

December 11, 2000

Mr. Charles Rossi
President
Tabb Lakes Homes Association
Box 8088
Yorktown, Virginia 23693

**RE: Sediment Load Analysis
Tabb Lakes Homes Association**

Dear Mr. Rossi:

Williamsburg Environmental Group, Inc. (WEG) has completed the Sediment Load Analysis of the two lakes situated within the Tabb Lakes subdivision. A detailed bathymetric survey of water depths and sediment depths was conducted to complete the assessment. Design plans for the subdivision were provided to WEG by the Tabb Lakes Homes Association. Those plans were evaluated to determine design normal pool and lake depths. A review of the plans showed that both lakes had a design normal water surface elevation of 27 feet above mean sea level (ft msl) and a design lake bottom elevation of 21 ft msl for a total design depth of 6 feet.

Sediment Load Analysis

As part of the analysis, detailed cross-sections and longitudinal profiles were developed for both lakes using data gathered during the field assessment. In addition, several photographs are attached which show the two lakes, several inlet locations, and the berm behind commercial properties along Rt. 17. The results of the survey are presented in the attached plan set. The sections indicate water elevation, sediment thickness, and lake bottom data. Also depicted on the plans are locations of all inlets, both pipes and swales, to each lake as well as the locations of all outfall structures. Lake volumes including sediment volumes are shown in Table 1. The total volume for Lake 2, the upstream lake, is approximately 1/2 the total volume of Lake 1. Based on the sediment load analysis, approximately 13% of the volume of Lake 1 is comprised of sediment while sediment loads are approximately 12.5% of the volume in Lake 2. Soil textures were also characterized as part of the survey. Soils located in the areas of cross-sections A, B, and J exhibited a heavy clay content, while the remainder of the sediment was characterized as black organic muck.

**Table 1
Lake Volumes**

	Volume of Sediment (cubic yards)	Volume of Water (cubic yards)	Total Volume (cubic yards)
Lake 1	8400	55295	63695
Lake 2	3851	27078	30929

As shown on the attached plans, Lake 1 was constructed much deeper than the design lake bottom elevation of 21 ft msl as shown on Lake Section C1-C2. Portions of Lake 2 were not constructed to its design depth as presented on Lake Section L1-L2. The cross-section for Lake 1 shows that the depth of water in Lake 1 ranges from 9 to 14 feet. The thickness of sediment in Lake 1 ranged from 0 to 2.7 feet with an average thickness of 0.6 feet. Based on these measured depths, there appears to be no need for dredging Lake 1 at this time. The Lake 2 cross-section shows areas within the lake with a depth of water less than 3 feet. The south end of Lake 2 has an average depth of 4 feet. However, this shallow depth appears to be the result of original construction instead of a heavy accumulation of sediment. For Lake 2, sediment thicknesses ranged from 0 to 1.9 feet with an average thickness of 1 foot. The analysis shows that the shallow section at the south end of Lake 2 was not the result of heavy sediment buildup. Based on the assessment, this portion of the Lake was never excavated to its original design depth of 6 feet.

Watershed Assessment

The field assessment portion of this task also included an assessment to evaluate the watershed for the two lakes. The Tabb Lakes subdivision consists of 446 homes located within the area bounded by Rt. 17, Rt. 134, and Rt. 171 (Victory Boulevard). Stormwater runoff from the subdivision drains north through two interconnected lakes, flows under Rt. 171, and ultimately drains into the Poquoson River. The Sediment Load Analysis plans show 17 inlet points, either pipes or swales, where stormwater enters the two lakes. Several inlet locations showed evidence of older sediment deposits in the lake, but the majority of the inlets showed no significant sediment deposition. The lakes within the Tabb Lakes subdivision were designed as a stormwater system connected by twin elliptical pipes under Bridge Wood Drive. Approximately 9 to 10 inches of sediment and rock was noted in those twin pipes connecting the two lakes.

New construction located within the Tabb Lakes watershed is occurring immediately east of the Tabb Lakes subdivision. This construction appears to be the only location where large sediment loads could potentially enter the lakes. Based on a review of the surrounding watershed, however, only a portion of the new construction drains towards the Tabb Lakes subdivision. Provided that adequate erosion and sediment (E & S) controls are installed at the area under construction, the lakes do not appear at risk of silting in as a result of this new development. No other potentially significant sources of sedimentation were identified within the Tabb Lakes watershed.

