



April 8, 2016

Ms. Cindy Mulkey
Program Administrator
Office of Siting Coordination
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3000

RE: Seminole Electric Cooperative, Inc.
Hardee Power Station, Hardee County, FL
Power Plant Certification PA 89-25
Post Certification Amendment to Application

Dear Ms. Mulkey:

Pursuant to Section 403.5113, Florida Statutes, and Rule 62-17.205, Florida Administrative Code, please accept this letter and the attachments hereto as a post-certification amendment to the Seminole Electric Cooperative, Inc. (SECI) Site Certification Application (SCA) for the Hardee Power Station (HPS) in Hardee County, Florida. This post-certification amendment addresses the proposed installation of a solar station within the boundaries of the current certified HPS site (PA 89-25). The solar station will be a photovoltaic (PV) single axis tracking system with a peak power output of 2.2 MW AC / 2.68 MW DC. SECI is dedicating approximately 29.52-acres for the project easement, of which approximately 18.24 acres will contain actual solar facility related equipment on it.

If you have any questions, please feel free to call Michael Lee at (813) 739-1281 or by email at mlee@seminole-electric.com.

Sincerely,

Michael W. Lee
Senior Environmental Regulatory Coordinator

cc: Lewis Snyder, SECI
Glenn Spurlock, SECI
Tim Frost, Invenergy
Ralph Randall, Invenergy
Alex George, Invenergy
Doug Roberts, HGS
Ann Seiler – FDEP w/attachments



AMENDMENT REQUEST
Hardee Power Station Site Certification Application:
Seminole Solar Project

April 8, 2016

Proposed Activity

Pursuant to Section 403.5113, Florida Statutes, and Rule 62-17.205, Florida Administrative Code, Seminole Electric Cooperative, Inc. (SECI) requests an amendment to the Hardee Power Station (HPS) Site Certification (PA89-25) to construct and operate a 2.2 MW AC / 2.68 MW DC photovoltaic (PV) solar generating station on the Hardee Power site. Radiance Solar LLC will be in charge of the engineering, procurement, and construction of the solar facility; Farm Credit Leasing (FCL) will be the owner; SECI will net lease the facility through FCL, as well as operate and maintain it.

HPS is located in Hardee and Polk Counties about nine miles northwest of the city of Wauchula, 16 miles south-southwest of the city of Bartow, and 40 miles east of the Tampa Bay area (see Figure 1). The site is bordered on the east by Old Castle, Inc., County Road 663, and a CSX Railroad line. The remaining portions of the site are surrounded by The Mosaic Company property. The solar station will be located completely within Hardee County within a designated approximately 29.52-acre easement. The solar station will be located in the area shown on Figure 2. Figure 3 shows the detailed boundary survey for the solar station.

Purpose/Reason for Activity

The purpose of the Seminole Solar project is to expand SECI's renewable energy portfolio. This along with SECI's other generating resources will serve our current member energy needs. This solar site was selected as the location of the PV station based on various factors including system load, interconnection availability, proximity to existing Seminole operations and maintenance personnel, as well as economics.

Licensing of Hardee Power Station

In 1990, the Siting Board granted certification under the Power Plant Siting Act (PPSA) for the construction and operation of the Hardee Power Station under Siting Number PA89-25. That certification approved the initial 440 MW electrical generating facility at the Hardee County power plant site which is now owned by Invenergy, LLC, along with electrical transmission lines that serve the facility. Seminole is the owner of the 1300-acre plant site and Invenergy operates its facility on the power plant site under a lease from Seminole. The 1990 certification covered the 1300-acre plant site located in Hardee and Polk counties. During that proceeding, the Siting Board also determined that the 1300-acre plant site was consistent and in compliance with the land use plans and zoning ordinances of Hardee and Polk counties. In 1995, the Siting Board approved the construction and operation of the now-Midulla Generating Station, a 440 MW electrical generating unit that is owned by Seminole, Siting Number 89-25/SA. The 1995 certification covered a 50-acre parcel within the larger 1300-acre power plant site. The Midulla Generating Station utilizes the existing cooling pond, access road and electrical transmission lines along with other common, onsite facilities.

The proposed solar facility is located on the 1300-acre power plant site covered by the initial certification.

Land Use and Zoning

The solar facility location within the power plant site was previously found to be consistent with the land use plans and zoning ordinances of Hardee County as part of the initial 1990 site certification proceeding. The facility's location is within lands designated for Industrial uses on the Future Land Use Map of the Hardee County Comprehensive Plan. The site is zoned I-1, industrial, under the Hardee County zoning code.

Site Development Plan

Hardee County's Unified Land Development Code section 7.06.08.02 sets out criteria for Site Development Plans for facilities such as Seminole's solar facility. Appendix A to this Request contains information and figures addressing the County's applicable site plan criteria. The information in Appendix A demonstrates that the solar facility will be undertaken consistent with those criteria.

Technical Description of Activity

The output of the PV installation will vary with weather, time of year and the age of the facility but is nominally anticipated to generate a total of 2.2 MW AC / 2.68 MW DC. The system will have single-axis tracking capability which will allow the panels to track the sunlight throughout the day and thereby increasing the effective use of the land. The facility will include approximately 1,470 piles, 8,400 panels, supporting racks, a DC/AC inverter, a transformer to increase the voltage to the distribution system level, breakers, relays, and associated wiring, fencing and appurtenances. The support piles will be driven into the ground to provide adequate support to the racks and panels under the 140 mph wind conditions specified in the building code.

Site Construction

SECI requested that the design of the solar arrays consider soil conditions that would support a single axis tracking system design. Sub-contractors were hired to perform geotechnical studies of the soil conditions to understand potential impacts (Appendix B). The study results indicated that some portions of the land identified for the original solar array location had soil conditions that might not be suitable for the use of piles. The panel locations were then rearranged to place the arrays in the most stable soil areas based on the results of the studies. Any permanent installation associated with the solar arrays will be located to allow for a minimum buffer of 40 feet between the installation and any identified wetlands.

Upon construction start, site preparation will include proper installation of the required NPDES silt and erosion control around the area of construction. The project area within the fenceline will be mowed and the construction zone will be selectively cleared of vegetation and woody debris. A laydown area for project material during construction will be created in the southeast corner of the project area. The soil will be minimally prepped in the areas where arrays are being placed. The site in general slopes from east to west. Site elevations range from 132 to 125 feet National Geodetic Vertical Datum of 1929 (ft-NGVD). Existing site

topography is shown on Figure 4. Adjustability within the tracker structural system allows it to follow existing contours so no grading will be required. The idea is to leave as much of the solar site area in as natural a state possible.

No improvements or additions to the current stormwater system of the certified site are expected, as areas of impervious surface will be minimized for construction of the solar facility and runoff will be allowed to percolate naturally into the underlying grassy area. Stormwater during construction and operation will be managed in accordance with FDEP's Best Management Practices for stormwater, and in compliance with FDEP, Southwest Florida Water Management District (SWFWMD), and Hardee County rules on stormwater management. Cleaning and maintenance of the solar panels will be minimal and not require the use of chemicals. The intent is for the panels to be washed naturally from rainfall.

A small road to gain limited access for maintenance and/or emergency purposes will be constructed to the fenced in solar facility area from the plant main entrance road. The road will be built at grade using #57 stone with no additional compaction required. A perimeter security fence will be constructed to control access to the site. There are no requirements for permanent water and/or sanitary facilities, and therefore will not be constructed. No dewatering is necessary for construction.

Structural/Mechanical/Electrical

The system is structurally designed and will be installed to withstand 140 mph winds. Two weather stations will be installed to monitor the wind speed. When winds in excess of approximately 37 mph are detected for long durations, the system will be directed to stow the panels in a flat configuration or in the position that makes them most safe depending upon wind direction. A 30 watt battery will power each tracker motor.

It is intended that the solar panels will be supported by 20 foot long steel H piles driven approximately 15 feet into the ground. Figure 5 shows a side drawing of the array. Concrete foundations measuring approximately 5' x 5' x 1' will be used only as needed for stability (see Figure 6) if problem soil areas are encountered during construction. The solar facility and pile placement were designed to utilize the strongest soil areas found during the preliminary geotechnical work (see Appendix B). SECI does not intend to install any concrete foundations unless they are considered necessary for proper function and stability of the individual pile. If any concrete foundations are needed, they will be discontinuous (not connected to one another). Rainwater runoff would then percolate into the surrounding natural areas and have no adverse impact offsite.

The electrical energy coming from the panels will be generated at 320 W DC. It will be collected by electrical cables in buried small diameter conduit and delivered to a DC-to-AC inverter. From the inverter the voltage will be stepped up in a transformer to match the voltage of the existing Peace River Electric Cooperative electrical distribution circuit operating at 12.47 kV AC. The solar array and associated equipment, as well as the surrounding security fence, will be properly grounded for safety.

Environmental Effects of Project

Hardee Power Station was originally certified under the PPSA in 1990. During that process, delineation and mitigation of the site development footprint was approved by the Siting Board and reviewing agencies prior to any construction.

The entire site was constructed on phosphate mine reclamation area with the majority being disturbed due to those activities. The portion of the site that will contain the solar facility has most recently been used as a grazing area for cattle. The solar facility will be constructed entirely in uplands, as no wetlands occur within the solar project boundary.

Native shrubs and invasive exotic groundcover species dominate the current vegetative cover within the solar project area. The shrub species include wax myrtle (*Myrica cerifera*), groundsel tree (*Baccharis halimifolia*), and Brazilian pepper (*Schinus terebinthifolius*). Groundcover species include exotic cogon grass (*Imperata cylindrical*), Caesar weed (*Urena lobata*), blackberry (*Rhubs* sp.), Bahia grass (*Paspalum notatum*), and rattlebox (*Sesbania punicea*).

No listed flora or fauna species have been observed or are known to inhabit the solar site area; therefore no impacts to listed species are anticipated. Please see the attached ecological assessment report of the project site for more detailed information (Appendix C). If any issues involving wildlife species were to occur during the construction or operation of the solar facility, SECI will consult with FWC, FDEP, and any other agencies necessary to determine steps to minimize or mitigate concerns.

Archaeological and Historical Resources

The solar facility site is located on lands previously mined for phosphate. The 1990 site certification application reported that there were no significant archaeological or historical resources on the larger 1300 acre power plant site within which the solar facility will be located. The Florida Department of State, Division of Historical Resources concurred in this finding. See Hardee Power Station SCA, section 2.2.6, (1989).

Conclusion

Seminole Electric Cooperative believes the information submitted in this Request for Amendment of Site Certification PA89-25, demonstrates that the solar facility can be constructed and operated with minimal, if any environmental or other impacts. The project can also be undertaken in accordance with the existing conditions of certification; no modification of those conditions is required for the solar facility, as described in this submittal. Seminole requests, therefore, that the Department of Environmental Protection review this submittal and upon completion of its review, approve this request as an Amendment to the Hardee Power Station Site Certification Application, in accordance with section 403.5113, Florida Statutes.

LIST OF ATTACHMENTS:

FIGURES:

Figure 1 – Location Map

Figure 2 – Seminole Solar Project Site Development Plan

Figure 3 – Boundary Survey

Figure 4 – Topographic Map

Figure 5 – NEXTracker Elevation – Array Side Drawing

Figure 6 – Structural Pier Details

Figure 7 – FEMA Map

APPENDICES:

Appendix 1 - Hardee County Site Development Plan Criteria

Appendix 2 - Geotechnical Studies

Appendix 3 - Ecological Assessment Report

FIGURES

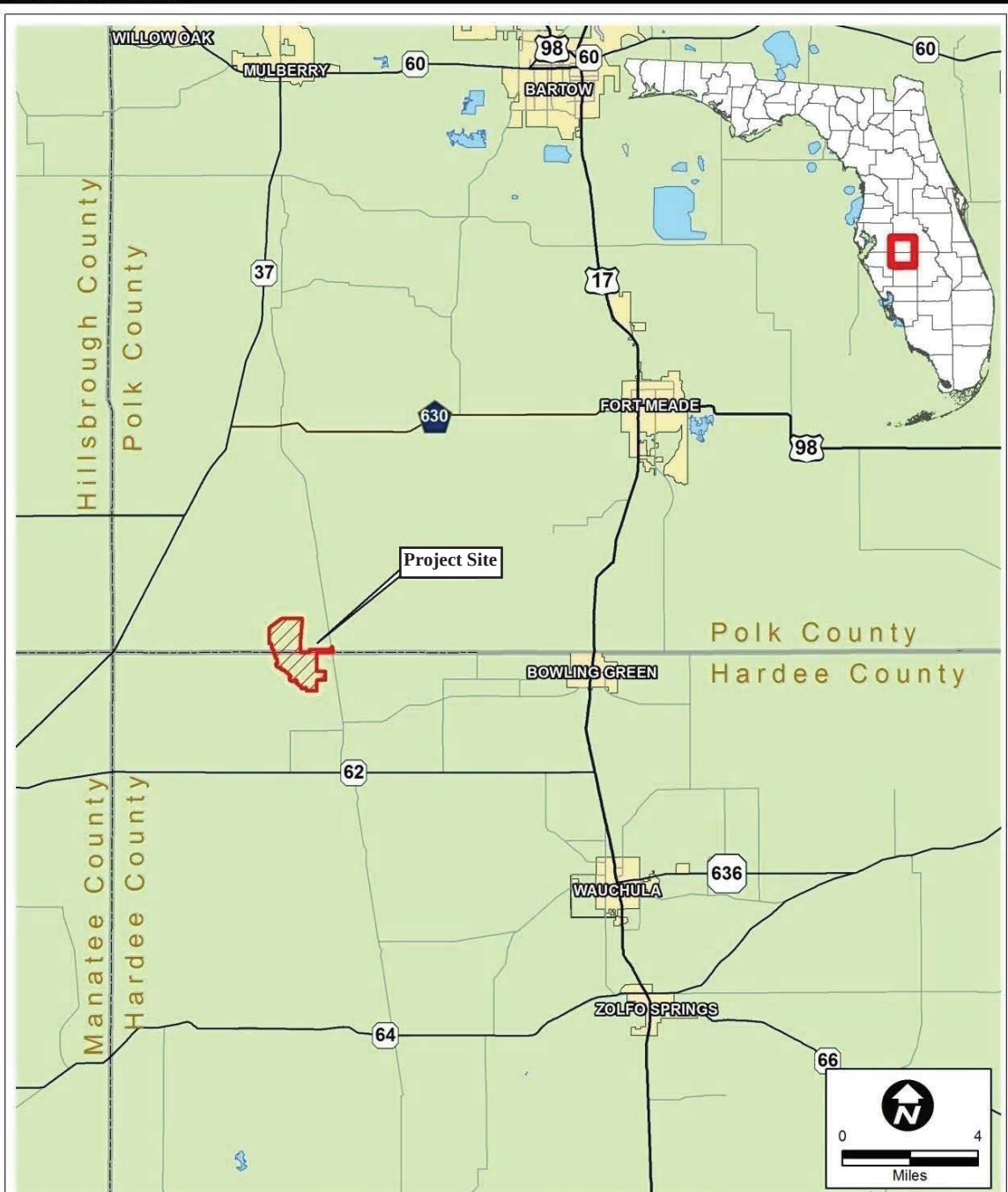


Figure 1 - Location Map

Source: ESRI, 2009; US Census, 2000; ECT, 2009.

