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**REPORT OF GEOTECHNICAL EXPLORATION,  
LABORATORY AND ENGINEERING SERVICES  
DIAMOND TIMBER WILDLAND FIRE RESERVOIR  
MAXVILLE, FLORIDA  
E&A PROJECT NO. 4170-0002**

**Prepared for:**

Diamond Timber Investments  
9995 Gate Parkway North, Suite 330  
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**Prepared by:**

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August 16, 2013

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August 16, 2013

Mr. Brian Brown  
Diamond Timber Investments  
9995 Gate Parkway North, Suite 330  
Jacksonville, Florida 32246

Reference: Report of Geotechnical Exploration, Laboratory and Engineering Services  
Diamond Timber Wildland Fire Reservoir  
Maxville, Florida  
E&A Project No. 4170-0002

Dear Mr. Brown:

As requested recently, Ellis & Associates, Inc. has completed a geotechnical exploration of the subject site. This letter briefly describes the field exploration and laboratory testing performed, presents the data obtained, and presents our evaluation of the suitability of the soils for use as final cover material at the Trail Ridge landfill.

In summary, based on a review of the soils encountered in the borings and the results of the laboratory testing performed on representative samples of the soils, the materials encountered in the borings above a depth of 15.5 feet, meet or exceed the project specifications for use as the initial cover material.

The site for the subject project is located east of Maxville-Middleburg Road in Maxville, Florida. The general site location is shown on the Site Location Plan, Figure 1. We performed a field exploration at the site in the proposed borrow area on August 1, 2013. We located and performed 2 auger borings at the site. The borings were advanced to depths of approximately 20 feet below the existing ground surface. An aerial photograph of the site, which shows the approximate boring locations, is included as the Field Exploration Plan, Figure 2. The approximate boring locations were determined in the field by our personnel using GPS equipment, and should be considered accurate only to the degree implied by the method of measurement used. Log of Boring Records are attached.

The auger borings generally encountered a surficial layer of topsoil, approximately 0.5 to one foot deep, underlain by fine sand (SP) and silty fine sand (SM) to depths of 2.5 to 3.5 feet below existing grade. Below, layers of clayey to very clayey fine sand (SC) were encountered to depths of 15.5 to 16.5 feet below existing grade. Clay and clay with sand (CH) was encountered below the clayey sands to the termination depths of the borings. Groundwater was encountered at the borings from approximately 4 inches above the existing grade to a depth of 8 inches below the existing ground surface.

Representative soil samples obtained during our field exploration were visually classified, in general accordance with ASTM D 2488. Quantitative laboratory testing was performed on selected samples from the borings to better define the composition of the soils encountered and to provide data for correlation to their anticipated strength and compressibility characteristics. The laboratory testing determined the percent fines and natural moisture contents of selected soil samples. The laboratory test results are shown on the attached Summary of Laboratory Test Results tables and on the boring logs at the respective depths from which the tested samples were recovered. A Key to Soil Classification sheet is attached.

The Initial Cover Specification for the Trail Ridge landfill (Section 31.101.4) states the initial cover material shall be clean granular soil, free from organics, brush, weeds, roots, stumps, rocks, and any other deleterious material. The results of the borings, visual classification, and our laboratory testing indicate the subsurfacesoils at the subject site are relatively clean granular soils, with low organic contents, and reasonably free of organic materials, brush, weeds, roots, stumps, rocks, and other deleterious materials. Based on our evaluation of the explored soils at this site, it is our opinion that borrow material from this site, within the upper approximate 15.5 feet of the ground surface, would meet the specifications for and is suitable for use as the Initial Cover material for the Final Cover at the Trail Ridge Landfill.

We appreciate the opportunity to be your geotechnical consultant on this phase of the project and look forward to working with you towards a successful completion. If you have any questions, or if we may be of any further service, please contact us.

