Professional Services

J. W. Corbett Wildlife Management Area
Hydrologic Assessment

Florida Fish and Wildlife
Conservation Commission
FWC - 14275

FINAL Geotechnical Data Report

January 28, 2016

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1.0 Data Acquisition Summary

Objectives

This data report presents the results of the geotechnical engineering services, including soil boring, laboratory testing of soil samples, monitoring well installation and pumping/slug tests for the project site, as framed and limited in the Statement of Work issued with the subconsultant agreement between South Florida Engineering and Consulting, LLC (SFEC) and Gannett Fleming, Inc. (GF) and performed by GF, as a subconsultant to SFEC, a prime consultant under the contract (FWC-14275) between Florida Fish and Wildlife Conservation Commission (FWC) and SFEC.

A SPT soil boring, and monitoring well installations along with field permeability pumping tests were conducted to provide pertinent soil subsurface information. Refer to **Figure 1** for the location of the GW monitoring wells and boring location plan, as specified by SFWMD.

Scope of Work

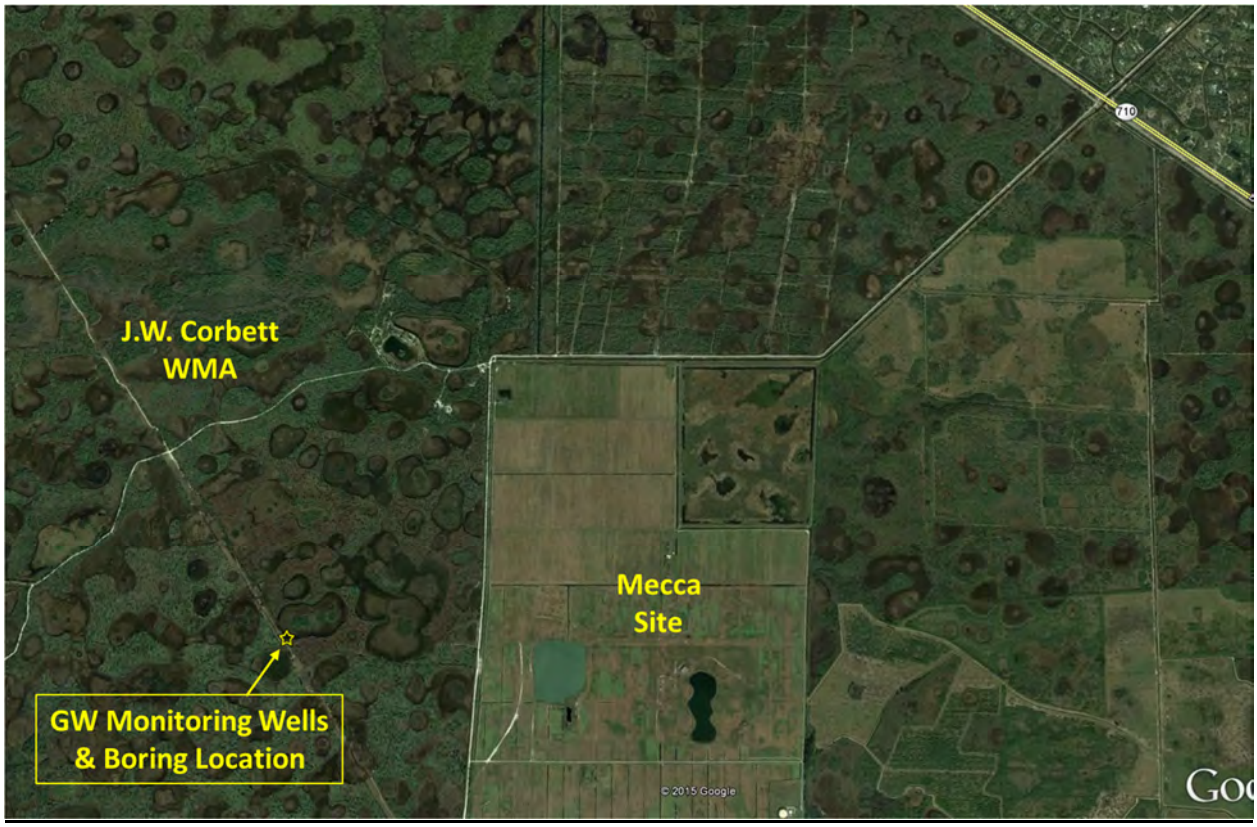
The Scope of Work included the following task activities:

- Drilling and Sampling with SPT soil boring, Sample Classification, and Laboratory Analysis of Unconsolidated Samples. (Tasks 2.1, 2.2 & 2.3)
- Piezometers Installation, Well Completion. (Tasks 2.4 & 2.5)
- Borehole Geophysical Logging. (Task 2.6)
- Slug Tests and Constant Head Field Permeability Tests. (Task 2.7)

Collaboration Entities

- Drilling and Sampling with SPT soil boring – Centerline Drilling, Inc.
- Soil Sample Classification, and Laboratory Analysis of Unconsolidated Samples – Gannett Fleming, Inc.
- Piezometers Installation, Well Completion – Centerline Drilling, Inc.
- Borehole Geophysical Logging – RMBAKER LLC.
- Slug Tests and Constant Head Field Permeability Tests – Gerhardt M. Witt & Associates, Inc.
- Surveying – Erdman Anthony

Figure 1. GW Monitoring Wells & Boring Location Plan



2.0 Site Conditions

Regional and Local Geology

In Palm Beach County, the surficial sediments are comprised of quartz and calcareous sands, shell, and limestone with occasional sandstone (**Figure 2**). These sediments were deposited one to five million years ago during the Pleistocene and Pliocene Epochs. The geologic materials that underlie Palm Beach County were deposited in a mixture of environments that range from high energy beach (typically sands) to low energy lagoon (typically silts and clays), which may also represent both freshwater and marine environments. The geologic formations within the Pleistocene Epoch are the Pamlico Sand, the Anastasia Formation, and the Fort Thompson Formation. The Tamiami Formation delineates the Pliocene Epoch and the Hawthorn Group sediments delineate the Miocene time frame of 25 million years ago. The sediments of the Hawthorn Group underlie the Tamiami Formation. Together they combine to form a thickness ranging from 100 feet in western parts of the county to approximately 300 feet in eastern parts of the county.

Regional and Local Soils

The soil associations in Palm Beach County Area have been grouped into four general kinds of landscapes for broad interpretative purposes as follows (**Figure 3**):

- The eastern coast – consist mainly of nearly level to sloping, excessively drained soils that are sandy to a depth of 80 inches or more, but there are also moderately well drained to somewhat poorly drained soils that are mixtures of sand and shell fragments. Many areas have been modified and are in urban use.
- The eastern third of the county, just west of the coastal ridge – consist mainly of nearly level, poorly drained soils and nearly level to gently sloping, moderately well drained soils on low ridges, all of which have a weakly cemented layer in the subsoil; and nearly level, poorly drained soils that have a loamy subsoil. Most areas of these soils are not subject to flooding, but small scattered areas in sloughs and depressions are frequently flooded.
- The east central part – consist mainly of nearly level, poorly and very poorly drained soils that have a loamy subsoil, some of which have a thin organic surface layer; poorly drained sandy soils; and poorly drained soils that rest on limestone. These soils are mostly in low sloughs and depressions that are subject to frequent flooding and covered with water for long periods.
- The western part, including the Everglades – consist mainly of nearly level, very poorly drained organic soils, some of which rest on limestone.

The J.W. Corbett Wildlife Management Area is located in the east central part of Palm Beach County and thus the soils underlying the project location area represent the soil characteristics of the third group of soil groupings above.

Figure 2. General Geology Map of Palm Beach County

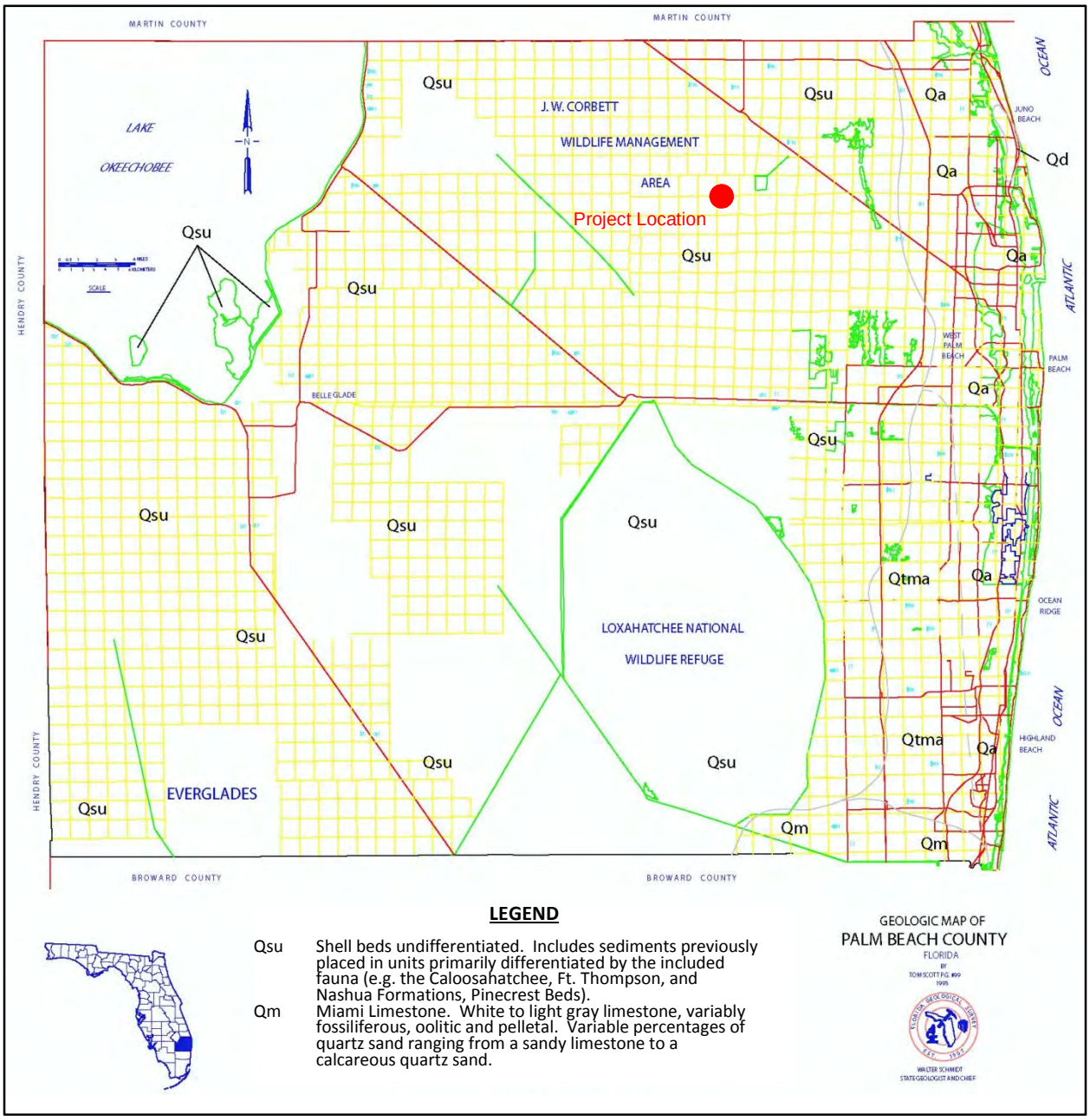
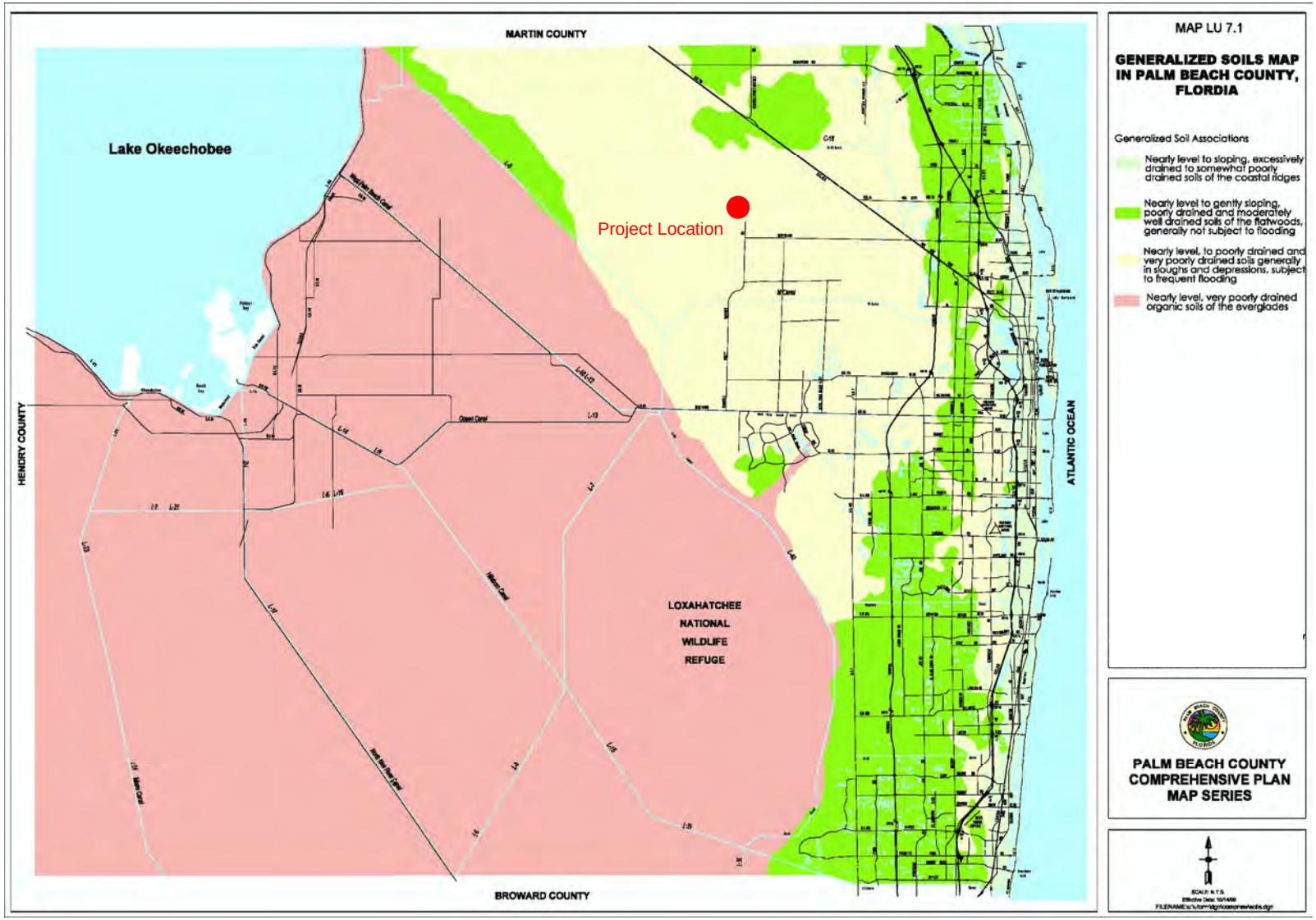


Figure 3. General Soil Map of Palm Beach County



3.0 SPT Soil Boring

One (1) Standard Penetration Test (SPT) soil boring was conducted to characterize the subsurface conditions. The boring location is shown in **Figure 1**, and the soil boring logs were compiled in **Appendix A**.

Boring Logs

The SPT soil boring was drilled using mud rotary methods, and samples of the materials were obtained using SPT procedures described in **ASTM D1586**. SPT samples were obtained continuously for the 100-foot depth. The borehole was sealed with cement-bentonite grout upon completion. The soil boring summary is listed on **Table 1**.

Table 1. Soil Boring Summary

Boring Number	GPS Location		Ground Elevation, ft NAVD88 (estimated from DEM)
	Latitude	Longitude	
MFEBBH25	26° 50’ 10”N	80° 18’ 21”W	21.00

The soil boring log is included in **Appendix A**.

Representative samples from the boring were tested for index properties including moisture content (**ASTM D2216**), organic content (**ASTM D2974**), and grain size distribution (**ASTM C136**). The laboratory testing result table was included in **Appendix B**.

Subsurface Materials Encountered

Subsurface materials encountered in the borings generally consist of natural sandy soils within the undifferentiated shell bed and limestone formation associated with Caloosahatchee, Ft. Thompson, and Nashua Formations, Pinecrest Beds.

The upper soils, at depths ranging from 0 to 32 ft below ground surface (bgs), are composed of loose to medium dense dark gray sand with some shell fragments.

The underlying soils, at depths ranging from 32 to 60 ft bgs, are composed of dense to very dense gray sand with trace of shell fragments. These soils have an origin of limestone formation, based upon the HCl reaction.

The underlying soils, at depths ranging from 60 to 100 ft bgs, are composed of medium dense to dense silty gray fine sand with trace of shell fragments.

Groundwater Levels

Groundwater depth is located at ground surface.

4.0 Geophysical Borehole Logging

Geophysical logging and borehole imaging was performed by RMBAKER LLC on October 1, 2015 in accordance with SFWMD logging specifications. The intention of the logging and borehole imaging is to provide the in situ high resolution downhole data about the geologic formation(s) encountered. The logging data for the pilot borehole was presented as a series of downhole curves and images alongside summary information for lithology and relative soil density. This information collected will be provided to the SFWMD for their use and continuing efforts to characterize the hydrogeologic framework of the site.

The logging was performed on a 100 foot deep mudded pilot borehole using a variety of techniques (acoustic televiewer, caliper, natural gamma, dual induction, electric and sonic). The logging data collected was specified by the SFWMD as part of the overall geotechnical testing program. Each logging tool was advanced into the borehole using a logging cable and winch. Data was collected while trolling the tool from the bottom upward to the ground surface. The data was collected on a laptop computer and processed to form the completed logs provided herein. Logging data was provided in both PDF and .las ascii forms.

The SFWMD logging specifications called for the appropriate use of a video camera, optical televiewer or acoustic televiewer imaging device in the pilot hole. Given that the pilot hole was mud-filled, the only option was to utilize an acoustic televiewer. The HRAT tool (high resolution acoustic televiewer) used a sonic beam to record the first reflection time and amplitude of the inside of the borehole. The data was presented in the logs as a bitmap image of an unwrapped borehole. For the most part the HRAT images showed irregular patterns that appeared to be cuts from the drill bit. In general, the HRAT imaging technique was not able to resolve bedding patterns or structural aspects of any limestone layers. The HRAT imaging of the borehole wall was partially impeded by the presence of the drilling mud and mud-cake loaded with sand, silt and shell material.

The dual induction method appeared to produce superior data as compared to the standard normal resistivity method, with more indications of sediment layering and variable porosity conditions. There also appeared to be a loose correlation between the dual induction resistivity curves and the SPT N-values, with higher resistivity layers corresponding to higher N-values. This relationship was presumably triggered by the combined increased presence of silts and clays in lower density sediments and the increased total porosity of the higher density sediments, although this relationship would require laboratory data as confirmation.

The SFWMD logging specifications called for a calculation of sonic porosity from the interval velocity (slowness velocity) of the formation. This calculation was complicated by the highly variable and unconsolidated nature of the sediments encountered, with sand (either siliceous or calcareous) being the predominant sediment type noted in the

sediment logs. We utilized a matrix velocity value (58.8 µsec/ft) consistent with highly unconsolidated “sandstone” in order to calculate the sonic porosity utilizing the interval velocity (DT) measured by our sonic logging tool. Table 2 lists the logging tools and their log types / codes utilized for geophysical logging and borehole imaging.

