AQUASCAPE ENVIRONMENTAL

March 19, 2012

Austin Lake HOA
C/O Mr. Al Little
2232 Austin Lake Dr.
Smyrna, GA 30082

RE: Lake Sediment Assessment
Austin Lake, Cobb County

Dear Mr. Little:

At your request, Aquascape Environmental conducted a Lake Sediment Assessment for the approximately 5.4 acre impoundment located within the Austin Lake community in Cobb County (Figure 1). Field activities for this investigation were performed on March 14 and 15, 2012. The purpose of this investigation was to document existing sediment conditions and quantify sediment that has accumulated since the initial study was conducted in March 2006. We have developed this report based on our investigation and are pleased to present it for your review.

EXECUTIVE SUMMARY

A lake sediment study was conducted to gather data regarding sediment and water depths. GPS equipment and physical markers were used to replicate the original sediment study performed on February 24 and March 20, 2006, which set up eight (8) transects across the primary inlet of the lake. In addition, general observations about impoundment conditions are included in this report.

The information gathered during the investigation indicates an approximate 35% increase in sediment within the study area compared to our March 2006 report, with a corresponding loss of 0.57 feet in average water depth. Furthermore, the data indicates an increase in sediment volume of roughly 15% within the defined transect study area.

Note: This Executive Summary is provided for your convenience only, and should not be used in lieu of the full report.

LAKE SEDIMENT STUDY

General Observations/Notes

- The exact age of the lake could not be determined. However, in our review of map information provided by the 1992 United States Geological Survey (USGS) *Mableton, Georgia*, the lake is shown as an original landscape feature. This would date the lake's construction at some time prior to 1992, for an approximate age of at least 20.
- Throughout our investigation, the clarity of the lake was greater than 36 inches.
- The total watershed for this impoundment was determined to be approximately 149.14 acres.
- No visible signs of recent sediment impact accumulations were observed within the primary inlet.

Study Methods

This follow-up survey used the same study areas that were used in the 2006 survey. Some of the iron pins that were flagged during the previous study were missing and were relocated with the use of a survey grade GPS to ensure survey accuracy. A total of eight (8) transects were laid out at 25, 50, 75, 100, 150, 200, 250 and 300 feet from the baseline. In order to establish sampling points along each transect, a calibrated line was utilized. Each transect station was spaced at 10 foot intervals for transects under 150 feet in length and at 15 foot intervals thereafter. The total number of stations along each transect depended on the length of the particular transect. The line was stretched across the lake at each transect location and the water depths were recorded at each station. Water depths were determined using a calibrated survey rod allowed to rest on the surface of the sediment. The remaining portions of the lake were documented with random probe measurements.

Measurements were taken at each location using a graduated survey rod. Water depth measurements were collected by resting the end of the rod on top of the bottom sediments. Pond depth measurements were collected by inserting the rod into the sediments until consolidated sediments were encountered. This typically delineates the original pond bottom. Sediment thickness was then calculated by subtracting the pond depth from the water depth. The water elevation of the pond served as the control point for these measurements. The top of the angle iron on the concrete spillway was measured at 3.85 feet to the water's surface and was used as the benchmark for this survey. The water level was found to be 0.25 feet lower than the previous survey. It is important to note that the data provided in Table 1 has been adjusted in order to provide comparable figures.

The locations of each transect and random probes were recorded using a Trimble GeoXH Global Positioning System receiver. This system utilizes a 12-channel integrated GPS/Beacon/Satellite Differential receiver and antenna to record point position data with an accuracy of <1 meter horizontal. Integrating real-time differential GPS (DGPS) into the system is necessary for accurately relocating these stations established in the 2006 baseline study. This system was also used to construct a site map of the lake, which identifies each transect and random probe locations (Figures 2 and 3).

Lake Sediment Study Summary

Study Data

The following table is a summary of the study results. The entire data of measurements from this study, as well as comparison data, is attached as Table 1.

	2006	**2012**
Number of Data Points	94	79
Average Water Depth[1] (Feet)	2.31	1.74
Range of Water Depths (Feet)	0.00-8.86	0.00-9.15
Average Sediment Thickness[2] (Feet)	3.15	3.75

Notes: 1. Water depth is the measurement from the water surface to the top of the existing sediments.
2. Sediment thickness is the depth of sediment from the top of sediment to the "hard" bottom of pond.

