Wood Environment & Infrastructure Solutions, Inc.
1101 Channelside Drive

Suite 200
Tampa, FL 33602
USA

T: 813-289-0750

F: 813-289-5474

www.woodplc.com

DRAFT TECHNICAL MEMORANDUM

To: Laurie Smith, City of Lakeland

From: Mary Szafraniec, PhD; Francesca Lauterman
Wood Environment & Infrastructure Solutions, Inc.

Date: July 30, 2021

Re. DRAFT 4e Plan Technical Support Services for Lake Morton, Task 4

Wood Project No. 600537.21C

1.0 INTRODUCTION

The City of Lakeland contracted Wood Environment & Infrastructure Solutions, Inc. (Wood) to conduct a study to assist the City of Lakeland (City) with Technical Support Services to collect supplemental data and to develop a Pollutant Reduction Plan (4e) for Lake Morton. This memorandum will address **Task 4**, Sediment Characterization and Screening Level Muck Thickness Survey.

2.0 SEDIMENT ASSESSMENTS

2.1 Screening Level Sediment Thickness Survey

Systematic sampling of soft-sediment thickness within Lake Morton was performed by recording the difference in depths between the sediment interface and hard bottom of the lake. Depths were recorded using a 2" diameter PVC sounding pole that was vertically lowered to the top of the sediment and then further pushed down to make apparent contact with the lake's hard bottom. The difference in the depths is the approximate soft-sediment thickness at that location. Measured soft-sediment volume totaled 139,463.5 cubic yards (CUYDs) and was primarily found within the center of the lake at transects 3 and 4 (**Figure A.5, Appendix A**). Maps describing results of the soft-sediment thickness survey are shown in **Figures A.2** through **A.4**, **Appendix A**. Results of the muck thickness survey were used to select the best locations for physical and chemical sediment characterization.

2.2 Methodology for Phosphorus Fractionation and Sediment Characterization

Four thirty-centimeter (30 cm) intact sediment cores were collected for sediment characterization and sequential phosphorus extraction on May 13, 2021, from locations within Lake Morton **Figure A.1,**

Appendix A. Sediment characterization was performed on the top 10 cm of each core to measure grain size (i.e. % silt and % clay), % dry weight, bulk density, volatile solids, total phosphorus, total Kjeldahl nitrogen, ammonia, total organic carbon, iron, calcium, aluminum, nitrate-nitrite, total sulfur, and the full suite of phosphorus fractionation parameters. Laboratory reports with results are provided in **Appendix B**.

Sequential phosphorus extraction procedures used to calculate the mass of potentially bioavailable P in the upper 10 cm of sediments were modified by Meis et al. (2012) and based on methods developed earlier by Hupfer et al. (1995) and Psenner et al. (1988). Operational sediment phosphorus availability is defined from most available to most strongly bound in order of labile, reductant-soluble, metal-oxide, organic, and apatite, and residual. The P fractionation extraction sequence includes the following steps:

1. Extraction with 1M NH4Cl to determine loosely adsorbed and porewater P ('labile P')
2. Extraction with 0.11 M NaHCO3/0.11 M Na2S2O4 to determine P mainly bound to Fe-hydroxides or manganese (Mn) compounds ('reductant-soluble P')

3a. Extraction in 1 M NaOH to mobilize P, which is mainly exchangeable against hydroxide ions determined as Soluble Reactive Phosphorus ('metal-oxide adsorbed P')

3b. Organic bound P in the same fraction quantified by subtraction NaOH-SRP from Na-OH-TSP ('organic P')

4. Extraction with 0.5 M HCl to determine P bound to carbonates and apatite P ('apatite bound P')
5. Digestion with 30% (v/v) H2SO4 and 8% K2S2O4 followed by TSP quantification to determine refractory P ('residual P')

2.3 Sediment Characterization and Phosphorus Fractionation Results

Sediment cores collected within the center portion of the lake were largely composed of dark brown clayey fine to coarse sand and organic matter, while cores collected near the outfalls were composed of light brown fine sand. **Table 2.1** provides the range of in-situ water quality data measured across the vertical profiles at the time of sediment core collection. In-situ water quality data measurements were taken at depths ranging from 0.6 to 3.7 meters, representing the top, middle, and bottom of the water column. Qualitative characteristics of the sediment cores were described at the time of sediment core collection.

Table 2.1 – Summary of In-Situ Water Quality Parameters

Site	Water Quality Depth (m)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen Saturation (%)	Salinity (ppt)	Conductivity (us/cm)	pH	Turbidity (NTU)
Site 1	0.6-3.7	26.90-28.55	3.87-9.80	44.9-126.3	0.06	123-130	8.53-9.74	14.17
Site 2	0.6-3.7	27.38-28.88	5.31-11.85	67.2-152.0	0.06	123-127	8.84-9.75	14.78
Site 3	0.6	30.21	11.61	153.4	0.06	123	9.86	14.61
Site 4	0.6-1.8	28.53-29.30	11.22-11.90	144.3-154.8	0.06	123	9.57-9.71	16.63

Tables 2.2 through **2.4** summarize the physical and chemical results for sediment cores retrieved from Lake Morton. Percent dry weight was measured to be higher in sediments with lower organic content and lower moisture content. Overall, the highest values of tested chemical parameters were found in locations containing higher organic content. Site 1 displayed the highest values for both nutrient and metal parameters, while Site 4 displayed the lowest values. To show possible nutrient inputs from Lake Morton to Lake Hollingsworth, a sediment core was collected at the mouth of the outfall to Lake Hollingsworth (Site 3).

Table 2.2 – Percent Finer Test Results (ASTM D4318)

Opening Size	Percent Finer (%)			
	Site 1	Site 2	Site 3	Site 4
3/4"	100	100	100	100
1/2"	100	100	100	100
3/8"	100	100	100	100
#4	94.3	100	99.9	100
#10	64.7	96.8	99.6	100
#20	51.6	92.8	99.2	99.9
#40	47.2	87.2	94.1	95
#60	44.4	76.5	70.4	73.3
#100	40.5	55.6	27	29.1
#200	36.6	38	0.8	2

Table 2.3 – Summary of Physical and Chemical Results

Site:	Percent Moisture (%)	Bulk Density (g/cc)	Average Total Organic Carbon (mg/kg)	Total Volatile Solids (%)	Grain Size (mm)						
					% Gravel		% Sand			% Fines	
					Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
Site 1	82	0.17	140,000	52,000	0.0	5.7	29.6	17.5	10.6	36.6	
Site 2	78	0.25	107,000	45,000	0.0	0.0	3.2	9.6	49.2	38.0	
Site 3	23	1.4	3,380	1.0	0.0	0.1	0.3	5.5	93.3	0.8	
Site 4	25	1.4	5,410	0.59	0.0	0.0	0.0	5.0	93.0	2.0	

Table 2.4 – Summary of Sediment Chemical Characterization Results

Site	Aluminum (mg/kg)	Ammonia (mg/kg)	Calcium (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nitrate + Nitrite (mg/kg)	Sulfate (mg/kg)	Total Kjeldahl Nitrogen (mg/kg)	Total Phosphorus (mg/kg)
Site 1	25,000	640	13,000	6,600	40	15	200	5,900	13,000
Site 2	16,000	220	9,200	3,800	23	8	61	3,800	5,700
Site 3	730	4.4	780	120	1.5	1.9	10	210	400
Site 4	580	3.32[1]	420	160	0.95	1.6	13	120	180

[1]Lab Qualifier (U): The compound was analyzed for but not detected

Table 2.5 describes the different forms of phosphorus in the fractionation data along with physiochemical drivers and likelihood of BAP release. **Table 2.6** provides the measured concentrations of phosphorus fractions in the upper 10 cm of the four sites, along with the drivers and likelihood of each potential type of phosphorus release. Sediment fractionation analyses showed the highest fraction concentrations of readily-available phosphorus in site 1, while the lowest fractions were shown in locations closest to the outfalls (sites 3 and 4). TP concentrations within the four sediment locations ranged from 334 to 13,500 mg/kg (**Table 2.6)**. The lowest TP concentrations were found at sites 3 and 4, while the highest TP concentration was observed at site 1.

Table 2.5 – Phosphorus Fractionation Forms with Drivers of BAP Release

P FRACTION	P FORMS IN FRACTION	DRIVER OF BAP RELEASE FROM SEDIMENTS	LIKELIHOOD OF BAP RELEASE TO WATER COLUMN
Labile P	Directly bioavailable P; loosely bound or adsorbed P	Desorption; diffusion; steep concentration gradients	High
Reductant soluble P	P bound to Fe-hydroxides and Mn-compounds	Anoxia	High
Organic P	Allochthonous organic material; detritus	Bacterial mineralization (temperature dependent)	Medium to High
Metal-oxide adsorbed P	P adsorbed to metal oxides (mainly FE, Al); P exchangeable against OH-	High pH (e.g., from high levels of photosynthetic activity in water column)	Medium to High
Apatite bound P	P bound to carbonates and apatite P	Low pH	Medium
Residual P	Refractory compounds		Low
Total BAP	Labile P + Reductant soluble P + Metal oxide adsorbed P + Organic P	See individual driver's above	Medium to High

Table 2.6- Measured Concentrations of Phosphorus Forms in Lake Morton

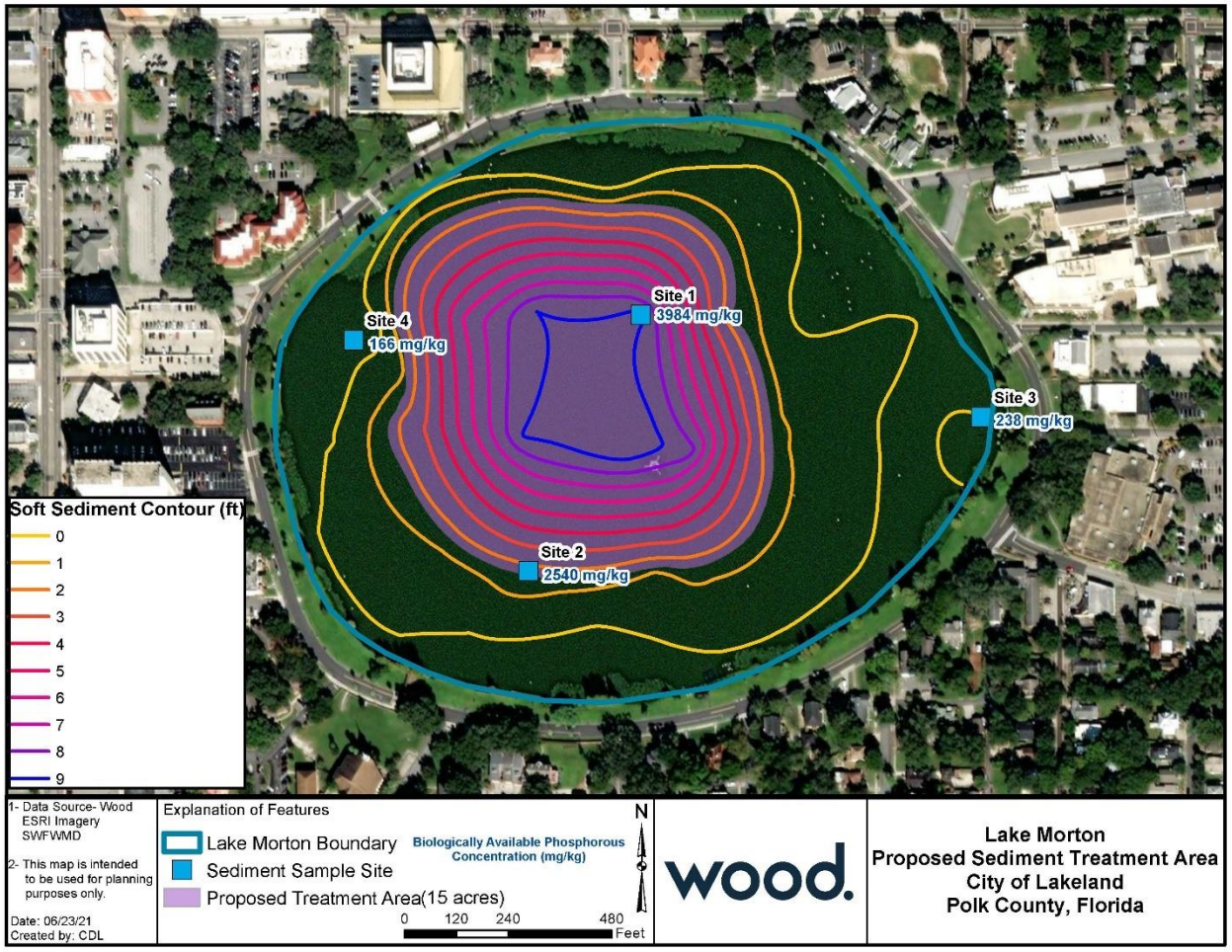
	Phosphorus Fraction Concentration (MG/KG)			
P FRACTION	Site 1	Site 2	Site 3	Site 4
Labile P	4	8	2	7
Reductant soluble P	150	112	5	4
Organic P	420	360	15	15
Metal-oxide adsorbed P	3,410	2,060	215	140
Apatite bound P	987	668	37	56
Residual P	8,750	4,550	112	52
Total BAP	3,984	2,540	238	166
Total P	13,500	8,240	442	334

3.0 SUMMARY AND RECOMMENDATIONS

Results from the **Task 4** sediment characterization and screening level muck thickness survey show that soft sediment accumulation is greatest within the center of Lake Morton. As expected, sediment cores retrieved from these areas of high organic accumulation contained the highest values of BAP as well as tested nutrient and metal parameters.