In addition to receiving the additional residential runoff, the lakes also collect runoff from existing commercial properties along Rt. 17. Currently, runoff from the commercial properties along Rt. 17 sheet flows to the back of the properties and then flows along a grassy channel north towards Lake 1. In an attempt to keep large amounts of water from flooding the backyards within Tabb Lakes abutting the commercial properties, York County constructed a small berm to direct the runoff towards an existing channel to the lake. Although the berm appears in good condition, the lack of an adequate channel on the west side of the berm prohibits positive drainage of this runoff to the lakes. WEG recommends the regrading/construction of an adequate channel to handle stormwater from the commercial properties.

Cost Estimate

WEG staff is currently evaluating cost estimates associated with dredging activities. Based on our experience, dredging costs can range from \$25 to \$100 per cubic yard depending on site conditions. Since it is currently unknown whether adequate dewatering of the sediments will occur once complete drawdown is completed, the type of equipment required is uncertain. As such, a barge excavator or

mechanical boom may be required to effectively dredge the two lakes. As a result, appropriate dewatering and disposal facilities will both need to be further addressed before a more accurate assessment can be completed. Additionally, access along the perimeter of the lake may pose a constraint for heavy equipment. WEG is currently compiling dredging costs from several local municipalities and contractors in order to provide the Tabb Lakes Homes Association with the most realistic cost estimate, which will be provided to the Homes Association upon our final review.

Conclusion

The lakes in the Tabb Lakes subdivision are approximately 15 years old but they appear in good condition. The south end of Lake 2 is fairly shallow which has caused problems with algal growth and the operation of a fountain. Based on the results of the sediment load analysis, however, it appears that this section of Lake 2 was not constructed to its design depth of 6 feet. On the average, only a foot of sediment was measured in this section of the lake. Lake 1 and the north end of Lake 2 are deeper and appear to have fewer problems with algal growth. Overall, the shallow depth in Lake 2 is not a result of significant sedimentation but the fact that neither the lakes nor the outfall structures were constructed in accordance with the design plans.