Table 2. Geophysical Borehole Logging Tools, Logs, and Log Codes

Logging Tool	Logs	Log Code
Caliper	Borehole diameter	CAL
	Natural gamma	GAMM
Dual Induction	Deep formation resistivity	ILD
	Shallow formation resistivity	ILM
Electric	Single point resistance	RES
	Spontaneous potential	ESP
	64 inch normal resistivity	RLN
	32 inch normal resistivity	R32
	16 inch normal resistivity	RSN
	8 inch normal resistivity	R8
Sonic	Interval velocity	DT
	Variable density log	RX3
	Calculated sonic porosity	SONIC POROSITY
High Resolution Acoustic Televiewer	Travel time image	TRAVEL TIME
	Amplitude image	AMPLITUDE

Source: RMBAKER LLC, 8600 Old Bridge Lane, Orlando FL 32819.
Note: Below is the description of the information that can be reasonably obtained for the logs performed at this site. A more complete reference for a broad discussion of the possible information from logging is outlined in the publication “Borehole Geophysics Applied to Ground-Water Investigations”, USGS Techniques of Water Resources Investigations, Chapter E2, by W. Scott Keys (1990).

Information from each log

Caliper: A caliper log is a measure of borehole diameter, and the presence of wash-outs and natural voids can be determined.

Natural Gamma: The presence of clays and/or phosphates will create gamma curve spikes as compared to the relatively low gamma signals from siliceous and calcareous detrital materials (sand, silt, shell and limestone).

Dual Induction: Shallow and deep penetrating induction dipoles measure the decay of an electrical current induced within the formation. The resultant resistivity curve data is a bulk measure of mineralogy, fluid chemistry and total porosity. Lower resistivity would be associated with an increase in fines content and/or a decrease in porosity. Higher

resistivity would be associated with a decrease in fines content (more highly washed sediment) and/or an increase in porosity.

Electric:

Single point resistance: The single point resistance is a focused measure of the electrical resistance of the surface of the borehole sidewall.

Spontaneous potential: The spontaneous potential is a measure of the ambient electrical potential between two electrodes, and is used primarily as an indicator of changes in gross lithology.

Normal resistivity: The normal resistivities are measured in four layers with varying electrical current penetration into the formation. The resultant resistivity curve data is a bulk measure of mineralogy, fluid chemistry and total porosity. Lower resistivity would be associated with an increase in fines content and/or a decrease in porosity. Higher resistivity would be associated with a decrease in fines content (more highly washed sediment) and/or an increase in porosity.

Sonic: The sonic sonde measures the interval acoustic velocity of the formation, which is the difference in signal arrival time between two variably spaced receivers. The interval velocity can be used to estimate the primary porosity of the formation with an appropriately assumed matrix velocity value. The variable density log is a graphical representation of the acoustic signal returned to the nearest receiver.

Acoustic Televiewer: An acoustic televiewer is an imaging device that can provide a picture of conditions within the borehole when poor visibility prevents the use of optical/light based techniques. The compass-referenced televiewer data can be used to measure the strike and dip of structural surfaces within the borehole.

Referring to Geophysical Borehole Log, Appendix C (Pages 30 & 31)

- The elevated gamma values (>50 and <100 CPS) from 18 to 38 feet, including the spike at 20 feet, may indicate a slight increase in clay within the formation sediments. Background values of less than 50 CPS are typical of shell and calcareous sand. Gamma values up to 100 CPS are likely to be associated with interstitial clays.
- The SPT density and induction resistivity curves trend similarly with a notable dense layer from 40 to 57.5 feet. There lithology logs indicated a dense sand within this interval.
- There was no lithological variation in the logs that could be attributed as the cause of the rapid wiggle of the induction curves between 70 and 75 feet. The resistivity anomaly may be related to formation attributes such as porosity and bedding not represented by the relatively small split spoon samples.

5.0 Monitoring Well Installation and Data

In support of the project, the following work activities were conducted:

- One (1) monitoring 3-well cluster was installed at the SFWMD specified location by Centerline Drilling, Inc., a SFWMD-approved well-drilling subcontractor.
- One (1) aquifer pumping test and one (1) slug test was completed at each of the three (3) wells by Gerhardt M. Witt & Associates, Inc. (GWA), a subcontractor to Centerline Drilling. Each pumping test was completed for a relatively short duration, at a constant rate, and in accordance with industry standards.
- Pumping test water level drawdown data collected by GWA were analyzed by Gannett Fleming, utilizing the AQTESOLV computer program, to estimate aquifer hydraulic conductivity and transmissivity at the new monitoring well locations.

5.1 Well Cluster Location and Description

Welling Drilling

One (1) monitoring 3-well cluster (2-inch finished diameter) was installed at the SFWMD specified location (refer to **Figure 1**). Monitoring well cluster included three (3) wells, which were installed at various depths as noted in **Table 3**.

Table 3. Installation Depths of Monitoring Well Cluster

Well Name	Installation Depth (ft)
MFEB9-GW1	100
MFEB9-GW2	39
MFEB9-GW3	15

Well Logs and Well Permits

Appendix D shows the well logs to illustrate the boring log details as well as the well installation details. Also, included in **Appendix E** are a copy of the well installation permits filed with the Palm Beach County.

5.2 Pumping and Slug Tests Summary

Slug tests and constant-rate pumping tests were performed on October 15, 2015 at the three monitoring wells (MFEB9-GW1, -GW2, and –GW3) to evaluate aquifer hydraulic characteristics. The slug test water level displacement data and pumping test water level drawdown data were analyzed utilizing the AQTESOLV computer program to estimate aquifer hydraulic conductivity and transmissivity values. **Tables 4 and 5** summarize the monitoring well pumping and slug test data analysis results, respectively. The AQTESOLV analyses output reports are included in **Appendix F**.

Details Conducting Pumping and Slug Tests
A constant-rate pumping test was performed at each of the three (3) 2-inch diameter monitoring wells. The pumping tests were conducted by Gerhardt Witt & Associates (GWA) on behalf of Centerline Drilling under subcontract to SFEC. For the pumping tests, data loggers, recording at 4 sec intervals, were installed in the wells.

First, the deep well (MFEB9-GW1) was pumped for 1 hr. The pumping rate was maintained at a constant rate of 6.5 gpm during the pumping test. Then the pump was stopped after the water level in the pumping well stabilized, and the data on the recovery to the initial condition was recorded.

After deep well recovered, the middle well (MFEB9-GW2) was pumped for 1 hr. The pumping rate was maintained at a constant rate of 5.9 gpm during the pumping test. Then the pump was stopped after the water level in the pumping well stabilized, and the data on the recovery to the initial condition was recorded.

After middle well recovered, the shallow well (MFEB9-GW3) was pumped for 1 hr. The pumping rate was maintained at a constant rate of 2.3 gpm during the pumping test. Then the pump was stopped after the water level in the pumping well stabilized, and the data on the recovery to the initial condition was recorded.

Manual readings on water levels were obtained from each well throughout each pumping test.

For the slug tests, data loggers, recording at 4 sec intervals, were installed in the wells. The slug test was also conducted by GWA on behalf of Centerline Drilling under subcontract to SFEC. The slug test was performed by filling each monitoring well with water to the top and then recording the drop of water in the well. The slug test was performed three (3) times on each well.

Monitoring Well Aquifer Tests Analyses Summary
The well pumping test and slug test data obtained in the field were provided by GWA to Gannett Fleming to conduct the analyses to estimate hydraulic conductivity values of the subsurface material. These analyses were conducted using different aquifer model assumptions and curve-matching solutions available in the AQTESOLV computer

program. These aquifer model solutions included the Hantush and the Neuman-Witherspoon solutions for leaky aquifers, the Neuman solution for unconfined aquifers, and the Bouwer-Rice solution for unconfined aquifers.

The pumping test drawdown data were analyzed using the Hantush and the Neuman-Witherspoon leaky aquifer model solutions. The leaky aquifer model solutions were selected because borehole stratigraphy showed a possible aquitard located between about 40 to 60 feet below ground surface. In addition, the type-curve for the leaky aquifer solutions could be matched to both very early and later drawdown data collected at the wells (i.e., data collected in the first 10 to 60 minutes) during the pumping period. Therefore, these two solutions were considered more appropriate for the pumping test data analyses than other available solutions in the program.

The slug test recovery data were analyzed using the Bouwer-Rice unconfined aquifer model solution. The type-curve for this solution was matched to falling head data collected in the first one to two minutes after the water was displaced by the slug-in stress period, which was considered most appropriate for the analyses. The results of the analyses are shown on the enclosed table.

The variation of hydraulic conductivity values determined from the constant rate pumping test drawdown data versus the slug test data is likely a result in variations between the extent of aquifer stressed by the two types of tests, and the solutions used to analyze the data. The slug tests only displaced up to 3.6 feet of water in the test wells for several seconds, which likely resulted in very little displacement of water in the surrounding aquifer. The pumping tests applied more stress on the local aquifer over 60 minutes, which resulted in about 8 to 15 feet of drawdown in the test wells and drawdown in the surrounding aquifer. Therefore, the slug test displacement data used to determine the near-well aquifer characteristics may provide hydraulic conductivity results that are different than the results determined from longer-term pumping test data influenced by portions of the aquifer located farther from the well. In addition, if the drawdown data collected in the first minute of the pumping period were influenced by well bore storage, the leaky aquifer model solution results may underestimate the aquifer transmissivity and hydraulic conductivity.

It is worthy of special mention that similar lithologic units can have hydraulic conductivity values that vary. For example, within the L-8 FEB project domain (92 square miles) in Palm Beach County, reported values of hydraulic conductivity for similar lithologic units in the vicinity of the reservoir and adjacent local areas ranged from less than 1 ft/day to more than 100 ft/day and vary both spatially and vertically.

Table 4. Summary of Estimated Aquifer Values Determined from Pumping Test Data

Well ID	Screened Interval (ft)	Estimated Aquifer Thickness (ft)	Pumping Test Rate (gpm)	Early Drawdown Data Curve-Matching using Hantush Soln.		Early Drawdown Data Curve-Matching using Newman-Witherspoon Soln.		Average Transmissivity (ft^2/d)	Average Hydraulic Conductivity (ft/d)
				Transmissivity (ft^2/d)	Hydraulic Conductivity (ft/d)	Transmissivity (ft^2/d)	Hydraulic Conductivity (ft/d)		
MFEB9-GW1	95.0-100.0	40.0	6.5	30.0	0.75	27.1	0.68	28.6	0.71
MFEB9-GW2	34.0-39.0	39.3	5.9	15.6	0.40	16.1	0.41	15.9	0.40
MFEB9-GW3	10.0-15.0	39.3	2.3	23.5	0.60	17.8	0.45	20.7	0.53

Table 5. Summary of Hydraulic Conductivity Values Determined From Slug Testing

Well ID	Screened Interval (ft)	Estimated Aquifer Thickness (ft)	Slug-in Test
			Hydraulic Conductivity (ft/d)
MFEB9-GW1	95.0-100.0	40.0	42.68
MFEB9-GW2	34.0-39.0	39.3	10.17
MFEB9-GW3	12.5-17.5	39.3	6.89

6.0 Data Results

This data report presents the results of the geotechnical data collection, including soil boring, laboratory testing of soil samples, monitoring well installation and pumping/slug tests for the project site, as framed and limited in the Statement of Work issued with the subconsultant agreement between South Florida Engineering and Consulting, LLC (SFEC) and Gannett Fleming, Inc. (GF) and performed by GF, as a subconsultant to SFEC, a prime consultant under the contract (FWC-14275) between Florida Fish and Wildlife Conservation Commission (FWC) and SFEC.

One (1) SPT soil boring and monitoring well installation, consisting of one (1) 3-well cluster, along with field pumping and slug tests were conducted to provide pertinent soil subsurface and hydraulic conductivity information.

Field surveying was conducted by Erdman Anthony to support the SPT soil boring and monitoring well installation which located the locations of the borehole and the wells with state plane coordinates and reference elevations in NAVD88 vertical datum. The field survey data report is included in **Appendix G**.

7.0 References

- American Society for Testing and Materials (ASTM), **ASTM D1586-11** Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils.
- American Society for Testing and Materials (ASTM), **ASTM D4220-95(2007)** Standard Practices for Preserving and Transporting Soil Samples.
- American Society for Testing and Materials (ASTM), **ASTM D2487-11** Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- American Society for Testing and Materials (ASTM), **ASTM D2974-07** Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
- American Society for Testing and Materials (ASTM), **ASTM C136-06** Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- American Society for Testing and Materials (ASTM), **ASTM D2216-10** Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
- Florida Geological Survey, Open File Map Series No. 65 (OFMS 65) - Geologic Map of Palm Beach County, Florida, by T. Scott, 1993. Scale: 1:126,720.
- Palm Beach County, Palm Beach County Comprehensive Plan Map Series Map LU 7.1 – Generalized Soils Map in Palm Beach County, Florida. Effective October 14, 1999.
- Keys, W. S., Borehole Geophysics Applied to Ground-Water Investigations, USGS Techniques of Water Resources Investigations, Chapter E2, 1990.

APPENDIX A

SOIL BORING LOGS
(Borehole by Centerline Drilling, Inc.)

TEST BORING LOG

Gannett Fleming

Project: J. W. CORBETT WILDLIFE MANAGEMENT AREA
Boring Location: 26° 50' 10" N, 80°18' 21" W
Ground Elevation: +21.00 NAVD'88 (est. from survey)
Groundwater Depth: ▽ At Ground Surface
Length of Casing Set: 6'

Boring No. MFEBBH25
Sheet 1 of 3
Job No. 060735
Boring Completed 9/23/2015
Driller SAY/DELMAS
Drill Rig MANUAL

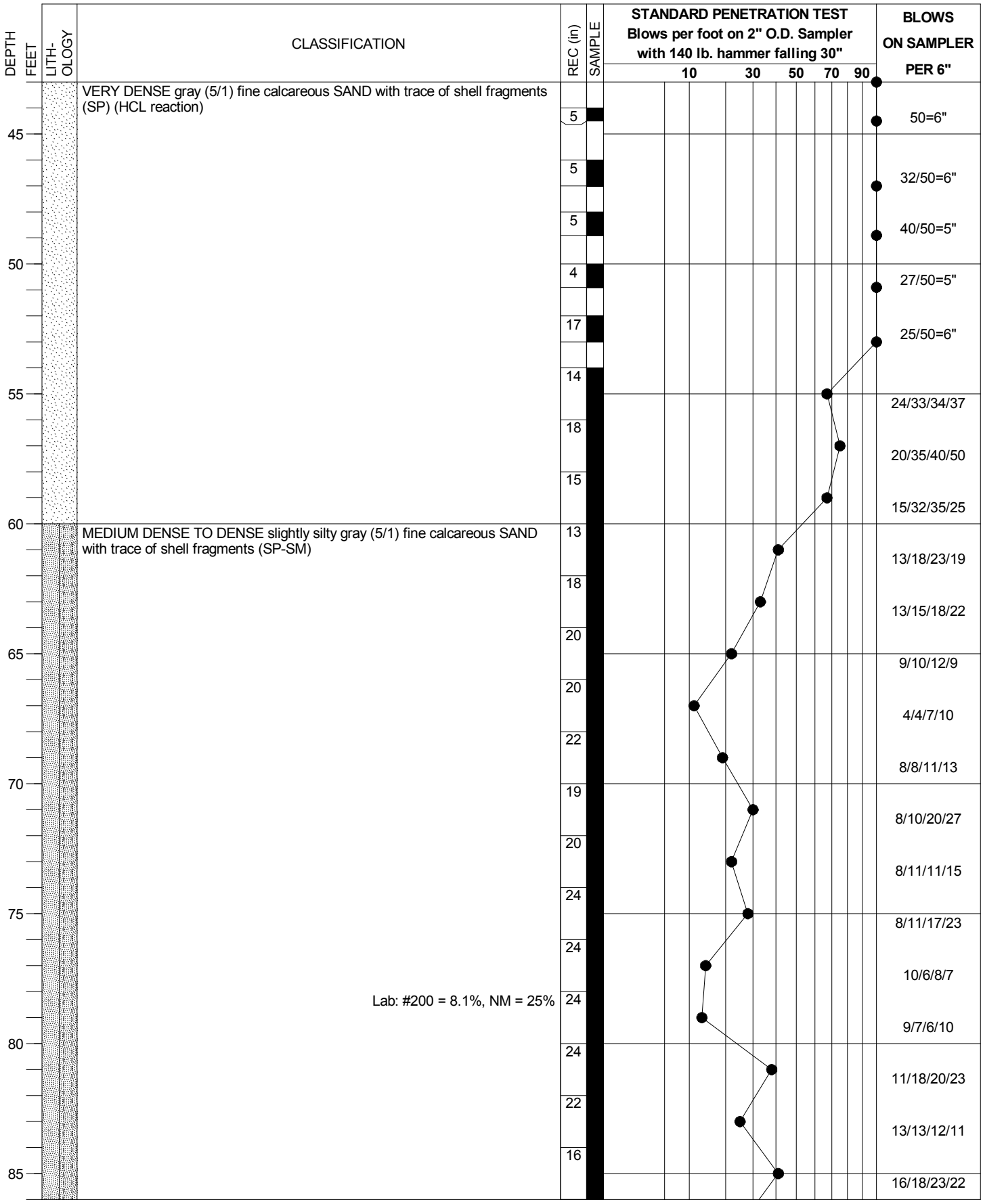
DEPTH FEET	LITH-OLOGY	CLASSIFICATION	REC (in)	SAMPLE	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30" (10 / 30 / 50 / 70 / 90)	BLOWS ON SAMPLER PER 6"
		LOOSE black SAND with organics and roots (SP)	12			1/2/3/5
			24			3/6/3/2
5		LOOSE light brownish gray (6/2) SAND with some shell fragments (limestone formation) (SP)	16			6/2/2/2
		MEDIUM DENSE dark gray (4/1) fine SAND with little shell fragmets (SP) Lab: Org = 0.7%, NM = 18.6%	18			3/3/7/11
10			17			4/7/16/14
			17			9/10/11/11
15		MEDIUM DENSE dark gray (4/1) fine SAND with little shell fragmets (SP)	18			5/6/8/9
			18			8/8/11/7
		LOOSE gray (5/1) fine SAND with some shell fragments (SP)	15			7/4/3/3
20			16			3/3/5/3
			15			2/2/3/4
25		VERY LOOSE to LOOSE dark gray (3/1) fine SAND with some shell fragments and trace of roots (SP)	15			1/2/1/2
		Lab: #200 = 2.9%, NM = 27.6%	16			2/1/2/5
			16			4/5/9/15
30			20			6/10/11/12
		DENSE to VERY DENSE gray (5/1) fine SAND with trace of shell fragments (SP) (HCL reaction)	17			5/11/17/20
35			24			11/20/29/29
			24			9/18/27/29
			15			11/20/27/27
40			8			17/24/35/48
			11			25/50=6"

TEST BORING LOG

Gannett Fleming

Project **J. W. CORBETT WILDLIFE MANAGEMENT AREA**

Boring No. **MFEBBH25**
Sheet **2** of **3**
Job No. **060735**



TEST BORING LOG

Gannett Fleming

Project **J. W. CORBETT WILDLIFE MANAGEMENT AREA**

Boring No. **MFEBBH25**
Sheet **3** of **3**
Job No. **060735**

DEPTH FEET	LITH-OLOGY	CLASSIFICATION	REC (in)	SAMPLE	STANDARD PENETRATION TEST Blows per foot on 2" O.D. Sampler with 140 lb. hammer falling 30" (10 / 30 / 50 / 70 / 90)	BLOWS ON SAMPLER PER 6"
90		MEDIUM DENSE TO DENSE slightly silty gray (5/1) fine calcareous SAND with trace of shell fragments (SP-SM)	16			10/13/12/10
			13			10/11/12/10
			15			10/13/12/10
			15			18/18/14/12
95			16			11/15/12/11
			18			15/12/13/11
			18			7/9/20/17
100		Boring Terminated @ 100.0'				
105						
110						
115						
120						
125						

APPENDIX B

LABORATORY TESTING RESULTS TABLE
(by Gannett Fleming, Inc.)