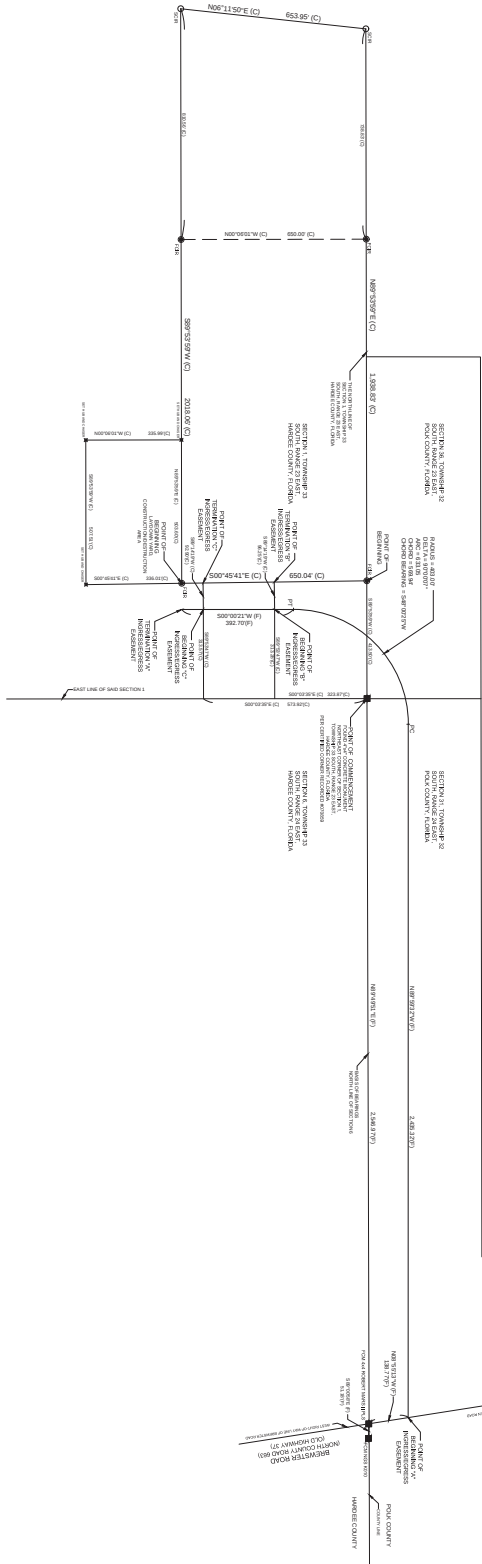
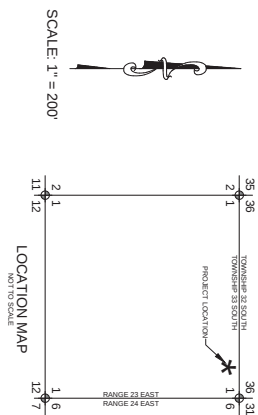
Site size: 794,341.38 sq. ft./18.24 acres
Modules: 180,768 sq. ft.
Piles: 83 sq. ft.
Fence posts: 500 sq. ft.
Concrete gate posts: 40 sq. ft.
Concrete inverter/transformer pad: 100 sq. ft.
Gravel road: 5,568 sq. ft.
Gravel switch yard: 2,500 sq. ft.



(8,400) Canadian Solar 320W Modules
2.68 MW DC Total
2.2 MW AC Total



THIS DRAWING IS THE PROPERTY OF SEMINOLE ELECTRIC COOPERATIVE, INC. THE CONTENTS OF THIS DRAWING ARE CONFIDENTIAL AND PROPRIETARY TO SECI AND MAY NOT BE REPRODUCED WITHOUT WRITTEN COMPANY PERMISSION.		FIGURE 2 SEMINOLE SOLAR PROJECT SITE DEVELOPMENT PLAN			
DATE: 4/1/2016	APPD:			SECI DWG. NO. PV003	PAGE 1 OF 1
SCALE: 1"=100'	DRWN:				
CHKD:	CHKD:				



7					
6					
5					
4					
3					
2					
1	12/21/2015	REVISED BOUNDARY SURVEY AND LEGAL DESCRIPTION			
NO.	DATE	DESCRIPTION	BY	CHK	NETS

SECTION 1
TOWNSHIP 33 SOUTH
RANGE 23 EAST
HARDEE COUNTY
FLORIDA

FIGURE 3

BOUNDARY SURVEY
SEMINOLE SOLAR SITE
SEMINOLE ELECTRIC COOPERATIVE, INC
16313 N. DALE MABRY HWY.
TAMPA, FLORIDA 33618

SURVEYOR'S NOTES

- [illegible]

LEGAL DESCRIPTION

TOGETHER WITH A LAYDOWN, CONTRIBUTION TO STRUCTURE IDEA

[illegible][illegible][illegible]

CERTIFICATION	
CERTIFIED TO:	
I HEREBY CERTIFY THAT THE SIGNATURE WAS MADE UNDER MY OBSERVATION ON THE DATE SHOWN BASED ON MY PERSONAL KNOWLEDGE OF THE SIGNATURE OF THE INDIVIDUAL NAMED IN THE SIGNATURE FIELD AND THAT THE SIGNATURE WAS MADE IN THE STATE OF CALIFORNIA IN ACCORDANCE WITH CHAPTERS 32-37, 2006, F.C.A.R.S. AND CHAPTER 16, CODE OF REGULATION, TO REGISTRATION TO RESIDE IN CALIFORNIA, 2010.	
DATE OF SIGNATURE	PROFESSIONAL NAME AND ADDRESS
SIGNATURE	PROFESSIONAL NAME AND ADDRESS
NOT VALID WITHOUT THE SIGNATURE AND CHIEF OR CLERK SEAL OF A CALIFORNIA LICENSED SIGNATURE AND SEALING	

ESP ASSOCIATES, P.A.
5459 W. WATERS AVENUE, SUITE 210
TAMPA, FLORIDA 33634
PHONE: 813-313-2838
WWW.ESPNSOCCRETS.COM
PROFESSIONAL SURVEYOR'S AND ENGINEER'S
L.E. 17924



SHEET 1 OF 1



916 Joseph E Lowery Blvd, NW
Suite 2
Atlanta, GA 30318
Phone: 404.885.9898

Project:
Seminole Electric
Cooperative, INC

Client:
6697 N. County Road 663
Bowling Green, FL 33834

Consultants:

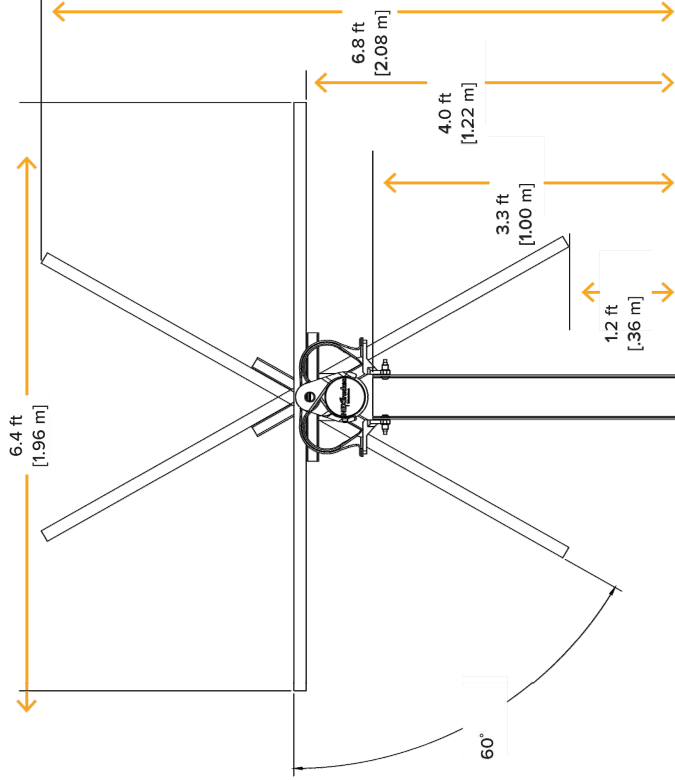
Date:
March 10, 2016

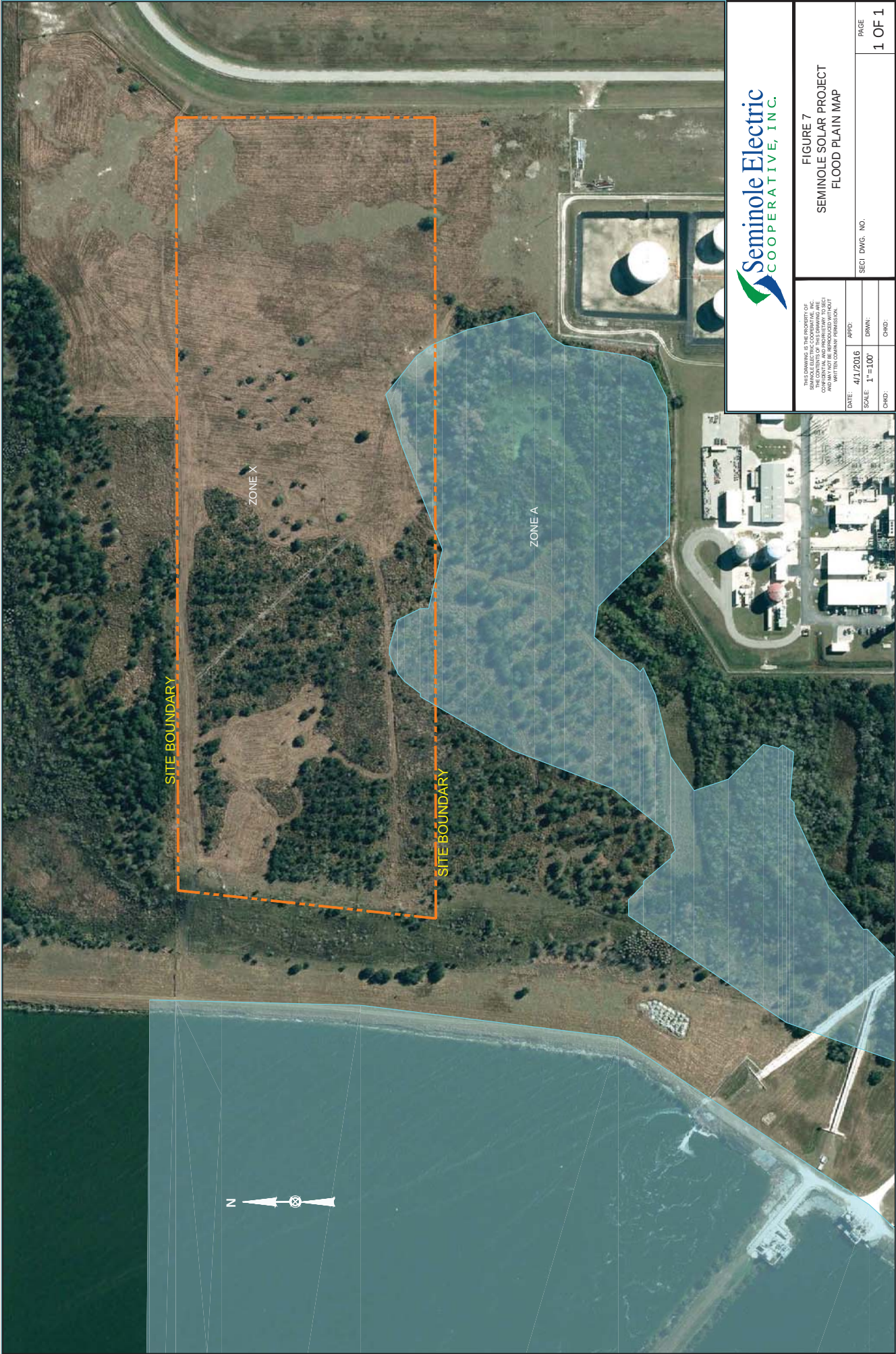
Revision:

Scale:
1-1/2"=1'-0"

Title:
Figure 5:
NexTracker Elevation

PV0003





APPENDIX A

HARDEE COUNTY SITE DEVELOPMENT PLAN CRITERIA

Appendix A
Seminole Electric Cooperative, Inc.
Seminole Solar Project
Hardee County Site Development Plan Criteria

Seminole Electric Cooperative is providing the following information to demonstrate that the Seminole Solar project meets the criteria related to a Site Development Plan under section 7.06.08.02, of the Unified Land Development Code of Hardee County. The solar facility is described in the Amendment Request for Hardee Power Station Site Certification Application: Seminole Solar Project (Request) to which this Appendix is made. This submittal tracks the criteria in that Code section with responses provided for each criterion. Figures reflecting this information are included in the figures attached to the Request.

(A) Site Survey.

Response: See Figure 3 in Request.

(B) Contents of Plan

The following information shall be required:

(01) Site Development Plan name.

Response: Seminole Solar Project

(02) The property owner's name, address and telephone number; and the designated project applicant or representative if other than the property owner.

Response: The property owner is Seminole Electric Cooperative, Inc. Address: PO Box 27200, Tampa, Florida 33688-2000. Telephone: 813-963-0994

(03) The preparer's name, address, telephone number, and email address.

Response: Preparer is Michael Lee, Seminole Electric Cooperative, Inc. Address is PO Box 27200, Tampa, Florida 33688-2000. Telephone: 813-739-1281. Email: MLee@seminole-electric.com

(04) North arrow, scale and date prepared.

Response: Shown on figures.

(05) Land use designation and zoning district assigned to the property that is the subject of the plan and to the properties contiguous thereto.

The project location is designated Industrial on the Hardee County Future Land Use Map and is zoned I-1, Industrial.

(06) Location map.

Response: See Figure 1 in the Request.

(07) A specific delineation of watercourses, wetlands and the 100-year floodplain on the site. Delineation should be accurate based on expertise or filed verified data.

Response: See Figure 2 for wetlands and Figure 7 for floodplains.

(08) If a residential subdivision, accurate depiction of lot layout with the lot size proposed, accurate depiction of internal roadway configuration with drainage features; e.g., if curb and gutter drainage identify curbing and curbing type on the plan; if swale drainage, identify swales and cross-section detail.

Response: Not applicable

(09) Accurate depiction of stormwater systems, including drainage flow, conveyance systems, pond location(s) with approximate size area and structures.

Response: No stormwater management systems are required under FDEP regulations and none are proposed.

(10) Location of all easements to be proposed on the site and individual lots/properties.

Response: No easements are proposed or required.

(11) If multifamily residential or non-residential, location of all buildings/structures, number of floors and gross square footage, setbacks and building separations.

Response: The facility does not involve any new buildings; electrical equipment will be located in enclosures.

(12) Location of major roads/streets at the site, along with functional classification, right-of way width, and physical characteristics of the roadway (pavement width and drainage type) and the location of all proposed accesses into the site with radii.

Response: No new roads are proposed. A single internal gravel driveway to access the solar facility location is shown on Figure 2 of the Request. Existing internal roads are shown on Figure 2. The existing power plant site accesses CR 663, which is classified as a major collector road.

(13) Completion of a traffic impact analysis based on procedures described in the Hardee County Traffic Impact Study Procedures Manual.

Response: A traffic impact analysis is not required as the solar facility does not result in additional traffic.

(14) Location of vehicular use areas.

Response: No new vehicular use areas are required beyond new internal gravel driveway.

(15) Depiction of proposed parking spaces and size of parking spaces.

Response: None required or proposed.

(16) Type, size and location of utilities proposed, if any, including potable water, sewer, reuse, and fire hydrants.

Response: No new public utilities or services are required.

(17) Depiction of all buffer and landscape areas with vegetation size and type proposed. Location of all walls or fences.

Response: Unaffected natural vegetated areas are shown on Figure 2. The fence around the solar facility is shown on Figure 2.

(18) Sign location and size, if any.

Response: No new signs are planned.

(19) Typical details including roadway cross section, typical building lot with setbacks and similar details.

Response: No new roadways are planned; new onsite internal gravel driveway to access the solar facility is shown on Figure 2.

(20) Tabular data block including area of the site, in acres or square feet as appropriate, area in wetlands and floodplains, if applicable, total number of lots and gross density or, if multifamily, commercial or industrial, number of units, gross square footage of building(s), floor area ratio, area of impervious surface and impervious surface ratio, area in stormwater management, area in common/open space, number of parking spaces and any other information necessary to determine code compliance of the project

Response:

Area of the site, in acres or square feet	29.52 acres
Area in wetlands and floodplains	No work in wetlands; no buildings or fill in floodplains
For industrial uses, number of units,	None
Gross square footage of building(s)	None; no buildings
Floor area ratio,	N/A
Area of impervious surface and impervious surface ratio	140 square feet. (Individual piles may require 5'x5' concrete footers for stability as determined during construction)
Area in stormwater management	None; no stormwater management required
Area in common/open space	None
Number of parking spaces	None required

(21) Completion of Application for Concurrency/Worksheet.

Response: No concurrency related impacts are proposed. Therefore, no Concurrency Application is required.

APPENDIX B

GEOTECHNICAL STUDIES



November 13, 2015

Mr. Keith Craig
Radiance Solar
916 Joseph E. Lowery Boulevard
Suite 2
Atlanta, Georgia 30318

ECS Project No. 41:1464

Reference: Letter Report of Subsurface Exploration, 6997 North County Road, Bowling Green, Florida

Dear Mr. Craig:

ECS Florida, LLC (ECS) completed the subsurface exploration for the proposed solar array in Bowling Green, Florida. We have prepared this letter to present the findings of our subsurface exploration.

Project Description

Based on our phone conversations with your office on July 17, 2015, we understand that the project will include several solar panels. Details regarding the design of the solar field were not available to us at the time of this letter preparation. The description of the proposed project is based on the information provided to us by your office or other design team members.

Scope of Work

ECS performed a total of seven soil test borings (referenced as B-1, B-2, B-4, B-6, B-7, B-8, and B-10) within the development limits of the solar field. Each of the soil test borings were advanced to depths between approximately 15 feet and 30 feet below existing ground surface. No engineering recommendations are included as part of this letter, in accordance with ECS Proposal No. 41:891-GP dated September 9, 2015.

The soil test locations were selected by your office and located in the field by representatives of ECS. No site survey was available for our field exploration. Consider the indicated locations and depths to be approximate. Our layout crew located the borings based upon limited GPS data and visually estimated distances and relationships to obvious landmarks. The Boring Location Plan is included as an attachment to this letter.