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

Sincerely,



Toni E. B. Small, P.E.
Civil Engineer

Attachment

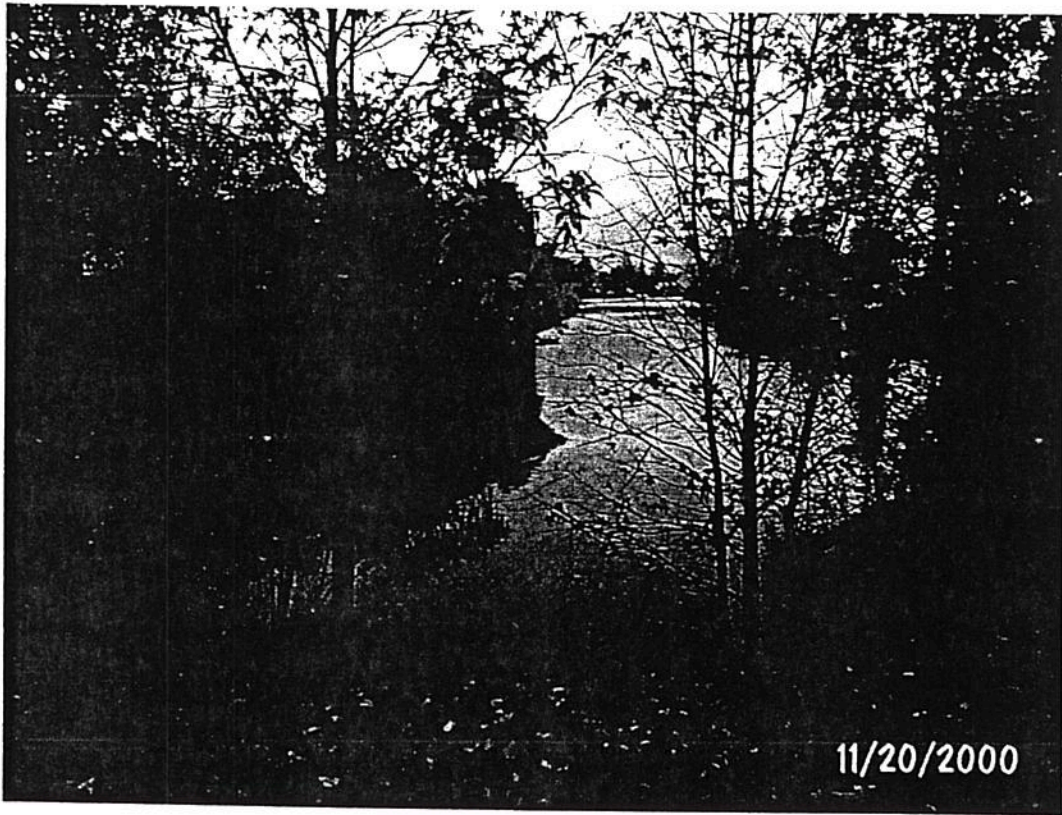


Photo #1 – View of Lake 2 from Bridge Wood Drive looking south

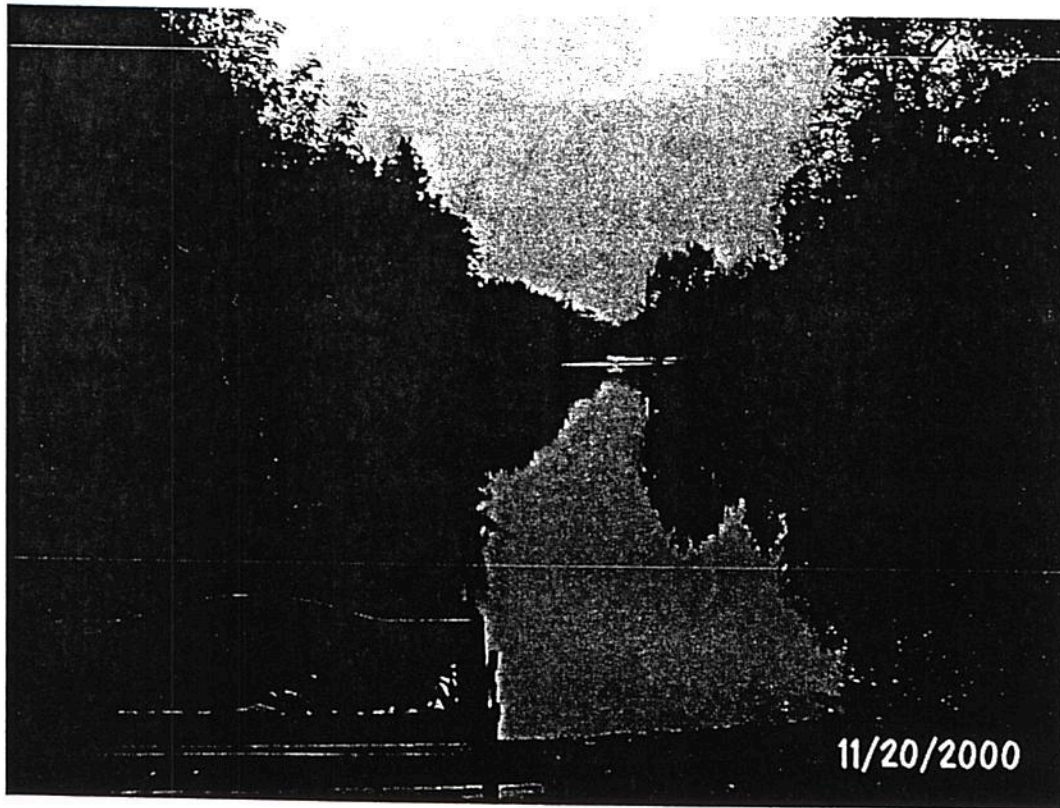