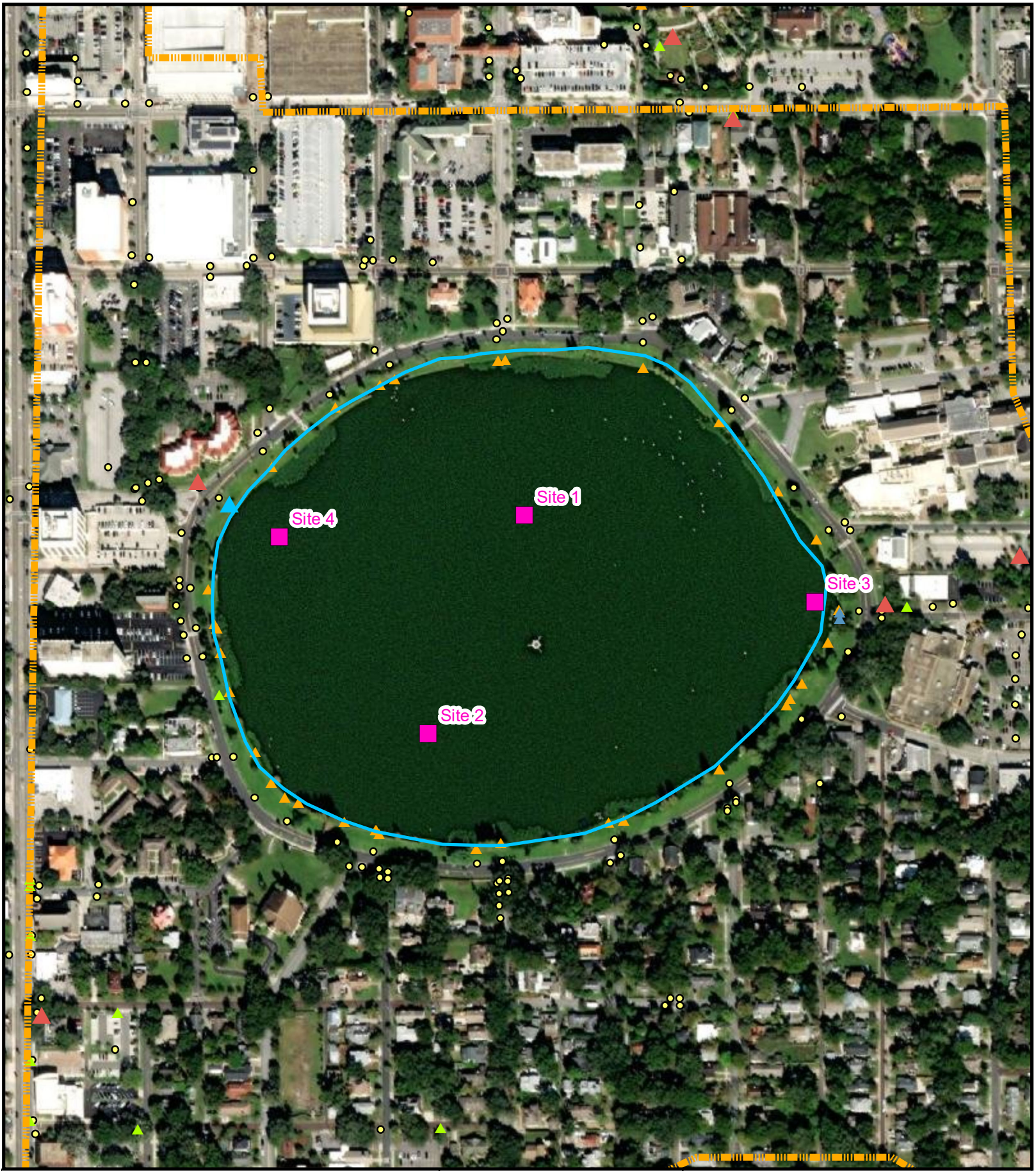
Wood estimates that the lake center contains soft-sediment spanning roughly 15 acres (**Figure 3.1**). To effectively treat this portion of the lake, Wood recommends a targeted application of a sediment treatment alternative of approximately 139,463.5 CUYDs of soft sediment. Using an assumed average (from previous projects) and conservative cost per acre of $15,000 for sediment capping alternatives, the cost for the 15-acre targeted treatment would be $225,000 and $585,000 to treat the entire lake (39 acres). Dredging is not recommended due to the bathymetry of the lake and existing water depths.

Figure 3.1 – Recommended Treatment Area



APPENDIX A

Maps



Sediment Characterization Site
Lake Morton Boundary
Morton Drainage Basin

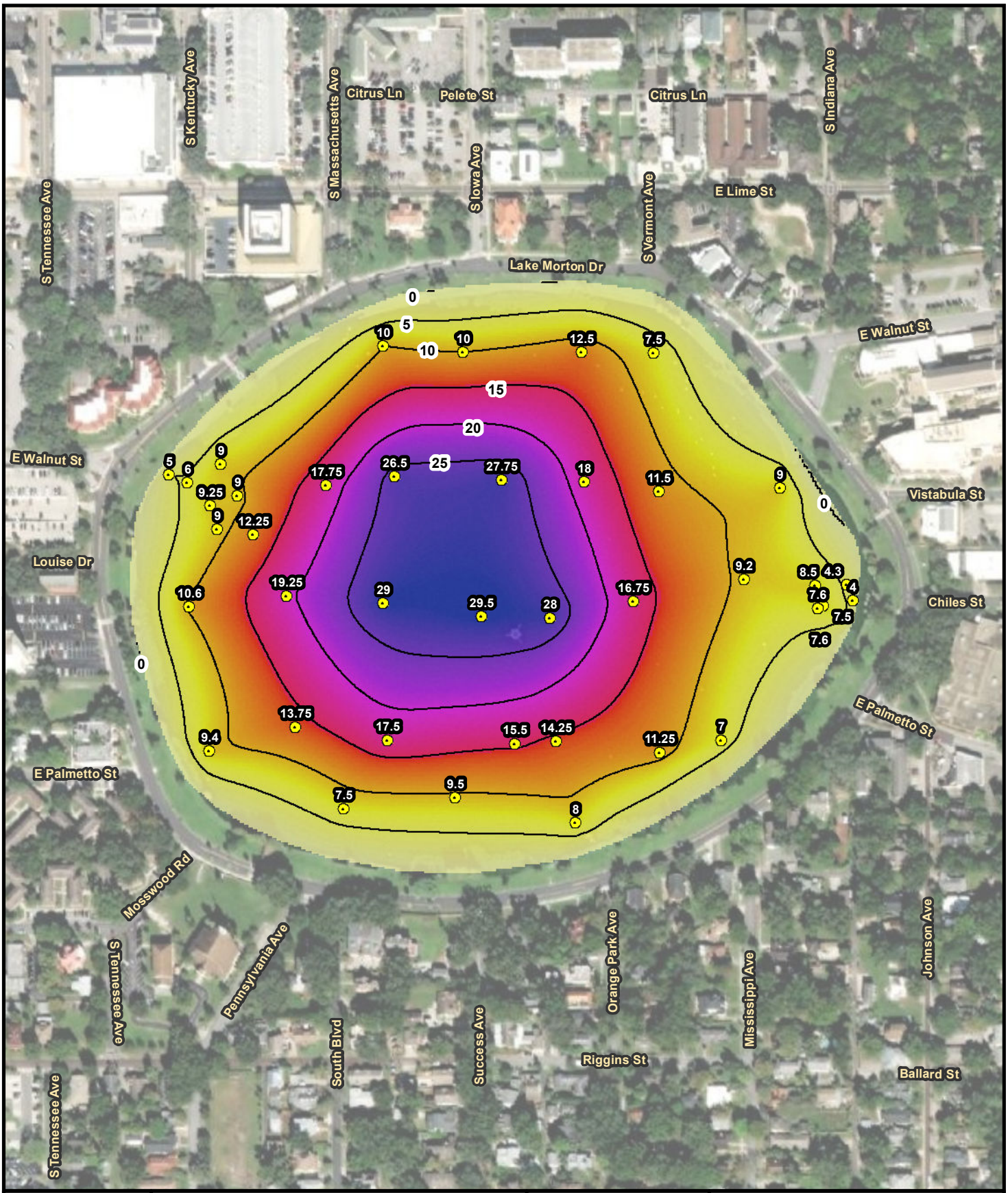
SW Outlet
EndOfPipe
LakeCreekOutlet
OutfallMajor
OutfallMinor
RetDetOutlet

N

0 250 500 1,000 Feet

wood.

Figure A.1
Lake Morton
Sediment Characterization Sites
Lakeland, FL



Notes:

1- Project No.: 600537x21

2- Data Source - Wood, ESRI

3- This map is intended to be used for planning purposes only. It is not a survey.

Date: 05/20/2021
Revised: AB
Checked By: MS

Explanation of Features

N

Sediment Sample

Hard Bottom Depth 5ft Contours

Hard Bottom Depth (feet)

