

Recommendation re: Task Authorization with Geosyntec Consultants, Inc. (Geosyntec) for Lake Morton Sediment Treatment Study

Lake Morton is one of the priority lakes within the City of Lakeland which has a current regulatory mandate requiring reduction of nutrients. The Florida Department of Environmental Protection (FDEP) has placed Lake Morton on the Verified Impaired Waters List due to documented eutrophic conditions resulting from poor water clarity and constant algal blooms. Previous studies indicate the lake sediments are a main source of nutrients via internal recycling. This Lake Morton Sediment Treatment Study will be conducted in two phases to evaluate various sediment treatment options to reduce internal nutrient loads from sediment recycling and improve surface water quality. Phase I will evaluate the efficacy of three different nutrient sediment treatment products via column testing in the laboratory. Phase II will consist of evaluation of different treatment dosing using the product determined to be the most effective during Phase I.

The major elements of this Lake Morton Sediment Treatment Study will be completed as follows:

- Compilation and review of previously collected sediment and water quality laboratory analytical data.
- Collection of core samples of unconsolidated sediments and surface water samples for laboratory analysis of physical and chemical characteristics during Phase I and Phase II of the project.
- Transfer of core sediment and surface water samples to an analytical laboratory to complete column testing.
- Column testing of sediment and surface water with three different sediment nutrient reduction products will be completed during Phase I testing. Columns will be sampled periodically over the course of the study to evaluate nutrient release potential from the sediments, and at the end of Phase I the product exhibiting the lowest nutrient release potential will be selected for Phase II testing.
- Column testing during Phase II of the study will consist of applying various doses of the product and periodic sampling to evaluate nutrient release potential differences and identify the optimal application dose of the selected product.
- Summarization and analysis of data, including recommendations for the selected sediment treatment product and dosing; and
- Preparation and submittal of DRAFT and FINAL Technical Memoranda that synthesizes data analysis results and includes recommendations for the selected sediment treatment product and dosing requirements.

Results of the Lake Morton Sediment Treatment Study will be used to assist the City in planning, permitting and budgeting for Lake Morton sediment treatment and lake restoration projects.

Funding for this project in the not-to-exceed amount of \$245,677.70 is provided in the FY23 Stormwater CIP budget.

It is recommended that the City Commission authorize the appropriate City officials to execute the Task Authorization with Geosyntec for the Lake Morton Sediment Treatment Study in the not-to-exceed amount of \$245,677.70.

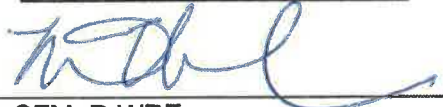
TASK AUTHORIZATION FORM

In accordance with the **Geosyntec Consultants (Geosyntec)** Continuing Contract and Agreement for Professional Lakes & Watershed Management Services, dated June 6, 2022, the City hereby authorizes the services as set forth in the attached work order by the City and/or attached scope of services proposed by the Engineer and the following:

Task Authorization No.: Geosyntec Consultants (Geosyntec) – 23-01
Project No: 596.246.7500.008589.618.00.000
Project Title: Lake Morton Sediment Treatment Study
Schedule: **Start:** Upon Acceptance
Complete: 180 days, or to completion of project
Billing: As set forth in the agreement and the approved proposal.
Not-To-Exceed Cost: \$245,677.70
Scope of Work: Geosyntec Proposal (dated April 19, 2023) is attached herein as Exhibit "A." Engineer's reimbursable costs shall be in conformance with the City's Consultant Expense Reimbursement Policy, attached herein as Exhibit "B". Exhibits "A" and "B" are made a part of this Task Authorization.

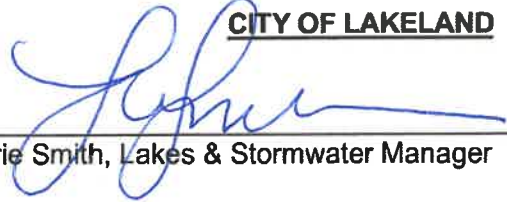
AUTHORIZATION:

GEOSYNTEC CONSULTANTS

Accepted By: 
Mark Ellard, PE, CFM. D.WRE
Senior Principal

Date: 5/5/23

CITY OF LAKELAND

Reviewed By: 
Laurie Smith, Lakes & Stormwater Manager

Date: 5/5/23

Accepted By: _____
Heath Frederick, Director of Public Works

Date: _____

Accepted By: _____
William Mutz, Mayor

Date: _____



April 19, 2023

Laurie Smith

Manager, Lakes & Stormwater
City of Lakeland
407 Fairway Avenue
Lakeland, Florida 33801

Subject: **Proposal for Lake Morton Sediment Treatment Study**
Continuing Contract for Professional Lakes and Watershed Management Services
City of Lakeland, Florida

Dear Ms. Smith:

Geosyntec Consultants, Inc. (Geosyntec) is pleased to provide this proposal for the above referenced project to the City of Lakeland (City).

BACKGROUND

Lake Morton is located in downtown Lakeland and receives runoff from a highly urbanized area approximately 176.2 acres in size. The lake has a surface area of approximately 40 acres with a maximum water depth of 22.0 feet and an average water depth of 11.8 feet. It receives no inflows from any other lakes and its waters discharge to either Lake Hollingsworth and/or Lake Horney via an adjustable control structure and a downstream in-pipe diversion dam.

Lake Morton has exhibited eutrophic conditions (e.g., poor water clarity and constant algal blooms) since the late 1980s. Previous studies have identified lake sediments as a source of nutrients via internal recycling, which contributes to eutrophic conditions in the lake. To mitigate this, the City is interested in conducting a sediment treatment study to reduce internal nutrient loads in Lake Morton.

This proposal provides a scope of work to study various sediment treatment methods and provide the City with recommendations for sediment treatment projects to be implemented for the improvement of water quality within Lake Morton. The study will evaluate which treatment amongst: (1) Lanthanum Modified Bentonite (LMB; e.g., Phoslock or EutroSORB G), (2) Aluminum Sulfate (Alum), or (3) LMB + Alum will result in the largest reduction of nutrient cycling from sediment under oxic and anoxic conditions compared to an unamended control condition. The study will be carried out in two phases. Phase 1 will evaluate which treatment is the most efficient for reducing nutrient cycling. Phase 2 will evaluate the treatment dosage of the standout treatment identified in Phase 1. This will be determined by applying low, mid, and high doses of the treatments to sediment cores from different locations within the lake to provide insight into the spatial variability of nutrient cycling.

SCOPE OF WORK:

Geosyntec proposes to perform the following tasks for the City in support of the Lake Morton Sediment Treatment Study.

1. Project Kick Off

- 1.1. **Coordinate Project Initiation** – Coordinate with the City and subconsultants to initiate the project.

1.2. **Attend Project Kickoff Meeting** – Attend one initial project kick off meeting to discuss project goals, scope, approach, and constraints.

1.3. **Meeting Summary** – A meeting summary will be prepared and submitted to the City.

2. Existing Data Evaluation

2.1. **Existing Data Collection** – Compile relevant available reports, surveys, geotechnical data, ecological data, and plans relevant to the project. Geosyntec has much of this data already from previous projects with the City, so this effort will be focused on ensuring the data is up to date.

2.2. **Existing Data Evaluation** – Evaluate data to assess historical and existing conditions. The focus of this data evaluation will be on prior drainage, water quality, and sediment studies.

3. Project Planning

3.1. **Prepare QAPP** – Prepare a Quality Assurance Project Plan (QAPP) detailing the approach for site selection, field work, sample collection, laboratory analysis, and data evaluation. The plan will be reviewed, approved, and signed by all parties before proceeding with **Task 4**.

3.2. **Prepare HASP** - Prepare a Health and Safety Plan (HASP) to detail all potential hazards related to Geosyntec field activities and how these will be mitigated.

4. Phase 1 Sample Collection and Laboratory Analysis

In this task, Geosyntec will evaluate which sediment treatment method is most effective for reducing nutrient cycling from sediment cores obtained in Lake Morton.

4.1. **Phase 1 Sample Collection** – Field core samples of lake unconsolidated sediments (muck) will be collected by Geosyntec subconsultant *Geotechnical and Environmental Consultants (GEC)* at approximately the lake center where muck depth and nutrient content are greatest (Wood, 2021). The exact location will be determined based on the existing data evaluated in **Task 2**. Samples will include nine (9) sediment cores and approximately twenty (20) gallons of surface water. *GEC* will also measure muck depth at the site. Each core will be cut to isolate the top 12-18 inches, capped, sealed, and placed on ice for overnight transport. The cores will be handled carefully to minimize disturbance during collection and transport. The water samples will be collected into large 5-gallon carboys and transported overnight at ambient temperature. Geosyntec will accompany *GEC* staff to provide oversight during field sampling. All samples will be collected and handled in accordance with the QAPP developed in **Task 3**.

4.2. **Phase 1 Laboratory Analysis** – Sediment core and lake water samples will be delivered to Geosyntec subconsultant laboratory *SiREM* in Knoxville, TN, where column tests will be performed in accordance with the QAPP developed in **Task 3** to evaluate water quality and potential nutrient release from sediment cores under different treatment conditions. Upon arrival, One (1) core* will be analyzed for the following analytes:

- Percent moisture
- Bulk density
- Total organic carbon
- Total volatile solids

* Note: Because the sediments in Lake Morton have been characterized previously by Wood (2021), Geosyntec does not need to analyze multiple cores. A single core will be analyzed to corroborate the results of the previous study.