Photo #2 – View of Lake 1 from Bridge Wood Drive looking north

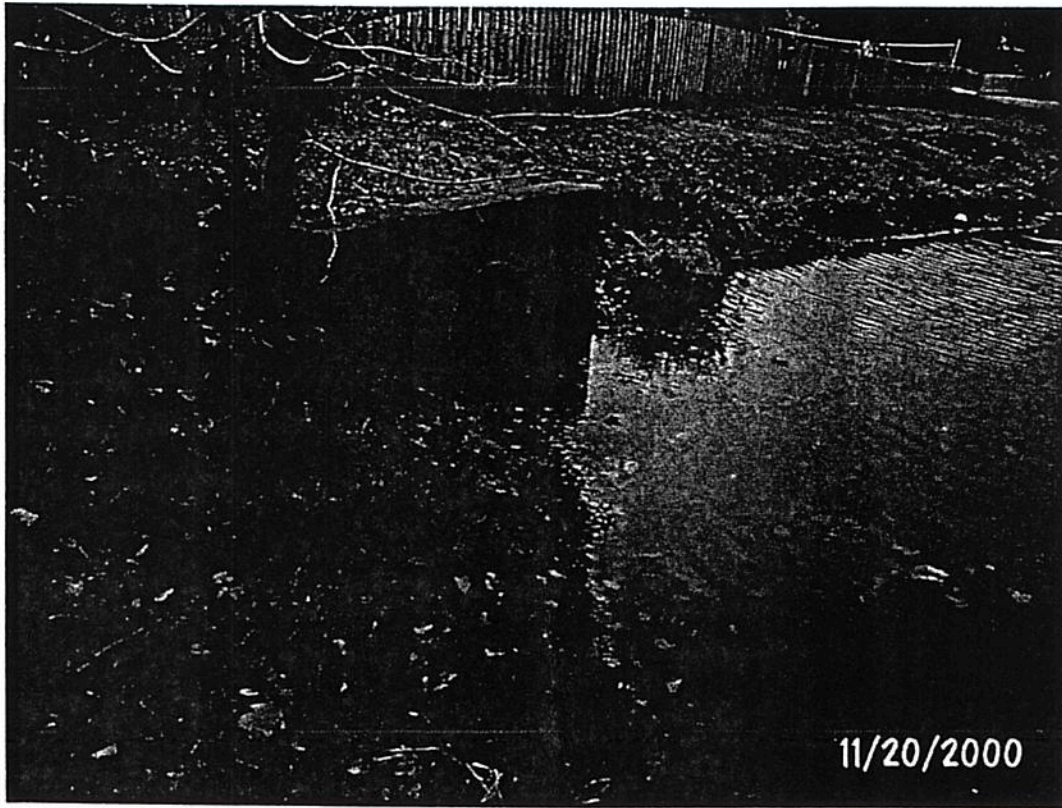


Photo #3 - View of an inlet pipe to Lake 2



Photo #4 - View of twin pipes leading to the south end of Lake 2 from Richard Run



