Wood Environment & Infrastructure Solutions, Inc.
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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 Mirror, Task 4

Wood Project No. 600537.21B

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 4e Pollutant Reduction Plans for Lake Mirror. 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 77,337 5 cubic yards (CUYDs) across the sampled transects (**Figure A.5, Appendix A**). The largest concentrations of soft sediment were found within the center of the lake, suggesting the transport of sediments from shallow areas to the deeper areas of the basin by wind-generated mixing. Maps describing results of the soft-sediment thickness survey are shown in **Figures A.2** through **A.5, 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 Mirror **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 NH_4Cl to determine loosely adsorbed and porewater P ('labile P')
2. Extraction with 0.11 M $NaHCO_3$/0.11 M $Na_2S_2O_4$ 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) H_2SO_4 and 8% $K_2S_2O_4$ followed by TSP quantification to determine refractory P ('residual P')

2.3 Sediment Characterization and Phosphorus Fractionation Results

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 2.4 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	0.6-2.4	28.45-29.27	10.40-10.58	135.8-138.7	0.10	214-218	8.75-8.85	6.44
Site 2	0.6-2.4	27.02-30.09	9.14-10.48	118.6-137.6	0.10	208-211	8.87-9.22	6.90
Site 3	0.6-1.8	28.84-31.47	10.74-11.35	137.6-152.1	0.10	214-215	9.09-9.23	6.16
Site 4	0.6-2.4	28.82-29.13	10.64-11.22	136.3-145.3	0.10	208-215	8.58-8.73	6.29

Tables 2.2 through **2.4** summarize the physical and chemical results for sediment cores retrieved from Lake Mirror. 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. Sites 1 and 4 displayed the highest values for both nutrient and metal parameters. To show possible nutrient inputs to Lake Parker, a sediment core was collected at the mouth of the outfall to Lake Parker. This location, Site 3, displayed the lowest values of tested chemical parameters.

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	98.9	99.8	99.8	85.5
#10	93.2	99.4	99.8	52.1
#20	89.7	98.7	99.7	43.6
#40	86	96.3	96.4	38.8
#60	80.7	78.8	76.4	35.4
#100	68.3	29.2	28.7	30.7
#200	48.8	2.1	1.4	25.9

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	84	0.24	121,000	38,000	0	1.1	6	7	37.2	48.8	
Site 2	26	1.2	20,100	21,000	0.0	0.2	0.4	3.1	94.2	2.1	
Site 3	23	1.4	3,920	8,900	0.0	0.2	0.0	3.4	95.0	1.4	
Site 4	87	0.1	183,000	31,000	0.0	14.5	33.4	13.3	12.9	25.9	

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	18,000	57	68,000	11,000	60	38	61	6,100	10,000
Site 2	1,400	9.5	10,000	1,100	8.3	1.5	25	480	1,600
Site 3	3,300	4.7	720	300	5.2	1.1	21	310	1,200
Site 4	12,000	19.6[1]	34,000	8,300	49	10	210	6,000	7,200

[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 4, while the lowest fractions were found at the outfall (site 3). TP concentrations within the four sediment locations ranged from 1,230 to 9,590 mg/kg (**Table 2.6)**. The lowest TP concentrations were found at sites 2 and 3, while the highest TP concentration was observed at site 4.

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 Mirror

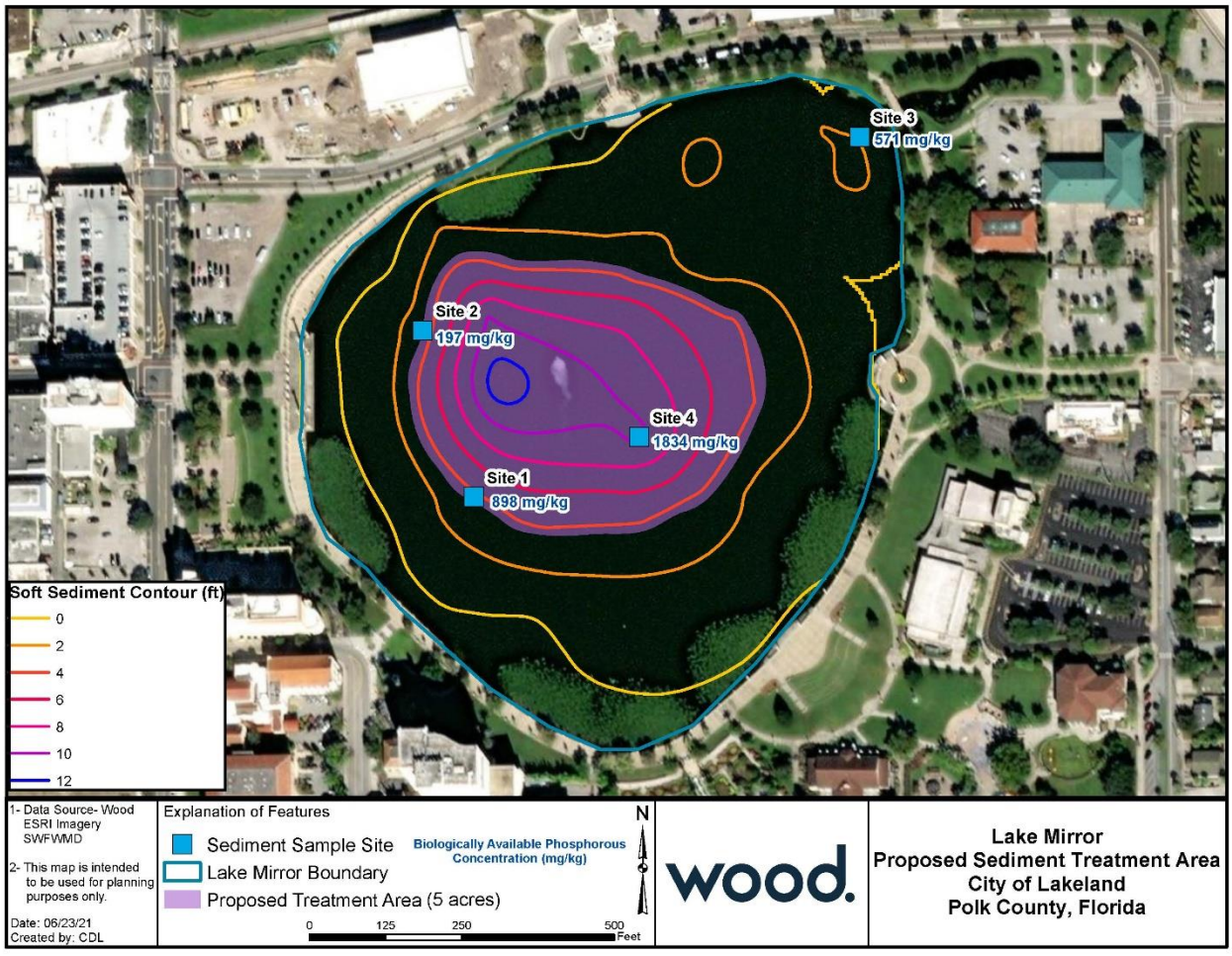
	Phosphorus Fraction Concentration (MG/KG)			
P FRACTION	Site 1	Site 2	Site 3	Site 4
Labile P	23	3	3	21
Reductant soluble P	103	17	16	293
Organic P	219	219	29	83
Metal-oxide adsorbed P	553	148	0	1,180
Apatite bound P	1,770	812	36	1,750
Residual P	4,100	108	350	4,820
Total BAP	898	197	571	1,834
Total P	8,240	1,700	1,230	9,590

3.0 SUMMARY AND RECOMMENDATIONS

Preliminary 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 Mirror. 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.