The remaining eight (8) cores will be used for column testing. These cores will be orientated upright, the cap removed, and the sediment section fused with a 4-inch diameter 4-foot section of PVC using a rubber coupling. A 2.5-foot hydraulic head will be added by gently filling each column with the collected lake water. The columns will be allowed to settle and equilibrate before treating with the following:

- i. Lanthanum Modified Bentonite (LMB; e.g., Phoslock or EutroSORB G)
- ii. Aluminum Sulfate (Alum)
- iii. LMB + Alum
- iv. Control (no treatment)

Geosyntec will consult with the manufacturer for each of these products and apply a single dose treatment per the manufacturers recommendation. After treatments are applied, the columns will be incubated under oxic and anoxic conditions for a period of thirty (30) days. Four (4) cores will be used to test nutrient release for each of the treatments under oxic conditions, while the remaining four (4) cores will be used to test nutrient release for each of the treatments under anoxic conditions. Over the test period, seven (7) water samples will be periodically collected from the hydraulic head of each column and analyzed for the following analytes:

- Total Nitrogen (TN)
- Total Phosphorus (TP)
- Total Kjeldahl Nitrogen (TKN)
- Ammonium (NH_4^+)
- Nitrate-Nitrite (NO_x)
- Orthophosphate (OP)
- Dissolved Oxygen (DO)
- Redox Potential (ORP)
- Alkalinity*
- pH

* *Note: Alkalinity will only be assessed in four (4) of the samples collected over the 30-day period.*

Two (2) additional water samples will be collected from the lake water carboys prior to column preparation and analyzed for the above analytes to establish baseline conditions. All samples will be analyzed in accordance with the QAPP developed in **Task 3**.

- 4.3. **Phase 1 Quality Assurance Data Review** – Geosyntec will review sampling and analysis reports from subcontractors for quality assurance. A summary of the subconsultant efforts will be written up for inclusion into the draft report.
- 4.4. **Phase 1 Data Evaluation** – An evaluation of the data collected during **Phase 1** will be performed to determine the recommended sediment treatment option for Lake Morton. Comparisons between the various treatment options will be made. Recommendations will also be made about what treatment to proceed with and what doses should be evaluated in **Phase 2**. Figures and tables will be generated for inclusion in the draft report.
- 4.5. **Phase 1 Summary Memo** – A written memo summarizing the results of **Phase 1 (Task 4)** will be generated for the City’s review. Geosyntec will attend a review meeting with the City to discuss results and next steps.

5. Phase 2 Sample Collection and Laboratory Analysis

In this task, Geosyntec will apply different dosing's of the standout treatment identified in **Task 4** to evaluate which treatment dosing is most appropriate for reducing nutrient cycling from sediment cores obtained from Lake Morton.

5.1. **Phase 2 Sample Collection** – Additional lake sediment cores will be collected by Geosyntec subconsultant **GEC** at three (3) different locations around the lake representing varying muck depths at 9, 5, and 1 feet. Note that the 9-foot muck depth location will be the same one that was sampled in **Task 4.1**. Eleven (11) sediment cores and approximately twenty-five (25) gallons of lake water will be collected. Three (3) cores will be collected from the 9-foot location and four (4) cores each from the 5 and 1-foot locations (see note in **Task 5.2**). **GEC** will also measure muck depth at each site to confirm muck depth. Geosyntec will accompany **GEC** staff to provide oversight during field sampling. All samples will be collected in accordance with the QAPP developed in **Task 3**.

Note: It is not possible to collect all of the cores during Phase 1 because of chemical and biological changes that would occur during long-term storage.

5.2. **Phase 2 Laboratory Analysis** – Sediment core and lake water samples will be delivered to Geosyntec subconsultant laboratory **SiREM** in Knoxville, TN, where column tests will be performed in accordance with the QAPP developed in **Task 3** to evaluate water quality and potential nutrient release from sediment cores under different dosing conditions. The purpose of this assessment is to determine if the dose needs to vary across the treatment area. Upon arrival, two (2) cores collected from the 5- and 1-foot muck depth locations will be analyzed for the following analytes:

- Percent moisture
- Bulk density
- Total organic carbon
- Total volatile solids

*Note: The 9-foot muck depth location will have already been characterized in **Task 4.2***

The remaining nine (9) cores will be used for column testing. These cores will be orientated upright, the cap removed, and the sediment section fused with a 4-inch diameter 4-foot section of PVC using a rubber coupling. A 2.5-foot hydraulic head will be added by gently filling each column with the collected lake water. The columns will be allowed to settle and equilibrate before treating with the following doses of the best treatment option identified in **Task 4**.

Muck Depth	Treatment Dose	Core Number
9 ft	Low	1
	Moderate	2
	High	3
5 ft	Low	4
	Moderate	5
	High	6
1 ft	Low	7
	Moderate	8
	High	9

Geosyntec will consult with the manufacturer of the selected product and apply treatment dosages per the manufacturer’s recommendations. After treatments are applied, the columns will be sparged with compressed oxygen and incubated under oxic conditions for thirty (30) days. Then, the columns will be sparged with argon and incubated under anoxic conditions for an additional thirty (30) days. Over the 60-day test period, fourteen (14) water samples will be periodically collected from the hydraulic head of each column and analyzed for the following analytes:

- Total Nitrogen (TN)
- Total Phosphorus (TP)
- Total Kjeldahl Nitrogen (TKN)
- Ammonium (NH₄⁺)
- Nitrate-Nitrite (NO_x)
- Orthophosphate (OP)
- Dissolved Oxygen (DO)
- Redox Potential (ORP)
- Alkalinity*
- pH

* Note: Alkalinity will only be assessed in eight (8) of the samples collected over the 60-day period.

Two (2) additional water samples will be collected from the lake water carboys prior to column preparation and analyzed for the above analytes to establish baseline conditions. All samples will be analyzed in accordance with the QAPP developed in **Task 3**.

- 5.3. **Phase 2 Quality Assurance Data Review** – Geosyntec will review sampling and analysis reports from subcontractors for quality assurance. A summary of the subconsultant efforts will be written up for inclusion into the draft report.
- 5.4. **Phase 2 Data Evaluation** – An evaluation of the data collected during **Phase 2** will be performed to determine the recommended sediment treatment dosing for Lake Morton. Comparisons between the various treatment dosings will be made. Figures and tables will be generated for inclusion in the draft report.

6. Sediment Treatment Option Recommendation

- 6.1. Based on the evaluation of the data collected throughout the project, a recommended sediment treatment option and dosing schedule for Lake Morton will be developed. Geosyntec will assess if the dosing should be applied in a single uniform layer across the lake or if this should vary based on the results from the previous tasks. A dosing schedule will be proposed along with continued monitoring recommendations to document the water quality benefit.

7. Draft Report

- 7.1. A draft report will be prepared which presents the results of the previous tasks. The report will include detailed discussions on data analysis, data interpretation, and sediment treatment options. The report is anticipated to include the following sections

- a. Introduction and Background
- b. Existing Data Review
- c. Sediment Treatment Assessment
- d. Treatment Dosing Evaluation
- e. Conclusions and Recommendations

8. Final Report

- 8.1. Geosyntec will review any comments and incorporate into a Final Report which will be delivered to the City in electronic PDF format.

9. Project Management

- 9.1. This task includes Geosyntec efforts to ensure proper project administration, effective communication within the project team and to the City, management and oversight of subcontractors, as well as ensuring that technical procedures and guidelines are followed throughout the project duration. This will allow for successful project delivery to the City. This task will address the following:

- Project Administration Setup
- Management of Project Staff
- Project Tracking
- Schedule Updates
- Project Meetings
- Status Reports

DELIVERABLES

Digital PDF copies of the following deliverables shall be submitted to the City:

- a. Kick Off Meeting Summary
- b. QAPP
- c. Phase 1 Summary Memo
- d. Draft Report
- e. Final Report

SCOPE ASSUMPTIONS

- a. Geosyntec will be provided access to all public facilities within the Study Area.
- b. The City will make all pertinent data available to Geosyntec.
- c. The information and data provided by the City will be assumed correct and representative.
- d. The consultant will not be involved in any meetings with the Water Management District, other regulatory agencies, local jurisdictions, or the public.
- e. No engineering sketches or design plans are included herein.
- f. The City will provide Geosyntec with one complete set of consolidated comments on the QAPP and Draft Report.
- g. The City will conduct any maintenance of vegetation or other obstructions needed for access to sampling locations.
- h. The City will provide Geosyntec subconsultant GEC access to the Lake Morton boat ramp.
- i. The muck/sediment composition is such that it allows for gravity driven cores to be collected.
- j. The Draft Report will be reviewed and commented solely by the City, and not other parties or regulatory entities.
- k. Follow-up or future services identified in this scope of work is not included in the budget herein.
- l. In consideration of the environment, all deliverables to the City will be electronic. No hard copy reports are included.

BUDGET ESTIMATE

Geosyntec proposes to provide the services discussed herein for **\$245,677.70** on a lump sum basis, in accordance with the terms and conditions specified herein and pursuant to our 2022 Continuing Contract and Agreement for Professional Lakes and Watershed Management Services. The lump sum amount is based on our estimated budget for performing these services, which includes the labor, subconsultant fees, and other direct costs necessary to complete the work scope described in the proposal, as detailed in **Attachment 1**.

Project efforts will be billed to the City on a lump sum task percent complete basis, based on the major tasks defined in the cost build-up spreadsheet in Attachment A. Individual subconsultant and combined other direct costs (where applicable) will likewise be billed lump sum based on a percent complete basis. Invoices will be structured to list project tasks (and subconsultant / combined other direct cost) with accomplished percent complete, then corresponding budget invoiced, overall budget expended and overall budget remaining. A separate status report will be provided to the City's project manager providing a narrative of work accomplished supporting the invoice.

