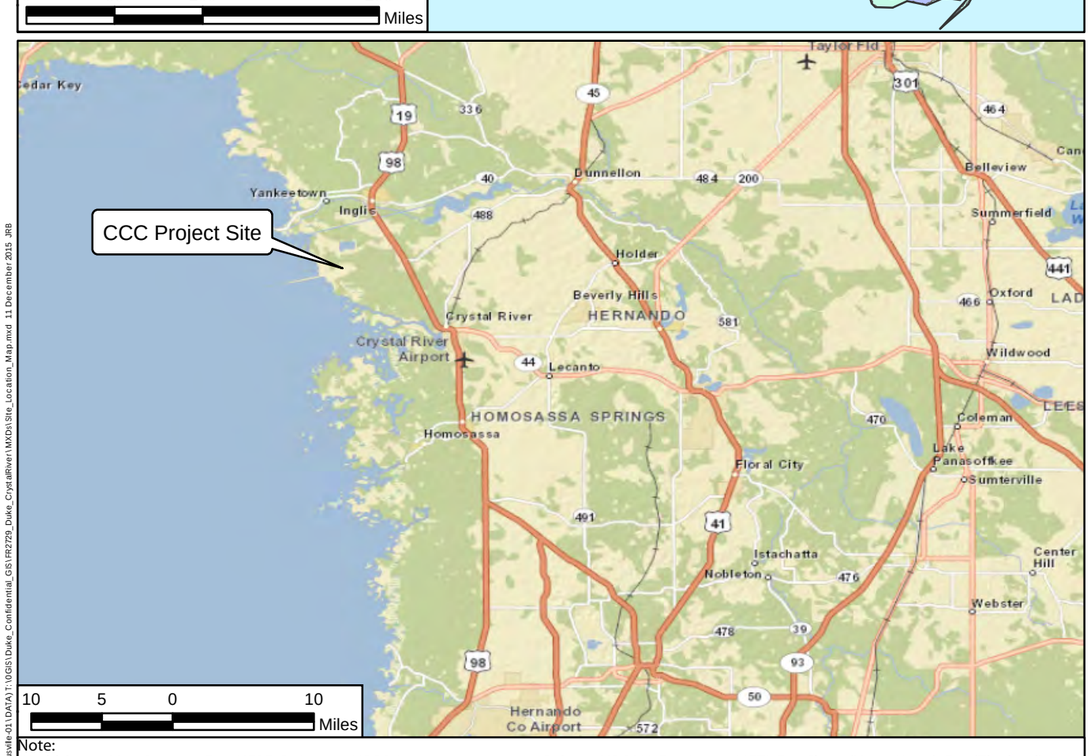
Citrus Combined Cycle Plant
Crystal River, FL

Well ID	Designation	Diameter (in)	Total Depth (ft bls)	Screen Interval (ft bls)
MWB-1	Background	2	25	15 - 25
MW-2	Monitoring	2	20	10 - 20
MW-3	Monitoring	2	20	10 - 20
MW-4	Monitoring	2	25	15 - 25
MW-5*	Monitoring	2	20	10 - 20
MW-6*	Monitoring	2	20	10 - 20

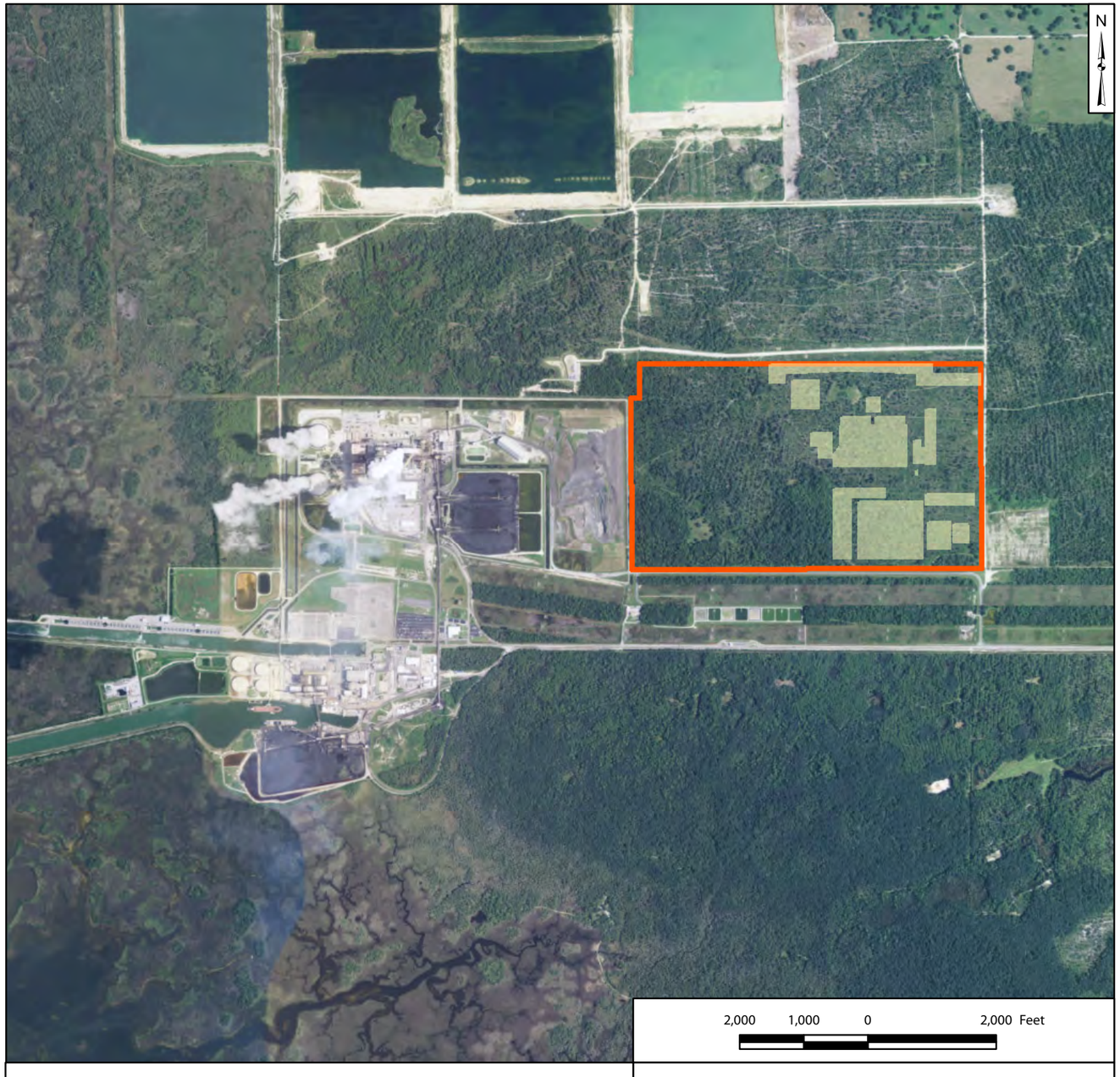
Notes:
in = inches
ft = feet
bls = below land surface
* = Proposed monitoring well

FIGURES





Note:
World Street Map Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.



Legend

- CCC Project Footprint
- CCC Project Site

Notes:
1. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2013 World Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Site Location Map

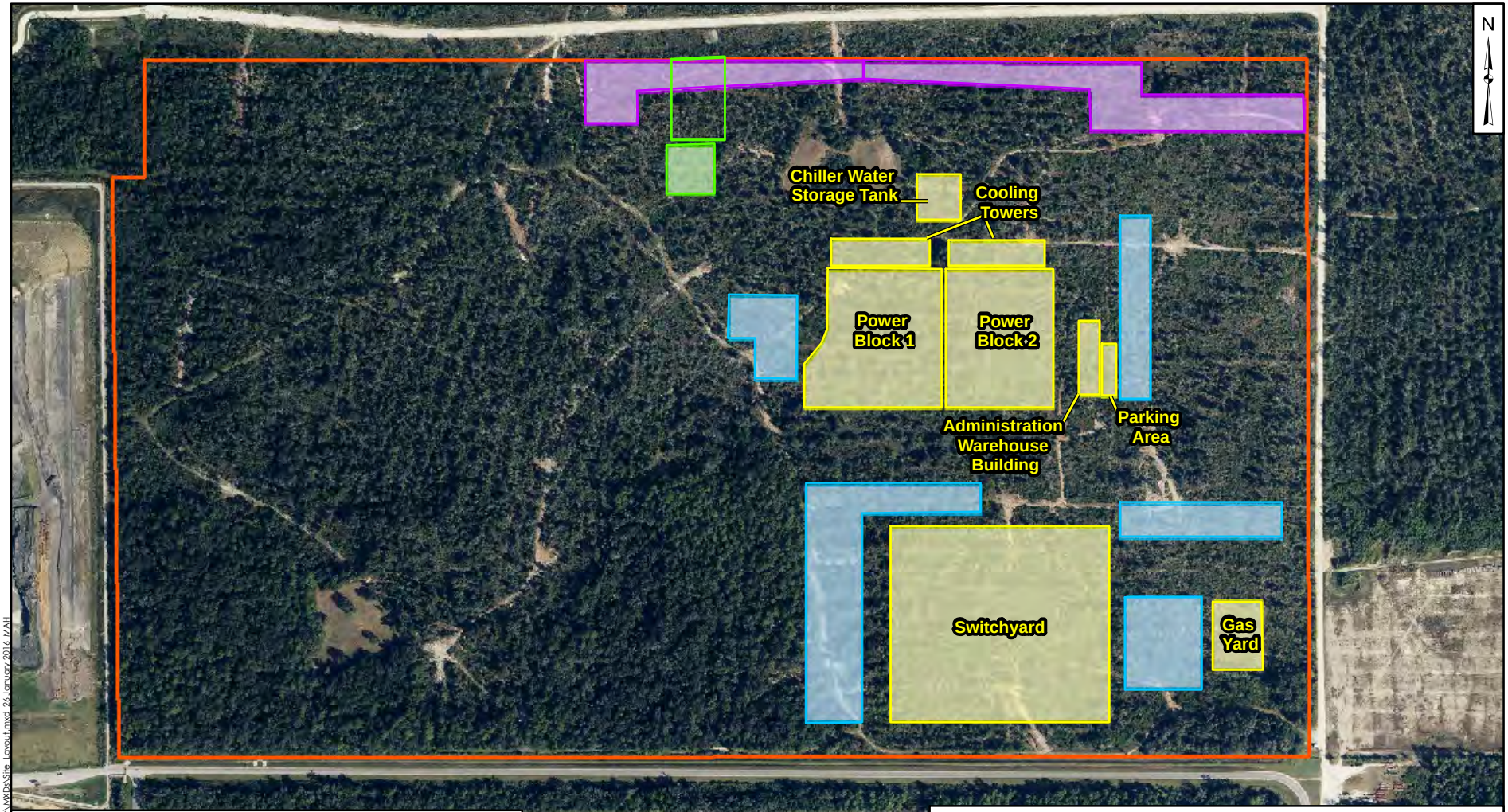
Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

Geosyntec consultants

Tampa, FL | December 2015

Figure 1

Path: (\tusvfle-01\DATA)1:\GIS\Duke_Confidential_GIS\FR2729_Duke_CrystalRiver1MXDs\Site_Location_Map.mxd 11 December 2015 JRB



Legend

- Construction Stormwater Detention Pond
- Stormwater Detention Ponds
- Current IWW Percolation Pond
- Facility Layout
- CCC Project Site
- Proposed IWW Percolation Pond

Notes:
1. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2014 aerial image source: Florida Department of Transportation, Office of Surveying and Mapping website.

700 350 0 700 Feet

Proposed Site Layout

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

Geosyntec consultants

Tampa, FL | March 2019

Figure **2**

Path: \\tlusville-01\DATA1\P:\OGIS\Duke_Confidential GIS\FR2729_Duke_CrystalRiver\MXDs\Site_Layout.mxd 26 January 2016 MAH

	Era	System	Series	Formation
Surface Beds	Cenozoic	Quaternary	Recent	Sand, peat and clay, unnamed
			Pleistocene	Lake Flirt marl, of late Wisconsin glacial stage
				Pamlico formation, of Peorian age
				Wicomico formation, of Sangamon age
				Okefenokee formation, of Yarmouth age
				Coharie formation, of Aftonian age
		Tertiary	Miocene	Alachua formation (Terrestrial) ? ? Hawthorn formation (Marine)
			Oligocene	Suwannee limestone
			Eocene	Ocala limestone, of Jackson age
				Moodys Branch formation, Jackson age: Williston member
				Moodys Branch formation, Jackson age: Inglis member
				Avon Park limestone, of Claiborne age
				Lake City limestone, of Claiborne age
				Oldsmar limestone, of Wilcox age
			Paleocene	Cedar Keys formation, of Midway age
Sub-Surface Beds	Mesozoic	Cretaceous	Gulf	Lawson limestone, of Navarro age
				Beds of Taylor age
				Beds of Austin age
				Atkinson formation: Beds of Eagle Ford age
				Atkinson formation: Beds of Woodbine age
			Comanche?	Undifferentiated shale and sand, "red beds"
		Triassic?		Quartz diabase, possible sill?
	Paleozoic	Lower Devonian or Upper Silurian ? ? ? Lower Ordovician		Possible fault contact

Vernon, R.O. 1951. Geology of Citrus and Levy Counties, Florida. US Geological Survey Bulletin No. 33:17, 186-224.

System	Series	Stratigraphic Unit	General Lithology	Hydrogeologic Unit	
Quaternary	Holocene and Pleistocene	Alluvium and terrace deposits	Sands and clays	Surficial aquifer system	
Tertiary	Pliocene	Alachua Formation	Phosphatic sands and clays	(Of limited areal extent in study area)	
	Miocene	Hawthorn Group[1]	Phosphatic sands, and clays		
	Eocene	Ocala Limestone	Limestone, fossiliferous to micritic	Floridan aquifer system	Upper Floridan aquifer (S)
		Avon Park Formation	Upper part, limestone and dolostone		
			Lower part, dolomite with intergranular gypsum; some bedded gypsum, peat and chert		Middle confining unit
		Oldsmar Formation	Limestone and dolomite; some evaporites and chert		Lower Floridan aquifer (D)
	Paleocene	Cedar Keys Formation	Dolomite with evaporites		

[1] Based on nomenclature of Scott (1988)

S Typical open intervals of shallow (S) and deep (D) wells

Sacks, L.A. 1995. Geochemical and Isotopic Composition of Ground Water with Emphasis on Sources of Sulfate in the Upper Floridan Aquifer in Parts of Marion, Sumter, and . Citrus Counties, Florida. US Geological Survey Water-Resources Investigations Report 95–4251.