Very truly yours,

**ELLIS & ASSOCIATES, INC.**



Seth Morla, E.I.  
Staff Engineer



8/16/13

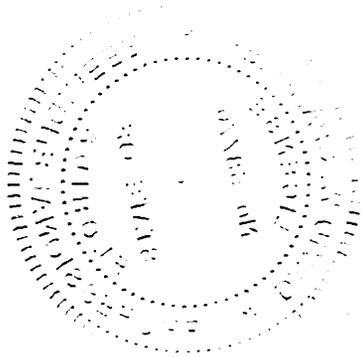
David W. Spangler, P.E.  
Senior Project Engineer  
Registered, Florida No. 58770

**FIGURES**

- |          |                        |
|----------|------------------------|
| Figure 1 | Site Location Plan     |
| Figure 2 | Field Exploration Plan |

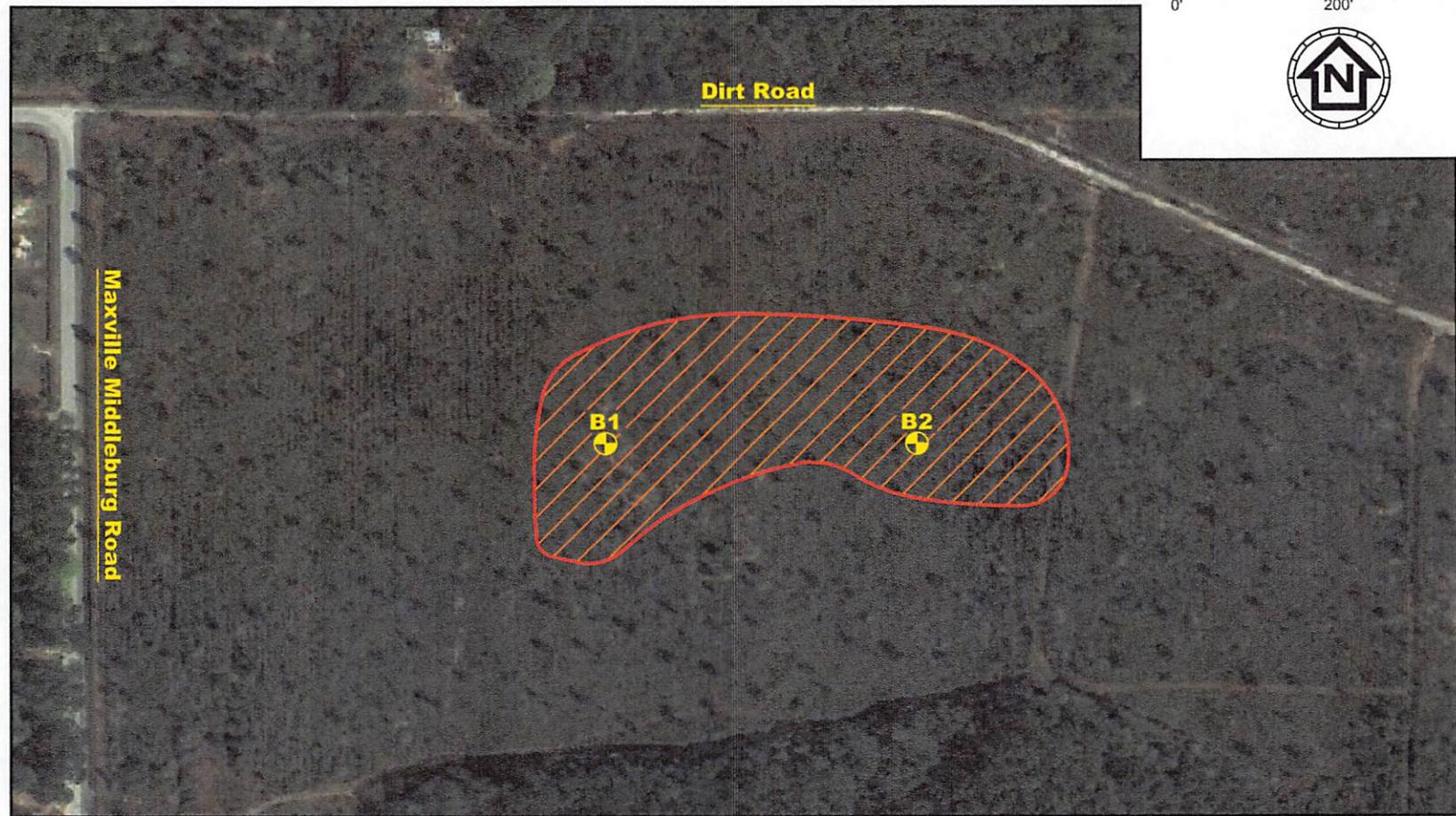
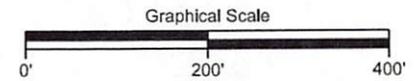
**APPENDICES**

- |            |  |
|------------|--|
| Appendix A | Soil Boring Logs<br>Field Exploration Procedures<br>Key to Soil Classification |
| Appendix B | Laboratory Data<br>Laboratory Test Procedures                                  |