SCHEDULE

Geosyntec can begin work immediately upon receipt of Notice to Proceed. The following project schedule is anticipated.

Task	Task Description	Length
1	Project Kickoff	2 Weeks
2	Existing Data Evaluation	1 Month
3	Project Planning	1 Month
4	Phase 1 Sample Collection and Laboratory Analysis	3 Months
5	Phase 2 Sample Collection and Laboratory Analysis	4 Months
6	Sediment Treatment Option Recommendation	1 Months
7	Draft Report	2 Months
8	Final Report	1 Month
9	Project Management	Ongoing
	Total Project Length:	14 Months

REFERENCES

Wood Environment & Infrastructure Solutions, Inc. (2021). *4e Plan Technical Support Services for Lake Morton, Task 4 Technical Memorandum*.

CLOSURE

We appreciate the opportunity to work with the City on this project. Should you have any questions or comments regarding this proposal, please do not hesitate to contact the undersigned at 407-321-7030.

Sincerely,

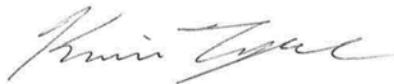
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ATTACHMENT 1

PROJECT BUDGET ESTIMATES

EXHIBIT A1 - FEE ESTIMATE

Proposal for Lake Morton Sediment Treatment Study											Date: 04/19/23				
City of Lakeland, Florida											Contract: Professional Lakes and Watershed Management Services				
Task	Activity	Senior Principal		Principal Engineer		Project Professional		Staff Professional		Project Administrator		Basic Activity Amount	Man-hours by Activity	Average Hourly Rate	
		Rate = \$262.00	Manhours	Cost	Manhours	Cost	Rate = \$198.00	Manhours	Cost	Rate = \$132.00	Manhours				Cost
Task 1 - Kick Off Meeting															
1.1	Coordinate Project Initiation			\$0.00	2	\$488.00	1	\$198.00		\$0.00		\$0.00	\$686.00	3	\$228.67
1.2	Attend Project Kick Off Meeting			\$0.00	2	\$488.00	4	\$792.00		\$0.00		\$0.00	\$1,280.00	6	\$213.33
1.3	Meeting Summary and Data Request			\$0.00	1	\$244.00	4	\$792.00		\$0.00	4	\$292.00	\$1,328.00	9	\$147.56
SUBTOTAL		0		\$0.00	5	\$1,220.00	9	\$1,782.00	0	\$0.00	4	\$292.00	\$3,294.00	18	\$183.00
Task 2 - Existing Data Evaluation															
2.1	Existing Data Collection			\$0.00	2	\$488.00	4	\$792.00	4	\$528.00		\$0.00	\$1,808.00	10	\$180.80
2.2	Existing Data Evaluation			\$0.00	2	\$488.00	12	\$2,376.00	16	\$2,112.00	4	\$292.00	\$5,268.00	34	\$154.94
SUBTOTAL		0		\$0.00	4	\$976.00	16	\$3,168.00	20	\$2,640.00	4	\$292.00	\$7,076.00	44	\$160.82
Task 3 - Project Planning															
3.1	Prepare maps and field equipment	2		\$524.00	2	\$488.00	4	\$792.00	32	\$4,224.00		\$0.00	\$6,028.00	40	\$150.70
3.2	Translate field data			\$0.00	2	\$488.00	4	\$792.00	8	\$1,056.00	4	\$292.00	\$2,628.00	18	\$146.00
SUBTOTAL		2		\$524.00	4	\$976.00	8	\$1,584.00	40	\$5,280.00	4	\$292.00	\$8,656.00	58	\$149.24
Task 4 - Phase 1 Sample Collection and Laboratory Analysis															
4.1	Phase 1 Sample Collection			\$0.00	4	\$976.00	24	\$4,752.00		\$0.00		\$0.00	\$5,728.00	28	\$204.57
4.2	Phase 1 Laboratory Analysis			\$0.00	4	\$976.00	8	\$1,584.00		\$0.00		\$0.00	\$2,560.00	12	\$213.33
4.3	Phase 1 Quality Assurance Data Review			\$0.00	4	\$976.00	16	\$3,168.00		\$0.00		\$0.00	\$4,144.00	20	\$207.20
4.4	Phase 1 Data Evaluation			\$0.00	4	\$976.00	8	\$1,584.00	16	\$2,112.00		\$0.00	\$4,672.00	28	\$166.86
4.5	Summary Memo	2		\$524.00	4	\$976.00	8	\$1,584.00	24	\$3,168.00	4	\$292.00	\$6,544.00	42	\$155.81
SUBTOTAL		2		\$524.00	20	\$4,880.00	64	\$12,672.00	40	\$5,280.00	4	\$292.00	\$23,648.00	130	\$181.91
Task 5 - Phase 2 Sample Collection and Laboratory Analysis															
5.1	Phase 2 Sample Collection			\$0.00	4	\$976.00	24	\$4,752.00		\$0.00		\$0.00	\$5,728.00	28	\$204.57
5.2	Phase 2 Laboratory Analysis			\$0.00	4	\$976.00	8	\$1,584.00		\$0.00		\$0.00	\$2,560.00	12	\$213.33
5.3	Phase 2 Quality Assurance Data Review			\$0.00	4	\$976.00	16	\$3,168.00		\$0.00		\$0.00	\$4,144.00	20	\$207.20
5.4	Phase 2 Data Evaluation			\$0.00	4	\$976.00	8	\$1,584.00	16	\$2,112.00	4	\$292.00	\$4,964.00	32	\$155.13
SUBTOTAL		0		\$0.00	16	\$3,904.00	56	\$11,088.00	16	\$2,112.00	4	\$292.00	\$17,396.00	92	\$189.09
Task 6 - Sediment Treatment Option Recommendation															
6.1	Summarize and evaluate collected sampling data	2		\$524.00	4	\$976.00	12	\$2,376.00	40	\$5,280.00	4	\$292.00	\$9,448.00	62	\$152.39
SUBTOTAL		2		\$524.00	4	\$976.00	12	\$2,376.00	40	\$5,280.00	4	\$292.00	\$9,448.00	62	\$152.39

EXHIBIT A1 - FEE ESTIMATE

Proposal for Lake Morton Sediment Treatment Study **Date:** 04/19/23
City of Lakeland, Florida **Contract:** Professional Lakes and Watershed Management Services

Task	Activity	Senior Principal		Principal Engineer		Project Professional		Staff Professional		Project Administrator		Basic Activity Amount	Man-hours by Activity	Average Hourly Rate
		Rate = \$262.00		Rate = \$244.00		Rate = \$198.00		Rate = \$132.00		Rate = \$73.00				
		Manhours	Cost	Manhours	Cost	Manhours	Cost	Manhours	Cost	Manhours	Cost			
Task 7 - Draft Report														
	Section 1 - Introduction and Background	2	\$524.00	2	\$488.00	4	\$792.00	8	\$1,056.00		\$0.00	\$2,860.00	16	\$178.75
	Section 2 - Existing Data Review	2	\$524.00	2	\$488.00	4	\$792.00	12	\$1,584.00		\$0.00	\$3,388.00	20	\$169.40
7.1	Section 3 - Sediment Treatment Assessment	2	\$524.00	2	\$488.00	4	\$792.00	8	\$1,056.00		\$0.00	\$2,860.00	16	\$178.75
	Section 4 - Treatment Dosing Evaluation	2	\$524.00	4	\$976.00	8	\$1,584.00	16	\$2,112.00		\$0.00	\$5,196.00	30	\$173.20
	Section 5 - Conclusions and Recommendations	2	\$524.00	2	\$488.00	4	\$792.00	12	\$1,584.00		\$0.00	\$3,388.00	20	\$169.40
	Figures, Exhibits, and Tables	2	\$524.00	4	\$976.00	8	\$1,584.00	40	\$5,280.00	4	\$292.00	\$8,656.00	58	\$149.24
SUBTOTAL		12	\$3,144.00	16	\$3,904.00	32	\$6,336.00	96	\$12,672.00	4	\$292.00	\$26,348.00	160	\$164.68
Task 8 - Final Report														
8.1	Final Report	2	\$524.00	2	\$488.00	4	\$792.00	12	\$1,584.00	4	\$292.00	\$3,680.00	24	\$153.33
SUBTOTAL		2	\$524.00	2	\$488.00	4	\$792.00	12	\$1,584.00	4	\$292.00	\$3,680.00	24	\$153.33
Task 9 - Evaluation & Ranking of BMP Alternatives														
	Project Administration Setup	4	\$1,048.00	4	\$976.00		\$0.00		\$0.00	4	\$292.00	\$2,316.00	12	\$193.00
	Management of Project Staff	4	\$1,048.00	6	\$1,464.00		\$0.00		\$0.00	4	\$292.00	\$2,804.00	14	\$200.29
9.1	Project Tracking	4	\$1,048.00	4	\$976.00		\$0.00		\$0.00	4	\$292.00	\$2,316.00	12	\$193.00
	Project Meetings	4	\$1,048.00	8	\$1,952.00		\$0.00		\$0.00	4	\$292.00	\$3,292.00	16	\$205.75
	Status Reports	4	\$1,048.00	4	\$976.00		\$0.00		\$0.00	4	\$292.00	\$2,316.00	12	\$193.00
SUBTOTAL		20	\$5,240.00	26	\$6,344.00	0	\$0.00	0	\$0.00	20	\$1,460.00	\$13,044.00	66	\$197.64
TOTALS		40.0	\$10,480.00	97.0	\$23,668.00	201.0	\$39,798.00	264.0	\$34,848.00	52.0	\$3,796.00	\$112,590.00	654.00	
Percent Breakdown		6%	9%	15%	21%	31%	35%	40%	31%	8%	3%	100%	100%	