Regional Hydrogeologic Framework

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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Figure 3

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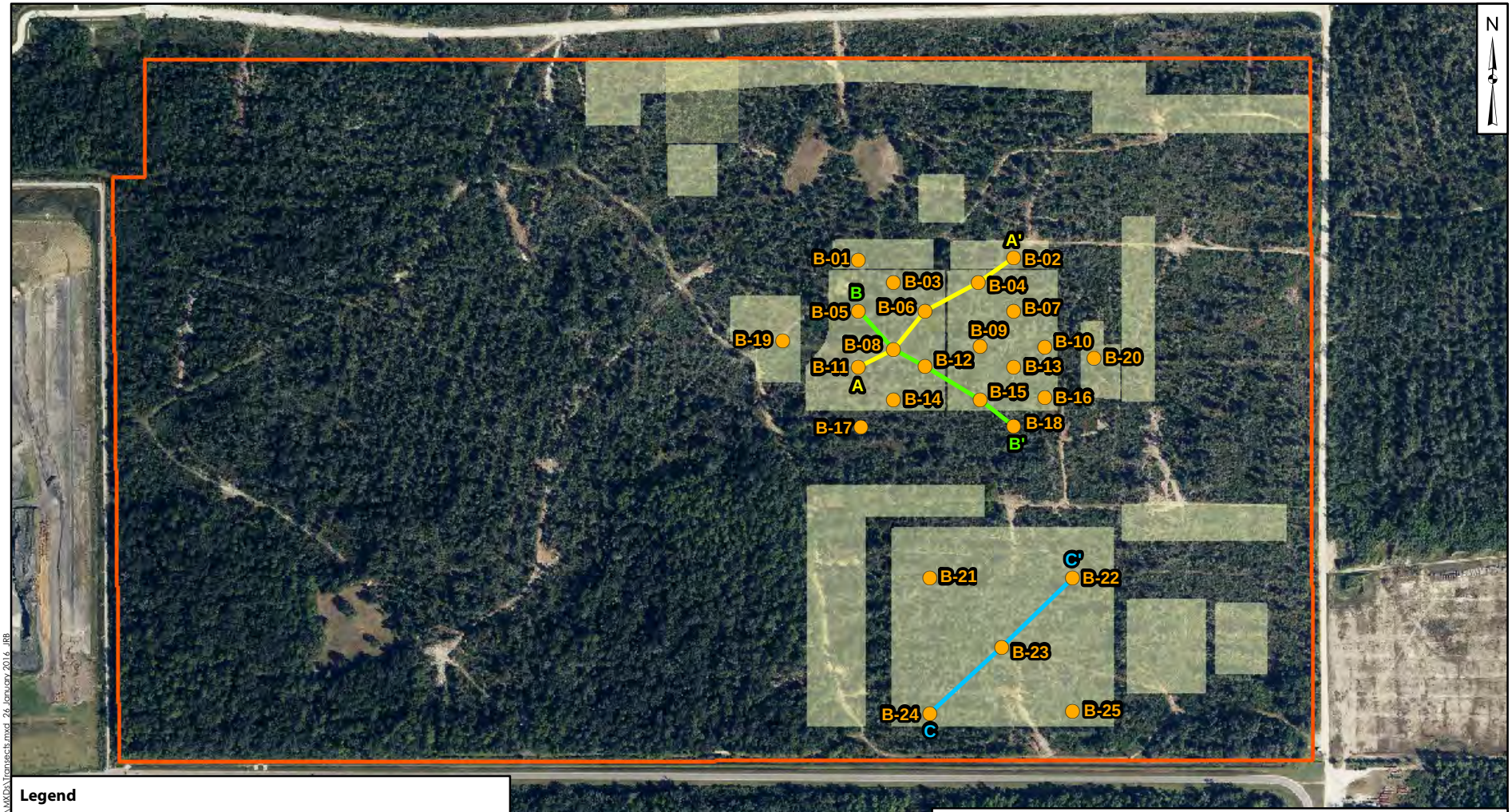

Legend

- Soil Boring Location
- A-A' Transect
- B-B' Transect
- C-C' Transect
- CCC Project Footprint
- CCC Project Site

Notes:

1. CCC Project footprint and soil boring locations obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2014 aerial image source: Florida Department of Transportation, Office of Surveying and Mapping website.

700 350 0 700 Feet

Soil Borings and Geologic Cross Section Transects

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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Figure 4

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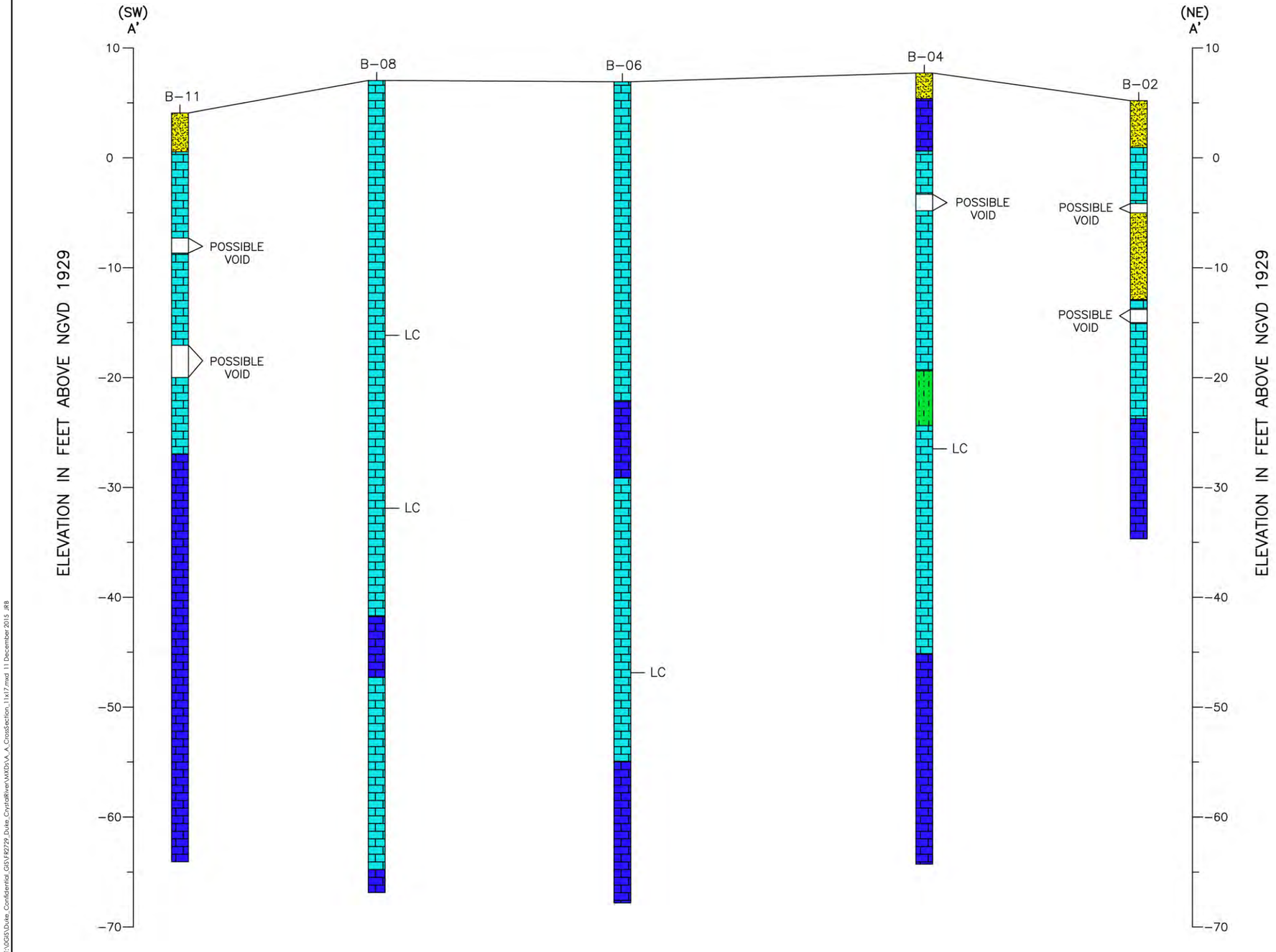

LEGEND

- SAND
- LIMESTONE – WEATHERED –POORLY TO MODERATELY INDURATED
- LIMESTONE – WELL INDURATED – MODERATELY TO WELL INDURATED
- SILT

LC = LOSS OF CIRCULATION OF DRILLING FLUID

HORIZONTAL SCALE: 1"=100'
VERTICAL SCALE: 1"=10'

Obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.

Geologic Cross Section A-A' (Southwest - Northeast)

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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Tampa, FL | December 2015

Figure 5

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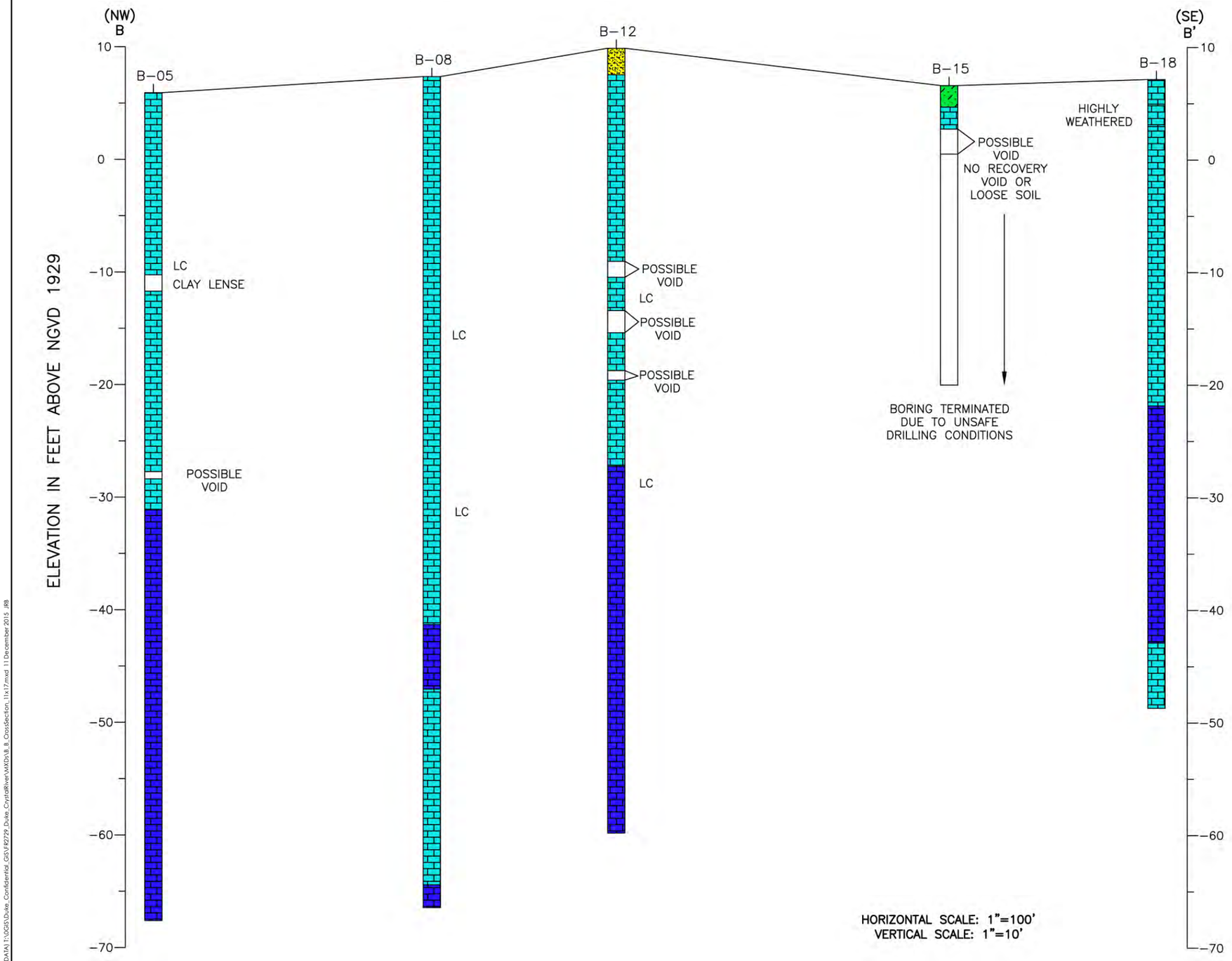

LEGEND

- SAND
- LIMESTONE – WRED –POORLY TO MODERATELY INDURATED
- LIMESTONE – WELL INDURATED – MODERATELY TO WELL INDURATED
- SILT
- CLAYEY–SILTY SAND

LC = LOSS OF CIRCULATION OF DRILLING FLUID

WRED = WEATHERED

Obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.

Geologic Cross Section B-B' (Northwest - Southeast)

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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Tampa, FL | December 2015

Figure 6

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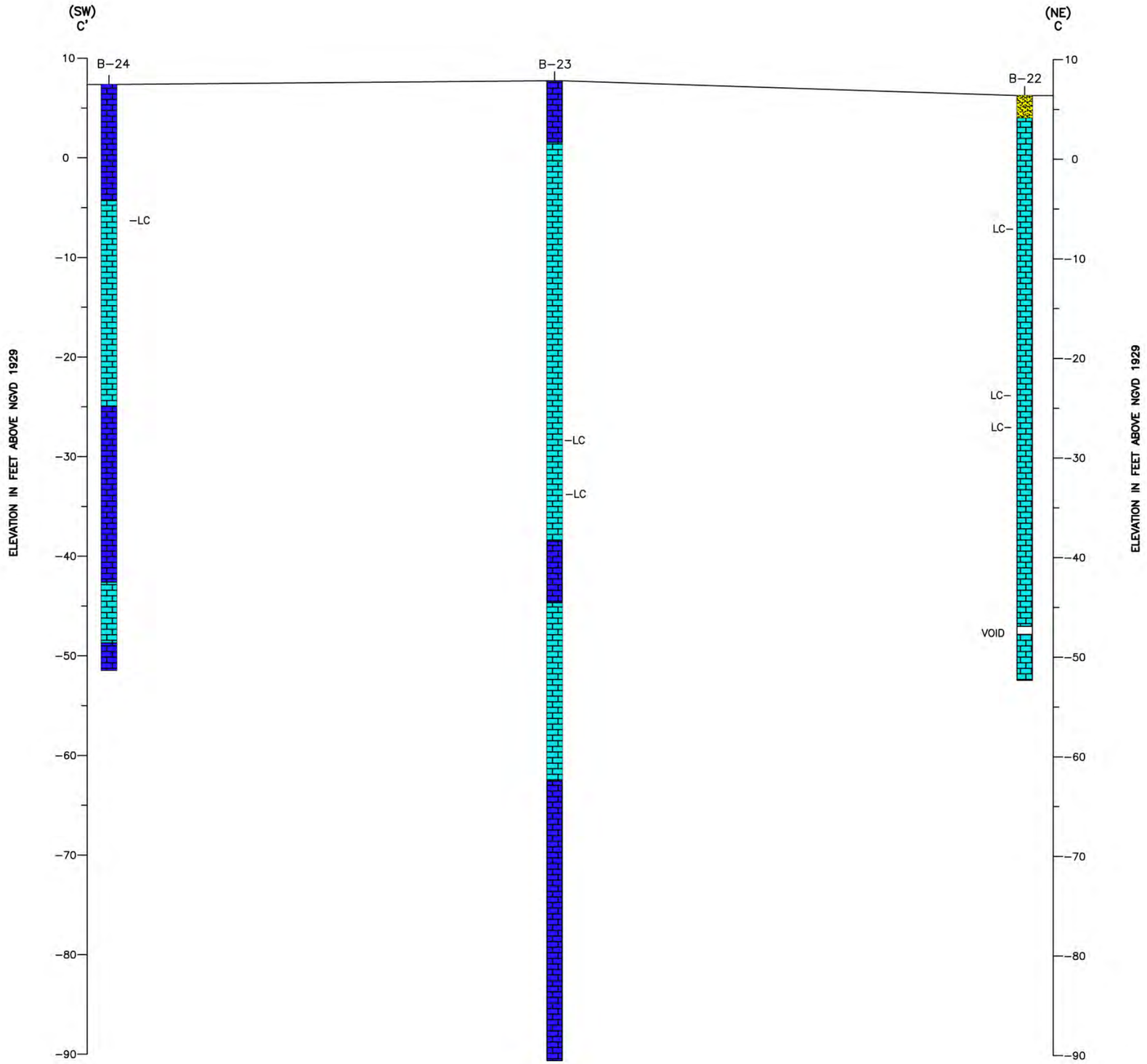

LEGEND

- SAND
- LIMESTONE – WEATHERED –POORLY TO MODERATELY INDURATED
- LIMESTONE – WELL INDURATED – MODERATELY TO WELL INDURATED

LC = LOSS OF CIRCULATION OF DRILLING FLUID

HORIZONTAL SCALE: 1"=130'
VERTICAL SCALE: 1"=10'

Obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.

