WBQ Design & Engineering Inc.

LETTER OF TRANSMITTAL

To: FDEP
3319 Maguire Blvd
Orlando, FL 32803

Stormwater Review Department

Date: 12/23/10 **Job No.:** 10REG.STA

Re: OUC Stanton Energy Center Solar Project
Environmental Resource Permit Application
Application Packages

We are sending you: ☒ **Attached** ☐ **Under Separate Cover**

☐ **Shop drawings** ☐ **Prints** ☒ **Plans**
☐ **Copy of Letter** ☐ **Change Order** ☐ **Specifications**
☒ **Other:** Refer to items below

Copies	Date	No.	Description
1	Dec-10	1	Post Certification Cover Letter
5	Dec-10	2	Section A Application Form
5	Dec-10	3	Section C Application Form
5	Dec-10	4	Environmental Resource Permit Application Package
5	Dec-10	5	Geotechnical Report by Nodarse and Associates, Inc.
5	Dec-10	6	Signed and Sealed Construction Plans

These are transmitted as checked below:
☒ **For your use**
☐ **Returned after loan**
☐ **As requested**
☒ **For your review**

Remarks: To whom it may concern,
Please find attached the Environmental Resource Permit application package for the OUC Stanton Energy Center Solar Energy Project. Please contact us at dangel@wbq.com or 407-839-4300 with any questions.
Sincerely,

Signed:
Richard K. Ramoutar, E.I.

Copy to:			
file	☐ **Transmittal Only**	☒ **w/Attachments**
Leo Anglero - FDEP	☐ **Transmittal Only**	☒ **w/Attachments**
Erica Goshleski - FDEP	☐ **Transmittal Only**	☒ **w/Attachments**
James Cowdery - Regenesis	☐ **Transmittal Only**	☒ **w/Attachments**
	☐ **Transmittal Only**	☐ **w/Attachments**

201 N. Magnolia Avenue ▲ Suite 200 ▲ Orlando, FL 32801
(407) 839-4300 ▲ Fax: (407) 839-1621 ▲ E-mail: wbq@wbq.com

WBQ Design & Engineering, Inc.

December 23, 2010

Mr. Michael P. Halpin, P.E.
Administrator - Siting Coordination Office
Majory Stoneman Douglas building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

RE: OUC Stanton Energy Center (PA 81-14)
ERP Application Submittal
Post Certification Documentation

Dear Mr. Halpin:

WBQ Design & Engineering, Inc. is hereby submitting the required Environmental Resource Permit Application for the above referenced project on behalf of Regenesis Power Orlando and Orlando Utilities Commission. The attached application package is being submitted as Post Certification Documentation for the Amendment Request for a 5.9 MW Photovoltaic Solar Generating Station as required by Sections IV.Y, V.A, and V.G of the Facility's Conditions of Certification. Copies of this application have been submitted to the FDEP Central District Office in Orlando, Florida for review.

We hope this information is sufficient to facilitate the issuance of a permit for this project. Should you have any questions or require additional information during the review process, please contact our office directly so we can expedite an immediate response.

Sincerely,
WBQ Design & Engineering, Inc.

Dan L. Angel, CCS
Senior Associate / Director of Operations

Encl. – CD of Application Package
CC: Leo Anglero – FDEP Central District
Erica Goshleski – FDEP Central District
James Cowdery – Regenesis Power Orlando

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WBQ Design & Engineering Inc.
EB NO. 0006796

Orlando Utilities Commission
Stanton Energy Center Solar Energy Project

Environmental Resource Permit Application

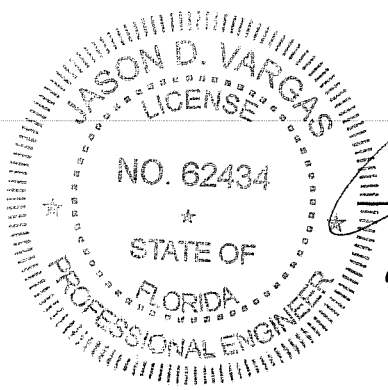
December 2010

Prepared for:

Regenesis Power Orlando
2295 Commerce Point Drive
Lakeland, Florida 33801-6863
407-782-7282

Prepared by:

WBQ Design & Engineering, Inc.
201 N. Magnolia Avenue, Suite 200
Orlando, Florida 32801
407-839-4300



DEC 23 2010

Jason D. Vargas, P.E.
FL Registration No. 62434

WBQ Design & Engineering Inc.
EB NO. 0006796

Orlando Utilities Commission
Stanton Energy Center Solar Energy Project

Environmental Resource Permit Application

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1 Executive Summary

1.1 Project Description

Regenesis Power Orlando (RPO) proposes to construct photo-voltaic solar energy collection arrays on behalf of Orlando Utilities Commission (OUC) at the OUC Stanton Energy Center in southeast Orange County, Florida. The project site is more specifically located in Section 13, Township 23S., Range 31E., on Parcel 13-23-31-000-00-001. RPO will serve as the Design/Builder/Operator of the project on a 20 year agreement with OUC to generate 5.91 Megawatts of electric power and connect to the OUC power distribution system. This project has previously been approved as an amendment to the Stanton Energy Center's Site Certification Application. A copy of the approval letter, dated September 29, 2010, has been included in **Appendix A** of this report. This Environmental Resource Permit Application is being submitted as post certification documentation to the amendment approval.

Stormwater impoundment berms will be constructed along the eastern side of the northern section of the project site and on the north and south sides of the southern portion of the site to provide stormwater quality treatment and attenuation.

The existing site is undeveloped with grasses and underbrush along with occasional trees. Existing conveyance ditches are located along the western boundary and across the middle of the site. Runoff from the site ultimately discharges to a nearby wetland via a combination of overland flow and the above described conveyance ditches.

1.2 Scope and Purpose

Proposed improvements to the project site will consist of the following objectives:

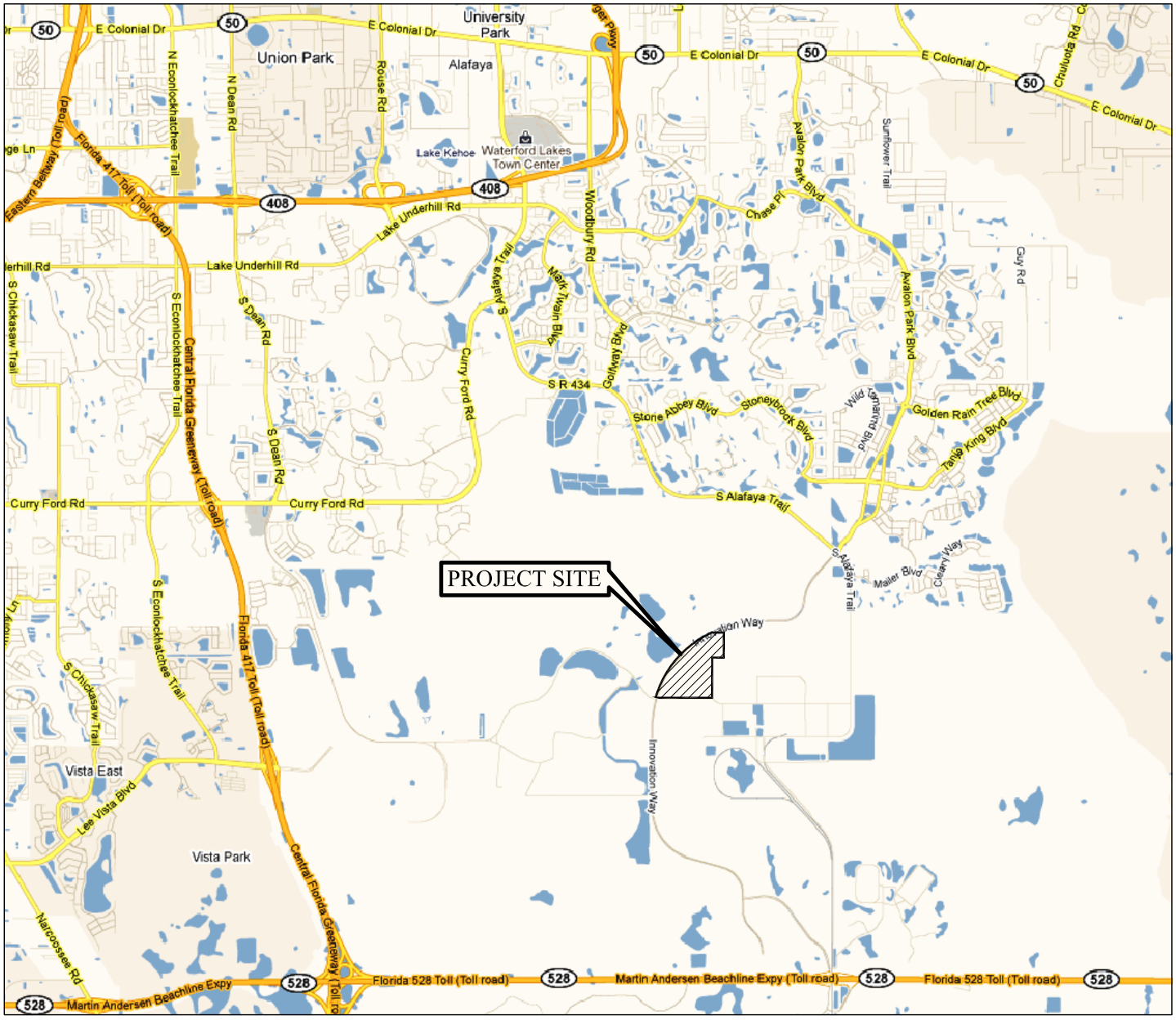
- Selective clearing and grubbing of the project area.
- Excavation and grading of the site to establish final grades.
- Installation of photo-voltaic solar arrays, low voltage power inverters and electrical transformers.
- Construction of surface water management system (primary system).
- Construction of surface water conveyance system (secondary system).
- Installation of low voltage underground cables in conduit.

The purpose of this report is to document the engineering details pertaining to the surface water management systems designed to serve the site. The information presented in this report is sufficient to satisfy the requirements of the Florida Department of Environmental Protection (FDEP).

1.3 Computer Analysis

The computer program Interconnected Channel and Pond Routing Model Version 3.2 by Streamline Technologies Inc. was used to analyze the existing and proposed drainage basins and perform pond routing calculations.

The site hydrology and detention calculations are based on the Santa Barbara Urban Hydrograph (SBUH) method for calculating stormwater runoff. The SBUH method computes a hydrograph directly without going through intermediate steps (i.e. a unit hydrograph) to determine the runoff hydrograph. The SBUH method depends on several variables: impervious and pervious land areas, time of concentration, runoff curve numbers applicable to the site and design storm.



N.T.S.

OUC STANTON SOLAR ENERGY SITE

LOCATION MAP

FIGURE 1-1

S 13 T 23S R 31E

12/20/10

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Phone (407) 839-4300 Fax (407) 839-1621

NORTH

N.T.S.

OUC STANTON SOLAR ENERGY SITE

AERIAL MAP

FIGURE 1-2

S 13 T 23S R 31E

12/20/10

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2 Pre-Developed Analysis

2.1 Pre-Developed Drainage Conditions

The pre-developed site is undeveloped and consists of grasses and underbrush along with occasional trees. Existing conveyance ditches are located along the western boundary and across the middle of the site. Runoff from the site ultimately discharges to a nearby wetland via a combination of overland flow and the above described conveyance ditches.

In the pre-developed condition, the site is divided into three basins. The northern basin (Basin C) flows easterly to existing wetland area by overland flow. Runoff from the southern basin flows via a combination of overland flow and ditches to a wetland located east of the site; the southern basin is comprised of two sub-basins (Basin A and Basin B). Refer to **Figure 2-4** for the, *Pre-Developed Basin Map* and the *Pre-Developed Nodal Diagram*.

2.1.1 Pre-Developed Basin Characteristics

The characteristics for the pre-developed basins are summarized in **Table 2.1** below. Additional information and backup data are provided in **Appendix B and Appendix C**.

Table 2.1 Pre-Development Land Use Summary

Basin	Total Drainage Area (ac)	Curve Number (CN)	Time of Concentration (minutes)
BASIN A	19.35	84	39.6
BASIN B	5.44	84	15.5
BASIN C	10.55	84	25.1
TOTAL	35.34		

2.1.2 Receiving Tailwater

The receiving tailwater for the basin is the nearby wetland located east of the site, which is hydraulically connected to the Econlockhatchee River. Staging elevations at the

receiving tailwater for each design storm under consideration were obtained from observations of water marks and limits of "health grass" within the discharge areas.

2.1.3 Pre-Developed Flow Rates

The pre-developed condition was modeled using adICPR in order to determine allowable flow rates. The peak flow rates for the pre-developed basin are listed in **Table 2.2** below.

Table 2.2 Pre-Development Nodal Flow Rates Summary

	Mean-Annual/ 24-hr (cfs)	25-yr/24-hr (cfs)
DITCH A	22.68	53.48
WETLAND B	9.98	22.98
WETLAND C	15.90	37.04

2.2 Soil Characteristics

The Orange County Soil Survey (**Figure 2-2**) was consulted to delineate the soil types and hydrologic soil groups on-site.

The characteristics of the soils on-site are as follows:

Type	Hydrologic Group
#20 –Immokalee Fine Sand	B/D
#44 – Smyrna Fine Sand	B/D

Per the Orange County Soil Survey:

 # 20 Immokalee Fine Sand is nearly level and poorly drained. It is on broad flatwoods. In most years, a seasonal high water table is within 10 inches of the

surfaces for 1 to 3 months, and recedes to a depth of 10 to 40 inches for more than 6 months.

 # 44 Smyrna Fine Sand is nearly level and poorly drained. This complex sits on broad flatwoods with smooth slopes ranging from 0 to 2 percent. In most years, a seasonal high water table is within 10 inches of the surfaces for 1 to 3 months, and recedes to a depth of 10 to 40 inches for more than 6 months.

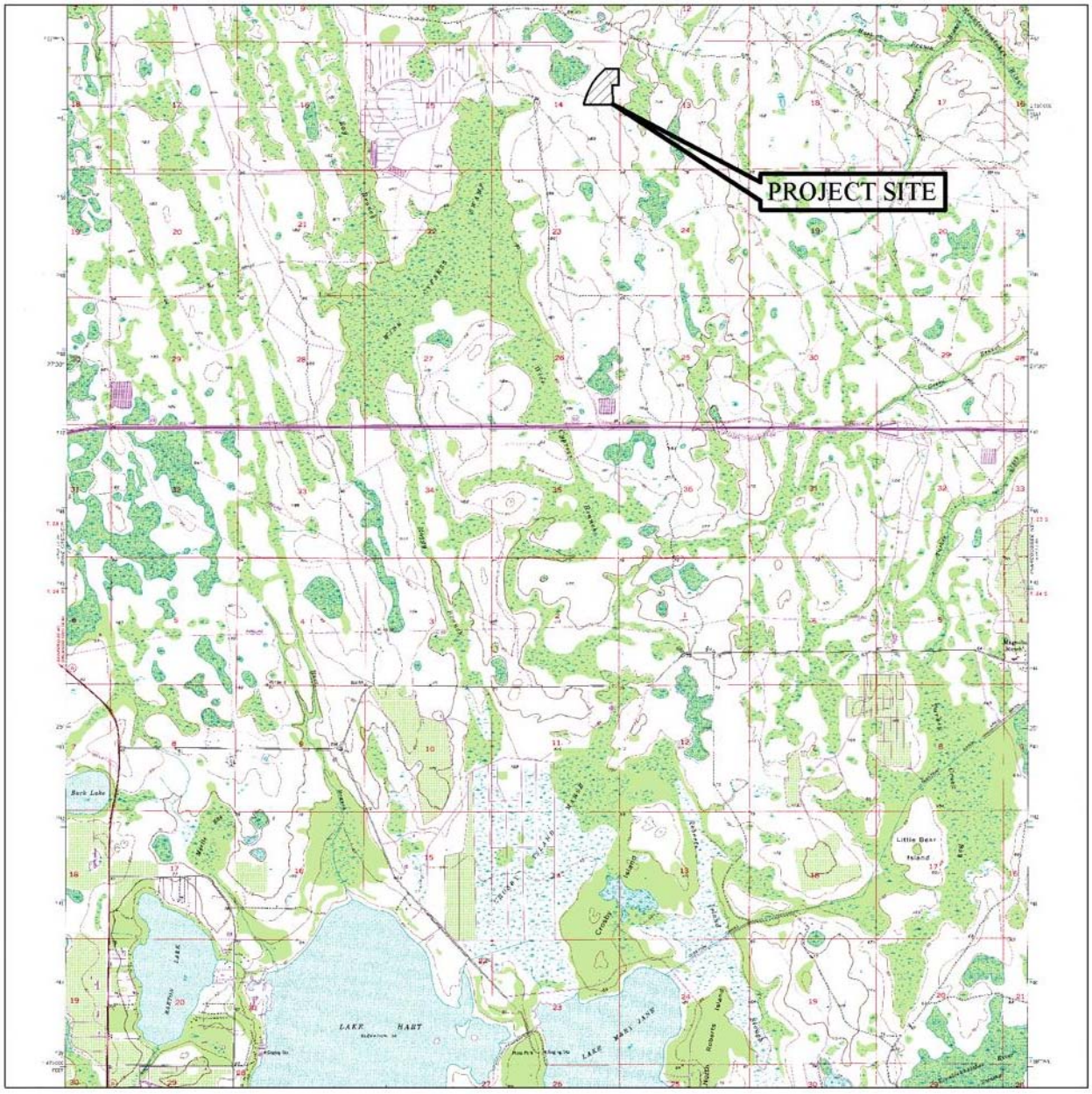
2.3 100 Year Flood Plain

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel No. 12095C0475F, dated September 25, 2009, **(Figure 2-3)** delineates the 100-year flood plain. There are no portions of the proposed project area located within the 100-year flood plain.

2.4 Wetlands and Surface Waters

Wetlands and surface waters are present on the existing site. Refer to the Environmental Assessment Report prepared by Lotspeich and Associates, Inc. included in **Appendix G** of this report.

NORTH



N.T.S.

OUC STANTON SOLAR ENERGY SITE

USGS QUADRANGLE MAP

FIGURE 2-1

S 13 T 23S R 31E

12/20/10

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Phone (407) 839-4300 Fax (407) 839-1621

N.T.S.

OUC STANTON SOLAR ENERGY SITE

NRCS SOIL MAP

FIGURE 2-2

S 13 T 23S R 31E

12/20/10

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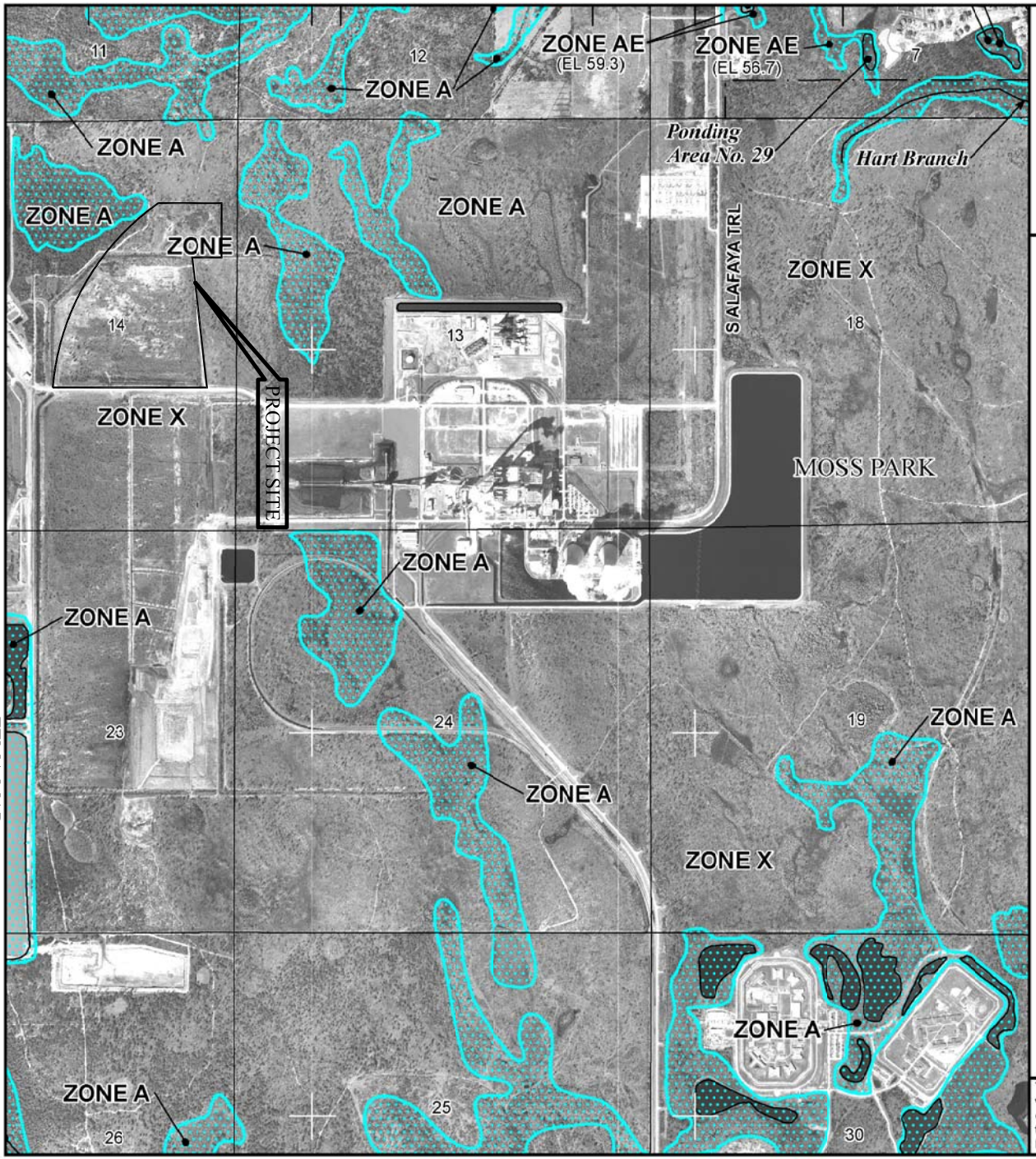
Phone (407) 839-4300 Fax (407) 839-1621

OUC STANTON SOLAR ENERGY SITE



PANEL 0475F

FIRM

FLOOD INSURANCE RATE MAP

ORANGE COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 475 OF 750

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ORANGE COUNTY	120179	0475	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12095C0475F

MAP REVISED
SEPTEMBER 25, 2009

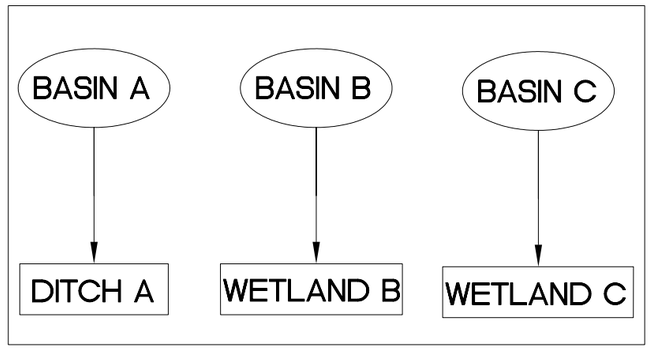
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FEMA MAP
FIGURE 2-3

12/20/10
N.T.S.