Gannett Fleming

SUMMARY OF LABORATORY TESTING

Client South Florida Water Management District

Project Name J.W. Corbett Wildlife Management Area

Project Number 060735

Sample ID	Sample #	Sample Depth (ft)	Sieve Analysis (Percent Passing)									Natural Moisture (%)	Atterberg Limits (%)		Organic Content (%)
		From - To	3/8"	#4	#10	#20	#40	#50	#70	#100	#200		LL	PI	
S-5	5	8 ' 10'	-	-	-	-	-	-	-	-	-	18.6	-	-	0.7
S-14	14	26' -28	99.3	99	98.8	98.7	98.3	96.7	80.7	40.8	2.9	27.6	-	-	-
S-40	40	78' -80'	97.3	91.3	80	67.2	57.7	53.8	48.9	41.8	8.1	25	-	-	-

* No soil classification conducted for S-5. Only organic content is reported.

Gannett Fleming

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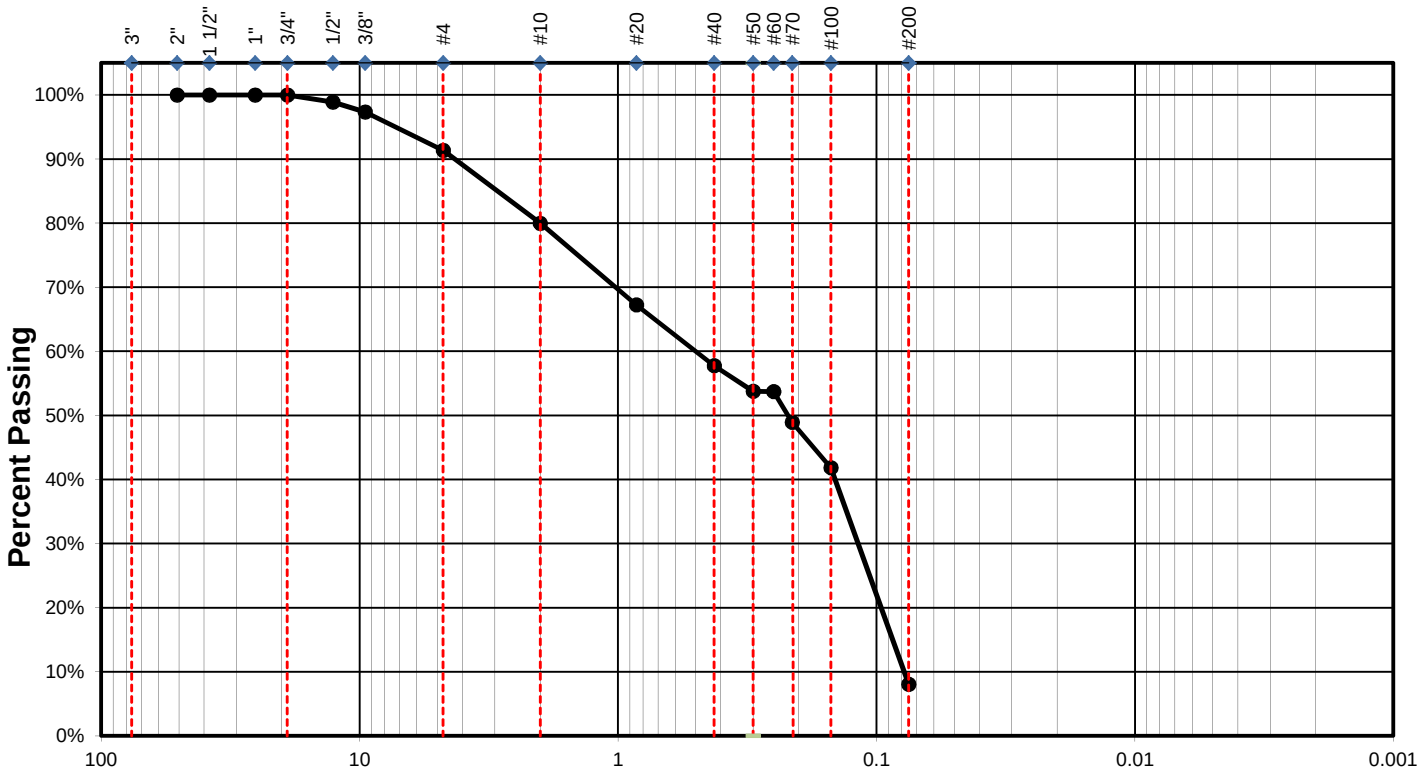
SOIL CLASSIFICATION - ASTM D 2487

PROJECT NAME:	Corbett Geotechnical	**LAB ID NO.:**	CL-0001
PROJECT LOCATION:	Corbette Wildlife	**PROJECT NO.:**	060735
PROJECT CLIENT:	South Florida Water Management District		

SAMPLE ID:	DESCRIPTION	MC	ATTERBERG LIMITS LL	PL	PI	Organics	pH
D1	Medium dense to dense gray fine sand, trace shell fragments, rocks	25.0%	**	**	**	**	**
Depth (feet): 78' - 80'	SP-SM ** Not Tested	**TOTAL WEIGHT OF DRY SAMPLE:** 937.8					

D90 (mm)	D60 (mm)	D50 (mm)	D30 (mm)	D10 (mm)	Cc	Cu	% Gravel	% Sand	% Fine
4.29	0.50	0.22	0.12	0.08	0.35	6.42	8.7%	83%	8.1%

GRAIN SIZE DISTRIBUTION CURVE



GRAVEL	SAND			FINES	
	COARSE	MEDIUM	FINE	SILT	CLAY

TEST METHODS

MOISTURE CONTENT (ASTM D2216)	PERCENT PASING #200 SIEVE (ASTM D1140)	SIEVE ANALYSIS (ASTM D422)
Ph of Soils (ASTM D4972)	ORGANIC CONTENT BY WEIGHT (ASTM D2974)	Topsoil Used for Landscaping Purposes (ASTM D5268)

SOIL CLASSIFICATION - LAB OUTPUT

PROJECT NAME: Corbett Geotechnical PROJECT NO.: 060735

LAB ID NO.: CL-0001 SAMPLE LOCATION: D1 78' - 80'

SAMPLE DESCRIPTION: Medium dense to dense gray fine sand, trace shell fragments, rocks

MOISTURE CONTENT (ASTM D2216)		PERCENT PASING #200 SIEVE (ASTM D1140)	
TARE NUMBER	J	TARE NUMBER	J
WT. OF TARE	119.10	WT. OF TARE	119.10
WT. OF WET SAMPLE + TARE	1290.90	WT. OF SAMPLE BEFORE WASH + TARE	1056.90
WT. OF DRY SAMPLE + TARE	1056.90	WT. OF SAMPLE AFTER WASH + TARE	994.80
WT. OF WATER	234.00	WT. OF SAMPLE AFTER WASH	875.70
MOISTURE CONTENT	**25.0%**	PERCENT PASSING #200 SIEVE	**6.6%**

SIEVE ANALYSIS (ASTM D422)

TOTAL DRY WEIGHT OF SAMPLE		**937.80**		
SIEVE SIZE	INDIVIDUAL WEIGHT RETAINED	CUMULATIVE WEIGHT RETAINED	PERCENT RETAINED	PERCENT PASSING
2"	0.00	0.00	0%	**100.0%**
1 1/2"	0.00	0.00	0%	**100.0%**
1"	0.00	0.00	0%	**100.0%**
3/4"	0.00	0.00	0%	**100.0%**
1/2"	10.30	10.30	1.1%	**98.9%**
3/8"	14.60	24.90	2.7%	**97.3%**
#4	56.30	81.20	8.7%	**91.3%**
#10	106.60	187.80	20.0%	**80.0%**
#20	119.40	307.20	32.8%	**67.2%**
#40	89.10	396.30	42.3%	**57.7%**
#50	37.40	433.70	46.2%	**53.8%**
#60	0.30	434.00	46.3%	**53.7%**
#70	45.00	479.00	51.1%	**48.9%**
#100	66.60	545.60	58.2%	**41.8%**
#200	316.70	862.30	91.9%	**8.1%**
Pan	13.40	875.70	93.4%	

Gannett Fleming

1900 NW 40th Court
Pompano Beach, FL 33064-8718
Phone: 954-972-7570
Fax: 954-972-6608

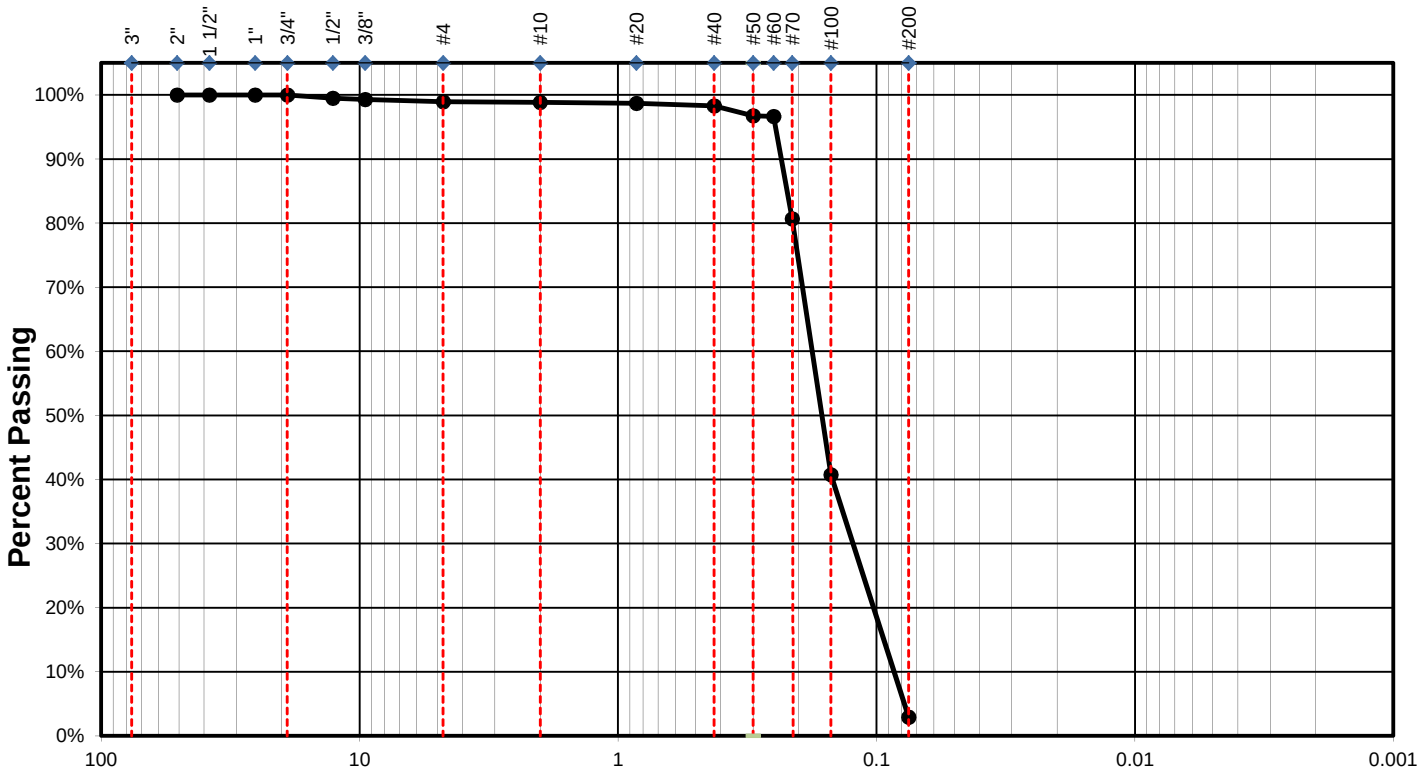
SOIL CLASSIFICATION - ASTM D 2487

PROJECT NAME:	Corbett Geotechnical	**LAB ID NO.:**	CL-0002
PROJECT LOCATION:	Corbette Wildlife	**PROJECT NO.:**	060735
PROJECT CLIENT:	South Florida Water Management District		

SAMPLE ID:	DESCRIPTION	MC	ATTERBERG LIMITS LL	PL	PI	Organics	pH
D1	Very loose to loose very dark gray fine sand, trace of shell fragments, rocks, and organics	27.6%	**	**	**	**	**
Depth (feet): 26' - 28'	SP ** Not Tested	**TOTAL WEIGHT OF DRY SAMPLE:** 781.0					

D90 (mm)	D60 (mm)	D50 (mm)	D30 (mm)	D10 (mm)	Cc	Cu	% Gravel	% Sand	% Fine
0.23	0.18	0.16	0.12	0.09	1.00	2.08	1.0%	96%	2.9%

GRAIN SIZE DISTRIBUTION CURVE



GRAVEL	SAND			FINES	
	COARSE	MEDIUM	FINE	SILT	CLAY

TEST METHODS

MOISTURE CONTENT (ASTM D2216)	PERCENT PASING #200 SIEVE (ASTM D1140)	SIEVE ANALYSIS (ASTM D422)
Ph of Soils (ASTM D4972)	ORGANIC CONTENT BY WEIGHT (ASTM D2974)	Topsoil Used for Landscaping Purposes (ASTM D5268)

SOIL CLASSIFICATION - LAB OUTPUT

PROJECT NAME: Corbett Geotechnical PROJECT NO.: 060735

LAB ID NO.: CL-0002 SAMPLE LOCATION: D1 26' - 28'

SAMPLE DESCRIPTION: Very loose to loose very dark gray fine sand, trace of shell fragments, rocks, and organics

MOISTURE CONTENT (ASTM D2216)		PERCENT PASING #200 SIEVE (ASTM D1140)	
TARE NUMBER	K	TARE NUMBER	K
WT. OF TARE	119.70	WT. OF TARE	119.70
WT. OF WET SAMPLE + TARE	1115.90	WT. OF SAMPLE BEFORE WASH + TARE	900.70
WT. OF DRY SAMPLE + TARE	900.70	WT. OF SAMPLE AFTER WASH + TARE	881.40
WT. OF WATER	215.20	WT. OF SAMPLE AFTER WASH	761.70
MOISTURE CONTENT	**27.6%**	PERCENT PASSING #200 SIEVE	**2.5%**

SIEVE ANALYSIS (ASTM D422)

TOTAL DRY WEIGHT OF SAMPLE		**781.00**		
SIEVE SIZE	INDIVIDUAL WEIGHT RETAINED	CUMULATIVE WEIGHT RETAINED	PERCENT RETAINED	PERCENT PASSING
2"	0.00	0.00	0%	**100.0%**
1 1/2"	0.00	0.00	0%	**100.0%**
1"	0.00	0.00	0%	**100.0%**
3/4"	0.00	0.00	0%	**100.0%**
1/2"	3.90	3.90	0.5%	**99.5%**
3/8"	1.70	5.60	0.7%	**99.3%**
#4	2.50	8.10	1.0%	**99.0%**
#10	1.10	9.20	1.2%	**98.8%**
#20	0.90	10.10	1.3%	**98.7%**
#40	3.10	13.20	1.7%	**98.3%**
#50	12.30	25.50	3.3%	**96.7%**
#60	0.60	26.10	3.3%	**96.7%**
#70	124.90	151.00	19.3%	**80.7%**
#100	311.60	462.60	59.2%	**40.8%**
#200	295.70	758.30	97.1%	**2.9%**
Pan	3.40	761.70	97.5%	

SOIL CLASSIFICATION - LAB OUTPUT

PROJECT NAME: Corbett Geotechnical PROJECT NO.: 060735

LAB ID NO.: CL-0003 SAMPLE LOCATION: D1 8' - 10'

SAMPLE DESCRIPTION: Medium dense inorganic dark gray fine sand, trace of shell fragments, rocks

MOISTURE CONTENT (ASTM D2216)		PERCENT PASING #200 SIEVE (ASTM D1140)	
TARE NUMBER	V	TARE NUMBER	V
WT. OF TARE	118.10	WT. OF TARE	118.10
WT. OF WET SAMPLE + TARE	1073.10	WT. OF SAMPLE BEFORE WASH + TARE	0.00
WT. OF DRY SAMPLE + TARE	923.30	WT. OF SAMPLE AFTER WASH + TARE	0.00
WT. OF WATER	149.80	WT. OF SAMPLE AFTER WASH	-118.10
MOISTURE CONTENT	**18.6%**	PERCENT PASSING #200 SIEVE	**0.0%**

ORGANIC CONTENT BY WEIGHT (ASTM D2974)				Pan	
TARE NUMBER	254	263	199	PH VALUE	**N/A**
WT. OF DRY SAMPLE + TARE	186.85	134.02	149.23		
WT. OF SAMPLE AFTER IGNITION + TARE	185.95	133.31	148.43		
WT. OF TARE	67.22	37.92	41.11		
ORGANIC CONTENT BY WEIGHT	**0.8%**	**0.7%**	**0.7%**	**0.7%**	

* No soil classification conducted for S-5. Only organic content is reported.

APPENDIX C

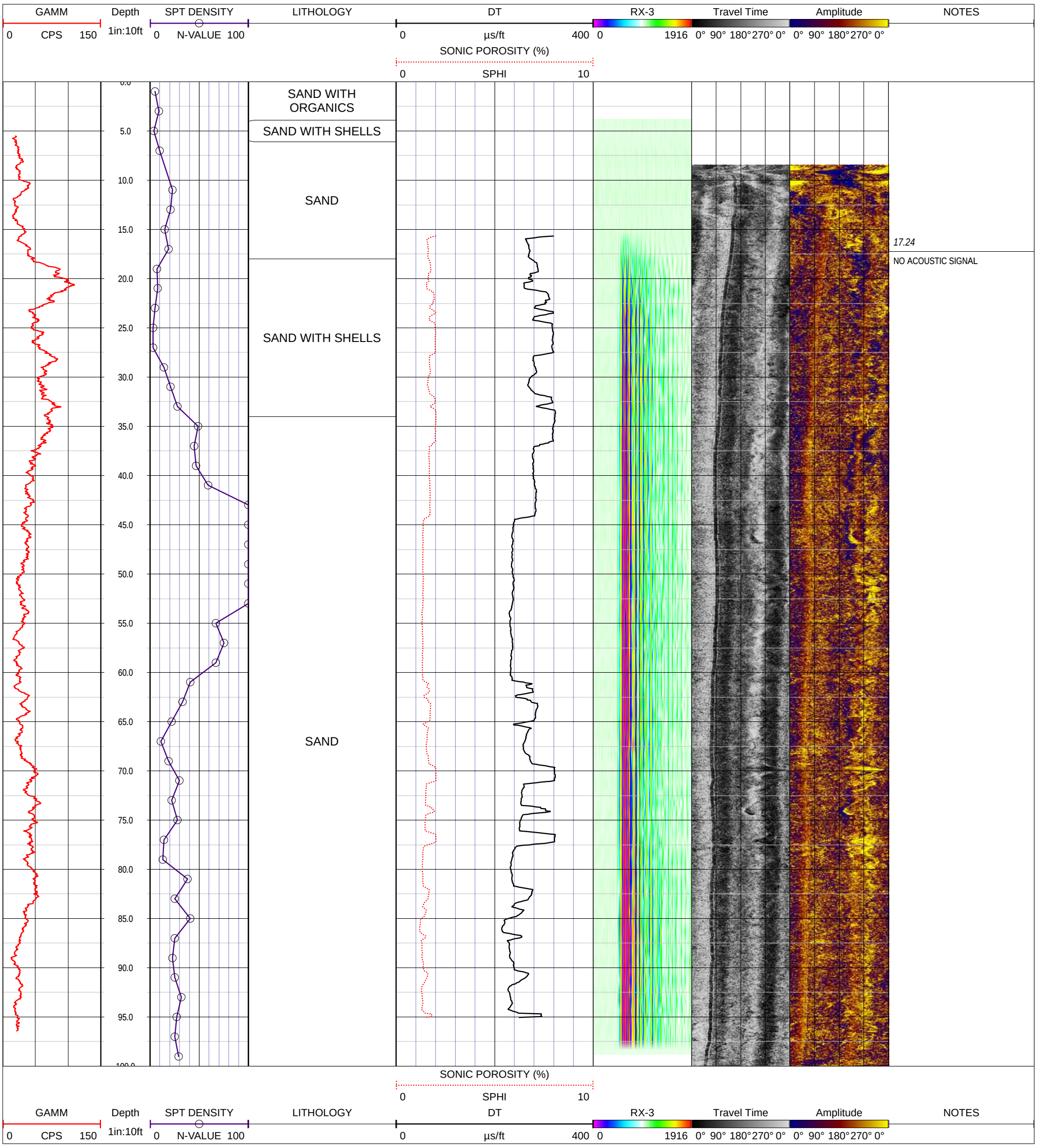
GEOPHYSICAL BOREHOLE LOGS (by RMBAKER LLC)

RMBAKER LLC
www.rmbaker.com
rob@rmbaker.com
407-733-8958

Location:	JW Corbett	Driller:	Centerline
County:	Palm Beach	Depth (ft):	102.5
State:	Florida	Logger:	R. Baker
Country:	USA	Witness:	Centerline

WELL ID: **MFEB9-GW1**
Date(s): 1 OCT 2015

PROJECT NOTES:
-The well was logged as a mudded pilot hole (HRAT, dual induction, electric, caliper, natural gamma, sonic). The well was also known as MFEBBH25.
-The lithology and SPT density data was provided by Centerline/SFEC via Gannett Fleming. We have summarized some aspects of the original logs for our purposes.
-The sonic slowness velocity (DT) was calculated using the arrival times from dual transmitters to a single receiver.
-The sonic porosity was calculated using the Wyllie method, a velocity of 189 usec/ft for the freshwater mud, and a matrix velocity of 58.8 usec/ft for unconsolidated mixed sands, silts and shells (unconsolidated sandstone equivalent).