Geologic Cross Section C-C' (Southwest - Northeast)

Citrus Combined Cycle Plant
14385 N. Access Road
Crystal River, FL 34428

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Tampa, FL | December 2015

Figure 7

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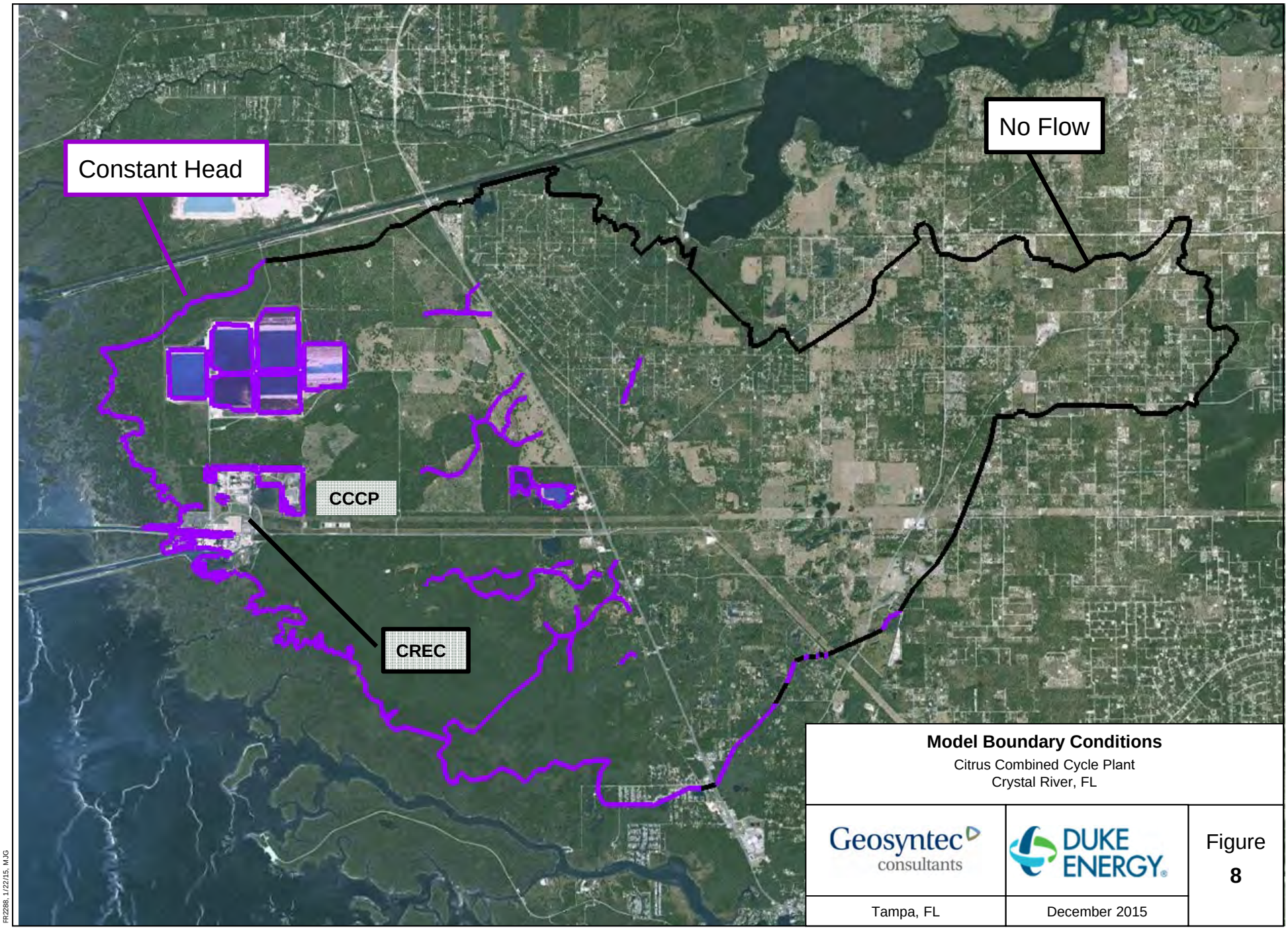


Model Boundary Conditions

Citrus Combined Cycle Plant
Crystal River, FL

Geosyntec consultants

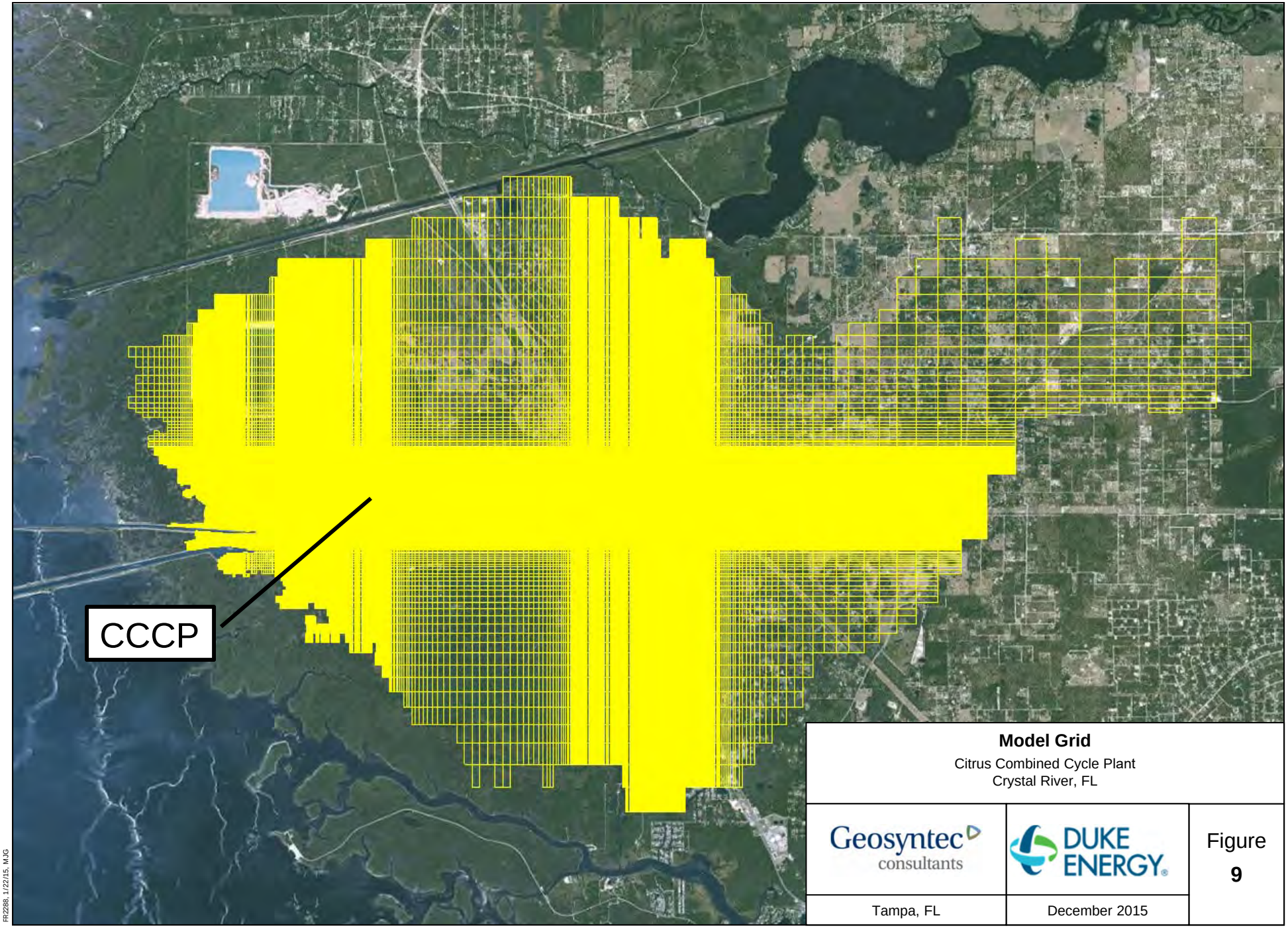
DUKE ENERGY

Figure **8**

Tampa, FL

December 2015

FR2288, 1/22/15, MJG



Model Grid

Citrus Combined Cycle Plant
Crystal River, FL

Geosyntec consultants

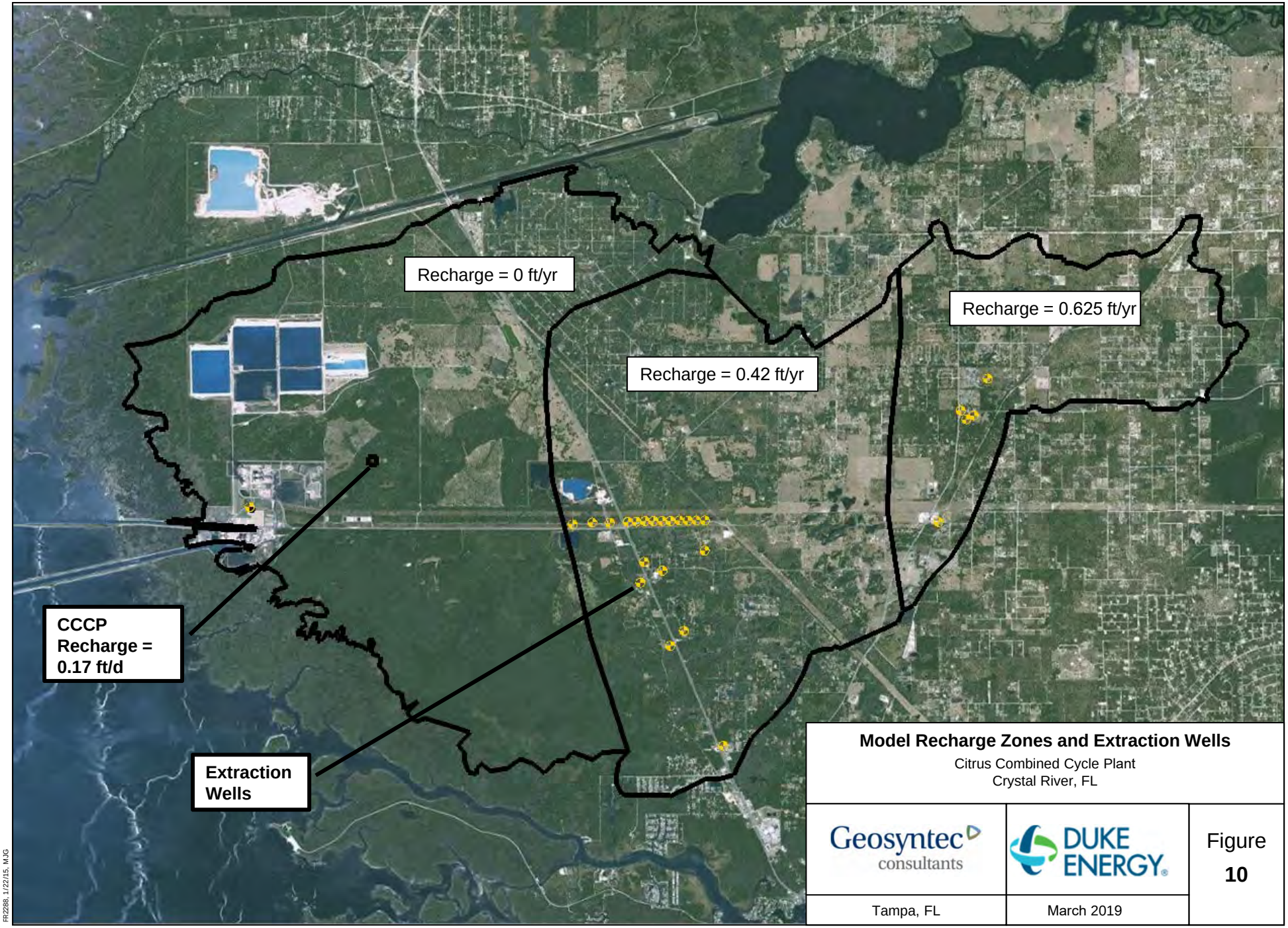
DUKE ENERGY

Figure **9**

Tampa, FL

December 2015

FR2288, 1/22/15, MJG

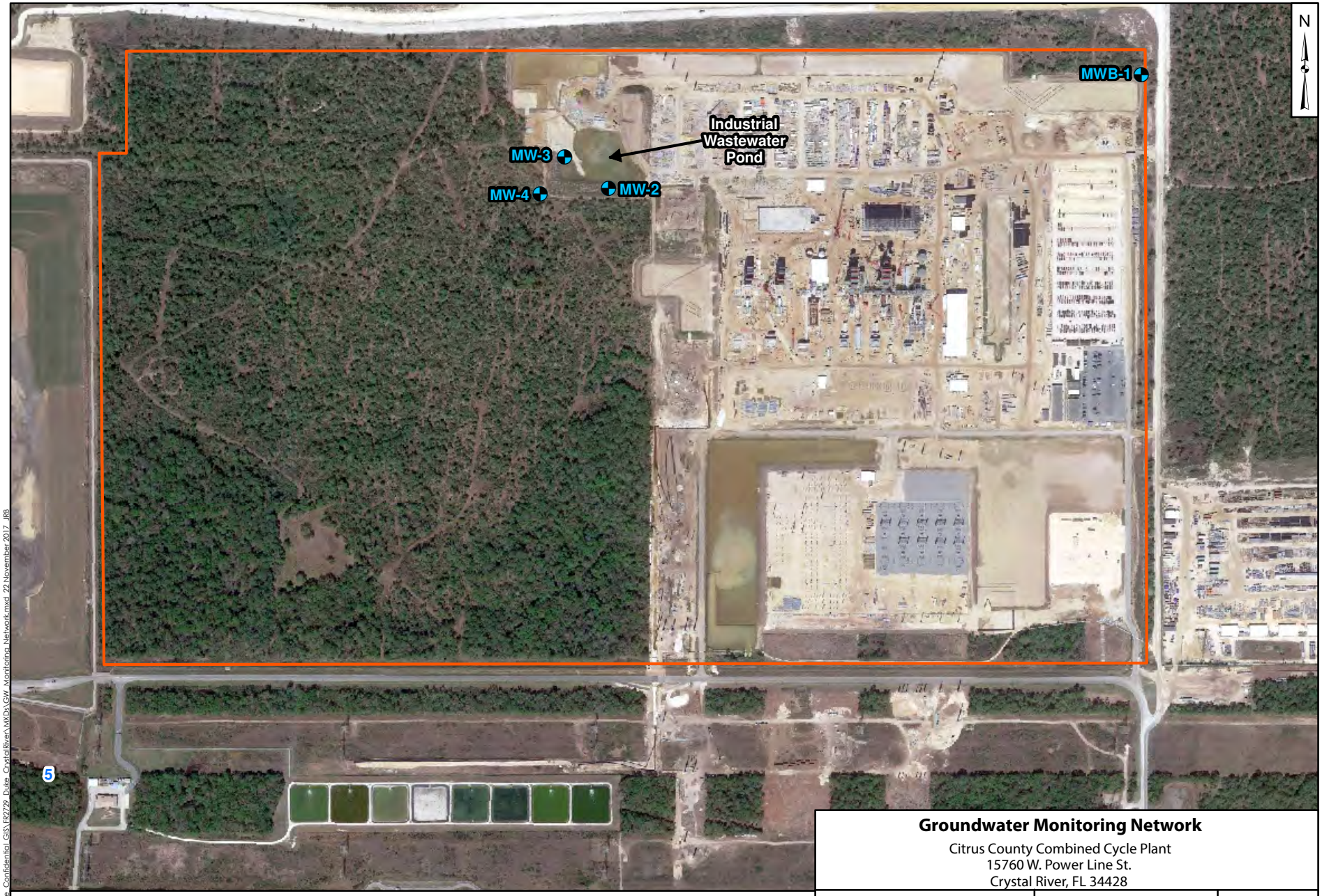


Model Recharge Zones and Extraction Wells

Citrus Combined Cycle Plant
Crystal River, FL

Geosyntec consultants	DUKE ENERGY	Figure **10**
Tampa, FL	March 2019	

FR2288, 1/22/15, MJG



Legend

- Monitoring Well Location
- CCC Project Site

Notes:
1. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2017 aerial image source: Google Earth Pro.