NODAL DIAGRAM



GRAPHIC SCALE
100 50 0 100 200
(IN FEET)

LEGEND
- PROPERTY LINE
- WETLAND LINE
- UPLAND BUFFER LINE
- NEW FENCE LINE
- BASIN BOUNDARY LINE

rp orlando

REGENESIS POWER ORLANDO LLC
2295 COMMERCE POINT DR., SUITE 100
LAKELAND, FL 33801

GENERAL NOTICES:

WBQ Design & Engineering Inc.
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Phone (407) 859-6300 Fax (407) 859-1621
Certification of Authorization No. EB - 0008798

CLIENT:
ORLANDO UTILITIES COMMISSION
ORLANDO, FLORIDA

PROJECT:
OUC
ORLANDO UTILITIES COMMISSION

NOTICES:

REV'N NO.	APPR. BY	DATE	DESCRIPTION OF REVISIONS
7			
6			
5			
4			
3			
2			
1			

KEY PERSONS

PROJECT MANAGER:	DIRECTOR OF DESIGN:
PROJECT ARCHITECT:	DESIGN MANAGER: **DLA**
PROJECT DESIGNER:	DRAWN BY: **RKR**
APPROVAL:	DATE: / FILENAME:

PROJECT TITLE:

SHEET TITLE:
FIGURE 2-4
PRE DEVELOPMENT
BASIN MAP

PROJECT NO./PKG. CODE: | PHASE:

DRAWING NO.:

REVISION NO.: △

3 Post-Developed Analysis

3.1 Post-Developed Drainage Conditions

In the post-developed condition, the site will consist of 19 photo-voltaic solar energy collection arrays, low voltage power inverters and electrical transformers. Stormwater impoundment berms will be constructed along the eastern side of the northern section of the project site and on the north and south sides of the southern portion of the site to provide stormwater quality treatment and attenuation. Refer to **Figure 3-1** for the *Post-Developed Basin Map* the *Post-Developed Nodal Diagram*.

3.1.1 Post-Developed Basin Characteristics

There are three basins in the post-developed condition. The characteristics for the post-developed basins are summarized in **Table 3.1** below. Additional information and backup data are provided in **Appendix B**.

Table 3.1 Post-Development Land Use Summary

Basin	Total Drainage Area (ac)	Curve Number (CN)	Time of Concentration (minutes)
BASIN A1	12.13	61	16.5
BASIN B1	12.66	61	14.9
BASIN C1	10.55	61	25.1
TOTAL	35.34		

3.1.2 Stormwater Impoundment

Stormwater impoundment berms will be constructed along the eastern side of the northern section of the project site and on the north and south sides of the southern portion of the site to provide stormwater quality treatment and attenuation. The berm in the northern section of the site will be 3 feet in height with a bottom elevation of 77.00 and a top elevation of 80.00. The top of the berm will be 8 feet wide with 4:1 side slopes

to grade . Stormwater runoff will be impounded behind the berm to a depth of 2 feet to provide the required treatment volume at elevation 79.00. At that point, excess runoff

will be allowed to drain into drainage control structures and discharge to the wetland area to the east.

The two southern impoundment berms will also be 3 feet in height with a bottom elevation of 80.00 and a top elevation of 83.00. The top of the southernmost berm will be 4 feet wide with 4:1 side slopes to grade. The top of the northernmost berm will be 21 feet in width to accommodate a 15-foot wide emergency vehicle access road along the top of the berm. This berm will also have 4:1 side slopes to grade. Stormwater runoff will be impounded behind these berms as noted in **Tables 3.2** through **3.4**. At that point, excess runoff will discharge through drainage control structures to the existing stormwater conveyance ditches along the west and north side of the southern portion of the project site.

The Stage-Storage data for the stormwater impoundment areas are summarized in **Table 3.2**. For more detailed information refer to **Appendix C**.

Table 3.2 Stage-Storage for Impoundment Berm A

Stage (El.)	Area (ac)	Storage Volume, (ac-ft)	Remark
81.00	3.94	2.44	
80.40	3.83	1.52	Treatment Elevation
80.00	3.76	0.00	Bottom Elevation

Table 3.3 Stage-Storage for Impoundment Berm B

Stage (El.)	Area (ac)	Storage Volume, (ac-ft)	Remark
81.00	6.17	6.03	
80.30	5.98	1.78	Treatment Elevation
80.00	5.90	0.00	Bottom Elevation

Table 3.4 Stage-Storage for Impoundment Berm C

Stage (El.)	Area (ac)	Storage Volume, (ac-ft)	Remark
79.00	3.83	4.98	
78.00	2.77	1.68	
77.50	2.70	1.13	Treatment Elevation
77.00	2.63	0.00	Bottom Elevation

3.2 Hydraulic and Hydrologic Analysis

The proposed land use and pond data were modeled to generate the maximum flow rates from the post-developed basins. **Table 3.5** summarizes the hydrological analysis of the post-development conditions. The detailed routing analysis is attached in **Appendix D**.

Table 3.5 Post-Development Flow Rates Summary

	Mean-Annual/ 24-hr (cfs)	25-yr/24-hr (cfs)
Ditch A	0.00	3.09
Wetland B	0.00	2.05
Wetland C	0.00	3.27

As demonstrated in **Table 2.2** and **Table 3.5**, the peak discharge rates from the post-developed condition are less than those of the existing conditions in the Mean-Annual/24-hour and 25-year/24-hour storm events. **Tables 3.6** through **3.8** below compares the allowable flow rates to the post-developed flow rates

Table 3.6 Comparison of Flow Rates
(Maximum inflow rates into Node DITCH A)

	Mean-Annual/ 24-hr (cfs)	25-yr/24-hr (cfs)
Allowable Flow Rates	**22.68**	**53.48**
Post-Dev. Flow Rates	**0.00**	**3.09**

Table 3.7 Comparison of Flow Rates
(Maximum inflow rates into Node WETLAND B)

	Mean-Annual/ 24-hr (cfs)	25-yr/24-hr (cfs)
Allowable Flow Rates	9.98	22.98
Post-Dev. Flow Rates	0.00	2.05

Table 3.8 Comparison of Flow Rates
(Maximum inflow rates into Node WETLAND C)

	Mean-Annual/ 24-hr (cfs)	25-yr/24-hr (cfs)
Allowable Flow Rates	15.90	37.04
Post-Dev. Flow Rates	0.00	3.27

3.3 Erosion Control

Silt fences and synthetic hay bales will be used as required during construction to control erosion. Refer to the construction plans for erosion control details.

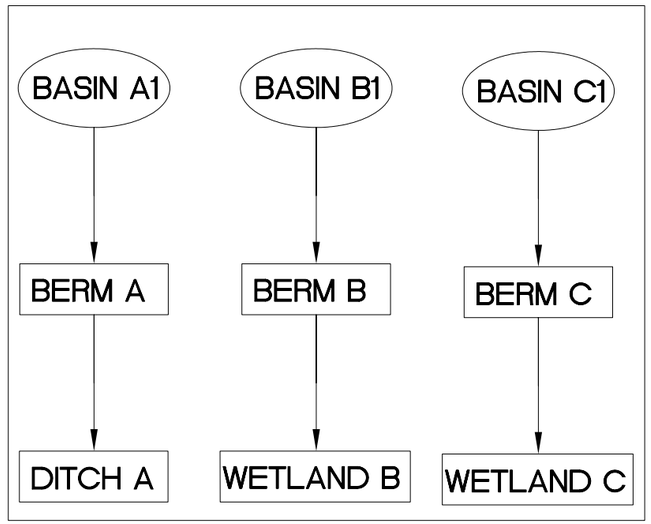
3.4 Operation and Maintenance

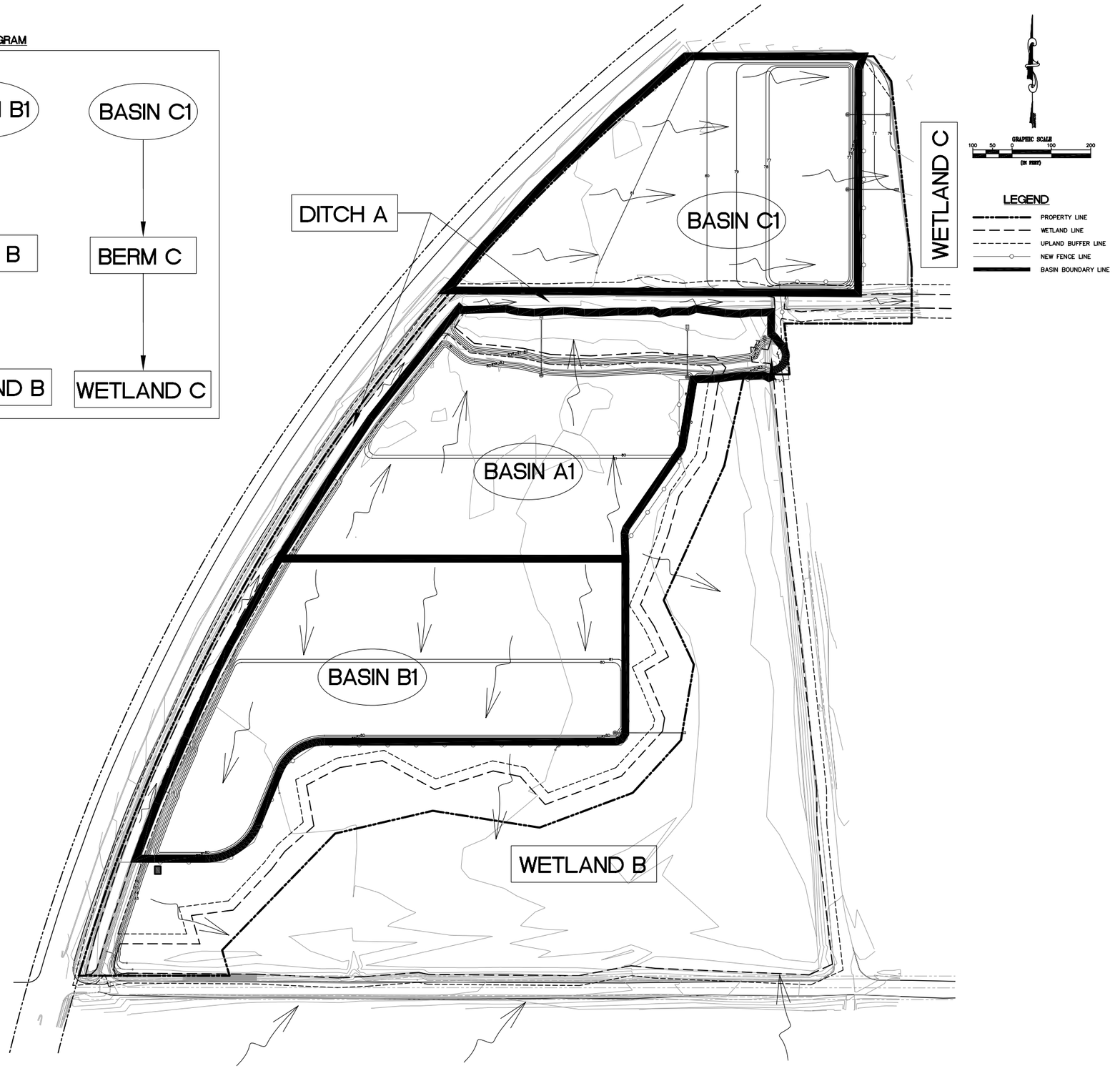
Regenesis Power Orlando (RPO) will perform the routine maintenance required to keep the stormwater facilities free of debris and repair any damaged stormwater structures.

3.5 Utilities

There are no water and wastewater service required for this project.

NODAL DIAGRAM





rp orlando

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PROJECT:
OUC
ORLANDO UTILITIES COMMISSION

NOTICES:

REV. NO.	APPR. BY	DATE	DESCRIPTION OF REVISIONS
7			
6			
5			
4			
3			
2			
1			

KEY PERSONS

PROJECT MANAGER:	DIRECTOR OF DESIGN:
PROJECT ARCHITECT:	DESIGN MANAGER: **DLA**
PROJECT DESIGNER:	DRAWN BY: **RKR**
APPROVAL:	DATE: / FILENAME:

PROJECT TITLE:

SHEET TITLE:
FIGURE 3–1
POST DEVELOPMENT
BASIN MAP

PROJECT NO./PKG. CODE: | PHASE:

DRAWING NO.:

REVISION NO.: △

APPENDIX A

Copy of Power Plant Siting Act Approval Letter

APPENDIX B

Pre-Development ICPR Hydrologic Analysis

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
DITCH A	BASE	25yr/24hr	0.00	79.500	79.500	0.0000	0	12.00	53.480	0.00	0.000
WETLAND B	BASE	25yr/24hr	0.00	80.000	80.000	0.0000	0	11.93	22.980	0.00	0.000
WETLAND C	BASE	25yr/24hr	0.00	77.000	77.000	0.0000	0	12.00	37.037	0.00	0.000
DITCH A	BASE	MeanAnnual	0.00	79.500	79.500	0.0000	0	12.00	22.682	0.00	0.000
WETLAND B	BASE	MeanAnnual	0.00	80.000	80.000	0.0000	0	12.00	9.975	0.00	0.000
WETLAND C	BASE	MeanAnnual	0.00	77.000	77.000	0.0000	0	12.00	15.900	0.00	0.000

==========
==== Basins ====
==========

Name: BASIN A Node: DITCH A Status: Onsite
Group: BASE Type: Santa Barbara CN

Rainfall File: Flmod Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.500 Time of Conc(min): 39.60
Area(ac): 19.350 Time Shift(hrs): 0.00
Curve Number: 84.00 Time Increment(min): 5.00
DCIA(%): 0.00 Max Allowable Q(cfs): 999999.000

Name: BASIN B Node: WETLAND B Status: Onsite
Group: BASE Type: Santa Barbara CN

Rainfall File: Flmod Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.500 Time of Conc(min): 15.50
Area(ac): 5.440 Time Shift(hrs): 0.00
Curve Number: 84.00 Time Increment(min): 5.00
DCIA(%): 0.00 Max Allowable Q(cfs): 999999.000

Name: BASIN C Node: WETLAND C Status: Onsite
Group: BASE Type: Santa Barbara CN

Rainfall File: Flmod Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.500 Time of Conc(min): 25.10
Area(ac): 10.550 Time Shift(hrs): 0.00
Curve Number: 84.00 Time Increment(min): 5.00
DCIA(%): 0.00 Max Allowable Q(cfs): 999999.000

==========
==== Nodes ====
==========

Name: DITCH A Base Flow(cfs): 0.000 Init Stage(ft): 79.500
Group: BASE Warn Stage(ft): 79.500
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	79.500
24.00	79.500

Name: WETLAND B Base Flow(cfs): 0.000 Init Stage(ft): 80.000
Group: BASE Warn Stage(ft): 80.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	80.000
24.00	80.000

Name: WETLAND C Base Flow(cfs): 0.000 Init Stage(ft): 77.000
Group: BASE Warn Stage(ft): 77.000
Type: Time/Stage

Time(hrs)	Stage(ft)

```
           0.00          77.000
          24.00          77.000

================================================================================
==== Hydrology Simulations =====================================================
================================================================================

         Name: 100yr/24hr
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\100yr24hr.R32

      Override Defaults: Yes
    Storm Duration(hrs): 24.00
          Rainfall File: Flmod
    Rainfall Amount(in): 10.60

Time(hrs)       Print Inc(min)
--------------- ---------------
24.000          5.00

--------------------------------------------------------------------------------------------------------
         Name: 10yr/24hr
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\10yr24hr.R32

      Override Defaults: Yes
    Storm Duration(hrs): 24.00
          Rainfall File: Flmod
    Rainfall Amount(in): 6.80

Time(hrs)       Print Inc(min)
--------------- ---------------
24.000          5.00

--------------------------------------------------------------------------------------------------------
         Name: 25yr/24hr
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\25yr24hr.R32

      Override Defaults: Yes
    Storm Duration(hrs): 24.00
          Rainfall File: Flmod
    Rainfall Amount(in): 8.60

Time(hrs)       Print Inc(min)
--------------- ---------------
24.000          5.00

--------------------------------------------------------------------------------------------------------
         Name: MeanAnnual
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\MeanAnnual.R32

      Override Defaults: No

Time(hrs)       Print Inc(min)
--------------- ---------------
24.000          5.00

================================================================================
==== Routing Simulations =======================================================
================================================================================

         Name: 100yr/24hr          Hydrology Sim: 100yr/24hr
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\100yr24hr.I32

      Execute: No          Restart: No           Patch: No
  Alternative: No

        Max Delta Z(ft): 1.00                    Delta Z Factor: 0.00500
    Time Step Optimizer: 10.000
        Start Time(hrs): 0.000                    End Time(hrs): 24.00
     Min Calc Time(sec): 0.5000               Max Calc Time(sec): 60.0000
        Boundary Stages:                         Boundary Flows:


Time(hrs)       Print Inc(min)
--------------- ---------------
24.000          5.000
```

Group	Run
BASE	Yes

Name: 10yr/24hr Hydrology Sim: 10yr/24hr
Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\10yr24hr.I32

Execute: No Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
24.000	5.000

Group	Run
BASE	Yes

Name: 25yr/24hr Hydrology Sim: 25yr/24hr
Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\25yr24hr.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
24.000	5.000

Group	Run
BASE	Yes

Name: MeanAnnual Hydrology Sim: MeanAnnual
Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\MeanAnnual.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
24.000	5.000

Group	Run
BASE	Yes

APPENDIX C

Post-Development Design Calculations

Project Land Use Summary
OUC Stanton Energy Site
Orange County, Florida

Pre-Development

Sites	BASIN A		BASIN B		BASIN C		TOTAL PROJECT	
	sf	ac	sf	ac	sf	ac	sf	ac
Land Use								
Roadway/Sidewalks/Parking/Hardcourts	0	0.00	0	0.00	0	0.00	0	0.00
Existing Buildings (Roof Tops)	0	0.00	0	0.00	0	0.00	0	0.00
Total Impervious Area	0	0.00	0	0.00	0	0.00	0	0.00
Pervious / Open space	842,822	19.35	237,149	5.44	459,391	10.55	1,539,362	35.34
Existing water surface	0	0.00	0	0.00	0	0.00	0	0.00
Total Area	842,822	19.35	237,149	5.44	459,391	10.55	1,539,362	35.34
% Impervious =	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
	19.35		5.44		10.55		35.34	

Post-Development

Sites	BASIN A1		BASIN B1		BASIN C1		TOTAL PROJECT	
	sf	ac	sf	ac	sf	ac	sf	ac
Land Use								
Roadway/Sidewalks/Parking/Hardcourts	0	0.00	0	0.00	0	0.00	0	0.00
Buildings (Roof Tops)	0	0.00	0	0.00	0	0.00	0	0.00
Total Impervious Area	0	0.00	0	0.00	0	0.00	0	0.00
Pervious / Open space	528,490	12.13	551,481	12.66	459,391	10.55	1,539,362	35.34
Proposed water surface	0	0.00	0	0.00	0	0.00	0	0.00
Total Area	528,490	12.13	551,481	12.66	459,391	10.55	1,539,362	35.34
% Impervious =	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
	12.13		12.66		10.55		35.34	

Pre-DevelopmentComposite Curve Number
OUC Stanton Energy Site
Orange County, FL

BASIN A

Soil Name and Hydrologic Group	Cover Description (Cover type, treatment, and hydrologic conditions; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Table 2-3	CN Table 2-4	Area Acres	Product of CN x Area
Water Surface		100			0.00	0
Impervious Area	Building	98			0.00	0
Impervious Area	Asphalt, Concrete	98			0.00	0
Pervious Area:	Open spac w/fair conditions					
#20 Immokalee (D)		84			9.68	813
#44 Smyrna (D)		84			9.68	813
			Total		19.35	1625

CN (weighted) = Total Product / Total Area
= 84.00

BASIN B

Soil Name and Hydrologic Group	Cover Description (Cover type, treatment, and hydrologic conditions; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Table 2-3	CN Table 2-4	Area Acres	Product of CN x Area
Water Surface		100			0.00	0
Impervious Area	Building	98			0.00	0
Impervious Area	Asphalt, Concrete	98			0.00	0
Pervious Area:	Open spac w/fair conditions					
#20 Immokalee (D)		84			2.72	228
#44 Smyrna (D)		84			2.72	228
			Total		5.44	457

CN (weighted) = Total Product / Total Area
= 84.00

BASIN C

Soil Name and Hydrologic Group	Cover Description (Cover type, treatment, and hydrologic conditions; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Table 2-3	CN Table 2-4	Area Acres	Product of CN x Area
Water Surface		100			0.00	0
Impervious Area	Building	98			0.00	0
Impervious Area	Asphalt, Concrete	98			0.00	0
Pervious Area:	Open spac w/fair conditions					
#20 Immokalee (D)		84			5.28	444
#44 Smyrna (D)		84			5.27	443
			Total		10.55	886

CN (weighted) = Total Product / Total Area
= 84.00

Post-DevelopmentComposite Curve Number
OUC Stanton Energy Site
Orange County, FL

BASIN A1

Soil Name and Hydrologic Group	Cover Description (Cover type, treatment, and hydrologic conditions; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Table 2-3	CN Table 2-4	Area Acres	Product of CN x Area
Water Surface		100			0.00	0
Impervious Area	Building	98			0.00	0
Impervious Area	Asphalt, Concrete	98			0.00	0
Pervious Area:	Open spac w/ good conditions					
#20 Immokalee (B)		61			6.07	370
#44 Smyrna (B)		61			6.06	370
			Total		12.13	740

CN (weighted) = Total Product / Total Area
= 61.00

BASIN B1

Soil Name and Hydrologic Group	Cover Description (Cover type, treatment, and hydrologic conditions; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Table 2-3	CN Table 2-4	Area Acres	Product of CN x Area
Water Surface		100			0.00	0
Impervious Area	Building	98			0.00	0
Impervious Area	Asphalt, Concrete	98			0.00	0
Pervious Area:	Open spac w/good conditions					
#20 Immokalee (B)		61			6.33	386
#44 Smyrna (B)		61			6.33	386
			Total		12.66	772