NOTES:
While due care has been exercised in the performance of these measurements and observations, in accordance with methodologies utilized by the general practitioner, RMBAKER LLC can make no representations, warranties, or guarantees with respect to latent or concealed conditions that may exist, which may be beyond the detection capabilities of the methodologies used, or that may extend beyond the areas and depths surveyed.
The geophysical well logs show subsurface conditions as they existed at the dates and locations shown, and it is not warranted that they are representative of subsurface conditions at other locations and times.
If, at any time, different subsurface conditions from those observed are determined to be present, we must be advised and allowed to review and revise our observations if necessary.

FL Licensed Geology Business GB 458

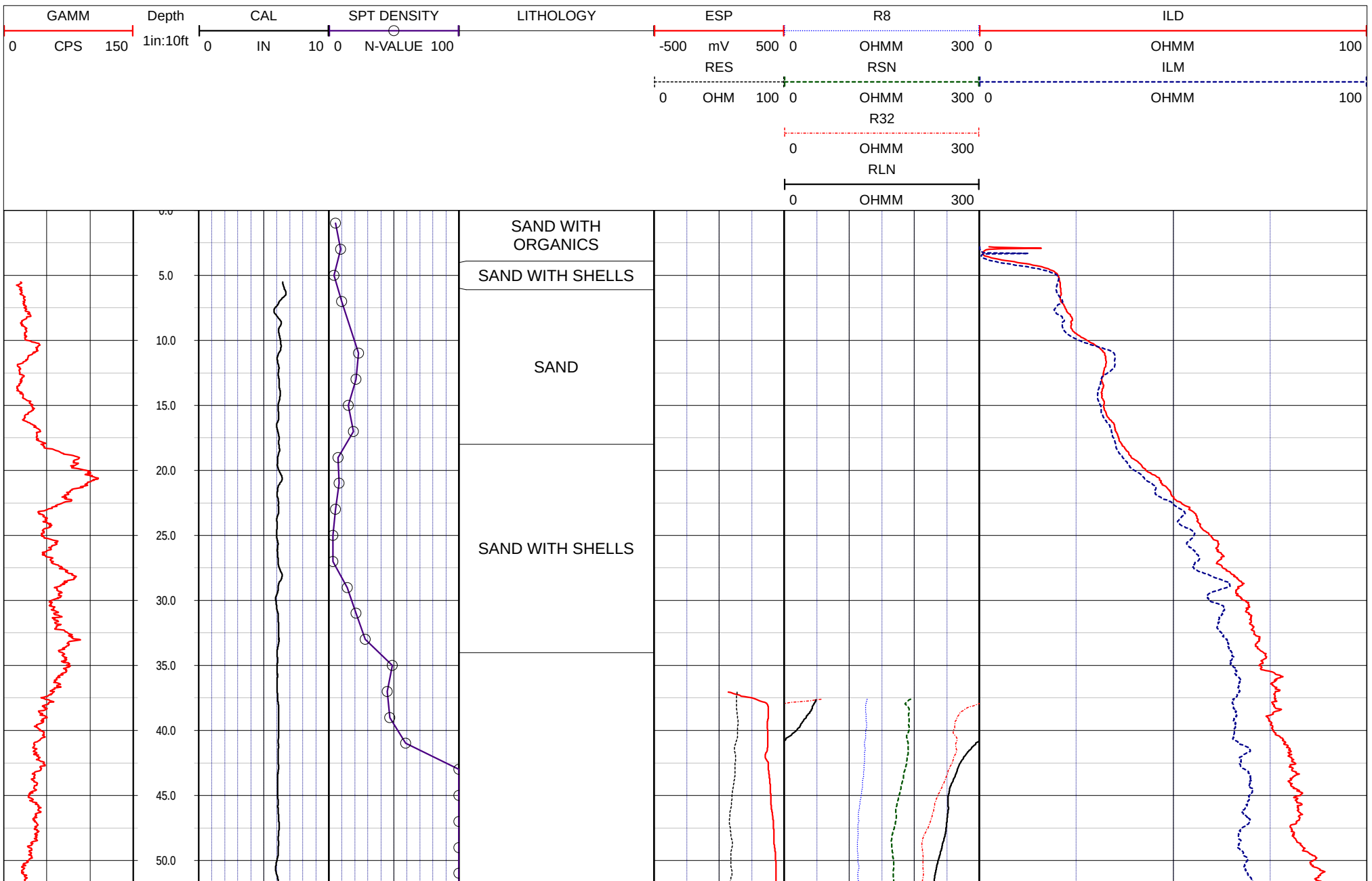
END OF LOG

RMBAKER LLC
www.rmbaker.com
rob@rmbaker.com
407-733-8958

Location:	JW Corbett	Driller:	Centerline
County:	Palm Beach	Depth (ft):	102.5
State:	Florida	Logger:	R. Baker
Country:	USA	Witness:	Centerline

WELL ID: **MFEB9-GW1**
Date(s): 1 OCT 2015

PROJECT NOTES:
-The well was logged as a mudded pilot hole (HRAT, dual induction, electric, caliper, natural gamma, sonic). The well was also known as MFEBBH25.
-The lithology and SPT density data was provided by Centerline/SFEC via Gannett Fleming. We have summarized some aspects of the original logs for our purposes.
-The electric logging tool utilized a downhole bridle for the remote electrode. Logging effectively stopped with the bridle electrode rose above the water level in the borehole.



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The geophysical well logs show subsurface conditions as they existed at the dates and locations shown, and it is not warranted that they are representative of subsurface conditions at other locations and times.
If, at any time, different subsurface conditions from those observed are determined to be present, we must be advised and allowed to review and revise our observations if necessary.

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END OF LOG

APPENDIX D

WELL CORE BORING LOGS WITH WELL COMPLETION DETAILS
(Well Development by Centerline Drilling, Inc.)

Gannett Fleming

Well Number: MFEB9-GW1

Client Name: South Florida Water Management District

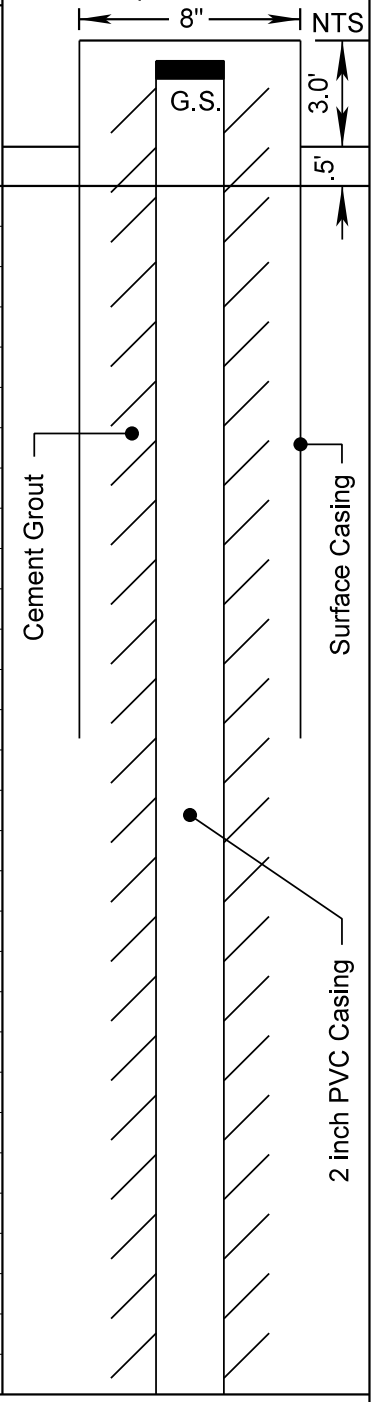
Project Name: J. W. Corbett Wildlife Management Area

Project Number: 060735 Logged By: Y. Delmas

City & State: West Palm Beach , Florida Attachment:

Depth (ft)	Elev (ft) (NAVD88)	Symbol	Description	Depth/Elev	Number	Type	n - Value	Vapor
0	21.0		Black SAND with organics and roots (SP)		1	SS	5	
				4/17.0	2	SS	9	
			Light brownish gray (6/2) SAND with some shell fragments (limestone formation) (SP)	6/15.0	3	SS	4	
10	11.0		Dark gray (4/1) fine SAND with little shell fragments (SP)		4	SS	10	
					5	SS		
					6	SS	23	
				14/7.0	7	SS	21	
			Dark gray (4/1) fine SAND with little shell fragments (SP)		8	SS	14	
				18/3.0	9	SS	19	
20	1.0		Gray (5/1) fine SAND with some shell fragments (SP)		10	SS	7	
					11	SS	8	
				24/-3.0	12	SS	5	
			Dark gray (3/1) fine SAND with some shell fragments and trace of roots (SP)		13	SS	3	
					14	SS	3	
					15	SS	14	
30	-9.0			32/-11.0	16	SS	21	
			Gray (5/1) fine SAND with trace of shell fragments (SP) (HCL reaction)		17	SS	28	
					18	SS	49	
					19	SS	45	
					20	SS	47	
40	-19.0				21	SS	59	
				43/-22.0	22	SS	50=6"	
			Gray (5/1) fine calcareous SAND with trace of shell fragments (SP) (HCL reaction)		23	SS	50=6"	
					24	SS	50=6"	
					25	SS	50=5"	
50	-29.0				26	SS	50=5"	
					27	SS	50=6"	
					28	SS	67	
					29	SS	75	
60	-39.0			60/-39.0	30	SS	67	

Well Completion Details



Drilled By: Centerline Drilling, inc. Hole Size: 6 inch diameter

Drilling Method: Bentonite Mud Rotary Datum: NAVD 1988 (Elevation estimated)

Drill Date: September, 2015 Sheet: 1 of 2

Gannett Fleming

Well Number: MFEB9-GW1

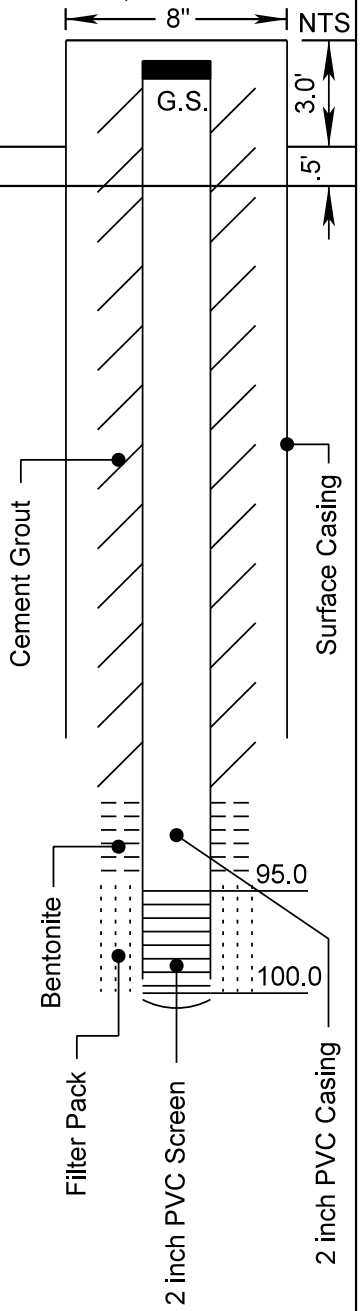
Client Name: South Florida Water Management District

Project Name: J. W. Corbett Wildlife Management Area

Project Number: 060735 Logged By: Y. Delmas

City & State: West Palm Beach , Florida Attachment:

Depth (ft)	Elev (ft) (NAVD88)	Symbol	Description	Depth\Elev	Number	Type	n - Value	Vapor
60	-39.0		Slightly silty gray (5/1) fine calcareous SAND with trace of shell fragments (SP-SM)		31	SS	41	
					32	SS	33	
					33	SS	22	
					34	SS	11	
70	-49.0				35	SS	19	
					36	SS	30	
					37	SS	22	
					38	SS	28	
					39	SS	14	
80	-59.0				40	SS	13	
					41	SS	38	
					42	SS	25	
					43	SS	41	
					44	SS	25	
90	-69.0				45	SS	23	
					46	SS	25	
					47	SS	32	
					48	SS	27	
					49	SS	25	
100	-79.0			100/-79.0	50	SS	29	



Drilled By: Centerline Drilling, inc. Hole Size: 6 inch diameter

Drilling Method: Bentonite Mud Rotary Datum: NAVD 1988 (Elevation estimated)

Drill Date: September, 2015 Sheet: 2 of 2

Gannett Fleming

Well Number: MFEB9-GW2

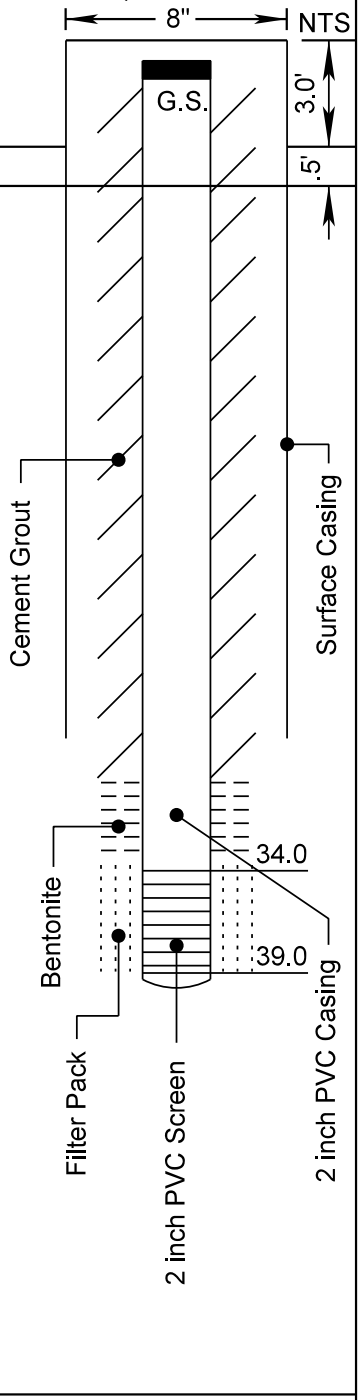
Client Name: South Florida Water Management District

Project Name: J. W. Corbett Wildlife Management Area

Project Number: 060735 Logged By: Y. Delmas

City & State: West Palm Beach , Florida Attachment:

Depth (ft)	Elev (ft) (NAVD88)	Symbol	Description	Depth\Elev	Number	Type	n - Value	Vapor
0	21.0		Black SAND with organics and roots (SP)		1	SS	5	
				4/17.0	2	SS	9	
			Light brownish gray (6/2) SAND with some shell fragments (limestone formation) (SP)	6/15.0	3	SS	4	
10	11.0		Dark gray (4/1) fine SAND with little shell fragments (SP)		4	SS	10	
					5	SS		
					6	SS	23	
				14/7.0	7	SS	21	
			Dark gray (4/1) fine SAND with little shell fragments (SP)		8	SS	14	
				18/3.0	9	SS	19	
20	1.0		Gray (5/1) fine SAND with some shell fragments (SP)		10	SS	7	
					11	SS	8	
				24/-3.0	12	SS	5	
30	-9.0		Dark gray (3/1) fine SAND with some shell fragments and trace of roots (SP)		13	SS	3	
					14	SS	3	
					15	SS	14	
				32/-11.0	16	SS	21	
40	-19.0		Gray (5/1) fine SAND with trace of shell fragments (SP) (HCL reaction)		17	SS	28	
					18	SS	49	
					19	SS	45	
					20	SS	47	
				43/-22.0	21	SS	59	
50	-29.0		Gray (5/1) fine calcareous SAND with trace of shell fragments (SP) (HCL reaction)		22	SS	50=6"	
					23	SS	50=6"	
					24	SS	50=6"	
					25	SS	50=5"	
					26	SS	50=5"	
					27	SS	50=6"	
					28	SS	67	
					29	SS	75	
60	-39.0			60/-39.0	30	SS	67	



Drilled By: Centerline Drilling, inc. Hole Size: 6 inch diameter

Drilling Method: Bentonite Mud Rotary Datum: NAVD 1988 (Elevation estimated)

Drill Date: September, 2015 Sheet: 1 of 1

Gannett Fleming

Well Number: MFEB9-GW3

Client Name: South Florida Water Management District

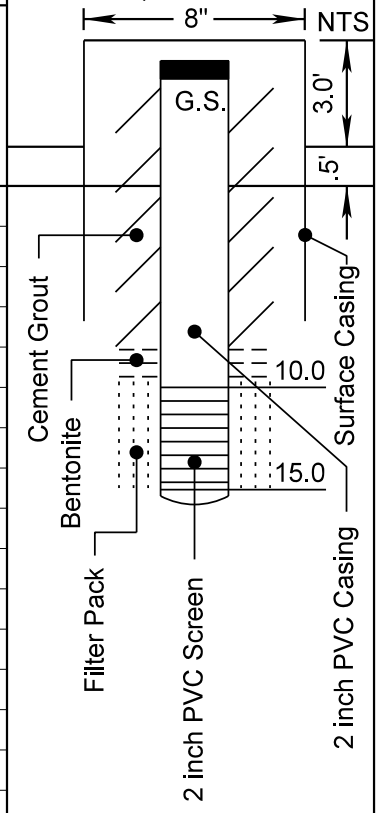
Project Name: J. W. Corbett Wildlife Management Area

Project Number: 060735 Logged By: Y. Delmas

City & State: West Palm Beach , Florida Attachment:

Depth (ft)	Elev (ft) (NAVD88)	Symbol	Description	Depth\Elev	Number	Type	n - Value	Vapor
0	21.0		Black SAND with organics and roots (SP)		1	SS	5	
				4/17.0	2	SS	9	
			Light brownish gray (6/2) SAND with some shell fragments (limestone formation) (SP)	6/15.0	3	SS	4	
10	11.0		Dark gray (4/1) fine SAND with little shell fragments (SP)		4	SS	10	
					5	SS		
					6	SS	23	
				14/7.0	7	SS	21	
			Dark gray (4/1) fine SAND with little shell fragments (SP)		8	SS	14	
				18/3.0	9	SS	19	
20	1.0		Gray (5/1) fine SAND with some shell fragments (SP)		10	SS	7	
					11	SS	8	
				24/-3.0	12	SS	5	
			Dark gray (3/1) fine SAND with some shell fragments and trace of roots (SP)		13	SS	3	
					14	SS	3	
					15	SS	14	
30	-9.0			32/-11.0	16	SS	21	
			Gray (5/1) fine SAND with trace of shell fragments (SP) (HCL reaction)		17	SS	28	
					18	SS	49	
					19	SS	45	
					20	SS	47	
40	-19.0				21	SS	59	
				43/-22.0	22	SS	50=6"	
			Gray (5/1) fine calcareous SAND with trace of shell fragments (SP) (HCL reaction)		23	SS	50=6"	
					24	SS	50=6"	
					25	SS	50=5"	
50	-29.0				26	SS	50=5"	
					27	SS	50=6"	
					28	SS	67	
					29	SS	75	
60	-39.0			60/-39.0	30	SS	67	

Well Completion Details



Drilled By: Centerline Drilling, inc. Hole Size: 6 inch diameter

Drilling Method: Bentonite Mud Rotary Datum: NAVD 1988 (Elevation estimated)

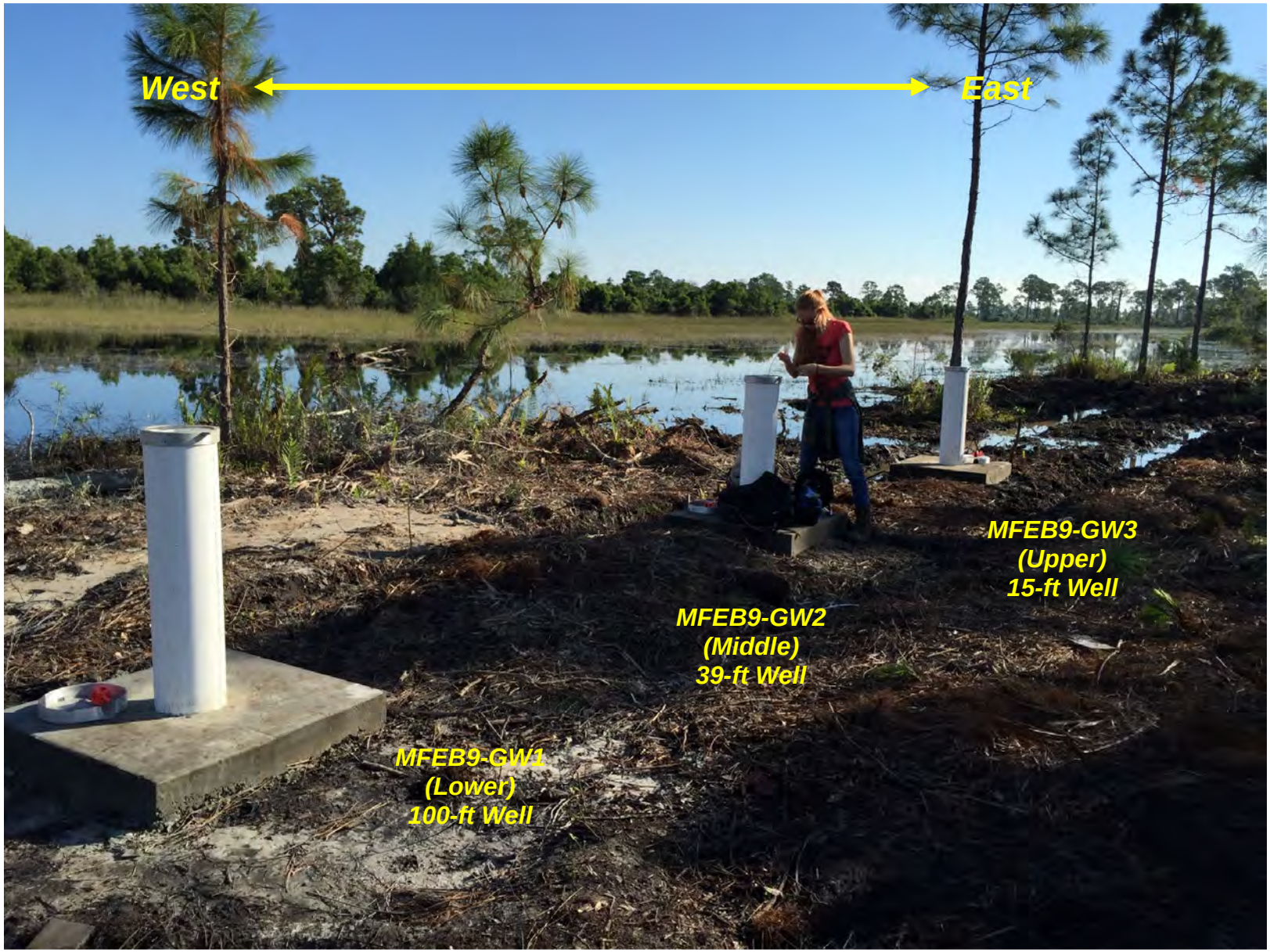
Drill Date: September, 2015 Sheet: 1 of 1

APPENDIX E

WELL INSTALLATION DETAILS AND PERMITS

- Well Installation Snapshot
- Sample Data Logging Data from Installed Electronic Telemetry Equipment
- Well Installation Permits

WELL INSTALLATION SNAPSHOT


West
East
MFEB9-GW3
(Upper)
15-ft Well
MFEB9-GW2
(Middle)
39-ft Well
MFEB9-GW1
(Lower)
100-ft Well

SAMPLE DATA LOGGING DATA FROM INSTALLED ELECTRONIC TELEMETRY EQUIPMENT


In-Situ

In-Situ Inc.

ISI Data Center

Company: SFEC
User: MichaelCox

Navigation
Site Index
Default

Logout

Reporting
Create new report
Manage reports

User Management
Create New User
Manage Users

Site Management
Manage Site
Manage Device
Configure Graph

Alarm Management
Contacts
Devices

Quick Help
The Device Detail page allows you to view historical data for the selected device. You can change the data range by clicking the report time drop down box and choosing a new value. All date ranges are referenced to the last received message.

MFEB9-GW1

Device: Level TROLL 500, S/N: 426779, TROLL Link FW: 1.40

Report Time: 14 Days
Switch to: Graph View Date Range View Export to CSV

Received	Temperature F	Water Elevation Ft	External Voltage V	Tip Total	Rain Fall in
23-Nov-15 3:00 PM	76.20	20.90		221	0.00
23-Nov-15 11:00 AM	76.19	20.92		221	0.00
23-Nov-15 7:00 AM	76.19	20.94		221	0.00
23-Nov-15 3:00 AM	76.19	20.97		221	0.00
22-Nov-15 11:00 PM	76.19	20.98		221	0.00
22-Nov-15 7:00 PM	76.19	21.00		221	0.00
22-Nov-15 3:00 PM	76.20	21.05		221	0.02
22-Nov-15 11:00 AM	76.20	21.02		218	0.06
22-Nov-15 7:00 AM	76.20	21.02		211	0.03
22-Nov-15 3:00 AM	76.19	21.04		207	0.22
21-Nov-15 11:00 PM	76.20	20.95		179	0.06
21-Nov-15 7:00 PM	76.20	20.88		172	0.61
21-Nov-15 3:00 PM	76.20	20.34		94	0.08
21-Nov-15 11:00 AM	76.20	20.23		84	0.00
21-Nov-15 7:00 AM	76.19	20.23		84	0.00
21-Nov-15 3:00 AM	76.20	20.24		84	0.00
20-Nov-15 11:00 PM	76.20	20.23		84	0.00
20-Nov-15 7:00 PM	76.20	20.22		84	0.00
20-Nov-15 3:00 PM	76.20	20.27		84	0.00
20-Nov-15 11:00 AM	76.20	20.34		84	0.00
20-Nov-15 7:00 AM	76.20	20.35		84	0.00
20-Nov-15 3:00 AM	76.20	20.36		84	0.02
19-Nov-15 11:00 PM	76.20	20.31		82	0.00
19-Nov-15 7:00 PM	76.20	20.32		82	0.00
19-Nov-15 3:00 PM	76.21	20.36		82	0.00
19-Nov-15 11:00 AM	76.21	20.41		82	0.00
19-Nov-15 7:00 AM	76.20	20.43		82	0.00
19-Nov-15 3:00 AM	76.20	20.45		82	0.00
18-Nov-15 11:00 PM	76.21	20.46		82	0.00
18-Nov-15 7:00 PM	76.21	20.48		82	0.00
18-Nov-15 3:00 PM	76.21	20.54		82	0.00
18-Nov-15 11:00 AM	76.22	20.53		82	0.28
18-Nov-15 7:00 AM	76.21	20.26		47	0.01
18-Nov-15 3:00 AM	76.22	20.12		46	0.27
17-Nov-15 11:00 PM	76.21	19.85		12	0.00
17-Nov-15 7:00 PM	76.21	19.83		12	0.00
17-Nov-15 3:00 PM	76.22	19.85		12	0.00
17-Nov-15 11:00 AM	76.22	19.91		12	0.00
17-Nov-15 7:00 AM	76.21	19.92		12	0.00
17-Nov-15 3:00 AM	76.21	19.91		12	0.00
16-Nov-15 11:00 PM	76.21	19.88		12	0.00
16-Nov-15 7:00 PM	76.22	19.87		12	0.00
16-Nov-15 3:00 PM	76.21	19.89		12	0.00
16-Nov-15 11:00 AM	76.22	19.94		12	0.00
16-Nov-15 7:00 AM	76.21	19.95		12	0.00
16-Nov-15 3:00 AM	76.22	19.94		12	0.00
15-Nov-15 11:00 PM	76.22	19.92		12	0.00
15-Nov-15 7:00 PM	76.22	19.92		12	0.00
15-Nov-15 3:00 PM	76.22	19.93		12	0.00
15-Nov-15 11:00 AM	76.22	19.97		12	0.00
15-Nov-15 7:00 AM	76.22	19.98		12	0.00
15-Nov-15 3:00 AM	76.22	19.98		12	0.00
14-Nov-15 11:00 PM	76.22	19.96		12	0.00
14-Nov-15 7:00 PM	76.22	19.97		12	0.00
14-Nov-15 3:00 PM	76.23	19.99		12	0.00
14-Nov-15 11:00 AM	76.23	20.02		12	0.00
14-Nov-15 7:00 AM	76.23	20.05		12	0.00
14-Nov-15 3:00 AM	76.23	20.06		12	0.00
13-Nov-15 11:00 PM	76.23	20.04		12	0.00
13-Nov-15 7:00 PM	76.23	20.04		12	0.00
13-Nov-15 3:00 PM	76.23	19.91		12	12.00
13-Nov-15 11:00 AM	76.23	19.94	0.00		0.00
13-Nov-15 7:00 AM	76.23	19.95	0.00		

13-Nov-15 3:00 AM	76.23	19.94	0.00		
12-Nov-15 11:00 PM	76.23	19.91	0.00		
12-Nov-15 7:00 PM	76.24	19.89	0.00		
12-Nov-15 3:00 PM	76.23	19.91	0.00		
12-Nov-15 11:00 AM	76.23	19.95	0.00		
12-Nov-15 7:00 AM	76.24	19.96	0.00		
12-Nov-15 3:00 AM	76.23	19.95	0.00		
11-Nov-15 11:00 PM	76.24	19.92	0.00		
11-Nov-15 7:00 PM	76.24	19.90	0.00		
11-Nov-15 3:00 PM	76.24	19.92	0.00		
11-Nov-15 11:00 AM	76.24	19.96	0.00		
11-Nov-15 7:00 AM	76.24	19.97	0.00		
11-Nov-15 3:00 AM	76.24	19.96	0.00		
10-Nov-15 11:00 PM	76.24	19.92	0.00		
10-Nov-15 7:00 PM	76.24	19.90	0.00		
10-Nov-15 3:00 PM	76.24	19.92	0.00		
10-Nov-15 11:00 AM	76.24	19.97	0.00		
10-Nov-15 7:00 AM	76.24	19.98	0.00		
10-Nov-15 3:00 AM	76.25	19.97	0.00		
9-Nov-15 11:00 PM	76.25	19.93	0.00		
9-Nov-15 7:00 PM	76.24	19.91	0.00		
9-Nov-15 3:00 PM	76.25	19.92	0.00		

WELL INSTALLATION PERMITS

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

☐ Southwest
☐ Northwest
☐ St. Johns River
☑ South Florida
☐ Suwannee River
☐ DEP
☐ Delegated Authority (If Applicable) _____

PLEASE FILL OUT ALL APPLICABLE FIELDS
(*Denotes Required Fields Where Applicable)

The water well contractor is responsible for completing this form and forwarding the permit application to the appropriate delegated authority where applicable.

Permit No. 5268-15
Florida Unique ID _____
Permit Stipulations Required (See Attached) _____
62-524 Quad No. _____ Delineation No. _____
CUP/WUP Application No. _____
ABOVE THIS LINE - FOR OFFICIAL USE ONLY

1. Florida Fish & Wildlife Conser 8535 Northlake Blvd. West Palm Beach Florida 33412
*Owner, Legal Name if Corporation *Address *City *State *ZIP Telephone Number
2. 11835 Seminole Pratt Whitney Road West Palm Beach, Florida 33412 - JW Corbett Wildlife Management Area
*Well Location - Address, Road Name or Number, City
3. 00-40-42-12-00-000-9000 Lot Block Unit
*Parcel ID No. (PIN) or Alternate Key (Circle One)
4. 12 42 40 Palm Beach Check if 62-524 ☐ Yes ☐ No
*Section or Land Grant *Township *Range *County Subdivision
5. Centerline Drilling, Inc. 11132 561-615-0988 ctrlinedrilling@aol.com
*Water Well Contractor *License Number *Telephone Number E-mail Address
6. 1696 Old Okeechobee Road, Suite 3C West Palm Beach Florida 33409
*Water Well Contractor's Address City State ZIP
7. *Type of Work: ☑ Construction ☐ Repair ☐ Modification ☐ Abandonment _____
*Reason for Repair, Modification, or Abandonment
8. *Number of Proposed Wells 1
9. *Specify Intended Use(s) of Well(s)

☐ Domestic	☐ Landscape Irrigation	☐ Agricultural Irrigation	☐ Site Investigations	
☐ Bottled Water Supply	☐ Recreation Area Irrigation	☐ Livestock	☑ Monitoring	
☐ Public Water Supply (Limited Use/DOH)		☐ Nursery Irrigation	☐ Test	
☐ Public Water Supply (Community or Non-Community/DEP)		☐ Commercial/Industrial	☐ Earth-Coupled Geothermal	
☐ Class I Injection		☐ Golf Course Irrigation	☐ HVAC Supply	
			☐ HVAC Return	

Class V Injection: ☐ Recharge ☐ Commercial/Industrial Disposal ☐ Aquifer Storage and Recovery ☐ Drainage
Remediation: ☐ Recovery ☐ Air Sparge ☐ Other (Describe) _____
☐ Other (Describe) _____

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Dist. Stamp
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10. *Distance from Septic System if ≤ 200 ft. 1Mile 11. Facility Description _____ 12. Estimated Start Date 09/2015
13. *Estimated Well Depth 100 ft. *Estimated Casing Depth 95 ft. Primary Casing Diameter 2 in. Open Hole: From ____ To ____ ft.
14. Estimated Screen Interval: From 95 To 100 ft.
15. *Primary Casing Material: Black Steel Galvanized ✓ PVC Stainless Steel Not Cased Other: _____
16. Secondary Casing: Telescope Casing Liner Surface Casing Diameter _____ in.
17. Secondary Casing Material: Black Steel Galvanized PVC Stainless Steel Other _____
18. *Method of Construction, Repair, or Abandonment: Auger Cable Tool Jetted ✓ Rotary Sonic
Combination (Two or More Methods) Hand Driven (Well Point, Sand Point) Hydraulic Point (Direct Push)
Horizontal Drilling Plugged by Approved Method Other (Describe) _____
[Talked over phone]
19. Proposed Grouting Interval for the Primary, Secondary, and Additional Casing.
From ____ To ____ Seal Material (Bentonite Neat Cement Other _____)
From ____ To ____ Seal Material (Bentonite Neat Cement Other _____)
From ____ To ____ Seal Material (Bentonite Neat Cement Other _____)
From ____ To ____ Seal Material (Bentonite Neat Cement Other _____)
20. Indicate total number of existing wells on site _____ List number of existing unused wells on site _____
21. *Is this well or any existing well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? Yes ✓ No If yes, complete the following: CUP/WUP No. _____ District Well ID No. _____
22. Latitude _____ Longitude _____
23. Data Obtained From: GPS Map Survey Datum: _____ NAD 27 _____ NAD 83 _____ WGS 84

I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit or additional recharge permit, if required, has been or will be obtained prior to commencement of well construction. I further certify that all information provided in this application is accurate and that all work will conform to the criteria and standards established by the Department of Health or applicable local governmental authority, unless otherwise specified by the permit. I agree to provide a well completion report to the District within 30 days after completion of the construction, repair, or modification or abandonment authorized by the permit, or the permit expiration, whichever occurs first.

I certify that I am the owner of the property that the information provided in section 1 and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well, or, if I certify that I am the owner of the property that the information provided in section 1 and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well, or, if I certify that I am not the owner, that the information provided in section 1 is accurate. I authorize the construction, repair, modification, or abandonment activities as described in this application. I agree to allow authorized representatives of the WMD or Delegated Authority access to the property to inspect the construction, repair, modification, or abandonment authorized by this permit.

Dan Seay Jr. 11132 — *Signature of Contractor, *License No
Native — *Signature of Owner or Agent, *Date 8/3/15

RECOMMENDED FOR OFFICIAL USE ONLY

Approval Granted By Kyle Issue Date 9/9/15 Expiration Date _____ Hydrologist Approval KB Initials
Fee Received $ 50 Receipt No. 2541904 Check No. Visa 0812

THIS PERMIT IS NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD OR DELEGATED AUTHORITY. THE PERMIT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL CONSTRUCTION, REPAIR, MODIFICATION, OR ABANDONMENT ACTIVITIES.

DEP Form 62-532.900(1) Incorporated in 62-532.400(1), F.A.C. Effective Date: October 7, 2010 Page 1 of 2

PERMIT CONDITIONS

Permit Number: 5268 - 2015 **Page 2 of 2**

X	Condition
1.	The Well Driller shall provide notice to the Department of the approximate start date and time that construction of the well at least 24 hours prior to the start of construction either by fax (561-837-5293) or e-mail (FDOHPB.Wells@FLhealth.gov)
2.	The well shall be drilled in accordance with the construction details and site plan submitted with the application.
3.	The well shall not be located in any low area subject to flooding or within the minimum setback distance from any know hazard.
4.	If this is a replacement well, the existing well shall be abandoned by filling it from the bottom to the top with neat cement grout. This shall be accomplished before the new well is released for service.
5.	This permit does not indicate a waiver of or approval of any permits required by other federal/state/local agencies or of any permit required by the Department for other aspects of the total project.
6.	Upon completion of the well and prior to use, the following must be submitted to the Department before the well can be put into service: a. Private Drinking Water Well. (i). A well completion Report (No Later than 30 days from completion of construction). (ii). One satisfactory bacteriological sample result, no older than 30 days. Sample to be taken by the well contractor. b. Non-Potable Wells (Irrigation, Fire Protection, etc.). (i). A well completion Report (No Later than 30 days from completion of construction). c. Limited Use Well. (i). A well completion Report (No Later then 30 days from completion of construction). (ii). Five (5) satisfactory bacteriological sample results taken for five (5) consecutive days. Sample shall be taken by a certified lab. The last sample shall be no older than 30 days. (iii). Chemical analysis for lead and nitrate.
7.	Other Condition(s): Environmental Control Rule II, Section 8, A.5 - For private and multi-family water wells and irrigation wells the casing shall be surrounded at grade level by a two-inch thick concrete pad extending at least six inches in all directions and the upper terminus of the well casing shall project at least 12 inches above finished grade, [Ord. 2005 - 003] Environmental Control Rule II, Section 8, A.6 - Whenever the pump is not set at the vertical casing, the line between the vertical casing and pump shall be considered an extension of the casing and protected from sanitary hazards in a similar manner as the casing.