Our exploration was confined to the zone of soil likely to be stressed by the proposed construction. Our work did not address the potential for surface expression of deep geological conditions, such as sinkhole development related to karst activity. This evaluation requires a more extensive range of field services than performed in this study. We will be pleased to conduct an exploration to evaluate the probable effect of the regional geology upon the proposed construction, if you desire.

This report presents an additional evaluation of site conditions on the basis of traditional geotechnical procedures for site characterization. The samples were not examined, either

visually or analytically, for chemical composition or environmental hazards.

Subsurface Exploration Procedures

The soil borings were performed with an ATV-mounted drilling rig, which used continuous mud rotary methods to advance the boreholes. Drilling fluid was used in this process to prevent the borehole from collapsing.

Representative soil samples were obtained by the split-barrel sampling procedure per ASTM Specification D-1586. In this procedure, a 2-inch O.D., split-barrel sampler is driven into the soil a distance of 18 inches or 24 inches by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler through a 12-inch interval is termed the SPT value, or "N" value, and is indicated for each sample on the boring logs. This value can be used as a qualitative indication of the in-place relative density of non-cohesive soils. In a less reliable way, it also indicates the consistency of cohesive soils. This indication is qualitative, since many factors can significantly affect the standard penetration resistance value and prevent a direct correlation between drill crews, drill rigs, drilling procedures, and hammer-rod-sampler assemblies.

Laboratory Testing Program

Representative soil samples were selected and tested in our laboratory to check the field classification and to determine pertinent engineering properties. The laboratory testing program included visual classifications, natural moisture content tests, wash No. 200, resistivity testing, pH, and sulfate content tests of selected soil samples. Data obtained from the laboratory testing program is included on respective boring logs and on separate laboratory sheets attached to this letter.

Each soil sample was visually classified on the basis of texture and plasticity in accordance with the Unified Soil Classification System (USCS). The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. A brief explanation of the USCS is included with this report. The samples were grouped by various soil types into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs and profiles are approximate; in situ, the transitions may be gradual, rather than distinct.

The soil samples obtained from this exploration will be retained at our laboratory for a period of 60 days from the time drilling was completed. After 60 days from completion of drilling, they will be discarded unless we receive other direction from your office.

Soil Conditions

Subsurface conditions within the project site were evaluated with seven soil test borings. The borings were extended to depths between approximately 15 feet and 30 feet below the existing ground surface. The approximate boring locations are shown on the Boring Location Plan, included as an attachment to this letter.

The borings generally encountered two layers of natural soils consisting of fine sand with varying amounts of silt or clay (SP, SP-SM, and SP-SC) to depths between approximately 2 feet and 12 feet below existing ground surface underlain by clayey fine sand (SC) to boring termination depths. SPT N-values within the natural soils ranged from 3 blows per foot (bpf) to

30 bpf. These values correspond to very loose to medium dense relative densities in the sandy soils. For more detailed boring information, please see the attached boring logs, included as attachments to this letter.

Groundwater Observations

On the basis of depth to water measurements made in the open boreholes, we estimate the groundwater level was at depths of approximately 3 feet and 4 feet below the existing ground surface in the borings at the time of drilling. The groundwater will fluctuate seasonally depending upon local rainfall. The rainy season in Central/Western Florida is normally between June and September. Variations in the location of the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, and other factors not apparent at the time of this exploration. It should be noted that the elevation change on the site may be significant. In order to better evaluate the groundwater, ECS recommends surveying the boring locations for elevation.

Closing

This letter has been prepared to aid in the evaluation of this site and to assist the design team with the design of the proposed facility. The scope is limited to this specific project and the location described. The project description represents our current understanding of the significant aspects of the proposed improvements relevant to the geotechnical considerations.

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. ECS reviewed field and laboratory data and then applied professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this letter. Retaining ECS to provide construction observation is one of the most effective methods of managing the risks associated with unanticipated conditions.

A geotechnical engineering report is based upon conditions that existed at the time the study was performed. Do not rely on this report if the adequacy may have been affected by: passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events such as floods, hurricanes, or groundwater fluctuations.

Always contact ECS before applying this letter to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems. Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of study. Typical factors include: the client's goals, objectives, and risk management preferences; the nature of the structure involved, its size, and configuration; the location of the structure on site; and other planned or existing site improvements, such as access roads, parking lots, underground utilities. Unless ECS indicates otherwise, do not rely on this letter if it was not prepared for you; not prepared for your project; not prepared for the specific site explored; or completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that effect: the function of the proposed structure; elevation, configuration, location, orientation, or weight of the proposed structure; composition of the design team; or project ownership. As a general rule, always inform ECS of project changes – even minor ones – and request an assessment of their impact. ECS cannot accept responsibility or liability for problems that occur because our report does not consider developments of which we were not informed.

The letter was designed to meet the specific needs that we have discussed. **This letter should not be relied upon to fulfill the needs of contractors.** No one should rely on this letter without first consulting with ECS. Furthermore, no one should apply this letter for any purpose or project except the one originally contemplated.

ECS recommends that the letter be provided to contractors, but that it should be prefaced with a clearly written letter of transmittal. In that letter, advise contractors that **the letter was not prepared for purposes of bid development** and that the report's accuracy is limited. We recommend that the contractor retain ECS to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference may also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might you be in a position to give contractors the available information, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

We can finalize our recommendations only by observing actual subsurface conditions revealed during construction. The placement of any new engineered fill will require adequate monitoring during construction in order to confirm that the fill mass is installed properly to avoid future settlements. Because of our in-depth knowledge of the subsurface conditions at the site, we recommend that ECS observe all earthwork and construction operations to confirm that the work is being performed in accordance with the project specifications. It is also recommended that ECS be allowed to prepare or at least review the project specifications with regard to the earthwork for this site. ECS cannot assume responsibility or liability if we do not perform full-time construction observation during earthwork operations and foundation installation.

We recommend that the construction activities be monitored by a qualified geotechnical engineering firm to provide oversight during construction. We would be most pleased to provide these services.

We would be pleased to be of further assistance to you by providing additional recommendations during design and construction of the project. Should you have any questions with the respect the information contained in this letter, please contact any of the undersigned.

Respectfully,

ECS FLORIDA, LLC



for Chris M. Egan, P.E.
Project Manager



Mike A. Santiago, P.E.
Principal Engineer
P.E. # 74520

Attachments: Unified Soil Classification System
Reference Notes for Boring Logs
Boring Logs B-1, B-2, B-4, B-6, B-7, B-8, and B-10
Laboratory Testing Summary
pH and Resistivity
Sulfate Content
Boring Location Plan



Unified Soil Classification System (ASTM Designation D-2487)

Major Division	Group Symbol	Typical Names	Classification Criteria	
Coarse-grained soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	
		GP	Poorly graded gravels and gravel-sand mixtures, little or no fines	
		GM	Silty gravels, gravel-sand-silt mixtures	
		GC	Clayey gravels, gravel-sand-clay mixtures	
		Sands More than 50% of coarse fraction passes No. 4 sieve	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
			SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
	Silt and Clays Liquid limit 50% or less	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
		OL	Organic silts and organic silty clays of low plasticity	
		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts	
		CH	Inorganic clays of high plasticity, fat clays	
		OH	Organic clays of medium to high plasticity	
Fine-grained soils 50% or more passing No. 200 sieve	Classification on basis of percentage of fines Less than 5% Pass No. 200 sieve More than 12% Pass No. 200 sieve 5% to 12% Pass No. 200 sieve GW, GP, SW, SP GM, GC, SM, SC Borderline classification requiring use of dual symbol $C_u = D_{60}/D_{10}$ Greater than 4 $C_z = (D_{30})^2/(D_{10} \times D_{60})$ Between 1 and 3 Not meeting both criteria for GW Atterberg limits plot below “A” line or plasticity index less than 4 Atterberg limits plot above “A” line and plasticity index greater than 7 $C_u = D_{60}/D_{10}$ Greater than 6 $C_z = (D_{30})^2/(D_{10} \times D_{60})$ Between 1 and 3 Not meeting both criteria for SW Atterberg limits plot below “A” line or plasticity index less than 4 Atterberg limits plot above “A” line and plasticity index greater than 7			
	Note: U-line represents approximate upper limit of LL and PI combinations for natural soils (empirically determined). ASTM-D2487. Plasticity chart for the classification of fine-grained soils. Tests made on fraction finer than No. 40 sieve			
Highly organic soils	Pt	Peat, muck and other highly organic soils	Fibrous organic matter; will char, burn, or glow	



UNIFIED SOIL CLASSIFICATION SYSTEM

REFERENCE NOTES FOR BORING LOGS

I. Drilling Sampling Symbols:

SS	Split Spoon Sampler	ST	Shelby Tube Sampler
RC	Rock Core, NX, BX, AX	PM	Pressuremeter
DC	Dutch Cone Penetrometer	RD	Rock Bit Drilling
BS	Bulk Sample of Cuttings	PA	Power Auger (no sample)
HAS	Hollow Stem Auger	WS	Wash Sample

II. Correlation of Penetration Resistances to Soil Properties:

Standard Penetration (Blows/Ft) refers to the blows per foot of a 140 lb. Hammer falling 30 inches on a 2-inch OD split spoon sampler, as specified in ASTM D-1586. The blow count is commonly referred to as the N value.

A. Non-Cohesive Soils (Silt, Sand, Gravel and Combinations)

<i>Density</i>		<i>Relative Properties</i>	
Under 4 blows/ft	Very Loose	Adjective Form	12% to 49%
4 to 10 blows/ft	Loose	With	5% to 12%
11 to 30 blows/ft	Medium Dense		
31 to 50 blows/ft	Dense		
Over 51 blows/ft	Very Dense		

<i>Particle Size Identification</i>		
Boulders		8 inches or larger
Cobbles		3 to 8 inches
Gravel	Coarse	1 to 3 inches
	Medium	½ to 1 inch
	Fine	¼ to ½ inch
Sand	Coarse	2.00 mm to ¼ inch (dia. of lead pencil)
	Medium	0.42 to 2.00 mm (dia. of broom straw)
	Fine	0.074 to 0.42 mm (dia. of human hair)
Silt and Clay		0.0 to 0.074 mm (particles cannot be seen)

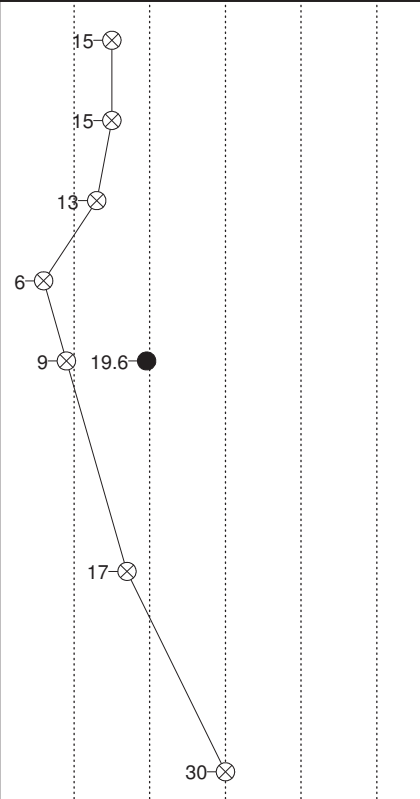
B. Cohesive Soils (Clay, Silt, and Combinations)

<i>Blows/ft</i>	<i>Consistency</i>	<i>Unconfined Comp. Strength Q_p (tsf)</i>	<i>Degree of Plasticity</i>	<i>Plasticity Index</i>
Under 2	Very Soft	Under 0.25	None to Slight	0 – 4
2 to 4	Soft	0.25-0.49	Slight	5 -7
4 to 8	Med. Stiff	0.50-0.99	Medium	8 - 22
9 to 15	Stiff	1.00-1.99	High to Very High	Over 22
16 to 30	Very Stiff	2.00-3.00		
Over 30	Hard	Over 4.00		

III. Water Level Measurement Symbols:

WL	Water Level	BCR	Before Casing Removal	DCI	Dry Cave-In
WS	While Sampling	ACR	After Casing Removal	WCI	Wet Cave-In
WD	While Drilling	▽	Existing Groundwater Level	▽	Est. Seasonal High GWT

The water levels are those water levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clay and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

CLIENT		JOB #	BORING #	SHEET																																																																																																															
Radiance Solar		1464	B-1	1 OF 1																																																																																																															
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DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ENGLISH UNITS	WATER LEVELS	ELEVATION (FT)	BLOWS/6"																																																																																																										
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WL(BCR)		WL(ACR)		BORING COMPLETED 09/29/15	HAMMER TYPE Manual																																																																																																														
WL				RIG D-25 FOREMAN Brad	DRILLING METHOD Mud Rotary																																																																																																														

CLIENT Radiance Solar				JOB # 1464		BORING # B-2		SHEET 1 OF 1			
PROJECT NAME 6997 North County Road				ARCHITECT-ENGINEER							
SITE LOCATION 6997 North County Road, Bowling Green, Hardee County, FL											
NORTHING				EASTING		STATION		○ CALIBRATED PENETROMETER TONS/FT ² ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% - - - PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% ✕ ● △ ⊗ STANDARD PENETRATION BLOWS/FT			
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ENGLISH UNITS	WATER LEVELS	ELEVATION (FT)	BLOWS/6"		
0					BOTTOM OF CASING ➡	LOSS OF CIRCULATION ➡ 100%					
					SURFACE ELEVATION						
0	S-1	SS	24	24	(SP-SC) SAND WITH CLAY, Gray, Moist, Loose				2	5	
	S-2	SS	24	24					3	5	
5	S-3	SS	24	24			(SC) CLAYEY FINE SAND, Gray to Yellow, Moist, Medium Dense			7	19
	S-4	SS	24	24						8	17
	S-5	SS	24	24						9	19
10								11			
	S-6	SS	18	18				8	16		
15					END OF BORING @ 20'				9		
	S-7	SS	18	18					11	25	
20									13		
25											
30											

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL 3.5 WS ☐ WD ☒	BORING STARTED 09/29/15	CAVE IN DEPTH
WL(BCR) WL(ACR) ☒	BORING COMPLETED 09/29/15	HAMMER TYPE Manual
WL	RIG D-25 FOREMAN Brad	DRILLING METHOD Mud Rotary

CLIENT Radiance Solar				JOB # 1464		BORING # B-4		SHEET 1 OF 1			
PROJECT NAME 6997 North County Road				ARCHITECT-ENGINEER							
SITE LOCATION 6997 North County Road, Bowling Green, Hardee County, FL											
NORTHING				EASTING		STATION		○ CALIBRATED PENETROMETER TONS/FT ² ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% _____ PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% ✕ ● △ ⊗ STANDARD PENETRATION BLOWS/FT			
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ENGLISH UNITS	WATER LEVELS	ELEVATION (FT)	BLOWS/6"		
0					BOTTOM OF CASING ➡	LOSS OF CIRCULATION ➡100%					
					SURFACE ELEVATION						
5	S-1	SS	24	24	(SP-SM) FINE SAND WITH SILT, Trace Gravel, Grayish Brown, Moist to Saturated, Very Loose to Loose				2	5-⊗	
	S-2	SS	24	24				3	6-⊗		
	S-3	SS	24	24				2	⊗-3		
	S-4	SS	24	24				1	⊗-3		
	S-5	SS	24	24				1	⊗-3		
10					(SC) CLAYEY FINE SAND, Gray, Moist, Very Loose to Medium Dense				2	17.5●	
	S-6	SS	18	18				3	5-⊗		
								1			
	S-7	SS	18	18				7	⊗-4		
								3			
15									1		
	S-8	SS	18	18				5	6-⊗		
								4			
	S-9	SS	18	18				2			
20									9	18-⊗	
								11	●-23.3		
								7			
25									11	25-⊗	
								12			
								13			
30					END OF BORING @ 30'						
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.											
WL 4 WS ☐ WD ☒		BORING STARTED 09/29/15			CAVE IN DEPTH						
WL(BCR) WL(ACR) ☒		BORING COMPLETED 09/29/15			HAMMER TYPE Manual						
WL ☒		RIG D-25 FOREMAN Brad			DRILLING METHOD Mud Rotary						