CN (weighted) = Total Product / Total Area
= 61.00

BASIN C1

Soil Name and Hydrologic Group	Cover Description (Cover type, treatment, and hydrologic conditions; percent impervious; unconnected/connected impervious area ratio)	CN Table 2-2	CN Table 2-3	CN Table 2-4	Area Acres	Product of CN x Area
Water Surface		100			0.00	0
Impervious Area	Building	98			0.00	0
Impervious Area	Asphalt, Concrete	98			0.00	0
Pervious Area:	Open spac w/good conditions					
#20 Immokalee (B)		61			5.28	322
#44 Smyrna (B)		61			5.27	321
			Total		10.55	644

CN (weighted) = Total Product / Total Area
= 61.00

Time of Concentration Calculations
OUC Stanton Energy Site
Orange County, Florida

Pre-Development

Watershed ID	Segment I: Sheetflow					Segment II: Shallow Concentrated Flow					Segment III: Channel/Pipe Flow			
	Flow Length (ft)	Avg. Slope (ft/ft)	Flow Path Cover	Manning's n	Travel Time (min.)	Flow Length (ft)	Paved or Not?	Avg. Slope (ft/ft)	Avg. Velocity (ft/s)	Travel Time (min.)	Flow Length (ft)	Avg. Velocity (ft/s)	Travel Time (min.)	Total Tc (min.)
BASIN A	300	0.003	FALLOW	0.050	12.4	1318	N	0.003	0.8	27.2	0	3.5	0.0	39.6
BASIN B	300	0.002	FALLOW	0.050	13.5	85	N	0.002	0.7	2.0	0	3.5	0.0	15.5
BASIN C	300	0.007	FALLOW	0.050	8.2	394	N	0.007	1.3	4.9	0	3.5	0.0	13.1

Post-Development

Watershed ID	Segment I: Sheetflow					Segment II: Shallow Concentrated Flow					Segment III: Channel/Pipe Flow			
	Flow Length (ft)	Avg. Slope (ft/ft)	Flow Path Cover	Manning's n	Travel Time (min.)	Flow Length (ft)	Paved or Not?	Avg. Slope (ft/ft)	Avg. Velocity (ft/s)	Travel Time (min.)	Flow Length (ft)	Avg. Velocity (ft/s)	Travel Time (min.)	Total Tc (min.)
BASIN A1	202	0.00495	GRASS	0.150	16.5	0	P	0.01	2.0	0.0	0	3.5	0.0	16.5
BASIN B1	185	0.005	GRASS	0.150	14.9	0	P	0.01	2.0	0.0	0	3.5	0.0	14.9
BASIN C1	300	0.006	GRASS	0.150	21.0	394	N	0.01	1.6	4.1	0	3.5	0.0	25.1

Notes:

1. Tc is calculated with the TR-55 method.
2. If calculated Tc is less than 10 minutes, a minimum of 10 minutes is used.

Treatment Volume Calculations
OUC Stanton Energy Site
Orange County, Florida

SJRWMD Requirements :		**BASIN A1**
Wet Retention Pond		
Greater of:	0.50" runoff from entire basin =	0.81 ac-ft
or	1.25" runoff from Impv. Area =	0.00 ac-ft
Plus	0.50" runoff from entire basin =	0.81 ac-ft
Standard Treatment Volume Required:		1.61 ac-ft
OFW Treatment Volume Required:		0.81 ac-ft
Total Treatment Volume Required:		**2.42 ac-ft**

SJRWMD Requirements :		**BASIN B1**
Wet Retention Pond		
Greater of:	0.50" runoff from entire basin =	0.53 ac-ft
or	1.25" runoff from Impv. Area =	0.00 ac-ft
Plus	0.50" runoff from entire basin =	0.53 ac-ft
Standard Treatment Volume Required:		1.06 ac-ft
OFW Treatment Volume Required:		0.53 ac-ft
Total Treatment Volume Required:		**1.58 ac-ft**

SJRWMD Requirements :		**BASIN C1**
Wet Retention Pond		
Greater of:	0.50" runoff from entire basin =	0.44 ac-ft
or	1.25" runoff from Impv. Area =	0.00 ac-ft
Plus	0.50" runoff from entire basin =	0.44 ac-ft
Standard Treatment Volume Required:		0.88 ac-ft
OFW Treatment Volume Required:		0.44 ac-ft
Total Treatment Volume Required:		**1.32 ac-ft**

Stage-Storage Relationship
OUC Stanton Energy Site
Orange County, Florida

Impoundment Berm A

Stage	Area		Distance Between	Volume Between	Accum. Volume		Remarks	Side Slopes
	(sf)	ac	(ft)	(cf)	(cf)	(ac-ft)		
81.00	171,537	3.938			167,564	3.85		
			0.60	101,491				
80.40	166,765	3.828			66,074	1.52	T.V.	
			0.40	66,074				
80.00	163,603	3.756			0	0.00		
			0.00	0				

Treatment Volume Required = 1.52 ac-ft
Treatment Volume Provided = 1.52 ac-ft at Ele. 80.40

Impoundment Berm B

Stage	Area		Distance Between	Volume Between	Accum. Volume		Remarks	Side Slopes
	(sf)	ac	(ft)	(cf)	(cf)	(ac-ft)		
81.00	268,914	6.173			262,839	6.03		
			0.70	185,261				
80.30	260,403	5.978			77,577	1.78	T.V.	
			0.30	77,577				
80.00	256,780	5.895			0	0.00		
			0.00	0				

Treatment Volume Required = 1.58 ac-ft
Treatment Volume Provided = 1.78 ac-ft at Ele. 80.30

Impoundment Berm C

Stage	Area		Distance Between	Volume Between	Accum. Volume		Remarks	Side Slopes
	(sf)	ac	(ft)	(cf)	(cf)	(ac-ft)		
79.00	167,028	3.834			261,208	6.00		
			1.00	143,750				
78.00	120,471	2.766			117,459	2.70		
			0.50	59,481				
77.50	117,452	2.696			57,978	1.33	T.V.	
			0.50	57,978				
77.00	114,459	2.628			0	0.00		
			0.00	0				

Treatment Volume Required = 1.32 ac-ft
Treatment Volume Provided = 1.33 ac-ft at Ele. 77.50

APPENDIX D

Post-Development ICPR Hydrologic Analysis

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
BERM A	BASE	25yr/24hr	14.27	80.608	81.000	0.0050	168433	12.00	29.884	14.27	3.090
BERM B	BASE	25yr/24hr	16.16	80.458	81.000	0.0035	262338	12.00	32.387	16.16	2.053
BERM C	BASE	25yr/24hr	14.06	77.716	79.000	0.0047	119621	12.00	21.462	14.06	3.266
DITCH A	BASE	25yr/24hr	0.00	79.500	79.500	0.0000	0	14.27	3.090	0.00	0.000
WETLAND B	BASE	25yr/24hr	0.00	80.000	80.000	0.0000	0	16.16	2.053	0.00	0.000
WETLAND C	BASE	25yr/24hr	0.00	77.000	77.000	0.0000	0	14.06	3.266	0.00	0.000
BERM A	BASE	MeanAnnual	24.00	80.287	81.000	0.0026	165885	12.00	7.087	0.00	0.000
BERM B	BASE	MeanAnnual	24.00	80.191	81.000	0.0018	259103	12.00	7.764	0.00	0.000
BERM C	BASE	MeanAnnual	24.00	77.347	79.000	0.0026	118496	12.17	5.037	0.00	0.000
DITCH A	BASE	MeanAnnual	0.00	79.500	79.500	0.0000	0	0.00	0.000	0.00	0.000
WETLAND B	BASE	MeanAnnual	0.00	80.000	80.000	0.0000	0	0.00	0.000	0.00	0.000
WETLAND C	BASE	MeanAnnual	0.00	77.000	77.000	0.0000	0	0.00	0.000	0.00	0.000

==========
==== Basins ====
==========

Name: A1 Node: BERM A Status: Onsite
Group: BASE Type: Santa Barbara CN

Rainfall File: Flmod Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.500 Time of Conc(min): 16.50
Area(ac): 12.130 Time Shift(hrs): 0.00
Curve Number: 61.00 Time Increment(min): 5.00
DCIA(%): 0.00 Max Allowable Q(cfs): 999999.000

Name: B1 Node: BERM B Status: Onsite
Group: BASE Type: Santa Barbara CN

Rainfall File: Flmod Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.500 Time of Conc(min): 14.90
Area(ac): 12.660 Time Shift(hrs): 0.00
Curve Number: 61.00 Time Increment(min): 5.00
DCIA(%): 0.00 Max Allowable Q(cfs): 999999.000

Name: C-1 Node: BERM C Status: Onsite
Group: BASE Type: Santa Barbara CN

Rainfall File: Flmod Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.500 Time of Conc(min): 25.10
Area(ac): 10.550 Time Shift(hrs): 0.00
Curve Number: 61.00 Time Increment(min): 5.00
DCIA(%): 0.00 Max Allowable Q(cfs): 999999.000

==========
==== Nodes ====
==========

Name: BERM A Base Flow(cfs): 0.000 Init Stage(ft): 80.000
Group: BASE Warn Stage(ft): 81.000
Type: Stage/Area

Stage(ft)	Area(ac)
80.000	3.7560
81.000	3.9380

Name: BERM B Base Flow(cfs): 0.000 Init Stage(ft): 80.000
Group: BASE Warn Stage(ft): 81.000
Type: Stage/Area

Stage(ft)	Area(ac)
80.000	5.8950
81.000	6.1730

Name: BERM C Base Flow(cfs): 0.000 Init Stage(ft): 77.000
Group: BASE Warn Stage(ft): 79.000
Type: Stage/Area

Stage(ft)	Area(ac)

```
         77.000          2.6960
         78.000          2.7660
         79.000          3.8340

-------------------------------------------------------------------------------------------
      Name: DITCH A             Base Flow(cfs): 0.000          Init Stage(ft): 79.500
     Group: BASE                                              Warn Stage(ft): 79.500
      Type: Time/Stage


      Time(hrs)       Stage(ft)
--------------- ---------------
           0.00          79.500
          24.00          79.500

-------------------------------------------------------------------------------------------
      Name: WETLAND B           Base Flow(cfs): 0.000          Init Stage(ft): 80.000
     Group: BASE                                              Warn Stage(ft): 80.000
      Type: Time/Stage


      Time(hrs)       Stage(ft)
--------------- ---------------
           0.00          80.000
          24.00          80.000

-------------------------------------------------------------------------------------------
      Name: WETLAND C           Base Flow(cfs): 0.000          Init Stage(ft): 77.000
     Group: BASE                                              Warn Stage(ft): 77.000
      Type: Time/Stage


      Time(hrs)       Stage(ft)
--------------- ---------------
           0.00          77.000
          24.00          77.000

===========================================================================================
==== Drop Structures ======================================================================
===========================================================================================

         Name: OUT A               From Node: BERM A             Length(ft): 180.00
        Group: BASE                  To Node: DITCH A                Count: 1

               UPSTREAM       DOWNSTREAM                 Friction Equation: Automatic
     Geometry: Circular       Circular                  Solution Algorithm: Most Restrictive
     Span(in): 18.00          18.00                                Flow: Both
     Rise(in): 18.00          18.00                    Entrance Loss Coef: 0.500
   Invert(ft): 77.900         77.540                       Exit Loss Coef: 0.500
  Manning's N: 0.013000       0.013000                   Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                       Inlet Ctrl Spec: Use dc
 Bot Clip(in): 0.000          0.000                         Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall


*** Weir 1 of 1 for Drop Structure OUT A ***
                                                                                  TABLE
                  Count: 1                       Bottom Clip(in): 0.000
                   Type: Horizontal                 Top Clip(in): 0.000
                   Flow: Both                     Weir Disc Coef: 3.200
               Geometry: Rectangular          Orifice Disc Coef: 0.600

               Span(in): 24.00                      Invert(ft): 80.400
               Rise(in): 37.00                 Control Elev(ft): 80.400


-------------------------------------------------------------------------------------------
```

```
         Name: OUT B               From Node: BERM B            Length(ft): 180.00
        Group: BASE                  To Node: WETLAND B             Count: 1

               UPSTREAM       DOWNSTREAM                 Friction Equation: Automatic
     Geometry: Circular       Circular                 Solution Algorithm: Most Restrictive
     Span(in): 18.00          18.00                                 Flow: Both
     Rise(in): 18.00          18.00                  Entrance Loss Coef: 0.500
   Invert(ft): 77.800         77.230                     Exit Loss Coef: 0.500
  Manning's N: 0.013000       0.013000                 Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                     Inlet Ctrl Spec: Use dc
 Bot Clip(in): 0.000          0.000                       Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall



*** Weir 1 of 1 for Drop Structure OUT B ***
                                                                                TABLE
                  Count: 1                      Bottom Clip(in): 0.000
                   Type: Horizontal                Top Clip(in): 0.000
                   Flow: Both                   Weir Disc Coef: 3.200
               Geometry: Rectangular          Orifice Disc Coef: 0.600

               Span(in): 24.00                      Invert(ft): 80.300
               Rise(in): 37.00               Control Elev(ft): 80.300


-------------------------------------------------------------------------------------------------
         Name: OUT C               From Node: BERM C            Length(ft): 130.00
        Group: BASE                  To Node: WETLAND C             Count: 1

               UPSTREAM       DOWNSTREAM                 Friction Equation: Automatic
     Geometry: Circular       Circular                 Solution Algorithm: Most Restrictive
     Span(in): 18.00          18.00                                 Flow: Both
     Rise(in): 18.00          18.00                  Entrance Loss Coef: 0.500
   Invert(ft): 75.000         74.740                     Exit Loss Coef: 0.500
  Manning's N: 0.013000       0.013000                 Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                     Inlet Ctrl Spec: Use dc
 Bot Clip(in): 0.000          0.000                       Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall



*** Weir 1 of 1 for Drop Structure OUT C ***
                                                                                TABLE
                  Count: 1                      Bottom Clip(in): 0.000
                   Type: Horizontal                Top Clip(in): 0.000
                   Flow: Both                   Weir Disc Coef: 3.200
               Geometry: Rectangular          Orifice Disc Coef: 0.600

               Span(in): 24.00                      Invert(ft): 77.500
               Rise(in): 37.00               Control Elev(ft): 77.500


===============================================================================================
==== Hydrology Simulations ====================================================================
===============================================================================================

         Name: 100yr/24hr
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\100yr24hr.R32

      Override Defaults: Yes
    Storm Duration(hrs): 24.00
          Rainfall File: Flmod
    Rainfall Amount(in): 10.60

Time(hrs)       Print Inc(min)
```

```
-------------- ---------------
24.000         5.00

-------------------------------------------------------------------------------------------------
         Name: 10yr/24hr
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\10yr24hr.R32

      Override Defaults: Yes
    Storm Duration(hrs): 24.00
          Rainfall File: Flmod
    Rainfall Amount(in): 6.80

Time(hrs)      Print Inc(min)
-------------- ---------------
24.000         5.00

-------------------------------------------------------------------------------------------------
         Name: 25yr/24hr
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\25yr24hr.R32

      Override Defaults: Yes
    Storm Duration(hrs): 24.00
          Rainfall File: Flmod
    Rainfall Amount(in): 8.60

Time(hrs)      Print Inc(min)
-------------- ---------------
24.000         5.00

-------------------------------------------------------------------------------------------------
         Name: MeanAnnual
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\MeanAnnual.R32

      Override Defaults: No

Time(hrs)      Print Inc(min)
-------------- ---------------
24.000         5.00

=================================================================================================
==== Routing Simulations ========================================================================
=================================================================================================

         Name: 100yr/24hr          Hydrology Sim: 100yr/24hr
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\100yr24hr.I32

      Execute: No          Restart: No            Patch: No
  Alternative: No

        Max Delta Z(ft): 1.00                    Delta Z Factor: 0.00500
    Time Step Optimizer: 10.000
        Start Time(hrs): 0.000                    End Time(hrs): 24.00
     Min Calc Time(sec): 0.5000               Max Calc Time(sec): 60.0000
        Boundary Stages:                         Boundary Flows:



Time(hrs)      Print Inc(min)
-------------- ---------------
24.000         5.000

Group          Run
-------------- -----
BASE           Yes


-------------------------------------------------------------------------------------------------
         Name: 10yr/24hr           Hydrology Sim: 10yr/24hr
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\10yr24hr.I32

      Execute: No          Restart: No            Patch: No
  Alternative: No

        Max Delta Z(ft): 1.00                    Delta Z Factor: 0.00500
    Time Step Optimizer: 10.000
        Start Time(hrs): 0.000                    End Time(hrs): 24.00
```

```
     Min Calc Time(sec): 0.5000              Max Calc Time(sec): 60.0000
        Boundary Stages:                         Boundary Flows:


Time(hrs)       Print Inc(min)
--------------- ---------------
24.000          5.000

Group           Run
--------------- -----
BASE            Yes


-------------------------------------------------------------------------------------------------
         Name: 25yr/24hr           Hydrology Sim: 25yr/24hr
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\25yr24hr.I32

      Execute: Yes         Restart: No            Patch: No
  Alternative: No

        Max Delta Z(ft): 1.00                    Delta Z Factor: 0.00500
    Time Step Optimizer: 10.000
        Start Time(hrs): 0.000                    End Time(hrs): 24.00
     Min Calc Time(sec): 0.5000              Max Calc Time(sec): 60.0000
        Boundary Stages:                         Boundary Flows:


Time(hrs)       Print Inc(min)
--------------- ---------------
24.000          5.000

Group           Run
--------------- -----
BASE            Yes


-------------------------------------------------------------------------------------------------
         Name: MeanAnnual          Hydrology Sim: MeanAnnual
     Filename: P:\10REG.STAN\CALCULATIONS\adICPR\POST\MeanAnnual.I32

      Execute: Yes         Restart: No            Patch: No
  Alternative: No

        Max Delta Z(ft): 1.00                    Delta Z Factor: 0.00500
    Time Step Optimizer: 10.000
        Start Time(hrs): 0.000                    End Time(hrs): 24.00
     Min Calc Time(sec): 0.5000              Max Calc Time(sec): 60.0000
        Boundary Stages:                         Boundary Flows:


Time(hrs)       Print Inc(min)
--------------- ---------------
24.000          5.000

Group           Run
--------------- -----
BASE            Yes
```

APPENDIX E

TMDL Nutrient Analysis

OUC Stanton Energy Site
Site-Specific Pre-Development Pollutant Loading Analysis

Existing Condition	Land Use	Soil Type	Total P Loading (kg/ac-yr)		Basin Acreage (acres)		Inflow Mass Loading (kg/yr)		Treatment System	Inches of Retention Over Basin Area (in)	Pollutant Removal Efficiency (%)	Outflow Mass Loading (kg/yr)
Basin A	OPEN	HSG D	0.051	X	19.35	=	0.99			*N/A*	0	0.99
Basin B	OPEN	HSG D	0.051	X	5.44	=	0.28			*N/A*	0	0.28
Basin C	OPEN	HSG D	0.051	X	10.55	=	0.54			*N/A*	0	0.54
												1.80

Site-Specific Post-Development Pollutant Loading Analysis

Proposed Condition	Land Use	Soil Type	Total P Loading (kg/ac-yr)		Basin Acreage (acres)		Inflow Mass Loading (kg/yr)		Treatment System	Inches of Retention Over Basin Area (in)	Pollutant Removal Efficiency (%)	Outflow Mass Loading (kg/yr)
Basin A1	OPEN	HSG B	0.017	X	12.13	=	0.21		Dry Retention	*1.50*	96	0.01
Basin B1	OPEN	HSG B	0.017	X	12.66	=	0.22		Dry Retention	*1.68*	96	0.01
Basin C1	OPEN	HSG B	0.017	X	10.55	=	0.18		Dry Retention	*1.50*	96	0.01
												0.02

APPENDIX F

72-Hour Treatment Volume Recovery Calculations by Nodarse and Associates, Inc.

APPENDIX G

Environmental Assessment Report
by Lotspeich and Associates, Inc.

Lotspeich and Associates, Inc.
ECOLOGICAL CONSULTANTS

Ecological Assessment Report

OUC SOLAR ENERGY ARRAY PROJECT
STANTON ENERGY CENTER

in Section 14, Township 23 South, Range 31 East
Orange County, Florida

Prepared for:

WBQ Design and Engineering, Inc.
201 North Magnolia Avenue, Suite 200
Orlando, Florida 32801

21 December 2010
L&A No. 2010-013.41
Doc: \2010-013-EAR-21L10.wpd

2711 West Fairbanks Avenue, Winter Park, Florida 32789-3314 (407) 740-8482 FAX (407) 645-1305
www.lotspeichandassociates.com

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OUC SOLAR ENERGY ARRAY PROJECT
STANTON ENERGY CENTER

in Section 14, Township 23 South, Range 31 East,
Orange County, Florida
Doc. No.\2010-013-EAR-21L10.wpd
21 December 2010

INTRODUCTION

Lotspeich and Associates, Inc. (L&A), as the ecological consultant to WBQ Design and Engineering, Inc. (WBQ), conducted an ecological assessment of the OUC Solar Energy Array Project - Stanton Energy Center project area (Figure 1). The purpose of our assessment was to document the presence of ecological conditions occurring on-site that may pose constraints to the proposed development of a solar energy collection facility within the project area. The scope of this investigation was limited to biological elements such as plant community characterization, wetland delineation, and federal or state listed plant and animal species.

This report serves to document the findings from our investigation and is provided to accompany the "Joint Application" for a Florida Department of Environmental Protection (FDEP) Environmental Resource Permit (ERP) and a U.S. Army Corps of Engineers (Corps) Federal Dredge and Fill permit. Specifically, the contents of this report address the ecological issues identified within Section E of the FDEP's ERP application package. This report also serves to address permitting issues imposed by the Corps under the Section 404 b(1) Guidelines of the Clean Water Act of 1977 (as amended).

METHODOLOGY

The project area was investigated through review of published information (Appendix A). Further, L&A staff conducted a review of the state's database of species occurrence records and the bald eagle nest location database (Appendix B). Finally, field reviews were conducted by ecologists familiar with the natural communities of Florida to delineate jurisdictional wetlands and confirm or amend the information collected from database searches and the review of published information. The field reviews to identify site conditions were conducted on 19 August 2010 and 4 October 2010. The wetlands and surface waters associated with the project area were delineated in accordance with the 2008 Interim Supplement to the Corps of Engineers Wetlands Delineation Manual (1987) and the Unified Wetland Delineation Methodology for the State of Florida dated 1 July 1994. The project area was also reviewed for the presence of any resident listed plant and/or animal species through actual observation, signs of scat, prints, or other indications of their presence or utilization. These conclusions are based on limited field observations and existing data records and do not exclude the possibility that other listed species may occasionally forage on-site or may move into the area at a later date. General observations and vegetative community types were recorded via field data sheets and photographs. These findings reflect conditions on-site at the time of the investigation and do not preclude the possibility that on-site conditions may change in the future.

AGENCY JURISDICTION

Federal, state, and local regulatory agencies have potential jurisdiction over any dredging, filling, or otherwise altering wetlands or portions thereof as part of the proposed roadway improvements. These agencies include the Corps, the FDEP, and Orange County. FDEP staff reviewed and confirmed the wetland delineation on 6 September 2010 and again on 9 December 2010. Due to workloads and staff availability, the Corps was not able to conduct a pre-application review of the project area prior to the submittal of this document.