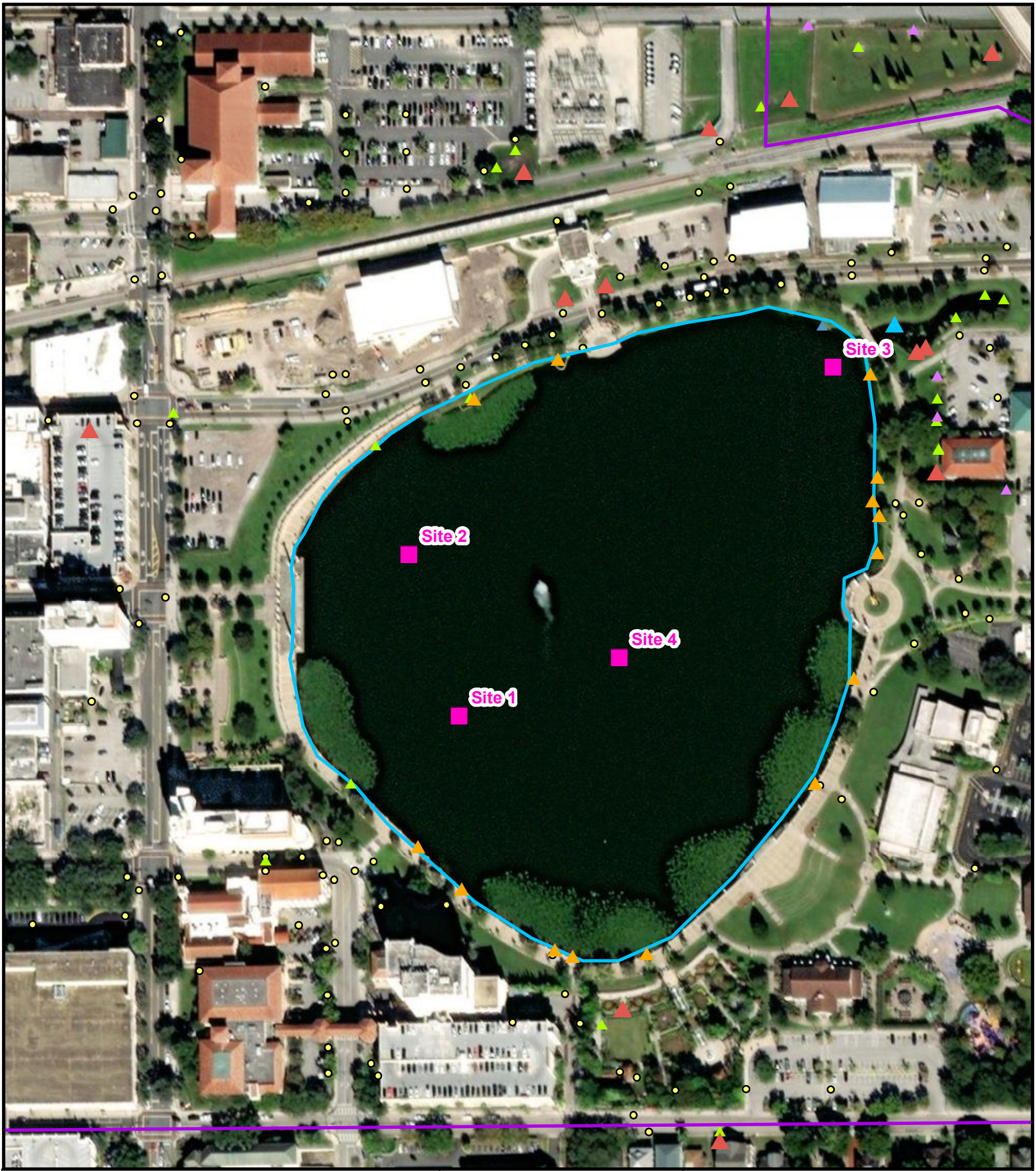
Wood estimates that the lake center contains soft sediment spanning roughly 5 acres (**Figure 3.1**). To effectively treat this portion of the lake, Wood recommends a targeted application of a sediment treatment alternative of approximately 77,337 CUYDs of soft sediment. Using an assumed average (from previous projects) and conservative cost per acre of $15,000 for sediment capping alternatives, the cost for the 5-acre targeted treatment would be $75,000 and $270,000 to treat the entire lake (18 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



SW Outlet
- EndOfPipe
- Flume
- LakeCreekOutlet
- OutfallMajor
- OutfallMinor
- RetDetOutlet
- SW inlet

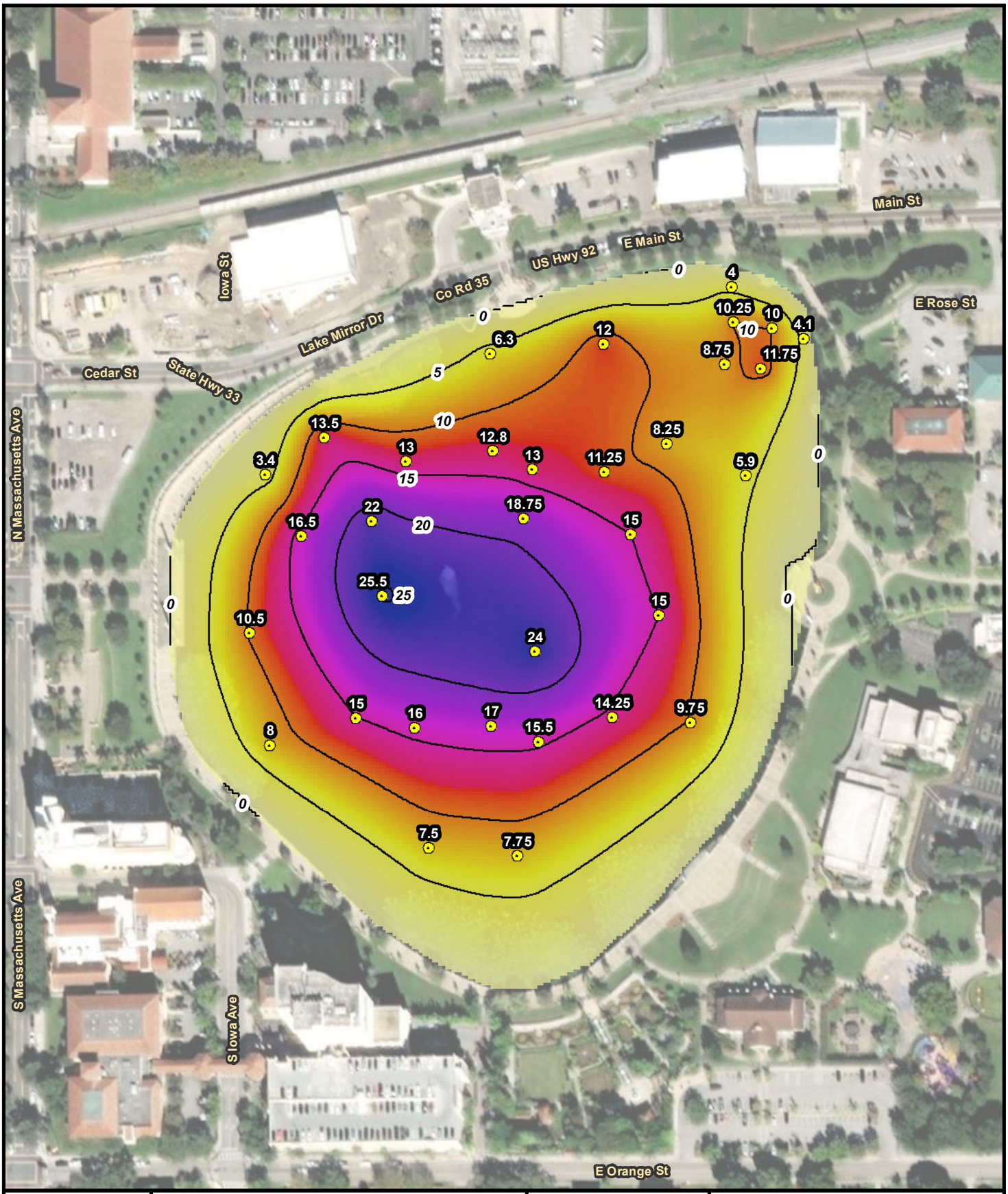
- Sediment Characterization Site
- Lake Mirror Boundary
- Mirror Drainage Basin

N

0 112.5 225 450 Feet

wood.

Figure A.1
Lake Mirror
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 (ft)