Groundwater Monitoring Network

Citrus County Combined Cycle Plant
15760 W. Power Line St.
Crystal River, FL 34428

Geosyntec consultants

Tampa, FL

DUKE ENERGY PROGRESS

March 2019

Figure **11**

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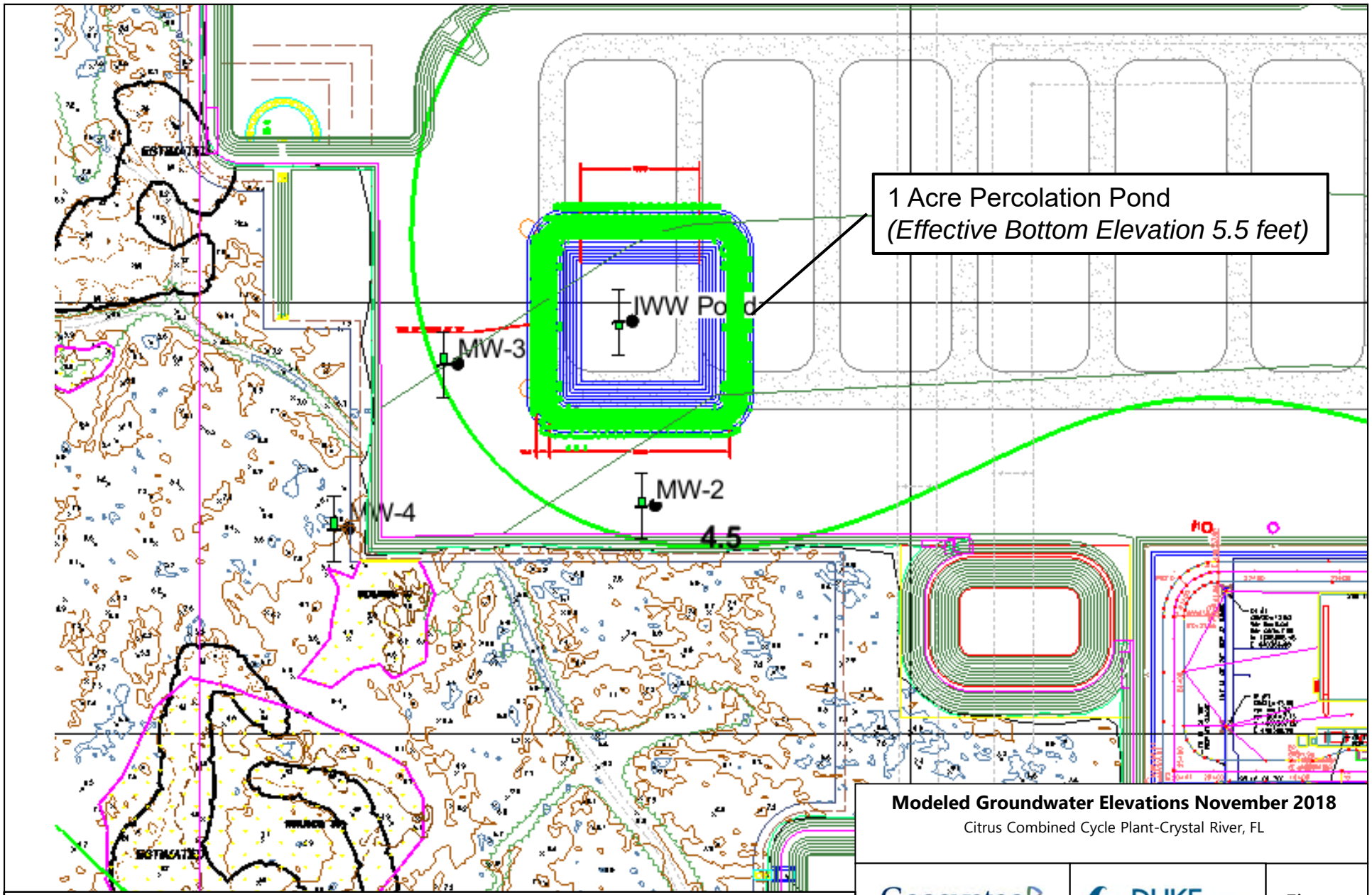


Modeled Groundwater Elevations November 2018

Citrus Combined Cycle Plant-Crystal River, FL

Legend:

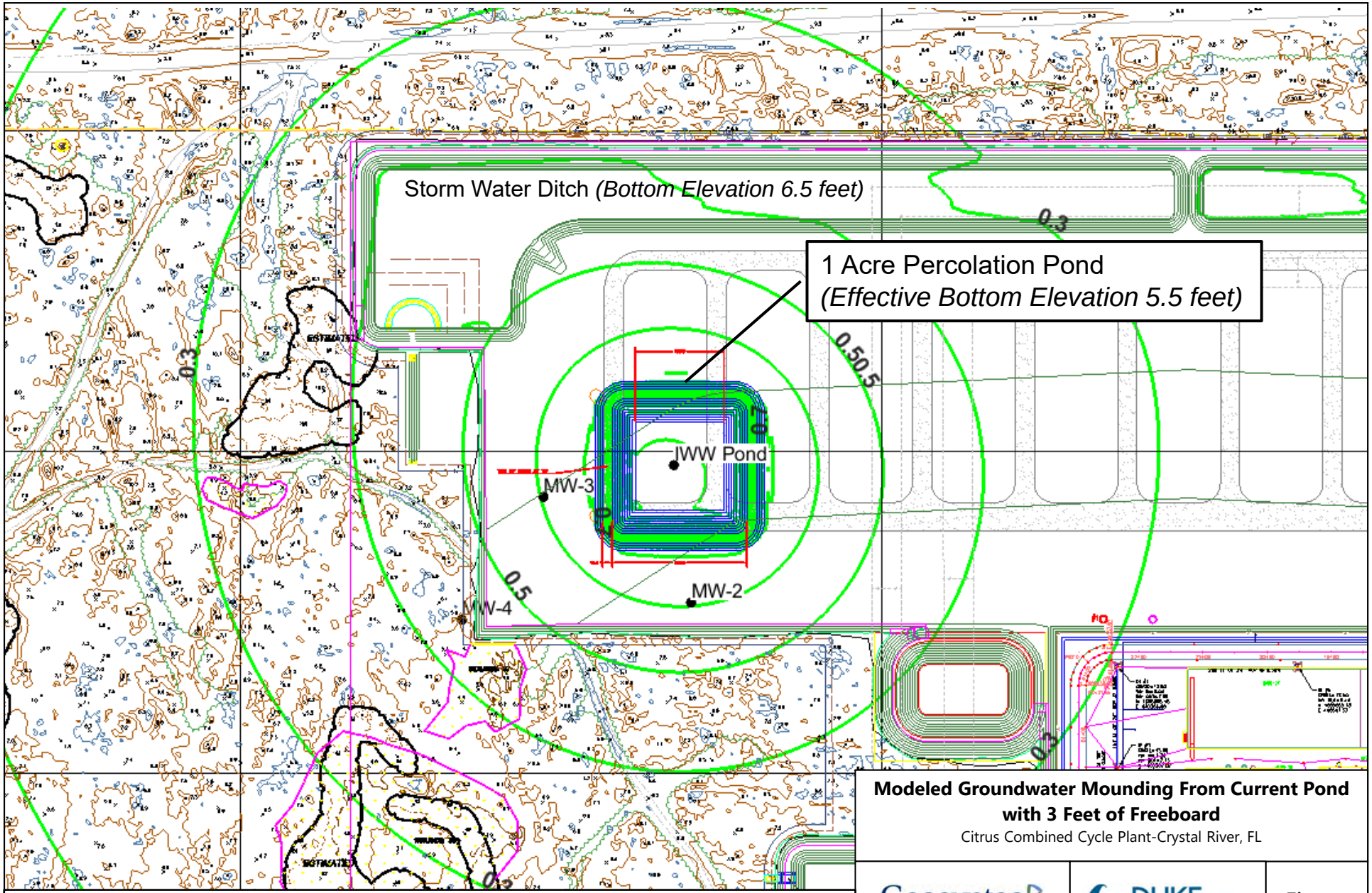
Groundwater Elevation (ft., NGVD29)

Ground Surface Elevation with 1 Foot Contour Interval (NGVD29)

[Note: Crest of Berm at 15 ft]

Geosyntec consultants	DUKE ENERGY	Figure 12
Tampa, FL	March 2019	

FR2288, 1/22/15, MJG



Modeled Groundwater Mounding From Current Pond with 3 Feet of Freeboard

Citrus Combined Cycle Plant-Crystal River, FL

Legend:

- Groundwater Mounding (ft)
- Proposed Ground Surface Elevation with 1 Foot Contour Interval (NGVD29) [Note: Crest of Berm at 15 ft]

Geosyntec consultants

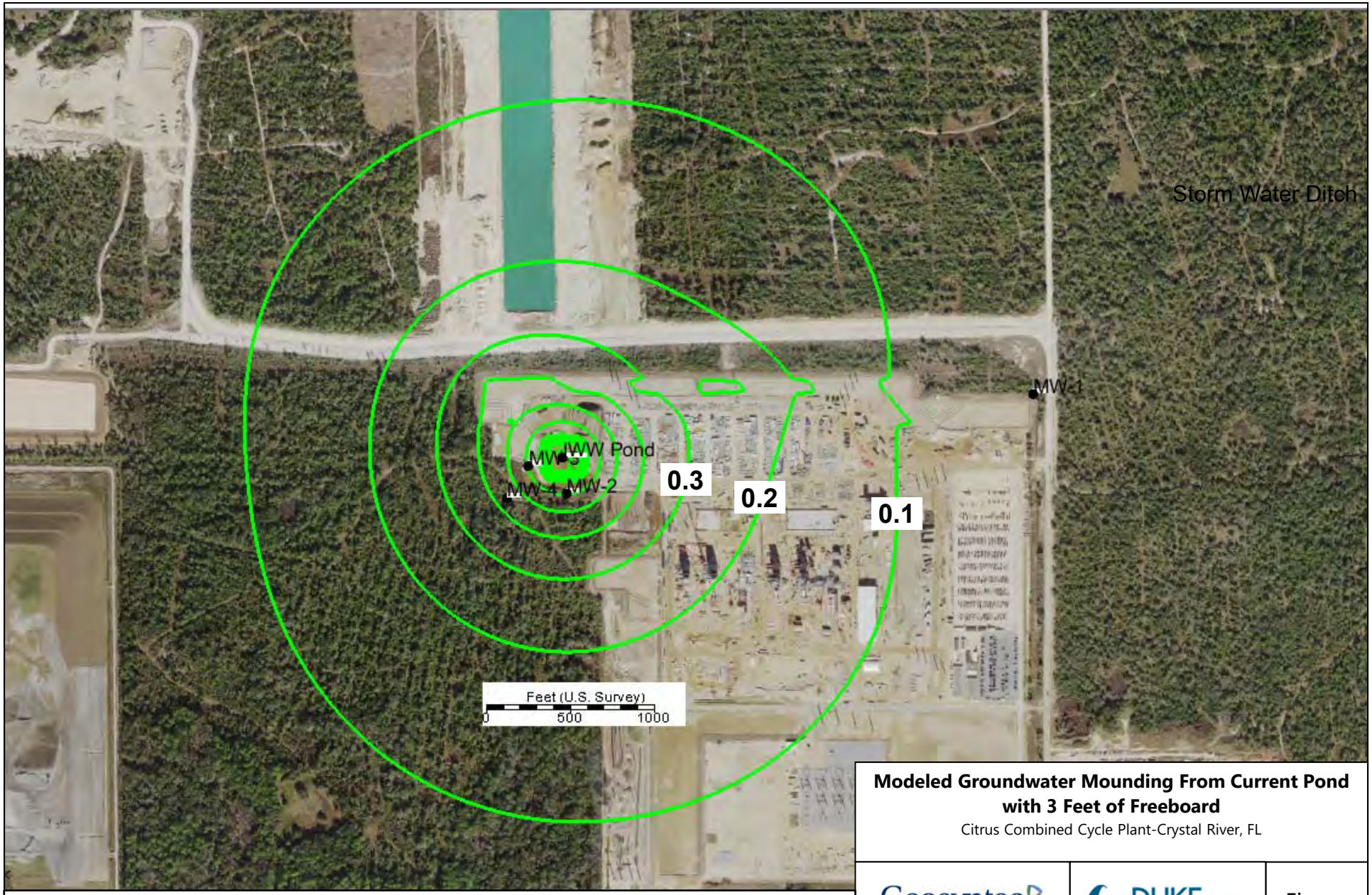
DUKE ENERGY

Figure **13**

Tampa, FL

March 2019

FR2288, 1/22/15, MJG



Legend:

Groundwater Mounding (ft)

Modeled Groundwater Mounding From Current Pond with 3 Feet of Freeboard

Citrus Combined Cycle Plant-Crystal River, FL

Geosyntec consultants

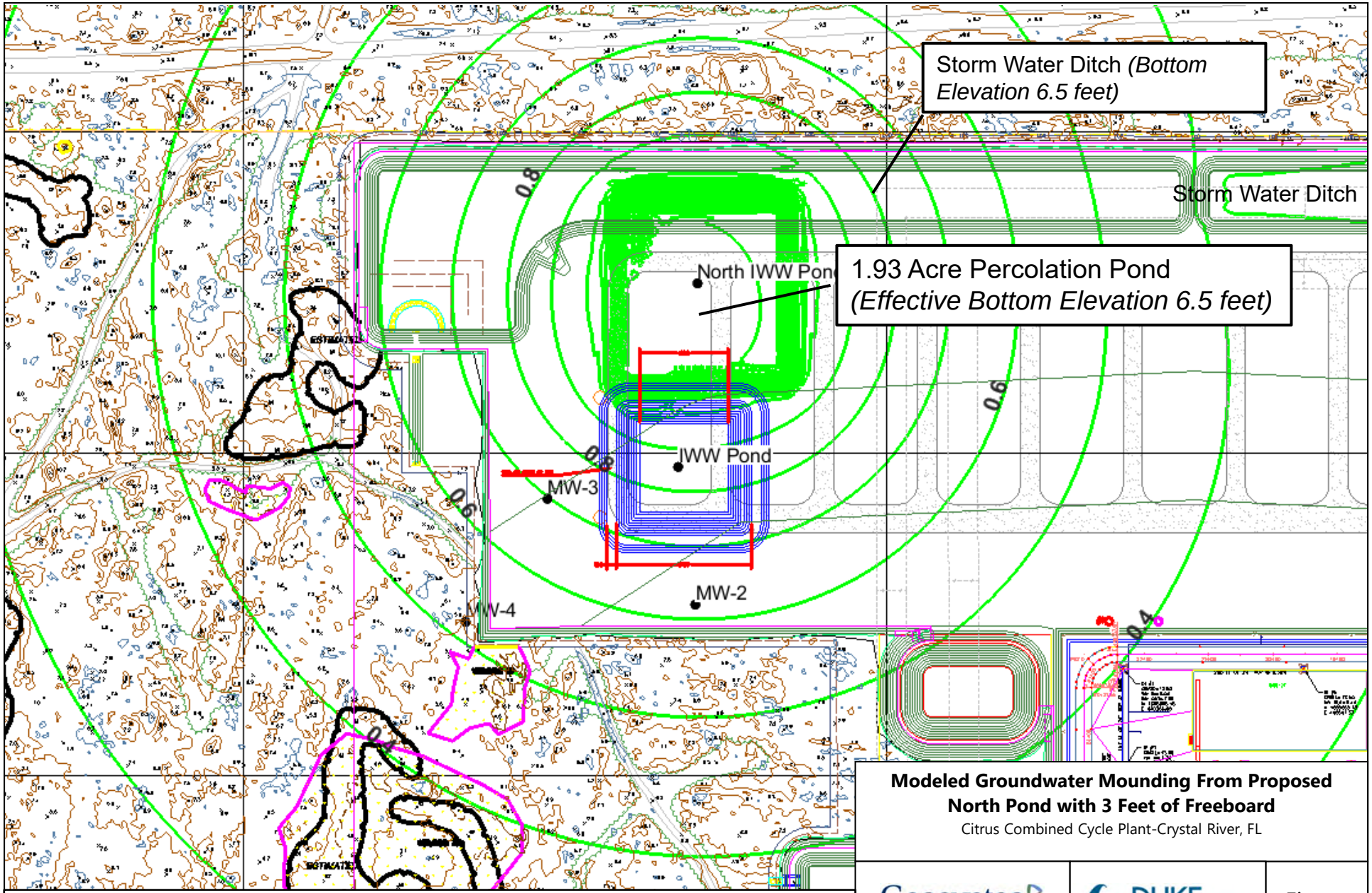
DUKE ENERGY

Figure **14**

Tampa, FL

March 2019

FR2288, 1/22/15, MJG



Legend:

Groundwater Mounding (ft)

Ground Surface Elevation with 1 Foot Contour Interval (NGVD29)

[Note: Crest of Berm at 15 ft]

Modeled Groundwater Mounding From Proposed North Pond with 3 Feet of Freeboard

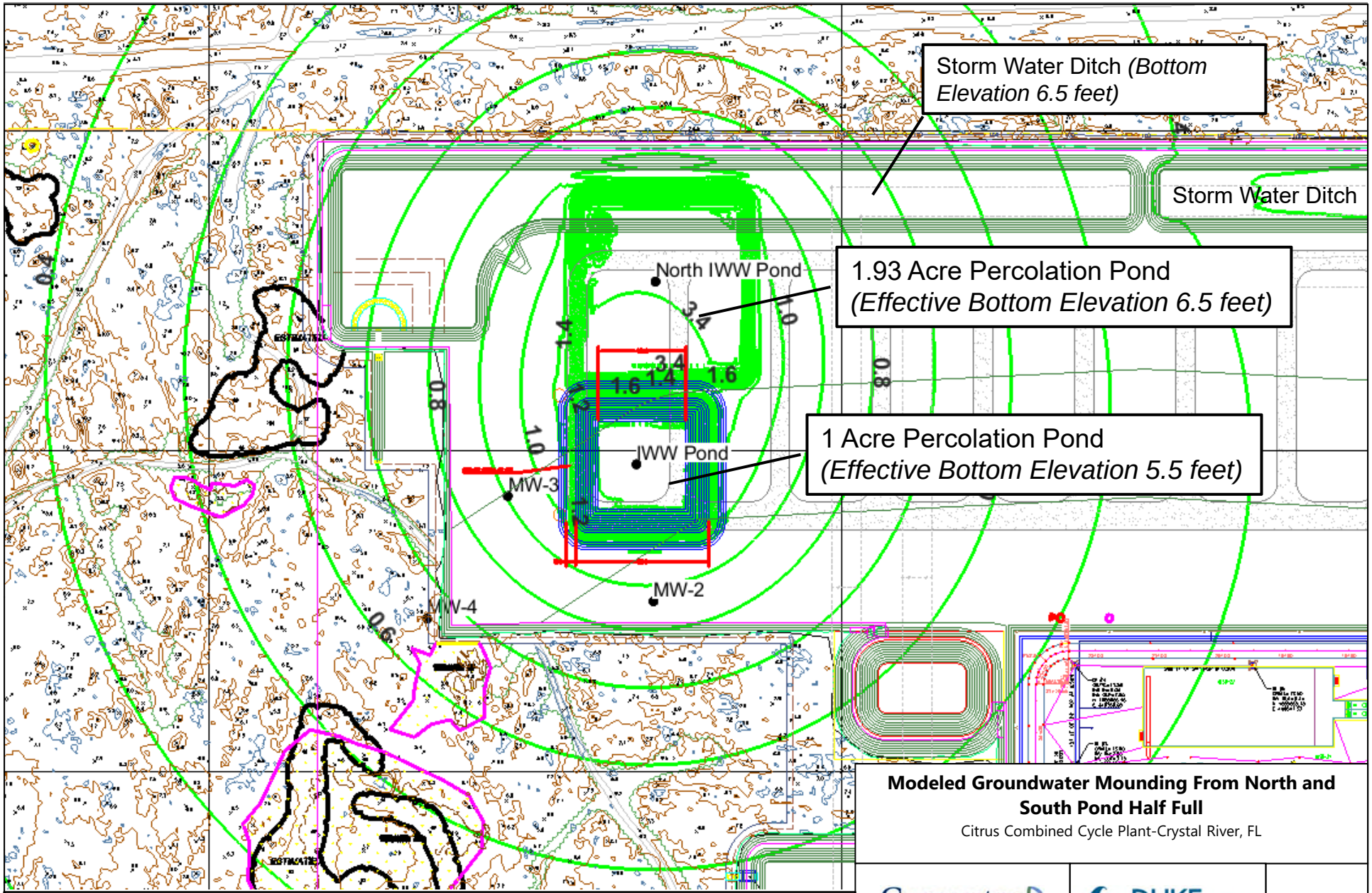
Citrus Combined Cycle Plant-Crystal River, FL

Geosyntec consultants | Tampa, FL

DUKE ENERGY | March 2019

Figure **15**

FR2288, 1/22/15, MJG



Legend:

Groundwater Mounding (ft)

Ground Surface Elevation with 1 Foot Contour Interval (NGVD29)

[Note: Crest of Berm at 15 ft]

Modeled Groundwater Mounding From North and South Pond Half Full

Citrus Combined Cycle Plant-Crystal River, FL

Geosyntec consultants

DUKE ENERGY

Figure **16**

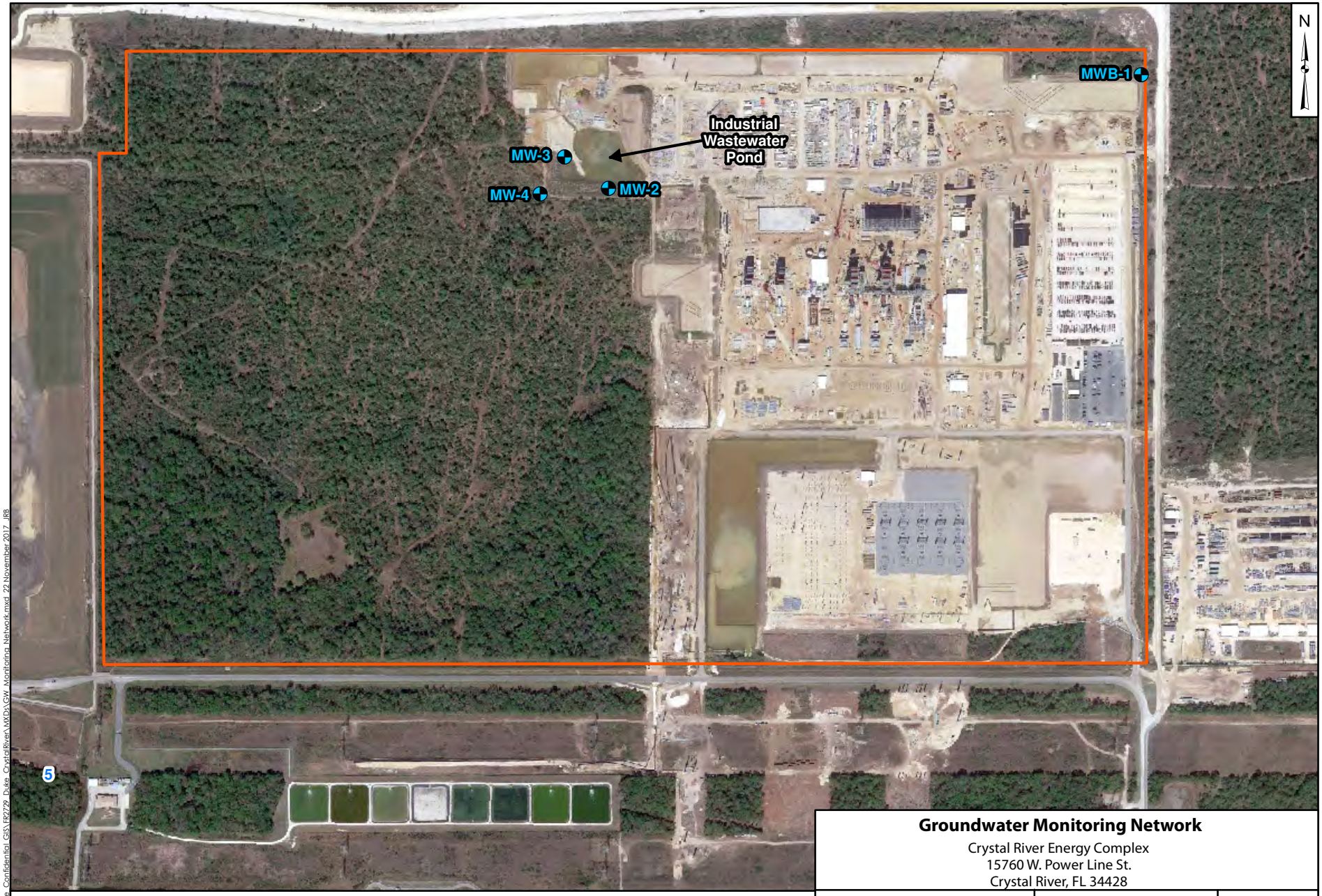
Tampa, FL

March 2019

FR2288, 1/22/15, MJG

APPENDIX A

Lithologic Logs



Groundwater Monitoring Network

Crystal River Energy Complex
15760 W. Power Line St.
Crystal River, FL 34428

Legend

- Monitoring Well Location
- CCC Project Site

Notes:
1. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2017 aerial image source: Google Earth Pro.

Geosyntec consultants | DUKE ENERGY PROGRESS | Figure 1

Tampa, FL | November 2017

Path: \\tlusville-01\DATA1\Duke_Confidential\GIS\FR2729_Duke_CrystalRiver\MXDs\GW_Monitoring_Network.mxd 22 November 2017 JRB

Geosyntec consultants

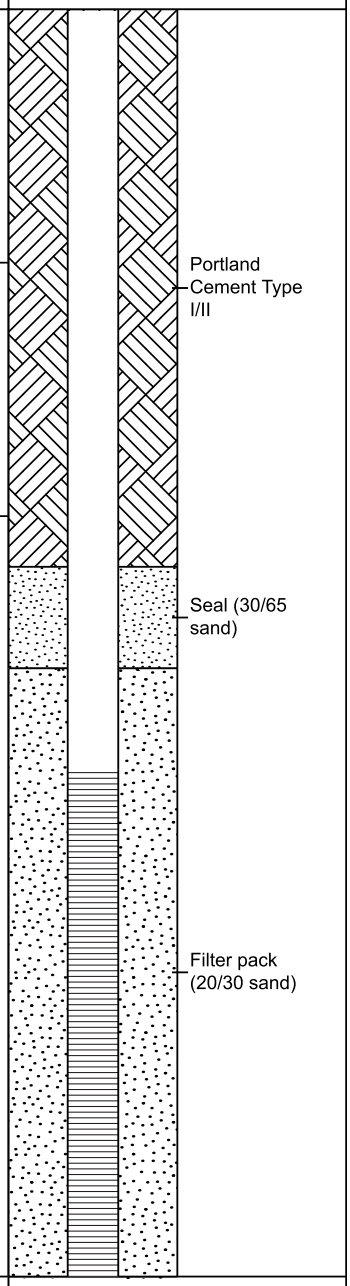
BORING LOG MWB-1

PROJECT NUMBER FR3131/02/02	**DRILLING DATE** 10/30/2017	**COORDINATES** 28.971029, -82.668276
PROJECT NAME Crystal River CCCP	**TOTAL DEPTH** 25 ft bls	**COORD SYS** NAD83
CLIENT Duke Energy Florida	**DIAMETER** 2"	**COMPLETION** Above-ground
DRILLING COMPANY Cascade Drilling	**CASING** Schedule 40 PVC	**SURFACE ELEVATION** 9.4
DRILLERS C. Turner	**SCREEN** Schedule 40 PVC w/ 0.010" slot	**WELL TOC** 12.24

COMMENTS Hand augered up to 5 ft BLS, remainder with rota-sonic drill rig with 4-inch core barrel followed by 6-inch temporary steel casing.

LOGGED BY M. Noto
CHECKED BY C. Cannon

Depth (ft)	Material Description	Run/Recovery
1	Fill SAND with limestone, 7.5YR 5/4, brown, well-sorted, with limestone chunks (1/4 - 1/8"), dry	60/60
4	SAND, fine-grained quartz, 10YR 6/1, gray, very well-sorted, subrounded, dry	
5	LIMESTONE, 10YR 8/1, white, weathered limestone with iron oxidation staining, moist	60/50
7 ▽	Same as above- wet, less weathered	
10	Same as above- more competent limestone	
15	Same as above	
20	Same as above- fossiliferous very competent limestone, bivalves and gastropods	
23	Calcareous mud- clayey weathered limestone, wet, 10YR 6/6	
25	Termination Depth at: 25 ft	



Disclaimer This bore log is intended for environmental not geotechnical purposes.

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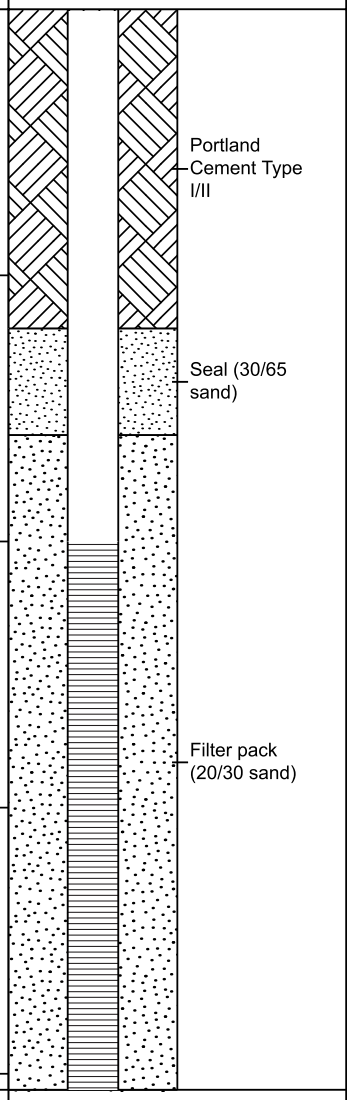
BORING LOG MW-2

PROJECT NUMBER FR3131/02/02	**DRILLING DATE** 9/24/2017	**COORDINATES** 28.969353, -82.676960
PROJECT NAME Crystal River CCCP	**TOTAL DEPTH** 20.3 ft bls	**COORD SYS** NAD83
CLIENT Duke Energy Florida	**DIAMETER** 2"	**COMPLETION** Above-ground
DRILLING COMPANY EDS	**CASING** Schedule 40 PVC	**SURFACE ELEVATION** 11.4
DRILLERS K. Rogers	**SCREEN** Schedule 40 PVC w/ 0.010" slot	**WELL TOC** 14.57

COMMENTS Hand augered up to 5 ft BLS, remainder with rota-sonic drill rig with 4-inch core barrel followed by 6-inch steel temporary casing.