EXISTING SITE CONDITIONS

Location

The OUC Solar Energy Array Project - Stanton Energy Center project area is located in Section 14, Township 23 South, Range 31 East, in the northwest portion of the Stanton Energy Center in southern Orange County, Florida (Figure 1). The approximate center of the project area is at Latitude 28° 33' 0.2" North and Longitude 81° 17' 24.8" West. The project area will be cleared and graded, and solar energy collecting facility will be constructed. The facility will also include access roads, small storage and mechanical buildings, and a surface water management facility. The project area is located east of Innovation Way and north of Pope Street, and is generally bordered by roadways, Orange County's municipal landfill, and preserved lands associated with the Stanton Energy Center.

Topography and Drainage

The project area is characterized by relatively level terrain, with ground surface elevations averaging approximately 80 to 81 feet National Geodetic Vertical Datum (NGVD)throughout the project area (Figure 2). The majority of the direct rainfall percolates into the ground, while some surface flow is directed through the project area via artificial conveyances (i.e., swales and ditches), eventually reaching the large channelized flowway that runs west to east through the project area. The project area is located within the St. Johns River Water Management District's Econlockhatchee River Nested Drainage Basin.

Soils

Soil mapping often provides an indication of the historic and/or current conditions of a site, the potential for presence of sensitive plant communities (e.g., wetlands, scrub, etc.), and/or the potential for presence of listed plants and animal species that are typically limited to specific plant communities. The majority of the project area is mapped as being underlain by Immokalee, Pomello, and Smyrna fine sands. The Pomello soils are moderately well drained and are typical of areas near the highest elevations along sand ridges, while the Immokalee and Smyrna soils are characteristic of broad level areas in flatwoods. A small inclusion of Basinger fine sand, depressional is located in the southwest portion of the project area. This soil is typically associated with wetlands and lower areas in the landscape. The current status of these soils may be quite different from the NRCS description due to the effects of adjacent development, approved agricultural practices, and drainage activities.

Table 1. Classification of On-Site Soils

Soil Map Unit	Drainage Class[1]	Hydric Character or Significant Hydric Inclusions[2]
Basinger fine sand, depressional (3)	Very Poorly Drained	Yes
Immokalee fine sand (20)	Poorly Drained	Yes
Pomello fine sand, 0 to 5 percent slopes (34)	Moderately Well Drained	No
Smyrna fine sand (44)	Poorly Drained	Yes

Notes
1. Soil Survey of Orange County, Florida, NRCS (1989)
2. Hydric Soils of Florida Handbook (1990), Florida Association of Environmental Soil Scientists

Vegetative Communities

The OUC Solar Energy Array Project - Stanton Energy Facility project area historically consisted of upland (pine flatwood) land uses. The on-site vegetative communities within the project area were altered during the original development of the Stanton Energy Center in the early 1980s. The land was cleared and soils borrowed for use in raising the land where the energy production facility is situated seven (7) feet. The current on-site vegetative communities were defined through interpretation of aerial photography (Figure 4) with groundtruthing and delineation of the wetland and surface water limits. The communities were then classified using the Florida Land Use, Cover and Forms Classification System (FLUCCS), 1999 (Figure 4). The communities discussed herein pertain only to the areas reviewed during qualitative review for listed species or wetland delineation, and occur within or immediately adjacent to the area of the proposed solar energy facility. This list reflects the representative species and is not necessarily a complete floristic inventory. Field sheets and complete plant lists are retained in the files of L&A and are available for review on written request.

Uplands

The majority of the uplands within and bordering the project area were historically pine flatwoods (FLUCCS 411) dominated by longleaf pine (*Pinus palustris*) and slash pine (*Pinus elliottii*). As previously noted, the project area was cleared and scraped to provide fill material for the development of the energy production facility. The current successional community that covers the southern portion of the project area would be characterized as Dry Prairie (FLUCCS 311). There are widely scattered longleaf pine and slash pine and an occasional saw palmetto (*Serenoa repens*) or scrub St. Johnswort (*Hypericum reductum*), but the majority of the vegetative cover consists of grasses and forbs including silverleaf aster (*Pityopsis graminifolia*), bluestem (*Andropogon virginicus*), blackroot (*Pterocaulon pycnostachyum*), rustweed (*Polypremum procumbens*), false pennyroyal (*Piloblephis rigida*), and lovegrass (*Eragrostis spectabilis*).

The northern portion of the project area has been utilized for the storage of fill dirt, and is characterized as (FLUCCS 740).

Wetlands and Surface Waters

One surface water and one wetland occur within the proposed project area. The surface water consists of an interconnected ditch system including a roadside ditch along Innovation Way, a roadside ditch along Pope Street, a roadside ditch along an unnamed north south access road, and the "east-west ditch" that connects to the ditch along Innovation Way and the ditch along the north-south access road. Dominant vegetation along the banks of the ditch includes pond pine (*Pinus serotina*), red maple (*Acer rubrum*), wax myrtle (*Myrica cerifera*), saltbush (*Baccharis halimifolia*), loblolly bay (*Gordonia lasianthus*), Chinese tallow (*Sapium sebiferum*), and Carolina willow (*Salix caroliniana*). Vegetation within the ditch includes cattail (*Typha* sp.), Virginia chain fern (*Woodwardia virginica*), cinnamon fern (*Osmunda cinnamomea*), marsh fern (*Thelypteris palustris*), maidencane (*Panicum hemitomon*), Peruvian primrose willow (*Ludwigia peruviana*), water pepper (*Polygonum punctatum*), and fragrant water lily (*Nymphaea odorata*).

The wetland within the project area is characterized as a Wet Prairie (FLUCCS 643). Dominant vegetation within this community consists of flattop goldenrod (*Euthamia minor*), yellow-eyed grass (*Xyris elliottii*), beakrush (*Rhynchospora fascicularis*), maidencane, bogbuttons (*Lachnocaulon anceps*), orange bachelor button (*Polygala lutea*), sundew (*Drosera brevifolia*), tapertip rush (*Juncus acuminatus*) and bog rush (*J. elliottii*).

THREATENED/ENDANGERED PLANT AND ANIMAL SPECIES

The U.S. Fish and Wildlife Service (Service) and the Florida Fish and Wildlife Conservation Commission (FWC) list wildlife species that are considered "endangered" or "threatened." The FWC uses an additional category - "species of special concern" (SSC) - for several animals that may ultimately be listed as endangered or threatened. This classification provides the SSC-listed animal with a level of protection that varies from species to species. The Service and the Florida Department of Agriculture and Consumer Services (FDACS) also compile lists of protected plant species. The Service classifies protected plants as either endangered or threatened, while the FDACS's plant list is categorized into endangered, threatened, and "commercially exploited" species.

Prior to the field inspection, various web sites were accessed in order to collect information concerning the possible presence of state and/or federally listed threatened or endangered species within the project area. These web sites included:

- The Service's web site was reviewed for federally listed species found within Orange County, Florida;
- The FWC's web site for protected species was accessed to identify state listed species know to occur within Orange County;
- The FWC's web site was reviewed for bald eagle (*Haliaeetus leucocephalus*) nest locations; and,
- The Florida Natural Areas Inventory (FNAI) database and Biodiversity Matrix was reviewed for known occurrences of listed species or critical habitat.

In addition, GIS data layers obtained from the FWC and the FNAI that provide species occurrence records were used in our determination of whether protected species may occur within the vicinity of the project area. Our field inspections consisted of a series of meandering pedestrian transects across the project area to evaluate existing land use and ascertain the likelihood that it supports protected species through the observation of individuals, tracks, burrows, scat, or other indications of listed plants and/or animals.

Based on in-house data searches, numerous protected animal and plants are known to occur in Orange County. From review of the habitat requirements of these plants and animals and the subsequent field inspections, it was determined that there is concern for the potential presence of the bald eagle (*Haliaeetus leucocephalus*), little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), limpkin (*Aramus guarauna*), white ibis (*Eudocimus albus*), tricolored heron (*Egretta tricolor*), and a variety of listed plants that are known to occur in the habitat types that occur on-site. No listed species were observed within the project area during the field reviews. These findings do not preclude the fact that these or other protected animals may move into the area or forage in the area at a later date, or that protected plants may be discovered on-site when blooming structures are apparent. Habitat descriptions and the probability of occurrence for these species are provided below.

L&A conducted a bald eagle nest search following the procedures of the FWC's *Eagle Nest Locator Database* (2010). The bald eagle has been recently removed from the FWC's list of threatened & endangered species and is no longer listed under the federal Endangered Species Act. However, it should be noted that protection of the bald eagle will continue under the federal Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and by the revised management plans issued by the FWC and the Service. The FWC database search revealed that the project does not occur within the 660-foot protection zone of any eagle nests. No coordination with the FWC is necessary unless eagles construct a new nest within the vicinity of the project area in the future.

Several species of wading birds listed as state SSC, including the little blue heron, snowy egret, limpkin, white ibis, and tricolored heron, have the potential to utilize the ditches within the project area and adjacent to Innovation Way. None of these species were observed during the field review. Further, based on the latest FWC's *Wading Bird Nest Locator Database* (2003), the closest wading bird colony (designated Colony 612038) is located approximately 4.8 miles to the southeast of the project area. The proposed site improvements should not result in any loss of the suitable habitat within the project area, nor should there be any deleterious effects on these species. Based on this information, no coordination with the FWC will likely be required for these species.

No state or federal endangered or threatened plants were observed within the project area during the field reviews. It should be noted that the incidental destruction of state-listed rare or commercially exploited plants, as may be caused by clearing associated with construction or agriculture, are neither regulated nor prohibited by the FDACS. Thus, no further coordination with the FDACS nor the Service is required as it relates to listed plants. These conclusions are based on field observations and existing data records.

PROPOSED ALTERATIONS TO WATERS OF FLORIDA

The proposed construction of the solar energy collection facility proposes the impact to approximately 0.21 acre of surface waters and wetlands. The impacts are necessary for the construction of an emergency vehicle access road and turnaround as required for the project by Orange County Fire and Rescue.

ALTERNATIVES ANALYSIS, AVOIDANCE, AND MINIMIZATION

The placement of the proposed solar energy collection facility is dictated by the existing infrastructure for power transfer and availability of suitable land within the Stanton Energy Center. Therefore, there was not a lot of flexibility in the choices of sites and layouts. No direct impacts to wetlands or surface waters are proposed due to the solar facility itself. The small amount of impacts that are proposed are to meet the requirements of Orange county Fire and Rescue. Original designs called for the construction of the solar facility utilizing the full width of the property, which would have resulted in shading impacts to the wetlands. The plan was subsequently modified/refined to utilize only the available uplands on the site, and providing maximal buffering wherever practicable. This reduced potential impacts to wetlands by approximately 2.2 acres.

SECONDARY AND CUMULATIVE IMPACTS ASSESSMENT

The criteria detailed in Sections 12.2.7 and 12.2.8 of the SJRWMD Applicant's Handbook were reviewed to evaluate the potential secondary and cumulative impacts that might occur as a result of the proposed project. A relatively small amount of secondary impacts are anticipated to occur to the wetlands on the project site, primarily resulting from the construction of a containment berm on the south side of the east west ditch (areas designated as B1 (0.46± acre) and B2 (0.14± acre) on WBQ's Wetland Impact Plan). It should be noted that these areas do not currently provide any significant buffering of the wetlands and surface waters they border, as B1 contains a compacted roadway that currently traverses the project site, and B2 contains the north south access road that borders the project site. An additional area of secondary impact (designated B3 - 0.06± acre) is anticipated to occur at the northeast corner of the project where grading within the buffer will occur adjacent to the proposed surface water management area. This area does not currently provide significant buffer value as it is cleared and graded. Secondary impacts to habitat for aquatic or wetland-dependent species listed in Table 12.2.7-1 of the Applicant's Handbook are considered negligible because none of these species are expected to utilize the site for nesting. Secondary impacts to the water quality of adjacent surface waters are not anticipated to be a concern, and will be ameliorated by the surface water management system proposed as part of this project.

Cumulative impacts are not anticipated to be a concern for this project. The applicant proposes to offset the proposed impacts to wetlands and surface waters through the preservation of additional upland buffer area (beyond the required 25 foot width) on-site, the preservation of upland buffer adjacent to a cypress dome just west of Innovation Way and, if necessary, the purchase of credits from the TM-Econ Mitigation Bank (which is located within the same drainage basin as the proposed impacts). Therefore, no unacceptable cumulative impacts are anticipated as a result of this project.

MITIGATION

The applicant proposes to offset the proposed impacts to wetlands and surface waters through the preservation of additional upland buffer area (beyond the required 25 foot width) on-site, the preservation of upland buffer adjacent to a cypress dome just west of Innovation Way and, if necessary, the purchase of credits from the TM-Econ Mitigation Bank. A UMAM analysis will be prepared in concert with Department staff in order to determine the area of preservation necessary, and determine if a credit purchase is warranted.

TURBIDITY AND EROSION CONTROL

Standard turbidity and erosion control measures will be addressed in detail by the project engineer. All other standard conservation techniques and Best Management Practices will be employed as well.

APPENDIX A

Information Sources

2711 West Fairbanks Avenue, Winter Park, Florida 32789-3314 (407) 740-8482 FAX (407) 645-1305
www.lotspeichandassociates.com

APPENDIX A

Information sources utilized for the OUC Solar Energy Array Project - Stanton Energy Facility Project Included:

- Florida Administrative Code, Chapter 40C. Regulations of the St. Johns River Water Management District.
- Florida Association of Professional Soil Classifiers, Hydric Soils of Florida Handbook, 1 ed. 1990.
- Florida Department of Agriculture and Consumer Services, Division of Plant Industry. 2003. "Notes of Florida's Endangered and Threatened Plants."
- Florida Department of Revenue, Black and White Aerial Photography for Orange County, January, 2004.
- Florida Department of Transportation, Florida Land Use, Cover and Forms Classification System, January, 1999.
- Florida Fish and Wildlife Conservation Commission. 2003. Florida's Waterbird Colony Locator.
- Florida Fish and Wildlife Conservation Commission. Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida, June 2010.
- Florida Fish and Wildlife Conservation Commission, Wildlife Technology Services, January 2009. Eagle Nest Locator.
- Natural Resources Conservation Service. Soil Survey for Orange County, Florida dated 1989.
- United States Army Corps of Engineers, Section 404 of the Clean Water Act (33 U.S.C. 1344) and 33 CFR Parts 320 through 330.
- United States Geological Survey Topographic Survey Map: Narcoossee NW, FL; photorevised 1980.

APPENDIX B

Coordination with the U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission, Bald Eagle Nest

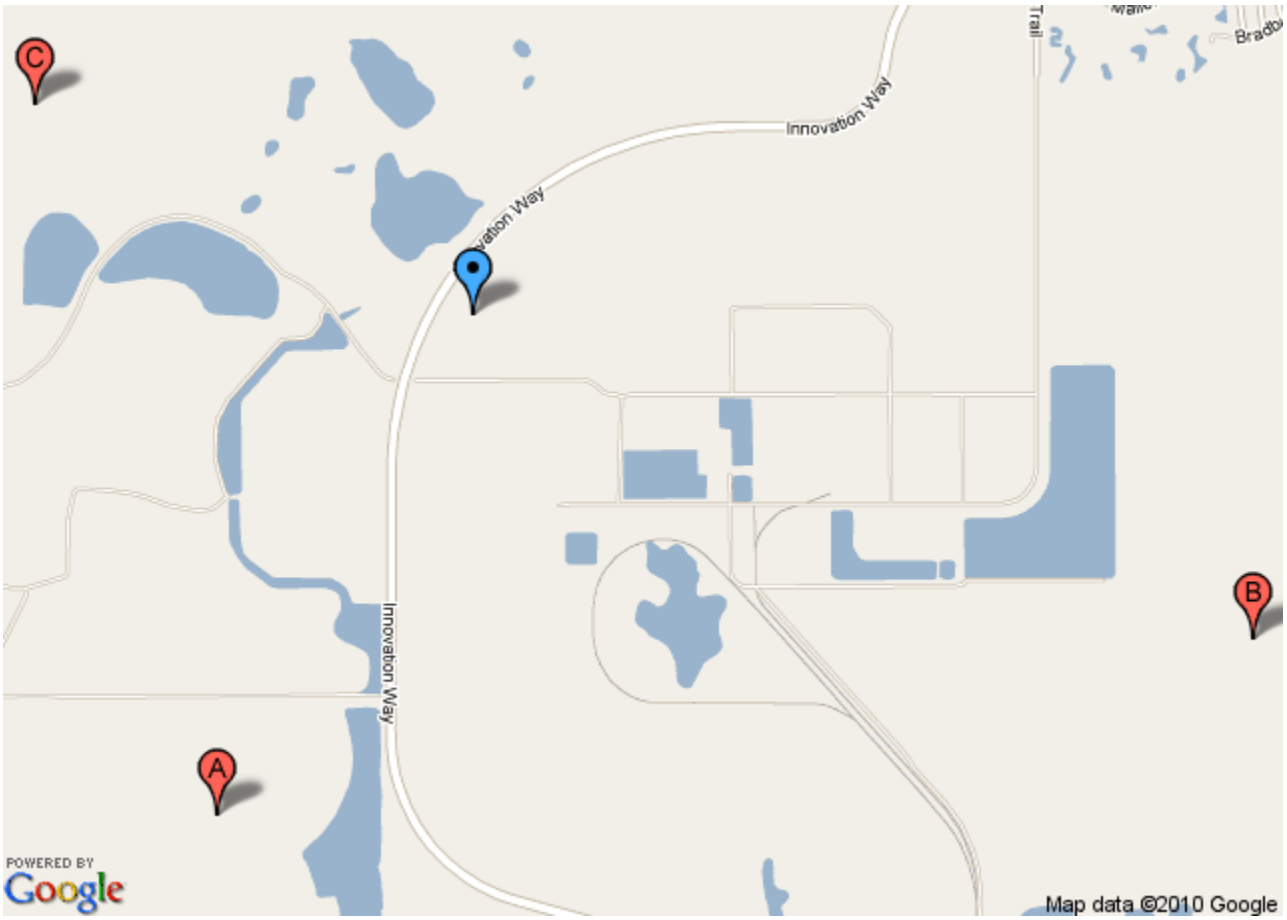
2711 West Fairbanks Avenue, Winter Park, Florida 32789-3314 (407) 740-8482 FAX (407) 645-1305
www.lotspeichandassociates.com

This report was generated using the bald eagle nest locator at www.MyFWC.com/eagle/mapping on 11/2/2010 4:56:15 PM.

Search Entered: Within 5 miles of latitude 28.4885611111111 and longitude 81.1825416666667; All Search Results

3 record(s) were found; 3 record(s) are shown

Bald Eagle Nest Map:



Bald Eagle Nest Data Search Results:

Results per page: All

Let-ter	Nest ID	County	Latitude	Longitude	Town-ship	Ran-ge	Sec-tion	Gaz Page	Last Known Active	Last Sur-veyed	Act 05	Act 06	Act 07	Act 08	Act 09	Dist. (Mi)
A	OR024	Orange	28 28.18	81 11.61	23S	31E	23	86	2008	2008	Y	Y	N	Y	*	1.46
B	OR043	Orange	28 28.58	81 08.95	23S	32E	19	86	2008	2008	Y	Y	Y	Y	*	2.19
C	OR062	Orange	28 29.79	81 12.08	23S	31E	10	86	2008	2008	-	-	-	Y	*	1.27

"Y" denotes an active nest
"N" denotes an inactive nest
"-" denotes an unobserved nest
"U" denotes a nest that was visited but status was undetermined
"*" denotes a nest that was not surveyed

Florida's waterbird colony search results.

Instructions for use of the "Map" and "Topo" buttons:

Clicking on the MAP button near the end of a colony row links to a website that displays the colony location on an interactive road map. You can zoom and shift the view area of the map and control the level of detail displayed. You can return to the list of found colonies by using the "Back" browser button.

Clicking on the TOPO button at the end of a colony row links to a website that displays the colony location on a printable portion of a USGS 1:100,000 scale topographic map. The name of the USGS 1:24,000 scale quad map on which the colony is located is displayed above the map, and additional USGS quad map information can be accessed by clicking on the "Quad Info" link. When the "printer dialog" box displays, you can choose to print the map immediately or cancel the printer dialog in order to view the map first. You can return to the list of found colonies by using the "Back" button on your browser.

Please Note: The colony location map accessed by the TOPO or MAP buttons is not an adequate substitute for careful plotting of FWC colony location coordinates on an accurate small-scale topographic paper map or Geographic Information System (GIS) electronic map. This feature is provided only to allow the user to view the general location of a colony and to confirm that an appropriate area of interest was targeted by the user's search. Careful plotting of a colony location on an accurate map is not an adequate substitute for a specific on-the-ground survey of the colony site.

Water bird colonies within 5 miles of latitude 28° 29.3136', longitude 81° 10.9525'.

Click on the atlas number to obtain details about the colony.

Location								Activity Status				Maps		
Atlas#	County	Date	Longitude	Latitude	Township	Range	Section	1970s	1980s	1990s	Total nests	Distance	Road	Topo
612038	Orange	5/19/1999	81 08.00	28 26.00	24S	32E	05	Active	Inactive	Inactive		4.8 SE	MAP	TOPO

Search Florida's waterbird colonies again

APPENDIX C

Environmental Resource Permit Application Forms

2711 West Fairbanks Avenue, Winter Park, Florida 32789-3314 (407) 740-8482 FAX (407) 645-1305
www.lotspeichandassociates.com

TABLE 1
PROJECT IMPACT SUMMARY
OUC Solar Energy Array Project - Stanton Energy Facility
December 2010

WL & SW ID	WL & SW TYPE	WL & SW SIZE (ac.) ON-SITE	WL & SW (ac.) NOT IMPACTED	PERMANENT WL & SW IMPACTS		TEMPORARY WL & SW IMPACTS		MITIGATION ID
				IMPACT SIZE (ac.)	IMPACT CODE	IMPACT SIZE (ac.)	IMPACT CODE	
East-West Ditch	511	3.18±	2.97±	0.21±	F	0.00±	—	A (see Tables 2 and 3
Innovation Way Ditch	511	1.20±	1.20±	0.00±	—	0.00±	—	N/A
Wet Prairie	643	4.52±	4.52±	0.00±	—	0.00±	—	N/A
PROJECT TOTALS	—	**8.90**±	**8.69**±	**0.21**±	—	**0.00**±	—	—

LEGEND
WL = Wetland; SW = Surface Water; ID = Identification number, letter, etc.
WETLAND TYPE: Use an established wetland classification system and indicate which classification system is being used in the "Comment" section below.
IMPACT CODE (Type): D = dredge; F = fill; H = change hydrology; S = shading; C = clearing; O = other. Indicate the final impact if more than one impact type is proposed in a given area. For example, show F only for an area that will first be demucked and then backfilled.