High : 29.5

Low : 0

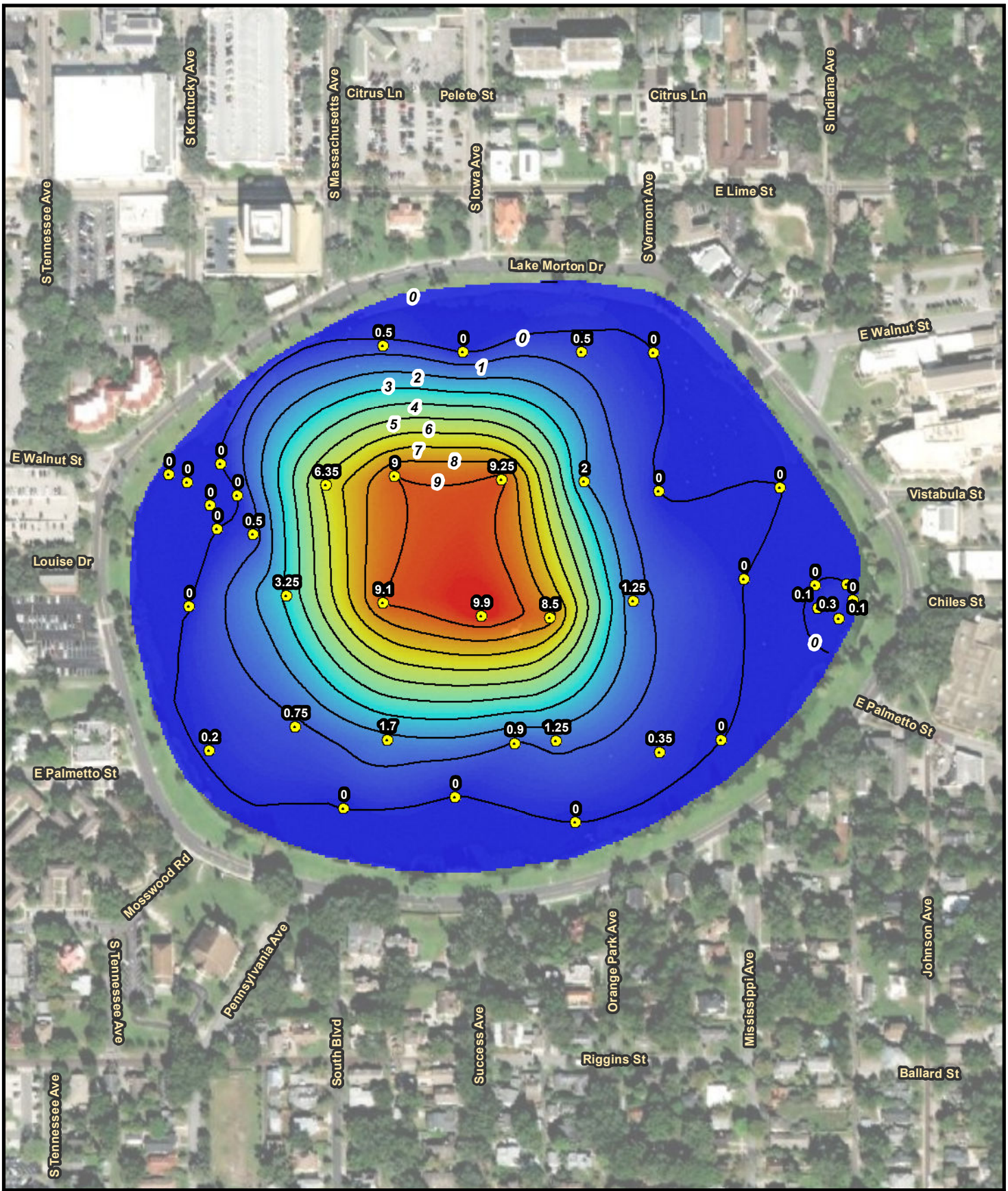
0 300

1" = 300 Feet

wood.

Figure A.2
Lake Morton
Hard Bottom Depth Map
City of Lakeland
Polk County, FL

Path: V:\600537x21_COL_Lk_Mirror_Morton\MXD\Report\Lake Morton_Hard_Btm_Depth.mxd



Notes:

1- Project No.: 600537x21

2- Data Source - Wood, ESRI

3- This map is intended to be used for planning purposes only. It is not a survey.

Date: 05/20/2021
Revised: AB
Checked By: MS

Explanation of Features

N

Sediment Sample

Sediment Thickness 2ft Contours

Soft Sediment Depth (feet)

High : 9.9

Low : 0

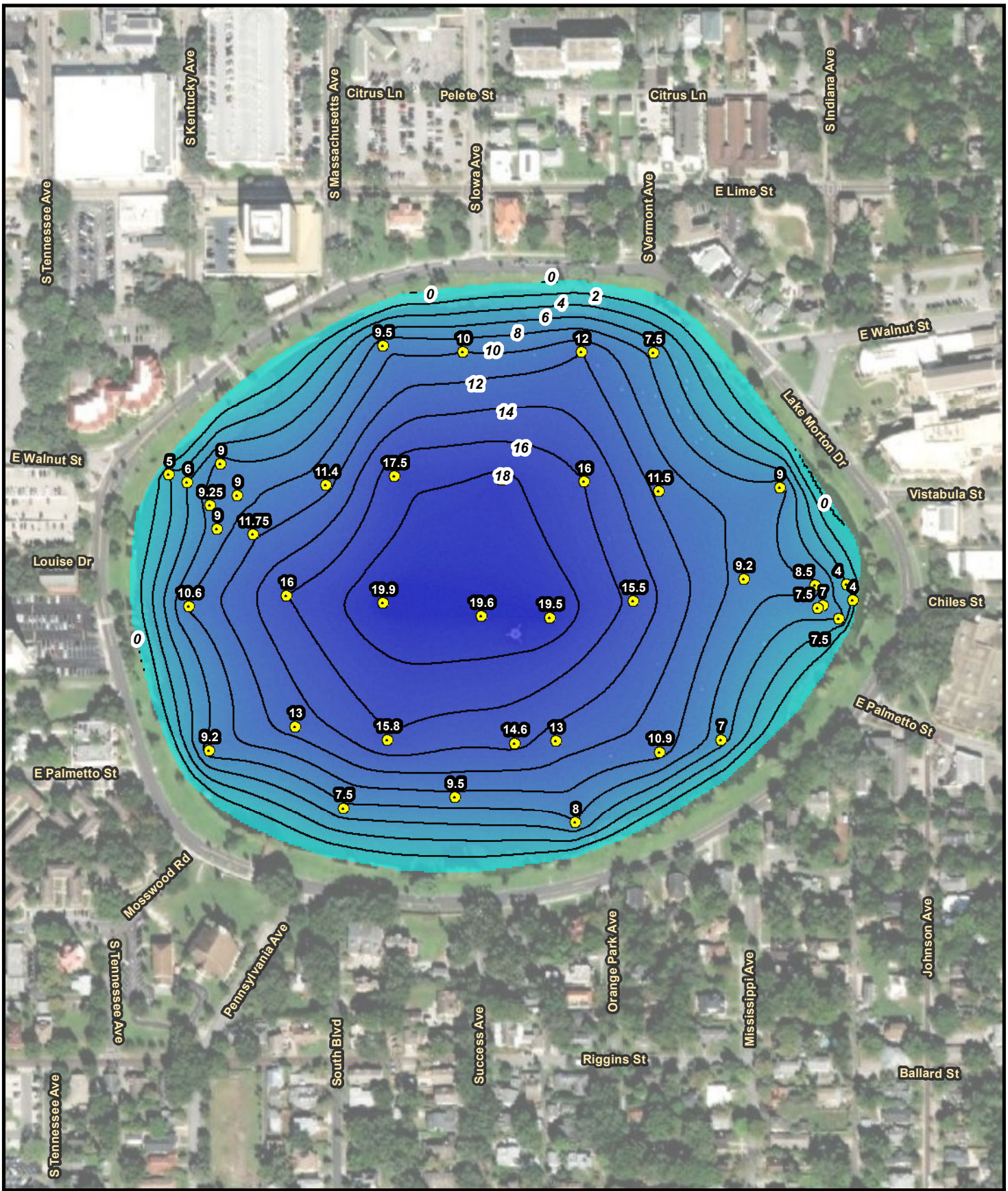
0 300

1" = 300 Feet

wood.

Figure A.3
Lake Morton
Soft Sediment Thickness Map
City of Lakeland
Polk County, FL

Path: V:\600537x21_COL_Lk_Mirror_Morton\MXD\Report\Lake Morton_Soft_sed.mxd



Notes:

1- Project No.: 600537x21

2- Data Source - Wood, ESRI

3- This map is intended to be used for planning purposes only. It is not a survey.

Date: 05/20/2021
Revised: AB
Checked By: MS

Explanation of Features

N

Sediment Sample

Water Depth 2 ft Contours

Water Depth (feet)

High : 19.9

Low : 0

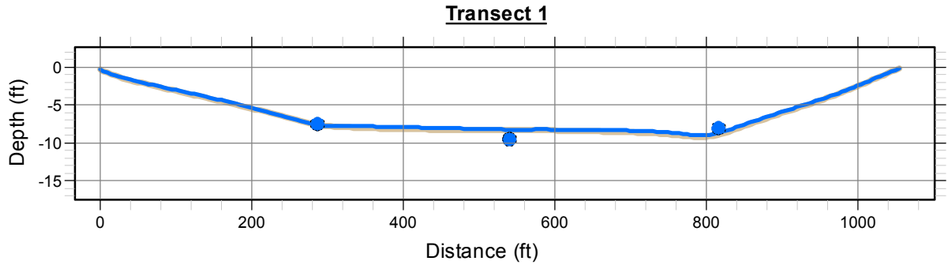
0 300

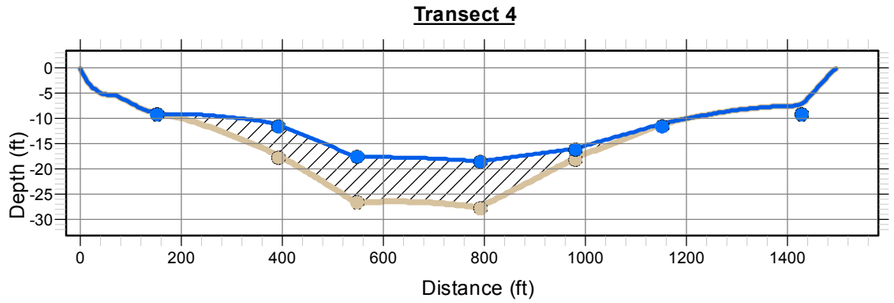
1" = 300 Feet

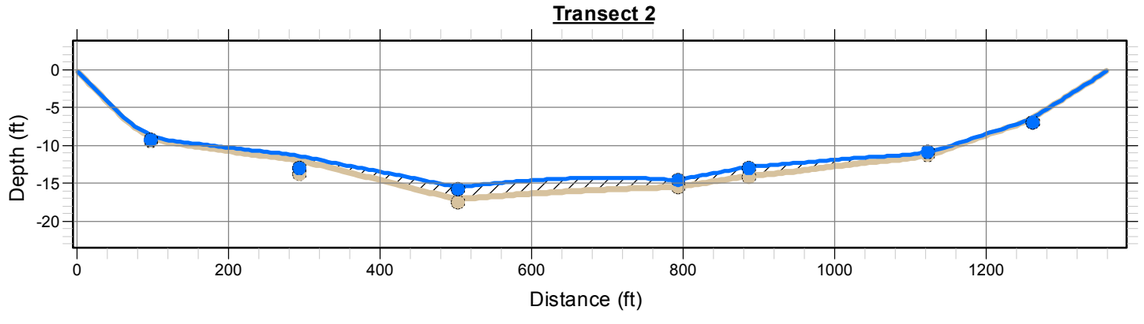
wood.

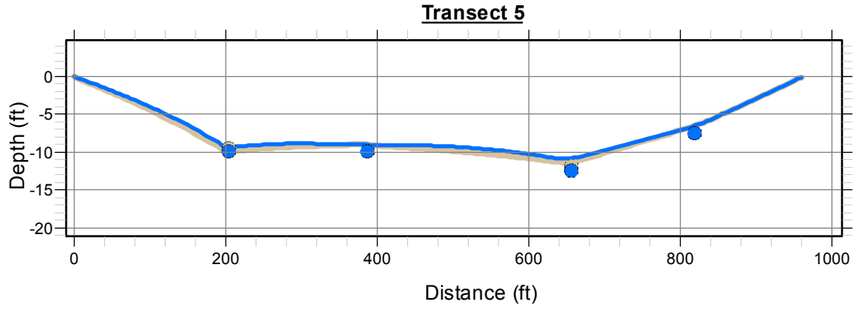
Figure A.4
Lake Morton
Water Depth Map
City of Lakeland
Polk County, FL

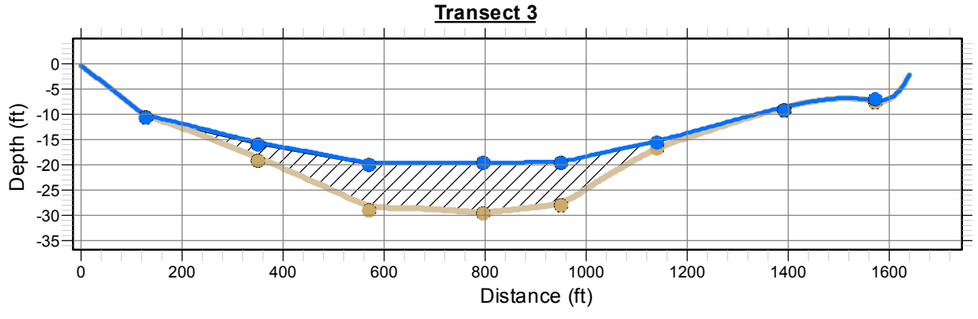
Path: V:\600537x21_COL_Lk_Mirror_Morton\MXD\Report\Lake Morton_Water_Depth.mxd



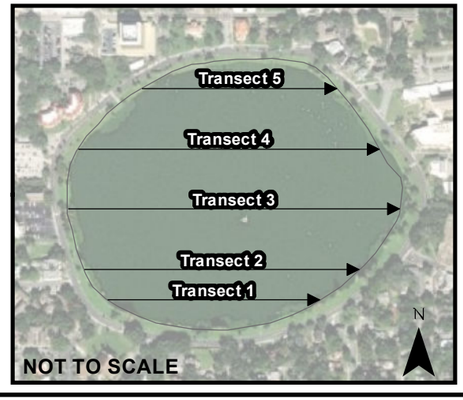








TOTAL SOFT SEDIMENT VOLUME: 139,463.5 CUYDs



Notes:

1- Project No.:600537x21

2- Data Sources - Wood, ESRI

3- This map is intended to be used for planning purposes only. It is not a survey.