FIGURES





**LEGEND**

 Approximate Location of Auger Boring

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Field Exploration Plan  
**Diamond Timber Wildland Fire Reservoir**  
 Maxville, Florida

Date: 08/07/13	Project No.: 4170-0002	Figure 2
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JAS - 41700002

APPENDIX A

SOIL BORING LOGS  
FIELD EXPLORATION PROCEDURES  
KEY TO SOIL CLASSIFICATION



Project No.: 4170-0002  
 Boring No.: B1  
 Sheet 1 of 1

**LOG OF BORING**

Project: Diamond Timber Wildland Fire Reservoir Client: Longleaf Timber Company  
 Drill Rig: ATV Driller: DK Register  
 Boring Location: See Field Exploration Plan Drill Rod: Flight Auger Drill Mud: \_\_\_\_\_  
 Casing Size: \_\_\_\_\_ Length of Casing: \_\_\_\_\_  
 Groundwater Depth: 0.7 ft Time: Drilling Date: 8/1/13 Boring Begun: 8/1/13 Boring Completed: 8/1/13

SAMPLE NO.	DEPTH, FEET	SAMPLE TYPE	DESCRIPTION	BLOWS PER 6 IN.	N Value	PERCENT ORGANIC MATERIAL	PERCENT PASSING NO. 200 SIEVE	OPLASTIC LIMIT	MOISTURE CONTENT +	LIQUID LIMIT	SHEAR STRENGTH (ksf)		
											○	⊙	
	0		Topsoil										
	0 - 1		Light Grayish Brown Fine SAND (SP)										
	1 - 2		Brown Fine SAND (SP)										
	2 - 3		Grayish Brown to Orangish Brown Clayey Fine SAND (SC)				29		+				
	3 - 5												
	5 - 4		Grayish Brown Clayey Fine SAND (SC)				25		+				
	4 - 10												
	10 - 5		Grayish Brown Clayey Fine SAND (SC)				20		+				
	5 - 15												
	15 - 6		Gray CLAY With Sand (CH)				81		○	+	⊙		
	6 - 20												
Boring Terminated @ 20 ft.													
Remarks													

LOG OF BORING 41700002.GPJ ELLIS ASSOCIATES.GDT 8/16/13



Project No.: 4170-0002  
 Boring No.: B2  
 Sheet 1 of 1

**LOG OF BORING**

Project: Diamond Timber Wildland Fire Reservoir Client: Longleaf Timber Company  
 Drill Rig: ATV Driller: DK Register  
 Boring Location: See Field Exploration Plan Drill Rod: Flight Auger Drill Mud: \_\_\_\_\_  
 Casing Size: \_\_\_\_\_ Length of Casing: \_\_\_\_\_  
 Groundwater Depth: +0.3 ft Time: Drilling Date: 8/1/13 Boring Begun: 8/1/13 Boring Completed: 8/1/13

SAMPLE NO.	DEPTH, FEET	SAMPLE TYPE	DESCRIPTION	BLOWS PER 6 IN.	N Value	PERCENT ORGANIC MATERIAL	PERCENT PASSING NO. 200 SIEVE	O PLASTIC LIMIT	MOISTURE CONTENT (%)	LIQUID LIMIT	SHEAR STRENGTH (ksf)	
											⊙	⊕
	0		Topsoil									
1	1	▲	Gray Silty Fine SAND (SM)				20		+			
2	2	▲	Gray to Grayish Brown Very Clayey Fine SAND (SC)				40	⊙		⊕		
	5											
3	3	▲	Light Grayish Brown Clayey Fine SAND (SC)									
	10											
4	4	▲					17		+			
	15											
5	5	▲	Gray CLAY (CH)				86	⊙	+	⊕		
	20											
Remarks: <u>Boring Terminated @ 20 ft.</u>												

LOG OF BORING 41700002.GPJ ELLIS ASSOCIATES.GDT 8/16/13

## FIELD EXPLORATION PROCEDURES

### Flight Auger Boring

The auger borings were performed mechanically by the use of a continuous-flight auger attached to the drill rig and in general accordance with the latest revision of ASTM D 1452, "Soil Investigation and Sampling by Auger Borings". Representative samples of the soils brought to the ground surface by the augering process were placed in glass jars, sealed, and transported to our laboratory where they were examined by our engineer to verify the driller's field classification.