NOTE: Multiple entries per cell are not allowed, except in the "Mitigation ID" column. Any given acreage of wetland should be listed in one row only, such that the total of all rows equals the project total for a given category (column). For example, if Wetland No. 1 includes multiple wetland types and multiple impact codes are proposed in each type, then each proposed impact in each wetland type should be shown on a separate row, while the size of each wetland type found in Wetland No. 1 should be listed in only one row.

COMMENTS: WL & SW types according to Florida Land Use, Cover and Forms Classification System (FLUCCS), 1999

REVIEWER: _____

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TABLE 2
ON-SITE MITIGATION SUMMARY
OUC Solar Energy Array Project - Stanton Energy Facility
December 2010

MITIGATION ID	CREATION		RESTORATION		ENHANCEMENT		WETLAND PRESERVE		UPLAND PRESERVE		OTHER	
	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE
A											1.56 acres	Buffer Preserve
PROJECT TOTALS		—		—		—		—		—		—

LEGEND

TARGET TYPE OR TYPE: Target or existing habitat type from an established wetland classification system or land use classification for non-wetland mitigation.

CODES: Multiple entries per cell are not allowed,

COMMENTS: _____

_____

_____

_____ REVIEWER: _____

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TABLE 3
OFF-SITE MITIGATION SUMMARY
OUC Solar Energy Array Project - Stanton Energy Facility
December 2010

MITIGATION ID	CREATION		RESTORATION		ENHANCEMENT		WETLAND PRESERVE		UPLAND PRESERVE		OTHER	
	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE
A									TBD	Upland Buffer Preservation	TBD	Mitigation Bank Credits
PROJECT TOTALS		—		—		—		—		—		—

LEGEND

TARGET TYPE OR TYPE: Target or existing habitat type from an established wetland classification system or land use classification for non-wetland mitigation.

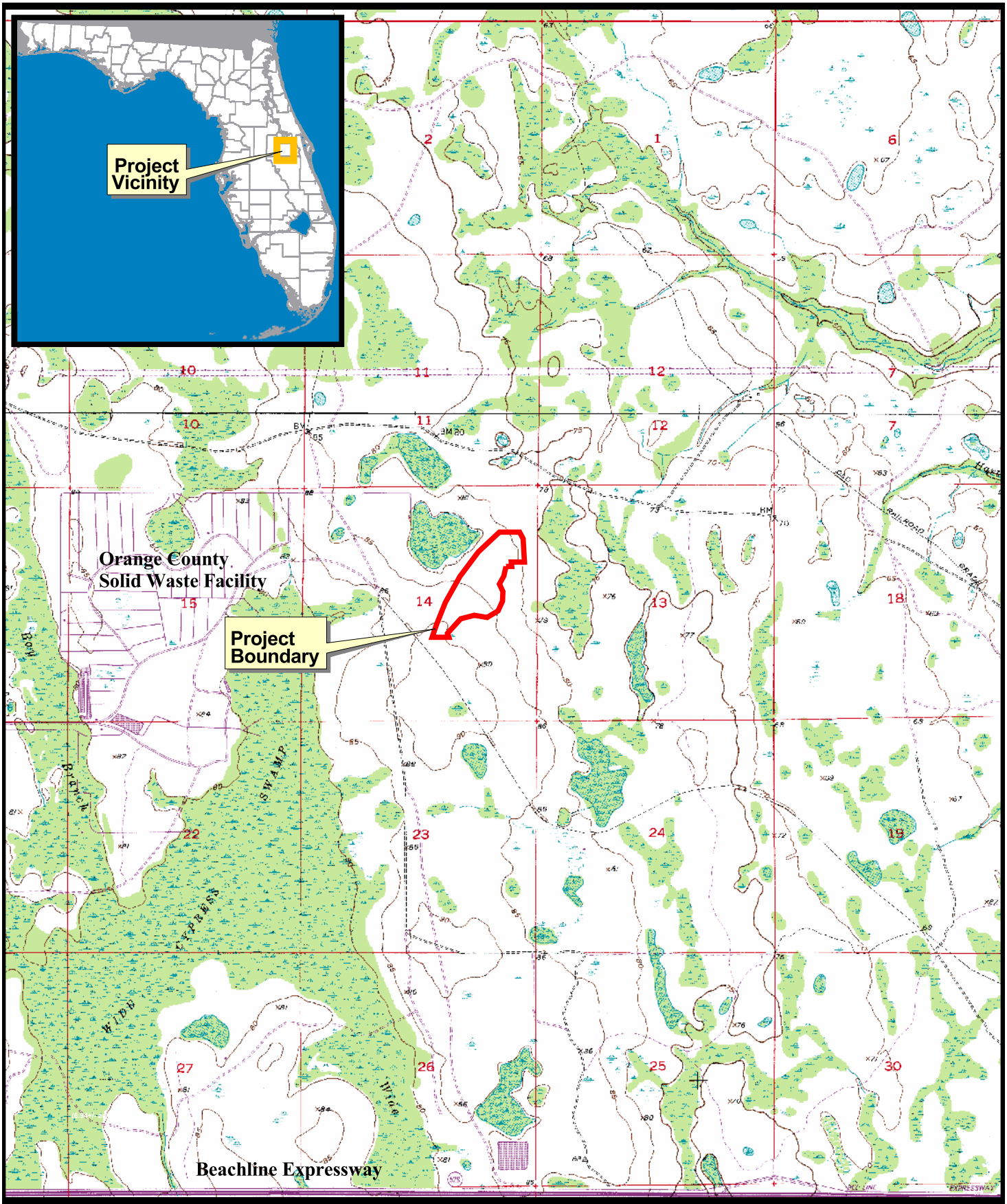
CODES: Multiple entries per cell are not allowed,

COMMENTS: _____

_____

_____

_____ REVIEWER: _____



Lotspeich and Associates, Inc.
ECOLOGICAL CONSULTANTS
2711 West Fairbanks Avenue, Winter Park, Florida 32789
(407) 740-8482 Fax - 645-1305 www.lotspeichandassociates.com

OUC - Stanton Solar Array Project

Section 14, Township 23 South, Range 31 East
Orange County, Florida

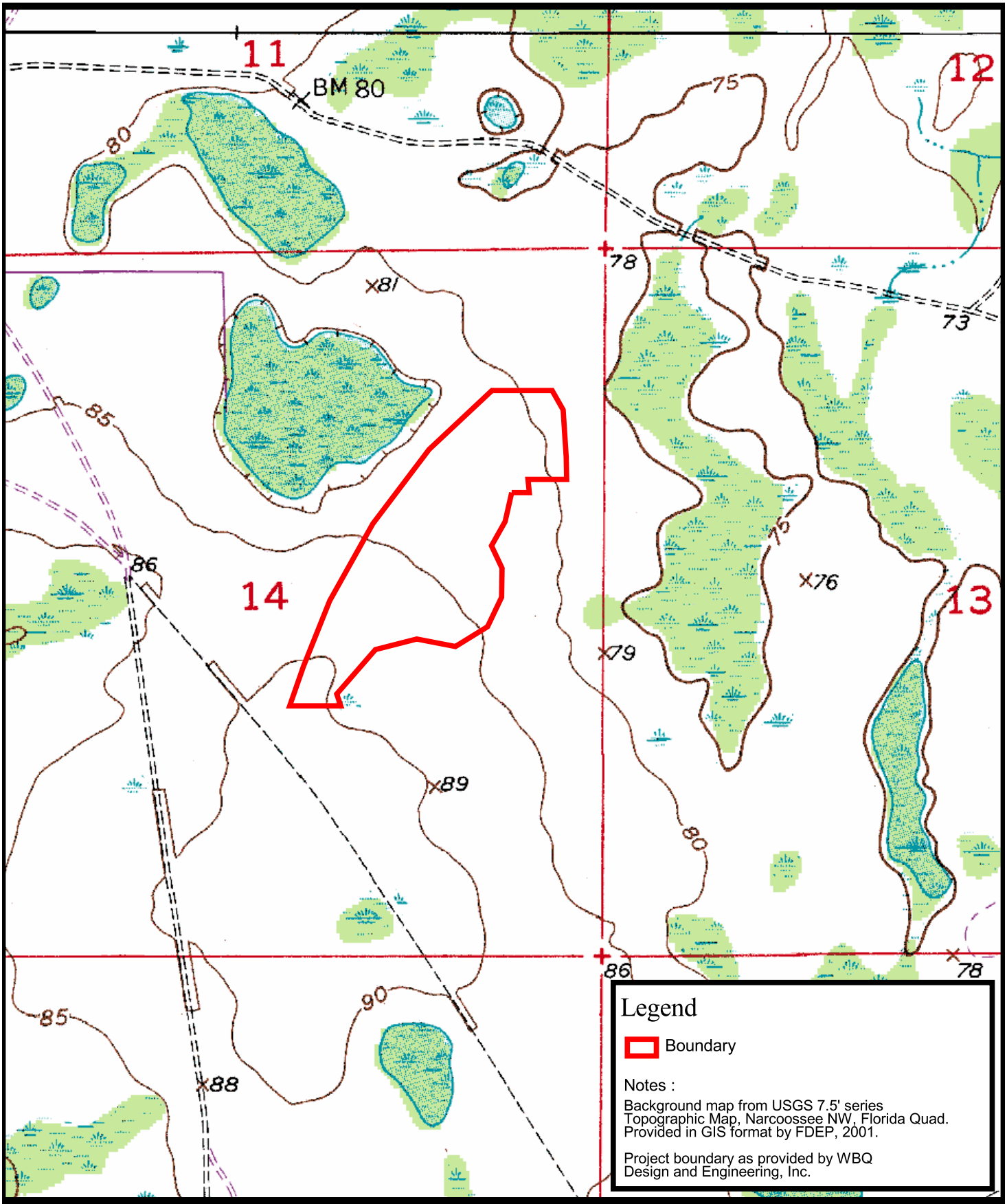
Vicinity Map

North

Scale: 1" = 3,000'

Figure 1

File: 10-013.APR	Drawn By: DJS	Job No.: 2010-013.33	Date: 21 DEC 2010



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OUC - Stanton Solar Array Project

Section 14, Township 23 South, Range 31 East
Orange County, Florida

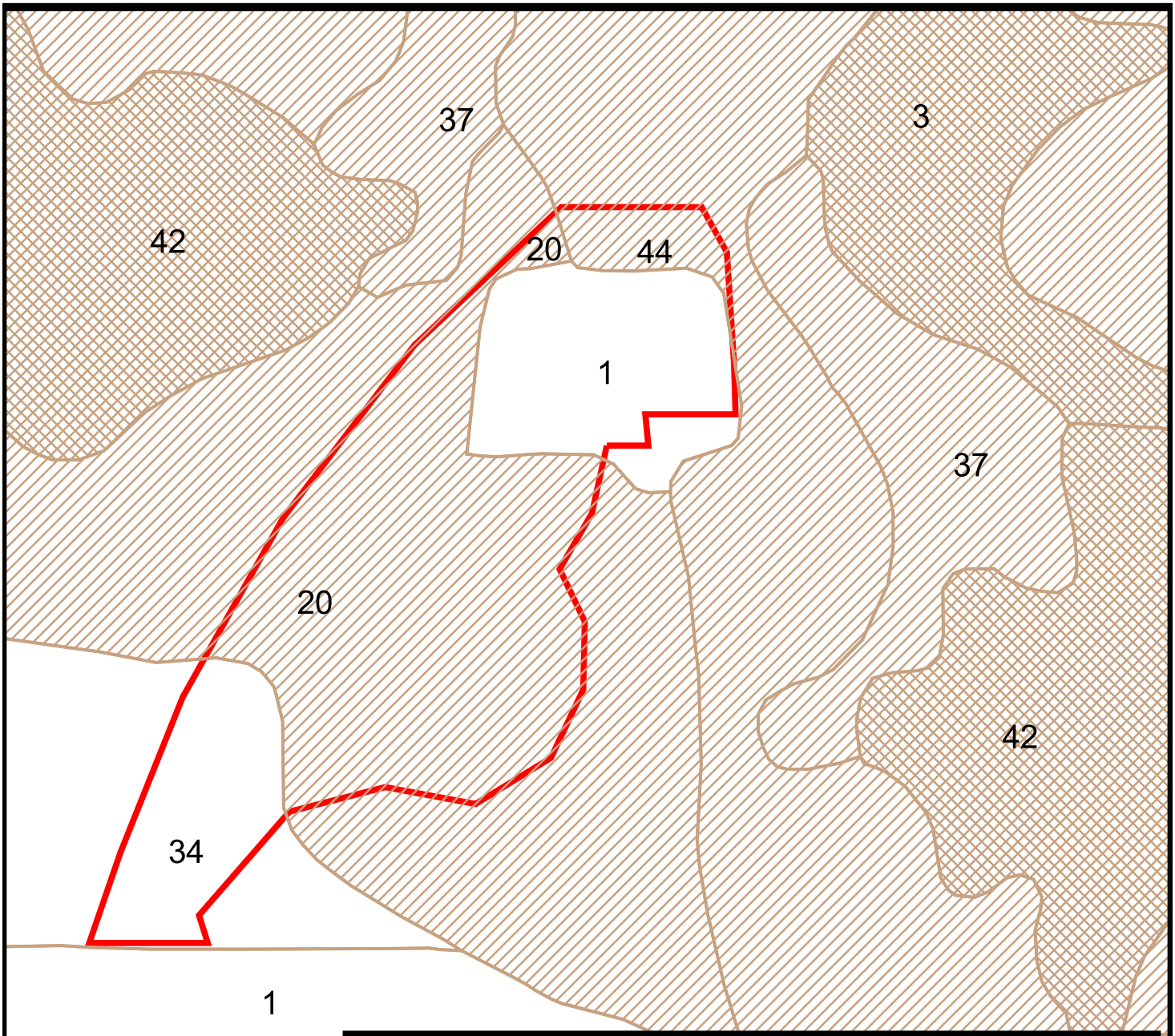
Topographic Map

North

Scale: 1" = 1,000'

Figure 2

File: 10-013.APR	Drawn By: DJS	Job No.: 2010-013.33	Date: 21 DEC 2010



Legend

Orange County Soils Classification

- Upland
- Hydric (SJRWMD & USACE)
- Hydric (USACE only)
- Open Water
- Boundary

Project Soils :

1 - Arents
20 - Immokalee fine sand
34 - Pomello fine sand, 0 to 5 percent slopes
44 - Smyrna fine sand

Notes :

Soils delineation from USDA, NRCS Soil Survey of Orange County, Florida, provided in GIS format by the SJRWMD.

Project boundary as provided by WBQ Design and Engineering, Inc.

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OUC - Stanton Solar Array Project

Section 14, Township 23 South, Range 31 East
Orange County, Florida

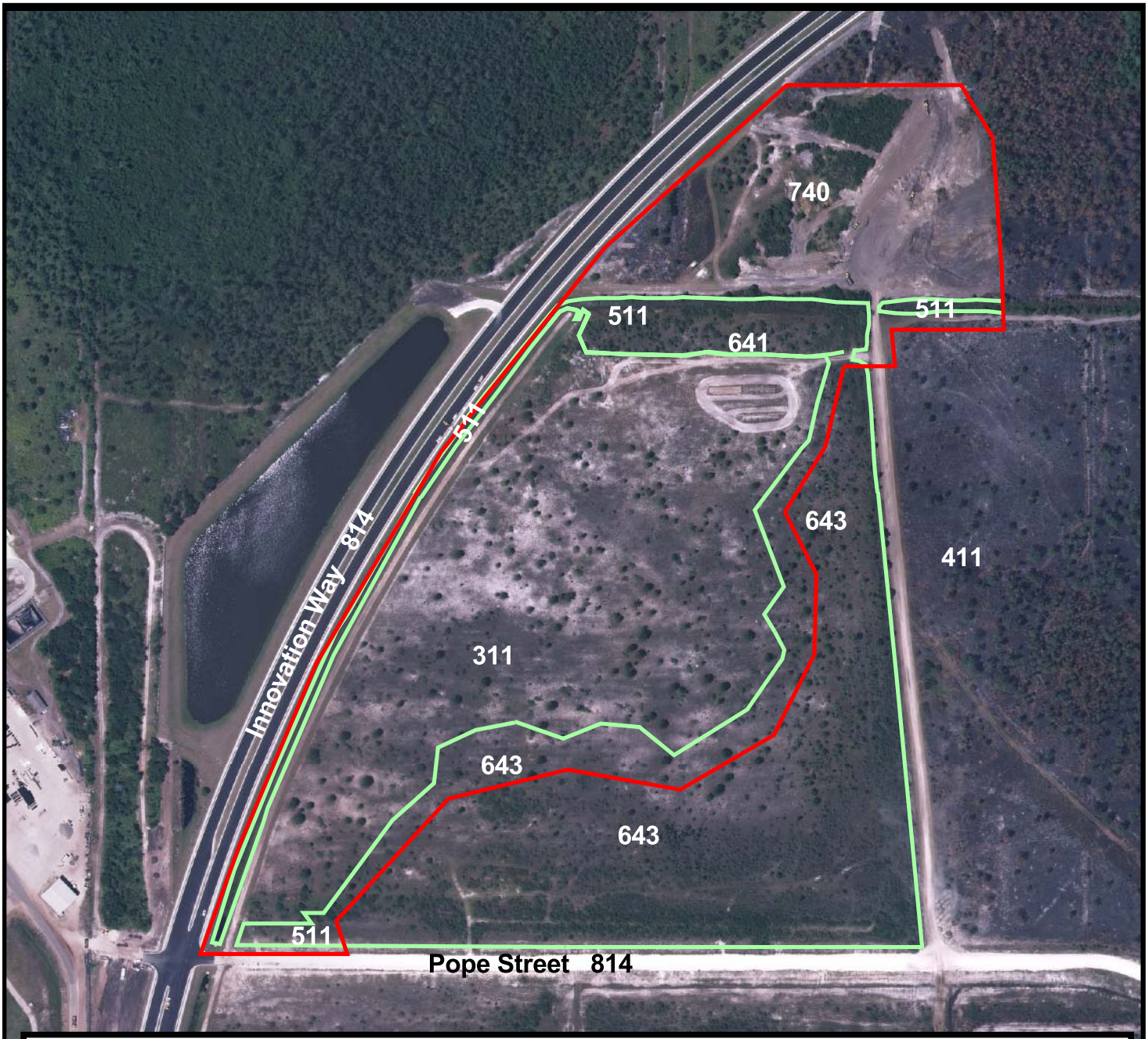
Soils Map

North

Scale: 1" = 500'

Figure 3

File: 10-013.APR | Drawn By: DJS | Job No.: 2010-013.33 | Date: 21 DEC 2010



Legend

Boundary

Land Use Limits

Land Use Codes:

311 - Dry Prairie
411 - Pine Flatwoods
511 - Ditches
641 - Freshwater Marsh
643 - Wet Prairie
740 - Disturbed Lands
814 - Roads and Highways

Notes :

Land Use delineation based on aerial photointerpretation and groundtruthing. All acreages are approximate. This is not a survey.

Classification based on Florida Land Use, Cover and Forms Classification System (FLUCFCS), FDOT, 1999.

Wetland delineation subject to verification by governmental agencies with regulatory authority.

Project boundary as provided by WBQ Design and Engineering, Inc.

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OUC - Stanton Solar Array Project

Section 14, Township 23 South, Range 31 East
Orange County, Florida

Existing Land Cover Map

North

Scale: 1" = 400'

Figure 4

File: 10-013.APR | Drawn By: DJS | Job No.: 2010-013.33 | Date: 21 DEC 2010

APPENDIX H

Geotechnical Report by Nodarse and Associates, Inc.

ENVIRONMENTAL CONSULTING
GEOTECHNICAL ENGINEERING
MATERIALS TESTING
THRESHOLD INSPECTION
DRILLING SERVICES

NODARSE
& ASSOCIATES, INC.

Subsurface Exploration and Geotechnical Engineering Evaluation Proposed Solar Panels at Stanton Energy Site Orange County, Florida

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ENVIRONMENTAL CONSULTING
GEOTECHNICAL ENGINEERING
MATERIALS TESTING
THRESHOLD INSPECTION
DRILLING SERVICES

NODARSE
& ASSOCIATES, INC.

Revised: December 22, 2010
October 21, 2010
Project No. 01-10-0516-101A

Mr. Jim Cowdery
Regenesis Power Orlando
2295 Commerce Point Drive, Suite 100
Lakeland, Florida 33801

Subsurface Exploration and Geotechnical Engineering Evaluation
Proposed Solar Panels at Stanton Energy Site
Orange County, Florida

Dear Mr. Cowdery:

Pursuant to our revised proposal dated September 15, 2010, and your authorization, **Nodarse & Associates, Inc. (N&A)** is pleased to present this revised report of our subsurface exploration and geotechnical engineering evaluation for the proposed Solar Panels at the Stanton Energy Plant in Orange County, Florida.

The purpose of our study was to explore and evaluate the subsurface soil and groundwater conditions in order to provide recommendations for foundation design, on-site stormwater management, pavement sections, and sinkhole potential.

This report describes our exploration procedures, exhibits the data obtained, and presents our geotechnical engineering evaluations and recommendations for various components of the project.

PROJECT LOCATION AND DESCRIPTION

The proposed project site is approximately 30 acres in size, located in the northwest corner of the Stanton Energy Center property, and bordered to the west by Innovation Way in Orange County, Florida. It is our understanding that solar panels will be constructed throughout the project site. The solar panels will be supported by shallow footings. As provided by the structural engineer, Mr. Mike Head, P.E. of TLC Engineering for Architecture, the compression loads on the foundations are very small and the foundation design will be controlled by uplift. The settlement must be virtually non-existent (0.25" or less) since all the panels are interconnected and any differential movement may cause problems with the mechanisms.

We also understand that impoundment ponds with elevated berms will be located along some of the property edges to store stormwater and eventually act as dry retention ponds. Details of the impoundment ponds and berms geometry were provided by the Civil Engineer (WBQ Design & Engineering, Inc.)

PURPOSE AND SCOPE

The purpose of this geotechnical engineering study was to perform subsoil geotechnical exploration and evaluation for the proposed development according to the information provided in order to provide a basis for recommendations for foundation design, site preparation techniques, stormwater management, pavement design, and berm stability.