High : 25.5

Low : 0

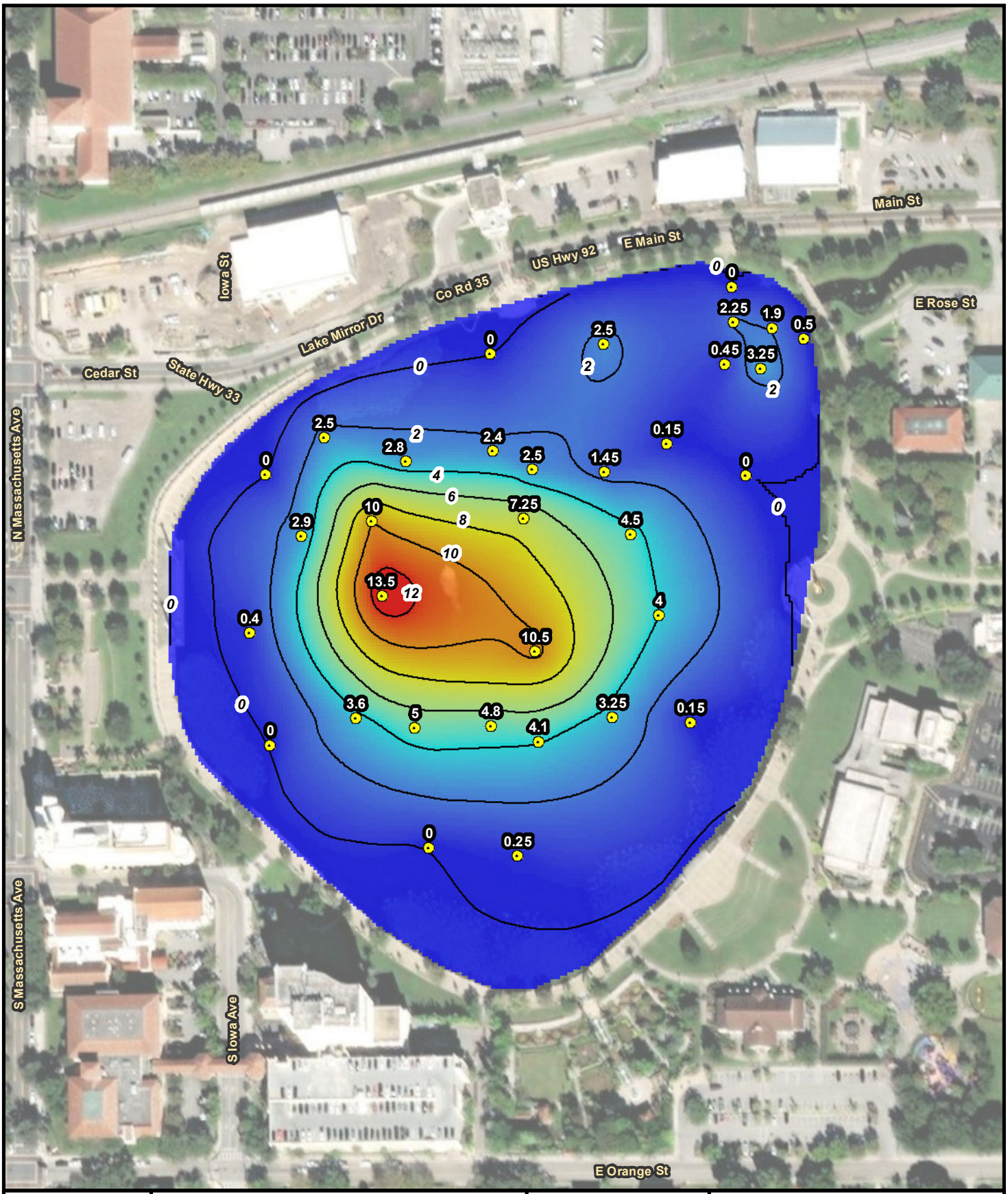
0 200

1" = 200 Feet

wood.

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

Path: V:\600537x21_COL_Lk_Mirror_Morton\MXD\Report\Lake Mirror_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 (ft)

High : 13.5

Low : 0

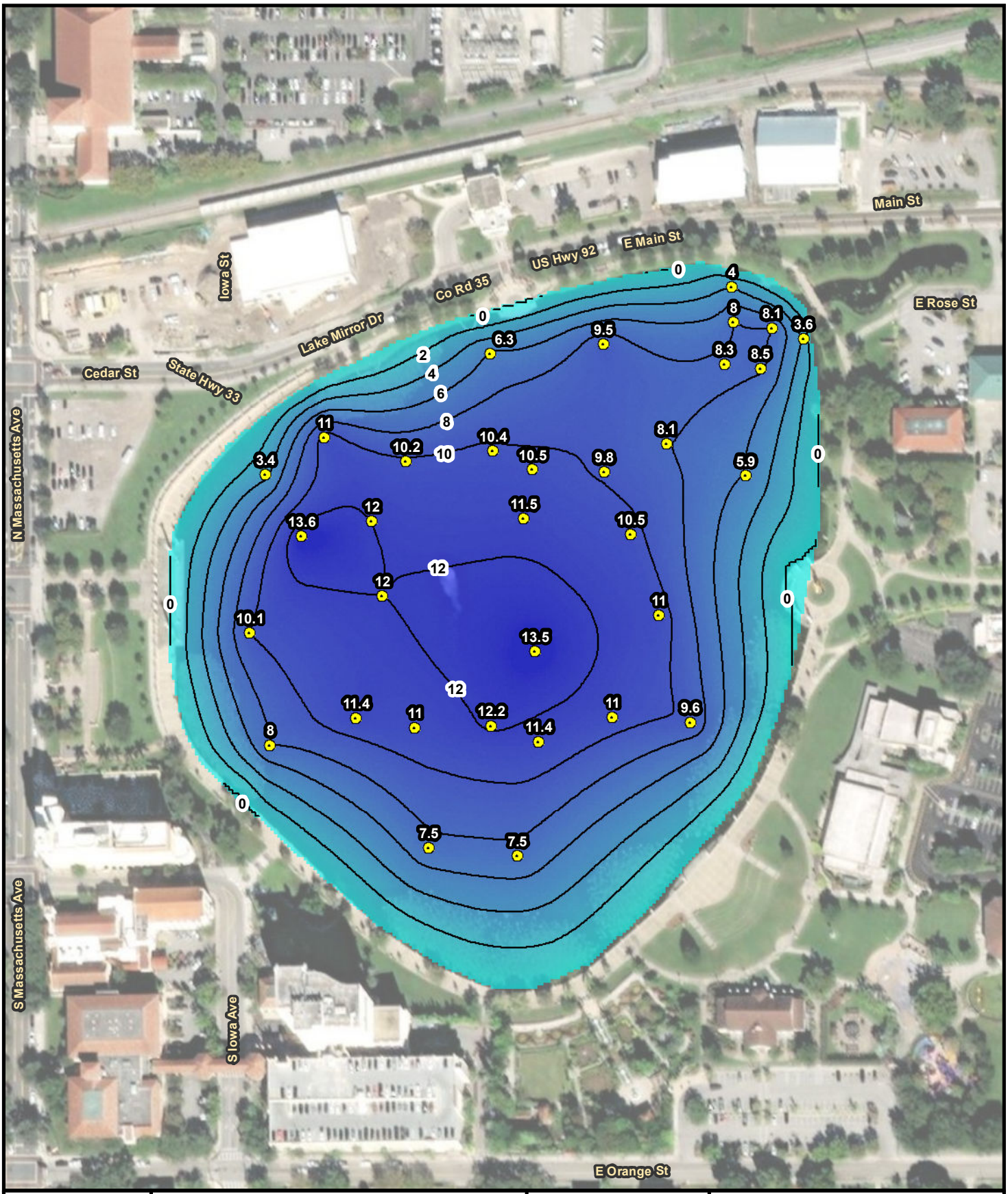
0 200

1" = 200 Feet

wood.

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

Path: V:\600537x21_COL_Lk_Mirror_Morton\MXD\Report\Lake Mirror_Softsed_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

Water Depth 2ft Contours

Water Depth (feet)

High : 13.6

Low : 0

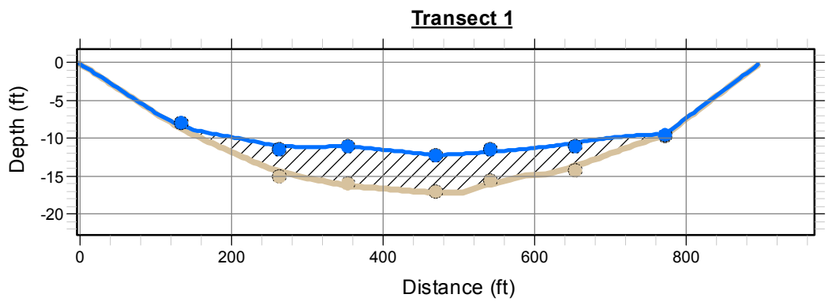
0 200

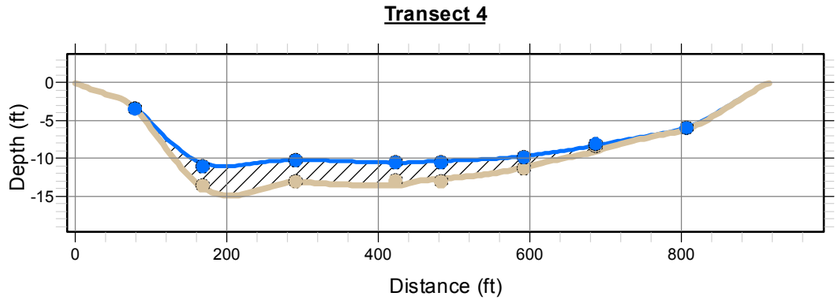
1" = 200 Feet

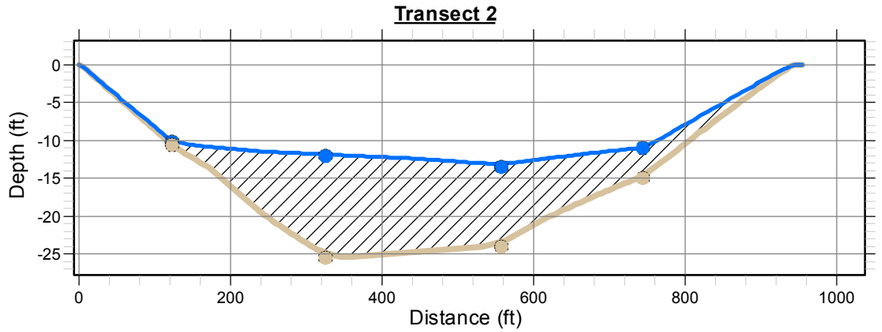
wood.