ANALYSIS OF FINDINGS

General Overview of Sediment Impacts to Lakes and Impoundments

The sedimentation of a lake is a natural process that begins when the first drop of water enters a lake following its construction. Sedimentation in an undisturbed condition consists of organic matter and the natural soil movement that occurs as a result of rainfall events.

As a general rule, the primary impact of sedimentation in a lake occurs where fast-moving, sediment-laden water comes in contact with the slack waters of the impoundment. The sediment-rich waters lose energy, causing the sediment load to fall out and be deposited in the lake. Sediment accumulation will tend to form at this location and move toward the end of the lake at a speed relative to the degree of deposition.

There are two basic types of soil particles that affect lakes. The first consists of small rocks and larger particles of coarse sand. These are the heaviest materials and are the first to drop out of the moving water, which is why these particles generally are found in the mouth of the lake. The second type is made up of lighter, colloidal clay materials that are minute in size. These particles, which have a high surface area-to-weight ratio, are suspended within the water column for longer periods of time, without contributing appreciably to the overall sediment accumulation within an impoundment.

Determination of Sedimentation Amounts

	Sediment Volume (CY)	
Transect	**2006**	**2012**
25	81	71
50	142	135
75	480	395
100	338	272
150	734	734
200	729	867
250	826	1169
300	958	1407
Randoms	15,282	24,887
Total	19,569	29,936

As outlined within the summary table above, the information gathered during the investigation indicates approximately ±29,936 cubic yards of sediment within the study area. This represents a 35% increase compared to the ±19,569 cubic yards of material documented in our March 2006 report, with a corresponding loss of 0.57 feet in average water depth. It is important to note that due to the random nature of our investigation with those portions of the lake outside of the transect study area, these quantifications should be considered rough approximations only. A more accurate picture of sediment conditions is garnered through a comparison of the transect study area data. The information gathered during our investigation indicates that approximately ±5,050 cubic yards of sediment is present within the transect study area. This represents an increase in volume of ±763 cubic yards or roughly 15% in comparison to the 2006 data.

As depicted within the summary table above, the data documented a minor decrease in the sediment volumes within the first 100 linear feet of study area. This is a common occurrence, especially considering the time that has elapsed in between the two investigations. This conclusion is typically the