For the stated purposes, the geotechnical exploration included the following:

- Review and consider the general topographic features of the site and its immediate vicinity using the United States Geological Survey (USGS) quadrangle map shown on **Figure 1**.
- Consider near surface soil types and conditions as mapped by the United States Department of Agriculture (USDA)/Soil Conservation Service (SCS) Soil Survey for Seminole County, shown on **Figure 2**.
- Mobilize a drilling rig and crew to the project site.
- Perform ten (10) SPT boreholes to a depth of 20 feet, three (3) SPT borings to a depth of 50 feet, and four (4) machine auger borings to a depth of 20 feet. The boreholes were performed at the approximate location shown on **Figure 3**.
- Collect eight (8) relatively undisturbed tube samples for laboratory permeability testing.
- Mobilize a backhoe to the site and perform five (5) test pits to approximate depths of 6 to 8 feet within the portion of the site that was previously filled. The test pits were performed at the approximate location shown on **Figure 3**. The test pits excavation was monitored by a Senior Geotechnical Engineer.
- Visually classifying the recovered soil samples obtained in the field from the borings by a Senior Geotechnical Technician and in our laboratory by a Senior Geotechnical Engineer.
- Conduct a laboratory-testing program that included moisture content, percent fines, organic content, Atterberg Limits, corrosion series, and falling head permeability tests.
- Preparing this report to include field and laboratory data and other exhibits and evaluating the subsoil and groundwater conditions to form the basis for the recommendations made later in this report.

SUBSOIL AND GROUNDWATER CONDITIONS

The USGS Quadrangle Map covering the project site (**Figure 1**) showed the site to be at a pre-development elevation sloping from elevation of +85.0 feet at the southwest corner to elevation +80.0 feet at the northeast corner. Most wetlands and lowlands around the site are at approximate elevation of +75.0 feet.

The USDA Soil Survey of Orange County, Florida (**Figure 2**) was reviewed for a general description of the near-surface soil types that may be anticipated at this project site. The USDA/SCS which surveyed and delineated the upper 80 inches of subsoil in this area, showed that the major shallow subsurface profile at the project site is represented by Immokalee Fine Sand (Unit 20) and Smyrna Fine Sand (Unit 44). A description of this soil is given below.

20 - Immokalee fine sand

This soil is nearly level and poorly drained. It is on broad flatwoods. Typically, this soil has a black, grayish brown, light gray, dark brown, brown and brownish gray fine sand. In most years, a seasonal high water table is within 10 inches of the surface for 1 month to 3 months, and it recedes to a depth of 10 to 40 inches for more than 6 months.

44 - Smyrna fine sand

This soils is nearly level and poorly drained. It is on broad flatwoods. The slopes are smooth and range from 0 to 2 percent. Typically, this soil has black, gray, dark brown, and pale brown fine sand. In most years, a seasonal high water table is within 10 inches of the surface for 1 month to 4 months. It recedes to a depth of 10 to 40 inches for more than 6 months.

Approximate Subsoil Stratification

The general subsoil and groundwater conditions within the site were explored and evaluated utilizing ten (10) SPT boreholes drilled to a depth of 20 feet, three (3) SPT boreholes drilled to a depth of 50 feet, and four (4) machine auger borings to a depth of 20 feet. The staked locations of the performed borings along with the details of the encountered subsoil conditions are plotted and shown on **Figures 3 through 6**.

Samples of the encountered soil were placed in glass jars that were sealed and transported to our laboratory for review by a Senior Geotechnical Engineer. The soils were classified utilizing the Unified Soil Classification System (USCS).

Five (5) test pits were excavated under the supervision of a Senior Geotechnical Engineer. **Appendix A** includes some of the pictures taken during test pit excavations. The site visit and the test pits showed that the natural soil at northern portion of the site (north of the central ditch) were filled with approximately 4 feet of clean sand followed by 18 to 24 inches of slightly silty sands with roots, tree branches, and pieces of wood (currently the surface soil at the northern portion of the site). From our observation during the test pits, it appears that the sandy fill was pushed on top of the original grade without scrapping the top soil since top soil with roots was observed below the clean sandy fill in some of the test pits.

The performed SPT and machine auger borings showed alternating layers of slightly silty and silty fine sand with relative density ranging from loose at shallow depths to dense at deeper depths (**Strata 1, 2, 4, and 5**). A layer of dense to very dense dark reddish silty fine sand (Hardpan) was encountered in most of the borings at depths of 8 to 16 feet and extended to depths of 13 to 21 feet (**Stratum 3**). Below 35 feet, loose to medium dense silty and clayey sands were encountered and extended to the termination depth of 50 feet (**Strata 6 and 7**).

Subsoil Penetration Resistance

In-field subsoil strength was evaluated during our site exploration by evaluating the penetration resistance by means of Standard Penetration Test (SPT) borings. The penetration resistance is characterized by the "N" value with higher resistance, density, and strength associated with higher "N" values. These "N" values are the number of blows (140 lb. hammer falling 30 inches) required to advance the split spoon sampler a distance of 12 inches through the tested soil. The "N" values had been empirically correlated with various soil properties and are considered to be indicative of the relative density of cohesionless soils and consistency of cohesive soils. Adjacent to the boring profiles, the "N" values were plotted as shown on **Figures 4 and 5**. The data was regenerated for better visualization on the plot shown in **Appendix B,** which shows the variation of the "N" values with depth for the performed SPT borings.

Groundwater Table

The groundwater table as encountered in the borings during our field exploration of September 2010 is presented adjacent to the boring profiles on **Figures 4 through 6**. For the northern portion of the site, which we believe was filled to about 5 to 6 feet above natural grade, the groundwater table (GWT) was encountered at depths of 2.3 to 6 feet below existing grade. At the location of TB-3 and TB-4, the GWT was not encountered within the top 10 feet, after which, drilling mud masked the GWT. For the southern portion of the site, which is still at natural grade, the GWT was encountered at depths of 1.0 to 1.5 feet below existing grade.

It should be noted that groundwater levels will fluctuate seasonally with the local rainfall and site development and, therefore, may be different at other times. It is our opinion that the SHWL is expected to be approximately about 0.5 to 1 foot above the encountered water levels.

The altitude of the piezometric surface of the Floridan aquifer, at the general project area, based on Florida Geological Survey Map is at about -225 feet, MSL. Based on this published data the piezometric surface of the Floridan is about 300 feet below land surface in the area of the general area of the project site.

Results of Laboratory Tests

Laboratory tests included percent fines (-200) tests, organic content tests, and natural moisture content tests to help in soil classification. Variable head permeability tests were performed on four (4) relatively undisturbed tube samples to estimate the hydraulic conductivity of the shallow soils. The results of these laboratory tests are shown next to the boring profiles (**Figures 4 through 6**).

Corrosivity tests were performed in accordance with FDOT Structure Design Guidelines. The laboratory testing program included pH, chlorides, sulfates, and resistivity tests. The results of the corrosivity tests are summarized in the following table:

SUBSTRUCTURE ENVIRONMENTAL CLASSIFICATION						
Depth Range (feet)	**pH**	**Chlorides (ppm)**	**Sulfates (ppm)**	**Resistivity (ohm-cm)**	**Concrete**	**Steel**
TB-1 2 to 4	6.9	60	<5	26,000	Slightly Aggressive	Slightly Aggressive
TB-3 4 to 6	6.6	60	<5	25,000	Slightly Aggressive	Slightly Aggressive
TB-6 2 to 4	6.2	60	<5	6,800	Slightly Aggressive	Slightly Aggressive
TB-7 4 to 6	3.7	60	105.5	52,000	Extremely Aggressive	Extremely Aggressive
TB-8 0 to 2	4.3	60	<5	82,000	Extremely Aggressive	Extremely Aggressive
TB-13 0 to 2	4.1	60	<5	5,200	Extremely Aggressive	Extremely Aggressive

EVALUATIONS AND RECOMMENDATIONS

The following evaluations and recommendations are based on the project characteristics previously described, the data obtained during our field explorations, and our experience with similar subsurface conditions, proposed development, and construction methods.

Foundation Design

Together with the recommended earth preparation at near existing grade explained later in this report and the light compression loads provided by the Structural Engineer, it is our opinion that the foundation soil should be able to support the anticipated loads using conventional shallow foundation system. The allowable bearing pressure is dependent on footing size and embedment depth as follows:

Minimum footing size	Minimum embedment depth	Allowable bearing pressure
4 feet x 4 feet	Surface footing ($D_f = 0$)	1200 psf
4 feet x 4 feet	6 inches	1750 psf
5 feet x 5 feet	Surface footing ($D_f = 0$)	1500 psf
5 feet x 5 feet	6 inches	2000 psf

Settlement is expected to be elastic and minimal. Assuming that site preparation recommendations are strictly followed, for a contact pressure of 2000 psf and a square footing of a dimension of 5x5 feet, settlement is estimated to be less than 0.5 inch.

Unless there was a considerable soil cover on top of the footing, the uplift capacity of the footing should not exceed the footing weight reduced by the appropriate factor of safety.

Sinkhole Potential Evaluation

The typical geologic stratigraphy of the site vicinity taken from the Florida Geological Survey's Report of Investigations No. 50 titled "Water Resources of Orange County, Florida" is generalized as follows:

- Ground surface at around +80 feet to about +85 feet, MSL, is undifferentiated deposits of the "Pleistocene and Recent Age" and particularly consists of quartz sand with varying amounts of clay and shell.

- Near elevation 0 feet, MSL is the Hawthorn Formation of the "Miocene Age". In Orange County it consists of gray-green clayey quartz sand and silt, phosphatic sand; phosphatic limestone mostly in the lower part.
- Near elevation -225 feet, MSL and deeper, is the Ocala Group limestones of the "Early Miocene to Late Eocene Age". It consists of cream to tan fine soft to medium hard granular porous sometime dolomite limestone.
- The Ocala Group Limestones is underlain by the Avon Park Limestones and collectively they form the upper part of the Floridan aquifer and are known to be porous and cavatatious.

It should be noted that the above conditions are idealized general conditions but, the stratigraphy varies especially near and within lakes, water bodies and closed topographic lows, surface depressions or sinkholes. Near and within such areas the Hawthorn is often breached, ruptured, discontinuous or totally absent and is totally or partially replaced with sands and soft sediment or organics near and within the center or throat of the depressions.

Based on the results of the three (3) SPT borings extended to 50 feet, the locations and profiles which are shown on **Figure 3 through 6,** the actual stratigraphy is typical to what was expected as described earlier. It should be noted that the borings did not extend deep enough to provide information about the existence and thickness of the Hawthorne group, hence provide basis for somewhat valuable sinkhole potential evaluation. However, the general site area is not known to be sinkhole-active area. Hence, we believe the project site has very low to low risk of sinkhole formation on a scale of very low , low, moderate, high, and very high risk.

Berm Stability Analysis

Berm stability analysis was performed for the impoundment berm according to the berm geometry and water levels provided by the Civil Engineer (WBQ Design & Engineering, Inc.). WIN-STABLE software was used to perform the analysis. The results of the analysis are shown in **Appendix C**. A minimum safety factor of 1.5 was calculated, which indicated that the slopes of the berm, with the provided geometry and assuming it was built using clean sandy fill (less than 10% fines) and compacted to a minimum of 95% of the Proctor Density, are safe against global slope stability.

Stormwater Impoundment Ponds

Based on the site plan provided, the stormwater will be managed on this site through impoundment ponds located at the east side of the northern portion of the site, to the north and south of the central ditch, and to the south of the southern portion of the site. Four (4) borings were performed within the proposed impoundment areas. Eight (8) relatively undisturbed tubes were collected from shallow depths and were tested in the laboratory to estimate the hydraulic conductivity. The following table summarizes the geotechnical properties and the hydro-geotechnical parameters based on the information obtained from our borings:

Property	Impoundment at east side of northern portion of the site	Impoundment to the north of the central ditch	Impoundment to the south of the central ditch	Impoundment to the south of the southern portion of the site
Representative Borings	TB-4, TB-5, TB-6	TB-1, TB-2, TB-3	TB-7, TB-8, TB-9	TB-13, TB-14, TB-15, TB-16, TB-17
Measured Vertical Hydraulic Conductivity	41 to 72 ft/day	N/A	10 to 19 ft/day	3 to 38 ft/day
Depth to Encountered Groundwater Table below grade	6 feet	2.3 to 2.5 feet	1 to 1.2 feet	1 to 1.5 feet
Recommended Vertical Hydraulic Conductivity	20 ft/day	20 ft/day	12 ft/day	18 ft/day
Recommended Horizontal Hydraulic Conductivity	30 ft/day	30 ft/day	18 ft/day	27 ft/day
Fillable Porosity	25 %	25 %	25 %	25 %
Recommended Depth to Normal Seasonal High Water Table below existing grade	3 feet	1 foot	0.5 foot	1.0 foot
Depth to Base of Effective Aquifer	10 feet	12 feet	11 feet	11 feet
Duration of Wet Season	120 days	120 days	120 days	120 days

Emergency Access Roadways

Emergency vehicle access may be required in unpaved areas of the site. For emergency access in sodded areas, the following section is recommended:

- Sod on a couple inches of topsoil (optional).

- 6-inches of crushed concrete graded aggregate base (FDOT Specification No. 204) or shell (LBR = 100).
- 12-inches of stabilized subbase (LBR = 40).

Use of limerock for the emergency access road base is not recommended due to potential for deterioration and weathering from rain and irrigation. The above pavement section should be adequate to support an emergency access vehicle up to 42 tons. Geometry, width, and markings should be provided per local emergency rescue requirements. Rutting of the sod on topsoil as the wheel loads are transferred to the crushed concrete or shell may require periodic maintenance on the access areas.

General Site Preparation and Fill Placement

Within the Northern Portion of the Site that was Previously Filled: The top 2 feet of fill should be completely removed to a distance of 2 feet beyond the perimeter of the footings. Compaction should be extended to 12 inches below the excavated depth satisfying the minimum of 95% and 98% of modified Proctor density as shown on **Plate 1** shown below.

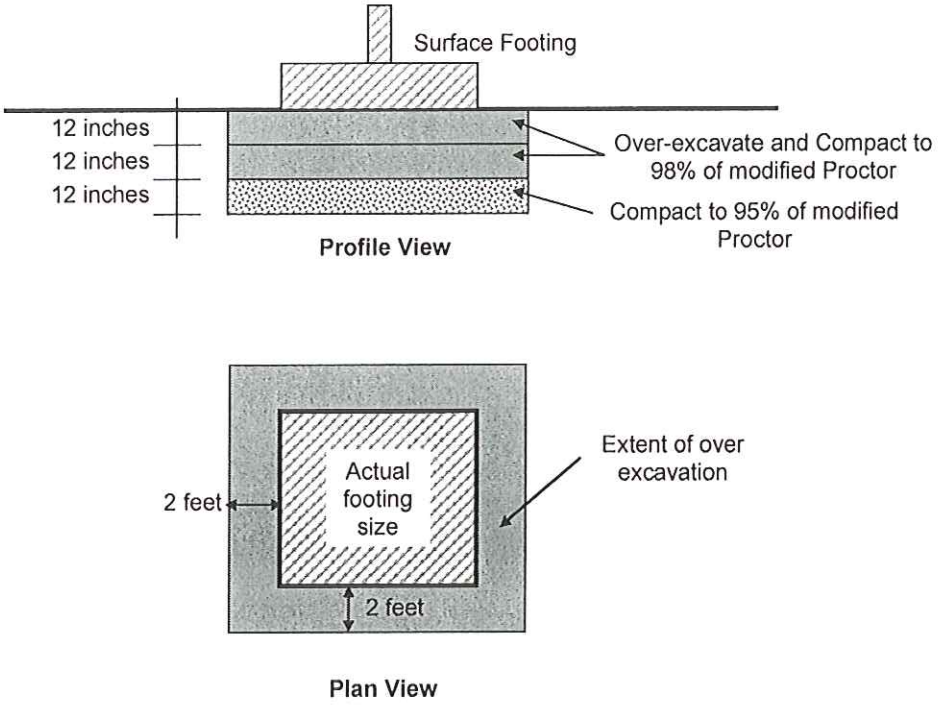


Plate 1. Sketch showing over-excavation, compaction, re-fill, and final compaction at footing locations

The over-excavated soil will need to be evaluated on site by a Geotechnical Engineer to provide recommendation whether it can be used to re-fill the excavated footing areas. Generally, approved fill should be inorganic, non-plastic, granular soil (clean sands). Preferably it should have less than 10 percent passing a No. 200 sieve. Again, the suitability of specific soils as fill material would be based on the results from classification and compaction tests and subject to approval of the Geotechnical Engineer.

As shown on **Plate 1**, the fill should be placed in level lifts not to exceed 12 inches loose thickness and should be compacted to the shown minimum degree of compaction (ASTM Specification D-1557). In-place density tests should be performed on each lift by an experienced Engineering Technician working under the direction of a registered Geotechnical Engineer to verify that the recommended degree of compaction has been achieved.

Excavations for the project should be made in accordance with recommendations outlined by the Occupational Safety and Health Administration (OSHA) "Construction Standards for Excavations". This indicates a maximum slope of 1.5 horizontal to 1 vertical (1.5H:1V) is permissible for excavations up to 20 feet in depth assuming there are no space constraints and that the excavation has been properly dewatered.

Minor dewatering may be needed during over-excavation and re-filling depending on the construction time and rainfall season. If needed, temporary dewatering may be performed by sock drains to lower the water table to about 2 feet below the bottom of excavation in order to achieve the target compaction. Another alternative is to use a sump-pump system to temporary dry the bottom of excavation. In this case, compaction will be difficult to achieve. The Contractor might use 6 to 12 inches of gravel (non-limerock) wrapped in a FDOT approved geofabric compacted to unyielding condition to raise the bottom of the excavation above the groundwater table.

For the Southern Portion of the Site: A minimum of 24 inches thick of suitable sandy soil below the footing, which extend to a minimum of 2 feet beyond the footing footprint should be compacted to 98% of the Modified Proctor Density (ASTM Specification D-1557). Recommendations for fill placement and minor dewatering provided for the northern portion of the site should be strictly followed at the southern portion of the site.

REPORT LIMITATIONS AND RELATED CONSIDERATIONS

The analyses and recommendations submitted in this report are based upon the data obtained from our subsoil investigation that included SPT boreholes and test pits performed at the approximate locations indicated. If significant subsoil variations become evident during the course of this project, a re-evaluation of the recommendations contained in this report will be necessary. The applicability of the report should also be reviewed in the event significant changes occur in the design, nature or location of the proposed structures.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied. **Nodarse & Associates, Inc.**, is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

N&A appreciates the opportunity to be of service to you on this project. If you should have any questions concerning the contents of this report, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,

NODARSE & ASSOCIATES, INC.

12/22/10

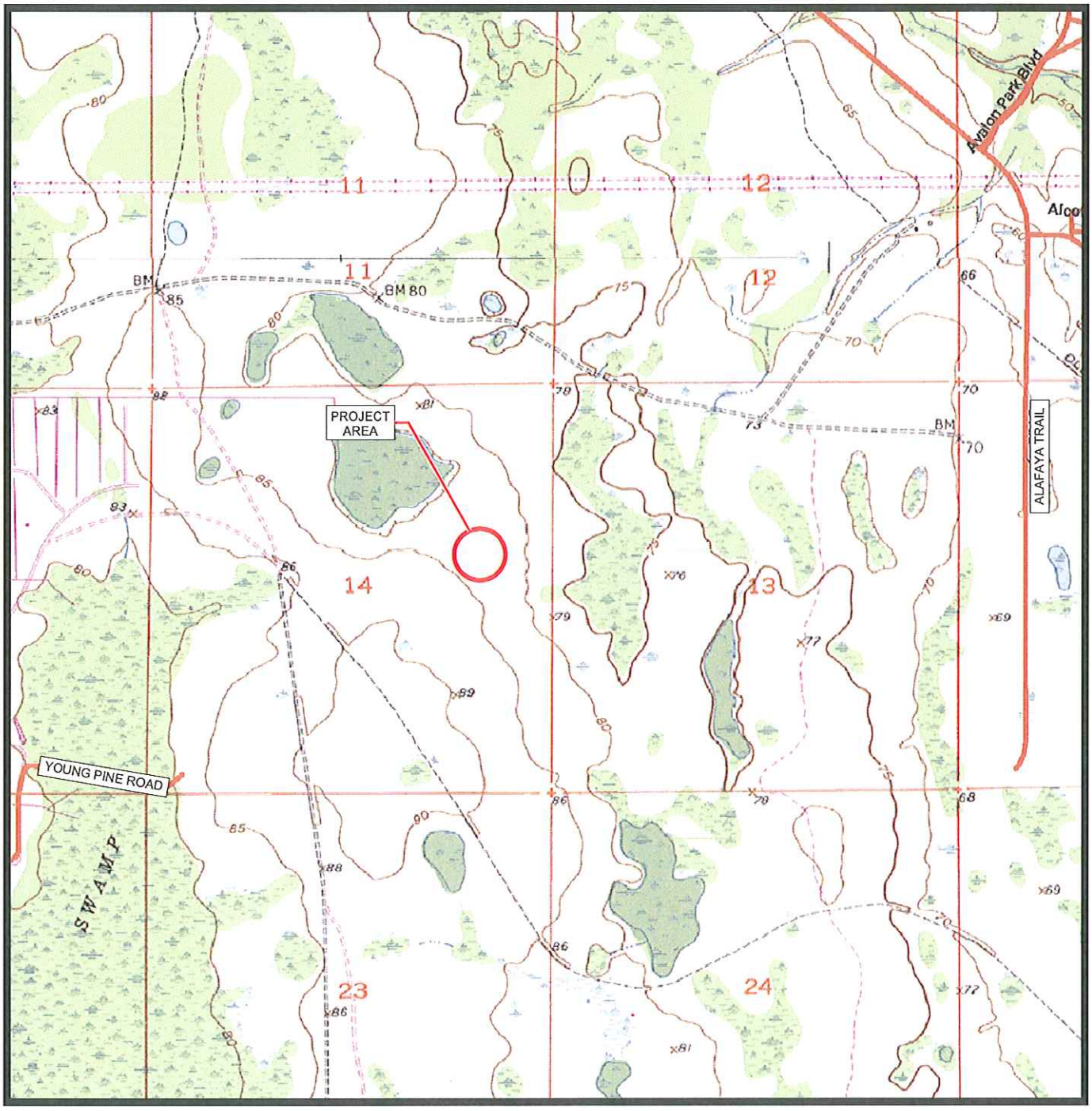
Amr Sallam, Ph.D., P.E.
Geotechnical Services Director, VP
FL Registration No. 67578

AMR M. SALLAM Ph.D
LICENSE
No. 67578
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Shenna McMaster, P.E.
Senior Geotechnical Engineer
FL Registration No. 57537

SHENNA LUU McMASTER
LICENSE
No 57537
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

FIGURES



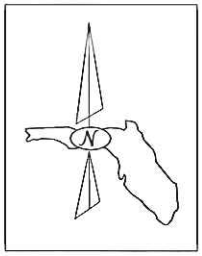
REFERENCE: U.S.G.S. "NARCOOSSEE NW, FLORIDA" QUADRANGLE MAP ISSUED: 1994 REVISED: NONE

SECTION: 14

TOWNSHIP: 23 SOUTH

RANGE: 31 EAST

SCALE: 1" = 2000'