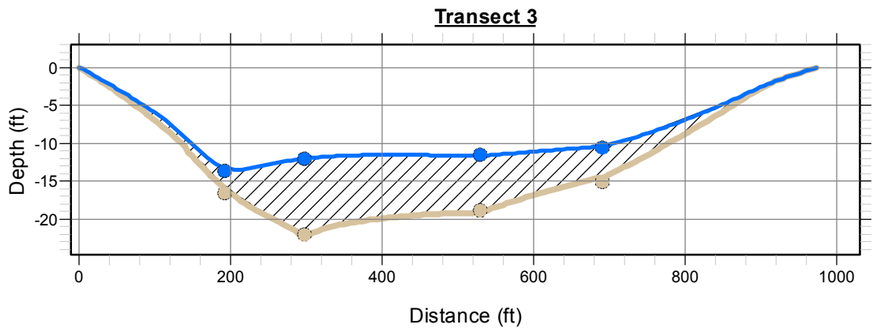
Figure A.4
Lake Mirror
Water Depth Map
City of Lakeland
Polk County, FL

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

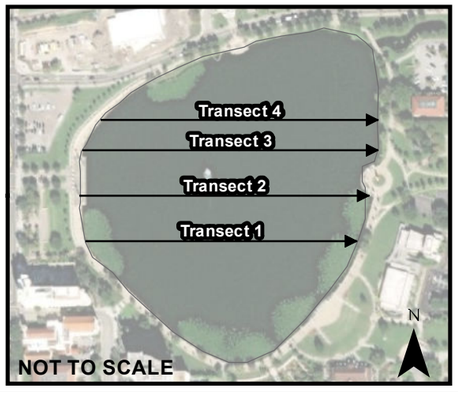








TOTAL SOFT SEDIMENT VOLUME: 77,337 CUYDs



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

N

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

wood.

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

File Path: V:\600537x21_COL_Lk_Mirror_Morton\MXD\lake_Mirror_profiles.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: T2108706 Lake Mirror

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: T2108706 Lake Mirror

Lab ID	Sample ID	Matrix	Date Collected	Date Received
T2108706001	LMIR-1	Soil	5/13/2021 09:50	5/14/2021 09:30
T2108706002	LMIR-2	Soil	5/13/2021 10:30	5/14/2021 09:30
T2108706003	LMIR-3	Soil	5/13/2021 11:10	5/14/2021 09:30
T2108706004	LMIR-4	Soil	5/13/2021 12:10	5/14/2021 09:30

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Fax: (813)630-4327

ANALYTICAL RESULTS

Workorder: T2108706 Lake Mirror

Lab ID: **T2108706001** Date Received: 05/14/21 09:30 Matrix: Soil

Sample ID: **LMIR-1** Date Collected: 05/13/21 09:50

Results for sample T2108706001 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	**18000**		**mg/Kg**	**5**	80	40	5/17/2021 17:06	T
Calcium	**68000**		**mg/Kg**	**1**	160	130	5/17/2021 15:50	T
Iron	**11000**		**mg/Kg**	**5**	80	40	5/17/2021 17:06	T
Manganese	**60**		**mg/Kg**	**1**	1.6	1.3	5/17/2021 15:50	T
WET CHEMISTRY								
Analysis Desc: Ammonia,E350.1,Soil	Analytical Method: EPA 350.1							
Ammonia (N)	**57**	**I**	**mg/Kg**	**1**	64.22	16.05	5/19/2021 17:32	T
Analysis Desc: TKN,E351.2,Solids	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**6100**		**mg/Kg**	**1**	320	120	5/19/2021 13:47	T
Analysis Desc: Total Phosphorus,E365.4,Analysis	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 365.4							
Total Phosphorus (as P)	**10000**		**mg/Kg**	**1**	320	180	5/19/2021 13:47	T
Analysis Desc: 9056, Soil	Analytical Method: EPA 9056							
Sulfate	**61**	**I**	**mg/Kg**	**1**	160	30	5/17/2021 23:37	T
Analysis Desc: Volatile Solids,SM2540G	Analytical Method: SM 2540G							
Total Volatile Solids	**38000**		**mg/Kg**	**1**	10	10	5/18/2021 12:00	T
Analysis Desc: Nitrate+Nitrite,SM4500NO3F,S	Analytical Method: SM 4500NO3-F							
Nitrate + Nitrite	**38**	**I**	**mg/Kg**	**5**	64	25	5/17/2021 14:05	T
WET CHEMISTRY								
Analysis Desc: Percent Solids,SM2540G,Soil	Analytical Method: SM 2540G							
Percent Moisture	**84**		**%**	**1**	0.0010	0.0010	5/17/2021 10:00	T

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ANALYTICAL RESULTS

Workorder: T2108706 Lake Mirror

Lab ID: **T2108706002** Date Received: 05/14/21 09:30 Matrix: Soil

Sample ID: **LMIR-2** Date Collected: 05/13/21 10:30

Results for sample T2108706002 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	**1400**		**mg/Kg**	**1**	3.2	1.6	5/17/2021 15:53	T
Calcium	**10000**		**mg/Kg**	**1**	32	26	5/17/2021 15:53	T
Iron	**1100**		**mg/Kg**	**1**	3.2	1.6	5/17/2021 15:53	T
Manganese	**8.3**		**mg/Kg**	**1**	0.32	0.26	5/17/2021 15:53	T
WET CHEMISTRY								
Analysis Desc: Ammonia,E350.1,Soil	Analytical Method: EPA 350.1							
Ammonia (N)	**9.5**	**I**	**mg/Kg**	**1**	13.43	3.36	5/19/2021 17:33	T
Analysis Desc: TKN,E351.2,Solids	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**480**		**mg/Kg**	**1**	67	25	5/19/2021 13:47	T
Analysis Desc: Total Phosphorus,E365.4,Analysis	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 365.4							
Total Phosphorus (as P)	**1600**		**mg/Kg**	**1**	67	37	5/19/2021 13:47	T
Analysis Desc: 9056, Soil	Analytical Method: EPA 9056							
Sulfate	**25**	**I**	**mg/Kg**	**1**	34	6.2	5/17/2021 23:53	T
Analysis Desc: Volatile Solids,SM2540G	Analytical Method: SM 2540G							
Total Volatile Solids	**21000**		**mg/Kg**	**1**	10	10	5/18/2021 12:00	T
Analysis Desc: Nitrate+Nitrite,SM4500NO3F,S	Analytical Method: SM 4500NO3-F							
Nitrate + Nitrite	**1.5**	**I**	**mg/Kg**	**1**	2.7	1.0	5/17/2021 14:06	T
WET CHEMISTRY								
Analysis Desc: Percent Solids,SM2540G,Soil	Analytical Method: SM 2540G							
Percent Moisture	**26**		**%**	**1**	0.0010	0.0010	5/17/2021 10:00	T

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ANALYTICAL RESULTS

Workorder: T2108706 Lake Mirror

Lab ID: **T2108706003** Date Received: 05/14/21 09:30 Matrix: Soil

Sample ID: **LMIR-3** Date Collected: 05/13/21 11:10

Results for sample T2108706003 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	**3300**		**mg/Kg**	**5**	16	8.0	5/17/2021 17:09	T
Calcium	**720**		**mg/Kg**	**1**	32	26	5/17/2021 15:56	T
Iron	**300**		**mg/Kg**	**1**	3.2	1.6	5/17/2021 15:56	T
Manganese	**5.2**		**mg/Kg**	**1**	0.32	0.26	5/17/2021 15:56	T
WET CHEMISTRY								
Analysis Desc: Ammonia,E350.1,Soil	Analytical Method: EPA 350.1							
Ammonia (N)	**4.7**	**I**	**mg/Kg**	**1**	13.01	3.25	5/19/2021 17:33	T
Analysis Desc: TKN,E351.2,Solids	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**310**		**mg/Kg**	**1**	65	24	5/19/2021 13:47	T
Analysis Desc: Total Phosphorus,E365.4,Analysis	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 365.4							
Total Phosphorus (as P)	**1200**		**mg/Kg**	**1**	65	36	5/19/2021 13:47	T
Analysis Desc: 9056, Soil	Analytical Method: EPA 9056							
Sulfate	**21**	**I**	**mg/Kg**	**1**	33	6.0	5/18/2021 00:09	T
Analysis Desc: Volatile Solids,SM2540G	Analytical Method: SM 2540G							
Total Volatile Solids	**8900**		**mg/Kg**	**1**	10	10	5/18/2021 12:00	T
Analysis Desc: Nitrate+Nitrite,SM4500NO3F,S	Analytical Method: SM 4500NO3-F							
Nitrate + Nitrite	**1.1**	**I**	**mg/Kg**	**1**	2.6	1.0	5/17/2021 14:06	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: T2108706 Lake Mirror