LOGGED BY M. Noto
CHECKED BY C. Cannon

Depth (ft)	Material Description	Run/Recovery
0	SAND/fill, 10YR 4/4, dark yellowish brown, fine-grained, well-sorted, dry, loose	60/60
1	Fill SAND, 10YR 2/2, very dark brown, very fine-grained, subrounded, dry, loose, quartz sand with 15-20% (1/4 - 1/8") gravel	
2		
3		
4		
5	Same as above	60/42
6		
7	▽	
8	SAND, 10YR 5/6, yellowish brown, moist, very well-sorted, firm, sub-rounded, fine-grained quartz sand	
9		
10	Same as above- wet	60/42
11	LIMESTONE, 10YR 8/1, white, wet, moderately friable, fossiliferous (bivalves), moderately competent; drilling slowed, more water used, less weathered competent rock	
12		
13		
14		
15	SAND, 10YR 5/6, yellowish-brown, wet, loose, well-sorted, rounded fine-grained quartz sand with 40% calcareous (bivalve) shell fragments	60/51
16		
17		
18	LIMESTONE, 10YR 8/11, white, wet, follliliferous (bivalves), very competent	
19	Sandy LIMESTONE with clay, 10YR 8/1, white, low plasticity, limestone mud, with competent limestone gravel, 8" size; increased drilling speed	
20		
21	Termination Depth at: 20.3 ft	
22		
23		
24		



produced by ESlog.ESdat.net on 12 Dec 2017

Geosyntec consultants

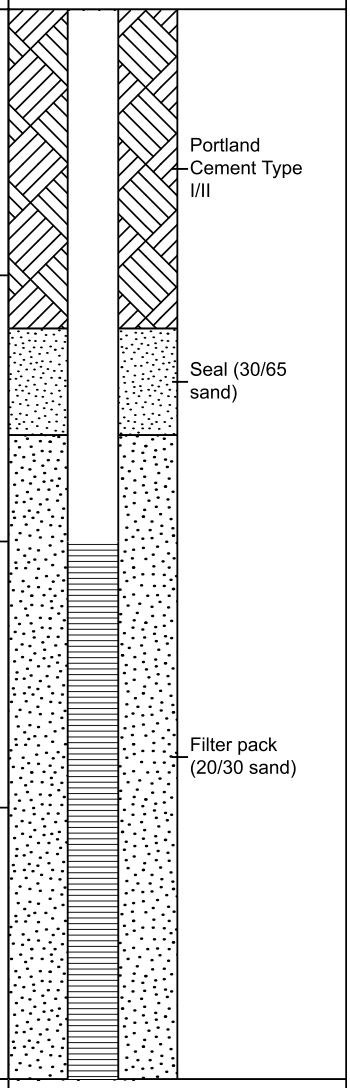
BORING LOG MW-3

PROJECT NUMBER FR3131/02/02	**DRILLING DATE** 9/24/2017	**COORDINATES** 28.969802, -82.677681
PROJECT NAME Crystal River CCCP	**TOTAL DEPTH** 20.1 ft bls	**COORD SYS** NAD83
CLIENT Duke Energy Florida	**DIAMETER** 2"	**COMPLETION** Above-ground
DRILLING COMPANY EDS	**CASING** Schedule 40 PVC	**SURFACE ELEVATION** 10.5
DRILLERS K. Rogers	**SCREEN** Schedule 40 PVC w/ 0.010" slot	**WELL TOC** 13.52

COMMENTS Hand augered up to 5 ft BLS, remainder with rota-sonic drill rig with 4-inch core barrel followed by 6-inch steel temporary casing.

LOGGED BY M. Noto
CHECKED BY C. Cannon

Depth (ft)	Material Description	Run/Recovery
0	Fill SAND with gravel, 10YR 3/4, dry, poorly sorted, fine-grained sand with gravel (1/4-4")(20-25%) limestone (weathered), very soft	60/60
3	Fill SAND, 10YR 3/4, with limestone, 60-70% limestone, friable, with bivalves (fossils)(7-8")	
4	Silty SAND, 10YR 2/2, very dark brown, loose, fine-grained, dry, with 5% gravel (1/4")	
5	LIMESTONE, 10YR 8/2, very pale brown, saturated/wet, friable, with fossils	60/44
6	▽	
8	Same as above, 10YR 8/1, white	
10	Sandy LIMESTONE, same as above, 10YR 8/2; increased drilling speed (more weathered limestone)	60/37
13	LIMESTONE, 10YR 8/1, white, same as above; decreased drilling speed	
15	Same as above, more competent	60/40
16	Void	
18	Sandy LIMESTONE, moist, increased friability, 10YR 8/1, white	
20		
21	Termination Depth at: 20.1 ft	



produced by ESlog.ESdat.net on 12 Dec 2017

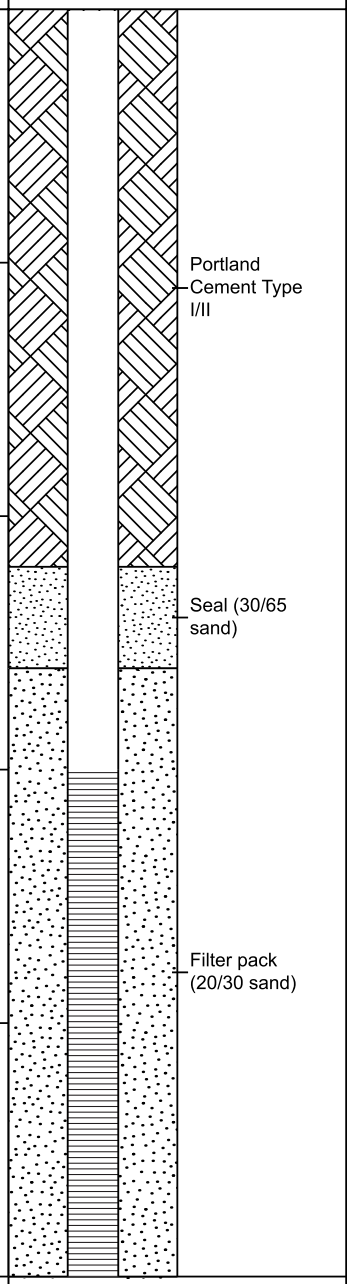
BORING LOG MW-4

PROJECT NUMBER FR3131/02/02	**DRILLING DATE** 10/31/2017	**COORDINATES** 28.969273, -82.678076
PROJECT NAME Crystal River CCCP	**TOTAL DEPTH** 25 ft bls	**COORD SYS** NAD83
CLIENT Duke Energy Florida	**DIAMETER** 2"	**COMPLETION** Above-ground
DRILLING COMPANY Cascade Drilling	**CASING** Schedule 40 PVC	**SURFACE ELEVATION** 8.5
DRILLERS C. Turner	**SCREEN** Schedule 40 PVC w/ 0.010" slot	**WELL TOC** 11.26

COMMENTS Hand augered up to 5 ft BLS, remainder with rota-sonic drill rig with 4-inch core barrel followed by 6-inch steel temporary casing.

LOGGED BY M. Noto
CHECKED BY C. Cannon

Depth (ft)	Material Description	Run/Recovery
1	Fill SAND, 10YR 4/4, well-sorted, dry, soft fine-grained quartz sand, not natural, fill on pad	60/36
2		
3	LIMESTONE, 10YR 8/1, white, very weathered friable limestone	
4		
5	Same as above, wet at 5'	60/24
6		
7		
8		
9		
10	Same as above, saturated	60/48
11		
12		
13		
14		
15	Same as above	60/60
16		
17	SAND, 5YR 3/3, dark reddish brown, fine-grained, well-sorted, wet quartz sand, sub-rounded	
18	SAND, 10YR 8/1- 5YR 7/6, white to reddish brown, extremely fine sand with veins of reddish brown fine-grained iron-stained sand, extremely well-sorted	
19		
20	Same as above, moist	
21		
22		
23	GLEY, Gley 5/1, greenish gray with iron staining, dry, with >2" ribbons	
24	Sandy SILT, 10YR 8/6, yellow, very fine, well-graded, dry silt with rounded grains <5% throughout, chalky texture	
25	Termination Depth at: 25 ft	
26		



Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 12 Dec 2017

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	CMA
Drawn by:	CJH
Checked by:	SCK
Approved by:	SCK

Project No.	H4155013
Scale:	AS SHOWN
File Name:	CAD
Date:	10/12/2015

Terracon
504 E. Tyler St.
Tampa, FL 33602

EXPLORATION PLAN

Citrus County Combined Cycle Project
15760 W Power Line Street
Crystal River, FL

Exhibit

A-1

BORING LOG NO. FP-01

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9675687° Longitude: -82.6716731°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		POORLY GRADED SAND WITH SILT(SP-SM), fine grained, reddish-brown, loose				
1.0		**HIGHLY WEATHERED LIMESTONE**, light brown				1-2-12-21 N=14
2.0		**LIMESTONE**, light brown				50/4"
		white	5			50/4"
						50/3"
8.0		**WEATHERED LIMESTONE**, white	10			23-33-39-47 N=72
						41-27-20-17 N=47
						17-25-20 N=45
13.5		***Boring Terminated at 13.5 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater intitially observed at a depth of 2.85'.

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/1/2015 Boring Completed: 10/1/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-3

BORING LOG NO. FP-02

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9680172° Longitude: -82.6716759°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		POORLY GRADED SAND WITH CLAY (SP-SC), fine grained, reddish-brown, loose, with limestone				2-4-3-2 N=7
		brown		▽		WOH/6"-1-2-5 N=3
4.0		**HIGHLY WEATHERED LIMESTONE**, yellowish-brown	5			2-7-11-19 N=18
6.0		**WEATHERED LIMESTONE**, light brown				32-34-43-28 N=77
		white				20-19-21-14 N=40
10.0		**HIGHLY WEATHERED LIMESTONE**, white	10			9-7-8-9 N=15
12.0		**WEATHERED LIMESTONE**, white				8-19-7 N=26
13.5		***Boring Terminated at 13.5 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 3.34'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/1/2015 Boring Completed: 10/1/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-4

BORING LOG NO. FP-03

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9684646° Longitude: -82.6716788°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
0	**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine grained, reddish-brown, loose, with roots			1-2-2-1 N=4
2.0	**WEATHERED LIMESTONE**, yellowish-brown	▽		6-16-21-21 N=37
	light brown			27-23-33-27 N=56
5				20-24-14-19 N=38
	white			21-16-20-23 N=36
10				5-10-17-50/5" N=27
				21-48-19-29 N=67
14.0	***Boring Terminated at 14 Feet***			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 2.81'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 9/30/2015 Boring Completed: 9/30/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-5

BORING LOG NO. FP-04

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9689126° Longitude: -82.671701°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		POORLY GRADED SAND (SP), fine grained, brown, loose		▽		WOH/6"-1-2-2 N=3
		very loose				1/12"-1/12" N=1
4.0		**HIGHLY WEATHERED LIMESTONE** yellowish-brown	5			1-3-1-1 N=4
6.0		**CLAYEY SAND (SC)**, fine grained, brown, loose, calcareous, with limestone				1-2-3-3 N=5
8.0		**POORLY GRADED SAND (SP)**, fine grained, white, loose, calcareous				2-1-2-2 N=3
10.0		**HIGHLY WEATHERED LIMESTONE** white	10			4-11-7 N=18
11.5		***Boring Terminated at 11.5 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 0.50'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 9/30/2015 Boring Completed: 9/30/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-6

BORING LOG NO. FP-05

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9675612° Longitude: -82.6733594°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
0					
1.0	**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine grained, brown, medium dense				2-5-16-47 N=21
2.0	**HIGHLY WEATHERED LIMESTONE**, light brown		▽		
	LIMESTONE, white				50/3"
4.0	**HIGHLY WEATHERED LIMESTONE**, yellowish-brown				2-4-3-7 N=7
	white	5			9-14-15-13 N=29
					6-8-9-11 N=17
		10			2-6-8 N=14
					11-8-12 N=20
13.0	***Boring Terminated at 13 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 1.77'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/1/2015 Boring Completed: 10/1/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-7

BORING LOG NO. FP-06

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9680088° Longitude: -82.6733623°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		WEATHERED LIMESTONE, light brown				
						3-6-23-20 N=29
		white		▽		17-15-16-22 N=31
			5			19-26-20-13 N=46
		yellowish-brown				8-14-18-24 N=32
	8.0	**HIGHLY WEATHERED LIMESTONE** light brown				3-5-7-17 N=12
			10			10-7-10 N=17
						15-9-10 N=19
	13.0	***Boring Terminated at 13 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 2.80'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/2/2015 Boring Completed: 10/2/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-8

BORING LOG NO. FP-07

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9684561° Longitude: -82.6733652°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
0	**POORLY GRADED SAND WITH CLAY (SP-SC)**, fine grained, brown, loose			
1.0	**HIGHLY WEATHERED LIMESTONE** light brown	▽		1-4-6-7 N=10
				5-4-1-3 N=5
	yellowish-brown			6-13-7-7 N=20
5				10-14-8-5 N=22
	white			24-8-2-13 N=10
10				22-7-3-10 N=10
12.0	***Boring Terminated at 12 Feet***			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 1.95'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/1/2015 Boring Completed: 10/1/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-9

BORING LOG NO. FP-08

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9689042° Longitude: -82.6733951°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		POORLY GRADED SAND WITH CLAY (SP-SC), fine grained, orange-brown, loose		▽		
1.0		**HIGHLY WEATHERED LIMESTONE**, white				1-6-7-4 N=13
						2-11-5-6 N=16
4.0		**WEATHERED LIMESTONE**, white	5			7-21-17-13 N=38
6.0		**LIMESTONE**, light brown				15-31-50/5"
8.0		**WEATHERED LIMESTONE**, white				16-32-9-18 N=41
10.0		**HIGHLY WEATHERED LIMESTONE**, light brown	10			9-10-13 N=23
11.5		***Boring Terminated at 11.5 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 0.62'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 10/1/2015 Boring Completed: 10/1/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-10

BORING LOG NO. FP-09

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9697239° Longitude: -82.6774241°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
0.3		**POORLY GRADED SAND WITH SILT(SP-SM)**, fine grained, brown, loose				
		HIGHLY WEATHERED LIMESTONE, light brown		▽		2-6-8-5 N=14
						4-6-9-12 N=15
4.0		**WEATHERED LIMESTONE**, yellowish-brown	5			9-8-21-11 N=29
6.0		***Boring Terminated at 6 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 1.67'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 9/29/2015 Boring Completed: 9/29/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-11

BORING LOG NO. FP-10

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9702368° Longitude: -82.6774275°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
	0.8	**POORLY GRADED SAND WITH SILT(SP-SM)**, fine grained, orange-brown, very loose				WOH/6"-2-19-16 N=21
	2.0	**HIGHLY WEATHERED LIMESTONE**				
		WEATHERED LIMESTONE, light brown	5	▽		11-6-23-17 N=29
						17-20-22-22 N=42
	7.5					16-17-9 N=26
		Boring Terminated at 7.5 Feet				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 2.30'.*

Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 9/30/2015 Boring Completed: 9/30/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-12

BORING LOG NO. PB-01

PROJECT: Citrus County Combined Cycle Project

CLIENT: Fluor Enterprises, Inc.
Charlotte, NC

SITE: Citrus County, Florida

LOCATION See Exhibit A-4

Latitude: 28.9699906° Longitude: -82.6774259°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
		POORLY GRADED SAND WITH SILT(SP-SM), fine grained, brown, loose				
1.0		**HIGHLY WEATHERED LIMESTONE** light brown				1-2-12-14 N=14
2.0		**WEATHERED LIMESTONE**, light brown		▽		23-10-23-10 N=33
		white	5			14-27-20-12 N=47
6.0		**HIGHLY WEATHERED LIMESTONE** white				20-7-8-5 N=15
						WOR/18"=2 N=0
10.0		**WEATHERED LIMESTONE**, white	10			7-22-41-28 N=63
						8-30-35-28 N=65
			15			14-11-16-11 N=27
16.0		***Boring Terminated at 16 Feet***				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Groundwater intitially observed at a depth of 2.40'.*