U.S.G.S. QUADRANGLE MAP

SOLAR PANELS AT STANTON ENERGY PLANT

ORANGE COUNTY, FLORIDA

DRAWN: MG	NODARSE & ASSOCIATES, INC.		
CHKD: AS			
SCALE: 1"=2000'			
DATE: 12-15-10	PROJ. NO: 01-10-0516-101A	FIGURE: 1	

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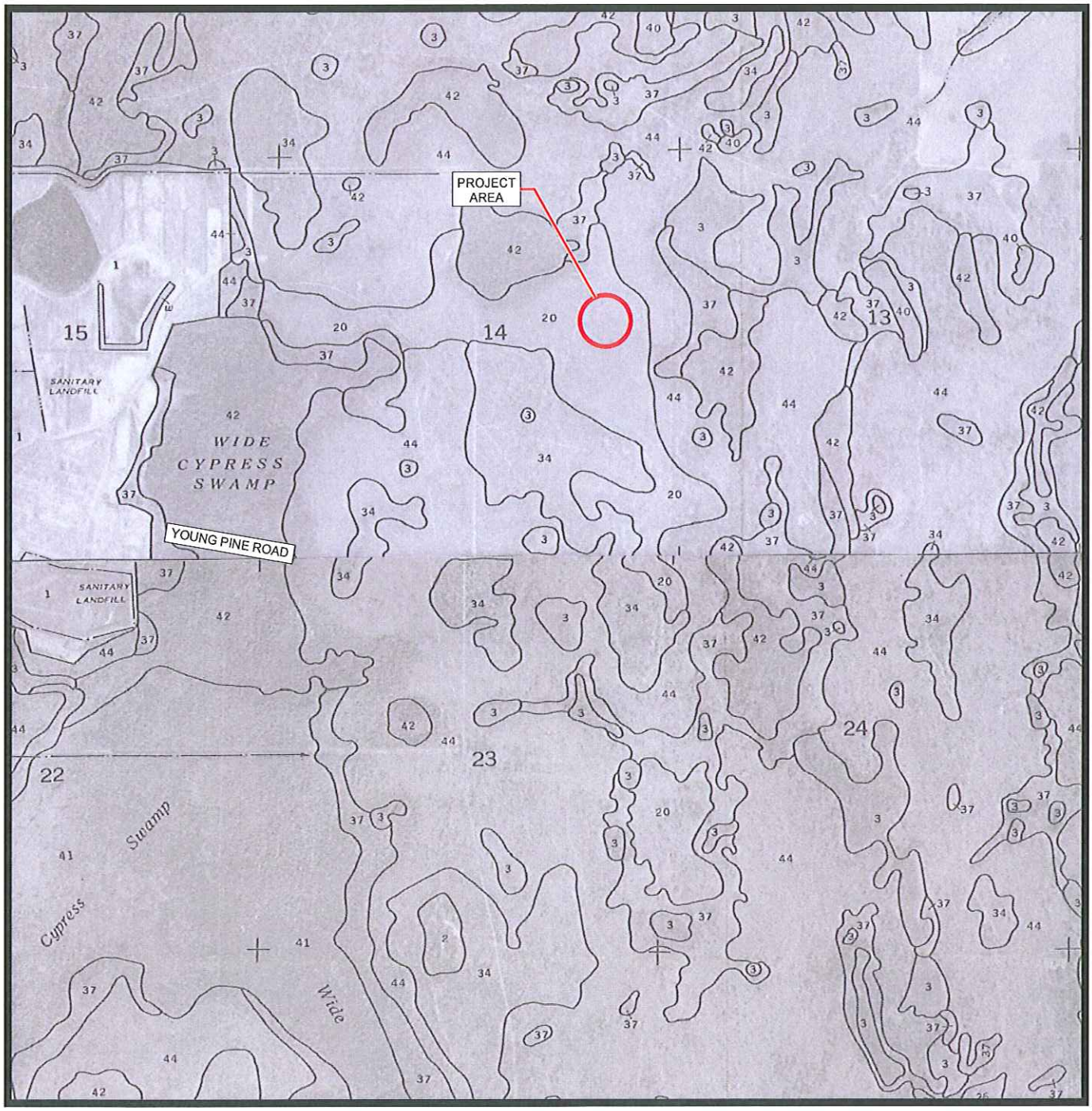


REFERENCE: U.S.D.A. ORANGE COUNTY, FLORIDA SOIL SURVEY

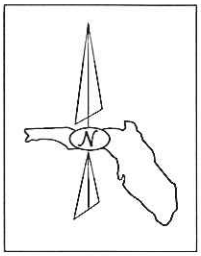
ISSUED: AUGUST 1989

SECTION: 14

TOWNSHIP: 23 SOUTH

RANGE: 31 EAST

SCALE: 1" = 2000'



SOIL LEGEND

20 IMMOKALEE FINE SAND

SOILS MAP

SOLAR PANELS AT STANTON ENERGY PLANT

ORANGE COUNTY, FLORIDA

DRAWN: MG	NODARSE & ASSOCIATES, INC.		
CHKD: AS			
SCALE: 1"=2000'			
DATE: 12-15-10	PROJ. NO: 01-10-0516-101A	FIGURE: 2	

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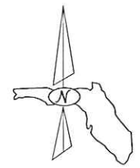


HORIZONTAL SCALE IN FEET

0 200 400

LEGEND

- APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING
- APPROXIMATE LOCATION OF AUGER BORING
- APPROXIMATE LOCATION OF TEST PIT

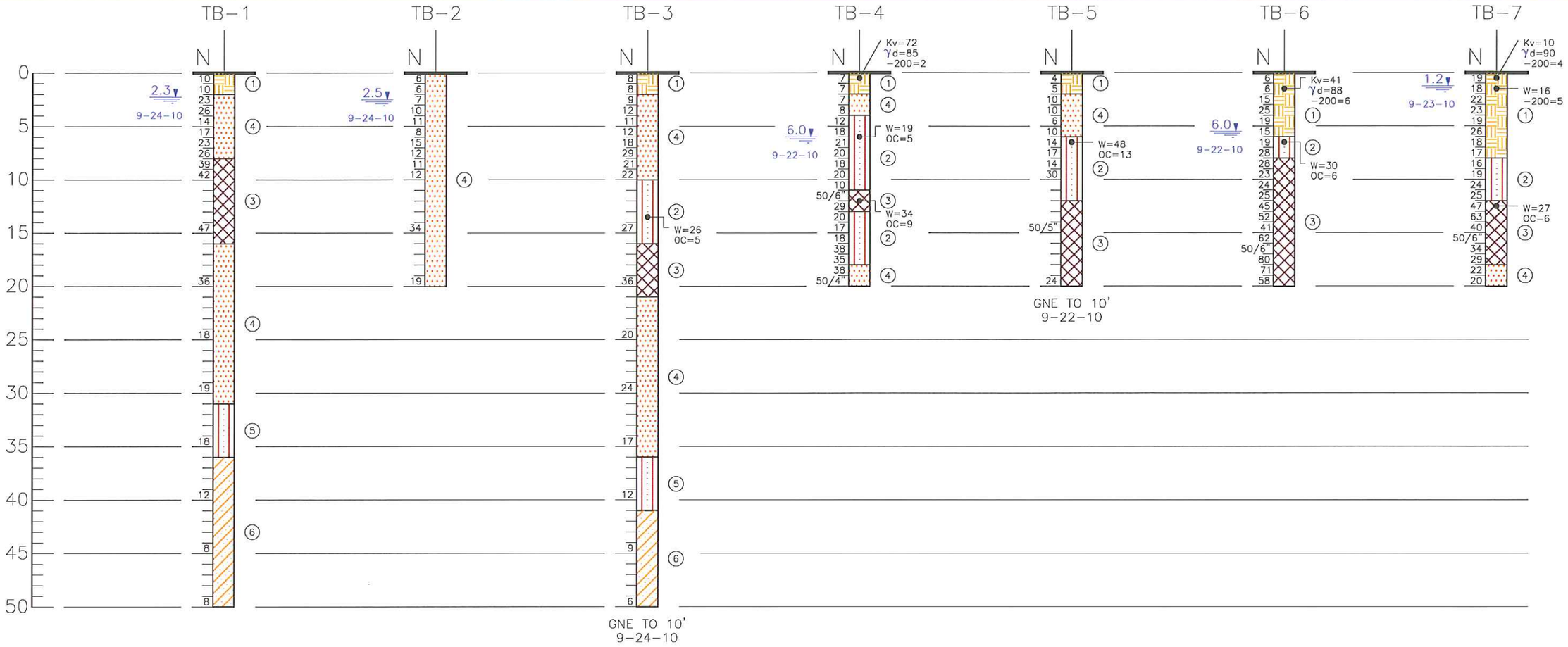
BORNG LOCATION PLAN

SOLAR PANELS AT STANTON ENERGY PLANT

ORANGE COUNTY, FLORIDA

DRAWN: MG	NODARSE & ASSOCIATES, INC.		
CHKD: AS			
SCALE: NOTED			
DATE: 12-15-10	PROJ. NO: 01-10-0516-101A	FIGURE: 3	

Dec15, 2010-4:02pm R:\2010\01-10-0516\101\A\cad\01-10-0516-101a-Figure-3.dwg



LEGEND

①	LOOSE TO MEDIUM DENSE, DARK BROWN FINE SLIGHTLY SILTY SAND, OCCASIONAL ROOTS (TOPSOIL) (SP-SM)
②	MEDIUM DENSE, DARK BROWN FINE SAND TO SLIGHTLY SILTY SAND WITH ORGANIC STAINS (SP)(SP-SM)
③	DENSE TO VERY DENSE, DARK BROWN TO DARK REDDISH FINE SILTY SAND (HARDPAN) (SM)
④	LOOSE TO DENSE, ORANGE, GRAYISH-BROWN AND BROWN FINE TO MEDIUM SAND (SP)
⑤	MEDIUM DENSE VERY LIGHT GRAY FINE SILTY SAND (SM)
⑥	SATURATED, LOOSE FINE CLAYEY SAND (SC)
⑦	MEDIUM DENSE, LIGHT GREENISH-GRAY FINE SILTY TO CLAYEY SAND WITH SHELLS/PHOSPAHTES (HAWTHORNE) (SM)
(SP)	UNIFIED SOIL CLASSIFICATION GROUP SYMBOL AS DETERMINED BY VISUAL EXAMINATION
2.3 ▼ 9-24-10	DEPTH TO GROUNDWATER LEVEL IN FEET WITH DATE OF READING

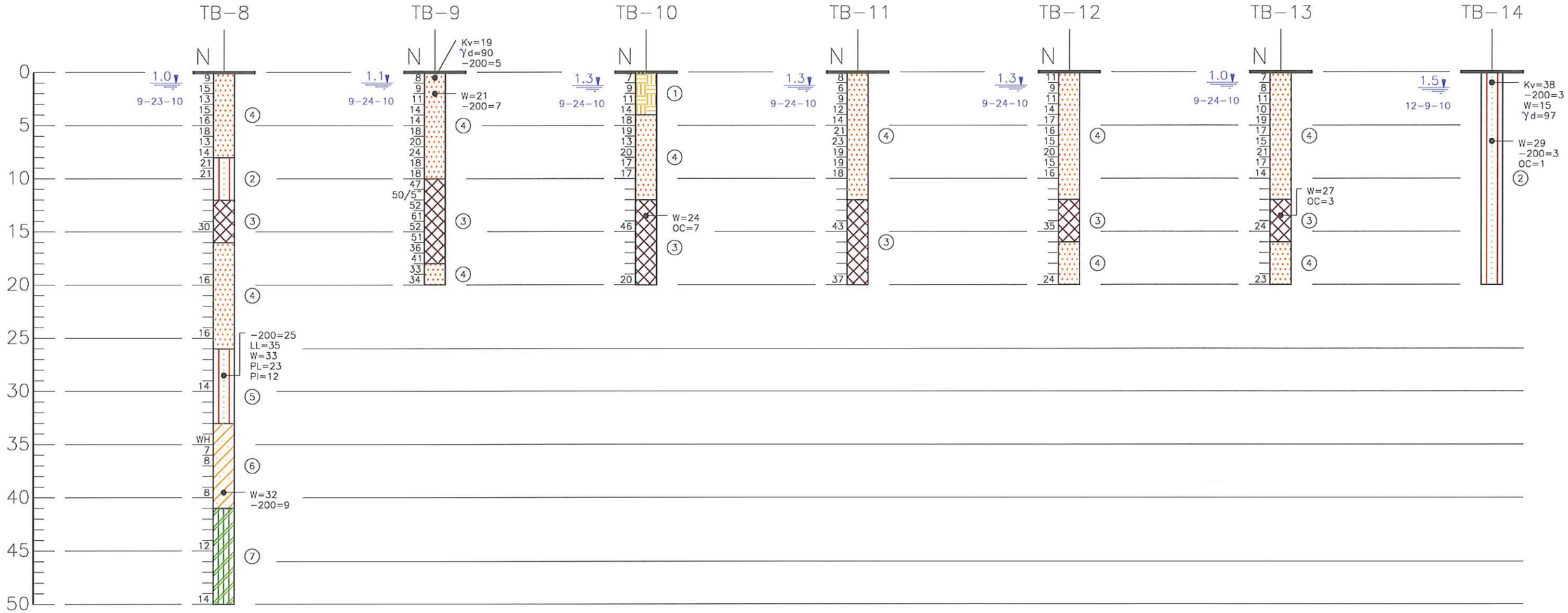
GNE TO 10'	GROUNDWATER NOT ENCOUNTERED TO THE DEPTH OF 10.0'
N	STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
50/5"	(50) BLOWS REQUIRED TO DRIVE SAMPLING SPOON (5) INCHES
Kv	COEFFICIENT OF VERTICAL PERMEABILITY (FT./DAY)
W	NATURAL MOISTURE CONTENT (%)
-200	FINES PASSING No. 200 SIEVE (%)
OC	ORGANIC CONTENT (%)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
PI	PLASTICITY INDEX (%)
γ_d	DRY UNIT WEIGHT (pcf)

SOIL BORING PROFILES

SOLAR PANELS AT STANTON ENERGY PLANT

ORANGE COUNTY, FLORIDA

DRAWN: MG	NODARSE & ASSOCIATES, INC.		
CHKD: AS			
SCALE: NOTED			
DATE: 12-15-10	PROJ. NO: 01-10-0516-101A	FIGURE: 4	



LEGEND

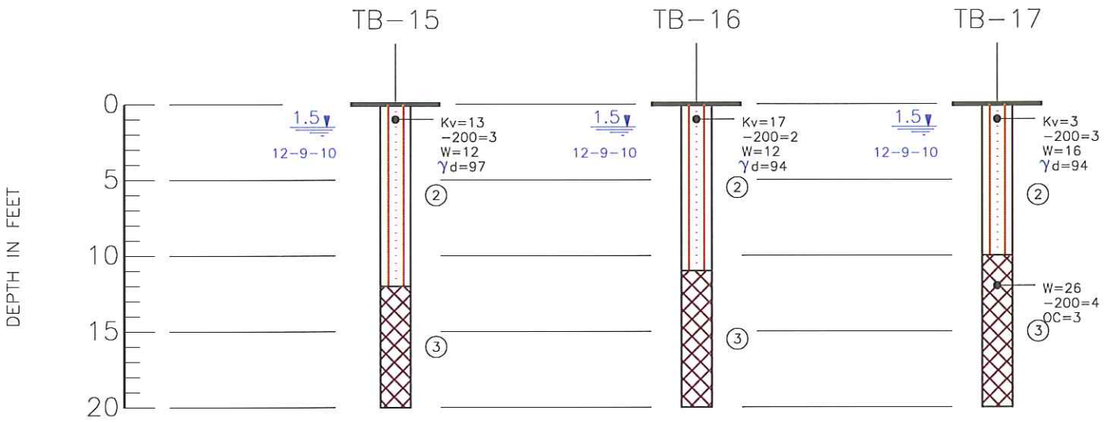
① LOOSE TO MEDIUM DENSE, DARK BROWN FINE SLIGHTLY SILTY SAND, OCCASIONAL ROOTS (TOPSOIL) (SP-SM)	GNE TO 10' — GROUNDWATER NOT ENCOUNTERED TO THE DEPTH OF 10.0'
② MEDIUM DENSE, DARK BROWN FINE SAND TO SLIGHTLY SILTY SAND WITH ORGANIC STAINS (SP)(SP-SM)	N — STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
③ DENSE TO VERY DENSE, DARK BROWN TO DARK REDDISH FINE SILTY SAND (HARDPAN) (SM)	50/5" — (50) BLOWS REQUIRED TO DRIVE SAMPLING SPOON (5) INCHES
④ LOOSE TO DENSE, ORANGE, GRAYISH-BROWN AND BROWN FINE TO MEDIUM SAND (SP)	Kv — COEFFICIENT OF VERTICAL PERMEABILITY (FT./DAY)
⑤ MEDIUM DENSE VERY LIGHT GRAY FINE SILTY SAND (SM)	W — NATURAL MOISTURE CONTENT (%)
⑥ SATURATED, LOOSE FINE CLAYEY SAND (SC)	-200 — FINES PASSING No. 200 SIEVE (%)
⑦ MEDIUM DENSE, LIGHT GREENISH-GRAY FINE SILTY TO CLAYEY SAND WITH SHELLS/PHOSPAHTES (HAWTHORNE) (SM)	OC — ORGANIC CONTENT (%)
(SP) — UNIFIED SOIL CLASSIFICATION GROUP SYMBOL AS DETERMINED BY VISUAL EXAMINATION	LL — LIQUID LIMIT (%)
2.3 ▼ 9-24-10 — DEPTH TO GROUNDWATER LEVEL IN FEET WITH DATE OF READING	PL — PLASTIC LIMIT (%)
	PI — PLASTICITY INDEX (%)
	γ_d — DRY UNIT WEIGHT (pcf)

SOIL BORING PROFILES

SOLAR PANELS AT STANTON ENERGY PLANT

ORANGE COUNTY, FLORIDA

DRAWN: MG	NODARSE & ASSOCIATES, INC.	
CHKD: AS		
SCALE: NOTED		
DATE: 12-15-10	PROJ. NO: 01-10-0516-101A	FIGURE: 5



LEGEND

①	LOOSE TO MEDIUM DENSE, DARK BROWN FINE SLIGHTLY SILTY SAND, OCCASIONAL ROOTS (TOPSOIL) (SP–SM)
②	MEDIUM DENSE, DARK BROWN FINE SAND TO SLIGHTLY SILTY SAND WITH ORGANIC STAINS (SP)(SP–SM)
③	DENSE TO VERY DENSE, DARK BROWN TO DARK REDDISH FINE SILTY SAND (HARDPAN) (SM)
④	LOOSE TO DENSE, ORANGE, GRAYISH–BROWN AND BROWN FINE TO MEDIUM SAND (SP)
⑤	MEDIUM DENSE VERY LIGHT GRAY FINE SILTY SAND (SM)
⑥	SATURATED, LOOSE FINE CLAYEY SAND (SC)
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2.3 ▼ 9–24–10	DEPTH TO GROUNDWATER LEVEL IN FEET WITH DATE OF READING

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50/5"	(50) BLOWS REQUIRED TO DRIVE SAMPLING SPOON (5) INCHES
Kv	COEFFICIENT OF VERTICAL PERMEABILITY (FT./DAY)
W	NATURAL MOISTURE CONTENT (%)
–200	FINES PASSING No. 200 SIEVE (%)
OC	ORGANIC CONTENT (%)
LL	LIQUID LIMIT (%)
PL	PLASTIC LIMIT (%)
PI	PLASTICITY INDEX (%)
γ_d	DRY UNIT WEIGHT (pcf)

SOIL BORING PROFILES

SOLAR PANELS AT STANTON ENERGY PLANT

ORANGE COUNTY, FLORIDA

DRAWN: MG	NODARSE & ASSOCIATES, INC.		
CHKD: AS			
SCALE: NOTED			
DATE: 12–15–10	PROJ. NO: 01–10–0516–101A	FIGURE: 6	

APPENDIX A

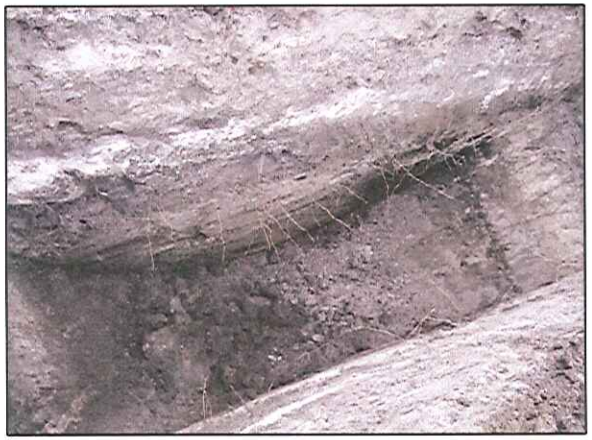
Test Pit TP-1

Test Pit TP-2









Test Pit TP-3

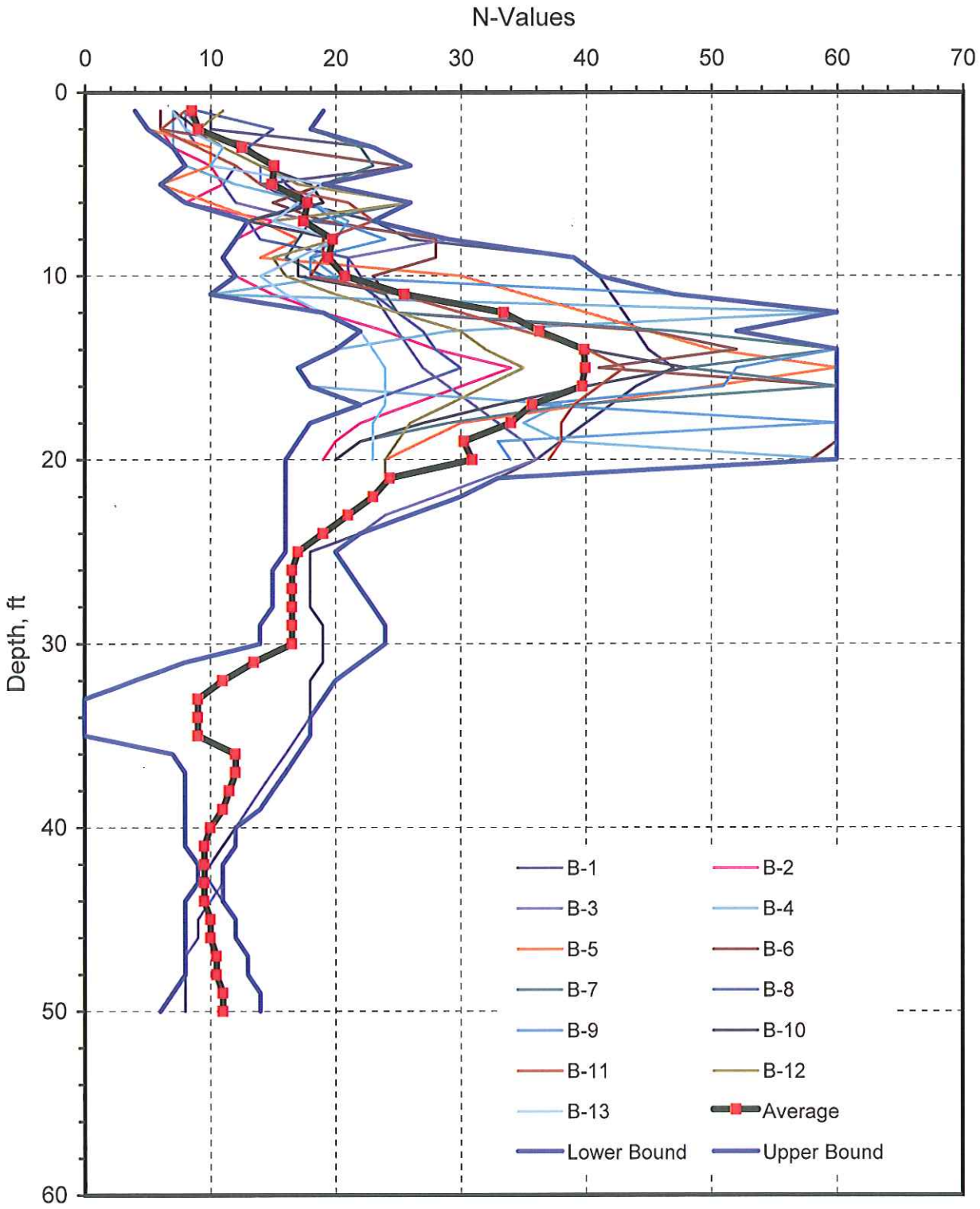
Test Pit TP-4

Test Pit TP-5

APPENDIX B

Nodarse & Associates Inc. - Project # 01-10-0516-101 - Solar Panels at Stanton Enrgy Plant