Lab ID: **T2108706004** Date Received: 05/14/21 09:30 Matrix: Soil

Sample ID: **LMIR-4** Date Collected: 05/13/21 12:10

Results for sample T2108706004 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	**12000**		**mg/Kg**	**5**	100	50	5/17/2021 17:12	T
Calcium	**34000**		**mg/Kg**	**1**	200	160	5/17/2021 15:59	T
Iron	**8300**		**mg/Kg**	**1**	20	10	5/17/2021 15:59	T
Manganese	**49**		**mg/Kg**	**1**	2.0	1.6	5/17/2021 15:59	T
WET CHEMISTRY								
Analysis Desc: Ammonia,E350.1,Soil	Analytical Method: EPA 350.1							
Ammonia (N)	**19.63**	**U**	**mg/Kg**	**1**	78.52	19.63	5/19/2021 17:34	T
Analysis Desc: TKN,E351.2,Solids	Preparation Method: Copper Sulfate Digestion Solid Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**6000**	**J4**	**mg/Kg**	**1**	380	140	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)	**7200**	**J4**	**mg/Kg**	**1**	380	210	5/19/2021 18:37	T
Analysis Desc: 9056, Soil	Analytical Method: EPA 9056							
Sulfate	**210**		**mg/Kg**	**1**	200	36	5/18/2021 00:25	T
Analysis Desc: Volatile Solids,SM2540G	Analytical Method: SM 2540G							
Total Volatile Solids	**31000**		**mg/Kg**	**1**	10	10	5/18/2021 12:00	T
Analysis Desc: Nitrate+Nitrite,SM4500NO3F,S	Analytical Method: SM 4500NO3-F							
Nitrate + Nitrite	**10**	**I**	**mg/Kg**	**1**	16	6.1	5/17/2021 14:07	T
WET CHEMISTRY								
Analysis Desc: Percent Solids,SM2540G,Soil	Analytical Method: SM 2540G							
Percent Moisture	**87**		**%**	**1**	0.0010	0.0010	5/17/2021 10:00	T

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Fax: (813)630-4327

ANALYTICAL RESULTS QUALIFIERS

Workorder: T2108706 Lake Mirror

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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QUALITY CONTROL DATA

Workorder: T2108706 Lake Mirror

QC Batch: WCAt/4080 Analysis Method: EPA 351.2
QC Batch Method: Copper Sulfate Digestion Solid Prepared: 05/18/2021 08:00
Associated Lab Samples: T2108706001, T2108706002, T2108706003

METHOD BLANK: 3882882

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

METHOD BLANK: 3882883

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

QC Batch: WCAt/4080 Analysis Method: EPA 365.4
QC Batch Method: Copper Sulfate Digestion Solid Prepared: 05/18/2021 08:00
Associated Lab Samples: T2108706001, T2108706002, T2108706003

METHOD BLANK: 3882882

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

METHOD BLANK: 3882883

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

QC Batch: WCAt/4201 Analysis Method: SM 2540G
QC Batch Method: SM 2540G Prepared:
Associated Lab Samples: T2108706001, T2108706002, T2108706003, T2108706004

CERTIFICATE OF ANALYSIS

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QUALITY CONTROL DATA

Workorder: T2108706 Lake Mirror

METHOD BLANK: 3888169

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Volatile Solids	mg/Kg	10	10	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: T2108706001, T2108706002, T2108706003, T2108706004

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: T2108706001, T2108706002, T2108706003, T2108706004

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: T2108706001, T2108706002, T2108706003, T2108706004

METHOD BLANK: 3890401

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

CERTIFICATE OF ANALYSIS

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Fax: (813)630-4327

QUALITY CONTROL DATA

Workorder: T2108706 Lake Mirror

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: T2108706004

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: T2108706004

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/4288 Analysis Method: EPA 350.1
QC Batch Method: EPA 350.1 Prepared:
Associated Lab Samples: T2108706001, T2108706002, T2108706003, T2108706004

CERTIFICATE OF ANALYSIS

Advanced Environmental Laboratories, Inc.

Advanced Environmental Laboratories, Inc
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Fax: (813)630-4327

QUALITY CONTROL DATA

Workorder: T2108706 Lake Mirror

METHOD BLANK: 3893206

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

QUALITY CONTROL DATA QUALIFIERS

Workorder: T2108706 Lake Mirror

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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Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
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Fax: (813)630-4327

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: T2108706 Lake Mirror

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
T2108706001	LMIR-1	Copper Sulfate Digestion Solid	WCAt/4080	EPA 351.2	WCAt/4314
T2108706002	LMIR-2	Copper Sulfate Digestion Solid	WCAt/4080	EPA 351.2	WCAt/4314
T2108706003	LMIR-3	Copper Sulfate Digestion Solid	WCAt/4080	EPA 351.2	WCAt/4314
T2108706001	LMIR-1	Copper Sulfate Digestion Solid	WCAt/4080	EPA 365.4	WCAt/4315
T2108706002	LMIR-2	Copper Sulfate Digestion Solid	WCAt/4080	EPA 365.4	WCAt/4315
T2108706003	LMIR-3	Copper Sulfate Digestion Solid	WCAt/4080	EPA 365.4	WCAt/4315
T2108706001	LMIR-1			SM 2540G	WCAt/4197
T2108706002	LMIR-2			SM 2540G	WCAt/4197
T2108706003	LMIR-3			SM 2540G	WCAt/4197
T2108706004	LMIR-4			SM 2540G	WCAt/4197
T2108706001	LMIR-1			SM 2540G	WCAt/4201
T2108706002	LMIR-2			SM 2540G	WCAt/4201
T2108706003	LMIR-3			SM 2540G	WCAt/4201
T2108706004	LMIR-4			SM 2540G	WCAt/4201
T2108706001	LMIR-1	SW-846 3050B	DGMt/1743	SW-846 6010	ICPt/1468
T2108706002	LMIR-2	SW-846 3050B	DGMt/1743	SW-846 6010	ICPt/1468
T2108706003	LMIR-3	SW-846 3050B	DGMt/1743	SW-846 6010	ICPt/1468
T2108706004	LMIR-4	SW-846 3050B	DGMt/1743	SW-846 6010	ICPt/1468
T2108706001	LMIR-1			SM 4500NO3-F	WCAt/4222
T2108706002	LMIR-2			SM 4500NO3-F	WCAt/4222
T2108706003	LMIR-3			SM 4500NO3-F	WCAt/4222
T2108706004	LMIR-4			SM 4500NO3-F	WCAt/4222
T2108706001	LMIR-1			EPA 9056	WCAt/4247
T2108706002	LMIR-2			EPA 9056	WCAt/4247
T2108706003	LMIR-3			EPA 9056	WCAt/4247
T2108706004	LMIR-4			EPA 9056	WCAt/4247

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Phone: (813)630-9616
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: T2108706 Lake Mirror

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
T2108706004	LMIR-4	Copper Sulfate Digestion Solid	WCAt/4276	EPA 351.2	WCAt/4320
T2108706004	LMIR-4	Copper Sulfate Digestion Solid	WCAt/4276	EPA 365.4	WCAt/4321
T2108706001	LMIR-1			EPA 350.1	WCAt/4288
T2108706002	LMIR-2			EPA 350.1	WCAt/4288
T2108706003	LMIR-3			EPA 350.1	WCAt/4288
T2108706004	LMIR-4			EPA 350.1	WCAt/4288

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

Page 1 of 1

Client Name: Wood PLC	Project Name: Lake Mirror
Address: 1101 Channelside Dr #200	Project Number: 600537x21B04
Tampa, FL 33602	PO Number: C01261020
Phone: 813-289-0750	FDEP Facility No:
FAX:	FDEP Facility Addr:
Contact: Francesca Lauterman	
Sampled By: F.Lauterman / R.Sheridan	Special Instructions:
Turn Around Time: Standard (Rush)	
AEL Profile #:	ADaPT EQuIS Other

ANALYSIS REQUIRED: metals; volatile solids / sulfate; TOC Nutrients (add TP); ~~Bathdensity~~

SAMPLE ID	SAMPLE DESCRIPTION	Grab/Comp	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. COUNT	metals	volatile solids / sulfate	TOC Nutrients (add TP)	~~Bathdensity~~	LABORATORY I.D. NUMBER
	LMIR-1	Comp	5/13/21	0950	SO	3	X	X	X	X	001
	LMIR-2	Comp	5/13/21	1030	SO	3	|	|	|	|	002
	LMIR-3	Comp	5/13/21	1110	SO	3	|	|	|	|	003
	LMIR-4	Comp	5/13/21	1210	SO	3	|	|	|	|	004

T2108706

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	[signature]	5/14/21	930	[signature]	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: T2108706
Client: Wood PLC
Project ID: Lake Mirror

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 recovery of TKN for T2108706004 was 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: T2108706
Client: Wood PLC
Project ID: Lake Mirror

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 recovery of TP for T2108706004 was 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.