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

- ☐ Southwest
- ☐ Northwest
- ☐ St. Johns River
- ☒ South Florida
- ☐ Suwannee River
- ☐ DEP
- ☐ Delegated Authority (If Applicable) ______

PLEASE FILL OUT ALL APPLICABLE FIELDS
(*Denotes Required Fields Where Applicable)

The water well contractor is responsible for completing this form and forwarding the permit application to the appropriate delegated authority where applicable.

Permit No. S 264-15
Florida Unique ID ______
Permit Stipulations Required (See Attached) ______
62-524 Quad No. ______ Delineation No. ______
CUP/WUP Application No. ______
ABOVE THIS LINE - FOR OFFICIAL USE ONLY

1. Florida Fish & Wildlife Conser. 8535 Northlake Blvd. West Palm Beach Florida 33412
*Owner, Legal Name if Corporation *Address *City *State *ZIP Telephone Number

2. 11835 Seminole Pratt Whitney Road West Palm Beach, Florida 33412 - JW Corbett Wildlife Management Area
*Well Location - Address, Road Name or Number, City

3. 00-40-42-12-00-000-9000
*Parcel ID No. (PIN) or Alternate Key (Circle One) Lot Block Unit

4. 12 42 40 Palm Beach
*Section or Land Grant *Township *Range *County Subdivision Check if 62-524 ☐ Yes ☐ No

5. Centerline Drilling, Inc. 11132 561-616-0988 ctrlinedrilling@aol.com
*Water Well Contractor *License Number *Telephone Number E-mail Address

6. 1698 Old Okeechobee Road, Suite 3C West Palm Beach Florida 33409
*Water Well Contractor's Address City State ZIP

7. *Type of Work: ☒ Construction ☐ Repair ☐ Modification ☐ Abandonment ______
*Reason for Repair, Modification, or Abandonment

8. *Number of Proposed Wells 1

9. *Specify Intended Use(s) of Well(s):

- ☐ Domestic
- ☐ Bottled Water Supply
- ☐ Public Water Supply (Limited Use/DOH)
- ☐ Public Water Supply (Community or Non-Community/DEP)
- ☐ Class I Injection
- ☐ Landscape Irrigation
- ☐ Recreation Area Irrigation
- ☐ Agricultural Irrigation
- ☐ Livestock
- ☐ Nursery Irrigation
- ☐ Commercial/Industrial
- ☐ Golf Course Irrigation
- ☐ Site Investigations
- ☒ Monitoring
- ☐ Test
- ☐ Earth-Coupled Geothermal
- ☐ HVAC Supply
- ☐ HVAC Return

Class V Injection: ☐ Recharge ☐ Commercial/Industrial Disposal ☐ Aquifer Storage and Recovery ☐ Drainage
Remediation: ☐ Recovery ☐ Air Sparge ☐ Other (Describe) ______
☐ Other (Describe) ______

Date Stamp
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Official Use Only

10. *Distance from Septic System if ≤ 200 ft. 1Mile 11. Facility Description ______ 12. Estimated Start Date 09/2015

13. *Estimated Well Depth 45 ft. *Estimated Casing Depth 40 ft. Primary Casing Diameter 2 in. Open Hole From ___ To ___

14. Estimated Screen Interval: From 40 To 45 ft.

15. *Primary Casing Material: Black Steel Galvanized ✓ PVC Stainless Steel Not Cased Other ______

16. Secondary Casing: Telescope Casing Liner Surface Casing Diameter ___ in.

17. Secondary Casing Material: Black Steel Galvanized PVC Stainless Steel Other ______

18. *Method of Construction, Repair, or Abandonment: Auger Cable Tool Jetted ✓ Rotary Sonic
Combination (Two or More Methods) Hand Driven (Well Point, Sand Point) Hydraulic Point (Direct Push)
Horizontal Drilling Plugged by Approved Method Other (Describe) ______

19. Proposed Grouting Interval for the Primary, Secondary, and Additional Casing:
From ___ To ___ Seal Material (Bentonite Neat Cement Other ___)
From ___ To ___ Seal Material (Bentonite Neat Cement Other ___)
From ___ To ___ Seal Material (Bentonite Neat Cement Other ___)
From ___ To ___ Seal Material (Bentonite Neat Cement Other ___)

20. Indicate total number of existing wells on site ___ List number of existing unused wells on site ___

21. *Is this well or any existing well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? Yes ✓ No If yes, complete the following: CUP/WUP No. ___ District Well ID No. ___

22. Latitude ______ Longitude ______

23. Data Obtained From: GPS Map Survey Datum ___ NAD 27 ___ NAD 83 ___ WGS 84

I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided in this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable. I agree to provide a well completion report to the District within 30 days after completion of the construction, repair, modification or abandonment authorized by this permit, or the permit expiration, whichever occurs first.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well, or I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of their responsibilities as stated above. [illegible]

[signature] 11132 [signature] 9/3/15
*Signature of Contractor *License No. *Signature of Owner or Agent *Date

BELOW THIS LINE - FOR OFFICIAL USE ONLY

Approval Granted By [signature] Issue Date 9/9/15 Expiration Date ______ Hydrologist Approval KB
Initials

Fee Received $ 50 Receipt No. 2941904 Check No. [illegible] 081

THIS PERMIT IS NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD OR DELEGATED AUTHORITY. THE PERMIT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL CONSTRUCTION, REPAIR, MODIFICATION, OR ABANDONMENT ACTIVITIES.

DEP Form: 62-532.900(1) Incorporated in 62-532.400(1), F.A.C. Effective Date: October 7, 2010

PERMIT CONDITIONS

Permit Number: 5269 - 2015 **Page 2 of 2**

X	Condition
1.	The Well Driller shall provide notice to the Department of the approximate start date and time that construction of the well at least 24 hours prior to the start of construction either by fax (561-837-5293) or e-mail (FDOHPB.Wells@FLhealth.gov)
2.	The well shall be drilled in accordance with the construction details and site plan submitted with the application.
3.	The well shall not be located in any low area subject to flooding or within the minimum setback distance from any know hazard.
4.	If this is a replacement well, the existing well shall be abandoned by filling it from the bottom to the top with neat cement grout. This shall be accomplished before the new well is released for service.
5.	This permit does not indicate a waiver of or approval of any permits required by other federal/state/local agencies or of any permit required by the Department for other aspects of the total project.
6.	Upon completion of the well and prior to use, the following must be submitted to the Department before the well can be put into service: a. Private Drinking Water Well. (i). A well completion Report (No Later than 30 days from completion of construction). (ii). One satisfactory bacteriological sample result, no older than 30 days. Sample to be taken by the well contractor. b. Non-Potable Wells (Irrigation, Fire Protection, etc.). (i). A well completion Report (No Later than 30 days from completion of construction). c. Limited Use Well. (i). A well completion Report (No Later then 30 days from completion of construction). (ii). Five (5) satisfactory bacteriological sample results taken for five (5) consecutive days. Sample shall be taken by a certified lab. The last sample shall be no older than 30 days. (iii). Chemical analysis for lead and nitrate.
7.	Other Condition(s): Environmental Control Rule II, Section 8, A.5 - For private and multi-family water wells and irrigation wells the casing shall be surrounded at grade level by a two-inch thick concrete pad extending at least six inches in all directions and the upper terminus of the well casing shall project at least 12 inches above finished grade, [Ord, 2005 - 003] Environmental Control Rule II, Section 8, A.6 - Whenever the pump is not set at the vertical casing, the line between the vertical casing and pump shall be considered an extension of the casing and protected from sanitary hazards in a similar manner as the casing.

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

☐ Southwest
☐ Northwest
☐ St. Johns River
☑ South Florida
☐ Suwannee River
☐ DEP
☐ Delegated Authority (If Applicable) _____

PLEASE FILL OUT ALL APPLICABLE FIELDS
(*Denotes Required Fields Where Applicable)

The water well contractor is responsible for completing this form and forwarding the permit application to the appropriate delegated authority where applicable.

Permit No. S270-15
Florida Unique ID _____
Permit Stipulations Required (See Attached) _____
62-524 Quad No. _____ Delineation No _____
CUP/WUP Application No _____
ABOVE THIS LINE - FOR OFFICIAL USE ONLY

1. Florida Fish & Wildlife Conse; 8535 Northlake Blvd. West Palm Beach Florida 33412
*Owner, Legal Name if Corporation *Address *City *State *ZIP Telephone Number
2. 11835 Seminole Pratt Whitney Road West Palm Beach, Florida 33412 - JW Corbett Wildlife Management Area
*Well Location - Address, Road Name or Number, City
3. 00-40-42-12-00-000-9000
*Parcel ID No. (PIN) or Alternate Key (Circle One) Lot Block Unit
4. 12 42 40 Palm Beach _____ Check if 62-524 ☐ Yes ☐ No
*Section or Land Grant *Township *Range *County Subdivision
5. Centerline Drilling, Inc 11132 561-615-0986 ctrlinedrilling@aol.com
*Water Well Contractor *License Number *Telephone Number E-mail Address
6. 1698 Old Okeechobee Road, Suite 3C West Palm Beach Florida 33409
*Water Well Contractor's Address City State ZIP
7. *Type of Work: ☑ Construction ☐ Repair ☐ Modification ☐ Abandonment _____
*Reason for Repair, Modification, or Abandonment
8. *Number of Proposed Wells 1
9. *Specify Intended Use(s) of Well(s).

☐ Domestic	☐ Landscape Irrigation	☐ Agricultural Irrigation	☐ Site Investigations
☐ Bottled Water Supply	☐ Recreation Area Irrigation	☐ Livestock	☑ Monitoring
☐ Public Water Supply (Limited Use/DOH)		☐ Nursery Irrigation	☐ Test
☐ Public Water Supply (Community or Non-Community/DEP)		☐ Commercial/Industrial	☐ Earth-Coupled Geothermal
☐ Class I Injection		☐ Golf Course Irrigation	☐ HVAC Supply
			☐ HVAC Return

Class V Injection: ☐ Recharge ☐ Commercial/Industrial Disposal ☐ Aquifer Storage and Recovery ☐ Drainage
Remediation: ☐ Recovery ☐ Air Sparge ☐ Other (Describe) _____
☐ Other (Describe) _____

RECEIVED
SEP 04 2015
Florida Department of Health PBC
Env. Review
Date Stamp
Office Use Only

10. *Distance from Septic System if ≤200 ft. 1Mile 11. Facility Description _____ 12 Estimated Start Date 09/2015
13. *Estimated Well Depth 15 ft. *Estimated Casing Depth 10 ft Primary Casing Diameter 2 in. Open Hole: From ____ To ____ ft.
14. Estimated Screen Interval: From 10 To 15 ft
15. *Primary Casing Material: Black Steel Galvanized ✓ PVC Stainless Steel
Not Cased Other _____
16. Secondary Casing: Telescope Casing Liner Surface Casing Diameter _____ in
17. Secondary Casing Material: Black Steel Galvanized PVC Stainless Steel Other _____
18. *Method of Construction, Repair, or Abandonment: Auger Cable Tool Jetted ✓ Rotary Sonic
Combination (Two or More Methods) Hand Driven (Well Point, Sand Point) Hydraulic Point (Direct Push)
Horizontal Drilling Plugged by Approved Method Other (Describe) _____
19. Proposed Grouting Interval for the Primary, Secondary, and Additional Casing:
From _____ To _____ Seal Material: Bentonite Neat Cement Other _____
From _____ To _____ Seal Material: Bentonite Neat Cement Other _____
From _____ To _____ Seal Material: Bentonite Neat Cement Other _____
From _____ To _____ Seal Material: Bentonite Neat Cement Other _____
20. Indicate total number of existing wells on site _____ List number of existing unused wells on site _____
21. *Is this well or any existing well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? Yes ✓ No If yes, complete the following: CUP/WUP No. _____ District Well ID No. _____
22. Latitude _____ Longitude _____
23. Data Obtained From: GPS Map Survey Datum _____ NAD 27 _____ NAD 83 _____ WGS 84

I hereby certify that I will comply with the applicable rules of Title 40, Florida Administrative Code, and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that all information provided in this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable. I agree to provide a well completion report to the District within 30 days after completion of the construction, repair, modification, or abandonment authorized by this permit, or the permit expiration, whichever occurs first.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well; or, I certify that I am acting on behalf of the owner (i.e. The owner has provided a statement, and that I have informed the owner of their responsibilities as stated above. Grant permission to allow employees of the WMD or Delegated Authority access to the well site during the construction, repair, modification, or abandonment authorized by this permit.

Tom Say Dr — 11132 — Before
*Signature of Contractor *Licensee No

*Signature of Owner or Agent — 9/3/15 *Date

OFFICE USE ONLY

Approval Granted By Kujaj Issue Date 9/9/15 Expiration Date _____ Hydrologist Approval KB Initials
Fee Received $ 50 Receipt No 2991909 Check No. Visa 0812

THIS PERMIT IS NOT VALID UNTIL PROPERLY SIGNED BY AN AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD OR DELEGATED AUTHORITY. THE PERMIT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL CONSTRUCTION, REPAIR, MODIFICATION, OR ABANDONMENT ACTIVITIES.

Page 1 of 2

DEP Form 62-532.900(1). Incorporated in 62-532.400(1), F.A.C. Effective Date: October 7, 2010

PERMIT CONDITIONS

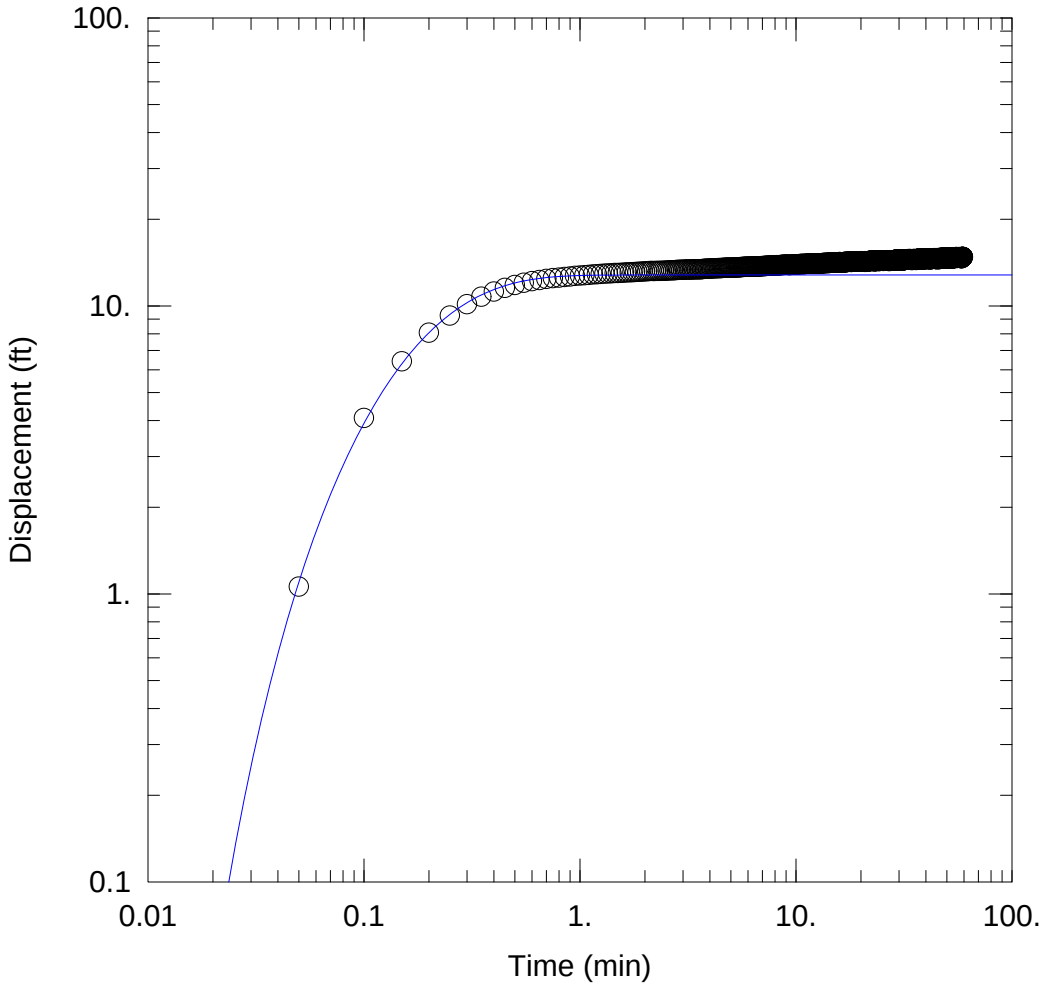
Permit Number: 5270 - 2015 **Page 2 of 2**

X	Condition
1.	The Well Driller shall provide notice to the Department of the approximate start date and time that construction of the well at least 24 hours prior to the start of construction either by fax (561-837-5293) or e-mail (FDOHPB.Wells@FLhealth.gov)
2.	The well shall be drilled in accordance with the construction details and site plan submitted with the application.
3.	The well shall not be located in any low area subject to flooding or within the minimum setback distance from any know hazard.
4.	If this is a replacement well, the existing well shall be abandoned by filling it from the bottom to the top with neat cement grout. This shall be accomplished before the new well is released for service.
5.	This permit does not indicate a waiver of or approval of any permits required by other federal/state/local agencies or of any permit required by the Department for other aspects of the total project.
6.	Upon completion of the well and prior to use, the following must be submitted to the Department before the well can be put into service: a. Private Drinking Water Well. (i). A well completion Report (No Later than 30 days from completion of construction). (ii). One satisfactory bacteriological sample result, no older than 30 days. Sample to be taken by the well contractor. b. Non-Potable Wells (Irrigation, Fire Protection, etc.). (i). A well completion Report (No Later than 30 days from completion of construction). c. Limited Use Well. (i). A well completion Report (No Later then 30 days from completion of construction). (ii). Five (5) satisfactory bacteriological sample results taken for five (5) consecutive days. Sample shall be taken by a certified lab. The last sample shall be no older than 30 days. (iii). Chemical analysis for lead and nitrate.
7.	Other Condition(s): Environmental Control Rule II, Section 8, A.5 - For private and multi-family water wells and irrigation wells the casing shall be surrounded at grade level by a two-inch thick concrete pad extending at least six inches in all directions and the upper terminus of the well casing shall project at least 12 inches above finished grade, [Ord, 2005 - 003] Environmental Control Rule II, Section 8, A.6 - Whenever the pump is not set at the vertical casing, the line between the vertical casing and pump shall be considered an extension of the casing and protected from sanitary hazards in a similar manner as the casing.