SPT versus Depth



APPENDIX C

result
** PCSTABL6 **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename: run.in
Output Filename: result.out
Unit: ENGLISH
Plotted Output Filename: result.plt

PROBLEM DESCRIPTION Solar Panels

BOUNDARY COORDINATES

5 Top Boundaries
5 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	77.00	50.00	77.00	1
2	50.00	77.00	66.00	81.00	1
3	66.00	81.00	86.00	81.00	1
4	86.00	81.00	102.00	77.00	1
5	102.00	77.00	150.00	77.00	1

1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	100.0	110.0	0.0	30.0	0.00	0.0	1

1

result
1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	0.00	75.00
2	50.00	77.00
3	94.00	79.00
4	150.00	79.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	66.00	86.00	600.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

400 Trial Surfaces Have Been Generated.

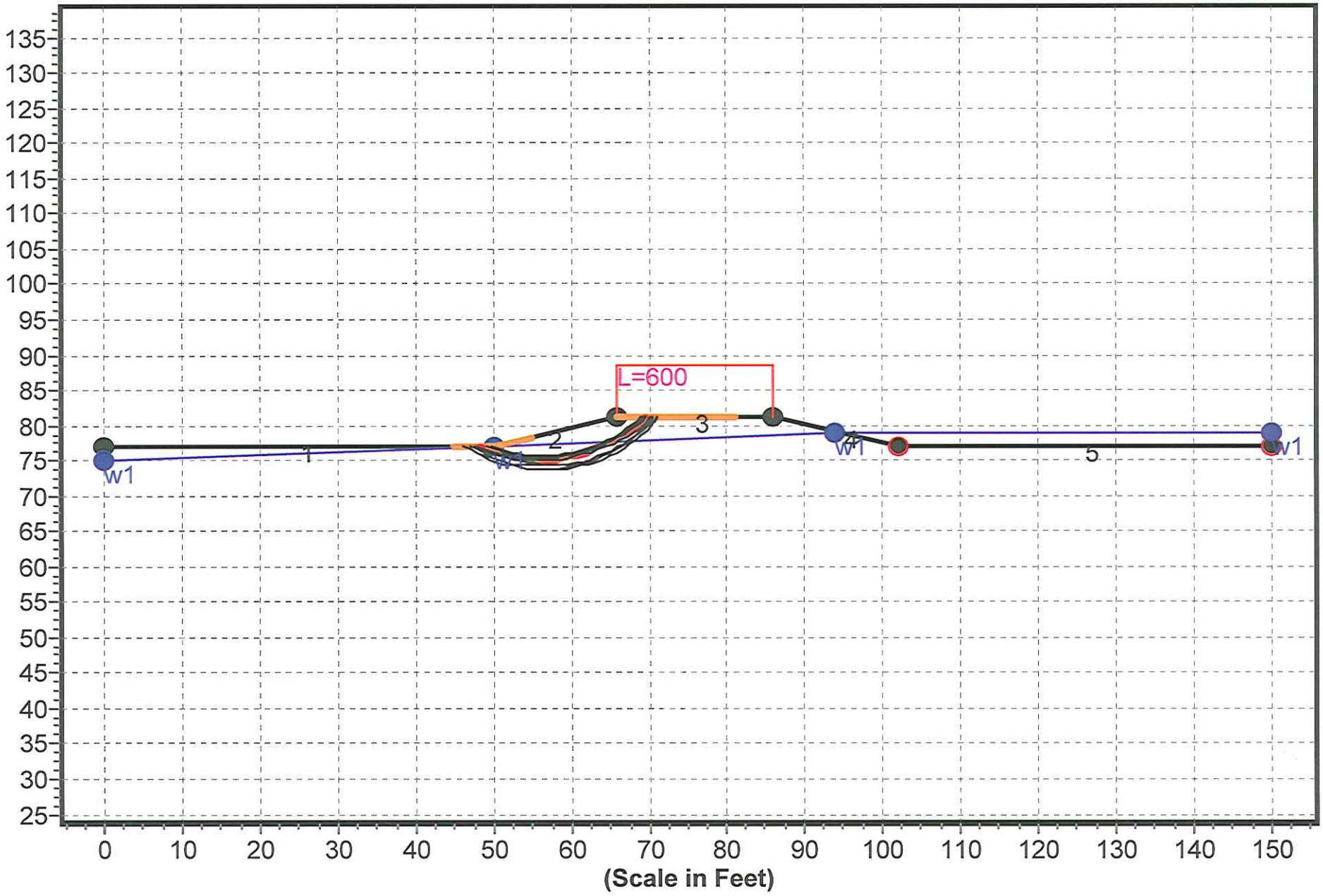
20 Surfaces Initiate From Each Of 20 Points Equally Spaced Along The Ground Surface Between X = 45.00 ft.
and X = 55.00 ft.

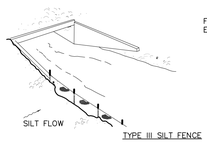
Each Surface Terminates Between X = 66.00 ft.
and X = 81.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

1.00 ft. Line Segments Define Each Trial Failure Surface.

Geometry and Boundary Conditions
Problem: Solar Panels - FS Min = 1.502





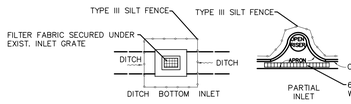
TYPE III SILT FENCE

TYPE III SILT FENCE PROTECTION AROUND DITCH BOTTOM INLETS.

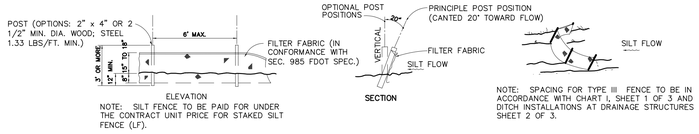
DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATION AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.

SILT FENCE APPLICATIONS

N.T.S.



TYPE III SILT FENCE



NOTE: SILT FENCE TO BE PAID FOR UNDER THE CONTRACT UNIT PRICE FOR STAKED SILT FENCE (LF).

NOTE: SPACING FOR TYPE III FENCE TO BE IN ACCORDANCE WITH CHART I, SHEET 1 OF 3 AND DITCH INSTALLATIONS AT DRAINAGE STRUCTURES SHEET 2 OF 3.

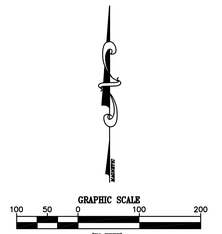
TYPE III SILT FENCE

NOTES:
ADS PERFORATED PIPE:
1. WHERE USED IN CONJUNCTION WITH SILT FENCE, ADS PERF. PIPE SHALL BE PLACED ON THE UPSTREAM SIDE OF THE FENCE.

TYPE III SILT FENCE:
1. TYPE III SILT FENCE TO BE USED AT MOST LOCATIONS. WHERE USED IN DITCHES, THE SPACING FOR TYPE III SILT FENCE SHALL BE IN ACCORDANCE WITH CHART 1, SHEET 1 OF THE FDOT ROADWAY AND TRAFFIC DESIGN STANDARDS INDEX #201.
2. TYPE IV SILT FENCE TO BE USED WHERE LARGE SEDIMENT LOADS ARE ANTICIPATED. SUGGESTED USE IS WHERE FILL SLOPE IS 1:2 OR STEEPER AND LENGTH OF SLOPE EXCEEDS 25 FEET. AVOID USE WHERE THE DETAINED WATER MAY BACK INTO TRAVEL LANES OR OFF THE RIGHT OF WAY.
3. DO NOT CONSTRUCT SILT FENCES ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.
4. WHERE USED AS SLOPE PROTECTION, SILT FENCE IS TO BE CONSTRUCTED ON 0% LONGITUDINAL GRADE TO AVOID CHANNELING RUNOFF ALONG THE LENGTH OF THE FENCE.

EROSION CONTROL DETAILS

N.T.S.



LEGEND

- PROPERTY LINE
- WETLAND LINE
- 25' UPLAND BUFFER LINE
- TYPE III SILT FENCE LINE
- LIMITS OF CLEARING AND SODDING/SEEDING

PERMIT SET (NOT FOR BID)

rp orlando

REGENESIS POWER ORLANDO LLC
2295 COMMERCE POINT DR., SUITE 100
LAKELAND, FL 33801

GENERAL NOTICES:

WBQ Design & Engineering, Inc.
201 N. Magnolia Avenue – Suite 200 – Orlando FL 32801
Phone (407) 839-4300 Fax (407) 839-1621
Certification of Authorization No. EB – 0006796

CLIENT:
ORLANDO UTILITIES COMMISSION
ORLANDO, FLORIDA

PROJECT:
OUC
ORLANDO UTILITIES COMMISSION

NOTICES:

REV NO.	APPR. BY	DATE	DESCRIPTION OF REVISIONS
7			
6			
5			
4			
3			
2			
1			

KEY PERSONS

PROJECT MANAGER:	DIRECTOR OF DESIGN:
PROJECT ARCHITECT:	DESIGN MANAGER: DLA
PROJECT DESIGNER:	DRAWN BY: RKR
APPROVAL:	DATE: / FILENAME:

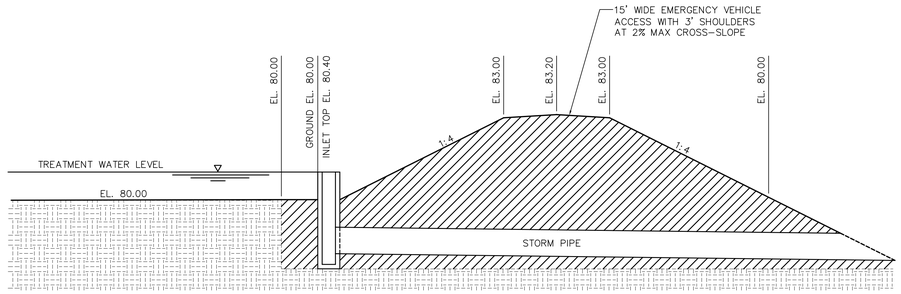
PROJECT TITLE:

SHEET TITLE:
EROSION PREVENTION PLAN

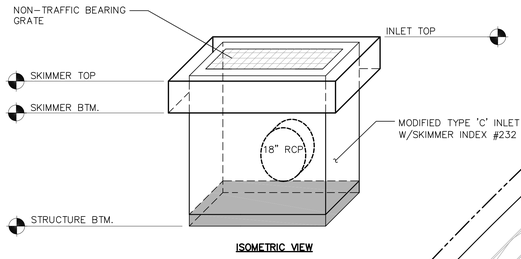
PROJECT NO./PKG. CODE: | PHASE:

DRAWING NO.:
C200

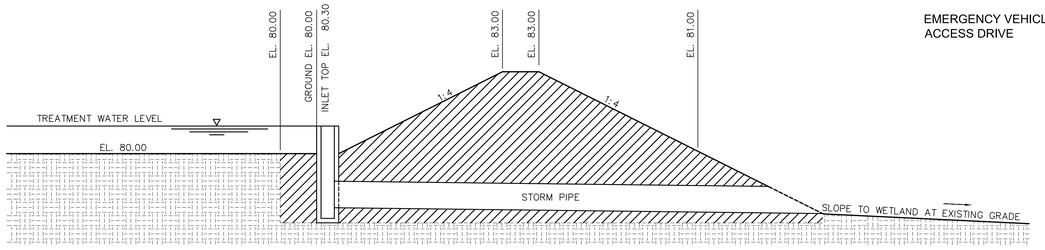
REVISION NO.: △



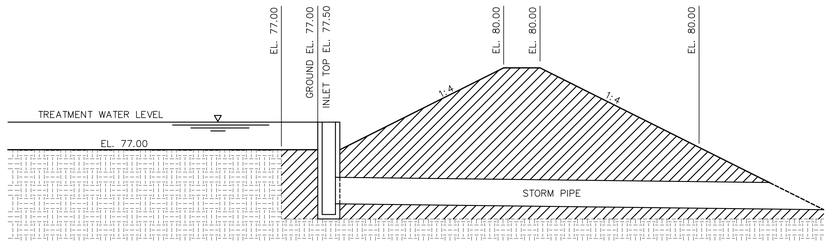
SECTION A-A
N.T.S.



TYPICAL IMPOUNDMENT BERM CONTROL STRUCTURE
NTS



SECTION B-B
N.T.S.



SECTION C-C
N.T.S.

DESIGN CRITERIA:

The stormwater management design criteria for this project is to retain the first inch and one-quarter of runoff from the impervious area on the site or the first one-half inch of rainfall over the site, whichever is greater. For this project, the first one-half inch of rainfall over the site will prevail. Pursuant to design criteria for On-Line treatment, an additional one-half inch of runoff over the project area will be provided. Also, since this project is located within the Econlockhatchee River Basin, an addition 50% treatment volume is required in the on-site stormwater management system.

Therefore, the design parameters are as follows:

Development Area South of East - West Conveyance Ditch

Project Area = 12.13 acres that discharge to the east - west conveyance ditch and the ditch along Innovation Way.

12.13 x 0.5/12 = 0.51 AF

0.51 AF + (12.13 x 0.5/12) = 1.02 AF of online storage.

1.02 AF x 1.5 = 1.52 AF of OFW Storage Required

Development Area North of Southern Wetland

Project Area = 12.66 acres that discharge to the southern wetland and the ditch along Innovation Way.

12.66 x 0.5/12 = 0.53 AF

0.53 AF + (12.66 x 0.5/12) = 1.06 AF of storage required.

1.06 AF x 1.5 = 1.58 AF of OFW Storage Required

Development Area North of East - West Conveyance Ditch

Project Area = 10.96 acres that discharge to upland flatwoods to the east.

10.96 x 0.5/12 = 0.46 Acre-Feet (AF)

0.46 AF + (10.96 x 0.5/12) = 0.92 AF of online storage.

0.92 AF x 1.5 = 1.38 AF of OFW Storage Required

Treatment Methodology:

The proposed treatment methodology for this project will be to provide impoundment berms to retain the first one-half inch of rainfall over the site. Traditional treatment methods were discounted from consideration due to the high groundwater table elevation across the property. The reservation of land area required to accommodate wet retention ponds would result in the loss of solar arrays and utilizing treatment swales would required that the entire site be filled significantly to provide the necessary two feet of separation between the bottom of the swale and the seasonal high ground water elevation.

It is proposed that a three foot high retention berm be placed along the east property line in the northern portion of the site and another along the south bank of the east-west conveyance ditch to impound the required treatment volume on the site. A third impoundment berm will be constructed just south of the southernmost solar arrays that will also retain stormwater runoff from the projet site and to prevent water from the undeveloped portion of the site south of the berm from entering the project area. Drainage control structures will be constructed on the upstream side of the berms to allow excess runoff over and above the required treatment volume to be released off site via a pipe through the berm to the pre-development points of discharge. The impounded stormwater will be slowly drawn down by natural percolation so that 50% of the treatment volume is recovered in 24 to 36 hours after the storm event and the remainder within 72 hours following the storm. The maximum depth of water after a storm event will be two feet along the face of the northern impoundment berm and one foot along the face of the southern two impoundment berms.

PERMIT SET (NOT FOR BID)

rp orlando

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PROJECT:
OUC
ORLANDO UTILITIES COMMISSION

NOTICES:

CONTRACTOR SHALL VERIFY ALL CONDITIONS ON JOB SITE AND NOTIFY THE OWNER OF ANY VARIATIONS FROM DIMENSIONS SHOWN ON THESE DRAWINGS BEFORE PROCEEDING WITH ANY CONSTRUCTION.

REV. NO.	APPR. BY	DATE	DESCRIPTION OF REVISIONS
7			
6			
5			
4			
3			
2			
1			

KEY PERSONS

PROJECT MANAGER:	DIRECTOR OF DESIGN:
PROJECT ARCHITECT:	DESIGN MANAGER: DLA
PROJECT DESIGNER:	DRAWN BY: RKR
APPROVAL:	DATE: / FILENAME:

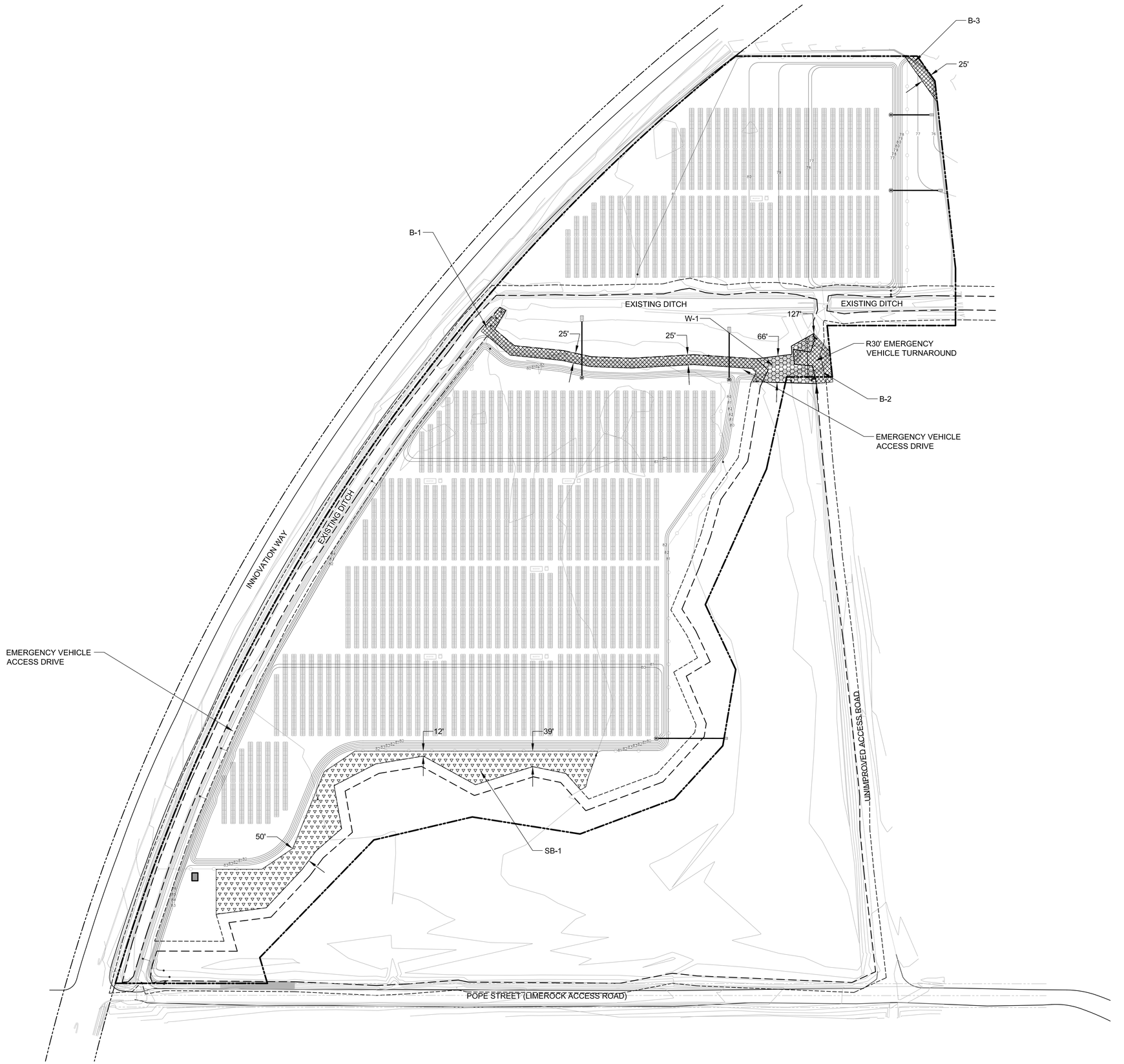
PROJECT TITLE:

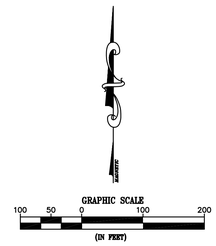
SHEET TITLE:
GRADING PLAN

PROJECT NO./PKG. CODE: / PHASE:

DRAWING NO.:
C300

REVISION NO.: △





LEGEND

- PROPERTY LINE
- WETLAND LINE
- 25' UPLAND BUFFER LINE
- NEW FENCE LINE
- WETLAND IMPACT
- UPLAND BUFFER IMPACT
- SUPPLEMENTAL UPLAND BUFFER

IMPACT SUMMARY TABLE	
IMPACT ID *	IMPACT AREA
B-1	0.46 acres
B-2	0.14 acres
B-3	0.06 acres
W-1	0.21 acres
SB-1	1.56 acres

* B = BUFFER IMPACT
W = WETLAND IMPACT
SB = SUPPLEMENTAL BUFFER

PERMIT SET (NOT FOR BID)

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PROJECT ARCHITECT:	DESIGN MANAGER: DLA
PROJECT DESIGNER:	DRAWN BY: RKR
APPROVAL:	DATE: / FILENAME:

PROJECT TITLE:

SHEET TITLE:
WETLAND IMPACT PLAN – FDEP

PROJECT NO./PKG. CODE: | PHASE:

DRAWING NO.:
C400

REVISION NO.: △