

# Proposal to Town of Highland Lake for Dredging Services

***Submitted to:***

Town of Highland Lake, Alabama

***Submitted by:***

Tetra Tech, Inc.  
2110 Powers Ferry Road  
Suite 202  
Atlanta, Georgia 30339

Phone: (770) 738-6030  
Fax: (770) 850-0950  
e-mail: [brian.watson@tetrattech.com](mailto:brian.watson@tetrattech.com)

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## A. Introduction

On August 30<sup>th</sup>, 2013, representatives from the Town of Highland Lake and Tetra Tech discussed issues about the feasibility of dredging Highland Lake. This approximately 250-acre reservoir has been historically impacted by sedimentation. Two areas near the mouths of Brasher Creek and Sand Creek were dredged in or about 2000 (Figure 1). At that time, a pre-dredging survey indicated that the depths in the bays of Brasher and Sand Creeks were a maximum of about 7 to 8 feet deep. No other surveys or characterization of these two bays or other areas of the lake have been conducted since the dredging in 2000. The Town of Highland Lake would like to characterize the current condition of the lake, quantify sedimentation impacts, and evaluate potential dredging options.

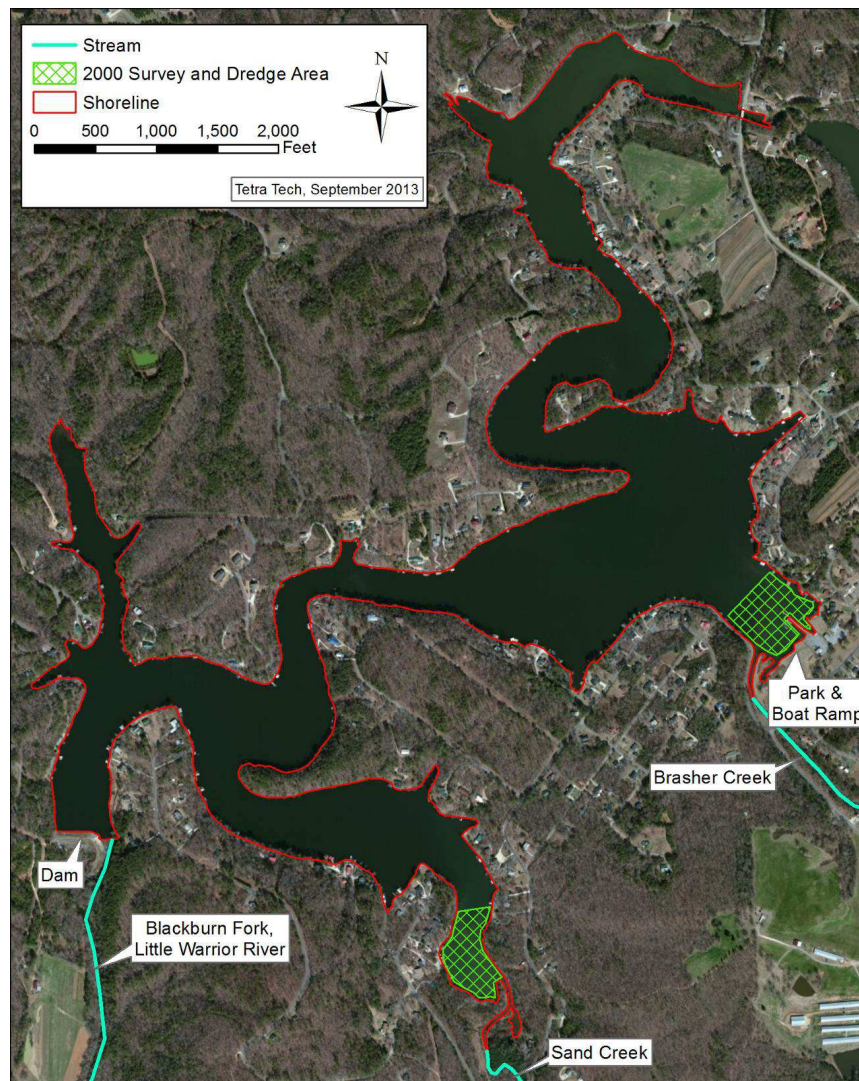


Figure 1. Highland Lake – 2000 Survey and Dredge Areas

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## B. Scope of Work

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The proposed dredging feasibility study is designed as a three-phase process. The first Phase, which is presented in two tasks, is a characterization of the areas impacted by sedimentation. Task 1 includes determining the present depths in the areas previously dredged and the change in volume since the last hydrographic survey and dredging effort. Because the 2000 hydrographic survey and dredging effort was limited to small portion of the lake, an optional Task 2 is proposed: a lakewide hydrographic survey. The purpose is to create a baseline bathymetry of the entire lake. This bathymetry then is used to evaluate the sedimentation impacts in the areas of the lake not surveyed in 2000. The results of the Phase 1 characterization will be discussed with the Town Officials to communicate the condition of the lake for use in the dredging decision making process.