4- Vertical exaggeration 10 times

Date: 06/02/2021
Revised: AB
Checked By: MS

Explanation of Features

- Transect Lines
- Water Depth (ft)
- Depth of Refusal (ft)
- Soft Sediment

wood.

Figure A.5
Lake Morton
Sediment Transect Profiles
City of Lakeland
Polk County, Florida

File Path: V:\600537x21_COL_Lk_Mirror_Morton\MXD\lake_Morton_profiles_v2.mxd

APPENDIX B

Lab Reports

Advanced Environmental Laboratories, Inc.

Advanced Environmental Laboratories, Inc
9610 Princess Palm Ave Tampa, FL 33619
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (813)630-9616
Fax: (813)630-4327

July 29, 2021

Francesca Lauterman
Wood EIS
1101 Channelside
Suite 200
Tampa, FL 33602

RE: Workorder: T2108705 Lake Morton

Dear Francesca Lauterman:

Enclosed are the analytical results for sample(s) received by the laboratory on Friday, May 14, 2021. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report. The analytical results for the samples contained in this report were submitted for analysis as outlined by the Chain of Custody and results pertain only to these samples.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Heidi Parker - Project Manager
HParker@AELLab.com

Enclosures

CERTIFICATE OF ANALYSIS

Advanced Environmental Laboratories, Inc.

Advanced Environmental Laboratories, Inc
9610 Princess Palm Ave Tampa, FL 33619
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (813)630-9616
Fax: (813)630-4327

SAMPLE SUMMARY

Workorder: T2108705 Lake Morton

Lab ID	Sample ID	Matrix	Date Collected	Date Received
T2108705001	LMORT-1	Soil	5/13/2021 14:00	5/14/2021 09:30
T2108705002	LMORT-2	Soil	5/13/2021 15:00	5/14/2021 09:30
T2108705003	LMORT-3	Soil	5/13/2021 15:30	5/14/2021 09:30
T2108705004	LMORT-4	Soil	5/13/2021 16:00	5/14/2021 09:30

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Fax: (813)630-4327

ANALYTICAL RESULTS

Workorder: T2108705 Lake Morton

Lab ID: **T2108705001** Date Received: 05/14/21 09:30 Matrix: Soil

Sample ID: **LMORT-1** Date Collected: 05/13/21 14:00

Results for sample T2108705001 are reported on a dry weight basis.

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
METALS								
Analysis Desc: SW846 6010B Analysis,Soils	Preparation Method: SW-846 3050B Analytical Method: SW-846 6010							
Aluminum	**25000**	**J4**	**mg/Kg**	**5**	69	34	5/17/2021 16:46	T
Calcium	**13000**		**mg/Kg**	**5**	690	550	5/17/2021 16:46	T
Iron	**6600**	**J4**	**mg/Kg**	**5**	69	34	5/17/2021 16:46	T
Manganese	**40**		**mg/Kg**	**5**	6.9	5.5	5/17/2021 16:46	T
WET CHEMISTRY								
Analysis Desc: Ammonia,E350.1,Soil	Analytical Method: EPA 350.1							
Ammonia (N)	**640**		**mg/Kg**	**5**	281.87	70.47	5/19/2021 17:56	T
Analysis Desc: TKN,E351.2,Solids	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**5900**		**mg/Kg**	**1**	260	96	5/19/2021 18:37	T
Analysis Desc: Total Phosphorus,E365.4,Analysis	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 365.4							
Total Phosphorus (as P)	**13000**		**mg/Kg**	**1**	260	150	5/19/2021 18:37	T
Analysis Desc: 9056, Soil	Analytical Method: EPA 9056							
Sulfate	**200**		**mg/Kg**	**1**	140	26	5/17/2021 22:01	T
Analysis Desc: Volatile Solids,SM2540G	Analytical Method: SM 2540G							
Total Volatile Solids	**52000**		**mg/Kg**	**1**	10	10	5/18/2021 12:00	T
Analysis Desc: Nitrate+Nitrite,SM4500NO3F,S	Analytical Method: SM 4500NO3-F							
Nitrate + Nitrite	**15**		**mg/Kg**	**1**	11	4.4	5/17/2021 14:08	T
WET CHEMISTRY								
Analysis Desc: Percent Solids,SM2540G,Soil	Analytical Method: SM 2540G							
Percent Moisture	**82**		**%**	**1**	0.0010	0.0010	5/17/2021 10:00	T

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Fax: (813)630-4327

ANALYTICAL RESULTS

Workorder: T2108705 Lake Morton

Lab ID: **T2108705002** Date Received: 05/14/21 09:30 Matrix: Soil

Sample ID: **LMORT-2** Date Collected: 05/13/21 15:00

Results for sample T2108705002 are reported on a dry weight basis.

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
METALS								
Analysis Desc: SW846 6010B Analysis,Soils	Preparation Method: SW-846 3050B Analytical Method: SW-846 6010							
Aluminum	**16000**		**mg/Kg**	**5**	57	29	5/17/2021 17:03	T
Calcium	**9200**		**mg/Kg**	**1**	110	92	5/17/2021 15:41	T
Iron	**3800**		**mg/Kg**	**1**	11	5.7	5/17/2021 15:41	T
Manganese	**23**		**mg/Kg**	**1**	1.1	0.92	5/17/2021 15:41	T
WET CHEMISTRY								
Analysis Desc: Ammonia,E350.1,Soil	Analytical Method: EPA 350.1							
Ammonia (N)	**220**	**I**	**mg/Kg**	**5**	222.59	55.65	5/19/2021 17:57	T
Analysis Desc: TKN,E351.2,Solids	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**3800**		**mg/Kg**	**1**	200	75	5/19/2021 18:37	T
Analysis Desc: Total Phosphorus,E365.4,Analysis	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 365.4							
Total Phosphorus (as P)	**5700**		**mg/Kg**	**1**	200	110	5/19/2021 18:37	T
Analysis Desc: 9056, Soil	Analytical Method: EPA 9056							
Sulfate	**61**	**I**	**mg/Kg**	**1**	110	20	5/17/2021 22:17	T
Analysis Desc: Volatile Solids,SM2540G	Analytical Method: SM 2540G							
Total Volatile Solids	**45000**		**mg/Kg**	**1**	10	10	5/18/2021 12:00	T
Analysis Desc: Nitrate+Nitrite,SM4500NO3F,S	Analytical Method: SM 4500NO3-F							
Nitrate + Nitrite	**8.0**	**I**	**mg/Kg**	**1**	8.9	3.5	5/17/2021 14:09	T
WET CHEMISTRY								
Analysis Desc: Percent Solids,SM2540G,Soil	Analytical Method: SM 2540G							
Percent Moisture	**78**		**%**	**1**	0.0010	0.0010	5/17/2021 10:00	T

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Fax: (813)630-4327

ANALYTICAL RESULTS

Workorder: T2108705 Lake Morton

Lab ID: **T2108705003** Date Received: 05/14/21 09:30 Matrix: Soil

Sample ID: **LMORT-3** Date Collected: 05/13/21 15:30

Results for sample T2108705003 are reported on a dry weight basis.

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
METALS								
Analysis Desc: SW846 6010B Analysis,Soils	Preparation Method: SW-846 3050B Analytical Method: SW-846 6010							
Aluminum	**730**		**mg/Kg**	**1**	3.1	1.6	5/17/2021 15:44	T
Calcium	**780**		**mg/Kg**	**1**	31	25	5/17/2021 15:44	T
Iron	**120**		**mg/Kg**	**1**	3.1	1.6	5/17/2021 15:44	T
Manganese	**1.5**		**mg/Kg**	**1**	0.31	0.25	5/17/2021 15:44	T
WET CHEMISTRY								
Analysis Desc: Ammonia,E350.1,Soil	Analytical Method: EPA 350.1							
Ammonia (N)	**4.4**	**I**	**mg/Kg**	**1**	13.06	3.26	5/19/2021 17:36	T
Analysis Desc: TKN,E351.2,Solids	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**210**		**mg/Kg**	**1**	65	24	5/19/2021 18:37	T
Analysis Desc: Total Phosphorus,E365.4,Analysis	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 365.4							
Total Phosphorus (as P)	**400**		**mg/Kg**	**1**	65	36	5/19/2021 18:37	T
Analysis Desc: 9056, Soil	Analytical Method: EPA 9056							
Sulfate	**10**	**I,J4**	**mg/Kg**	**1**	33	6.0	5/17/2021 22:33	T
Analysis Desc: Volatile Solids,SM2540G	Analytical Method: SM 2540G							
Total Volatile Solids %	**1.0**		**%**	**1**	0.0010	0.0010	5/18/2021 12:00	T
Analysis Desc: Nitrate+Nitrite,SM4500NO3F,S	Analytical Method: SM 4500NO3-F							
Nitrate + Nitrite	**1.9**	**I**	**mg/Kg**	**1**	2.6	1.0	5/17/2021 14:09	T
WET CHEMISTRY								
Analysis Desc: Percent Solids,SM2540G,Soil	Analytical Method: SM 2540G							
Percent Moisture	**23**		**%**	**1**	0.0010	0.0010	5/17/2021 10:00	T

CERTIFICATE OF ANALYSIS

Advanced Environmental Laboratories, Inc.
9610 Princess Palm Ave Tampa, FL 33619
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (813)630-9616
Fax: (813)630-4327

ANALYTICAL RESULTS

Workorder: T2108705 Lake Morton

Lab ID: **T2108705004** Date Received: 05/14/21 09:30 Matrix: Soil

Sample ID: **LMORT-4** Date Collected: 05/13/21 16:00

Results for sample T2108705004 are reported on a dry weight basis.