Photo #5 – View of twin elliptical pipes under Bridge Wood Drive looking north

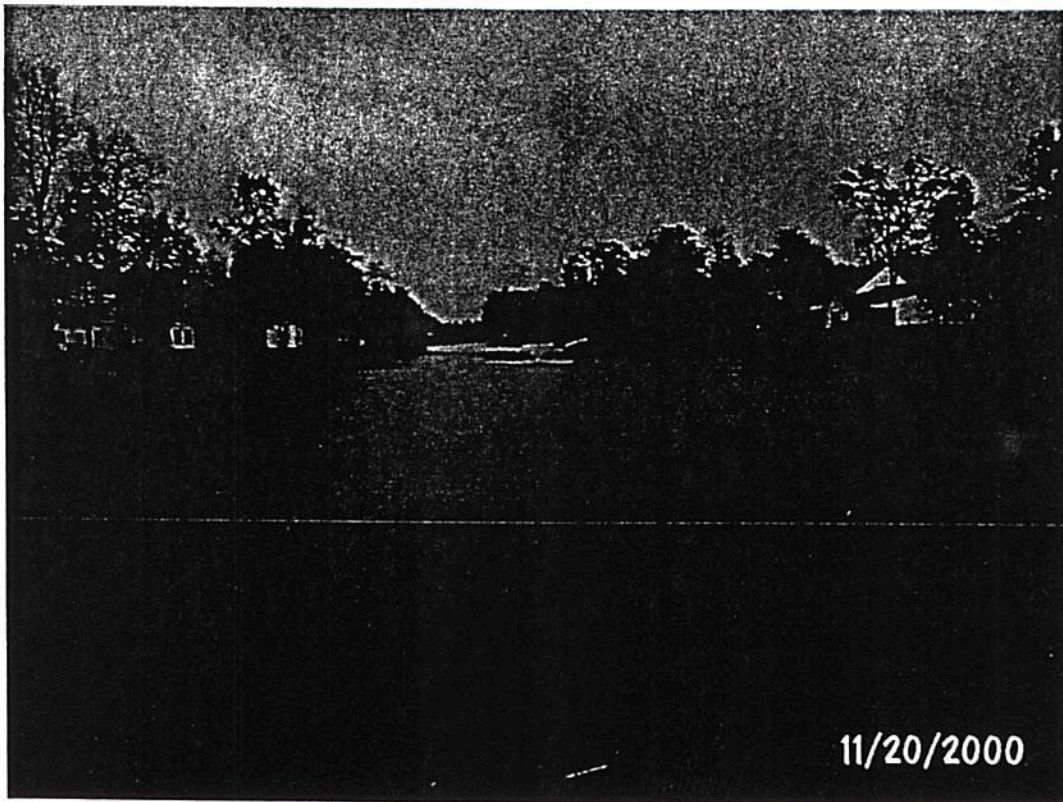


Photo #6 - View of Lake 2 from the south end looking north



Photo #7 – View of berm behind businesses along east side of Rt. 17

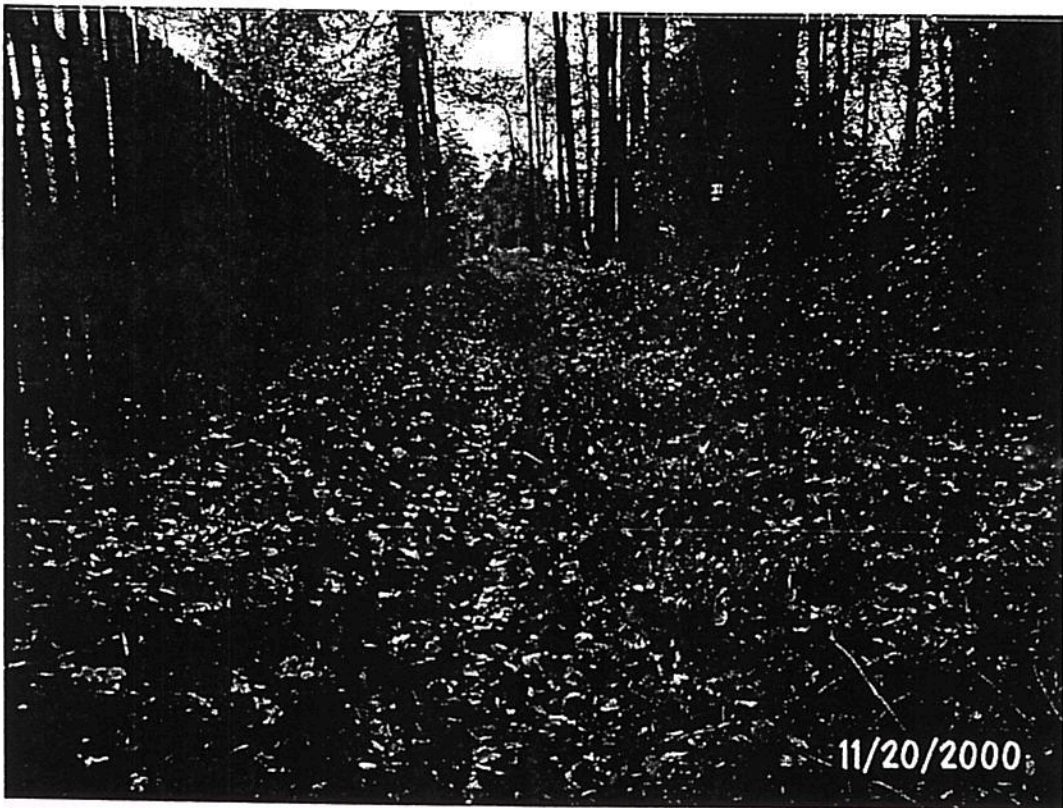


Photo #8 – Ditch draining businesses behind east side of Rt.17