**KEY TO SOIL CLASSIFICATION**

Description of Compactness or Consistency in Relation To Standard Penetration Resistance

COARSE GRAINED SOILS (Sands and Gravels)	
N-Value	Compactness
0 - 3	Very Loose
4 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
51 and Greater	Very Dense

FINE GRAINED SOILS (Silt and Clays)	
N-Value	Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very Stiff
31 and Greater	Hard

**DESCRIPTION OF SOIL COMPOSITION\*\***

(Unified Soil Classification System)

MAJOR DIVISION	Group Symbol	LABORATORY CLASSIFICATION CRITERIA		SOIL DESCRIPTION	
		FINER THAN 200 SIEVE %	SUPPLEMENTARY REQUIREMENTS		
Coarse grained (over 50% by weight coarser than No. 200 sieve)	Gravelly soils (over half of coarse fraction larger than No. 4)	GW	<5*	$D_{60}/D_{10}$ greater than 4, $D_{30}^2 / (D_{60} \times D_{10})$ between 1 & 3	Well graded gravels, sandy gravels
		GP	<5*	Not meeting above gradation for GW	Gap graded or uniform gravels, sandy gravels
		GM	>12*	PI less than 4 or below A-line	Silty gravels, silty sandy gravels
		GC	>12*	PI over 7 above A-line	Clayey gravels, clayey sandy gravels
	Sandy soils (over half of coarse fraction finer than No. 4)	SW	<5*	$D_{60}/D_{10}$ greater than 6, $D_{30}^2 / (D_{60} \times D_{10})$ between 1 & 3	Well graded sands, gravelly sands
		SP	<5*	Not meeting above gradation requirements	Gap graded or uniform sands, gravelly sands
		SM	>12*	PI less than 4 or below A-line	Silty sands, silty gravelly sands
		SC	>12*	PI over 7 and above A-line	Clayey sands, clayey gravelly sands
Fine grained (over 50% by weight finer than No. 200 sieve)	Low compressibility (liquid limit less than 50)	ML	Plasticity chart		Silts, very fine sands, silty or clayey fine sands, micaceous silts
		CL	Plasticity chart		Low plasticity clays, sandy or silty clays
		OL	Plasticity chart, organic odor or color		Organic silts and clays of low plasticity
	High compressibility (liquid limit more than 50)	MH	Plasticity chart		Micaceous silts, diatomaceous silts, volcanic ash
		CH	Plasticity chart		Highly plastic clays and sandy clays
		OH	Plasticity chart, organic odor or color		Organic silts and clays of high plasticity
Soils with fibrous organic matter	PT	Fibrous organic matter; will char, burn or glow		Peat, sandy peats, and clayey peat	

\* For soils having 5 to 12 percent passing the No. 200 sieve, use a dual symbol such as SP-SM.

\*\* Standard Classification of Soils for Engineering Purposes (ASTM D 2487)

SAND/GRAVEL DESCRIPTION MODIFIERS	
Modifier	Sand/Gravel Content
Trace	<15%
With	15% to 29%
Sandy/Gravelly	>29%

ORGANIC MATERIAL MODIFIERS	
Modifier	Organic Content
Trace	1% to 2%
Few	2% to 4%
Some	4% to 8%
Many	>8%

SILT/CLAY DESCRIPTION MODIFIERS	
Modifier	Silt/Clay Content
Trace	<5%
With	5% to 12%
Silty/Clayey	13% to 35%
Very	>35%

APPENDIX B

LABORATORY DATA  
LABORATORY TEST PROCEDURES



## LABORATORY TEST PROCEDURES

### Percent Fines Content

The percent fines or material passing the No. 200 mesh sieve of the sample tested was determined in general accordance with the latest revision of ASTM D 1140. The percent fines are the soil particles in the silt and clay size range.

### Natural Moisture Content

The water content of the sample tests was determined in general accordance with the latest revision of ASTM D 2216. The water content is defined as the ratio of "pore" or "free" water in a given mass of material to the mass of solid material particles.

### Atterberg Limits

The Atterberg Limits consist of the Liquid Limit (LL) and the Plastic Limit (PL). The LL and PL were determined in general accordance with the latest revision of ASTM D 4318. The LL is the water content of the material denoting the boundary between the liquid and plastic states. The PL is the water content denoting the boundary between the plastic and semi-solid states. The Plasticity Index (PI) is the range of water content over which a soil behaves plastically and is denoted numerically by the difference between the LL and the PL. The water content of the sample tested was determined in general accordance with the latest revision of ASTM D 2216. The water content is defined as the ration of "pore" or "free" water in a given mass of material to the mass of solid material particles.

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