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
METALS								
Analysis Desc: SW846 6010B Analysis,Soils	Preparation Method: SW-846 3050B Analytical Method: SW-846 6010							
Aluminum	**580**		**mg/Kg**	**1**	3.3	1.6	5/17/2021 15:47	T
Calcium	**420**		**mg/Kg**	**1**	33	26	5/17/2021 15:47	T
Iron	**160**		**mg/Kg**	**1**	3.3	1.6	5/17/2021 15:47	T
Manganese	**0.95**		**mg/Kg**	**1**	0.33	0.26	5/17/2021 15:47	T
WET CHEMISTRY								
Analysis Desc: Ammonia,E350.1,Soil	Analytical Method: EPA 350.1							
Ammonia (N)	**3.32**	**U**	**mg/Kg**	**1**	13.27	3.32	5/19/2021 17:37	T
Analysis Desc: TKN,E351.2,Solids	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**120**	**J4**	**mg/Kg**	**1**	66	24	5/21/2021 12:45	T
Analysis Desc: Total Phosphorus,E365.4,Analysis	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 365.4							
Total Phosphorus (as P)	**180**	**J4**	**mg/Kg**	**1**	66	37	5/21/2021 12:45	T
Analysis Desc: 9056, Soil	Analytical Method: EPA 9056							
Sulfate	**13**	**I**	**mg/Kg**	**1**	33	6.1	5/17/2021 23:21	T
Analysis Desc: Volatile Solids,SM2540G	Analytical Method: SM 2540G							
Total Volatile Solids %	**0.59**		**%**	**1**	0.0010	0.0010	5/18/2021 12:00	T
Analysis Desc: Nitrate+Nitrite,SM4500NO3F,S	Analytical Method: SM 4500NO3-F							
Nitrate + Nitrite	**1.6**	**I**	**mg/Kg**	**1**	2.7	1.0	5/17/2021 14:10	T
WET CHEMISTRY								
Analysis Desc: Percent Solids,SM2540G,Soil	Analytical Method: SM 2540G							
Percent Moisture	**25**		**%**	**1**	0.0010	0.0010	5/17/2021 10:00	T

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ANALYTICAL RESULTS QUALIFIERS

Workorder: T2108705 Lake Morton

PARAMETER QUALIFIERS

U	The compound was analyzed for but not detected.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
J4	Estimated Result

LAB QUALIFIERS

T	DOH Certification #E84589(AEL-T)(FL NELAC Certification)

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Fax: (813)630-4327

QUALITY CONTROL DATA

Workorder: T2108705 Lake Morton

QC Batch: WCAt/4201 Analysis Method: SM 2540G
QC Batch Method: SM 2540G Prepared:
Associated Lab Samples: T2108705001, T2108705002, T2108705003, T2108705004

METHOD BLANK: 3888169

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Volatile Solids	mg/Kg	10	10	U
Total Volatile Solids %	%	0.0010	0.0010	U

QC Batch: DGMt/1743 Analysis Method: SW-846 6010
QC Batch Method: SW-846 3050B Prepared: 05/17/2021 10:00
Associated Lab Samples: T2108705001, T2108705002, T2108705003, T2108705004

METHOD BLANK: 3888432

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
METALS				
Aluminum	mg/Kg	1.2	1.2	U
Calcium	mg/Kg	20	20	U
Iron	mg/Kg	1.2	1.2	U
Manganese	mg/Kg	0.20	0.20	U

QC Batch: WCAt/4222 Analysis Method: SM 4500NO3-F
QC Batch Method: SM 4500NO3-F Prepared:
Associated Lab Samples: T2108705001, T2108705002, T2108705003, T2108705004

METHOD BLANK: 3889256

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Nitrate + Nitrite	mg/Kg	0.78	0.78	U

QC Batch: WCAt/4247 Analysis Method: EPA 9056
QC Batch Method: EPA 9056 Prepared:
Associated Lab Samples: T2108705001, T2108705002, T2108705003, T2108705004

CERTIFICATE OF ANALYSIS

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Fax: (813)630-4327

QUALITY CONTROL DATA

Workorder: T2108705 Lake Morton

METHOD BLANK: 3890401

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Sulfate	mg/Kg	4.6	4.6	U

QC Batch: WCAt/4276 Analysis Method: EPA 351.2
QC Batch Method: Copper Sulfate Digestion Solid Prepared: 05/18/2021 08:00
Associated Lab Samples: T2108705001, T2108705002, T2108705003

METHOD BLANK: 3892144

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Kjeldahl Nitrogen	mg/Kg	18	18	U

METHOD BLANK: 3892145

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Phosphorus (as P)	mg/Kg	28	28	U

QC Batch: WCAt/4276 Analysis Method: EPA 365.4
QC Batch Method: Copper Sulfate Digestion Solid Prepared: 05/18/2021 08:00
Associated Lab Samples: T2108705001, T2108705002, T2108705003

METHOD BLANK: 3892144

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Kjeldahl Nitrogen	mg/Kg	18	18	U

METHOD BLANK: 3892145

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Phosphorus (as P)	mg/Kg	28	28	U

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QUALITY CONTROL DATA

Workorder: T2108705 Lake Morton

QC Batch: WCAt/4288 Analysis Method: EPA 350.1
QC Batch Method: EPA 350.1 Prepared:
Associated Lab Samples: T2108705001, T2108705002, T2108705003, T2108705004

METHOD BLANK: 3893206

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Ammonia (N)	mg/Kg	2.50	2.50	U

QC Batch: WCAt/4343 Analysis Method: EPA 351.2
QC Batch Method: Copper Sulfate Digestion Solid Prepared: 05/21/2021 09:00
Associated Lab Samples: T2108705004

METHOD BLANK: 3895585

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Phosphorus (as P)	mg/Kg	26	26	U

METHOD BLANK: 3895809

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Kjeldahl Nitrogen	mg/Kg	17	17	U

QC Batch: WCAt/4343 Analysis Method: EPA 365.4
QC Batch Method: Copper Sulfate Digestion Solid Prepared: 05/21/2021 09:00
Associated Lab Samples: T2108705004

METHOD BLANK: 3895585

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Phosphorus (as P)	mg/Kg	26	26	U

CERTIFICATE OF ANALYSIS

Advanced Environmental Laboratories, Inc.

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Phone: (813)630-9616
Fax: (813)630-4327

QUALITY CONTROL DATA

Workorder: T2108705 Lake Morton

METHOD BLANK: 3895809

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Kjeldahl Nitrogen	mg/Kg	17	17	U

QUALITY CONTROL DATA QUALIFIERS

Workorder: T2108705 Lake Morton

QUALITY CONTROL PARAMETER QUALIFIERS

U	The compound was analyzed for but not detected.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
J4	Estimated Result

Advanced Environmental Laboratories, Inc.

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Phone: (813)630-9616
Fax: (813)630-4327

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: T2108705 Lake Morton

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
T2108705001	LMORT-1			SM 2540G	WCAt/4197
T2108705002	LMORT-2			SM 2540G	WCAt/4197
T2108705003	LMORT-3			SM 2540G	WCAt/4197
T2108705004	LMORT-4			SM 2540G	WCAt/4197
T2108705001	LMORT-1			SM 2540G	WCAt/4201
T2108705002	LMORT-2			SM 2540G	WCAt/4201
T2108705003	LMORT-3			SM 2540G	WCAt/4201
T2108705004	LMORT-4			SM 2540G	WCAt/4201
T2108705001	LMORT-1	SW-846 3050B	DGMt/1743	SW-846 6010	ICPt/1468
T2108705002	LMORT-2	SW-846 3050B	DGMt/1743	SW-846 6010	ICPt/1468
T2108705003	LMORT-3	SW-846 3050B	DGMt/1743	SW-846 6010	ICPt/1468
T2108705004	LMORT-4	SW-846 3050B	DGMt/1743	SW-846 6010	ICPt/1468
T2108705001	LMORT-1			SM 4500NO3-F	WCAt/4222
T2108705002	LMORT-2			SM 4500NO3-F	WCAt/4222
T2108705003	LMORT-3			SM 4500NO3-F	WCAt/4222
T2108705004	LMORT-4			SM 4500NO3-F	WCAt/4222
T2108705001	LMORT-1			EPA 9056	WCAt/4247
T2108705002	LMORT-2			EPA 9056	WCAt/4247
T2108705003	LMORT-3			EPA 9056	WCAt/4247
T2108705004	LMORT-4			EPA 9056	WCAt/4247
T2108705001	LMORT-1	Copper Sulfate Digestion Solid	WCAt/4276	EPA 351.2	WCAt/4320
T2108705002	LMORT-2	Copper Sulfate Digestion Solid	WCAt/4276	EPA 351.2	WCAt/4320
T2108705003	LMORT-3	Copper Sulfate Digestion Solid	WCAt/4276	EPA 351.2	WCAt/4320
T2108705001	LMORT-1	Copper Sulfate Digestion Solid	WCAt/4276	EPA 365.4	WCAt/4321
T2108705002	LMORT-2	Copper Sulfate Digestion Solid	WCAt/4276	EPA 365.4	WCAt/4321
T2108705003	LMORT-3	Copper Sulfate Digestion Solid	WCAt/4276	EPA 365.4	WCAt/4321

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: T2108705 Lake Morton

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
T2108705001	LMORT-1			EPA 350.1	WCAt/4288
T2108705002	LMORT-2			EPA 350.1	WCAt/4288
T2108705003	LMORT-3			EPA 350.1	WCAt/4288
T2108705004	LMORT-4			EPA 350.1	WCAt/4288
T2108705004	LMORT-4	Copper Sulfate Digestion Solid	WCAt/4343	EPA 351.2	WCAt/4345
T2108705004	LMORT-4	Copper Sulfate Digestion Solid	WCAt/4343	EPA 365.4	WCAt/4346

Advanced Environmental Laboratories, Inc.

☐ **Altamonte Springs:** 380 Northlake Blvd., Ste. 1048, FL 32701 • 407.937.1594 • Lab ID: E53076
☐ **Fort Myers:** 13100 Westlinks Terrace, Ste. 10, FL 33913 • 239.674.8130 • Lab ID: E84492
☐ **Jacksonville:** 6681 Southpoint Pkwy., FL 32216 • 904.363.9350 • Lab ID: E82574
☐ **Tallahassee:** 2639 North Monroe St., Suite D, FL 32303 • 850.219.6274 • Lab ID: E811095
☐ **Gainesville:** 4965 SW 41st Blvd., FL 32608 • 352.377.2349 • Lab ID: E82001
☐ **Miramar:** 10200 USA Today Way, FL 33025 • 954.889.2288 • Lab ID: E82535
☒ **Tampa:** 9610 Princess Palm Ave., FL 33619 • 813.630.9616 • Lab ID: E84589

Client Name: Wood PLC	Project Name: Lake Morton
Address: 1101 Channelside Dr #200	Project Number: 6005378210.04
Tampa, FL 33602	PO Number: C0126102O2
Phone: 813-289-0750	FDEP Facility No:
FAX:	FDEP Facility Addr:
Contact: Francesca Lauterman	
Sampled By: F. Lauterman / R. Strader	Special Instructions:
Turn Around Time: Standard (Rush)	
AEL Profile #:	ADaPT EQuIS Other

SAMPLE ID	SAMPLE DESCRIPTION	Grab Comp	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. COUNT	BOTTLE SIZE & TYPE	ANALYSIS REQUIRED: Metals	Volatile solids (SM 2540E)	Nutrients TKN (calc TN)	Total dissolved solids	Preservation	Field-Filtered?	LABORATORY I.D. NUMBER
	LMORT-1	Comp	5/13/21	1400	SO	3		1	1	1				001
	LMORT-2	Comp	5/13/21	1500	SO	3		1	1	1				002
	LMORT-3	Comp	5/13/21	1530	SO	3		1	1	1				003
	LMORT-4	Comp	5/13/21	1600	SO	3		1	1	1				004

T2108705

Matrix Code: **WW** = wastewater **SW** = surface water **GW** = ground water **DW** = drinking water **O** = oil **A** = air **SO** = soil **SL** = sludge

Preservation Code: I = ice H=(HCl) S = (H2SO4) N = (HNO3) T = (Sodium Thiosulfate)

Received on Ice ☐ Yes ☐ No ☑ Temp taken from sample ☐ Temp from blank ☑ Where required, pH checked

Temp. when received (observed) 6 °C Temp. when received (corrected) 6 °C

DCN: AD-D051web Form last revised 08/07/2019

Device used for measuring Temp by unique identifier (circle IR temp gun used) J: 9A G: LT-1 LT-2 (T: 10A) A: 3A M: 3A S: 1V F: 1A

	Relinquished by:	Date	Time	Received by:	Date	Time
1		5/14/21	930		5/14/21	930
2						
3						
4						

FOR DRINKING WATER USE:

(When PWS Information not otherwise supplied) PWS ID:

Contact Person:

Supplier of Water:

Site-Address:

Advanced Environmental Laboratories, Inc.

Work Order: T2108705
Client: Wood PLC
Project ID: Lake Morton

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation: All holding times were met.

Analysis: All holding times were met.

III. Method

Analysis: EPA 9056

Preparation:

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration: All acceptance criteria were met.

Blanks: All acceptance criteria were met.

Surrogates: All acceptance criteria were met.

Spikes: The matrix spike recovery of Sulfate for T2108705003 was outside control criteria. Recoveries in the Laboratory Control Sample (LCS), and %RPD were acceptable, which indicates the analytical batch was in control. No further corrective action was required.

Internal Standard: All acceptance criteria were met.