CLIENT Radiance Solar				JOB # 1464		BORING # B-6		SHEET 1 OF 1			
PROJECT NAME 6997 North County Road				ARCHITECT-ENGINEER							
SITE LOCATION 6997 North County Road, Bowling Green, Hardee County, FL											
NORTHING				EASTING		STATION		○ CALIBRATED PENETROMETER TONS/FT ² ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% _____ PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% ✕ ● △ ⊗ STANDARD PENETRATION BLOWS/FT			
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ENGLISH UNITS	WATER LEVELS	ELEVATION (FT)	BLOWS/6"		
0					BOTTOM OF CASING ➡	LOSS OF CIRCULATION ➡ 100%					
					SURFACE ELEVATION						
0	S-1	SS	24	24	(SP-SM) FINE SAND WITH SILT, Gray to Brown, Moist, Very Loose to Loose				2	⊗-2	
	S-2	SS	24	24					1	⊗-3	
5	S-3	SS	24	24					2	7-⊗	● 21.3
	S-4	SS	24	24					2	⊗-2	
	S-5	SS	24	24	(SC) CLAYEY SAND, Gray, Moist to Wet, Very Loose to Medium Dense, Weak Cementation				1	⊗-3	
10									1		
	S-6	SS	18	18					10	23-⊗	
15					END OF BORING @ 15'				12		
									11		
20											
25											
30											
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.											
WL 3.5		WS ☐		WD ☒		BORING STARTED 09/28/15		CAVE IN DEPTH			
WL(BCR)		WL(ACR)				BORING COMPLETED 09/29/15		HAMMER TYPE Manual			
WL						RIG D-25 FOREMAN Brad		DRILLING METHOD Mud Rotary			

CLIENT		RADIANCE SOLAR		JOB # 1464		BORING # B-7		SHEET 1 OF 1											
PROJECT NAME				ARCHITECT-ENGINEER															
6997 North County Road																			
SITE LOCATION				6997 North County Road, Bowling Green, Hardee County, FL															
NORTHING		EASTING		STATION															
DEPTH (FT)		SAMPLE NO.		SAMPLE TYPE		SAMPLE DIST. (IN)		RECOVERY (IN)		DESCRIPTION OF MATERIAL		ENGLISH UNITS		WATER LEVELS		ELEVATION (FT)		BLOWS/6"	
										BOTTOM OF CASING		LOSS OF CIRCULATION							
										SURFACE ELEVATION									
0		S-1		SS		24		24		(SP-SC) FINE SAND WITH CLAY, Grayish Brown, Moist, Loose									
		S-2		SS		24		24		(SC) CLAYEY FINE SAND, Gray to Brown, Moist, Very Loose to Medium Dense									
5		S-3		SS		24		24											
		S-4		SS		24		24											
		S-5		SS		24		24											
10																			
		S-6		SS		18		18											
15										END OF BORING @ 15'									
20																			
25																			
30																			

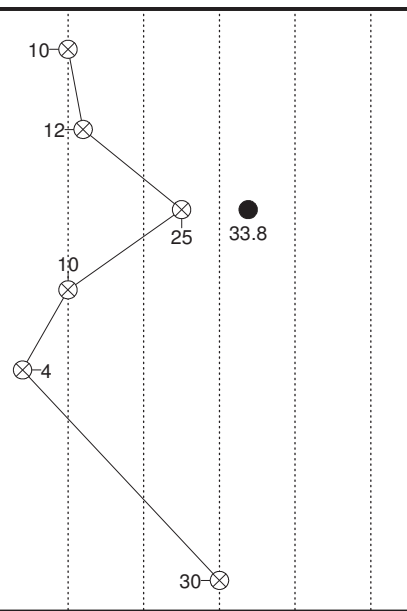
—○— CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY

RQD% — — — REC% — — —

PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%

⊗ STANDARD PENETRATION BLOWS/FT



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

 WL 3  WS  WD	BORING STARTED 09/29/15	CAVE IN DEPTH
 WL (BCR)  WL (ACR)	BORING COMPLETED 09/29/15	HAMMER TYPE Manual
 WL	RIG D-25 FOREMAN Brad	DRILLING METHOD Mud Rotary

CLIENT Radiance Solar				JOB # 1464		BORING # B-8		SHEET 1 OF 1			
PROJECT NAME 6997 North County Road				ARCHITECT-ENGINEER							
SITE LOCATION 6997 North County Road, Bowling Green, Hardee County, FL											
NORTHING				EASTING				STATION			
								CALIBRATED PENETROMETER TONS/FT ² ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% - - - PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% 			
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ENGLISH UNITS	WATER LEVELS	ELEVATION (FT)	BLOWS/6"		
					BOTTOM OF CASING SURFACE ELEVATION LOSS OF CIRCULATION						
0	S-1	SS	24	24	(SP) FINE TO MEDIUM SAND, Gray, Moist, Very Loose to Medium Dense, Contains Slight Phosphate				2		
	S-2	SS	24	24					5		
	S-3	SS	24	24					6		
	S-4	SS	24	24					4		
	S-5	SS	24	24					3		
5					(SC) CLAYEY FINE SAND, Gray, Moist, Loose to Medium Dense, Contains Slight Phosphate				2		
									5		
									6		
									4		
									6		
10									11		
									11		
									11		
15	S-6	SS	18	18					8		
									9		
									7		
									7		
									9		
20	S-7	SS	18	18					11		
									12		
									10		
25											
30											
					END OF BORING @ 20'						

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL 3.5 WS ☐ WD ☒	BORING STARTED 09/28/15	CAVE IN DEPTH
WL(BCR) WL(ACR)	BORING COMPLETED 09/28/15	HAMMER TYPE Manual
WL	RIG D-25 FOREMAN Brad	DRILLING METHOD Mud Rotary

CLIENT Radiance Solar				JOB # 1464		BORING # B-10		SHEET 1 OF 1			
PROJECT NAME 6997 North County Road				ARCHITECT-ENGINEER							
SITE LOCATION 6997 North County Road, Bowling Green, Hardee County, FL											
NORTHING				EASTING		STATION		CALIBRATED PENETROMETER TONS/FT ² ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% - - - PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% STANDARD PENETRATION BLOWS/FT			
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ENGLISH UNITS	WATER LEVELS	ELEVATION (FT)	BLOWS/6"		
0	S-1	SS	24	24	(SC) CLAYEY FINE SAND, Grayish Brown, Moist, Loose	LOSS OF CIRCULATION >100%			2	5	
	S-2	SS	24	24					2	17	
5	S-3	SS	24	24	(SP) FINE SAND, T, Gray, Moist, Medium Dense, Contains Slight Phosphate				4	16	
	S-4	SS	24	24					7	15	
	S-5	SS	24	24	(SC) CLAYEY FINE SAND, Trace Gravel, Gray, Wet to Saturated, Medium Dense, Constains Slight Phosphate				8	19	
10									10		
	S-6	SS	18	18					11	21	
15					END OF BORING @ 15'				12		
20									9		
25											
30											
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.											
WL		WS ☐ WD ☒		BORING STARTED 09/28/15		CAVE IN DEPTH					
WL(BCR)		WL(ACR)		BORING COMPLETED 09/28/15		HAMMER TYPE Manual					
WL				RIG D-25 FOREMAN Brad		DRILLING METHOD Mud Rotary					

Laboratory Testing Summary

Sample Source	Sample Number	Depth (feet)	MC ¹ (%)	Soil Type ²	Atterberg Limits ³			Percent Passing No. 200 Sieve ⁴	Moisture - Density (Corr.) ⁵		CBR Value ⁶	Other
					LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)		
B-1												
	S-5	8.00 - 10.00	19.6	SC				19				
B-4												
	S-4	6.00 - 8.00	17.5	SP-SM				7.6				
	S-8	23.50 - 25.00	23.3	SC				18				
B-6												
	S-3	4.00 - 6.00	21.3	SP-SM				11				
B-7												
	S-3	4.00 - 6.00	33.8	SC				35				

Notes:

1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

Definitions:

MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content (ASTM D 2974)

Project No.

1464

Project Name:

6997 North County Road

PM:

Chris Egan

PE:

Miguel A. Santiago

Printed On:

Wednesday, October 21, 2015



ECS Florida, LLC

Tampa, FL



ECS FLORIDA, LLC

"Setting the Standard for Service"

Geotechnical • Construction Materials • Environmental • Facilities

Client: Radiance Solar

Test Date: October 21, 2015

Address: 6997 North County Rd

ECS Job #: 1464

Boring	Depth (ft)	pH Results	Resistivity Results
		Water	Ohms
B-1	Composite	7.14	3900
B-2	Composite	7.42	8000
B-4	Composite	6.86	16500
B-6	Composite	6.71	30000
B-7	Composite	5.64	4800
B-8	Composite	6.32	22000
B-10	Composite	6.42	24000

Notes: This report indicates testing in dry soil only.



ENCO Laboratories

Accurate. Timely. Responsive. Innovative.

10775 Central Port Drive

Orlando FL, 32824

Phone: 407.826.5314 FAX: 407.850.6945

Thursday, October 22, 2015

ECS Florida, LLC (EN108)

Attn: Chris Egan

5316 56th Commerce Park Blvd.

Tampa, FL 33609

RE: Laboratory Results for

Project Number: 41: 1464, Project Name/Desc: 6997 North County Road

ENCO Workorder(s): A506628

Dear Chris Egan,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Wednesday, October 14, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Orlando. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

David Camacho

Project Manager

Enclosure(s)

SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: B1	Lab ID: A506628-01	Sampled: 10/07/15 09:00	Received: 10/14/15 16:20
<u>Parameter</u>	<u>Hold Date/Time(s)</u>	<u>Prep Date/Time(s)</u>	<u>Analysis Date/Time(s)</u>
EPA 9056A	11/04/15	10/20/15 19:00	10/21/15 12:54
Client ID: B2	Lab ID: A506628-02	Sampled: 10/07/15 09:20	Received: 10/14/15 16:20
<u>Parameter</u>	<u>Hold Date/Time(s)</u>	<u>Prep Date/Time(s)</u>	<u>Analysis Date/Time(s)</u>
EPA 9056A	11/04/15	10/20/15 19:00	10/21/15 13:11
Client ID: B4	Lab ID: A506628-03	Sampled: 10/07/15 09:30	Received: 10/14/15 16:20
<u>Parameter</u>	<u>Hold Date/Time(s)</u>	<u>Prep Date/Time(s)</u>	<u>Analysis Date/Time(s)</u>
EPA 9056A	11/04/15	10/20/15 19:00	10/21/15 13:24
Client ID: B6	Lab ID: A506628-04	Sampled: 10/07/15 09:45	Received: 10/14/15 16:20
<u>Parameter</u>	<u>Hold Date/Time(s)</u>	<u>Prep Date/Time(s)</u>	<u>Analysis Date/Time(s)</u>
EPA 9056A	11/04/15	10/20/15 19:00	10/21/15 13:37
Client ID: B7	Lab ID: A506628-05	Sampled: 10/07/15 10:30	Received: 10/14/15 16:20
<u>Parameter</u>	<u>Hold Date/Time(s)</u>	<u>Prep Date/Time(s)</u>	<u>Analysis Date/Time(s)</u>
EPA 9056A	11/04/15	10/20/15 19:00	10/21/15 13:50
Client ID: B8	Lab ID: A506628-06	Sampled: 10/07/15 11:00	Received: 10/14/15 16:20
<u>Parameter</u>	<u>Hold Date/Time(s)</u>	<u>Prep Date/Time(s)</u>	<u>Analysis Date/Time(s)</u>
EPA 9056A	11/04/15	10/20/15 19:00	10/21/15 14:03
Client ID: B10	Lab ID: A506628-07	Sampled: 10/07/15 11:45	Received: 10/14/15 16:20
<u>Parameter</u>	<u>Hold Date/Time(s)</u>	<u>Prep Date/Time(s)</u>	<u>Analysis Date/Time(s)</u>
EPA 9056A	11/04/15	10/20/15 19:00	10/21/15 14:42

SAMPLE DETECTION SUMMARY

Client ID: B1		Lab ID: A506628-01					
Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Sulfate	8.3	I	0.87	58	mg/kg dry	EPA 9056A	
Client ID: B2		Lab ID: A506628-02					
Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Sulfate	9.3	I	0.84	56	mg/kg dry	EPA 9056A	
Client ID: B4		Lab ID: A506628-03					
Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Sulfate	7.4	I	0.87	58	mg/kg dry	EPA 9056A	
Client ID: B6		Lab ID: A506628-04					
Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Sulfate	3.4	I	0.89	59	mg/kg dry	EPA 9056A	
Client ID: B7		Lab ID: A506628-05					
Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Sulfate	6.6	I	0.86	57	mg/kg dry	EPA 9056A	
Client ID: B8		Lab ID: A506628-06					
Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Sulfate	20	I	0.89	59	mg/kg dry	EPA 9056A	
Client ID: B10		Lab ID: A506628-07					
Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Sulfate	13	I	0.90	60	mg/kg dry	EPA 9056A	

ANALYTICAL RESULTS

Description: B1 **Lab Sample ID:** A506628-01 **Received:** 10/14/15 16:20
Matrix: Soil **Sampled:** 10/07/15 09:00 **Work Order:** A506628
Project: 6997 North County Road **Sampled By:** Chris Egan **% Solids:** 86.19

Classical Chemistry Parameters

^ - ENCO Orlando certified analyte [NELAC E83182]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Sulfate [14808-79-8]^	8.3	I	mg/kg dry	1	0.87	58	5J20003	EPA 9056A	10/21/15 12:54	RAIfo	

Description: B2 **Lab Sample ID:** A506628-02 **Received:** 10/14/15 16:20
Matrix: Soil **Sampled:** 10/07/15 09:20 **Work Order:** A506628
Project: 6997 North County Road **Sampled By:** Chris Egan **% Solids:** 88.85

Classical Chemistry Parameters

^ - ENCO Orlando certified analyte [NELAC E83182]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Sulfate [14808-79-8]^	9.3	I	mg/kg dry	1	0.84	56	5J20003	EPA 9056A	10/21/15 13:11	RAIfo	

Description: B4 **Lab Sample ID:** A506628-03 **Received:** 10/14/15 16:20
Matrix: Soil **Sampled:** 10/07/15 09:30 **Work Order:** A506628
Project: 6997 North County Road **Sampled By:** Chris Egan **% Solids:** 86.14

Classical Chemistry Parameters

^ - ENCO Orlando certified analyte [NELAC E83182]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Sulfate [14808-79-8]^	7.4	I	mg/kg dry	1	0.87	58	5J20003	EPA 9056A	10/21/15 13:24	RAIfo	

Description: B6 **Lab Sample ID:** A506628-04 **Received:** 10/14/15 16:20
Matrix: Soil **Sampled:** 10/07/15 09:45 **Work Order:** A506628
Project: 6997 North County Road **Sampled By:** Chris Egan **% Solids:** 84.48

Classical Chemistry Parameters

^ - ENCO Orlando certified analyte [NELAC E83182]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Sulfate [14808-79-8]^	3.4	I	mg/kg dry	1	0.89	59	5J20003	EPA 9056A	10/21/15 13:37	RAIfo	

Description: B7 **Lab Sample ID:** A506628-05 **Received:** 10/14/15 16:20
Matrix: Soil **Sampled:** 10/07/15 10:30 **Work Order:** A506628
Project: 6997 North County Road **Sampled By:** Chris Egan **% Solids:** 87.56

Classical Chemistry Parameters

^ - ENCO Orlando certified analyte [NELAC E83182]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Sulfate [14808-79-8]^	6.6	I	mg/kg dry	1	0.86	57	5J20003	EPA 9056A	10/21/15 13:50	RAIfo	

Description: B8 **Lab Sample ID:** A506628-06 **Received:** 10/14/15 16:20
Matrix: Soil **Sampled:** 10/07/15 11:00 **Work Order:** A506628
Project: 6997 North County Road **Sampled By:** Chris Egan **% Solids:** 84.38

Classical Chemistry Parameters

^ - ENCO Orlando certified analyte [NELAC E83182]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Sulfate [14808-79-8]^	20	I	mg/kg dry	1	0.89	59	5J20003	EPA 9056A	10/21/15 14:03	RAIfo	



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ANALYTICAL RESULTS

Description: B10

Lab Sample ID: A506628-07

Received: 10/14/15 16:20

Matrix: Soil

Sampled: 10/07/15 11:45

Work Order: A506628

Project: 6997 North County Road

Sampled By: Chris Egan

% Solids: 83.36

Classical Chemistry Parameters

^ - ENCO Orlando certified analyte [NELAC E83182]

<u>Analyte [CAS Number]</u>	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Sulfate [14808-79-8]^	13	I	mg/kg dry	1	0.90	60	5J20003	EPA 9056A	10/21/15 14:42	RAIfo	

QUALITY CONTROL DATA

Classical Chemistry Parameters - Quality Control

Batch 5J20003 - NO PREP

Blank (5J20003-BLK1)

Prepared: 10/20/2015 19:00 Analyzed: 10/21/2015 11:36

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Sulfate	0.75	U	50	mg/kg wet							

LCS (5J20003-BS1)

Prepared: 10/20/2015 19:00 Analyzed: 10/21/2015 11:49

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Sulfate	500		50	mg/kg wet	498		100	80-120			

Duplicate (5J20003-DUP1)

Prepared: 10/20/2015 19:00 Analyzed: 10/21/2015 15:10

Source: A506628-07

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Sulfate	13	I	60	mg/kg dry		13			5	15	

Matrix Spike (5J20003-MS1)

Prepared: 10/20/2015 19:00 Analyzed: 10/21/2015 12:28

Source: A506628-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Sulfate	580		58	mg/kg dry	577	8.3	99	80-120			

Matrix Spike Dup (5J20003-MSD1)

Prepared: 10/20/2015 19:00 Analyzed: 10/21/2015 12:41

Source: A506628-01

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Sulfate	570		58	mg/kg dry	573	8.3	98	80-120	2	15	

FLAGS/NOTES AND DEFINITIONS

PQL	PQL: Practical Quantitation Limit.
B	Results are based upon membrane filter colony counts that are outside the method indicated ideal range.
I	The reported value is between the laboratory method detection limit (MDL) and the practical quantitation limit (PQL).
J	Estimated value.
K	Off-scale low; Actual value is known to be less than the value given.
L	Off-scale high; Actual value is known to be greater than value given.
M	Presence of analyte is verified but not quantified; the actual value is less than the MRL but greater than the MDL.
N	Presumptive evidence of presence of material.
O	Sampled, but analysis lost or not performed.
Q	Sample exceeded the accepted holding time.
T	Value reported is less than the laboratory method detection limit. The value is reported for informational purposes only and shall not be used in statistical analysis.
U	Indicates that the compound was analyzed for but not detected.
V	Indicates that the analyte was detected in both the sample and the associated method blank.
Y	The laboratory analysis was from an improperly preserved sample. The data may not be accurate.
Z	Too many colonies were present (TNTC); the numeric value represents the filtration volume.
?	Data are rejected and should not be used. Some or all of the quality control data for the analyte were outside criteria, and the presence or absence of the analyte cannot be determined from the data.
*	Not reported due to interference.



ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

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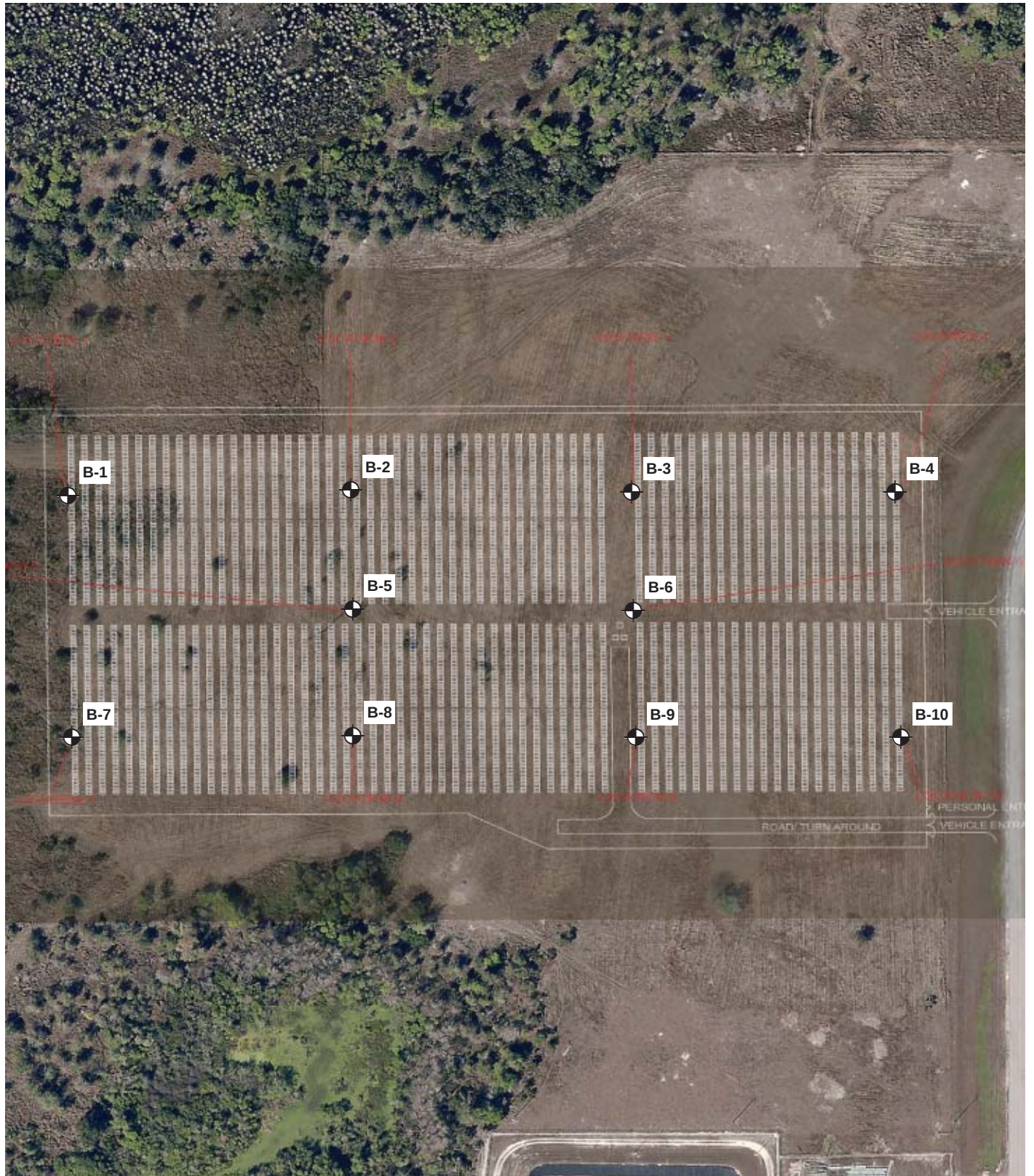
Page 1 of 1

Client Name CHRIS EGAN	Project Number 411464
Address 5316 56TH COMARQUE PARK BLVD	Project Name/Desc. 6997 NORTH COUNTY ROAD
City/ST/Zip TAMPA / FL 33609	PO # / Billing Info. 1464
Tel. (407) 230-8862	Reporting Contact CARIS EGAN
Fax (407) 859-9599	Billing Contact CEGAN@RESLIMIT.COM
Sampler(s) Name, Affiliation (Print) CHRIS EGAN	Site Location / Time Zone BOWLING GREEN, FLORIDA
Sampler(s) Signature 	

Requested Analyses				Preservation (See Codes) (Combine as necessary)												Requested Turnaround Times			
Sulfate																Note: Rush requests subject to acceptance by the facility			
																☒ Standard			
																☐ Expedited			
																Due <u> </u> / <u> </u> / <u> </u>			
																Lab Workorder A506628			
Item #	Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers	Sample Comments												
	B1	10/7/15	9:00	Comp	SO														
	B2		9:20																
	B4		9:30																
	B6		9:45																
	B7		10:30																
	B8		11:00																
	B10		11:45																
							Total # of Containers												

Sample Kit Prepared By 	Date/Time 10/14/15 1400	Relinquished By 	Date/Time 10/14/15 1400	Received By 	Date/Time 10/14/15 1400
Comments/Special Reporting Requirements		Relinquished By		Received By	
		Relinquished By		Received By	
Cooler # & Temps on Receipt Red - 2.50C			Condition Upon Receipt ☒ Acceptable ☐ Unacceptable		

Matrix: GW Groundwater SO-Soil DW-Drinking Water SE-Sediment SW-Surface Water WW-Wastewater A-Air O-Other (detail in comments)
Preservation: I-Ice H-HCl N-HNO3 S-H2SO4 NO-NaOH O-Other (detail in comments)
Note: All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist.



NOTES:

Site plan provided by Client.

Aerial photography courtesy of
Florida Department of Transportation
(FDOT)

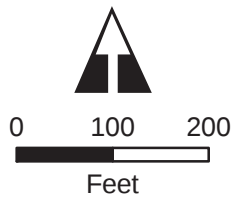


Figure 1
Boring Location Plan
6997 North County Road
Bowling Green, Florida



71 First Avenue NW
Lilburn, GA 30047
Office: (770) 564-6949
Fax: (678) 280-3476

November 18, 2015

Radiance Solar, LLC
916 Joseph E Lowery Blvd, NW
Suite 2
Atlanta, GA 30318
Phone: (404)-885-9898
Email: ian.agnew@radianceenergies.com

Attn: Mr. Ian Agnew

RE: H-Pile test at Seminole Electric Cooperative
6697 N.County Road 663, Bowling Green, FL 33834

Mr. Agnew:

As requested, The Foundation Firm (TFF) completed analysis of the on-site testing program of driven piles at the above referenced site completed by Cantsink. This letter summarizes the results of the pile tests performed on November 13, 2015 and presents our conclusions and recommendations regarding the installation of the proposed pile system and support of the solar arrays.

Project Information

The proposed project will include constructing a solar farm on approximately twelve acres of land on the west side of County Road 663 and to the north of three storage tanks near the site. See the attached figure for the site location.

Based on the information provided to us, we understand that approximately 3.1 MW of DC power solar array system will be installed. The site has not been graded and presents median size grass (knee height) and low underbrush at the time of the testing. Site does not seem to have a significant slope although the median size grass could be deceiving.

We understand that the solar panels will be supported on pre-engineered steel frames (fix tilt system or a tracker system) consisting of steel frames that span more than 15 feet between column supports. These frames can either support one module in portrait and pivot around a center rod (single angle tracker) or two modules in portrait (fix tilt system). Anticipated maximum uplift load per support is 4.24 kips for the fix tilt system and about 2.93 kips for the single axis tracker. The lateral load expected per array pile is 2.58 kips applied approximately four feet above grade for the single axis tracker and about 5.3 kips for the fix tilt system. These values were provided on a document written by NexTracker titled: "Pile Testing Criteria". The loads for the fix tilt system were given by Cantsink.

Subsurface Exploration

No surface exploration was performed by this firm; our analysis is based on the data results of the in-situ physical tests performed by Cantsink on November 13, 2015. The data recorded on each of these tests is presented on the attachment section of this report. Twelve W6x9 columns were tested under axial loading, primarily uplift forces and lateral load. Each of these tests was performed individually in different location (see attached map for location of each test).

The beams were installed at different depths to have a sense of what could be the minimum embedment depth for the above mentioned anticipated loads.

Pile testing procedure

The piles were advanced using a GRT Utilicorp track mounted post driving machine, then axial load was applied to each pile to record pile movement. The setup of the pile test consisted of a hydraulic ram cylinder, a set of clevises to attach to the beam and the cylinder and a Dillon "AP" Dynamometer with a rated capacity of 10 kips (see Photo 1 attached for pull test setup). Piles were loaded to two hundred percent of the anticipated loads, and were loaded in increments of 20% at a time with a five minutes hold time to check for pile creep (movement at any given load). Similar procedure were follow for the lateral load test, see picture of lateral load setup.

Conclusion and Recommendations

Based on the results of the of the pile testing program and our understanding of the proposed construction as outlined above and conversations with the client, we provide the following conclusions and recommendations:

Due to the lack of consistency on all the tests (tests that passed and tests that failed) it appears the west side is suitable for driven piles as confirmed by Cantsink pull tests and soil borings 1, 2, and 7 by ECS performed on September 29. Anticipated depth of the driven piles is fourteen feet. The east side will require helical piles to provide adequate pullout capacity. Due to the magnitude of the lateral loads, it will be necessary to install 5" pipe pile shaft helical piles to handle the bending loads and minimize deflections. Anticipated depths will range from ten to fifteen feet.

General Comments

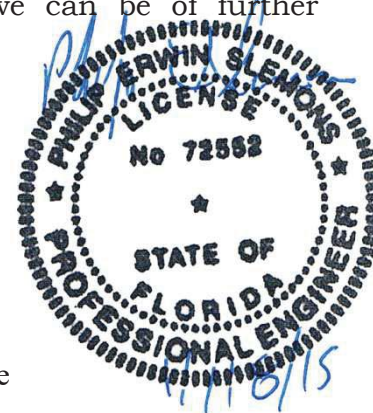
The conclusions submitted in this letter are based upon the information provided by the client, and the results of the testing performed by our firm. If the information or assumptions presented in the letter are not accurate, TFF should be notified to address any discrepancy.

We appreciate the opportunity to be of service to you. If you have any questions concerning the information presented on this letter, or if we can be of further assistance, please do not hesitate to contact us.

Respectfully,

THE FOUNDATION FIRM, LLC


Philip E. Slemons, P.E.



Attachments: approximate test location, load test setup, pile test measure

Pull Test Setup



Attachments: approximate test location, load test setup, pile test measurements.

Lateral Load Test Setup



Attachments: approximate test location, load test setup, pile test measurements.

Project Name: **Seminole Electric Cooperative**
 Customer: Radiance Solar
 Test Site: Bowling Green, FL 33834
 Date Tested: 11/13/2015

Lateral Test # 1

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.000
1.060	0.000
2.120	0.000
2.120	0.000
3.180	0.000
3.180	0.000
4.240	0.000
4.240	0.000
5.300	0.000
5.300	0.000
6.360	0.063
6.360	0.063
7.420	0.063
7.420	0.063
8.480	0.063
8.480	0.063
6.780	0.063
5.080	0.063
3.380	0.063
1.680	0.063
0.000	0.063

Lateral Test # 2

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.000
1.060	0.000
2.120	0.000
2.120	0.000
3.180	0.000
3.180	0.000
4.240	0.000
4.240	0.000
5.300	0.000
5.300	0.000
6.360	0.000
6.360	0.000
7.420	0.000
7.420	0.063
8.480	0.063
8.480	0.063
6.780	0.063
5.080	0.063
3.380	0.063
1.680	0.063
0.000	0.063

Lateral Test # 3

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.000
1.060	0.000
2.120	0.000
2.120	0.000
3.180	0.000
3.180	0.000
4.240	0.000
4.240	0.000
5.300	0.000
5.300	0.000
6.360	0.000
6.360	0.000
7.420	0.000
7.420	0.000
8.480	0.000
8.480	0.000
6.780	0.000
5.080	0.000
3.380	0.000
1.680	0.000
0.000	0.000

Total movement at a
load with a safety factor
of 2

Depth (ft) = **14.50**

Δ = **-0.063** Inches

Δ = **-0.063** Inches

Depth (ft) = **12.00**

Approximate Coordinates
Latitude :
Longitude:

Δ = **0.00** Inches

Depth (ft) : **12.00**

Approximate Coordinates
Latitude :
Longitude:

Project Name: **Seminole Electric Cooperative**
 Customer: Radiance Solar
 Test Site: Bowling Green, FL 33834
 Date Tested: 11/13/2015

Pull Test # 4

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.000
1.060	0.000
2.120	0.000
2.120	0.000
3.180	0.000
3.180	0.000
4.240	0.000
4.240	0.000
5.300	0.000
5.300	0.000
6.360	0.000
6.360	0.000
7.420	0.000
7.420	0.000
8.480	0.000
8.600	0.000
6.780	0.000
5.080	0.000
3.380	0.000
1.680	0.000
0.000	0.000

Total movement at a load with a safety factor of 2

Depth (ft) : **12.00**

Δ = **0.000** Inches

Approximate Coordinates

Latitude :

Longitude:

Pull Test # 5

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.000
1.060	0.000
2.120	0.000
2.120	0.000
3.180	0.000
3.180	0.000
4.240	0.000
4.240	0.000
5.300	0.000
5.300	0.000
6.360	0.000
6.360	0.000
7.420	0.000
7.420	0.000
8.480	0.000
8.480	0.000
6.780	0.000
5.080	0.000
3.380	0.000
1.680	0.000
0.000	0.000

Δ = **0.000** Inches

Depth (ft) = **12.00**

Approximate Coordinates

Latitude :

Longitude:

Pull Test # 6

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.000
1.060	0.000
2.120	0.250
2.120	0.250
3.180	0.750
3.180	0.750
4.240	1.000
4.240	0.000
5.300	0.000
5.300	0.000
6.360	0.000
6.360	0.000
7.420	0.000
7.420	0.000
8.480	0.000
8.480	0.000
6.780	0.000
5.080	0.000
3.380	0.000
1.680	0.000
0.000	0.000

Failed

Δ = **0.00** Inches

Depth (ft) = **13.00**

Started pulling out after 42

Approximate Coordinates

Latitude :

Longitude:

Project Name: **Seminole Electric Cooperative**
 Customer: Radiance Solar
 Test Site: Bowling Green, FL 33834
 Date Tested: 11/13/2015

Pull Test # 7

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.000
1.060	0.000
2.120	0.250
2.120	0.250
3.180	0.750
3.180	1.000
4.240	0.000
4.240	0.000
5.300	0.000
5.300	0.000
6.360	0.000
6.360	0.000
7.420	0.000
7.420	0.000
8.480	0.000
8.600	0.000
6.780	0.000
5.080	0.000
3.380	0.000
1.680	0.000
0.000	0.000

Failed

Pull Test # 8

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.000
1.060	0.000
2.120	0.063
2.120	0.650
3.180	0.250
3.180	0.250
4.240	0.375
4.240	0.375
5.300	0.438
5.300	0.438
6.360	0.438
6.360	0.438
7.420	0.500
7.420	0.500
8.480	0.563
8.480	0.563
6.780	0.563
5.080	0.563
3.380	0.563
1.680	0.563
0.000	0.563