DB Environmental

June 23, 2021

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

PO #: C012610199
Project Name: Lake Mirror
Project No.: 600537x21B-04
Batch ID: 373080

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 #: C012610199
Project Name : Lake Mirror
Project No. : 600537x21B-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
LMIR-1	373080	5/13/2021	09:50	% Dry Weight	ASA 21-2	21.56	%	0.01	5/17/2021	
LMIR-2	373081	5/13/2021	10:30	% Dry Weight	ASA 21-2	70.73	%	0.01	5/17/2021	
LMIR-3	373082	5/13/2021	11:10	% Dry Weight	ASA 21-2	77.17	%	0.01	5/17/2021	
LMIR-4	373083	5/13/2021	12:10	% Dry Weight	ASA 21-2	9.89	%	0.01	5/17/2021	
LMIR-1	373080	5/13/2021	09:50	Bulk Density	ASA 13	0.24	g/cc	0.001	5/17/2021	
LMIR-2	373081	5/13/2021	10:30	Bulk Density	ASA 13	1.2	g/cc	0.001	5/17/2021	
LMIR-3	373082	5/13/2021	11:10	Bulk Density	ASA 13	1.4	g/cc	0.001	5/17/2021	
LMIR-4	373083	5/13/2021	12:10	Bulk Density	ASA 13	0.10	g/cc	0.001	5/17/2021	
LMIR-1	373080	5/13/2021	09:50	Total Phosphorus	DBE SOP TP	8240	mg/kg dry	100	6/1/2021	
LMIR-2	373081	5/13/2021	10:30	Total Phosphorus	DBE SOP TP	1700	mg/kg dry	20	6/1/2021	
LMIR-3	373082	5/13/2021	11:10	Total Phosphorus	DBE SOP TP	1230	mg/kg dry	20	6/1/2021	
LMIR-4	373083	5/13/2021	12:10	Total Phosphorus	DBE SOP TP	9590	mg/kg dry	250	6/1/2021	
LMIR-1	373080	5/13/2021	09:50	Porewater SRP	DBE SOP OPO4	0.065	mg/L	0.002	5/18/2021 9:20	
LMIR-2	373081	5/13/2021	10:30	Porewater SRP	DBE SOP OPO4	0.014	mg/L	0.002	5/18/2021 9:20	A
LMIR-3	373082	5/13/2021	11:10	Porewater SRP	DBE SOP OPO4	0.100	mg/L	0.002	5/18/2021 9:20	A
LMIR-4	373083	5/13/2021	12:10	Porewater SRP	DBE SOP OPO4	0.040	mg/L	0.002	5/18/2021 9:20	
LMIR-1	373080	5/13/2021	09:50	Porewater SRP	DBE SOP OPO4	0.211	mg/kg dry	0.007	5/18/2021 9:20	
LMIR-2	373081	5/13/2021	10:30	Porewater SRP	DBE SOP OPO4	0.004	mg/kg dry	0.0005	5/18/2021 9:20	A
LMIR-3	373082	5/13/2021	11:10	Porewater SRP	DBE SOP OPO4	0.016	mg/kg dry	0.0003	5/18/2021 9:20	A
LMIR-4	373083	5/13/2021	12:10	Porewater SRP	DBE SOP OPO4	0.363	mg/kg dry	0.018	5/18/2021 9:20	
LMIR-1	373080	5/13/2021	09:50	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	3.15	mg/L	0.200	6/3/2021	
LMIR-2	373081	5/13/2021	10:30	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	9.28	mg/L	0.200	6/3/2021	A

SAMPLE ID	LAB LOG NUMBER	DATE SAMPLED	TIME SAMPLED	PARAMETER	METHOD NUMBER	RESULTS	UNITS	METHOD DETECTION LIMIT	DATE/TIME OF ANALYSIS	QUALIFIER CODE
LMIR-3	373082	5/13/2021	11:10	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	2.42	mg/L	0.200	6/3/2021	A
LMIR-4	373083	5/13/2021	12:10	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	51.5	mg/L	0.800	6/3/2021	
LMIR-1	373080	5/13/2021	09:50	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	10.3	mg/kg dry	0.65	6/3/2021	
LMIR-2	373081	5/13/2021	10:30	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	2.3	mg/kg dry	0.05	6/3/2021	A
LMIR-3	373082	5/13/2021	11:10	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	0.39	mg/kg dry	0.03	6/3/2021	A
LMIR-4	373083	5/13/2021	12:10	Porewater NH_3-N	SM 4500-NH3 (18th ed.)	464	mg/kg dry	7.2	6/3/2021	
LMIR-1	373080	5/13/2021	09:50	NH_4Cl TSP*	DBE SOP TP	22.9	mg/kg dry	0.8	5/26/2021	
LMIR-2	373081	5/13/2021	10:30	NH_4Cl TSP*	DBE SOP TP	3.4	mg/kg dry	0.7	5/26/2021	
LMIR-3	373082	5/13/2021	11:10	NH_4Cl TSP*	DBE SOP TP	3.1	mg/kg dry	0.7	5/26/2021	
LMIR-4	373083	5/13/2021	12:10	NH_4Cl TSP*	DBE SOP TP	20.6	mg/kg dry	0.8	5/26/2021	
LMIR-1	373080	5/13/2021	09:50	$NaHCO_3/Na_2S_2O_4$ TSP**	DBE SOP TP	103	mg/kg dry	3.0	5/26/2021	A
LMIR-2	373081	5/13/2021	10:30	$NaHCO_3/Na_2S_2O_4$ TSP**	DBE SOP TP	16.9	mg/kg dry	2.8	5/26/2021	
LMIR-3	373082	5/13/2021	11:10	$NaHCO_3/Na_2S_2O_4$ TSP**	DBE SOP TP	15.7	mg/kg dry	2.8	5/26/2021	
LMIR-4	373083	5/13/2021	12:10	$NaHCO_3/Na_2S_2O_4$ TSP**	DBE SOP TP	293	mg/kg dry	3.1	5/26/2021	I
LMIR-1	373080	5/13/2021	09:50	NaOH SRP***	DBE SOP OPO4	553	mg/kg dry	16.2	5/20/2021 11:41	
LMIR-2	373081	5/13/2021	10:30	NaOH SRP***	DBE SOP OPO4	148	mg/kg dry	14.8	5/20/2021 11:41	
LMIR-3	373082	5/13/2021	11:10	NaOH SRP***	DBE SOP OPO4	553	mg/kg dry	15.1	5/20/2021 11:41	A
LMIR-4	373083	5/13/2021	12:10	NaOH SRP***	DBE SOP OPO4	1180	mg/kg dry	16.7	5/20/2021 11:41	
LMIR-1	373080	5/13/2021	09:50	NaOH TSP	DBE SOP TP	772	mg/kg dry	10.5	5/26/2021	
LMIR-2	373081	5/13/2021	10:30	NaOH TSP	DBE SOP TP	177	mg/kg dry	9.6	5/26/2021	A
LMIR-3	373082	5/13/2021	11:10	NaOH TSP	DBE SOP TP	636	mg/kg dry	9.8	5/26/2021	
LMIR-4	373083	5/13/2021	12:10	NaOH TSP	DBE SOP TP	1520	mg/kg dry	10.9	5/26/2021	
LMIR-1	373080	5/13/2021	09:50	NaOH TSP minus NaOH SRP†	Calculation	219	mg/kg dry	16.2	n/a	
LMIR-2	373081	5/13/2021	10:30	NaOH TSP minus NaOH SRP†	Calculation	29	mg/kg dry	14.8	n/a	A I
LMIR-3	373082	5/13/2021	11:10	NaOH TSP minus NaOH SRP†	Calculation	83	mg/kg dry	15.1	n/a	A
LMIR-4	373083	5/13/2021	12:10	NaOH TSP minus NaOH SRP†	Calculation	340	mg/kg dry	16.7	n/a	
LMIR-1	373080	5/13/2021	09:50	HCl TSP††	DBE SOP TP	1770	mg/kg dry	15.2	6/9/2021	
LMIR-2	373081	5/13/2021	10:30	HCl TSP††	DBE SOP TP	812	mg/kg dry	13.9	6/9/2021	
LMIR-3	373082	5/13/2021	11:10	HCl TSP††	DBE SOP TP	35.8	mg/kg dry	2.8	6/9/2021	
LMIR-4	373083	5/13/2021	12:10	HCl TSP††	DBE SOP TP	1750	mg/kg dry	15.7	6/9/2021	
LMIR-1	373080	5/13/2021	09:50	Residual P	DBE SOP TP	4100	mg/kg dry	75	6/1/2021	
LMIR-2	373081	5/13/2021	10:30	Residual P	DBE SOP TP	108	mg/kg dry	18	6/1/2021	
LMIR-3	373082	5/13/2021	11:10	Residual P	DBE SOP TP	350	mg/kg dry	20	6/1/2021	A
LMIR-4	373083	5/13/2021	12:10	Residual P	DBE SOP TP	4820	mg/kg dry	65	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
LMIR-1	373080	5/13/2021	09:50	Total Organic Carbon	DBE SOP MVP/COE 3-73	121000	mg/kg dry	3030	5/27/2021	
LMIR-2	373081	5/13/2021	10:30	Total Organic Carbon	DBE SOP MVP/COE 3-73	20100	mg/kg dry	3030	5/27/2021	A I
LMIR-3	373082	5/13/2021	11:10	Total Organic Carbon	DBE SOP MVP/COE 3-73	3920	mg/kg dry	3030	5/27/2021	I
LMIR-4	373083	5/13/2021	12:10	Total Organic Carbon	DBE SOP MVP/COE 3-73	183000	mg/kg dry	3030	5/27/2021	

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.