Samples: All acceptance criteria were met.

Other: All acceptance criteria were met.

Serial Dilution: All acceptance criteria were met.

Duplicates: All acceptance criteria were met.

Advanced Environmental Laboratories, Inc.

Work Order: T2108705
Client: Wood PLC
Project ID: Lake Morton

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation:	All holding times were met.
Analysis:	All holding times were met.

III. Method

Analysis:	EPA 351.2
Preparation:	Copper Sulfate Digestion Solid

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration:	All acceptance criteria were met.
Blanks:	All acceptance criteria were met.
Surrogates:	All acceptance criteria were met.
Spikes	The matrix spike recoveries of TKN for T2108705004 outside control criteria. Recoveries in the Laboratory Control Sample (LCS), and %RPD were acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential low bias in this matrix. No further corrective action was required.
Internal Standard:	All acceptance criteria were met.
Samples:	All acceptance criteria were met.
Other:	All acceptance criteria were met.
Serial Dilution:	All acceptance criteria were met.
Duplicates:	All acceptance criteria were met.

Advanced Environmental Laboratories, Inc.

Work Order: T2108705
Client: Wood PLC
Project ID: Lake Morton

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation:	All holding times were met.
Analysis:	All holding times were met.

III. Method

Analysis:	EPA 365.4
Preparation:	Copper Sulfate Digestion Solid

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration:	All acceptance criteria were met.
Blanks:	All acceptance criteria were met.
Surrogates:	All acceptance criteria were met.
Spikes	The matrix spike recoveries of TP for T2108705004 were outside control criteria. Recoveries in the Laboratory Control Sample (LCS), and %RPD were acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential low bias in this matrix. No further corrective action was required.
Internal Standard:	All acceptance criteria were met.
Samples:	All acceptance criteria were met.
Other:	All acceptance criteria were met.
Serial Dilution:	All acceptance criteria were met.
Duplicates:	All acceptance criteria were met.

Advanced Environmental Laboratories, Inc.

Work Order: T2108705
Client: Wood PLC
Project ID: Lake Morton

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation:	All holding times were met.
Analysis:	All holding times were met.

III. Method

Analysis:	SW-846 6010
Preparation:	SW-846 3050B

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration:	All acceptance criteria were met.
Blanks:	All acceptance criteria were met.
Surrogates:	All acceptance criteria were met.
Spikes	The control criteria for matrix spike recoveries of Al and Fe for T2108705001 are not applicable. The analyte concentration in the sample was greater than 4 times the added spike concentrations, preventing accurate evaluation of the spike recovery. No further corrective action was required.
Internal Standard:	All acceptance criteria were met.
Samples:	All acceptance criteria were met.
Other:	All acceptance criteria were met.
Serial Dilution:	All acceptance criteria were met.
Duplicates:	All acceptance criteria were met.

DB Environmental

June 23, 2021

Wood PLC
Attention: Mary Szafraniec
1101 Channelside Dr. #200
Tampa, FL 33602

PO #: C012610203
Project Name: Lake Morton
Project No.: 600537x21C-04
Batch ID: 373084

Dear Mary Szafraniec:

DB Environmental received 4 samples on May 14, 2021 @ 09:39 for the analyses presented in the following report.

Analyses are performed with method required calibration and QA/QC samples whenever applicable. Method performance, which is based on the calibration and QA/QC samples, establishes the validity and certainty of the reported sample results. These results are calculated on a dry-weight basis, unless otherwise noted. These results relate only to the samples as received. The report shall not be reproduced except in full, without the written approval of the laboratory.

This report contains a total of 6 pages:

cover letter	1	case narrative	0	report	3
QC summary	1	COC	1	analytical results	0
correspondence	0	invoice	0		

Please note that any unused portion of the samples will be disposed of 30 days following issuance of report, unless you have requested otherwise.

If you have any questions regarding the analytical results, please feel free to call me at 321-639-4896.

Sincerely,

Nancy Chan
Project Manager

Enclosure

THIS DOCUMENT MEETS NELAC STANDARDS
NELAP Certification #E 83330

DB Environmental, Inc., 365 Gus Hipp Blvd., Rockledge, FL 32955 - (321) 639-4896
NELAP/FDOH# E 83330

Date: June 23, 2021

REPORT OF ANALYSIS

Client: Wood PLC
Attention: Mary Szafraniec
1101 Channelside Dr. #200
Tampa, FL 33602

Date and Time Received: 5/14/2021 9:39

PO #: C012610203
Project Name : Lake Morton
Project No. : 600537x21C-04
Matrix: Sediment

SAMPLE ID	LAB LOG NUMBER	DATE SAMPLED	TIME SAMPLED	PARAMETER	METHOD NUMBER	RESULTS	UNITS	METHOD DETECTION LIMIT	DATE/TIME OF ANALYSIS	QUALIFIER CODE
LMORT-1	373084	5/13/2021	14:00	% Dry Weight	ASA 21-2	16.37	%	0.01	5/17/2021	
LMORT-2	373085	5/13/2021	15:00	% Dry Weight	ASA 21-2	22.27	%	0.01	5/17/2021	
LMORT-3	373086	5/13/2021	15:30	% Dry Weight	ASA 21-2	74.49	%	0.01	5/17/2021	
LMORT-4	373087	5/13/2021	16:00	% Dry Weight	ASA 21-2	77.53	%	0.01	5/17/2021	
LMORT-1	373084	5/13/2021	14:00	Bulk Density	ASA 13	0.17	g/cc	0.001	5/17/2021	
LMORT-2	373085	5/13/2021	15:00	Bulk Density	ASA 13	0.25	g/cc	0.001	5/17/2021	
LMORT-3	373086	5/13/2021	15:30	Bulk Density	ASA 13	1.4	g/cc	0.001	5/17/2021	
LMORT-4	373087	5/13/2021	16:00	Bulk Density	ASA 13	1.4	g/cc	0.001	5/17/2021	
LMORT-1	373084	5/13/2021	14:00	Total Phosphorus	DBE SOP TP	13500	mg/kg dry	250	6/1/2021	
LMORT-2	373085	5/13/2021	15:00	Total Phosphorus	DBE SOP TP	8240	mg/kg dry	100	6/1/2021	
LMORT-3	373086	5/13/2021	15:30	Total Phosphorus	DBE SOP TP	442	mg/kg dry	10	6/1/2021	
LMORT-4	373087	5/13/2021	16:00	Total Phosphorus	DBE SOP TP	334	mg/kg dry	10	6/1/2021	A
LMORT-1	373084	5/13/2021	14:00	Porewater SRP	DBE SOP OPO4	0.065	mg/L	0.002	5/18/2021 9:20	
LMORT-2	373085	5/13/2021	15:00	Porewater SRP	DBE SOP OPO4	0.108	mg/L	0.002	5/18/2021 9:20	
LMORT-3	373086	5/13/2021	15:30	Porewater SRP	DBE SOP OPO4	0.332	mg/L	0.002	5/18/2021 9:20	
LMORT-4	373087	5/13/2021	16:00	Porewater SRP	DBE SOP OPO4	0.163	mg/L	0.002	5/18/2021 9:20	
LMORT-1	373084	5/13/2021	14:00	Porewater SRP	DBE SOP OPO4	0.318	mg/kg dry	0.010	5/18/2021 9:20	
LMORT-2	373085	5/13/2021	15:00	Porewater SRP	DBE SOP OPO4	0.337	mg/kg dry	0.006	5/18/2021 9:20	
LMORT-3	373086	5/13/2021	15:30	Porewater SRP	DBE SOP OPO4	0.060	mg/kg dry	0.0004	5/18/2021 9:20	
LMORT-4	373087	5/13/2021	16:00	Porewater SRP	DBE SOP OPO4	0.026	mg/kg dry	0.0003	5/18/2021 9:20	
LMORT-1	373084	5/13/2021	14:00	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	57.2	mg/L	0.800	6/3/2021	
LMORT-2	373085	5/13/2021	15:00	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	32.8	mg/L	0.800	6/3/2021	

SAMPLE ID	LAB LOG NUMBER	DATE SAMPLED	TIME SAMPLED	PARAMETER	METHOD NUMBER	RESULTS	UNITS	METHOD DETECTION LIMIT	DATE/TIME OF ANALYSIS	QUALIFIER CODE
LMORT-3	373086	5/13/2021	15:30	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	8.57	mg/L	0.200	6/3/2021	
LMORT-4	373087	5/13/2021	16:00	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	4.73	mg/L	0.200	6/3/2021	
LMORT-1	373084	5/13/2021	14:00	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	281	mg/kg dry	3.9	6/3/2021	
LMORT-2	373085	5/13/2021	15:00	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	102	mg/kg dry	2.5	6/3/2021	
LMORT-3	373086	5/13/2021	15:30	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	1.6	mg/kg dry	0.04	6/3/2021	
LMORT-4	373087	5/13/2021	16:00	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	0.76	mg/kg dry	0.03	6/3/2021	
LMORT-1	373084	5/13/2021	14:00	NH_4Cl TSP*	DBE SOP TP	3.8	mg/kg dry	0.8	6/8/2021	A
LMORT-2	373085	5/13/2021	15:00	NH_4Cl TSP*	DBE SOP TP	8.1	mg/kg dry	0.8	5/26/2021	A
LMORT-3	373086	5/13/2021	15:30	NH_4Cl TSP*	DBE SOP TP	2.3	mg/kg dry	0.7	5/26/2021	
LMORT-4	373087	5/13/2021	16:00	NH_4Cl TSP*	DBE SOP TP	6.6	mg/kg dry	0.7	5/26/2021	
LMORT-1	373084	5/13/2021	14:00	$NaHCO_3/Na_2S_2O_4$ TSP**	DBE SOP TP	150	mg/kg dry	3.0	5/26/2021	A
LMORT-2	373085	5/13/2021	15:00	$NaHCO_3/Na_2S_2O_4$ TSP**	DBE SOP TP	112	mg/kg dry	3.1	5/26/2021	
LMORT-3	373086	5/13/2021	15:30	$NaHCO_3/Na_2S_2O_4$ TSP**	DBE SOP TP	5.3	mg/kg dry	2.8	5/26/2021	I
LMORT-4	373087	5/13/2021	16:00	$NaHCO_3/Na_2S_2O_4$ TSP**	DBE SOP TP	3.8	mg/kg dry	2.9	5/26/2021	I
LMORT-1	373084	5/13/2021	14:00	NaOH SRP***	DBE SOP OPO4	3410	mg/kg dry	16.2	5/20/2021 11:41	A
LMORT-2	373085	5/13/2021	15:00	NaOH SRP***	DBE SOP OPO4	2060	mg/kg dry	16.4	5/20/2021 11:41	
LMORT-3	373086	5/13/2021	15:30	NaOH SRP***	DBE SOP OPO4	215	mg/kg dry	15.1	5/20/2021 11:41	
LMORT-4	373087	5/13/2021	16:00	NaOH SRP***	DBE SOP OPO4	140	mg/kg dry	15.2	5/20/2021 11:41	
LMORT-1	373084	5/13/2021	14:00	NaOH TSP	DBE SOP TP	3830	mg/kg dry	52.8	5/26/2021	A
LMORT-2	373085	5/13/2021	15:00	NaOH TSP	DBE SOP TP	2420	mg/kg dry	53.3	5/26/2021	
LMORT-3	373086	5/13/2021	15:30	NaOH TSP	DBE SOP TP	187	mg/kg dry	9.9	5/26/2021	
LMORT-4	373087	5/13/2021	16:00	NaOH TSP	DBE SOP TP	133	mg/kg dry	9.9	5/26/2021	
LMORT-1	373084	5/13/2021	14:00	NaOH TSP minus NaOH SRP†	Calculation	420	mg/kg dry	52.8	n/a	
LMORT-2	373085	5/13/2021	15:00	NaOH TSP minus NaOH SRP†	Calculation	360	mg/kg dry	53.3	n/a	
LMORT-3	373086	5/13/2021	15:30	NaOH TSP minus NaOH SRP†	Calculation	<15.1	mg/kg dry	15.1	n/a	U
LMORT-4	373087	5/13/2021	16:00	NaOH TSP minus NaOH SRP†	Calculation	<15.2	mg/kg dry	15.2	n/a	U
LMORT-1	373084	5/13/2021	14:00	HCl TSP††	DBE SOP TP	987	mg/kg dry	15.2	6/9/2021	A
LMORT-2	373085	5/13/2021	15:00	HCl TSP††	DBE SOP TP	668	mg/kg dry	3.1	6/9/2021	
LMORT-3	373086	5/13/2021	15:30	HCl TSP††	DBE SOP TP	37.4	mg/kg dry	2.8	6/9/2021	
LMORT-4	373087	5/13/2021	16:00	HCl TSP††	DBE SOP TP	56.0	mg/kg dry	2.9	6/9/2021	A
LMORT-1	373084	5/13/2021	14:00	Residual P	DBE SOP TP	8750	mg/kg dry	200	6/1/2021	A
LMORT-2	373085	5/13/2021	15:00	Residual P	DBE SOP TP	4550	mg/kg dry	85	6/1/2021	
LMORT-3	373086	5/13/2021	15:30	Residual P	DBE SOP TP	112	mg/kg dry	20	6/1/2021	
LMORT-4	373087	5/13/2021	16:00	Residual P	DBE SOP TP	52	mg/kg dry	10	6/1/2021	