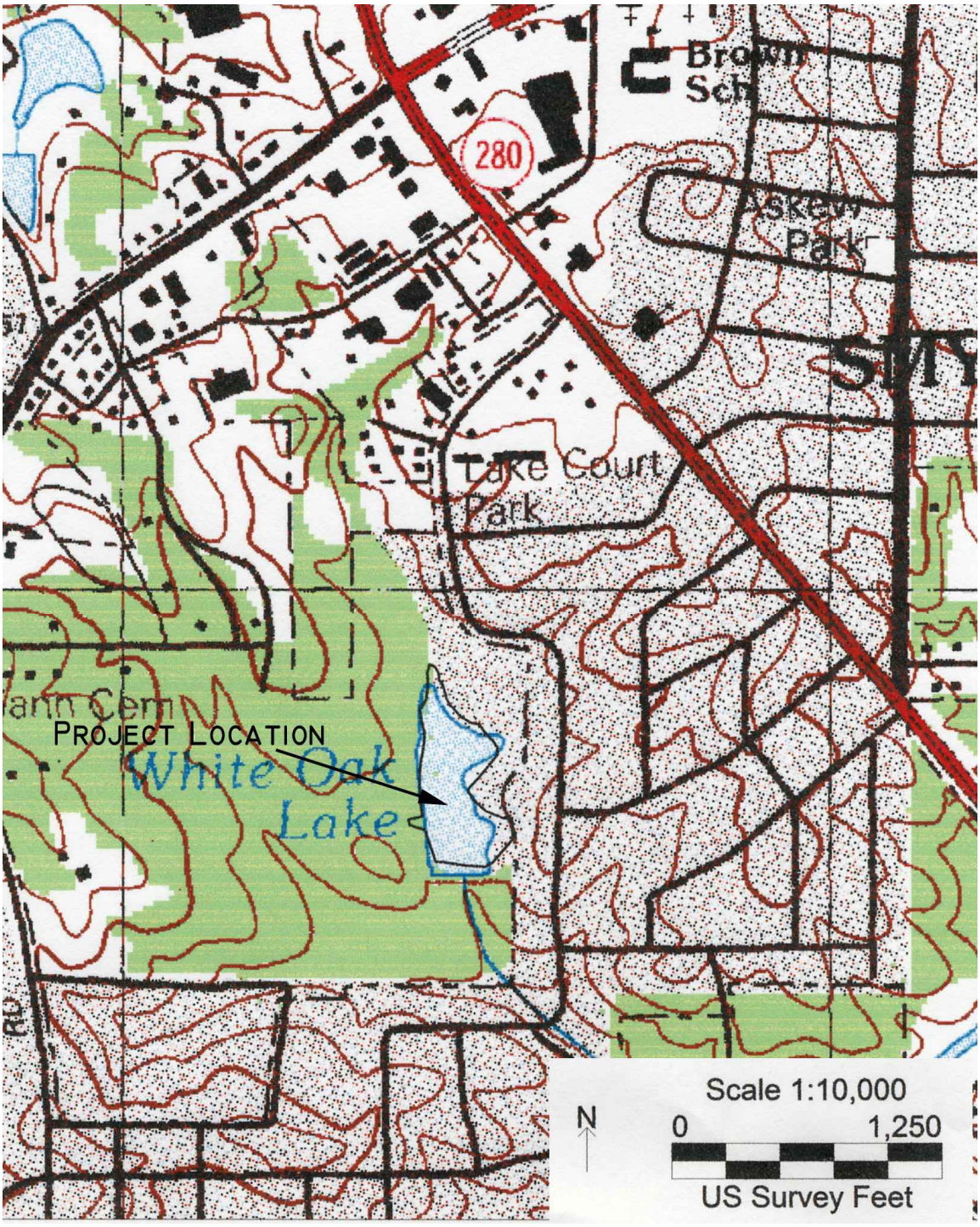
result of both consolidation of un-compacted sediments over time as well as the natural migration of sediments down gradient and further into the impoundment in response to significant storm events. *[Note: Sediment amounts are derived by applying the surface area of each transect study area (as garnered from GPS survey data) to the corresponding average sediment thickness for each transect, utilizing the average end method.]* For instance, Transect 2 represents approximately 838 square feet of impoundment area starting as measured from Transect 1 and extending approximately 25 linear feet to the Transect 2 demarcation. The measured average sediment thickness was found to be 3.80 feet for Transect 1 and 4.66 feet for Transect 2 for a final average sediment thickness of 4.34 feet based upon the average end method. This equates to ±135 cubic yards of material that has moved into this particular area of the lake since its construction and/or last maintenance dredging event. A complete outline of the calculations utilized for sediment quantification for this report has been included as Table 2.

We are pleased to have been able to assist you with this project and have made every effort to conduct a thorough assessment and analysis based upon the proposed study scope. If you have any questions about any aspect of this report, please do not hesitate to contact me.

Sincerely,
Aquascape Environmental

Jeremy Brown
Wildlife Biologist/Environmental Specialist

Attachments: Figure 1 - Site Location Map
Figure 2 - Study Area Location Map
Table 1 - Sediment Probing Data
Table 2 - Sediment Quantification Calculations



USGS Quad Map, *Mableton, Georgia 1992*

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FIGURE 1
PROJECT LOCATION MAP
FOLLOW-UP SEDIMENT REPORT
MARCH 19, 2012