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 # : C012610199
Project Name: Lake Mirror
Project No. : 600537x21-B-04
(373080-373083)

PARAMETER	LAB DUPLICATES	% RSD	SPIKES	% RECOVERY	BLANKS
Total Phosphorus / Residual P	373082	5.7	373081	75	<10 mg/kg dry
Porewater SRP	373082	2.3	373083	97	<0.001 mg/kg dry
Porewater NH3-N	373082	1.0	373086	94	<0.010 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		352-702-1254	

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

Project: Lake Mirror

Collected By: Francesca Laterman

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	% dry weight	bulk density	TP	Porewater SRP	Porewater NH3	Meis P Frac	TOC		Remarks
	373080	5/13/21	0950	Comp	SE				LMIR-1		1								
	373081	5/13/21	1030	Comp	SE				LMIR-2		1								
	373082	5/13/21	1110	Comp	SE				LMIR-3		1								
	373083	5/13/21	1210	Comp	SE				LMIR-4		1								

Custody Transfer:

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

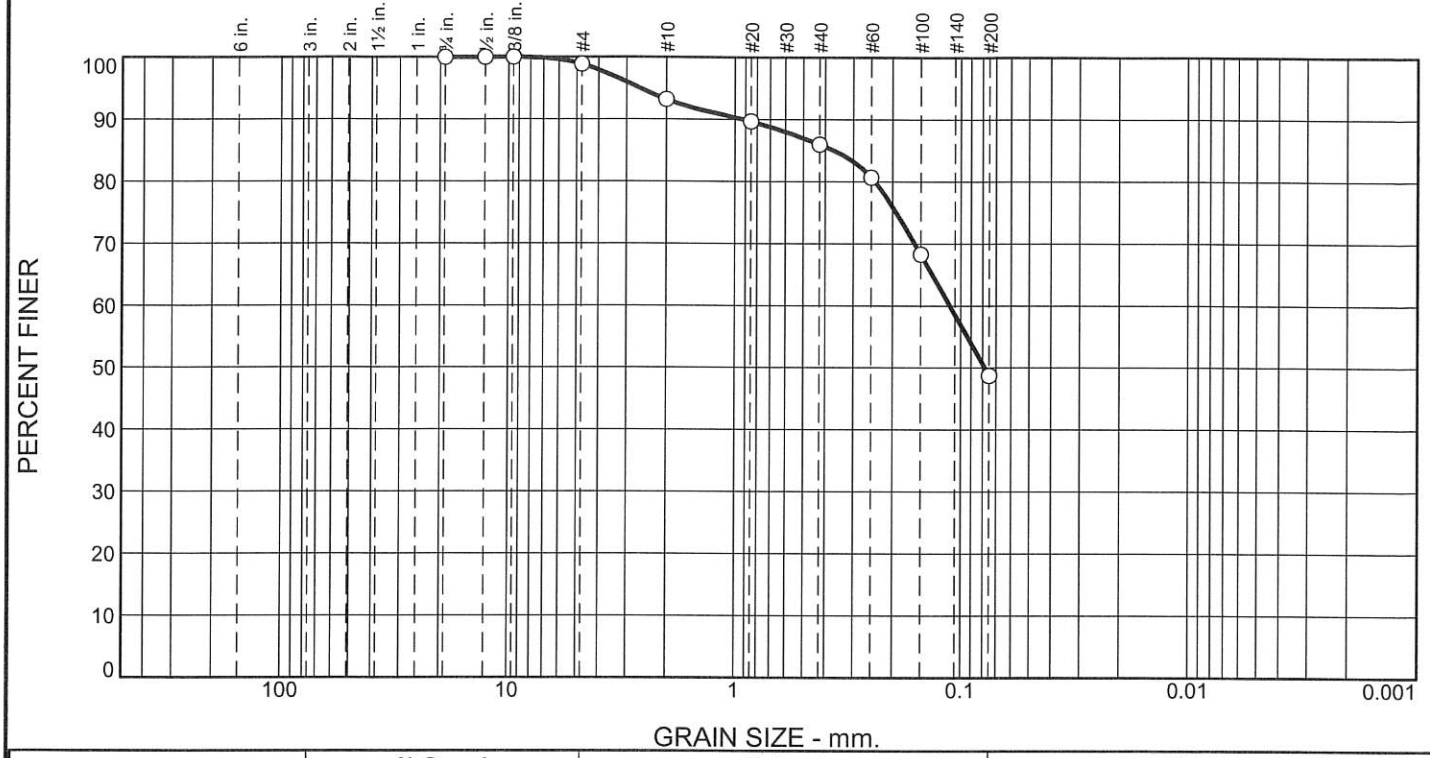
Matrix ID
F-Fish, FL-Floc, G-Gas, I-Invertebrate, L-Leachate, PE- Periphyton, PT-Plant/Veg, SD-Sludge, SE-Sediment, SO-Soil, DI- DI Water, DW-Drinking Water, GW-Ground Water, IW- Incubation Water, PW-Porewater, RW-Rain Water, SW-Surface Water, WW-Waste Water, O-Other ____

pH Code
H: HCl to pH <2
N: HNO_3 to pH <2
S1: H_2SO_4 to pH <2
S2: H_2SO_4 to pH 2-3
OH1: ZnAc+NaOH to pH >9
OH2: NaOH to pH >12
O: Other ____

Sample Receiving - For Lab Use Only
Method of Shipping/Delivery: FedEx
Received on ice or similar Yes X No ___ n/a ___
Receiving Temperature (°C) - *if applicable*: 1.7
Thermometer #: 64 Initials: JCH
pH checked in accordance with Preservation Codes Yes ___ No ___ n/a X Initials: NC
First Lab Log # (Batch ID): 373080

Comments:

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	5.7	7.2	37.2	48.8	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	98.9		
#10	93.2		
#20	89.7		
#40	86.0		
#60	80.7		
#100	68.3		
#200	48.8		

* (no specification provided)

Material Description

Dark brown silty fine SAND

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

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

Coefficients

D_{90}= 0.9263 D_{85}= 0.3658 D_{60}= 0.1117
D_{50}= 0.0784 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 5/19/2021 **Date Tested:** 5/23/2021

Tested By: Troy Hudson

Checked By: Michael A. Villatoro

Title: Staff Geotechnical Engineer

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

Wood E&I

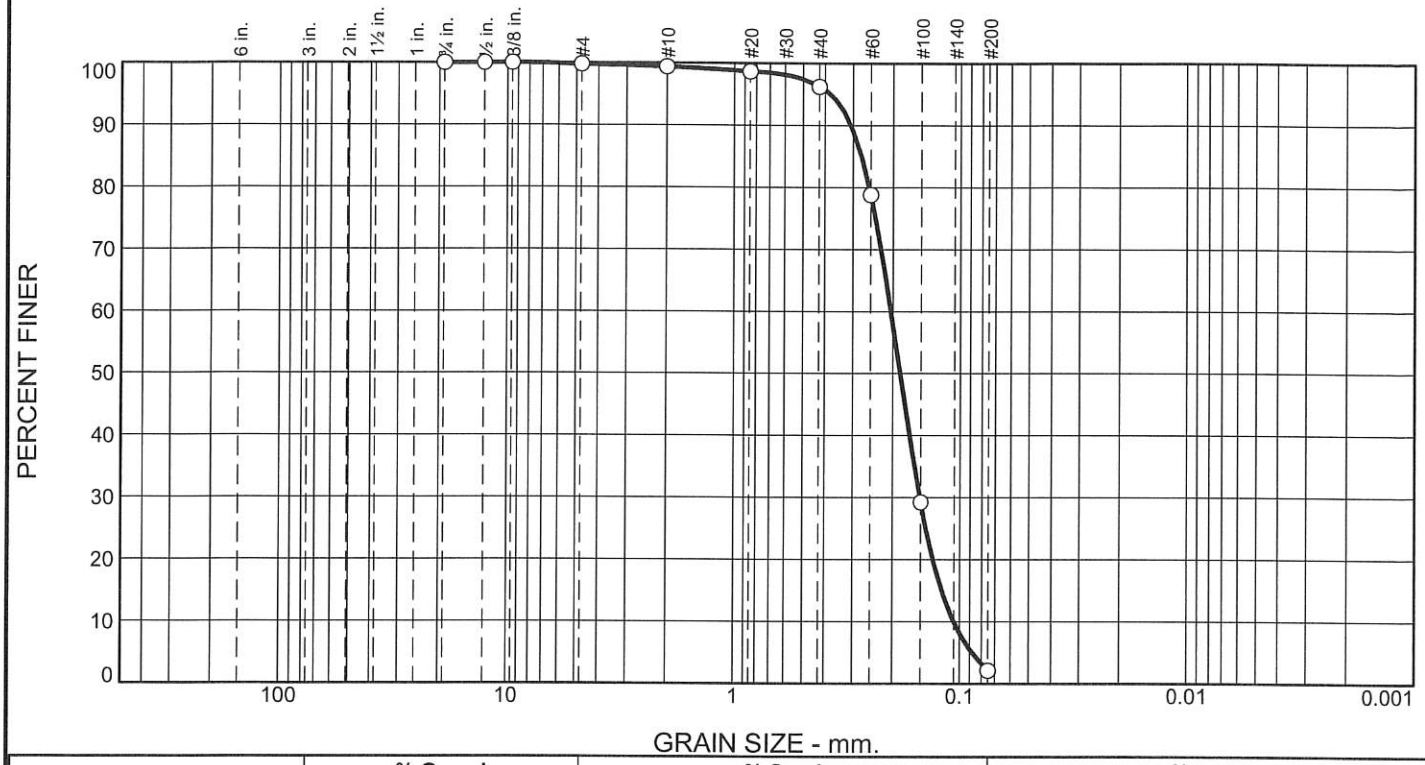
Jacksonville, Florida

Client: City of Lakeland
Project: Lake Mirror

Project No: 600537x21b

MAV
6/15/21

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.4	3.1	94.2	2.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.8		
#10	99.4		
#20	98.7		
#40	96.3		
#60	78.8		
#100	29.2		
#200	2.1		