The second phase also includes two tasks. Task 1 involves a sediment source study to locate the dominant sediment sources within the drainage basins to Highland Lake. The purpose is to provide information for long-term management of sediment sources. The ultimate goal is to minimize future dredging costs and improve water quality through the reduction of sediment (and associated pollutant) loads entering the lake. Task 2 will determine the approximate volume of material to be removed, evaluate various potential dredging techniques and disposal options, and address permitting and regulatory requirements.

The third phase would be support to the Town of Highland Lake in the bidding process with potential dredging companies.

An estimate of project costs and schedule are proposed based on the current understanding and best estimates of level of effort required to perform the tasks.

### Phase 1 – Task 1. Hydrographic Survey and Sediment Thickness Evaluation of Brasher Creek and Sand Creek Bays

The purpose of this task is to determine the present lake depths within the Brasher Creek and Sand Creek bays, and the present sediment thickness within these bays. The goal is to understand where sediment has become deposited, and how much sediment has been deposited within each of these bays. Tetra Tech will characterize the areas impacted by sedimentation through the following sub-tasks.

- Tetra Tech will review available data including historic bathymetric surveys, previous dredging records, topographic databases, and aerial photos, etc. Additionally, Tetra Tech will gather information from the Town related to short-term and long-term uses for the lake for use in determining how a dredging effort may improve those uses.
- A cursory investigation of the drainages to Highland Lake indicate that Brasher Creek and Sand Creek very likely contribute the highest quantities of sediment to the lake based on drainage area and land use. Typically, the largest quantities of sediment are deposited in shallow water near the mouths of the streams which carry the sediment to the lake. Additionally, shallow areas are typically of the most interest for human uses such as boating, swimming, and fishing. Thus, the hydrographic data collection effort will focus

on areas less than 10 feet deep, and on the Brasher Creek and Sand Creek bays. Other locations, such as the bay immediately east of Echo Lane, the region immediately downstream from Sugarland Lake, or other areas where uses of the lake may be impacted by sedimentation will be surveyed pending a discussion with the lake managers on areas of interest.

- The 2000 bathymetric contours of the Brasher Creek bay and Sand Creek bay will be entered into Geographic Information System (GIS) where they can be aligned with aerial photos of the lake. Newly collected hydrographic data will be entered into the GIS where depth contours can be generated and the bathymetry can be compared to the 2000 bathymetry.
- Tetra Tech will conduct a preliminary evaluation of areas to dispose of dredged materials. This will include evaluating the two sediment storage basins (one in the lakefront park at Brasher Creek, and the other at the mouth of Sand Creek) used during the 2000 dredging, plus discussing with Town Officials other potential disposal locations.
- To indicate which areas most highly impacted by sedimentation sediment thicknesses will be measured at several locations within each bay. This data will be used to estimate sediment volumes in the different areas of the two bays.
- Upon completion of the above tasks Tetra Tech will discuss with the Town Officials the results in order to help the Town make the best decisions for the next steps.

**Deliverable:** A letter report discussing the nature of sedimentation in the areas surveyed, and hard copy and digital format bathymetric maps of the areas surveyed. A meeting with Town Officials to discuss the condition of the lake and the viability of dredging.

**Approximate duration:** One month from notice to proceed

### Phase 1 – Task 2. Lakewide Hydrographic Survey

Tetra Tech will create a baseline lake bathymetry through a lakewide hydrographic survey effort. This is distinguished from Task 1 in that the lakewide survey would cover the entire 250 acres, whereas the bay surveys covers approximately 10 acres. However the level of effort is identical:

Task 2 takes one day to survey the entire lake at a low resolution, while Task 1 takes one day to survey at high resolution the previously dredged areas. Phase 1 Task 2 is considered optional because the added cost may not warrant the survey if the Town is not interested in characterizing other parts of the lake at this time. Sub-tasks include.

- All Phase 1 Task 1 sub-tasks plus the following:
- A lakewide hydrographic survey will be conducted to provide overall lake bathymetry and as a cursory investigation of sedimentation issues in other regions of the lake. This overall bathymetry will be less detailed than the Brasher Creek and Sand Creek bay

surveys. It will provide an overall snapshot of the lake, but will not be detailed enough for dredge volume calculations.

- The hydrographic data will be entered into GIS as a baseline dataset where estimates of lake volumes and dredging volumes can be made for the existing conditions, and for comparison with any future hydrographic data.

**Deliverable:** A report discussing the nature of the lake bathymetry and any noted sedimentation issues in the areas surveyed, and hard copy and digital format bathymetric maps of Highland Lake. A meeting with Town Officials to discuss the overall bathymetry of the lake.