BUDGET SUMMARY

SUBCONSULTANTS			
	<i>Name</i>	<i>Amount</i>	<i>Percentage</i>
(1)	Geotechnical and Environmental Consultants	\$ 16,870.00	6.9%
(2)	SiREM	\$ 111,200.00	45.3%
Total Subconsultant Fees:		\$ 128,070.00	52.1%

PHASE I - LUMP SUM FEE COMPUTATIONS		
(1) Professional Services Cost (from above)	=	\$112,590.00
(2) Technology/Communications Fee (3% of professional services total)	=	\$3,377.70
(3) Out-of-Pocket Expenses allowance	+	\$1,640.00
(4) Subtotal (Consultant's Fees) [(1)+(2)+(3)]	=	\$117,607.70
(5) Subconsultant's Fees (from left)	+	\$128,070.00
Proposed Lump Sum Fee [(4)+(5)]	=	\$245,677.70

EXHIBIT A2 - REIMBURSABLE OUT-OF-POCKET-EXPENSES

Proposal for Lake Morton Sediment Treatment Study
City of Lakeland, Florida

04/19/23

Reproduction Costs	Unit	Rate per	Quantity	Subtotal
Photocopies *				
<i>B/W Copies – 8½"x11"</i>	copy	\$0.10	0	\$0.00
<i>B/W Copies – 11"x17"</i>	copy	\$0.20	0	\$0.00
<i>Color Copies – 8½" x 11"</i>	copy	\$1.00	0	\$0.00
<i>Color Copies – 11" x 17"</i>	copy	\$2.00	0	\$0.00
Full Size Plans and Plots (plans, public meetings, etc.) *				
<i>24"x36" B/W Plot</i>	sheet	\$10.00	0	\$0.00
<i>24"x36" Color Plot</i>	sheet	\$20.00	0	\$0.00
<i>36"x48" B/W Plot</i>	sheet	\$15.00	0	\$0.00
<i>36"x48" Color Plot</i>	sheet	\$25.00	0	\$0.00
Miscellaneous Expenses				
Courier / Express Delivery Service				
<i>City / County</i>	delivery	\$25.00	0	\$0.00
<i>Sample Cooler Shipping</i>	each	\$100.00	11	\$1,100.00
Digital Archiving (include burning and labeling)				
<i>CD/DVD (Burn & Label)</i>	each	\$5.00	0	\$0.00
Report Production				
<i>Report Production - ½"- 1.5" (binder, dividers, sleeve inserts) – (per copy)</i>	each	\$20.00	0	\$0.00
<i>Report Production - 2"- 3" (binder, dividers, sleeve inserts) – (per copy)</i>	each	\$25.00	0	\$0.00
<i>Report Production - >3" (binder, dividers, sleeve inserts) – (per copy)</i>	each	\$30.00	0	\$0.00
Mounting & Laminating (Presentation Materials)				
<i>Display Mounting (Gator Board)</i>	sf	\$10.00	0	\$0.00
Technology Expenses				
<i>Specialized Computer Applications</i>	hour	\$20.00	0	\$0.00
Transportation				
<i>Personal Automobile (per mile Government rate)</i>	mile	\$0.55	0	\$0.00
Field Equipment				
None				
<i>Water Level Meter</i>	day	\$25.00	0	\$0.00
<i>Water Quality Meter (YSI style multi parameter)</i>	day	\$100.00	0	\$0.00
<i>Turbidity Meter</i>	day	\$25.00	0	\$0.00
<i>Field Sampling Supplies (ice, filters, jars, foil, etc.)</i>	day	\$25.00	4	\$100.00
<i>Stormwater Autosampler (ISCO style)</i>	month	\$400.00	0	\$0.00
<i>Stormwater Autosampler (ISCO style) w/ telemetry</i>	month	\$600.00	0	\$0.00
<i>Stormwater Autosampler Installation Materials (pad, connections, etc.)</i>	each	\$350.00	0	\$0.00
<i>GPS Unit</i>	day	\$20.00	0	\$0.00
<i>Digital Camera</i>	day	\$20.00	4	\$80.00
<i>Peristaltic Pump</i>	day	\$50.00	0	\$0.00
<i>Centrifugal Pump</i>	day	\$75.00	0	\$0.00
<i>Generator</i>	day	\$75.00	0	\$0.00
<i>Field Truck (4x4)</i>	day	\$90.00	4	\$360.00
<i>Pontoon Boat</i>	day	\$150.00	0	\$0.00
<i>John Boat / Carolina Skiff</i>	day	\$100.00	0	\$0.00
<i>Diving Gear (tanks, regulator, wetsuit, fins, etc.) (per person)</i>	day	\$125.00	0	\$0.00
<i>Lake Bottom Seepage Meters (fabrication/preparation)</i>	each	\$250.00	0	\$0.00
<i>Soil Sample Kit (Core Sampler)</i>	each	\$35.00	0	\$0.00
GRAND TOTAL:				\$1,640.00

* Includes check copies and internal archiving

ATTACHMENT 2

SUBCONSULTANT PROPOSALS



March 9, 2023

Geosyntec Consultants
3504 Lake Lynda Drive, Suite 155
Orlando, FL 32817

Attention: Kevin Tyre - Water Resources Scientist

Subject: Proposal for Geotechnical Engineering Services
LAKE MORTON SEDIMENT SAMPLING
Lakeland, Florida
GEC Proposal No. 11335G

Dear Kevin:

Geotechnical and Environmental Consultants, Inc. (GEC) is pleased to provide this proposal for the above-referenced project. Our proposed scope of services is based on the project information you provided to us, as shown on Attachment 1, and our correspondence on March 7, 2023. The purpose of this investigation is to collect lake bottom sediment core samples. This proposal presents our understanding of the project, our recommended scope of services, and a cost and schedule for providing those services.

Site Location and Project Description

The site includes Lake Morton in Lakeland, Florida as shown on Attachment 1. The lake is approximately 40 acres in area with water depths range from 5 to 20 feet with a maximum sediment depth of 10 feet. Lake Morton Drive surrounds the perimeter of Lake Morton and we understand a grassed boat ramp is present on the west side of the lake.

We understand the project includes two phases of lake bottom sediment sampling. The sediment samples will be collected with a 4" diameter sampler with a maximum core sample length of 2 feet. Relatively undisturbed samples will be collected using a manual gravity driven sampler. We understand samples will be shipped for laboratory testing by others.

Scope of Services

The following is a summary of the project scope of services:

Phase 1:

- Coordinate site access.
- Mobilize gravity driven sampling equipment and personnel.
- Mobilize boat for lake access.
- Collect 30 gallons of surface water in 6, 5-gallon carboys.
- Obtain 9, 4" diameter (maximum 2-foot length) samples of the upper surface of the lake bottom sediments near the lake center where muck depths are the greatest at locations provided by Geosyntec.

Phase 2:

- Coordinate site access.
- Mobilize gravity driven sampling equipment and personnel.
- Mobilize boat for lake access.
- Collect 35 gallons of surface water in 7, 5-gallon carboys.
- Obtain 11, 4" diameter (maximum 2-foot length) of the upper surface of the lake bottom sediments samples at locations provided by Geosyntec as follows:
 - Deep Sediments – 3 cores
 - Intermediate Sediments – 4 cores
 - Shallow Sediments – 4 cores

Cost

The cost to provide the scope of services is as follows:

Phase 1 Limiting Amount Fee:	\$7,860.00
Phase 2 Limiting Amount Fee:	<u>\$9,010.00</u>
Total Limiting Amount Fee:	\$16,870.00

Attachment 2 documents our detailed scope of services and fees. Our fees will be billed based on the actual units of work performed and the unit rates shown on Attachment 2; however, we will not exceed the limiting amount without your authorization.

Schedule

Our schedule to complete the work will be about 4 weeks from your written notice to proceed for each phase.

Upon your acceptance of this proposal, please forward current property contact information so we can coordinate access to the site for our field activities.

Limitations

This proposal is subject to the following limitations:

- The site will be accessible to the equipment assumed above. If the boat ramp does not provide sufficient access to allow transport of the boat into the lake, appropriate adjustments to the actual fees will be necessary.
- If collection of sediment samples is not feasible due to site and sample conditions by gravity driven sampling equipment, vibro-core sampling equipment shall be utilized. Appropriate adjustments to the actual fees will be necessary.
- This fee proposal will remain in effect for 90 days. If you require more than 90 days to authorize us to proceed, we request that we be allowed to review our proposal to adjust our cost estimate, if necessary.

Closure

GEC appreciates the opportunity to submit this proposal. If you have any questions regarding this proposal, or if we can be of further assistance, please contact the undersigned.

Very truly yours,

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.