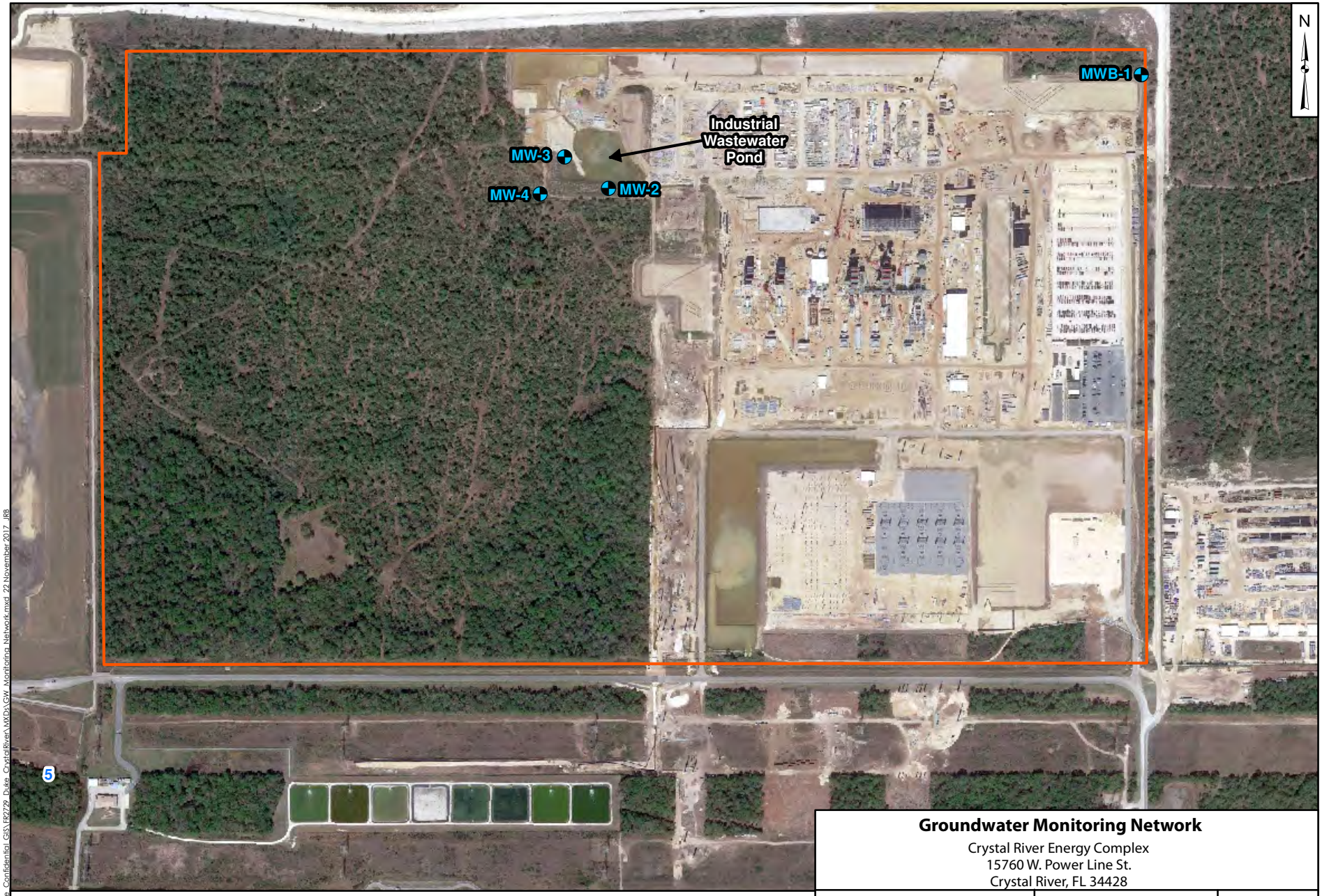
Terracon
504 East Tyler Street
Tampa, Florida

Boring Started: 9/30/2015 Boring Completed: 9/30/2015

Drill Rig: CME-45 Driller: R. Swint, Sr.

Project No.: H4155013 Exhibit: A-13

APPENDIX C
CREC and CCCP Site Groundwater Monitoring Networks



Groundwater Monitoring Network

Crystal River Energy Complex
15760 W. Power Line St.
Crystal River, FL 34428

Legend

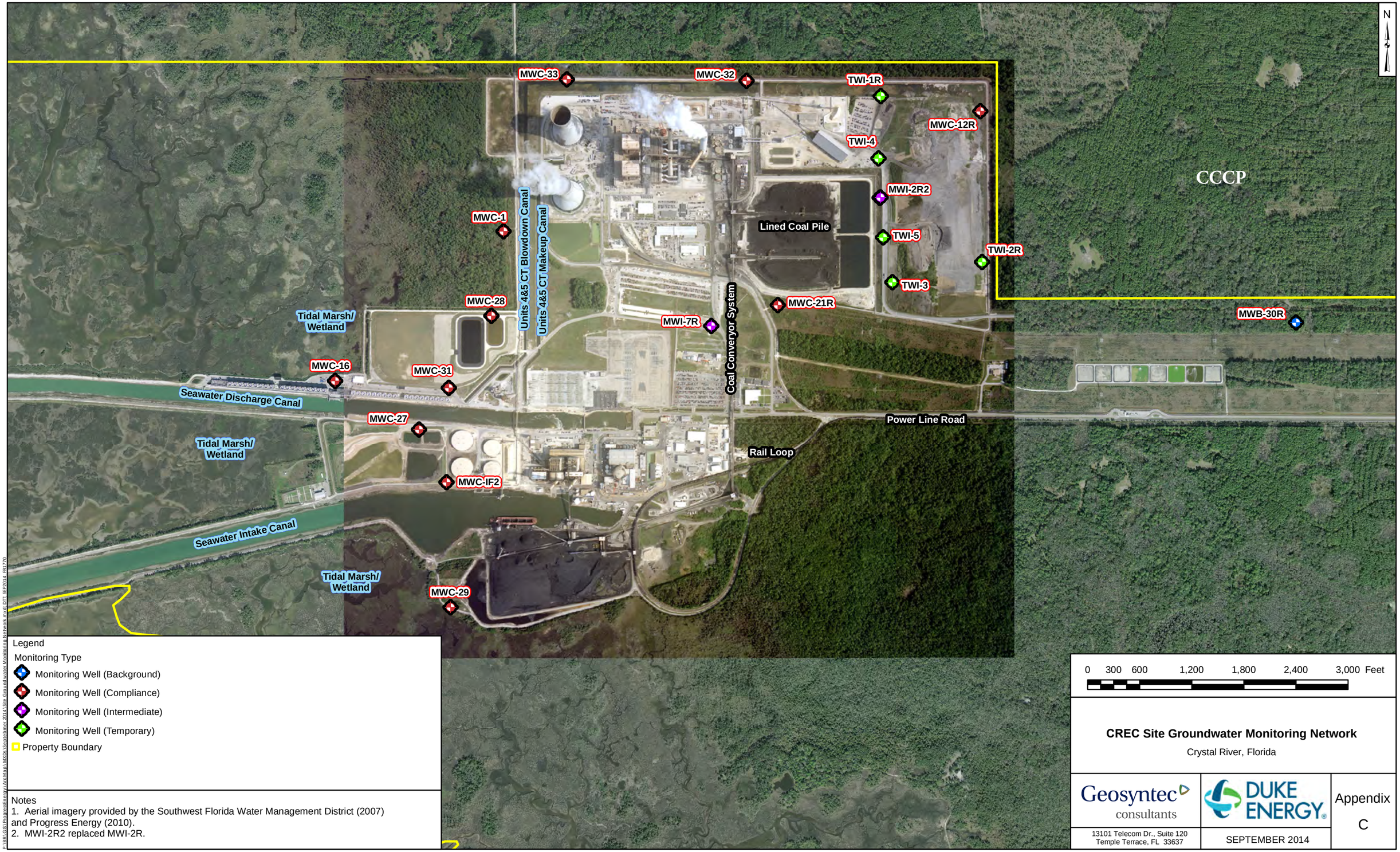
- Monitoring Well Location
- CCC Project Site

Notes:
1. CCC Project footprint obtained from Duke Energy Florida, Inc. Citrus Combined Cycle Project Site Certification Application, ECT, 2014.
2. Property boundary obtained from the Citrus County Property appraiser's office.
3. 2017 aerial image source: Google Earth Pro.

Geosyntec consultants | DUKE ENERGY PROGRESS | Figure 1

Tampa, FL | November 2017

Path: \\tlusville-01\DATA1\Duke_Confidential\GIS\FR2729_Duke_CrystalRiver\MXDs\GW_Monitoring_Network.mxd 22 November 2017 JRB



Legend

Monitoring Type

- Monitoring Well (Background)
- Monitoring Well (Compliance)
- Monitoring Well (Intermediate)
- Monitoring Well (Temporary)
- Property Boundary

Notes

1. Aerial imagery provided by the Southwest Florida Water Management District (2007) and Progress Energy (2010).
2. MWI-2R2 replaced MWI-2R.

0 300 600 1,200 1,800 2,400 3,000 Feet

CREC Site Groundwater Monitoring Network

Crystal River, Florida

Geosyntec consultants

13101 Telecom Dr., Suite 120
Temple Terrace, FL 33637

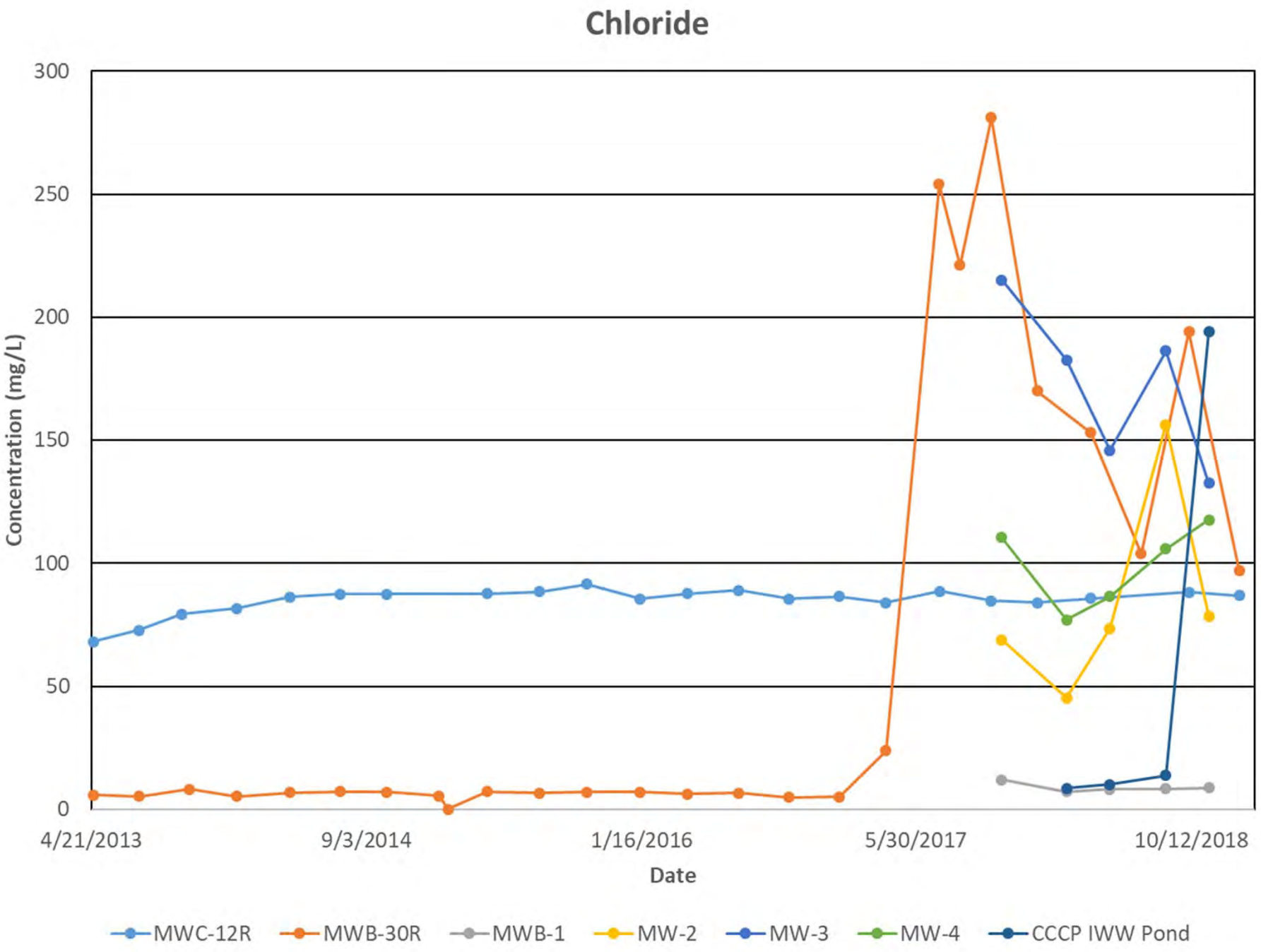
DUKE ENERGY

SEPTEMBER 2014

Appendix C

P:\BELGS\Progress\Energy\ArcMap\MXDs\September 2014 Site Groundwater Monitoring Network.mxd 07/ SEP/2014 12:17:20