Pull Test # 9

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.000
1.060	0.000
2.120	0.250
2.120	0.250
3.180	0.750
3.180	0.750
4.240	1.000
4.240	0.000
5.300	0.000
5.300	0.000
6.360	0.000
6.360	0.000
7.420	0.000
7.420	0.000
8.480	0.000
8.480	0.000
6.780	0.000
5.080	0.000
3.380	0.000
1.680	0.000
0.000	0.000

Failed

Total movement at a
load with a safety factor
of 2

Depth (ft) : **14.00**
 $\Delta = \mathbf{0.000}$ Inches

Approximate Coordinates
 Latitude :
 Longitude:

$\Delta = \mathbf{-0.563}$ Inches

Depth (ft) : **14.50**

Approximate Coordinates
 Latitude :
 Longitude:

$\Delta = \mathbf{0.00}$

Depth (ft) : **12.00**

Approximate Coordinates
 Latitude :
 Longitude:

Project Name: **Seminole Electric Cooperative**
 Customer: Radiance Solar
 Test Site: Bowling Green, FL 33834
 Date Tested: 11/13/2015

Pull Test # 10

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.000
1.060	0.000
2.120	0.750
2.120	0.750
3.180	0.750
3.180	0.750
4.240	0.750
4.240	0.750
5.300	1.000
5.300	0.000
6.360	0.000
6.360	0.000
7.420	0.000
7.420	0.000
8.480	0.000
8.600	0.000
6.780	0.000
5.080	0.000
3.380	0.000
1.680	0.000
0.000	0.000

Failed

Pull Test # 11

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.063
1.060	0.063
2.120	0.250
2.120	0.250
3.180	0.375
3.180	0.375
4.240	1.000
4.240	0.000
5.300	0.000
5.300	0.000
6.360	0.000
6.360	0.000
7.420	0.000
7.420	0.000
8.480	0.000
8.480	0.000
6.780	0.000
5.080	0.000
3.380	0.000
1.680	0.000
0.000	0.000

Failed

Pull Test # 12

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.250
1.060	0.438
2.120	0.750
2.120	0.838
3.180	1.000
3.180	0.000
4.240	0.000
4.240	0.000
5.300	0.000
5.300	0.000
6.360	0.000
6.360	0.000
7.420	0.000
7.420	0.000
8.480	0.000
8.480	0.000
6.780	0.000
5.080	0.000
3.380	0.000
1.680	0.000
0.000	0.000

Failed

Total movement at a
load with a safety factor
of 2

Depth (ft) : **15.00**
 $\Delta = 0.000$ Inches

Approximate Coordinates
 Latitude :
 Longitude:

$\Delta = 0.000$ Inches

Depth (ft) : **15.00**

Approximate Coordinates
 Latitude :
 Longitude:

$\Delta = 0.00$

Depth (ft) : **15.00**

Approximate Coordinates
 Latitude :
 Longitude:

City of Atlanta, Georgia

3116 Joseph E. Lowery Blvd NW
Atlanta, GA 30328
Phone: 404.888.3888

Project:
Seminole Electric
Cooperative, INC

Client:
6697 N. County Road 663
Bowling Green, FL 33834

Consultants:

Date:
November 4, 2015

Revision:

Scale:
1/64"=1'-0"

Title:
Preliminary Layout

PV1

APPROXIMATE LOCATION OF PULL TEST

016-061-17A-34-9-3

(9840)
Cevadian Sol
320W Modules
14 MW DC
Total
2.2 MW FACILITY
Total

COUNTY LINE

678'-0"





71 First Avenue NW
Lilburn, GA 30047
Office: (770) 564-6949
Fax: (678) 280-3476

December 24, 2015

Radiance Solar, LLC

916 Joseph E Lowery Blvd, NW
Suite 2
Atlanta, GA 30318
Phone: (404)-885-9898
Email: ian.agnew@radianceenergies.com

Attn: Mr. Ian Agnew

RE: H-Pile test at west side of Seminole Electric Cooperative
6697 N. County Road 663, Bowling Green, FL 33834

Mr. Agnew:

As requested, The Foundation Firm (TFF) completed analysis of the on-site testing program of driven piles at the above referenced site completed by Cantsink. This letter summarizes the results of the second round of pile tests performed on December 18, 2015 and presents our conclusions and recommendations regarding the installation of the proposed pile system and support of the solar arrays.

Project Information

The proposed project will include constructing a solar farm on approximately twelve acres of land on the west side of County Road 663 and to the north of three storage tanks near the site. See the attached figure for the site location. As the first tests on November 23 found the east side to be unsuitable for driven piles, further testing was done to the west to see if it was suitable.

Based on the information provided to us, we understand that approximately 3.1 MW of DC power solar array system will be installed. The site has not been graded and presents median size grass (knee height) and low underbrush at the time of the testing. Site does not seem to have a significant slope although the median size grass could be deceiving.

We understand that the solar panels will be supported on pre-engineered steel frames (fix tilt system or a tracker system) consisting of steel frames that span more than 15 feet between column supports. These frames can either support one module in portrait and pivot around a center rod (single angle tracker) or two modules in portrait (fix tilt system). Anticipated maximum uplift load per support is 4.24 kips for the fix tilt system and about 2.93 kips for the single axis tracker. The lateral load expected per array pile is 2.58 kips applied approximately four feet above grade for the single axis tracker and about 5.3 kips for the fix tilt system. These values were provided on a

document written by NexTracker titled: "Pile Testing Criteria". The loads for the fix tilt system were given by Cantsink.

Subsurface Exploration

No surface exploration was performed by this firm; our analysis is based on the data results of the in-situ physical tests performed by Cantsink on December 18, 2015. The data recorded on each of these tests is presented on the attachment section of this report. Seven W6x9 columns were tested under lateral loading and four under uplift axial loading. Each of these tests were performed individually in different locations (see attached map for location of each test).

The beams were installed at different depths to have a sense of what could be the minimum embedment depth for the above mentioned anticipated loads.

Pile testing procedure

The piles were advanced using a GRT Utilicorp track mounted post driving machine, then axial load was applied to each pile to record pile movement. The setup of the pile test consisted of a hydraulic ram cylinder, a set of clevises to attach to the beam and the cylinder and a Dillon "AP" Dynamometer with a rated capacity of 10 kips (see Photo 1 attached for pull test setup). Piles were loaded to two hundred percent of the anticipated loads, and were loaded in increments of 20% at a time with a five minutes hold time to check for pile creep (movement at any given load). Similar procedure were follow for the lateral load test, see picture of lateral load setup.

Conclusion and Recommendations

Based on the results of the of the pile testing program and our understanding of the proposed construction as outlined above and conversations with the client, we provide the following conclusions and recommendations:

The new western location only passed half the lateral tests and one third the pullout tests so it will require helical piles to provide adequate pullout capacity. Due to the magnitude of the lateral loads, it will be necessary to install 5" pipe pile shaft helical piles to handle the bending loads and minimize deflections. Anticipated depths will range from ten to fifteen feet. Areas near PT14 and PT17 are the sectors with poor soil quality where four pull tests failed at 13 and 15 feet of embedment.

General Comments

The conclusions submitted in this letter are based upon the information provided by the client, and the results of the testing performed by our firm. If the information or assumptions presented in the letter are not accurate, TFF should be notified to address any discrepancy.

We appreciate the opportunity to be of service to you. If you have any questions concerning the information presented on this letter, or if we can be of further assistance, please do not hesitate to contact us.

Respectfully,

THE FOUNDATION FIRM, LLC

Philip E. Slemons, P.E.

Attachments: approximate test location, load test setup, pile test measurements.

Pull Test Setup



Attachments: approximate test location, load test setup, pile test measurements.

Lateral Load Test Setup



Attachments: approximate test location, load test setup, pile test measurements.

Measuring Movement at Grade



Attachments: approximate test location, load test setup, pile test measurements.

The Foundation FirmProject Name: **Seminole Electric Cooperative**

Customer: Radiance Solar

Test Site: Bowling Green, FL 32834

Date Tested: 12/18/2015

Lateral Test #PT20**Lateral Test #PT19****Lateral Test #PT18**

Load (Kips)	Reading (in)		Load (Kips)	Reading (in)		Load (Kips)	Reading (in)
0.000	0.000		0.000	0.000		0.000	0.000
1.060	0.086		1.060	0.081		1.060	0.010
1.060	0.097		1.060	0.120		1.060	0.025
2.120	0.225		2.120	0.271		2.120	0.550
2.120	0.230		2.120	0.302		2.120	0.080
3.180	0.309		3.180	0.294		3.180	0.210
3.180	0.313		3.180	0.326		3.180	0.265
4.240	0.358		4.240	0.431		4.240	0.400
4.240	0.482		4.240	0.567		4.240	0.481
5.300	0.590		5.300	0.679		5.300	0.760
5.300	0.661		5.300	0.819		5.300	0.795
6.360			6.360			6.360	
6.360			6.360			6.360	
7.420			7.420			7.420	
7.420			7.420			7.420	
8.480			8.480			8.480	
8.480			8.480			8.480	
8.600			8.600			8.600	
6.780			6.780			6.780	
5.080			5.080			5.080	
3.380			3.380			3.380	
1.680			1.680			1.680	
0.000			0.000			0.000	

Depth 13'
Latitude N27.644614
Longitude E81.963327

13'
N27.644609
E81.964201

13'
N27.706279
E81.972503

Attachments: approximate test location, load test setup, pile test measurements.

Lateral Test #PT13**Lateral Test #PT15****Lateral Test #PT16**

Load (Kips)	Reading (in)		Load (Kips)	Reading (in)		Load (Kips)	Reading (in)
0.000	0.000		0.000	0.000		0.000	0.000
1.060	0.212		1.060	0.120		1.060	0.106
1.060	0.236		1.060	0.138		1.060	0.121
2.120	0.278		2.120	0.254		2.120	0.170
2.120	0.415		2.120	0.285		2.120	0.288
3.180	0.530		3.180	0.316		3.180	0.405
3.180	0.560		3.180	0.412		3.180	0.433
4.240	0.702		4.240	0.491		4.240	0.483
4.240	0.850		4.240	0.609		4.240	0.618
5.300	1.345		5.300	1.156		5.300	1.785
5.300	2.028		5.300	1.701		5.300	1.881
6.360			6.360			6.360	
6.360			6.360			6.360	
7.420			7.420			7.420	
7.420			7.420			7.420	
8.480			8.480			8.480	
8.480			8.480			8.480	
8.600			8.600			8.600	
6.780			6.780			6.780	
5.080			5.080			5.080	
3.380			3.380			3.380	
1.680			1.680			1.680	
0.000			0.000			0.000	

Depth 13'
Latitude N27.646056
Longitude E81.964138

13'
N27.645848
E81.962594

13'
N27.645387
E81.962025

Attachments: approximate test location, load test setup, pile test measurements.

Lateral Test #PT13

Load (Kips)	Reading (in)
0.000	0.000
1.060	0.295
1.060	0.438
2.120	0.515
2.120	0.693
3.180	0.766
3.180	0.803
4.240	1.162
4.240	1.020
5.300	
5.300	
6.360	
6.360	
7.420	
7.420	
8.480	
8.480	
8.600	
6.780	
5.080	
3.380	
1.680	
0.000	

Depth 13'
Latitude N27.646056
Longitude E81.964138

Attachments: approximate test location, load test setup, pile test measurements.

Pull Test #PT17**Pull Test #PT17****Pull Test #PT14**

Load (Kips)	Reading (in)		Load (Kips)	Reading (in)		Load (Kips)	Reading (in)
0.000			0.000			0.000	
1.060			1.060			1.060	
1.060			1.060			1.060	
2.120	0.063		2.120	0.125		2.120	
2.120	0.125		2.120	0.250		2.120	
3.180	0.500		3.180	0.375		3.180	
3.180			3.180			3.180	
4.240	0.750		4.240	0.500		4.240	6.000
4.240	12.000		4.240	1.500		4.240	
5.300			5.300	7.000		5.300	
5.300			5.300			5.300	
6.360			6.360			6.360	
6.360			6.360			6.360	
7.420			7.420			7.420	
7.420			7.420			7.420	
8.480			8.480			8.480	
8.480			8.480			8.480	
8.600			8.600			8.600	
6.780			6.780			6.780	
5.080			5.080			5.080	
3.380			3.380			3.380	
1.680			1.680			1.680	
0.000			0.000			0.000	

Depth 15'
Latitude N27.645351
Longitude E81.963369

15'
N27.645255
E81.963439

13'
N27.645988
E81.963484

Attachments: approximate test location, load test setup, pile test measurements.

Pull Test #PT14

Load (Kips)	Reading (in)
0.000	
1.060	
1.060	
2.120	
2.120	
3.180	
3.180	
4.240	0.250
4.240	0.375
5.300	1.000
5.300	1.125
6.360	2.750
6.360	
7.420	
7.420	
8.480	
8.480	
8.600	
6.780	
5.080	
3.380	
1.680	
0.000	

Pull Test #PT20

Load (Kips)	Reading (in)
0.000	
1.060	
1.060	
2.120	
2.120	
3.180	
3.180	
4.240	
4.240	
5.300	
5.300	0.0625
6.360	
6.360	
7.420	
7.420	
8.480	0.125
8.480	
8.600	
6.780	
5.080	
3.380	
1.680	
0.000	

Pull Test #PT15

Load (Kips)	Reading (in)
0.000	
1.060	
1.060	
2.120	
2.120	
3.180	
3.180	
4.240	
4.240	
5.300	
5.300	
6.360	
6.360	
7.420	0.063
7.420	
8.480	
8.480	
8.600	
6.780	
5.080	
3.380	
1.680	
0.000	

Depth 15'
Latitude N27.645914
Longitude E81.963428

13'
N27.644614
E81.963327

13'
N27.645898
E81.962594



Attachments: approximate test location, load test setup, pile test measurements.

APPENDIX C

ECOLOGICAL ASSESSMENT REPORT



ECOLOGICAL ASSESSMENT REPORT

Seminole Electric Cooperative, Inc.

Seminole Solar Site

Submitted To: Seminole Electric Cooperative, Inc.
16313 North Dale Mabry Highway
Tampa, FL 33618

Submitted By: Golder Associates Inc.
6026 NW 1st Place
Gainesville, FL 32607

Distribution: Michael Lee, SECI
(Electronic)

April 6, 2016

15-38799

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1.0 INTRODUCTION

Seminole Electric Cooperative, Inc. (SECI) requested Golder Associates Inc. (Golder) conduct an ecological assessment on an approximately 30-acre undeveloped parcel (Site) proposed for construction of a solar photovoltaic facility at the Hardee Power Station (HPS) facility located in Bowling Green, Hardee County, Florida (Figures 1 and 2). The scope of the ecological assessment included delineation of jurisdictional wetland boundaries and a threatened and endangered species survey to identify potential environmental constraints associated with development of the property. This assessment is based on information provided by SECI regarding the location and nature of the proposed development activities, as well as a review of available published research material. Additionally, Site visits were conducted on August 27, 2015 and December 8, 2015. Representative photographs of the Site are presented in Attachment A.

2.0 WETLANDS

Golder evaluated the Site for the presence of jurisdictional wetlands in accordance with applicable federal and state wetland criteria as set forth by the U.S. Army Corps of Engineers (USACE) and the Florida Department of Environmental Protection (FDEP). Specifically, the Site was examined for the presence of hydrophytic vegetation, hydric soils, and hydrologic indicators, by which the landward extent of jurisdictional wetlands may be identified. Golder marked wetland boundaries with high-visibility flagging tape and recorded GPS coordinates at each flag location using a handheld GPS unit. Golder also assessed the Site for the presence of stormwater management features, including swales and ditches.

One state and federal jurisdictional wetland system was identified during the Site visit (Figure 3). Wetland A is an approximately 0.20-acre mixed wetland hardwood system located in the southern portion of the Site. Several hydrologic indicators such as morphological plant adaptations, inundation, saturated soil, and water stained leaves were observed. Hydric soil characteristics such as mucky mineral texture were noted as well. Hydrologic alteration due to hog rooting and from cattle usage was observed within the system. Although the majority of vegetation present is typical of native mixed hardwood wetlands, upland invasive exotic species such as cogon grass (*Imperata cylindrica*) and Caesar weed (*Urena lobata*) have recruited within the interior edge of the system. Vegetation present within Wetland A is described in Section 3.2 below.

Based on conversations with SECI following the Site visits, no impacts to jurisdictional wetlands are proposed in regards to the development of the Site.



3.0 HABITAT CLASSIFICATION

Land use and land cover within the Site was classified using the Florida Land Use, Cover and Forms Classification System (FLUCFCS). FLUCFCS data from the Southwest Florida Water Management District were updated based on field observations and are described below (Figure 4).