Ryan J. Petersen, E.I.
Project Engineer

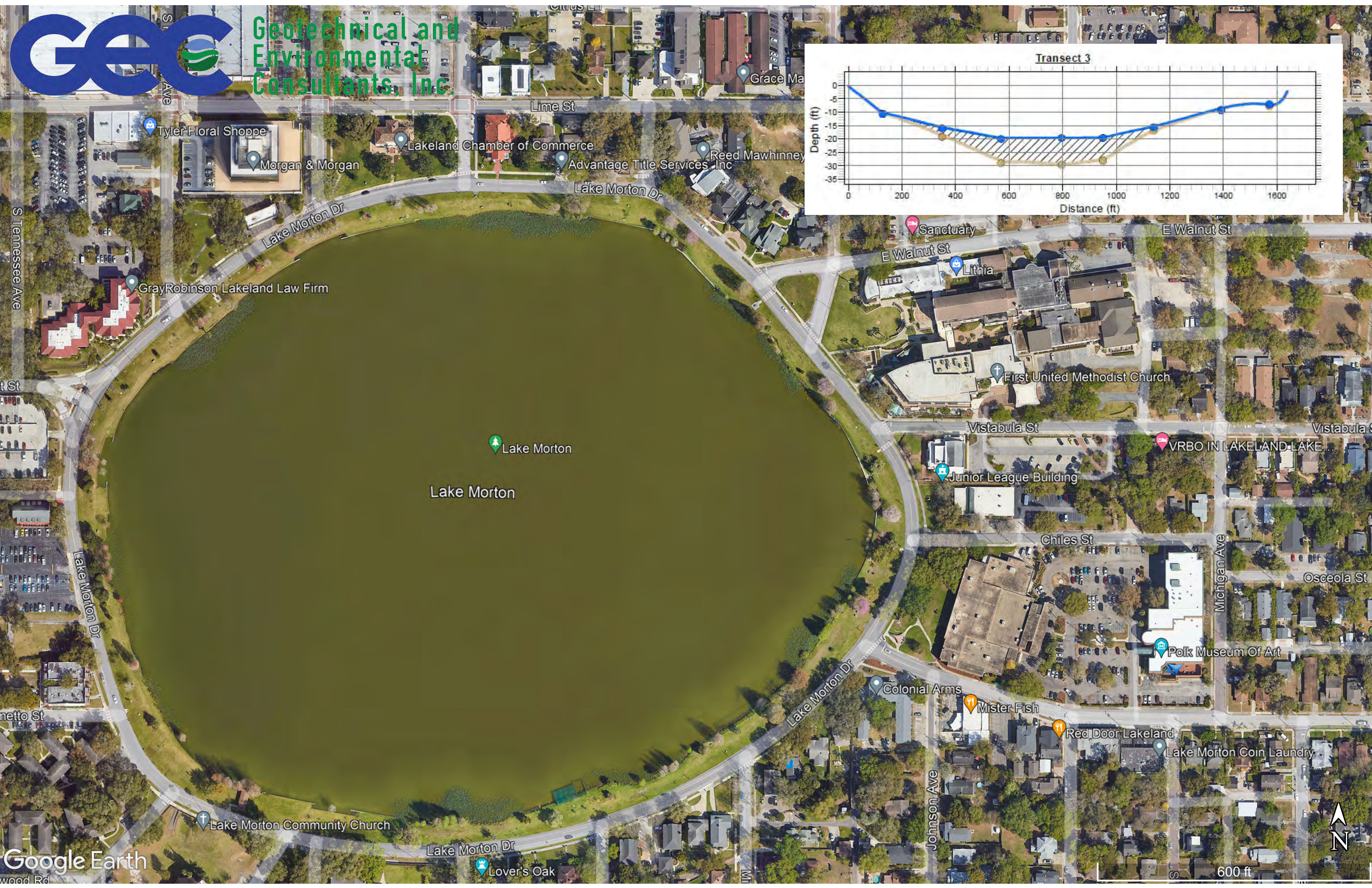
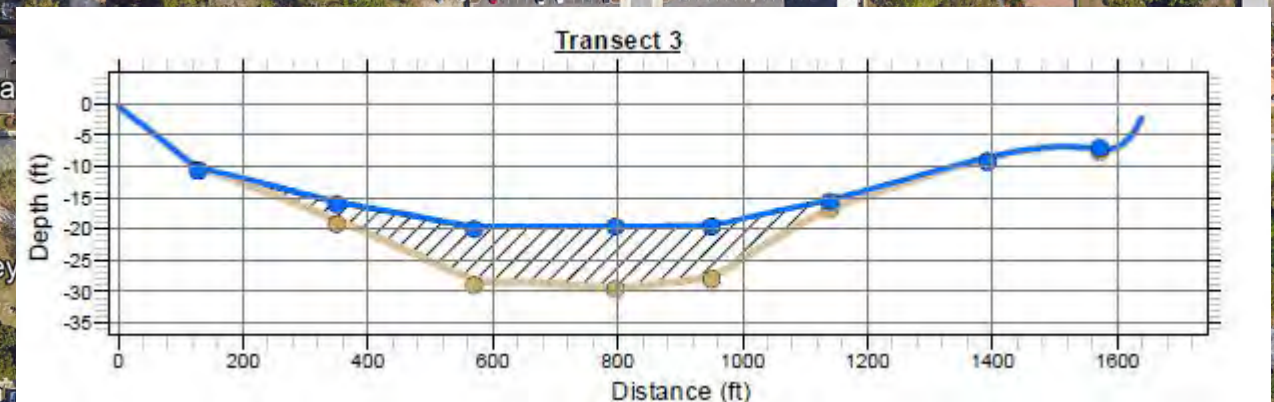


Craig G. Ballock. P.E.
Geotechnical Services Manager

ATTACHMENTS



Geotechnical and Environmental Consultants, Inc.



Google Earth



600 ft

Attachment 2
Geotechnical Scope of Services and Cost
LAKE MORTON SEDIMENT SAMPLING
Lakeland, Florida
GEC Proposal No. 11335G

PHASE 1	Quantity	Units	Unit Rate	Cost
Geotechnical Services				
Mobilization/Demobilization Pontoon Vibrocore Sampling Vessel	0	each	\$6,750.00	\$0.00
Crane (boat access/removal)	0	each	\$3,000.00	\$0.00
Undisturbed Vibro-core Sample				
4" Core Sample with Plastic Liner	0	each	\$1,300.00	\$0.00
Boat Mobilization	1	each	\$650.00	\$650.00
Gravity Driven Sediment Sample				
4" Core Sample	9	each	\$550.00	\$4,950.00
Centrifugal Pump	1	day	\$100.00	\$100.00
Expendable Sampling Equipment	6	each	\$50.00	\$300.00
GPS Unit	2	day	\$100.00	\$200.00
Senior Engineer	2	hr	\$250.00	\$500.00
Engineer Intern	6	hr	\$120.00	\$720.00
Senior Field Technician	4	hr	\$110.00	\$440.00
Phase 1 Total Limiting Amount Fee				\$7,860.00
<hr/>				
PHASE 2	Quantity	Units	Unit Rate	Cost
Geotechnical Services				
Mobilization/Demobilization Pontoon Vibrocore Sampling Vessel	0	each	\$6,750.00	\$0.00
Crane (boat access/removal)	0	each	\$3,000.00	\$0.00
Undisturbed Vibro-core Sample				
4" Core Sample with Plastic Liner	0	each	\$1,300.00	\$0.00
Boat Mobilization	1	each	\$650.00	\$650.00
Gravity Driven Sediment Sample				
4" Core Sample	11	each	\$550.00	\$6,050.00
Centrifugal Pump	1	day	\$100.00	\$100.00
Expendable Sampling Equipment	7	each	\$50.00	\$350.00
GPS Unit	2	day	\$100.00	\$200.00
Senior Engineer	2	hr	\$250.00	\$500.00
Engineer Intern	6	hr	\$120.00	\$720.00
Senior Field Technician	4	hr	\$110.00	\$440.00
Phase 2 Total Limiting Amount Fee				\$9,010.00
TOTAL LIMITING AMOUNT FEE				\$16,870.00

23 March 2023

SiREM Ref: Si-06416-032323

Mr. Mike Hardin and Mr. Kevin Tyre
Geosyntec Consultants, Inc.
1511 E State Rd 434, Suite 1005
Winter Springs, FL, 32708

via email: MHardin@Geosyntec.com; Kevin.Tyre@Geosyntec.com

Reference: Lake Morton/City of Lakeland Column Capping Treatment Testing

Dear Mike and Kevin:

SiREM Laboratory is pleased to submit this proposal to evaluate different sediment capping alternative treatments to address the internal nutrient, specifically phosphorus (P as phosphate), recycling in Lake Morton (the Site). The purpose of this study is to evaluate which treatment amongst: 1) Lanthanum Modified Bentonite (LMB; e.g., Phoslock or EutroSORB G), 2) Aluminum Sulfate (Alum), 3) LMB + Alum will result in the largest reduction of nutrient cycling from sediment under oxic and anoxic conditions compared to an unamended control condition. The study will be carried out in two phases. Phase 1 will evaluate which treatment is the most efficient for reducing nutrient cycling. Phase 2 will evaluate the treatment dosage of the standout treatment identified in Phase 1. This will be determined by applying low, mid, and high doses of the treatments to sediment cores from different locations within the lake to provide insight into the spatial variability of nutrient cycling.

This proposal presents: the study approach and methodology (Section 1); the proposed schedule (Section 2); and a cost estimate for the work (Section 3).

SiREM requires intact, undisturbed 4-inch diameter sediment cores collected from an area in Lake Morton expected to be most affected by phosphorus flux. The core samples need to be at least 4 inches (10 centimeters) thick as this upper portion of the sediment interacts physically, chemically, and biologically more readily with the lake water than deeper layers. After collection the cores must be placed on ice immediately and stored and transported in the dark. Geosyntec will provide nine (9) sediment cores, eight of which will be used for evaluating phosphorus flux during the oxic and anoxic phases and one will be used to obtain data pertaining to the total organic carbon (TOC), bulk density, moisture and volatile solids content. After collection, each core will be cut to contain the top 12 to 18 inches of sediment and sealed at the top and bottom using a Fernco cap or any other suitable plug that will prevent leakage. Thus, cores containing only the sediment, without any lake water will be collected. The cores will be placed in coolers on ice for transport to SiREM under chain of custody. Approximately 16 gallons of lake water will also be collected to maintain a hydraulic head 30 inches above freeboard during Phase 1 testing. These cores and sediment samples will be collected at approximately the lake center where muck depths are greatest. For Phase 2, Geosyntec will provide eleven (11) additional core samples collected in the same manner as for Phase 1 and approximately 22 gallons of surface water. The cores will be collected from three (3) different locations around the lake, representing varying muck depths, with three cores sampled at each location, plus two (2) cores for intermediate and shallow muck depths to perform TOC, bulk density, and moisture content analysis.