APPENDIX D
Preconstruction Groundwater Quality Graphs

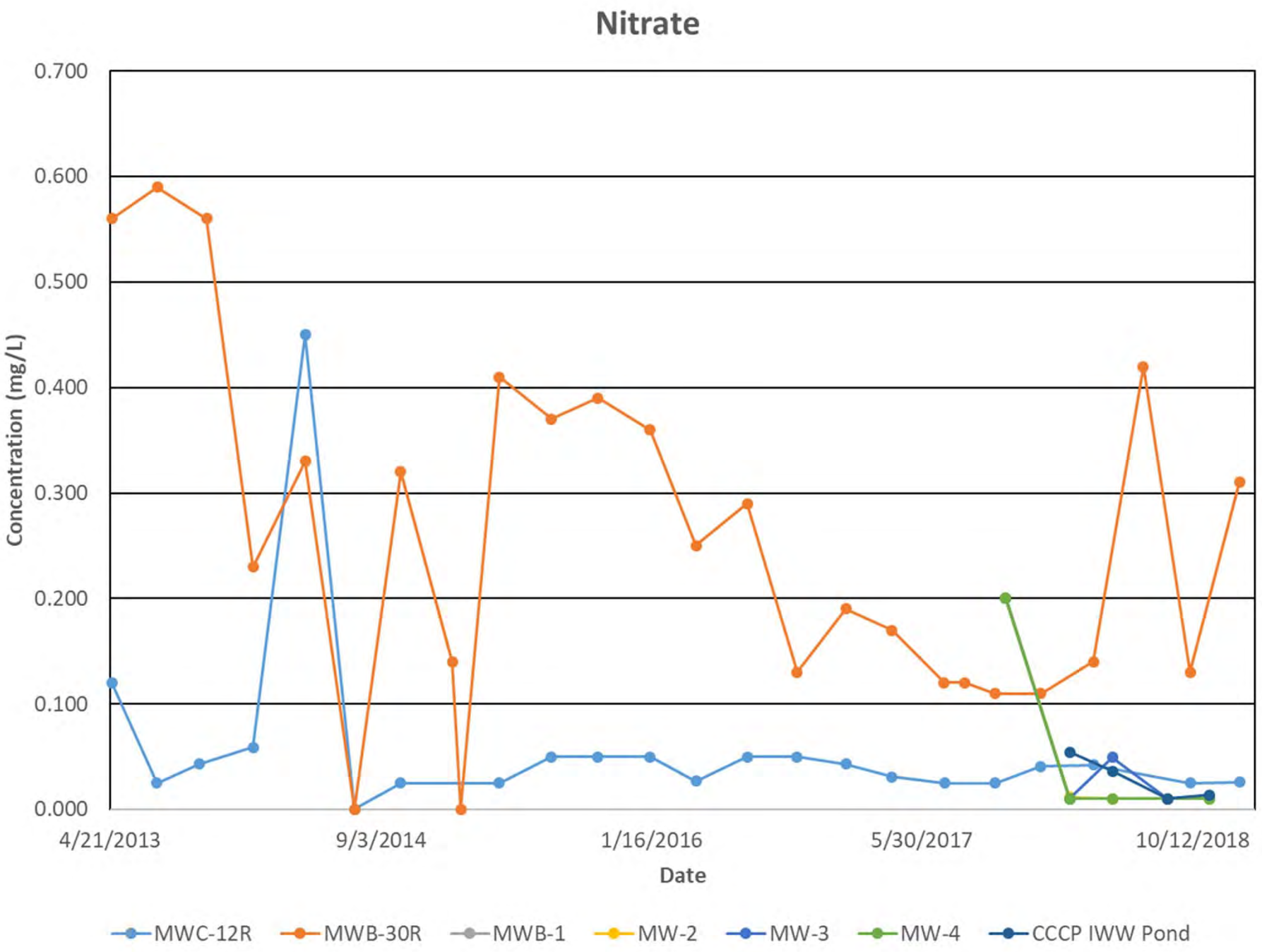


CCCP Background Water Quality

Geosyntec consultants

Tampa, Florida | March 2019

Appendix D-1

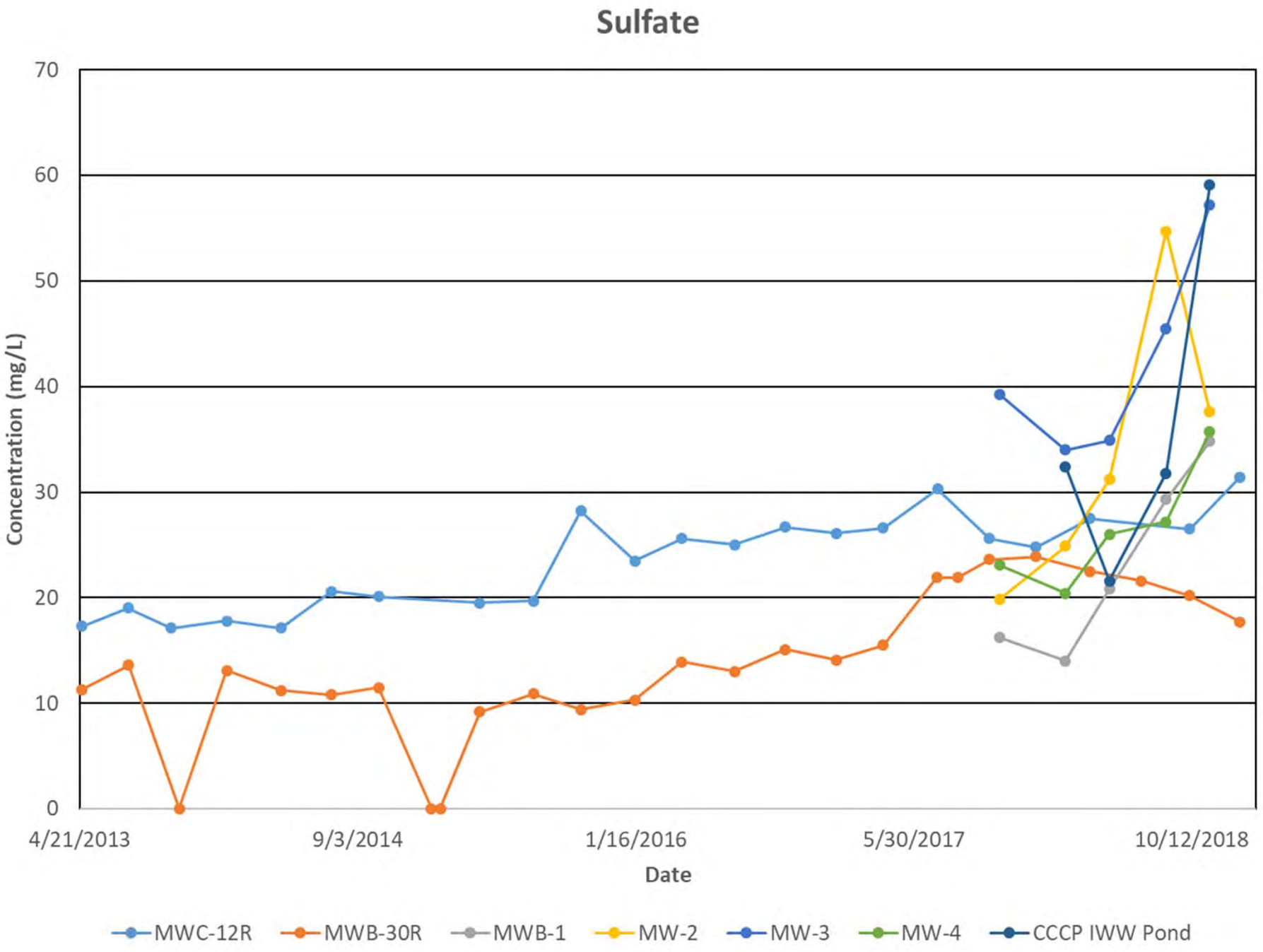


CCCP Background Water Quality

Geosyntec consultants

Tampa, Florida | March 2019

Appendix D-2

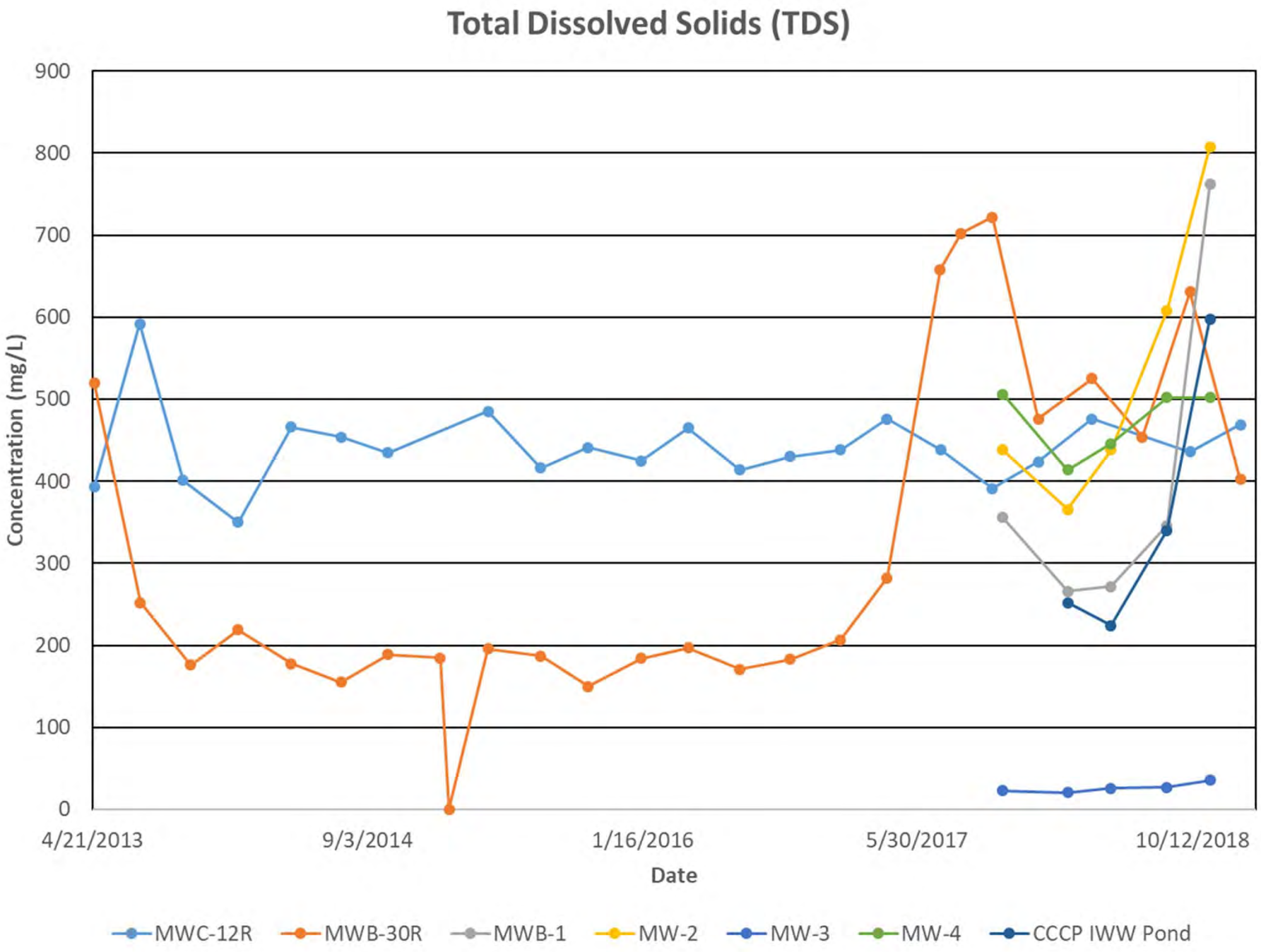


CCCP Background Water Quality

Geosyntec consultants

Tampa, Florida | March 2019

Appendix D-3



CCCP Background Water Quality

Geosyntec consultants

Tampa, Florida | March 2019

Appendix D-4

APPENDIX E
Baseline Groundwater Sampling Parameters

TABLE 1
MAXIMUM CONTAMINANT LEVELS FOR INORGANIC COMPOUNDS

FEDERAL CONTAMINANT ID NUMBER	CONTAMINANT	MCL (mg/L)
1074	Antimony	0.006
1005	Arsenic	0.05 through 12/31/2004 0.010 on and after 01/01/2005
1094	Asbestos	7 MFL
1010	Barium	2
1075	Beryllium	0.004
1015	Cadmium	0.005
1020	Chromium	0.1
1024	Cyanide (as free Cyanide)	0.2
1025	Fluoride	4.0
1030	Lead	0.015
1035	Mercury	0.002
1036	Nickel	0.1
1040	Nitrate	10 (as N)
1041	Nitrite	1 (as N)
	Total Nitrate and Nitrite	10 (as N)
1045	Selenium	0.05
1052	Sodium	160
1085	Thallium	0.002

Abbreviations Used: MCL = maximum contaminant level;
MFL = million fibers per liter (longer than 10 micrometers);
mg/L = milligrams per liter.

TABLE 4
MAXIMUM CONTAMINANT LEVELS FOR VOLATILE ORGANIC CONTAMINANTS

FEDERAL CONTAMINANT ID NUMBER	CONTAMINANT & (CAS NUMBER)	MCL (mg/L)
2977	1,1-Dichloroethylene (75-35-4)	0.007
2981	1,1,1-Trichloroethane (71-55-6)	0.2
2985	1,1,2-Tricholoroethane (79-00-5)	0.005
2980	1,2-Dichloroethane (107-06-2)	0.003
2983	1,2-Dichloropropane (78-87-5)	0.005
2378	1,2,4-Tricholorobenzene (120-82-1)	0.07
2990	Benzene (71-43-2)	0.001
2982	Carbon tetrachloride (56-23-5)	0.003
2380	cis-1,2-Dichloroethylene (156-59-2)	0.07
2964	Dichloromethane (75-09-2)	0.005
2992	Ethylbenzene (100-41-4)	0.7
2989	Monochlorobenzene (108-90-7)	0.1
2968	o-Dichlorobenzene (95-50-1)	0.6
2969	para-Dichlorobenzene (106-46-7)	0.075
2996	Styrene (100-42-5)	0.1
2987	Tetrachloroethylene (127-18-4)	0.003
2991	Toluene (108-88-3)	1
2979	trans-1,2-Dichloroethylene (156-60-5)	0.1
2984	Trichloroethylene (79-01-6)	0.003
2976	Vinyl chloride (75-01-4)	0.001
2955	Xylenes (total) (1330-20-7)	10

Abbreviations used: CAS Number = Chemical Abstract System Number;
MCL = maximum contaminant level;
mg/L = milligrams per liter.

TABLE 5
MAXIMUM CONTAMINANT LEVELS FOR SYNTHETIC ORGANIC CONTAMINANTS

FEDERAL CONTAMINANT ID NUMBER	CONTAMINANT & (CAS NUMBER)	MCL (mg/L)	Regulatory Detection Limit (mg/L)
2063	2,3,7,8-TCDD (Dioxin) (1746-01-6)	3×10^{-8}	5×10^{-9}
2105	2,4-D (94-75-7)	0.07	0.0001
2110	2,4,5-TP (Silvex) (93-72-1)	0.05	0.0002
2051	Alachlor (15972-60-8)	0.002	0.0002
2050	Atrazine (1912-24-9)	0.003	0.0001
2306	Benzo(a)pyrene (50-32-8)	0.0002	0.00002
2046	Carbofuran (1563-66-2)	0.04	0.0009
2959	Chlordane (57-74-9)	0.002	0.0002
2031	Dalapon (75-99-0)	0.2	0.001
2035	Di(2-ethylhexyl)adipate (103-23-1)	0.4	0.0006
2039	Di(2-ethylhexyl)phthalate (117-81-7)	0.006	0.0006
2931	Dibromochloropropane (DBCP) (96-	0.0002	0.00002
2041	Dinoseb (88-85-7)	0.007	0.0002
2032	Diquat (85-00-7)	0.02	0.0004
2033	Endothall (145-73-3)	0.1	0.009
2005	Endrin (72-20-8)	0.002	0.00001
2946	Ethylene dibromide (EDB) (106-93-4)	0.00002	0.00001
2034	Glyphosate (1071-83-6)	0.7	0.006
2065	Heptachlor (76-44-8)	0.0004	0.00004
2067	Heptachlor epoxide (1024-57-3)	0.0002	0.00002
2274	Hexachlorobenzene (118-74-1)	0.001	0.0001
2042	Hexachlorocyclopentadiene (77-47-4)	0.05	0.0001
2010	Lindane (58-89-9)	0.0002	0.00002
2015	Methoxychlor (72-43-5)	0.04	0.0001
2036	Oxamyl (vydate) (23135-22-0)	0.2	0.002
2326	Pentachlorophenol (87-86-5)	0.001	0.00004
2040	Picloram (1918-02-1)	0.5	0.0001
2383	Polychlorinated biphenyls (PCBs)	0.0005	0.0001

FEDERAL CONTAMINANT ID NUMBER	CONTAMINANT & (CAS NUMBER)	MCL (mg/L)	Regulatory Detection Limit (mg/L)
2037	Simazine (122-34-9)	0.004	0.00007
2020	Toxaphene (8001-35-2)	0.003	0.001

Abbreviations used: CAS Number = Chemical Abstract System Number;
MCL = maximum contaminant level;
mg/L = milligrams per liter.

NOTE: The Detection Limits listed in this table become effective January 22, 2004.

TABLE 6
SECONDARY DRINKING WATER STANDARDS

FEDERAL CONTAMINANT ID NUMBER	CONTAMINANT	SMCL (mg/L)*
1002	Aluminum	0.2
1017	Chloride	250
1022	Copper	1
1025	Fluoride	2.0
1028	Iron	0.3
1032	Manganese	0.05
1050	Silver	0.1
1055	Sulfate	250
1095	Zinc	5
1905	Color	15 color units
1920	Odor**	3 (threshold odor number)
1925	pH	6.5 - 8.5
1930	Total Dissolved Solids	500
2905	Foaming Agents	0.5

Abbreviations Used:

SMCL = maximum contaminant level;
mg/L = milligrams per liter.

* Except color, odor, and pH.

** For purpose of compliance with ground water quality secondary standards, as referenced in Chapter 62-520, F.A.C., levels of ethylbenzene exceeding 30 micrograms per liter, toluene exceeding 40 micrograms per liter, or xylenes exceeding 20 micrograms per liter shall be considered equivalent to exceeding the drinking water secondary standard for odor.