3.1 Mixed Rangeland (FLUCFCS 330)

Upland areas of the Site, comprising approximately 30 acres, are dominated by mixed rangeland. Vegetation present within these areas is dominated by native shrubs and invasive exotic groundcover species. The shrub layer is dominated by wax myrtle (*Myrica cerifera*), with groundsel tree (*Baccharis halimifolia*) and Brazilian pepper (*Schinus terebinthifolius*) also present. Groundcover species are dominated by the exotic cogon grass (*Imperata cylindrica*), with subdominant species including Caesar weed (*Urena lobata*), blackberry (*Rubus* sp.), Bahia grass (*Paspalum notatum*), licorice weed (*Scoparia dulcis*), and rattlebox (*Sesbania punicea*).

3.2 Mixed Wetland Hardwoods (FLUCFCS 617)

Wetland A is classified as a mixed wetland hardwood wetland and is approximately 0.20-acre. Canopy species consist of a combination of red maple (*Acer rubrum*), laurel oak (*Quercus laurifolia*), and Carolina willow (*Salix caroliniana*). Wax myrtle is the dominant shrub species, with groundsel tree, Carolina willow, laurel oak and Brazilian pepper also present. The groundcover layer is dominated by swamp fern (*Blechnum serrulatum*) and southern shield fern (*Thelypteris kunthii*), with a variety of subdominant species such as false nettle (*Boehmeria cylindrica*), lizard's tail (*Saururus cernuus*), Peruvian primrose willow (*Ludwigia peruviana*), climbing hemp vine (*Mikania scandens*), cogon grass, and Caesar weed. Upland invasive exotic upland groundcover species, specifically cogon grass and Caesar weed, have recruited well within the interior edge of the system.

4.0 THREATENED AND ENDANGERED SPECIES

Golder evaluated plant and animal species listed as endangered, threatened, or of special concern (listed species) that are known to occur or likely to occur within the Site based upon the presence of suitable habitat, GIS databases of known occurrences of listed species, review of the 1989 and 1994 environmental assessments prepared for the Site Certification Applications for the HPS and Hardee Unit 3 sites, and results of the field surveys. Listed plant species are those plants that are listed by the U.S. Fish and Wildlife Service (USFWS) or the Florida Department of Agriculture and Consumer Services (FDACS) as endangered, threatened, of special concern, or commercially exploited. Listed animal species are those animals that are listed as endangered, threatened, or of special concern by the USFWS or the Florida Fish and Wildlife Conservation Commission (FWC). The Florida Natural Areas Inventory (FNAI) element occurrence database was also queried to identify the location of documented threatened and endangered species observations within the vicinity of the Site.



4.1 Flora

According to the FNAI element occurrence query, no listed plant species have been documented in the vicinity of the Site. Additionally no listed plant species were observed during the Site visits. Although golden polypody (*Phlebodium aureum*) was reported as observed on the HPS site according to the 1989 environmental assessment, it is no longer classified as a listed species.

4.2 Fauna

The FNAI element occurrence database query indicated no documented occurrences of any state or federal listed animal species within 1-mile of the Site (Figure 5). According to the 1989 and 1994 environmental assessments, burrows of the currently state listed threatened gopher tortoise (*Gopherus polyphemus*), the federally threatened wood stork (observed flying overhead), and several wading bird species listed on the state level as species of special concern were observed on the HPS site, while wood storks were observed flying overhead on the Hardee Unit 3 site. None of these species or any other listed animal species or signs of their presence were observed during the Site visits conducted in 2015. Additionally, according to the FWC's bald eagle nest locator database, no known bald eagle nests occur within 660 feet of the Site. The closest known nest, HD007, is greater than 0.5 mile to the southwest of the Site.

Based on USFWS GIS data, the Site is located within the USFWS consultation area for Audubon's crested caracara (*Caracara plancus audubonii*) and the Florida scrub jay (*Aphelocoma coerulescens*), and is also located within the core foraging area (CFA) of two wood stork (*Mycteria americana*) colonies. Each of these species is described below.

4.2.1 Crested Caracara

Audubon's crested caracara is a large raptor which primarily scavenges for its prey. However, being an opportunistic feeder, they also prey on live insects, amphibians, reptiles, and small mammals. In Florida the species ranges from the central to south central portion of the state, preferring prairie and improved pasture habitats with scattered cabbage palms (*Sabal palmetto*) for their nest locations.

Audubon's crested caracara is classified as threatened by the USFWS and FWC. Although the Site is located within the USFWS consultation area for the species, no individuals or signs of their presence were observed within the Site area. Although marginal forage habitat exists within the Site, no suitable or preferred nesting habitat exists.

4.2.2 Florida Scrub Jay

The Florida scrub jay is relatively large passerine which feeds primarily on insects and small reptiles, as well as acorns. It is the only endemic avian species occurring in Florida. It has highly specific habitat requirements, preferring fire-maintained, open xeric oak scrub communities which occur on excessively



well-drained sandy soils. The species ranges throughout peninsular Florida, but has scattered distribution due to its highly specific habitat requirements and loss of habitat.

The Florida scrub jay is classified as threatened by the USFWS and FWC. Although the Site is located within the USFWS consultation area for the species, no individuals or signs of their presence were observed within the Site area, and no suitable forage or nesting habitat exists within the Site.

4.2.3 Wood Stork

The wood stork is a large-sized wading bird which forages primarily on amphibians, reptiles, and freshwater crustaceans. It is dependent on aquatic habitats to support its foraging and nesting needs, specifically freshwater marshes and forested wetlands which experience slight and periodic shifts in water depth. The wood stork can be found throughout most of peninsular Florida.

The wood stork is classified as endangered by both the USFWS and FWC. Although the Site is located within the CFA of wood stork colonies NE Mulberry and 616114, no individuals were observed within the Site area and only a small amount of marginal foraging habitat exists within the Site.

The USFWS and the FWC consider the area within 18.6 miles (30 km) of a wood stork nesting colony as the CFA for wood storks. As part of the USACE wetland permitting process under Section 404(b)(1) of the Clean Water Act and in accordance with 40 Code of Federal Regulations (CFR) Part 230 and 33 CFR Part 320, impacts to wetlands within a wood stork colony CFA are assessed in consultation with the USFWS under Section 7 of the Endangered Species Act. Under the South Florida Programmatic Concurrence for the wood stork between the USFWS and USACE, the USFWS has developed a Wood Stork Effect Determination Key to facilitate USACE's evaluation of potential adverse effects upon wood storks associated with a particular project. The USFWS routinely concurs with USACE's "may affect, not likely to adversely affect" determination for individual project effects to the wood stork when project effects are insignificant due to scope or location, or if assurances are given that wetland impacts have been avoided, minimized, and adequately compensated such that there is no net loss in foraging potential. Impacts to wetlands within a CFA that provides wood stork foraging habitat must be compensated through provision of mitigation that provides for equal or greater wood stork foraging habitat value, measured as the estimated prey biomass available on an annual basis.

Based on conversations with SECI following the Site visits, no impacts to jurisdictional wetlands are proposed in regards to the development of the Site. Since no jurisdictional wetland impacts are proposed, no impacts to wood stork CFA's will occur as a result of the development activities.

4.2.4 Non-listed Fauna

Several non-listed native and non-native fauna were directly or indirectly (i.e. tracks, scat) observed during the Site visit. These include feral hog (*Sus scrofa*), white-tailed deer (*Odocoileus virginianus*), coyote



(*Canis latrans*), brown anole (*Anolis sagrei*), northern cardinal (*Cardinalis cardinalis*), northern parula (*Setophaga americana*), Carolina wren (*Thryothorus ludovicianus*), eastern meadowlark (*Sturnella magna*), common ground dove (*Columbina passerina*), mourning dove (*Zenaida macroura*), blue-gray gnatcatcher (*Polioptila caerulea*), white-eyed vireo (*Vireo griseus*), barn swallow (*Hirundo rustica*), bank swallow (*Riparia riparia*), and northern rough-winged swallow (*Stelgidopteryx serripennis*).

5.0 CONCLUSION

Golder conducted a jurisdictional wetland delineation and threatened and endangered species assessment on an approximately 30-acre parcel adjacent to the HPS facility. A combination of information from SECI, GIS database queries, review of available published material, review of the 1989 and 1994 environmental assessments prepared for the Site Certification Applications for the HPS and Hardee Unit 3 sites, and Site visits were utilized to evaluate the presence of wetlands and listed species at the Site.

One state and federal jurisdictional wetland system was identified and delineated within the Site, a mixed wetland hardwood system (Wetland A) located within the southern portion of the Site (Figure 3). This wetland will be avoided by the project.

No listed plants or animals were observed during the Site visits and no documented occurrences of listed species were identified in the FNAI database review. The Site is located within the USFWS consultation area for Audubon's crested caracara and the Florida scrub jay, and is also located within the CFA of two wood stork colonies. Although marginal forage habitat exists for the wood stork and Audubon's crested caracara, no suitable nesting habitat exists within the Site for either species. Since no jurisdictional wetland impacts are proposed in regards to the development of the Site, no impacts to wood stork CFA's will occur. Additionally, the Site does not provide suitable foraging or nesting habitat for the Florida scrub jay.

Golder appreciates the continued opportunity to provide environmental consulting services for SECI. Please contact Adam Zions at 352-336-5600 with any questions or comments regarding this assessment.

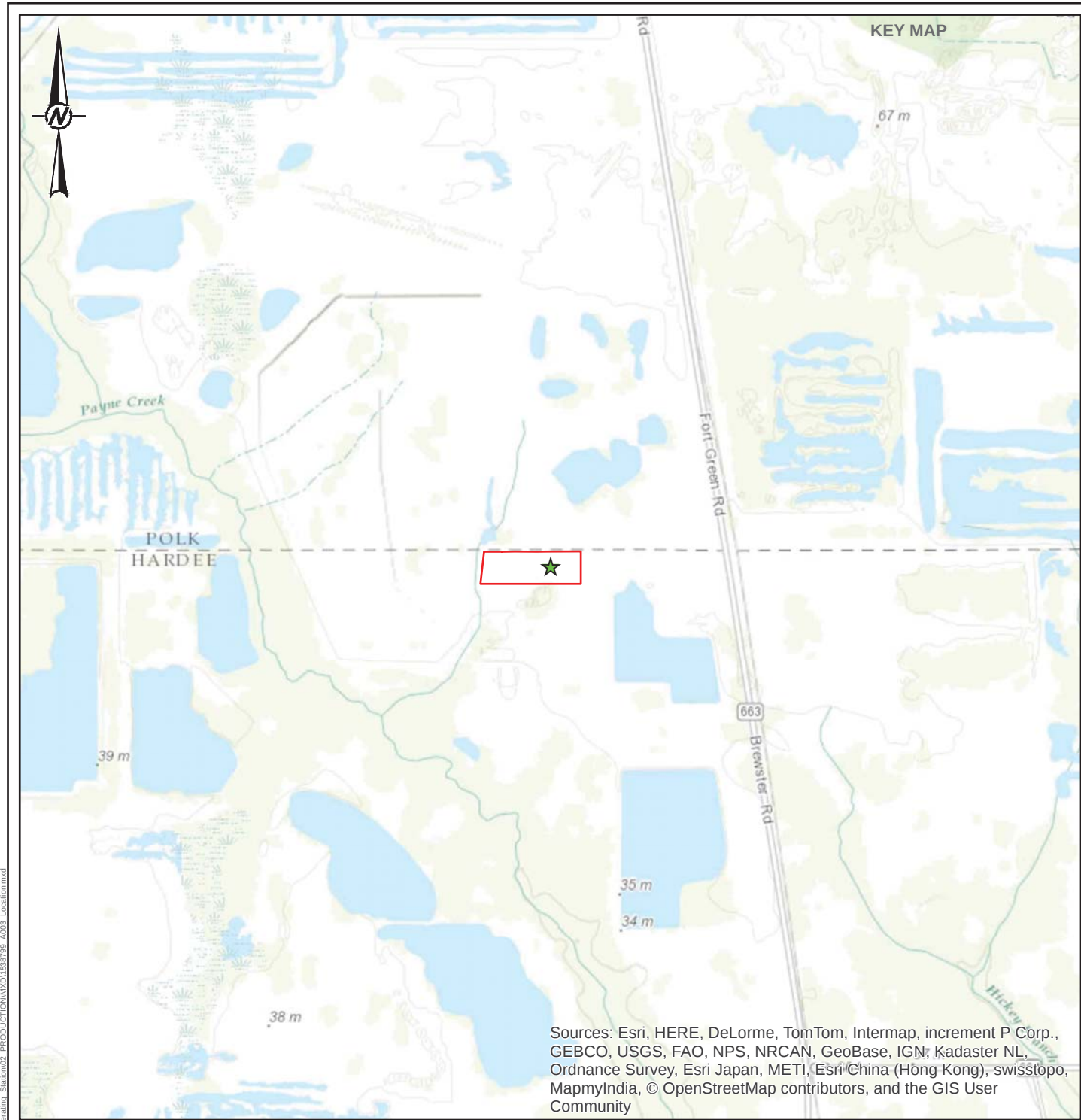
GOLDER ASSOCIATES INC.

Adam Zions
Ecologist and Project Manager

AZ/KB

Karl Bullock, M.S.
Associate and Project Director

FIGURES

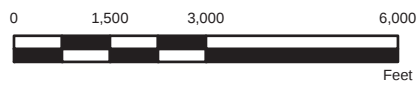
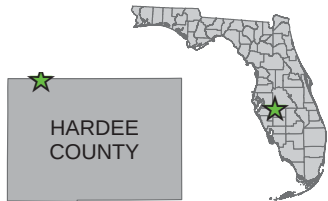


KEY MAP

Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

LEGEND

- ★ Site Location
- Site Boundary



REFERENCE(S)
SITE LOCATION, SITE BOUNDARY, GOLDER ASSOCIATES INC. 2016

CLIENT
SECI

PROJECT
SEMINOLE SOLAR SITE

CONSULTANT



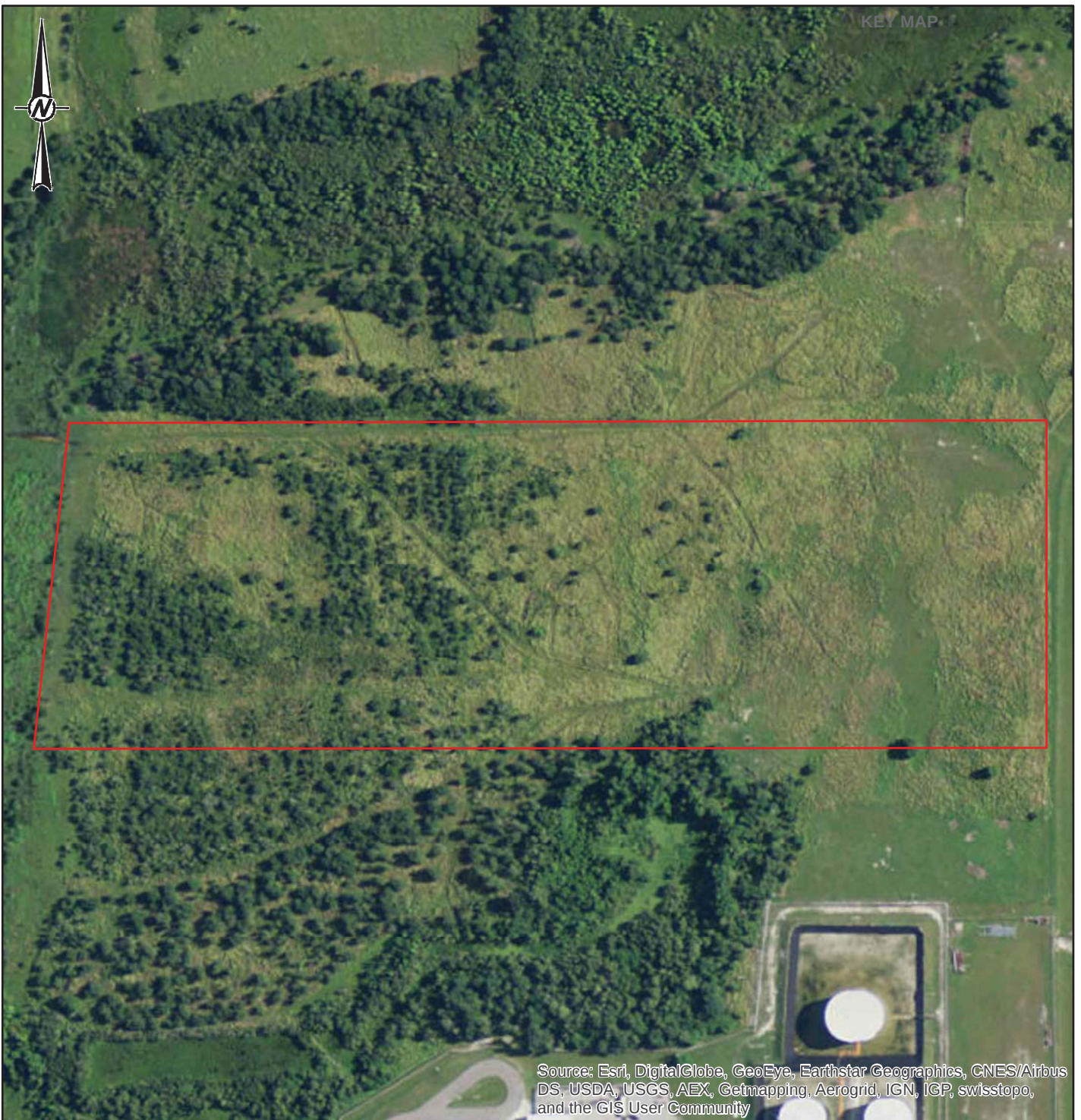
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PREPARED	JGW
REVIEWED	AZ
APPROVED	AZ