The nine representative core samples are summarized in Table 1 with proposed treatment doses and muck depths.

Table 1: Phase 2 Core Samples

Muck Depth	Treatment Dose	Core Number
9 ft	Low	1
	Moderate	2
	High	3
5 ft	Low	4
	Moderate	5
	High	6
1 ft	Low	7
	Moderate	8
	High	9

Please ship the cores to Rosemary Le or Jacques Smith at 180B Market Place Blvd, Knoxville, TN, 37922. Please note it is the shipper's responsibility to ship all materials in compliance with DOT and IATA regulations.

1. TREATABILITY STUDY APPROACH & METHODOLOGY

The treatability study will consist of the following tasks:

- Baseline Sample Analysis (Task 1)
- Phase 1 Oxidic and Anoxic Column Test (Task 2);
- Phase 2 Column Study of Best Treatment and Dosage Evaluation (Task 3); and
- Reporting (Task 4)

Task 1: Column Assembly and Baseline Analysis

Upon receipt, the sediment and water samples will be checked for leaks and logged into the lab's sample tracking system. One sediment sample for Phase 1 representing deep muck and two separate sediment samples from the sampling locations from the intermediate and shallow muck during Phase 2 will be characterized for percent moisture, bulk density (via Shelby tube), total organic carbon (TOC), and total volatile solids (TVS), shipped on ice under chain of custody (COC) to Eurofins. The sediment was fully characterized in a previous study and therefore the metals or phosphorus fractionation will not be characterized.

Two randomly collected water samples taken directly from the sample carboys will be shipped on ice under chain of custody (COC) to Eurofins Environment Testing America (Eurofins) for baseline total phosphorus (TP), total Kjeldahl nitrogen (TKN), ammonium (NH_4^+), nitrate-nitrite (NO_x), and orthophosphate (OP) for baseline analysis. In addition, SiREM will analyze the water samples for pH and oxidation reduction potential (ORP) using an Accumet XL-15 pH meter and probes (Fisher

Scientific, Waltham, MA), dissolved oxygen (DO) using a Hach sensION™ + DO6 probe (Loveland, CO), and conductivity using a Hach sensION™ + EC5.

For Phase 1 testing, eight of the sediment sections received will be orientated upright, the cap removed, and the sediment section fused with a 4-inch diameter 4 foot section of clear PVC using a Fernco rubber coupling. A 30 inch hydraulic head will be added by gently transferring lake water to each column.

Task 2: Phase 1 Oxic and Anoxic Column Tests

Column tests will be performed to evaluate potential phosphate release from sediment cores under oxic and anoxic conditions. The columns will be shielded from light to prevent activity from photosynthetic organisms and undesired phosphorous cycling. Oxic and anoxic columns will be run in parallel.

For oxic conditions, the top of each column will remain exposed to ambient air and compressed oxygen will be sparged into the water column with vinyl tubing connected to an air stone. For anoxic conditions each column will be sealed at the top and the cap fitted with ports to sample water and supply argon from a compressed argon cylinder. During the first 2 to 3 days of oxygen and argon sparging, frequent ORP measurements will be collected to confirm that both oxic and anoxic conditions have developed (approximately >100 mV for oxic and between 0 and -150 mV for anoxic). Once oxic and anoxic conditions have been established, sparging will be paused, and water samples will be collected from each column (eight in total). These samples will be shipped on ice under COC to Eurofins for TP, TKN, NH_4^+ , NO_x , and OP. In addition, SiREM will analyze the water samples for pH, ORP, and DO. These samples will correspond to Day 0 and start the 30-day experiment clock. The sediment columns will be capped with different amendments based on the total- and ortho-phosphate concentrations measured during the baseline assessment, in consultation with Geosyntec. The amendments and disturbed sediment particles will be allowed to settle, after which time sparging will be resumed for the duration of the test. After treatment application and restart of air and argon sparging, sampling will be performed on Day 1, Day 3, Day 5, Day 10, Day 20, and Day 30. During each sampling event, pH, ORP, and DO will be measured by SiREM and TP, TKN, NH_4^+ , NO_x , and OP will be analyzed by Eurofins. Alkalinity will be measured at four (4) time intervals: prior to treatment, immediately after, mid-way through, and at the conclusion of the test.

Tables 2 and 3 summarize the capping treatments under oxic and anoxic conditions, respectively, and the number of in-house and third-party samples per core for Phase 1. For each core sample, a single (1) column treatment will be studied, totaling 4 columns for each condition. During each sampling event 400 milliliters (mL) of water will be collected from each oxic and anoxic column for a total of 2,800 mL over the course of the testing. For 4-inch cores with 30 inches of hydraulic head over the sediment, no water replacement will be required during testing.

Table 2: Summary of Oxic Sampling of Sediment Core Treatments

Treatment	Description	Sampling Events	Number of Replicates	Analyses			
				TP/OP	DO/pH/ ORP	TKN/NH ₄ / NO _x	Alkalinity
Unamended Control	Control sample (sediment core + lake water, no treatment)	Day 0, 1, 3, 5, 10, 20, 30	1	7	7	7	4
LMB	Sediment core + lake water, LMB treatment	Day 0, 1, 3, 5, 10, 20, 30	1	7	7	7	4
Alum	Sediment core + lake water, Alum treatment	Day 0, 1, 3, 5, 10, 20, 30	1	7	7	7	4
LMB + Alum	Sediment core + lake water, LMB + Alum	Day 0, 1, 3, 5, 10, 20, 30	1	7	7	7	4
Total				28(2)*	28(2)	28(2)	16(2)

*Note: The number in parentheses accounts for the baseline analyses for the initial sampling of lake water from the carboys.

Table 3: Summary of Anoxic Sampling of Sediment Core Treatments

Treatment	Description	Sampling Events	Number of Replicates	Analyses			
				TP/OP	DO/pH/ ORP	TKN/NH ₄ / NO _x	Alkalinity
Unamended Control	Control sample (sediment core + lake water, no treatment)	Day 0, 1, 3, 5, 10, 20, 30	1	7	7	7	4
LMB	Sediment core + lake water, LMB treatment	Day 0, 1, 3, 5, 10, 20, 30	1	7	7	7	4

Alum	Sediment core + lake water, Alum treatment	Day 0, 1, 3, 5, 10, 20, 30	1	7	7	7	4
LMB + Alum	Sediment core + lake water, LMB + Alum	Day 0, 1, 3, 5, 10, 20, 30	1	7	7	7	4
Total				28	28	28	16

Task 3: Phase 2 Column Study of Best Treatment and Dosage Evaluation

The purpose of Phase 2 is to evaluate the treatment dosage of the standout treatment identified in Phase 1. This will be evaluated by applying low, mid, and high doses of the standout treatment to sediment cores from different locations within the lake to provide insight into the spatial variability of nutrient cycling. For each core depth and treatment dosage, one (1) column treatment will be studied, totaling nine (9) columns. Column preparation and administering the best performing amendment will be performed in the same manner as during Phase 1. Oxic and anoxic conditions will be run in series.

Upon receipt of core and water samples, SiREM will collect two randomly composited water samples from carboys for baseline characterization. These samples will be shipped on ice under COC to Eurofins for TP, TKN, NH₄⁺, NO_x, and OP. In addition, SiREM will analyze the water samples for pH, ORP, and DO. For Phase 2 testing, nine of the sediment sections received will be orientated upright, the cap removed, and the sediment section fused with a 4-inch diameter 5 foot section of clear PVC using a Fernco rubber coupling. A 40 inch hydraulic head will be added by gently transferring lake water to each column. For the oxic phase of testing, the columns will be left exposed to ambient air and compressed oxygen will be sparged into the water column with vinyl tubing connected to an air stone. During the initial oxygen sparging, frequent ORP measurements will be collected to confirm oxic conditions have developed (approximately >100 mV). Once oxic conditions have been established, sparging will be paused, and water samples will be collected from each column (nine in total). These samples will be shipped on ice under COC to Eurofins for TP, TKN, NH₄⁺, NO_x, and OP. In addition, SiREM will analyze the water samples for pH, ORP, and DO. These samples will correspond to Day 0 and start the 30-day oxic experiment clock. The sediment columns will be capped with the standout amendment at varying doses. Air sparging will restart on Day 1, after the amendments have been allowed to settle. After initial sampling on Day 0, sampling will occur on Day 0, Day 1, Day 3, Day 5, Day 10, Day 20, and Day 30.

After sample collection on Day 30 for oxic conditions, the columns will be shifted over to anoxic conditions. Each column will be sealed at the top and the cap fitted with ports to sample water and supply argon from a compressed argon cylinder. Argon sparging will begin on Day 30

immediately following the sampling under oxic conditions and continued for up to 2 days until anoxic conditions are achieved as determined by an ORP of between 0 and -150 mV. Once anoxic conditions are attained the 30-day anoxic experiment clock will start. Under anoxic conditions, sampling will occur on Day 32, Day 33, Day 35, Day 37, Day 42, Day 52, and Day 62.

During each sampling event, pH, DO, and ORP will be measured by SiREM and TP, TKN, NH₄⁺, NO_x, and OP will be measured by Eurofins. Alkalinity will be measured at four time points: prior to treatment, immediately after, mid-way through, and at the conclusion of the test. During each sampling event, approximately 400 mL will be collected for analysis from each of the nine cores for a total of 5,600 mL per column over the course of the testing. The representative core depths, dosage, and sampling schedule is summarized in Table 4. For 4-inch cores with 40 inches of hydraulic head over the sediment, no water replacement will be required during testing.