* (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}= 0.3072 D_{85}= 0.2752 D_{60}= 0.2039
D_{50}= 0.1855 D_{30}= 0.1514 D_{15}= 0.1204
D_{10}= 0.1064 C_u= 1.92 C_c= 1.06

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: LMIR-2 **Depth:** 0.0-10.0 cm **Date Sampled:**

Wood E&I

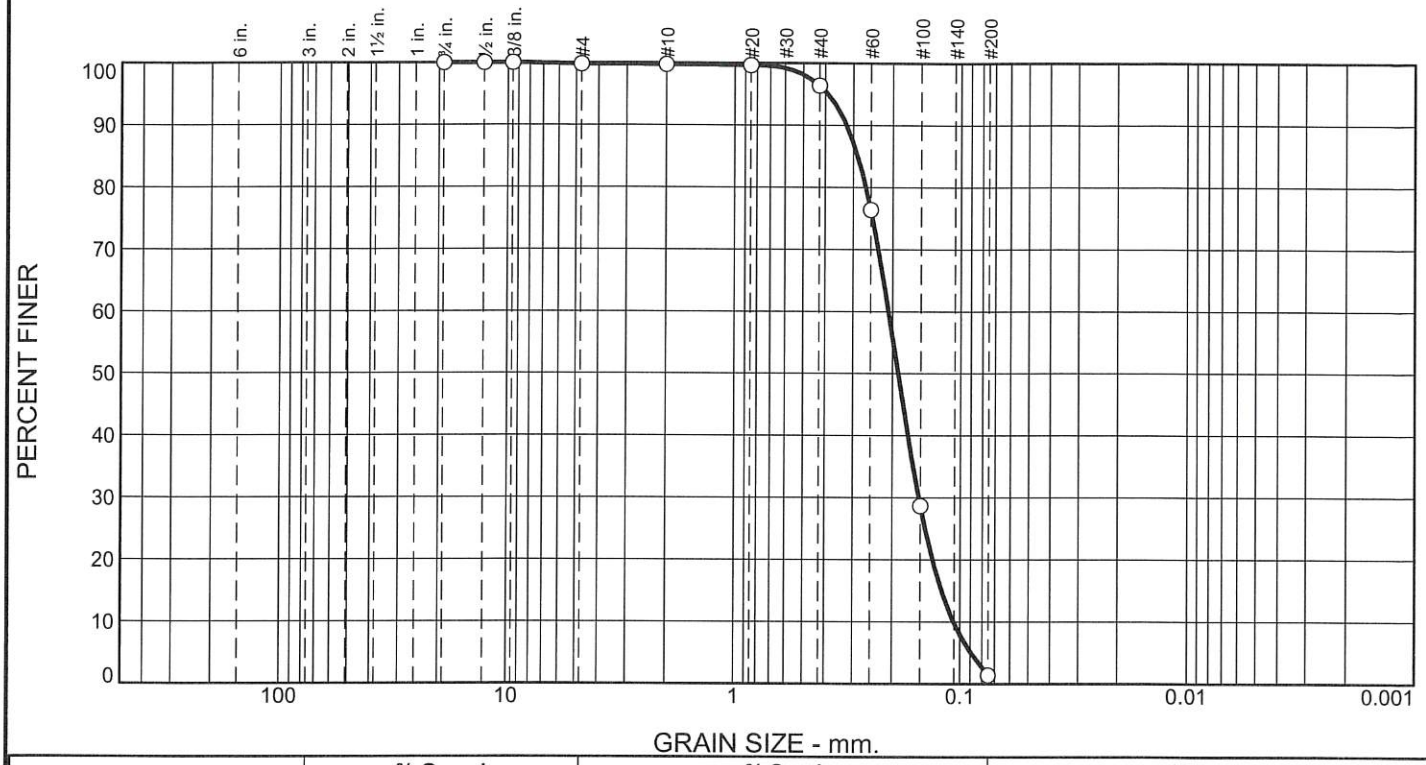
Jacksonville, Florida

Client: City of Lakeland
Project: Lake Mirror

Project No: 600537x21b

MAV
6/16/21

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.0	3.4	95.0	1.4	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.8		
#10	99.8		
#20	99.7		
#40	96.4		
#60	76.4		
#100	28.7		
#200	1.4		

* (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}= 0.3218 D_{85}= 0.2868 D_{60}= 0.2080
D_{50}= 0.1883 D_{30}= 0.1524 D_{15}= 0.1206
D_{10}= 0.1068 C_u= 1.95 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: LMIR-3 **Depth:** 0.0-10.0 cm **Date Sampled:**

Wood E&I

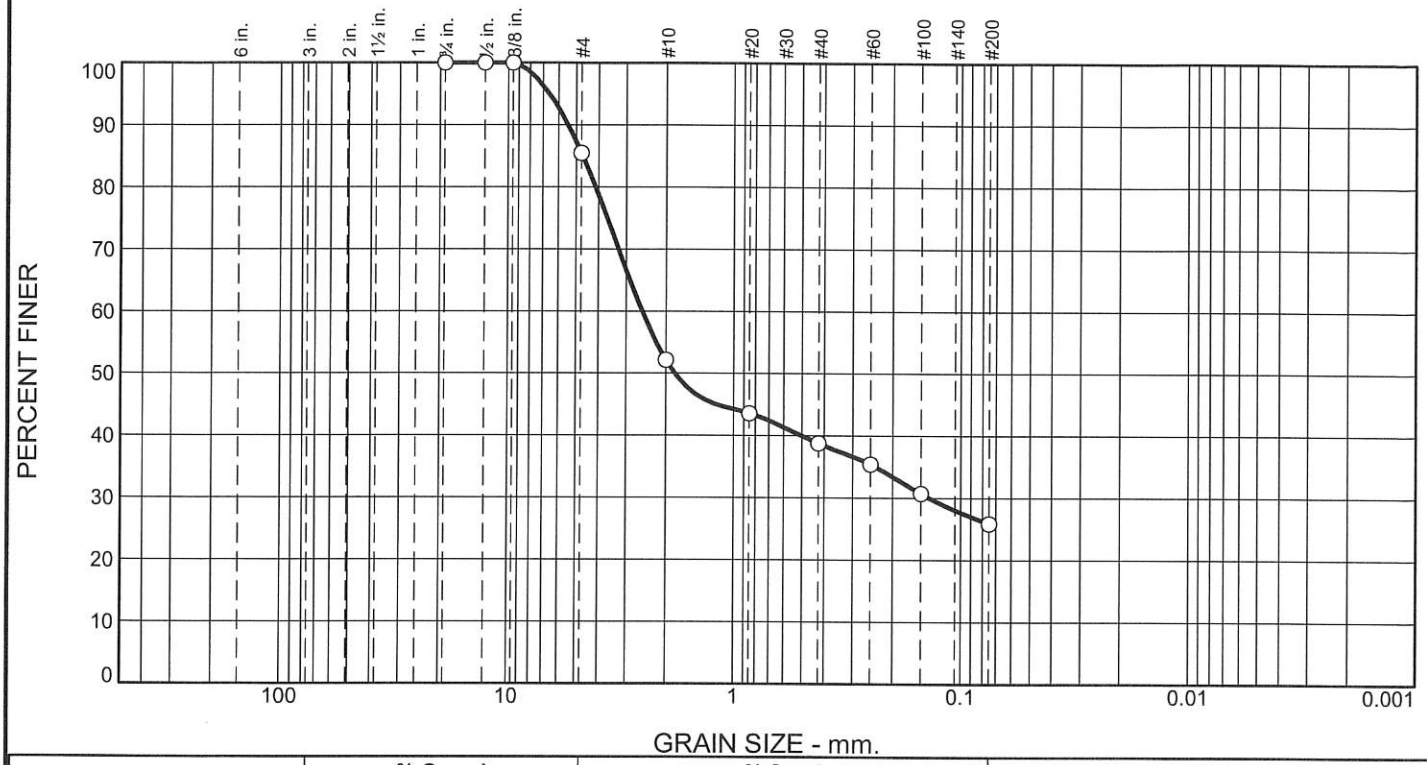
Jacksonville, Florida

Client: City of Lakeland
Project: Lake Mirror

Project No: 600537x21b

MAV
6/15/21

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.5	33.4	13.3	12.9	25.9	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	85.5		
#10	52.1		
#20	43.6		
#40	38.8		
#60	35.4		
#100	30.7		
#200	25.9		

* (no specification provided)

Material Description

Dark brown silty fine to coarse SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

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

Coefficients

D_{90}= 5.4416 D_{85}= 4.6893 D_{60}= 2.5476
D_{50}= 1.8270 D_{30}= 0.1378 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 5/19/2021 **Date Tested:** 5/23/2021

Tested By: Troy Hudson

Checked By: Michael A. Villatoro

Title: Staff Geotechnical Engineer

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

Wood E&I

Jacksonville, Florida

Client: City of Lakeland
Project: Lake Mirror

Project No: 600537x21b

MAV
6/15/21