TITLE
SITE LOCATION

PROJECT NO. 1538799	CONTROL A003	REV. 0	FIGURE 1
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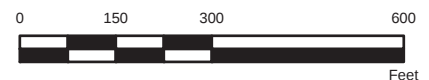
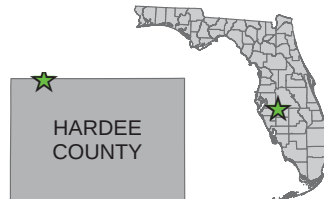
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

LEGEND

- ★ Site Location
- Site Boundary



REFERENCE(S)
SITE LOCATION, SITE BOUNDARY; GOLDER ASSOCIATES INC. 2016

CLIENT
SECI

PROJECT
SEMINOLE SOLAR SITE

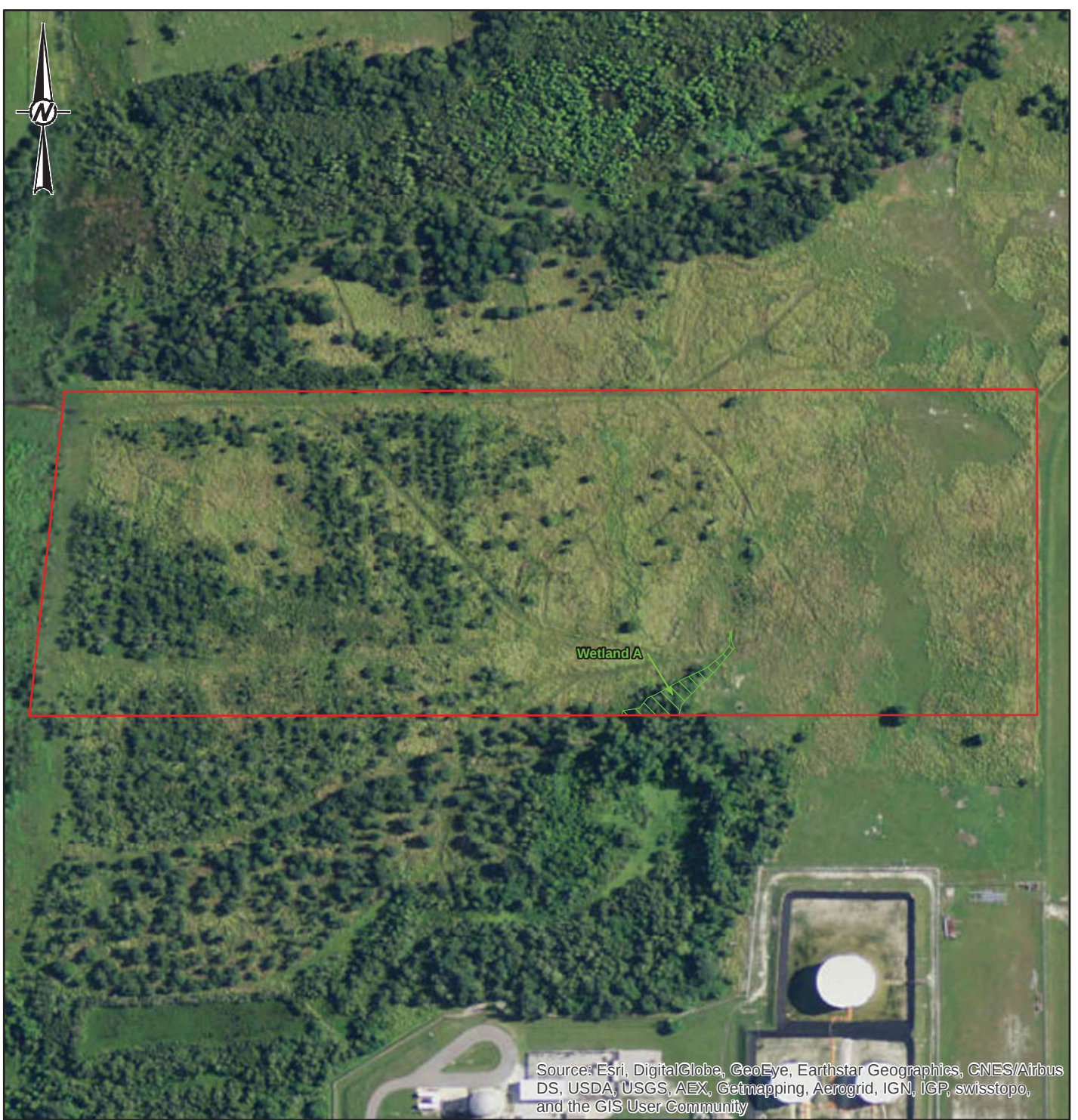
CONSULTANT

YYYY-MM-DD	2016-04-05
DESIGNED	JGW
PREPARED	JGW
REVIEWED	AZ
APPROVED	AZ



TITLE
AERIAL

PROJECT NO. 1538799	CONTROL A004	REV. 0	FIGURE 2
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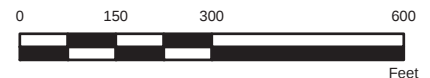
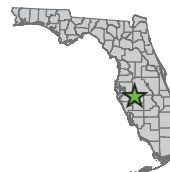


Source: ESri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

- ★ Site Location
- Site Boundary

Delineated Wetlands

- ▨ Jurisdictional Wetlands (+/- 0.18 Acres)



REFERENCE(S)

SITE LOCATION, SITE BOUNDARY, JURISDICTIONAL WETLANDS, GOLDER ASSOCIATES INC. 2016

CLIENT
SECI

CONSULTANT



YYYY-MM-DD 2016-04-05

DESIGNED JGW

PREPARED JGW

REVIEWED AZ

APPROVED AZ

PROJECT

SEMINOLE SOLAR SITE

TITLE

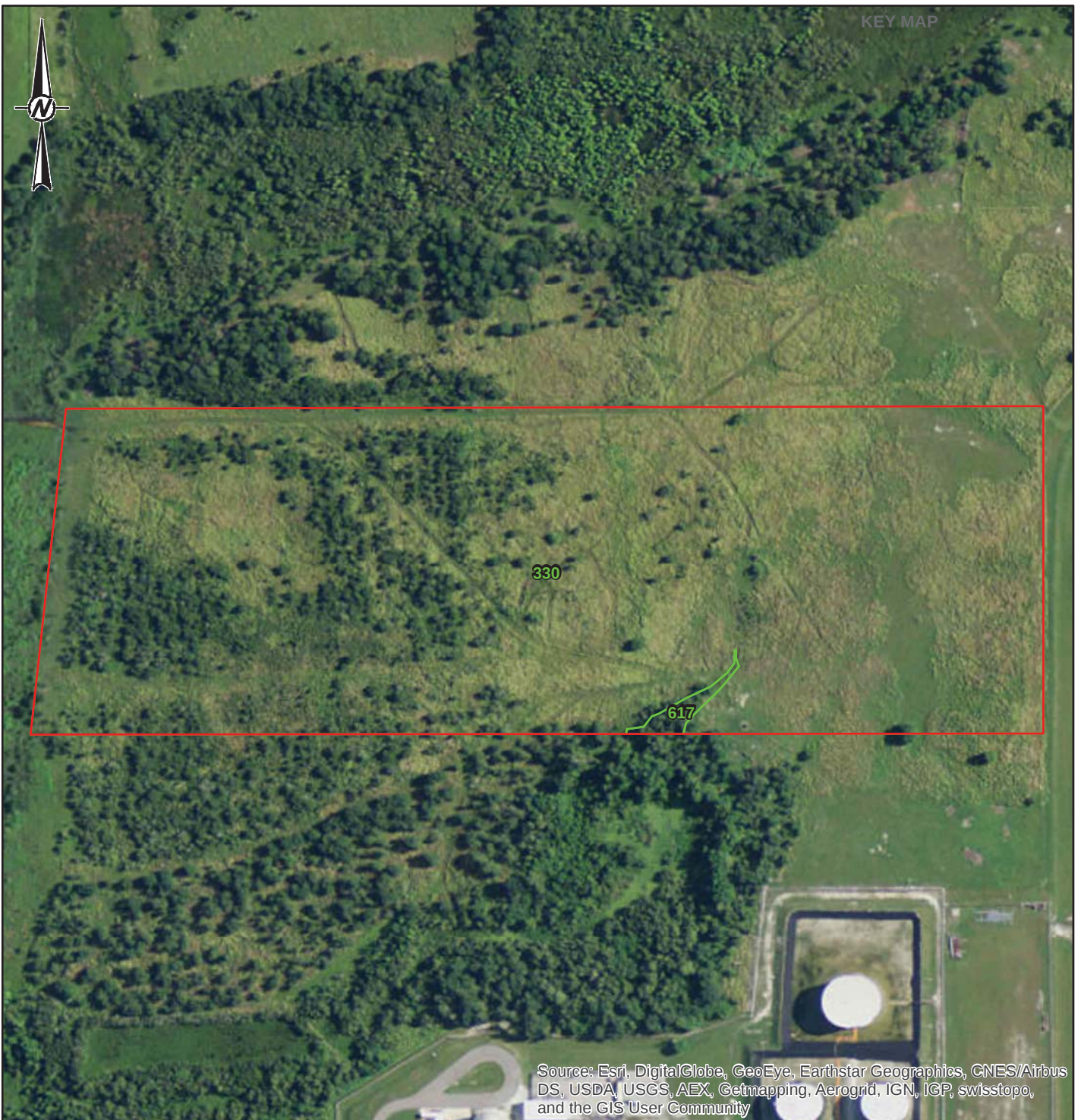
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PROJECT NO.
1538799

CONTROL
A001

REV.
0

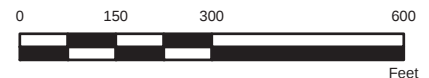
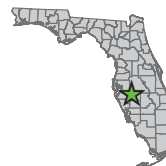
FIGURE
3



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

LEGEND

- ★ Site Location
- Site Boundary
- Land Use and Cover
- 330 - Mixed Rangeland
- 617 - Mixed Wetland Hardwoods



REFERENCE(S)

SITE LOCATION, SITE BOUNDARY, LAND USE, GOLDER ASSOCIATES INC. 2016

CLIENT
SECI

PROJECT
SEMINOLE SOLAR SITE

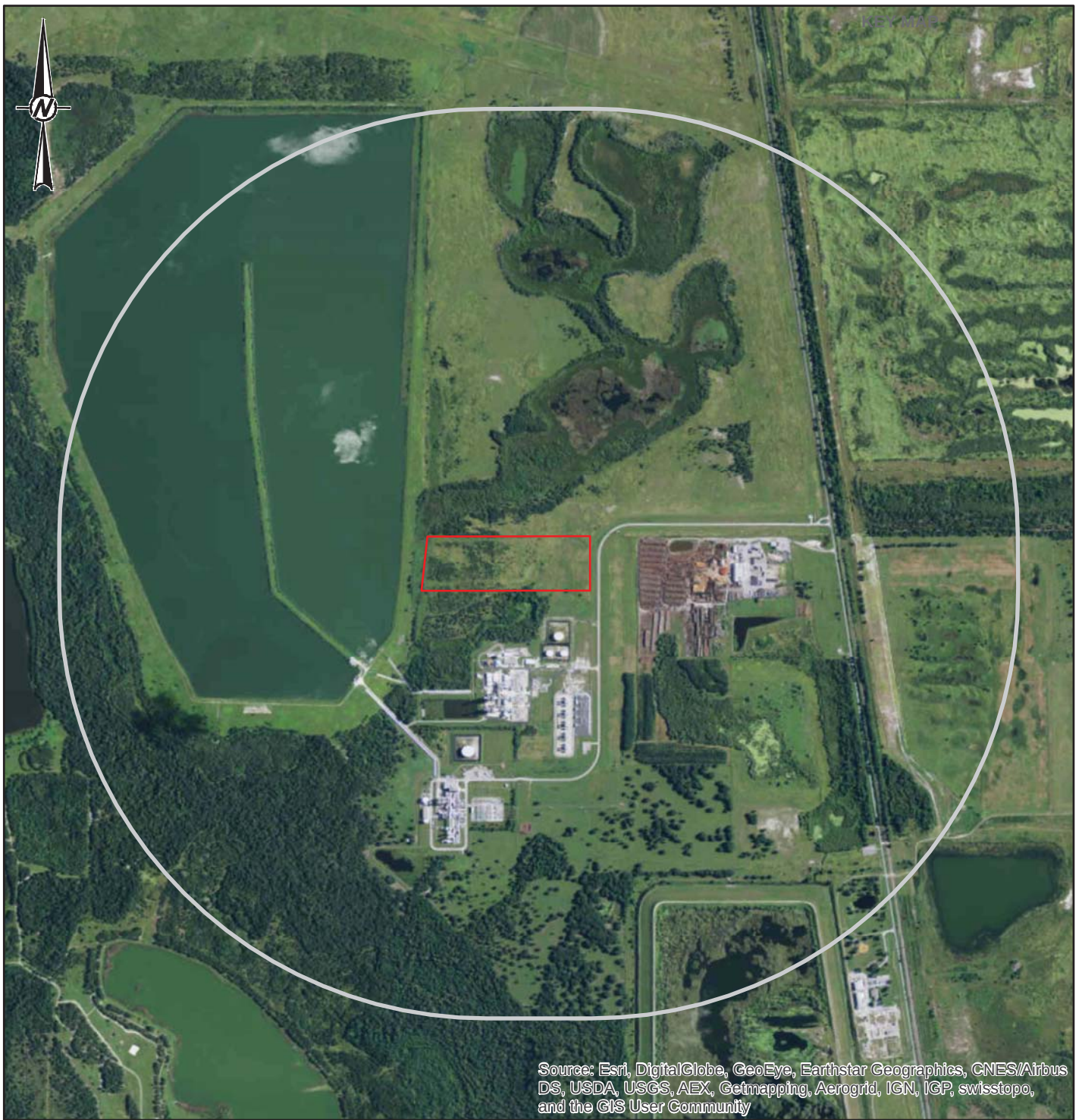
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DESIGNED	JGW
PREPARED	JGW
REVIEWED	AZ
APPROVED	AZ

TITLE
LAND USE AND COVER

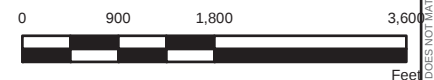
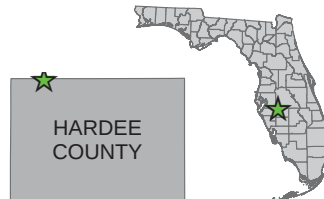
PROJECT NO. 1538799	CONTROL A005	REV. 0	FIGURE 4
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

LEGEND

- ★ Site Location
 - ▭ Site Boundary
 - FNAI Occurrences
- Buffer Distance**
- 1 Mile



REFERENCE(S)

SITE LOCATION, SITE BOUNDARY, BUFFER DISTANCE, GOLDER ASSOCIATES INC. 2016 FNAI OCCURRENCES; FNAI 2007

CLIENT
SECI

PROJECT
SEMINOLE SOLAR SITE

CONSULTANT



YYYY-MM-DD	2016-04-05
DESIGNED	JGW
PREPARED	JGW
REVIEWED	AZ
APPROVED	AZ

TITLE
FNAI OCCURRENCES

PROJECT NO.
1538799

CONTROL
A002

REV.
0

FIGURE
5

ATTACHMENT A
SITE PHOTOGRAPHS



Project Title: Seminole Solar Site

PHOTO 1

View to south of edge of Wetland A.



PHOTO 2

View to southeast of interior edge of Wetland A.





PHOTO 3

View to northeast of drainage feature associated with Wetland A.



PHOTO 4

View to east of cogon grass (*Imperata cylindrica*) dominated rangeland.





PHOTO 5

View to northwest of cogon grass dominated portion of rangeland giving way to wax myrtle (*Myrica cerifera*) dominated portion.



PHOTO 6

View of wax myrtle dominated portion of rangeland.