APPENDIX F

AQTESOLV PUMPING DATA ANALYSES OUTPUT
&
PUMPING / SLUG TEST FIELD NOTES

AQTESOLV PUMPING DATA ANALYSES OUTPUT



PUMP TEST RESULTS

Data Set: W:\433\Active Jobs\60735 JW Corbett Monitoring Wells\GW1-PumpTest Hantush.aqt
Date: 10/22/15 Time: 15:21:19

PROJECT INFORMATION

Company: GF
Client: SFWMD
Location: J.W. Corbett
Test Well: MFEB9-GW1
Test Date: 10/15/2015

AQUIFER DATA

Saturated Thickness: 40. ft
Aquitard Thickness (b'): 20. ft
Anisotropy Ratio (Kz/Kr): 0.1
Aquitard Thickness (b"): 1. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MFEB9-GW1	0	0

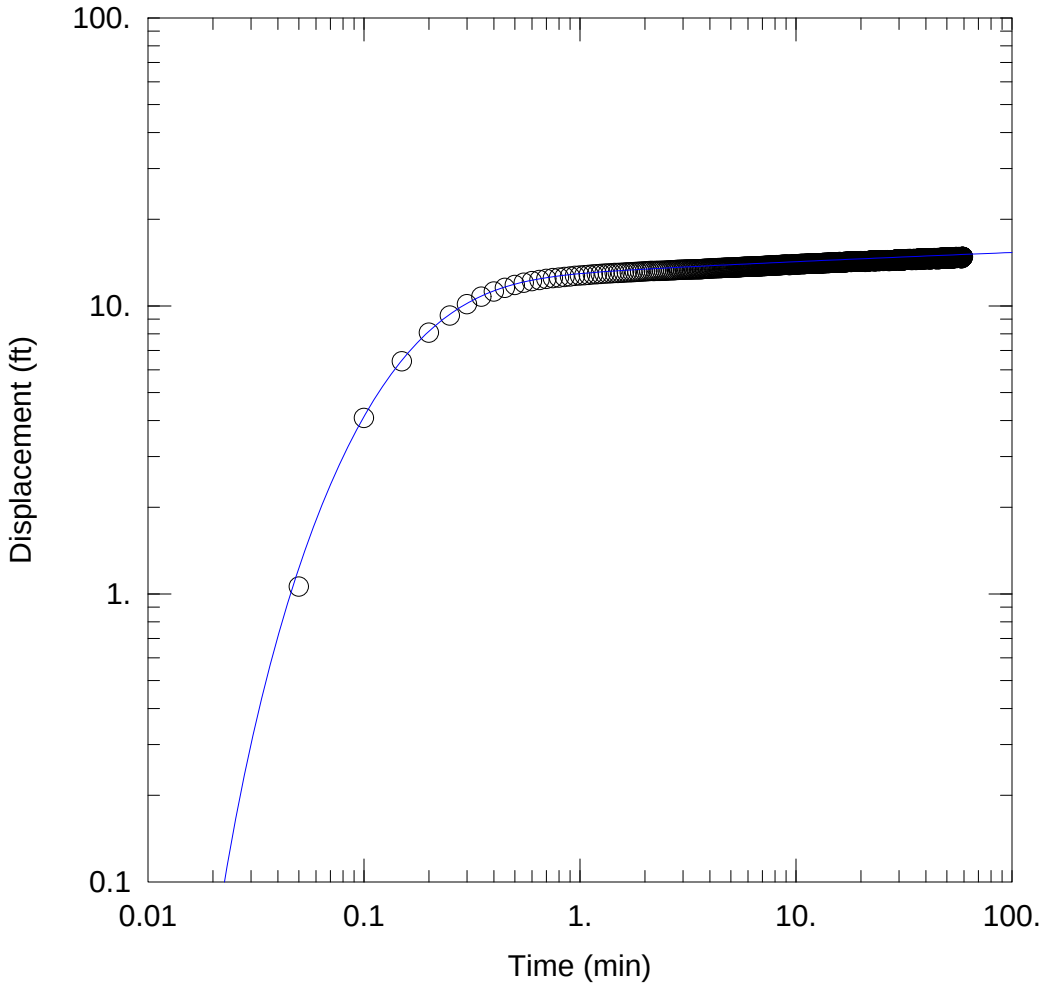
Observation Wells

Well Name	X (ft)	Y (ft)
○ MFEB9-GW1	0	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 29.97 ft^2/day
r/B' = 1.024
r/B" = 0.8913
S = 0.9859
ß' = 0.138
ß" = 0.1618



PUMP TEST RESULTS

Data Set: W:\...\GW1-PumpTest Newman-Witherspoon.aqt
Date: 10/22/15 Time: 15:22:18

PROJECT INFORMATION

Company: GF
Client: SFWMD
Location: J.W. Corbett
Test Well: MFEB9-GW1
Test Date: 10/15/2015

AQUIFER DATA

Saturated Thickness: 40. ft
Aquitard Thickness (b'): 20. ft
Anisotropy Ratio (Kz/Kr): 0.1
Aquitard Thickness (b"): 1. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MFEB9-GW1	0	0

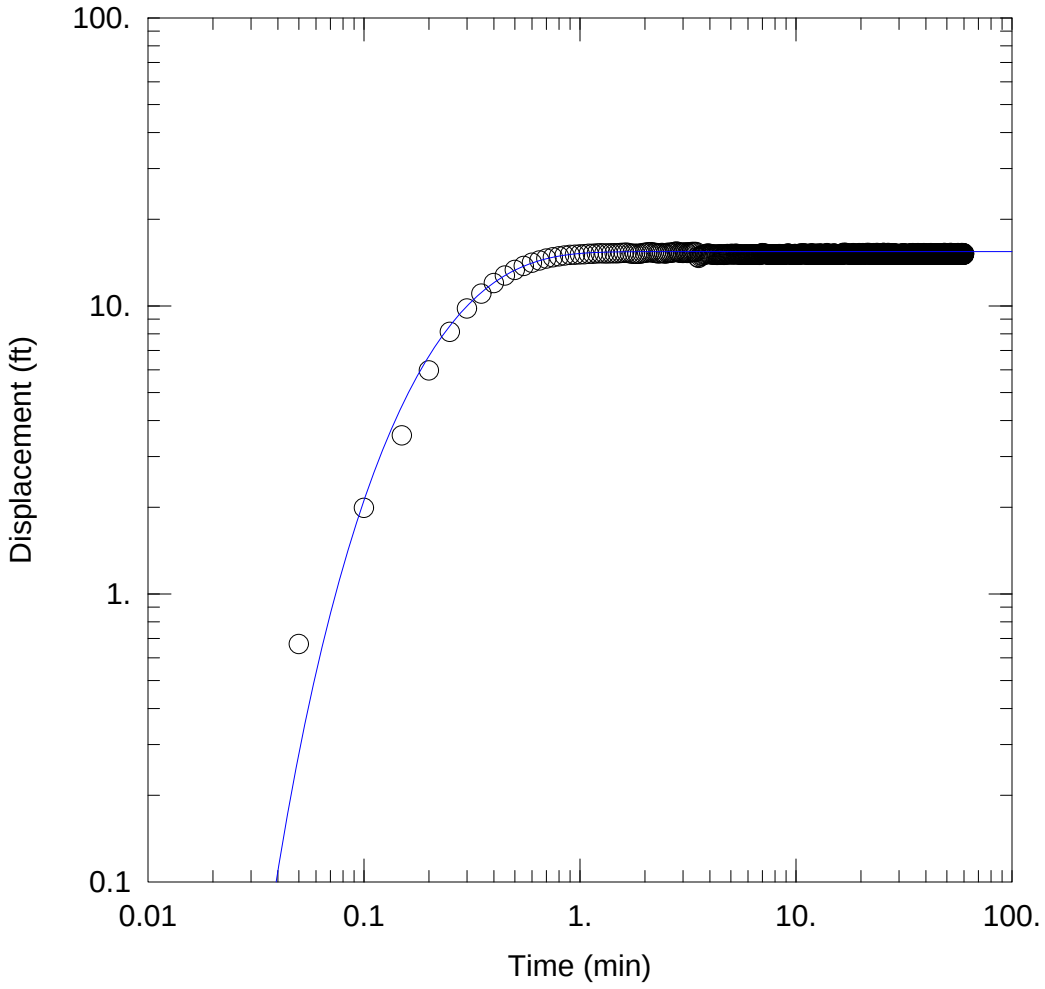
Observation Wells

Well Name	X (ft)	Y (ft)
○ MFEB9-GW1	0	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Neuman-Witherspoon

T = 27.08 ft^2/day
r/B = 1.534
T2 = 1574.8 ft^2/day
S = 0.8231
ß = 0.3937
S2 = 0.7943



PUMP TEST RESULTS

Data Set: W:\433\Active Jobs\60735 JW Corbett Monitoring Wells\GW2-PumpTest Hantush.aqt
Date: 10/22/15 Time: 15:24:15

PROJECT INFORMATION

Company: GF
Client: SFWMD
Location: J.W. Corbett
Test Well: MFEB9-GW2
Test Date: 10/15/2015

AQUIFER DATA

Saturated Thickness: 39.25 ft
Aquitard Thickness (b'): 1. ft
Anisotropy Ratio (Kz/Kr): 0.1
Aquitard Thickness (b"): 20. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MFEB9-GW2	0	0

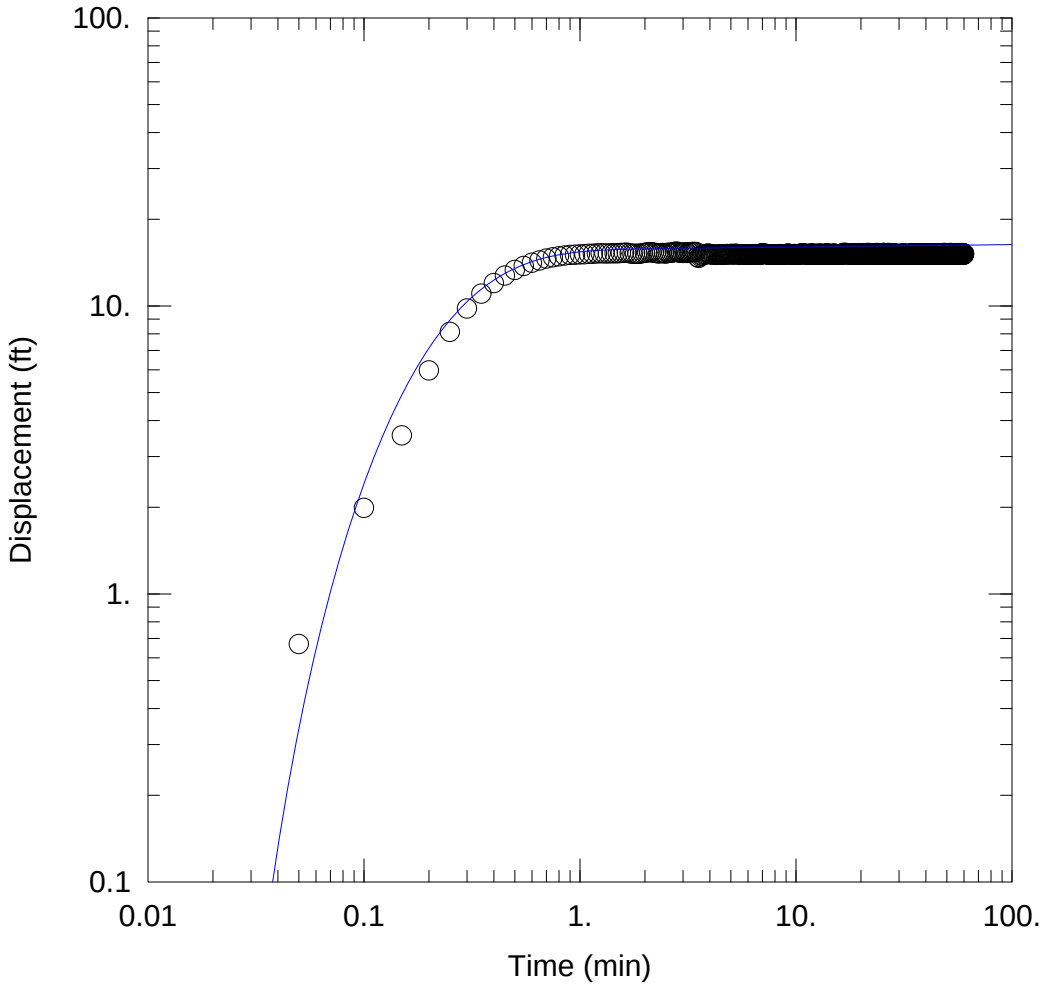
Observation Wells

Well Name	X (ft)	Y (ft)
○ MFEB9-GW2	0	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 15.63 ft^2/day
r/B' = 1.641
r/B" = 0.
S = 0.9434
ß' = 0.3503
ß" = 0.



PUMP TEST RESULTS

Data Set: W:\...\GW2-PumpTest Newman-Witherspoon.aqt
Date: 10/22/15 Time: 15:25:08

PROJECT INFORMATION

Company: GF
Client: SFWMD
Location: J.W. Corbett
Test Well: MFEB9-GW2
Test Date: 10/15/2015

AQUIFER DATA

Saturated Thickness: 39.25 ft
Aquitard Thickness (b'): 1. ft
Anisotropy Ratio (Kz/Kr): 0.1
Aquitard Thickness (b"): 20. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MFEB9-GW2	0	0

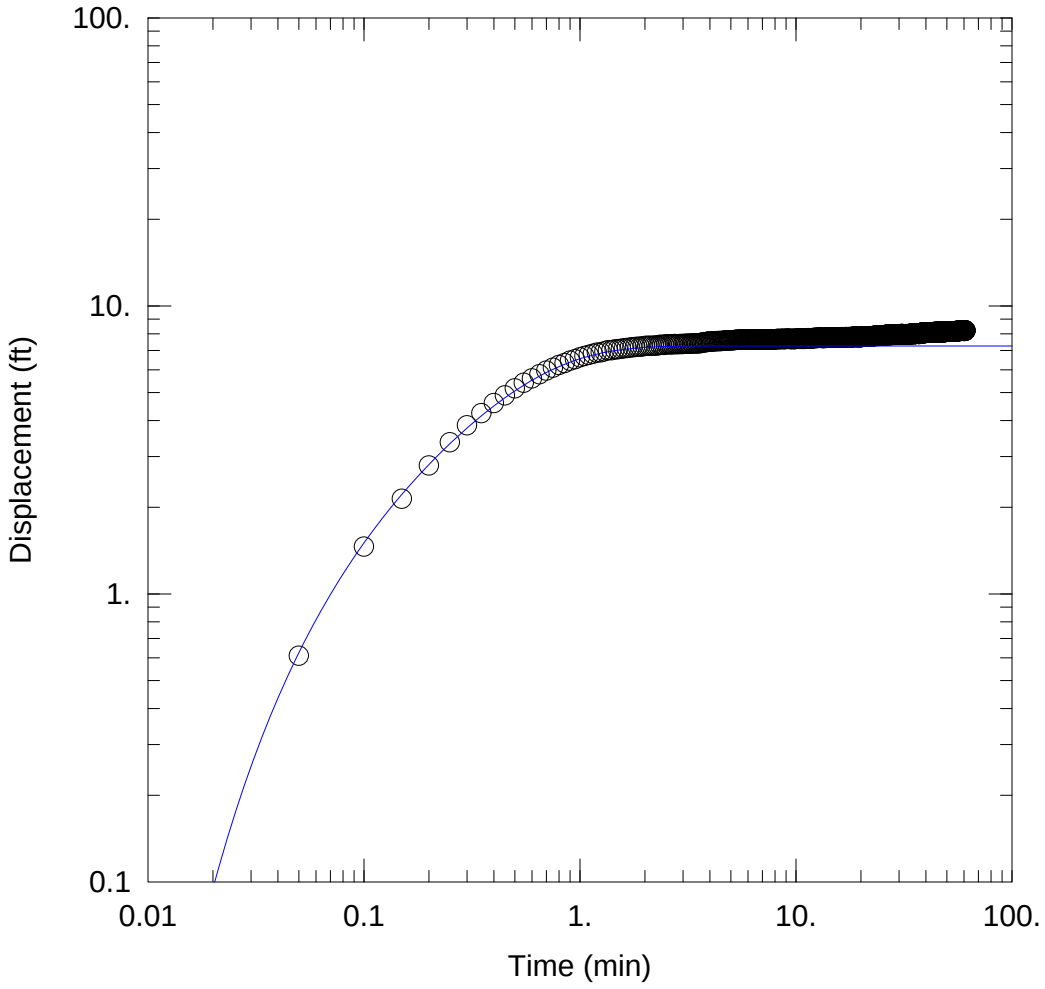
Observation Wells

Well Name	X (ft)	Y (ft)
○ MFEB9-GW2	0	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Neuman-Witherspoon

T = 16.08 ft^2/day
r/B = 1.641
T2 = 5109.3 ft^2/day
S = 0.9053
ß = 0.3503
S2 = 0.8913



SLUG TEST RESULTS

Data Set: W:\433\Active Jobs\60735 JW Corbett Monitoring Wells\GW3-PumpTest Hantush.aqt
Date: 10/22/15 Time: 15:26:17

PROJECT INFORMATION

Company: GF
Client: SFWMD
Location: J.W. Corbett
Test Well: MFEB9-GW3
Test Date: 10/15/2015

AQUIFER DATA

Saturated Thickness: 39.25 ft
Aquitard Thickness (b'): 1. ft
Anisotropy Ratio (Kz/Kr): 0.1
Aquitard Thickness (b"): 20. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MFEB9-GW3	0	0

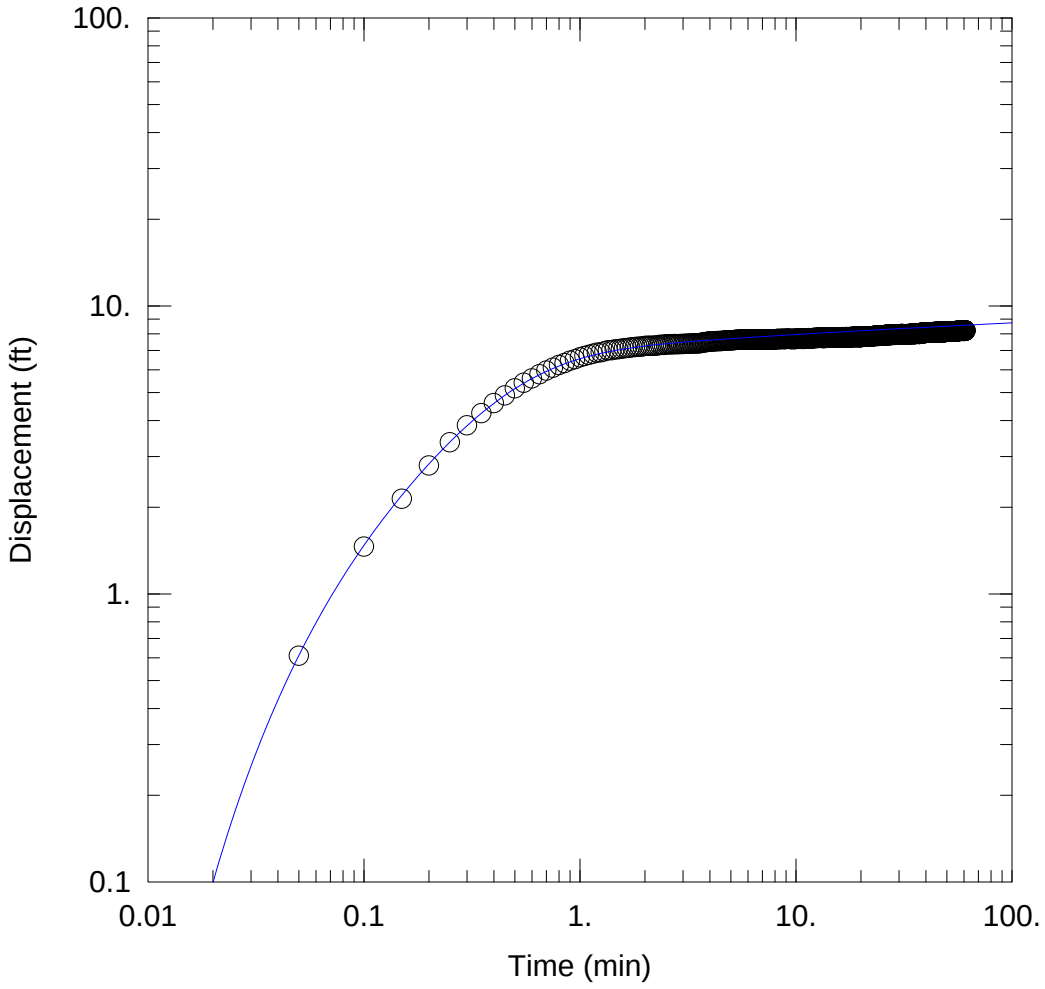
Observation Wells

Well Name	X (ft)	Y (ft)
○ MFEB9-GW3	0	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 23.49 ft^2/day
r/B' = 1.189
r/B" = 0.
S = 0.3623
ß' = 1.012
ß" = 0.