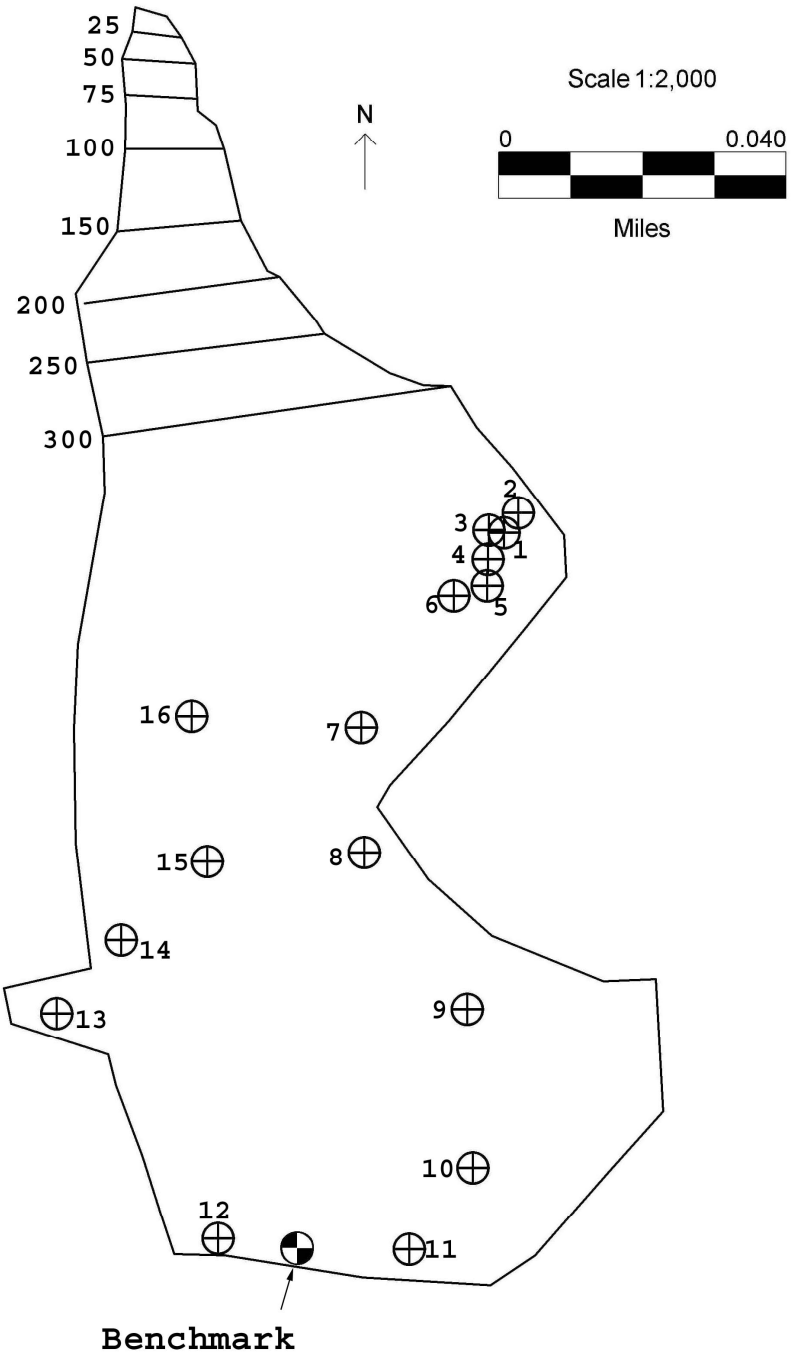

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FIGURE 2

STUDY AREA LOCATION MAP

FOLLOW-UP SEDIMENT REPORT

MARCH 19, 2012

Table 1
Sediment and Water Depth Data
Austin Lake
March 19, 2012

Transect #25 **Length: 39.70**

Station	Water Depth (ft)	Sediment Thickness (ft)	Lake Depth (ft)
10	0.20	3.72	3.92
20	0.20	2.76	2.96
30	0.00	4.91	4.91
Average	0.13	3.80	3.93

Transect #50 **Length: 52.70**

Station	Water Depth (ft)	Sediment Thickness (ft)	Lake Depth (ft)
10	0.00	5.52	5.52
20	0.00	4.15	4.15
30	0.00	4.15	4.15
40	0.31	3.94	4.25
50	0.00	5.53	5.53
Average	0.06	4.66	4.72

Transect #75 **Length: 62.70**

Station	Water Depth (ft)	Sediment Thickness (ft)	Lake Depth (ft)
10	0.00	2.95	2.95
20	0.00	3.65	3.65
30	0.00	3.05	3.05
40	0.02	5.44	5.46
50	0.32	4.21	4.53
60	0.00	4.95	4.95
Average	0.06	4.04	4.10