SAMPLE ID	LAB LOG NUMBER	DATE SAMPLED	TIME SAMPLED	PARAMETER	METHOD NUMBER	RESULTS	UNITS	METHOD DETECTION LIMIT	DATE/TIME OF ANALYSIS	QUALIFIER CODE
LMORT-1	373084	5/13/2021	14:00	Total Organic Carbon	DBE SOP MVP/COE 3-73	140000	mg/kg dry	3030	5/27/2021	
LMORT-2	373085	5/13/2021	15:00	Total Organic Carbon	DBE SOP MVP/COE 3-73	107000	mg/kg dry	3030	5/27/2021	
LMORT-3	373086	5/13/2021	15:30	Total Organic Carbon	DBE SOP MVP/COE 3-73	3380	mg/kg dry	3030	5/27/2021	I
LMORT-4	373087	5/13/2021	16:00	Total Organic Carbon	DBE SOP MVP/COE 3-73	5410	mg/kg dry	3030	5/27/2021	I

Key to Qualifier Code

A Result based on the mean of two or more determinations; average of lab dup and/or extraction dup results.

I Result is between the method detection limit and the practical quantitation limit.

U Indicates that the compound was analyzed for but not detected.

Project Manager: Nancy Chan

Reference

Meis, S., Spears, B.M., Maberly, S.C., O'Malley, M.B., Perkins, R.G. 2012. Sediment amendment with Phoslock® in Clatto Reservoir (Dundee, UK): Investigating changes in sediment elemental composition and phosphorus fractionation. *J. Environ. Manag.*; 93, 185-193.

*NH_4Cl TSP = Labile P

**$NaHCO_3/Na_2S_2O_4$ TSP = Reductant-Soluble P

***NaOH SRP = Metal-Oxide Adsorbed P

†NaOH TSP minus NaOH SRP = Organic P

††HCl TSP = Apatite Bound P

QC SUMMARY
Wood PLC
PO # : C012610203
Project Name: Lake Morton
Project No. : 600537x21C-04
(373084 - 373087)

PARAMETER	LAB DUPLICATES	% RSD	SPIKES	% RECOVERY	BLANKS
Total Phosphorus / Residual P	373087	11.1	373086	103	<10 mg/kg dry
Porewater SRP	373082	2.3	373083	97	<0.001 mg/kg dry
Porewater NH3-N	373082	1.0	373086	94	<0.028 mg/kg dry
NH_4Cl TSP	373085	0.0	373086	102	<0.8 mg/kg dry
$NaHCO_3/Na_2S_2O_4$ TSP	373080	4.4	373081	102	<3.0 mg/kg dry
NaOH SRP	373082	3.2	373086	110	<16.0 mg/kg dry
NaOH TSP	373081	0.0	373087	100	<10.5 mg/kg dry
HCl TSP	373087	3.9	373083	116	<3.0 mg/kg dry
Total Organic Carbon	373081	13.8	373086	100	<3030 mg/kg dry

DB Environmental, Inc.

365 Gus Hipp Blvd. Rockledge, FL 32955
Ph: (321) 639-4896 Fax: (321) 631-3169
e-mail: info@dbenv.com Lab Certification #: E83330

CHAIN OF CUSTODY

Revision 8.0, Effective 8/31/2018

Client:	Address:	City:	State:	Zip:	Phone:	Fax:
Wood PLC	1101 Channelside Dr. #200	Tampa	FL		352-70	2-1254

Contact Person:	Contact Info	Invoice #:	Requested Analysis
Francesca Lauterman	352-702-1254		

Project: Lake Morton

Collected By: Francesca Lauterman

pH Checked (for Lab Use Only)	Lab Log #:	Date	Time	Comp/ Grab	Matrix Code	Field- Filter Y/N	Preservative: Thermal (4°C, <0°C, or n/a)	Preservative: pH Code	Sample ID:	Sample Description	Alkalinity	Bulk density	TP	Porewater SRP	Porewater NH3	Meis Pfrac	TOC		Remarks
	373084	5/13/21	1400	comp	SE				LMORT-1		✓								
	373085	5/13/21	1500	comp	SE				LMORT-2		✓								
	373086	5/13/21	1530	comp	SE				LMORT-3		✓								
	373087	5/13/21	1600	comp	SE				LMORT-4		✓								

Custody Transfer:

	Relinquished by: Signature	Date/Time	Received by: Signature	Date/Time
1		5/13/21 17:00		5/14/21@0939
2				
3				
4				

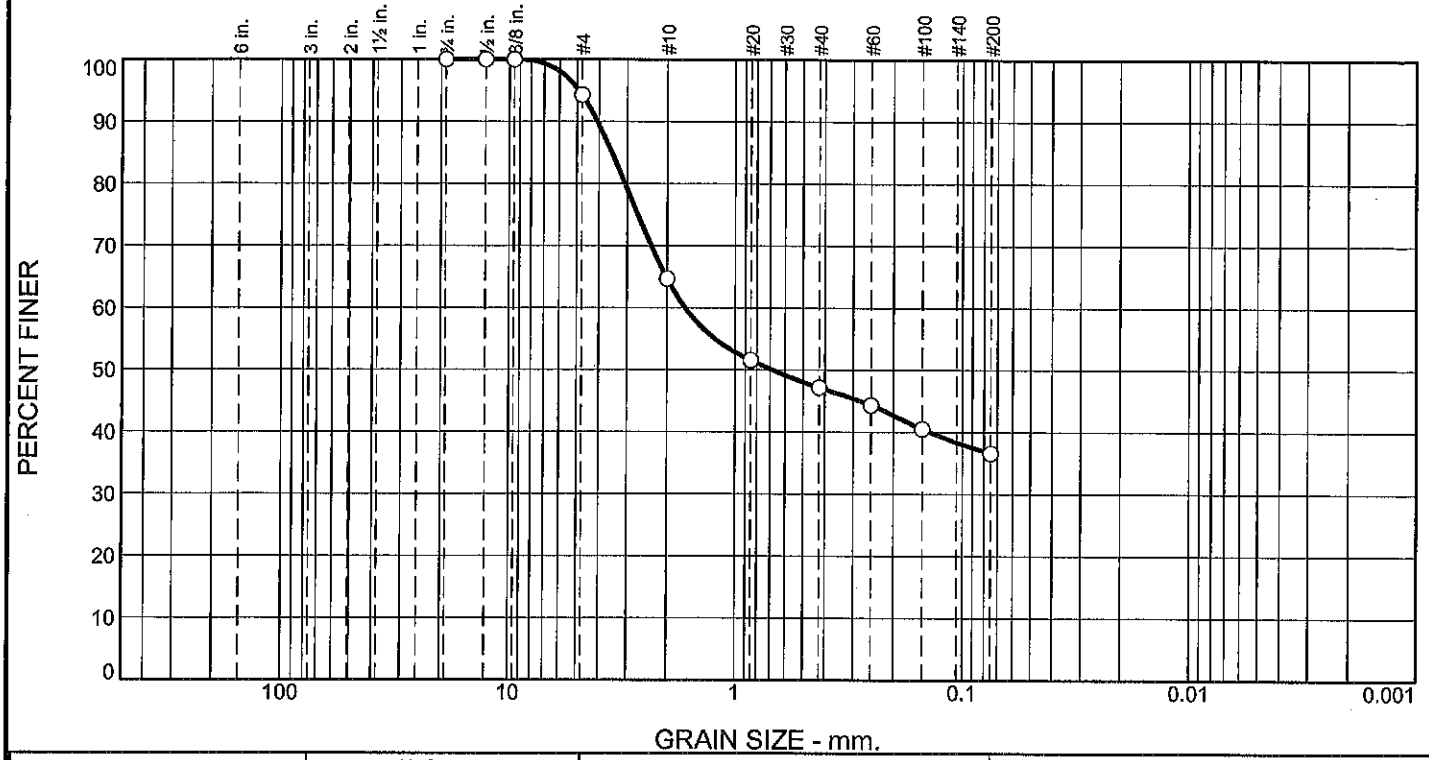
Matrix ID		pH Code	
F-Fish	DI- DI Water	H: HCl to pH <2	
FL-Floc	DW-Drinking Water	N: HNO_3 to pH <2	
G-Gas	GW-Ground Water	S1: H_2SO_4 to pH <2	
I-Invertebrate	IW- Incubation Water	S2: H_2SO_4 to pH 2-3	
L-Leachate	PW-Porewater		
PE- Periphyton	RW-Rain Water	OH1: ZnAc+NaOH	
PT-Plant/Veg	SW-Surface Water	to pH >9	
SD-Sludge	WW-Waste Water	OH2: NaOH to pH >12	
SE-Sediment	O-Other _____		
SO-Soil		O: Other _____	

Sample Receiving - For Lab Use Only

Method of Shipping/Delivery: Fed Ex
Received on ice or similar Yes X No____ n/a____
Receiving Temperature (°C) - *if applicable:* 1.7
Thermometer #: 64 Initials: DeH
pH checked in accordance with Preservation Codes
Yes____ No____ n/a X Initials: NC
First Lab Log # (Batch ID): 373084

Comments:

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.7	29.6	17.5	10.6	36.6	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	94.3		
#10	64.7		
#20	51.6		
#40	47.2		
#60	44.4		
#100	40.5		
#200	36.6		

* (no specification provided)

Material Description

Dark brown clayey fine to coarse SAND

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= SC AASHTO (M 145)=

Coefficients

D_{90}= 4.0637 D_{85}= 3.5070 D_{60}= 1.6618
D_{50}= 0.6830 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 5/19/2021 **Date Tested:** 5/24/2021