SLUG TEST RESULTS

Data Set: W:\...\GW3-PumpTest Newman-Witherspoon.aqt
Date: 10/22/15 Time: 15:27:02

PROJECT INFORMATION

Company: GF
Client: SFWMD
Location: J.W. Corbett
Test Well: MFEB9-GW3
Test Date: 10/15/2015

AQUIFER DATA

Saturated Thickness: 39.25 ft
Aquitard Thickness (b'): 1. ft
Anisotropy Ratio (Kz/Kr): 0.1
Aquitard Thickness (b"): 20. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MFEB9-GW3	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
○ MFEB9-GW3	0	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Neuman-Witherspoon

T = 17.76 ft^2/day
r/B = 1.514
T2 = 789.9 ft^2/day
S = 0.2399
ß = 1.396
S2 = 0.2323

PUMPING / SLUG TEST FIELD NOTES

Gerhard M.
Witt
& Associates, Inc.

1495 Forest Hill Blvd., Suite F
West Palm Beach, Florida 33406-6073
(561) 642-9923 Fax: (561) 642-3327

Pumping @ 6.5 gpm from 10:34 to 11:33 (pump stopped)

Logger @ 100 ft from top of PVC

Step-Drawdown Test Form

Project No. _____ Project Location: Cobott Wildlife

Well No. MF-GW-9A Step: _____ Drawdown ☑

Date: 10/15/15 Recovery ☐

Reference Point: Top of PVC Elevation of Measuring Point: _____

Elevation of Ground Level: _____ Pretest Water Level: 4.35 feet

GPS Location: Latitude _____ Longitude _____ Page 1 of 1

Elapsed Time (minutes)	Time (HH:MM)	Reading (ft)	Level Below Reference Point (ft)	Drawdown (ft)	Pumping Rate (gpm)	Remarks
0	10:34	4.35				Pumping Rate @ 6.5 gpm
10sec	10:34:10	6.00				
1 min	10:35:00	17.80				
3	10:37	17.88				Logger at
6	10:40	17.96				
5	10:49	18.28				
6	10:50	18.58				
7	10:59	18.78				
8	11:02	18.98				
9	11:07	19.00				
10	11:12	19.15				
12	11:16	19.25				
14	11:24	19.25				
16	11:26	19.30				
18	11:33	19.28				
20						
25						
30						
35						
40						
45						
50						
55						
60						

Pretest Water Levels @ 10:00
9A → 4.35
9B → 4.37
9C → 4.10

Water level @ 10:50
9A → 18.58 ft
9B → 4.45 ft
9C → 4.12 ft

Water level @ 11:12
9A → 19.25 ft
9B → 4.45 ft
9C → 4.12 ft

Water level @ 11:33
9A → 19.28 ft
9B 4.45 ft
9C 4.12 ft

Data Collected By: AWojnar QA Check: _____

File: 0 Rev.: 10/03 Step Form.wpd

Witt & Associates, Inc.
1495 Forest Hill Blvd., Suite F
West Palm Beach, Florida 33406-6073
(561) 642-9923 Fax: (561) 642-3327

Recovery from 11:38 to 11:50

Step-Drawdown Test Form

Project No. _____ Project Location: Corbett Wildlife
Well No. MFGW-9A Step: _____ Drawdown ☐
Date: 10/15/15 Recovery ☑
Reference Point: Top of PVC Elevation of Measuring Point: _____
Elevation of Ground Level: _____ ~~Pretest~~ Recovery Water Level: 19.28 ft

GPS Location: Latitude _____ Longitude _____ Page 1 of 1

Elapsed Time (minutes)	Time (HH:MM)	Reading (ft)	Level Below Reference Point (ft)	Drawdown (ft)	Pumping Rate (gpm)	Remarks
0	11:33	19.28 ft				
1	11:34	10.4 ft				
2	11:35	6.0				
3	11:35:30	4.98				
4	11:36	4.44				
5	11:37	4.40				
6	11:38	4.40				
7	11:41	4.39				
8	11:44	4.39				
9	11:47	4.38				
10						
12						
14						
16						
18						
20						
25						
30						
35						
40						
45						
50						
55						
60						

Post Recovery Water Levels

9A → 4.38 ft
9B → 4.42 ft
9C → 4.12 ft

Data Collected By: _____ QA Check: _____

File: 0
Hydrogeology, Geology, and Water Resources

Pumping rate @ 6.0 gpm from (11.56 to 12)
then ~ 5.8 gpm
Test from 11:56 to 12:56

Gerhardt M.
Witt
& Associates, Inc.

[illegible]

* logger at 40 ft from top of pvc

Step-Drawdown Test Form

Project No. ______ Project Location: Corbett Wildlife

Well No. MF-GW-9B Step: ______ Drawdown ☑ Recovery ☐

Date: 10/15/15

Reference Point: Top of PVC Elevation of Measuring Point: ______

Elevation of Ground Level ______ Present Water Level: 4.42

GPS Location: Latitude ______ Longitude ______ Page 1 of

Elapsed Time (minutes)	Time (HH:MM)	Reading (ft)	Level Below Reference Point (ft)	Drawdown (ft)	Pumping Rate (gpm)	Remarks
0	11:56	4.42				Pretest WL
1	11:57	8.0				9A → 4.41 ft
2	11:57:20	19.69				9B → 4.42 ft
3	11:57:40	19.79				9C → 4.15 ft
4	11:58	19.90				@ 12:05 WL
5	11:59	19.90				
6	12:00	19.65	— hose [illegible] / let more			
7	12:03	19.60				9A → 4.42 ft
8	12:05	19.60				9B → 19.60 ft
9	12:12	19.63				9C → 4.16 ft
10	12:25	19.65				@ 12:38 WL
12	12:37	19.70				
14	12:38	19.65				9A → 4.47 ft
16	12:40	19.65				9B → 19.65 ft
18	12:48	19.65				9C → 4.29 ft
20	12:50	19.65				
25	12:52	19.65				
30	12:55	19.60				@ 12:50 WL
35						
40						9A → 4.42 ft
45						9B → 19.65 ft
50						9C → 4.28 ft
55						
60						

6 gpm (margin note, elapsed time 0–5)

5.8 gpm (margin note, elapsed time 6–45)

Data Collected By: [signature] QA Check: ______

Gerhardt M.
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& Associates, Inc.

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Step-Drawdown Test Form

Project No. _____
Well No. MF-GW-9B
Date: 10/5/15
Reference Point: Top of PVC
Elevation of Ground Level: _____

Project Location: Corbett Wildlife
Step: _____
Drawdown ☐
Recovery ☑
Elevation of Measuring Point: _____
Pretest Water Level: 19.65 ft

GPS Location: Latitude _____ Longitude _____ Recovery Page 1 of 1

Elapsed Time (minutes)	Time (HH:MM)	Reading (ft)	Level Below Reference Point (ft)	Drawdown (ft)	Pumping Rate (gpm)	Remarks
0	12:56	19.65				
1	12:56:10	18.9				
2	12:56:20	16.4				
3	12:56:30	15.4				
4	12:56:40	9.9				Water @ 1:20
5	12:57	6.7				
6	12:57:30	5.7				9A → 4.38 ft
7	12:58	4.80				
8	12:59	4.65				9B → 4.45 ft
9	1:00	4.60				
10	1:01	4.55				9C → 4.20 ft
12	1:02	4.53				
14	1:05	4.50				
16	1:07	4.48				
18	1:10	4.47				
20	1:13	4.46				
25	1:13	4.46				
30	1:16	4.45				
35	1:17	4.48				
40						
45						
50						
55						
60						

Data Collected By: _____ QA Check: _____

File: 0 Rev.: 10/03 Step Form.wpd

Pumping @ 2.65 gpm from 1:34 to 2:35

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Logger @ 14.8 ft

Step-Drawdown Test Form

Project No. _____ Project Location: Cobert Wildlife

Well No. MF-GW-9C Step: _____ Drawdown ☐ Recovery ☐

Date: 10/5/15

Reference Point: Top of PVC Elevation of Measuring Point: _____

Elevation of Ground Level: _____ Pretest Water Level: 4.20 ft

GPS Location: Latitude _____ Longitude _____ Page 1 of 1

Elapsed Time (minutes)	Time (HH:MM)	Reading (ft)	Level Below Reference Point (ft)	Drawdown (ft)	Pumping Rate (gpm)	Remarks
0	1:34	4:20				Pretest WL @
1	1:34:20	6.0				9A → 4.38 ft
2	1:34:40	7.8				9B → 4.45 ft
3	1:34:50	8.9				9C → 4.20 ft
4	1:35	10:50				
5	1:36	11:68				
6	1:36:30	11:90				WL @ 1:40
7	1:37	11:98				
8	1:37:30	12:05				9A → 4.38 ft
9	1:37:50	12:08				9B → 4.49 ft
10	1:38	12:11				9C → 12.33 ft
12	1:38:30	12:18				
14	1:38:50	12:24				WL @ 2:00
16	1:39	12.25				
18	1:39:40	12.29				9A → 4.38 ft
20	1:40	12.33				9B → 4.52 ft
25	1:46	12.40				9C → 12.61 ft
30	1:52	12.48				
35	1:58	12.57				WL @ 2:25
40	2:00	12.61				
45	2:10	12:70				9A → 4.39 ft
50	2:15	12.85				9B → 4.52 ft
55	2:25	12:88				9C → 12.88 ft
60	2:35	12.91				

Data Collected By: A Wojnar QA Check: _____

File: 0 Rev.: 10/00 Step Form.wpd

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Recovery

Step-Drawdown Test Form

Project No. _____ Project Location: Corbett Wildlife
Well No. MW-GW-9C Step: _____ Drawdown ☐
Date: 10/15/15 Recovery ☒
Reference Point: Top of PVC Elevation of Measuring Point: _____
Elevation of Ground Level: _____ Pretest Water Level: 12.9 ft,
Recovery

GPS Location: Latitude _____ Longitude _____ Page ____ of ____

Elapsed Time (minutes)	Time (HH:MM)	Reading (ft)	Level Below Reference Point (ft)	Drawdown (ft)	Pumping Rate (gpm)	Remarks
0	2:35	12.9				
1	2:3530	10.3				
2	2:3550	7.3				
3	2:36	6.0				
4	2:37	5.0				WL@2:40
5	2:3739	4.80				
6	2:38	4.50				9A → 4.38 ft
7	2:40	4.40				9B → 4.49 ft
8	2:43	4.30				9C → 4:40 ft
9	2:45	4.28				
10	2:50	4.28				
12						
14						
16						
18						
20						
25						
30						
35						
40						
45						
50						
55						
60						

Data Collected By: _____ QA Check: _____

& Associates, Inc.
West Palm Beach, Florida 33406-6073
(561) 642-9923 Fax: (561) 642-3327

Step-Drawdown Test Form

Project No. _____ Project Location: Cobett Wildlife

Well No. _____ Step: _____ Drawdown ☐

Date: _____ Recovery ☐

Reference Point: _____ Elevation of Measuring Point: _____

Elevation of Ground Level: _____ Pretest Water Level: _____

GPS Location: Latitude _____ Longitude _____ Page ____ of ____

Elapsed Time (minutes)	Time (HH:MM)	Reading (ft)	Level Below Reference Point (ft)	Drawdown (ft)	Pumping Rate (gpm)	Remarks
0	Slug Tests		→ Recorded by loggers			
1			Water dropping too fast			
2			for manual readings			
3						
4						
5	Well 9A		Test 1	2:57 —		2:59 } Times
6			Test 2	2:59 —		3:02 }
7			Test 3	3:02		3:06 }
8						
9						
10						
12						
14						
16	Well 9B		Test 1	3:07 —		3:12 } Times
18						
20			Test 2	3:12 —		3:17 }
25			Test 3	3:18 —		3:22 }
30						
35						
40	Well 9C		Test 1	3:28 —		3:34 } Times
45			Test 2	3:34 —		3:41 }
50			Test 3	3:41 —		3:48 }
55						
60						

Data Collected By: _____ QA Check: _____

APPENDIX G

FIELD SURVEY DATA
(Field Surveying by Erdman Anthony)

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 4/08

COUNTY PALM BEACH	**PROJECT** J.W. CORBETT	**DESIGNATION** MFEB9
SECTION 12	**TOWNSHIP** 42 SOUTH	**RANGE** 40 EAST
NAME OF QUADRANGLE _____		
Established by ERDMAN ANTHONY	**Recovered by** _____ *(Surveyor / Firm Name)*	
DATE 11/03/2015 *(Established)*	**FIELD BOOK** CORBETT BOOK 1 **PAGE** 33-35	
HORIZONTAL DATUM: 1927 (*1983*) **ADJ** 2011 **Other**___ (circle one) ZONE (E) or W		
STATE PLANE COORDINATES	**N** 910,138.87 ft	**E** *882,547.55* ft
LATITUDE: N *26° 50' 09.2"*	**LONGITUDE:** W *80° 18' 20.8"*	
VERTICAL DATUM: MSL 1929 (*1988*) **Other** _____ (circle one)		**EL.** 21.44 ft
VERTICAL DATUM: MSL *1929* 1988 **Other** _____ (circle one)		**EL.** ft
CONTROL ACCURACY: HORIZONTAL 1 2 3 (*SUB-METER*) (circle one) **VERTICAL** 1 2 (3)		

DESCRIPTION

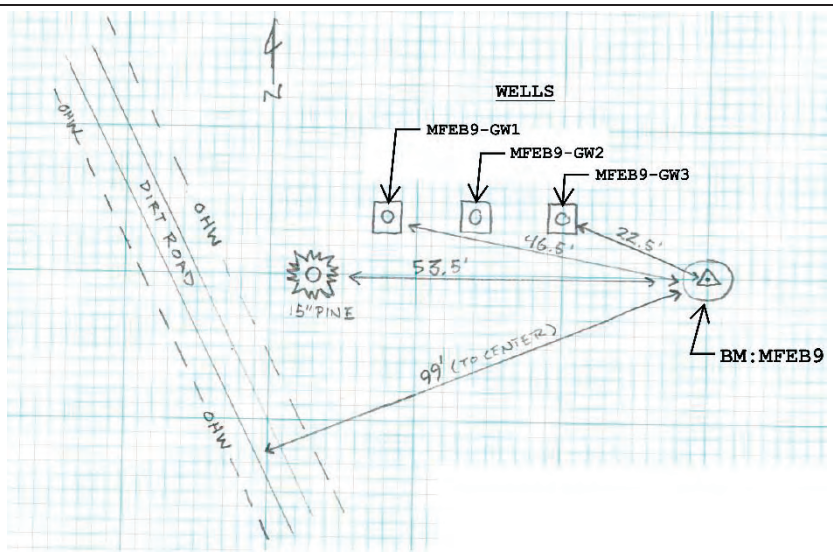
To Reach:

The benchmark is located within the J.W. Corbett Wildlife Management Area ("Corbett"). Near the southeast corner of said Corbett. To reach the benchmark from the intersection of Northlake Boulevard and Seminole Pratt Whitney Road, travel 3 miles north along Seminole Pratt Whitney Road to the south entrance of Corbett on the left, being Stumper's Grade trail. Travel west approximately 1.5 miles along Stumper's Grade trail to a (northwest/southeast) powerline corridor. Travel 1.0 mile southeast along said corridor to the station on the left. The benchmark is 99 feet perpendicular (northeast) to the center of the dirt road that runs along said corridor. The benchmark is 53.5 feet east of a 15 inch pine tree and 22.5 feet east-southeast of the most easterly well concrete pad.

NGS Benchmarks Used: U537, V537, & W537

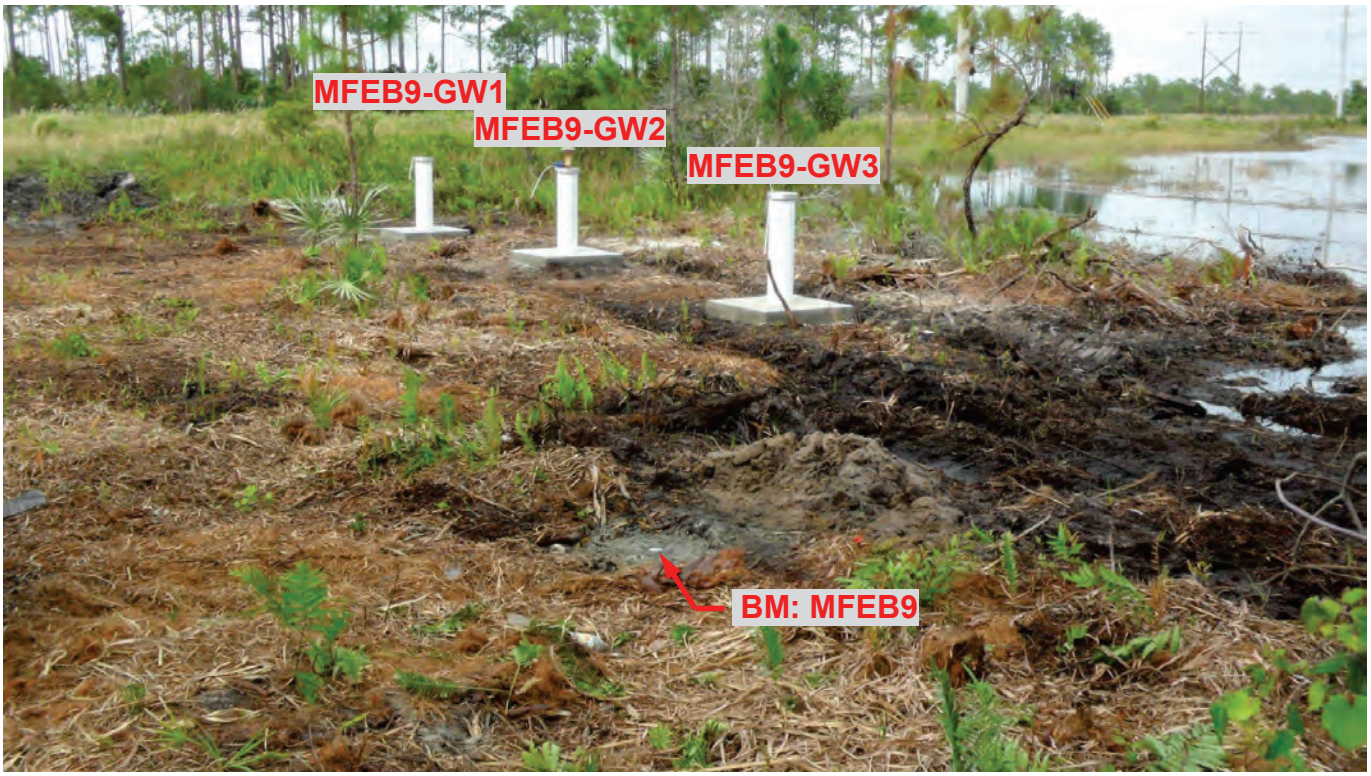
Notable Land marks: J.W. CORBETT WILDLIFE MANAGEMENT AREA

SKETCH



PICTURE


FLA. WATER MANAGEMENT DIST.
SURVEY
MFEB9
MARKER
OS


MFEB9-GW1
MFEB9-GW2
MFEB9-GW3
BM: MFEB9