Transect #100 **Length: 74.40**

Station	Water Depth (ft)	Sediment Thickness (ft)	Lake Depth (ft)
10	0.00	4.20	4.20
20	0.00	4.41	4.41
30	0.00	4.05	4.05
40	0.00	5.54	5.54
50	0.01	4.33	4.34
60	0.22	4.32	4.54
70	0.18	4.05	4.23
Average	0.06	4.41	4.47

Table 1
Sediment and Water Depth Data
Austin Lake
March 19, 2012

Transect #150 **Length: 98.30**

Station	Water Depth (ft)	Sediment Thickness (ft)	Lake Depth (ft)
15	1.19	2.93	4.12
30	0.75	5.11	5.86
45	0.04	5.49	5.53
60	0.02	4.13	4.15
75	0.28	3.58	3.86
90	0.00	4.35	4.35
Average	0.38	4.27	4.65

Transect #200 **Length: 144.10**

Station	Water Depth (ft)	Sediment Thickness (ft)	Lake Depth (ft)
15	1.90	3.05	4.95
30	2.45	2.00	4.45
45	2.21	6.25	8.46
60	1.45	4.41	5.86
75	0.40	7.46	7.86
90	1.03	4.27	5.30
105	0.50	3.50	4.00
120	0.85	3.15	4.00
135	0.29	3.67	3.96
Average	1.23	4.20	5.43

Transect #250 **Length: 191.60**

Station	Water Depth (ft)	Sediment Thickness (ft)	Lake Depth (ft)
15	0.80	5.16	5.96
30	2.72	1.92	4.64
45	2.25	2.38	4.63
60	2.84	2.02	4.86
75	2.69	6.05	8.74
90	2.45	6.60	9.05
105	1.91	2.69	4.60
120	1.58	1.92	3.50
135	1.22	4.64	5.86
150	1.12	6.95	8.07
165	0.98	2.48	3.46
Average	1.87	3.89	5.76

Table 1
Sediment and Water Depth Data
Austin Lake
March 19, 2012

Transect #300 **Length: 252.50**

Station	Water Depth (ft)	Sediment Thickness (ft)	Lake Depth (ft)
15	1.59	4.76	6.35
30	2.90	3.05	5.95
45	2.79	1.21	4.00
60	2.90	2.60	5.50
75	2.92	2.14	5.06
90	2.95	1.68	4.63
105	3.05	1.97	5.02
120	3.69	5.87	9.56
135	2.90	2.30	5.20
150	2.52	2.63	5.15
165	2.29	2.14	4.43
180	0.95	4.10	5.05
195	1.69	2.71	4.40
210	1.42	2.14	3.56
225	1.69	3.36	5.05
240	2.45	3.71	6.16
Average	2.42	2.90	5.32

Random Probes

Station	Water Depth (ft)	Sediment Thickness (ft)	Lake Depth (ft)
1	0.00	4.94	4.94
2	0.28	4.21	4.49
3	1.90	3.77	5.67
4	0.05	9.44	9.49
5	0.48	5.08	5.56
6	1.85	7.44	9.29
7	4.90	3.77	8.67
8	5.66	1.55	7.21
9	4.91	0.82	5.73
10	9.15	2.51	11.66
11	6.85	2.16	9.01
12	6.50	2.43	8.93
13	3.10	0.46	3.56
14	5.36	1.57	6.93
15	6.70	1.93	8.63
16	5.68	1.61	7.29
Average	3.96	3.36	7.32

Table 2
Calculations
Austin Lake
March 19, 2012

Calculations of Areas and Cubic Yards of Sediment (Average End Method)

Transect #	Transect Station (ft)	Transect Area (sq ft per GPS)	Avg Sediment Depth per Transect (ft)	Total Cubic Yards Per Transect Area (ft)
1	25	503	3.80	70.73
2	50	838	4.34	134.55
3	75	2,466	4.32	394.73
4	100	1,730	4.24	271.82
5	150	4,562	4.35	734.21
6	200	5,542	4.22	866.88
7	250	7,836	4.03	1,169.16
8	300	11,505	3.30	1,407.43
			Total	5,049.50

	Probes	(sq ft per GPS)	Avg Sediment Depth	Total Cubic Yards
Random	17	200,242.00	3.36	24,886.56