Table 4. Summary of Phase 2 Evaluation of Best Treatment Dose and Sampling of Sediment Core Treatments and Columns

Treatment Dose	Description	Sampling Events	Number of Replicates	Analyses		
				TP/OP	DO/pH/ORP	TKN/NH ₄ /NO _x
Low BT	9' muck depth core + lake water + LOW BT dose	<u>Baseline</u> Day 0 <u>Oxic Phase</u> Days 1, 3, 5, 10, 20, 30 <u>Anoxic Phase</u> Days 32, 33, 35, 37, 42, 52, 62	1	14	14	14
Low BT	5' muck depth core + lake water + LOW BT dose	<u>Baseline</u> Day 0 <u>Oxic Phase</u> Days 1, 3, 5, 10, 20, 30 <u>Anoxic Phase</u> Days 32, 33, 35, 37, 42, 52, 62	1	14	14	14
Low BT	1' muck depth core + lake water + LOW BT dose	<u>Baseline</u> Day 0 <u>Oxic Phase</u> Days 1, 3, 5, 10, 20, 30 <u>Anoxic Phase</u> Days 32, 33, 35, 37, 42, 52, 62	1	14	14	14

Mid BT	9' muck depth core + lake water + MID BT dose	<u>Baseline</u> Day 0 <u>Oxic Phase</u> Days 1, 3, 5, 10, 20, 30 <u>Anoxic Phase</u> Days 32, 33, 35, 37, 42, 52, 62	1	14	14	14
Mid BT	5' muck depth core + lake water + MID BT dose	<u>Baseline</u> Day 0 <u>Oxic Phase</u> Days 1, 3, 5, 10, 20, 30 <u>Anoxic Phase</u> Days 32, 33, 35, 37, 42, 52, 62	1	14	14	14
Mid BT	1' muck depth core + lake water + MID BT dose	<u>Baseline</u> Day 0 <u>Oxic Phase</u> Days 1, 3, 5, 10, 20, 30 <u>Anoxic Phase</u> Days 32, 33, 35, 37, 42, 52, 62	1	14	14	14
High BT	9' muck depth core + lake water + HIGH BT dose	<u>Baseline</u> Day 0 <u>Oxic Phase</u> Days 1, 3, 5, 10, 20, 30 <u>Anoxic Phase</u> Days 32, 33, 35, 37, 42, 52, 62	1	14	14	14
High BT	5' muck depth core + lake water + HIGH BT dose	<u>Baseline</u> Day 0 <u>Oxic Phase</u> Days 1, 3, 5, 10, 20, 30 <u>Anoxic Phase</u> Days 32, 33, 35, 37, 42, 52, 62	1	14	14	14

High BT	1' muck depth core + lake water + HIGH BT dose	<u>Baseline</u> Day 0 <u>Oxic Phase</u> Days 1, 3, 5, 10, 20, 30 <u>Anoxic Phase</u> Days 32, 33, 35, 37, 42, 52, 62	1	14	14	14
Total				126(2)*	126(2)	126(2)

*Note: The number in parentheses accounts for the baseline analyses for the initial sampling of lake water from the carboys.

Task 4: Reporting

SiREM will provide weekly updates to Geosyntec via email. After the conclusion of Phase 1, SiREM will prepare a full report detailing the material and methods used, relevant tables, figures and discussion to assist in making decisions regarding Phase 2 testing in consultation with Geosyntec. Similarly, a full report will be provided at the conclusion of Phase 2. Should the outcome of Phase 1 suggest that none of the treatments are fit for further optimization, SiREM will provide a full report for Phase 1 only. The draft report will be provided to Geosyntec for review and comment, and the final report will be provided after receipt of comments on the draft version.

2. SCHEDULE

SiREM is prepared to commence work upon award of contract. Testing and reporting of Phase 1 should be complete within approximately 10 weeks of sample receipt. The Phase 1 draft report will be submitted within two weeks of receipt of final analytical data from Phase 1. Phase 2 should be complete within approximately 6 weeks of sample receipt of the additional sediment cores. The Phase 2 draft report will be submitted within two weeks of receipt of final analytical data from Phase 2. The final report for both Phases will be provided two weeks after receipt of comments on the draft versions.

3. COST ESTIMATE AND ASSUMPTIONS

SiREM is prepared to conduct the proposed scope of work for lump sum not-to-exceed without authorization of \$43,100 for Phase 1 and \$68,100 for Phase 2. These costs include set-up and testing, reporting, all professional time, analytical costs and general laboratory disbursements. The costs are broken out as follows in Table 5.

Table 5: Breakdown of Study Costs by Task

Phase	Labor	Analytical	Disbursements	Total
Phase 1	\$25,200.00	\$12,400.00	\$5,500.00	\$43,100.00
Phase 2	\$39,200.00	\$24,400.00	\$4,500.00	\$68,100.00

This cost estimate is based on the following assumptions:

1. No Workplan, other than this proposal will be required for submittal/approval by regulatory agencies.
2. Sample collection and shipment to SiREM are paid for by customer (costs not included herein).
3. All price quotes are valid until 31 October 2023.

The contract terms and conditions applicable to laboratory research studies are provided in the attached terms and conditions (Attachment A). Please note that invoicing will consist of an initial 50% charge of the total budget upon initiation of the study and the remaining 50% will be billed monthly based on percent complete with the final billing upon delivery of the report. Your signature below and a PO number will confirm your acceptance of SiREM's proposal. Upon your approval, SiREM will proceed with its services.

Please note that SiREM is a division of Geosyntec Consultants, Inc., a corporation organized under the laws of the State of Florida.

If SiREM's proposal is acceptable, please indicate agreement by having an authorized representative sign in the space provided below and returning a complete copy of this proposal and attachments to my attention. Should you have any questions or need additional information regarding this quotation, please contact me at 865-291-4700.

Sincerely,



Rosemary Le, Ph.D.
Laboratory Supervisor I

cc: Jacques Smith, Ph.D.
SiREM Knoxville Branch Manager

Attachment A: Terms and Conditions for Research Studies

Agreed and Accepted By:

Proposal: Si-06416-032323	Total Amount: US \$111,200	
Authorized Signature		
Printed Name		
Email Address		
Purchase Order	PO #	
Prime Contract	<input type="checkbox"/> Applies, Copy Attached	<input type="checkbox"/> No Prime Contract Applies