Tested By: Troy Hudson

Checked By: Michael A. Villatoro

Title: Staff Geotechnical Engineer

Source of Sample: LMORT-1 **Depth:** 0.0-10.0 cm **Date Sampled:**

Wood E&I

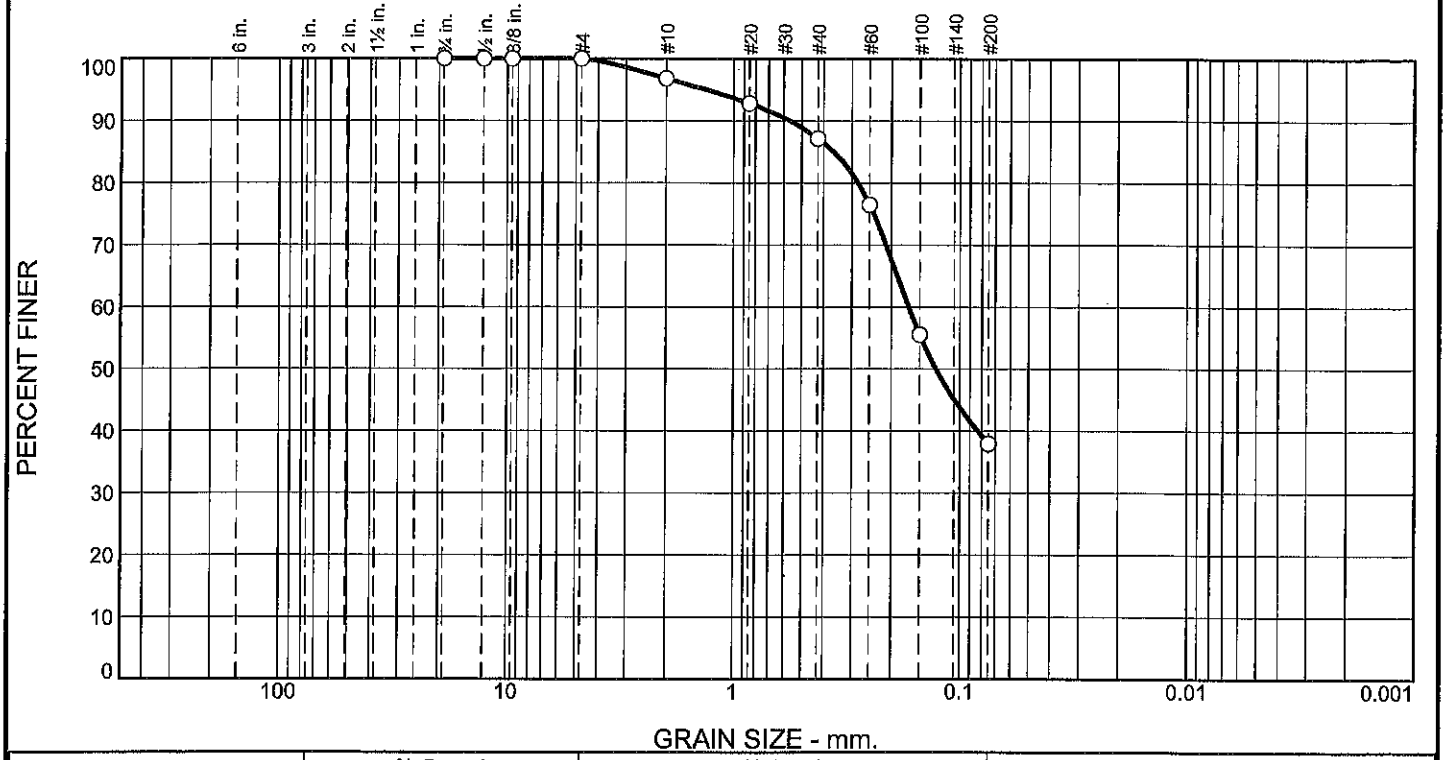
Jacksonville, Florida

Client: City of Lakeland
Project: Lake Morton

Project No: 600537x21c

MAV
6/15/21

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	3.2	9.6	49.2	38.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	100.0		
#10	96.8		
#20	92.8		
#40	87.2		
#60	76.5		
#100	55.6		
#200	38.0		

* (no specification provided)

Material Description

Dark brown clayey fine SAND

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= SC AASHTO (M 145)=

Coefficients

D_{90}= 0.5645 D_{85}= 0.3605 D_{60}= 0.1675
D_{50}= 0.1272 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 5/19/2021 **Date Tested:** 5/24/2021

Tested By: Troy Hudson

Checked By: Michael A. Villatoro

Title: Staff Geotechnical Engineer

Source of Sample: LMORT-2 **Depth:** 0.0-10.0 cm **Date Sampled:**

Wood E&I

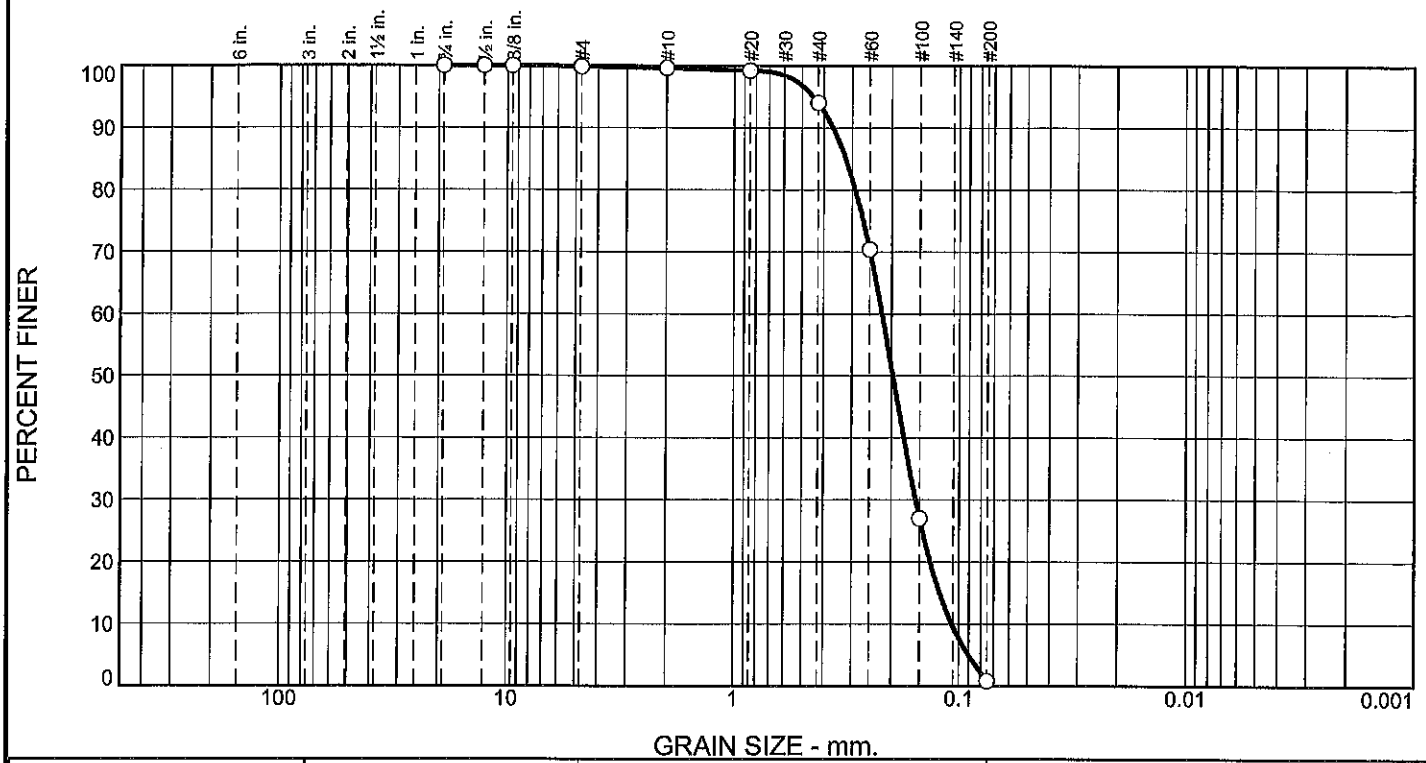
Jacksonville, Florida

Client: City of Lakeland
Project: Lake Morton

Project No: 600537x21c

MAV
6/15/21

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.3	5.5	93.3	0.8	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.9		
#10	99.6		
#20	99.2		
#40	94.1		
#60	70.4		
#100	27.0		
#200	0.8		

* (no specification provided)

Material Description

Light brown fine SAND

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= SP AASHTO (M 145)=

Coefficients

D_{90}= 0.3652 D_{85}= 0.3207 D_{60}= 0.2200
D_{50}= 0.1968 D_{30}= 0.1561 D_{15}= 0.1219
D_{10}= 0.1075 C_u= 2.05 C_c= 1.03

Remarks

Date Received: 5/19/2021 **Date Tested:** 5/21/2021

Tested By: Troy Hudson

Checked By: Michael A. Villatoro

Title: Staff Geotechnical Engineer

Source of Sample: LMORT-3 **Depth:** 0.0-10.0 cm **Date Sampled:**

Wood E&I

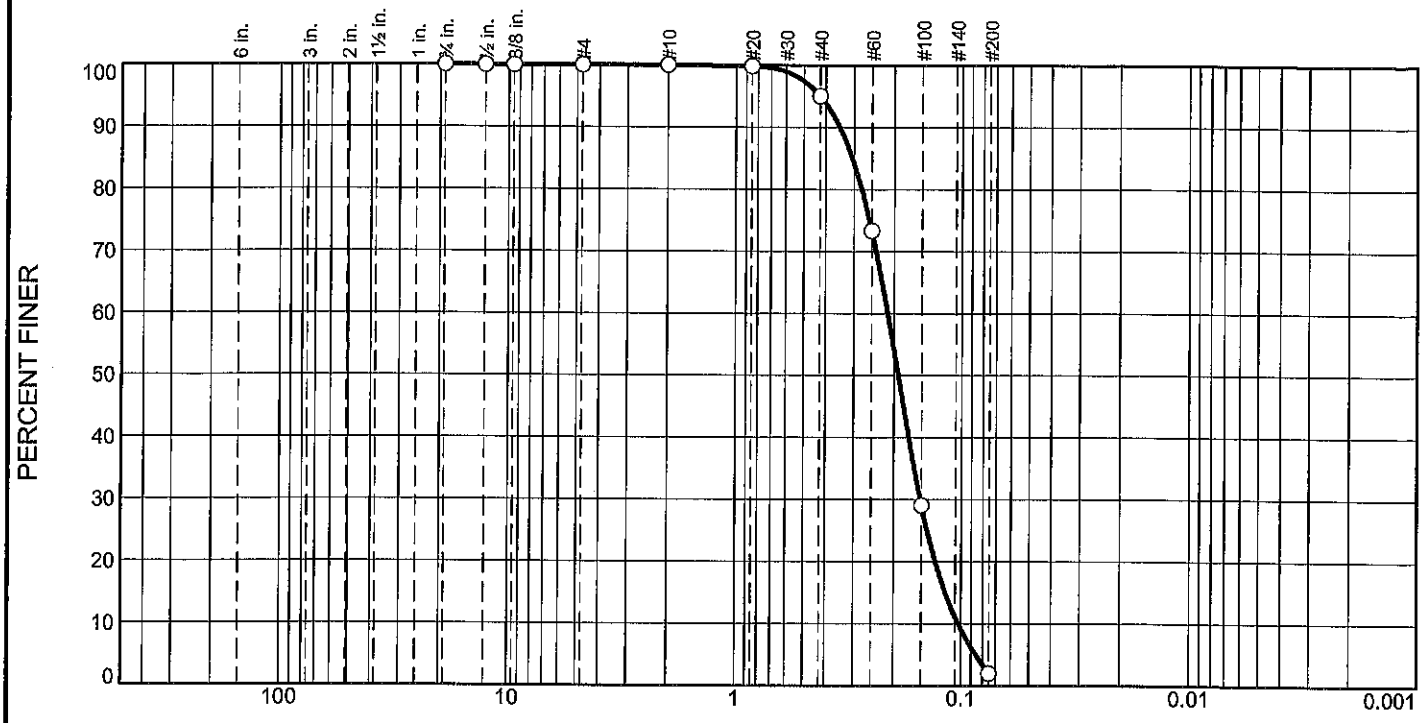
Jacksonville, Florida

Client: City of Lakeland
Project: Lake Morton

Project No: 600537x21c

MAV
6/15/21

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.0	93.0	2.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	95.0		
#60	73.3		
#100	29.1		
#200	2.0		

* (no specification provided)

Material Description

Light brown fine SAND

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= SP AASHTO (M 145)=

Coefficients

D_{90}= 0.3468 D_{85}= 0.3050 D_{60}= 0.2129
D_{50}= 0.1910 D_{30}= 0.1518 D_{15}= 0.1175
D_{10}= 0.1030 C_u= 2.07 C_c= 1.05

Remarks

Date Received: 5/19/2021 **Date Tested:** 5/21/2021

Tested By: Troy Hudson

Checked By: Michael A. Villatoro

Title: Staff Geotechnical Engineer

Source of Sample: LMORT-4 **Depth:** 0.0-10.0 cm **Date Sampled:**

Wood E&I

Jacksonville, Florida

Client: City of Lakeland
Project: Lake Morton

Project No: 600537x21c

MAV
6/15/21