**Approximate duration:** One month from notice to proceed

### Phase 2 – Task 1. Watershed Sediment Source Assessment.

Tetra Tech will characterize the watershed for long-term sediment management purposes. The key to reducing long-term dredging expenses is to prevent soil erosion in the first place, and to keep eroded soil from being transported from its source. Therefore, understanding where sediment is coming from in a watershed is the first step towards managing it. Sub-tasks include:

- The Highland Lake watershed will be assessed within GIS using aerial photos and land use data to locate and prioritize potential sediment sources.
- A geologist will conduct a site visit to the prioritized areas to determine if in fact they are sediment sources. The geologist will collect qualitative data on the sources. Qualitative data types include the nature of the erosional features (hill slope mass wasting, soil erosion, rilling, gully, stream bank erosion) and the forces driving the erosion (steep slopes, erodible soil types, soils saturated with ground water, rainsplash erosion, poor vegetative cover, etc).
- Sediment source management activities are often dictated by land ownership, local politics, and available funding. Thus, upon completion of the above tasks Tetra Tech will discuss with the Town Officials on the results of the assessment and the viability of various management options.
- **Deliverable:** A report discussing the nature of the sediment sources, potential management activities to reduce sediment loads, and hard copy and digital format sediment source potential maps of the areas investigated. A meeting with Town Officials to review the results and discuss sediment management options.

**Approximate duration:** One month from notice to proceed

## Phase 2 – Task 2. Dredging Feasibility Assessment

The results of the Phase 1 tasks will be used to guide the design of the Dredging Feasibility Assessment. Tetra Tech will assess the environmental, engineering, and cost components that influence project feasibility for the purpose recommending the most viable solution. This phase has several components including: defining locations to dredge, sediment characterization, dredge materials management, and permitting. The general steps are described as follows.

- The locations to dredge will be determined based on the outcomes of the hydrographic survey and the needs of the Town of Highland Lake.
- The sediment at the chosen dredging locations will be characterized in terms of thickness and physical properties. The thickness data are used to calculate volumes of material. The physical properties (percentages of sand, silt, clay) are used to determine the disposal and dewatering options. Additionally, chemical properties may be analyzed pending any permitting requirements related to disposal options.
- Determine what permits and approvals will be required for dredging and material disposal and the associated time frames for each. Tetra Tech will coordinate with the appropriate regulatory agencies, including ADEM, the USACE, and others if needed. The preparation of permit applications is not included in this proposal.
- Create a dredge volume estimate based on desired reservoir capacity and present reservoir condition. In cooperation with the Town, evaluate the suitability of dewatering sites. Factors to be considered include: proximity to lake, land area, land owner, land use, topographic relief, etc.
- Prioritize the lake into zones of primary and secondary concern based on quantities of material, depth, and transport distance.
- Evaluate two dredging methods—mechanical and hydraulic, and two dewatering methods—mechanical and geotextile containment—for production rate, regulatory requirements and cost.
- Evaluate re-use opportunities for the dredged material.
- Evaluate the watershed and lake for opportunities for future preservation and maintenance of reservoir capacity
- Tetra Tech will prepare a report that summarizes the feasibility assessments and presents a recommended dredging and disposal plan based on the Town's budget. The report will include GIS-based maps depicting the preliminary dredge plan.

**Deliverable:** Highland Lake Dredging Feasibility Study Report. A meeting with Town Officials to discuss the outcomes of the report and how to use it for future decision making.

**Approximate duration:** Three months from notice to proceed

### Phase 3. Support with Bidding Process

The purpose of this phase would be to support the Town of Highland Lake in the bidding process with potential dredging companies. Tasks under this phase would be used to help in such areas as qualifying, addressing proper insurance requirements, evaluating their dredging practices, etc. This phase of the contract would be setup as a time and materials (T&M) contract. It is estimated that approximately 36 hours will be needed for this phase, with an average labor rate of \$125 per hour, and that approximately \$500 will be needed for materials.

Should this phase be needed, Tt will evaluate the level of effort and discuss with the Town of Highland Lake prior to doing any work. It should be noted that depending on the findings from Phase 1 and 2, new regulations within the State of Alabama, or discussions with the Town, that the “not to exceed” amount for this phase may be higher.

## C. Project Cost

Project costs are based on current understanding and best estimates of level of effort required to perform the basic services and may be subject to change upon agreement between the Town of Highland Lake and Tetra Tech. Note that there is a substantial cost savings by conducting the Lakewide Hydrographic Survey. This is because the survey crew is already on site and has laid the groundwork to set up the surveying equipment. The Phase 2-Task 2 Dredging Feasibility Assessment cost is not included at this time. There is insufficient information about the areas of interest for dredging to develop an accurate cost. A more accurate cost will be developed based on the outcomes of the Phase 1 tasks.

Task	Cost
Phase 1 – Task 1: Hydrographic Survey and Sediment Thickness Evaluation of Brasher and Sand Creek bays	\$12,500
Phase 1 – Task 2: Lakewide Hydrographic Survey	\$8,500
Phase 2 – Task 1: Watershed Sediment Source Assessment	\$15,000
Phase 2 – Task 2: Dredging Feasibility Assessment	TBD
Phase 3: Support with Bidding Process	Time and Materials (T&M) with a Not to Exceed of \$5,000

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## D. Project Schedule

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The proposed schedule is based on current understanding and best estimates of time required to perform the basic services and may be subject to change upon agreement between the Town of Highland Lake and Tetra Tech. A Phase 1 report will be completed at 4 weeks from notice to proceed summarizing the findings of the hydrographic survey.

A Phase 2 Task 1 report will be completed at 4 weeks from notice to proceed. A Phase 2 Feasibility Study report will be completed at 3 months from notice to proceed.