ANALYTICAL					
Item	Test	Description	Unit Price	Qty	Total
BASELINE WATER PHASE 1					
1	pH	pH - Accumet XL-15 pH meter	\$ 15.00	2	\$ 30.00
2	DO	Dissolved oxygen - Hach sensION™ + DO6 probe	\$ 15.00	2	\$ 30.00
3	ORP	ORP - Accumet XL-15 ORP probe	\$ 15.00	2	\$ 30.00
4	Conductivity	Conductivity - Hach sensION™ + EC5 probe	\$ 15.00	2	\$ 30.00
5	total P	EPA Method 365.2/365.3/365.4/SM4500-P-[B+E]/CE-81-1	\$ 23.00	2	\$ 46.00
6	total TKN	EPA Method 351.2/CE-81-1	\$ 34.50	2	\$ 69.00
7	ammonia	EPA Method 350.1/SM4500-NH3-H/CE-81-1	\$ 28.75	2	\$ 57.50
8	NOx	EPA Method 353.2/SM4500-NO-3-F/CE-81-1	\$ 23.00	2	\$ 46.00
9	orthophosphate	EPA Method 365.1/365.2/SM4500-P-E	\$ 28.75	2	\$ 57.50
10	alkalinity	EPA Method 2340B	\$ 17.25	2	\$ 34.50
BASELINE SEDIMENT					
11	% moisture	EPA Method 160.3	\$ 34.50	1	\$ 34.50
12	bulk density	EPA Method COE-EM-1110-2-1906 AP2 - Shelby tube	\$ 34.50	1	\$ 34.50
13	total organic carbon	EPA Method 5310 or 9060	\$ 51.75	1	\$ 51.75
14	total volatile solids	EPA Method SM2540	\$ 17.25	1	\$ 17.25
PHASE 1 - OXIC					
15	pH	pH - Accumet XL-15 pH meter	\$ 15.00	28	\$ 420.00
16	DO	Dissolved oxygen - Hach sensION™ + DO6 probe	\$ 15.00	28	\$ 420.00
17	ORP	ORP - Accumet XL-15 ORP probe	\$ 15.00	28	\$ 420.00
18	total P	EPA Method 365.2/365.3/365.4/SM4500-P-[B+E]/CE-81-1	\$ 23.00	28	\$ 644.00
19	total TKN	EPA Method 351.2/CE-81-1	\$ 34.50	28	\$ 966.00
20	ammonium	EPA Method 350.1/SM4500-NH3-H/CE-81-1	\$ 28.75	28	\$ 805.00
21	NOx	EPA Method 353.2/SM4500-NO-3-F/CE-81-1	\$ 23.00	28	\$ 644.00
22	orthophosphate	EPA Method 365.1/365.2/SM4500-P-E	\$ 28.75	28	\$ 805.00
23	alkalinity	EPA Method 2340B	\$ 17.25	16	\$ 276.00
PHASE 1 - ANOXIC					
24	pH	pH - Accumet XL-15 pH meter	\$ 15.00	28	\$ 420.00
25	DO	Dissolved oxygen - Hach sensION™ + DO6 probe	\$ 15.00	28	\$ 420.00
26	ORP	ORP - Accumet XL-15 ORP probe	\$ 15.00	28	\$ 420.00
27	T-P/O-P	total phosphate and total ortho-phosphate, Hach kit TNT844	\$ 15.00	28	\$ 420.00
28	total N	EPA Method 351.2 + 353.2/CE-81-1	\$ 23.00	28	\$ 644.00
29	total P	EPA Method 365.2/365.3/365.4/SM4500-P-[B+E]/CE-81-1	\$ 23.00	28	\$ 644.00
30	total TKN	EPA Method 351.2/CE-81-1	\$ 34.50	28	\$ 966.00
31	ammonium	EPA Method 350.1/SM4500-NH3-H/CE-81-1	\$ 28.75	28	\$ 805.00
32	NOx	EPA Method 353.2/SM4500-NO-3-F/CE-81-1	\$ 23.00	28	\$ 644.00
33	orthophosphate	EPA Method 365.1/365.2/SM4500-P-E	\$ 28.75	28	\$ 805.00
34	alkalinity	EPA Method 2340B	\$ 17.25	16	\$ 276.00
Baseline + Phase 1 total =					\$ 12,432.50
BASELINE WATER PHASE 2					
35	pH	pH - Accumet XL-15 pH meter	\$ 15.00	2	\$ 30.00
36	DO	Dissolved oxygen - Hach sensION™ + DO6 probe	\$ 15.00	2	\$ 30.00
37	ORP	ORP - Accumet XL-15 ORP probe	\$ 15.00	2	\$ 30.00
38	Conductivity	Conductivity - Hach sensION™ + EC5 probe	\$ 15.00	2	\$ 30.00
39	total P	EPA Method 365.2/365.3/365.4/SM4500-P-[B+E]/CE-81-1	\$ 23.00	2	\$ 46.00
40	total TKN	EPA Method 351.2/CE-81-1	\$ 34.50	2	\$ 69.00
41	ammonia	EPA Method 350.1/SM4500-NH3-H/CE-81-1	\$ 28.75	2	\$ 57.50
42	NOx	EPA Method 353.2/SM4500-NO-3-F/CE-81-1	\$ 23.00	2	\$ 46.00
43	orthophosphate	EPA Method 365.1/365.2/SM4500-P-E	\$ 28.75	2	\$ 57.50
44	alkalinity	EPA Method 2340B	\$ 17.25	2	\$ 34.50
BASELINE SEDIMENT (Shallow/Intermed. Cores)					
45	% moisture	EPA Method 160.3	\$ 34.50	2	\$ 69.00
46	bulk density	EPA Method COE-EM-1110-2-1906 AP2 - Shelby tube	\$ 34.50	2	\$ 69.00
47	total organic carbon	EPA Method 5310 or 9060	\$ 51.75	2	\$ 103.50
48	total volatile solids	EPA Method SM2540	\$ 17.25	2	\$ 34.50
PHASE 2 - OXIC then ANOXIC					
49	pH	pH - Accumet XL-15 pH meter	\$ 15.00	126	\$ 1,890.00
50	DO	Dissolved oxygen - Hach sensION™ + DO6 probe	\$ 15.00	126	\$ 1,890.00
51	ORP	ORP - Accumet XL-15 ORP probe	\$ 15.00	126	\$ 1,890.00
52	total P	EPA Method 365.2/365.3/365.4/SM4500-P-[B+E]/CE-81-1	\$ 23.00	126	\$ 2,898.00
53	total TKN	EPA Method 351.2/CE-81-1	\$ 34.50	126	\$ 4,347.00
54	ammonium	EPA Method 350.1/SM4500-NH3-H/CE-81-1	\$ 28.75	126	\$ 3,622.50
55	NOx	EPA Method 353.2/SM4500-NO-3-F/CE-81-1	\$ 23.00	126	\$ 2,898.00
56	orthophosphate	EPA Method 365.1/365.2/SM4500-P-E	\$ 28.75	126	\$ 3,622.50
57	alkalinity	EPA Method 2340B	\$ 17.25	36	\$ 621.00
Phase 2 Baseline =					\$ 706.50
Phase 2 OXIC + ANOXIC =					\$ 23,679.00
Grand Total for Analytical =					\$ 36,800.00

LABOR PHASE 1 + PHASE 2					
			UNIT PRICE	P1 QTY	Total
58	STAFF	Senior Professional - JS	\$ 254.00	9.6	\$ 2,438.40
59		Staff Professional - RL	\$ 178.00	40.2	\$ 7,155.60
60		Sr. Tech I - SS	\$ 91.00	74.4	\$ 6,770.40
61		Tech I - KW, BW, WW	\$ 87.00	99.6	\$ 8,665.20
62		Project Admin	\$ 85.00	2.4	\$ 204.00
			UNIT PRICE	P2 (OXIC + ANOXIC) QTY	Total
63	STAFF	Senior Professional - JS	\$ 254.00	10.8	\$ 2,743.20
64		Staff Professional - RL	\$ 178.00	17.1	\$ 3,043.80
65		Sr. Tech I - SS	\$ 91.00	168	\$ 15,288.00
66		Tech I - KW, BW, WW	\$ 87.00	204	\$ 17,748.00
67		Project Admin	\$ 85.00	4.8	\$ 408.00
				P1 Labor Total =	\$ 25,200.00
				P2 Labor Total =	\$ 39,231.00
				P1 + P2 Labor Grand Total =	\$ 64,431.00

MATERIALS/DISBURSMENTS					
Phase 1					
			Unit Price	Qty	Total
68		filters for analytical - 12 per box	\$ 126.00	5	\$ 630.00
69		pH standard solution	\$ 56.00	1	\$ 56.00
70		Compressed argon	\$ 210.00	3	\$ 630.00
71		Compressed oxygen	\$ 168.00	3	\$ 504.00
72		Materials for Columns	\$ 210.00	12	\$ 2,520.00
73		red light bulbs	\$ 14.00	2	\$ 28.00
74		bed lamp stand	\$ 14.00	2	\$ 28.00
75		4-inch clear PVC pipe (8 ft)	\$ 198.80	4	\$ 795.20
Phase 2					
			Unit Price	Qty	Total
76		filters for analytical - 12 per box	\$ 126.00	10	\$ 1,260.00
77		Compressed argon	\$ 210.00	3	\$ 630.00
78		Compressed oxygen	\$ 168.00	3	\$ 504.00
79		Replacement light bulbs	\$ 14.00	2	\$ 28.00
80		4-inch clear PVC pipe (8 ft)	\$ 198.80	9	\$ 1,789.20
				P1 + P2 Materials Total =	\$ 9,402.40
81		Waste disposal	\$ 560.00	1	\$ 560.00
				Disbursements Total =	\$ 10,000.00
				GRAND TOTAL FOR PROPOSAL =	\$111,200.00

City of Lakeland
Consultant Expense Reimbursement Policy
Revised 6/18/2018

General

This policy governs all eligible reimbursement expenses paid to consultants hired by City Departments under professional service contracts. All reimbursable expenses must adhere to the following provisions and be verified and approved by the appropriate department head, or their designated representative administering the professional contract. An exhibit to each contract or agreement must be accepted by each professional services consultant prior to the agreement being considered fully executed. All proposed reimbursable consultant expenses must be submitted to the managing designee with matching receipts and specific documentation outlining the nature of the business conducted in association with the expenditure prior to approval by the City.

Consultant Contract Provisions

1. Reasonable expenses will be reimbursed for customary business activities deemed integral to the completion of the consulting assignment (i.e. phone calls, copies, printing, facsimile services, etc.)
2. Reasonable travel expenses will be reimbursed at a rate not-to-exceed the following:
 - Car Rental – Limited to mid-size vehicles or smaller.
 - Airline Travel – Limited to tourist or coach class fare, all efforts will be made to identify the most economical flight options available at time of scheduling.
 - Use of private automobile for administration of project related requirements may be reimbursed at the current IRS mileage reimbursement rate. (www.irs.gov)
 - Local hotel accommodations will be reimbursed at a rate not-to-exceed the GSA lodging rate for Tampa, Florida per night plus sales tax. (www.gsa.gov) Incidentals related to the hotel stay will not be reimbursed.
 - Meal expenses will be reimbursed at a rate not-to-exceed the GSA M&IE rate for Tampa, Florida. A maximum of 15% gratuity on meals will be allowed.
 - No entertainment expenses will be reimbursed, including, but not limited to, alcoholic beverages, in-room entertainment, registrations, tickets to sporting events or entertainment events, banquet and or client entertainment.
 - No reimbursement will be provided for personal expenses of any nature.
 - When representing the interest of the City outside of the Lakeland area, reimbursement of reasonable hotel accommodation costs will be provided as determined by the responsible Department Head.

Collection of Back-up Documentation

All consultant expenditures submitted for reimbursement shall be properly documented and approved by the appropriate department head or designated representative managing the agreement. Original receipts must be provided for payment, along with documentation on purpose. The department head or designated representative will be responsible for the collection of this documentation and for communicating with the consultant on issues related to reimbursable costs or back-up documentation. It will be the responsibility of the department head or designated representative to obtain the necessary approvals from the City Managers' Office for variances to the policy.

Prior to payment of invoices, the following will be required:

1. Verification that invoice references the correct professional service contract.
2. Verification that the specific contract deliverables have been met and scope of work has been satisfactorily completed.
3. Verification that all consultant reimbursable expenses were incurred in conjunction with specified services rendered and billed at cost.
4. All reimbursable expenses must be submitted with receipts documenting expenses.
5. Verify all expense calculations are correct.

Variance Approval

All variances or modifications to the provisions in this policy must be approved by the City Manager or authorized designee.