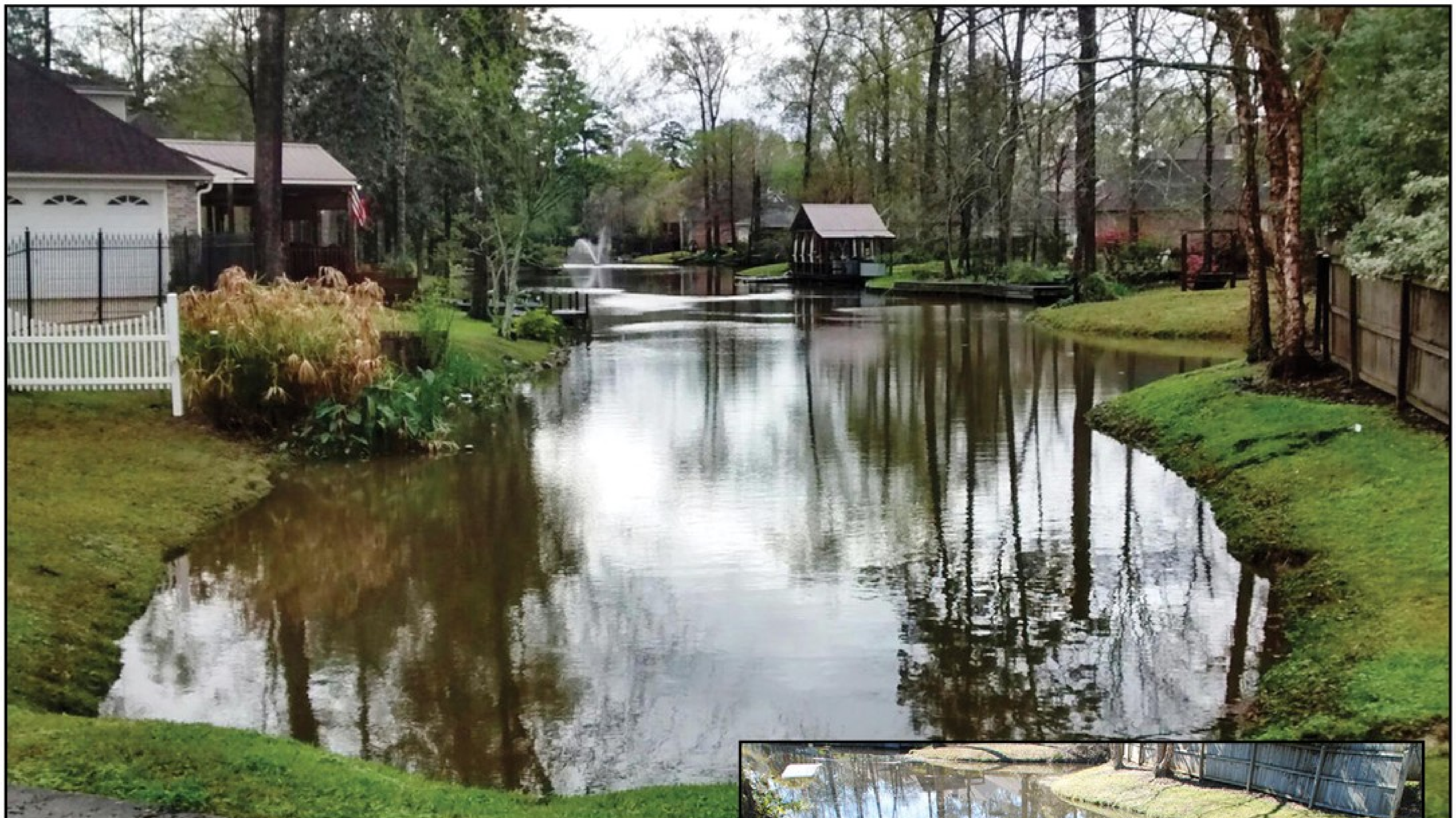
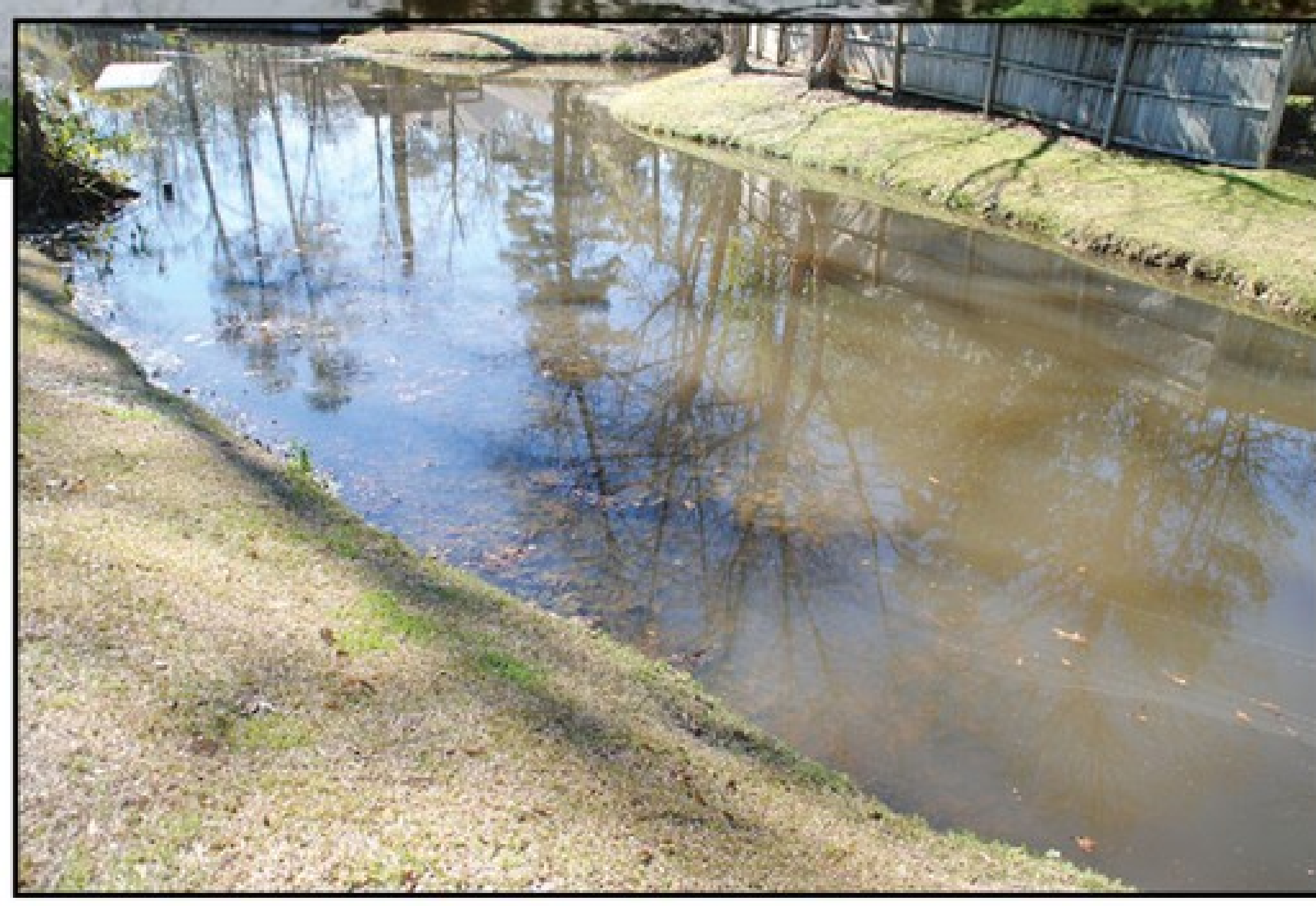
Baton Rouge Lake Dredging Project

A Cleaner Method for Removing and Dewatering Sediment





Above: Day 1 after project completion. Inset: Picture taken during initial site inspection shows visible accumulation of sediment and organic debris.

Project Description

In January of 2015, a residential home owners' association in Baton Rouge, LA contacted ENVIROdredge to evaluate their community lake for future dredging. After a preliminary phone consultation and exchange of information, an onsite inspection was scheduled. The purpose of the onsite inspection was to measure the lake water depth, quantify the amount of sedimentation present in the lake, and evaluate potential sediment dewatering areas so a low-impact solution for removing and dewatering the sediment could be provided, along with project costs for presentation to the HOA board.

The subdivision is located in East Baton Rouge Parish south of Interstate 12 with the Amite River to the east and Clay Cut Bayou to the south. The home owners' association includes five hundred and thirty five homes in a park-like setting of native hardwoods. Another subdivision lies directly to the north, from which the lake receives stormwater run-off. The subdivision's lake was a natural drainage area in the Amite River watershed prior to development. This drainage area was damned to form two lakes, one with a spillway delivering water into the other on its way to the Amite River. The lake that was the center of concern was the upper lake on the north end that flows into the larger lake before reaching the river.

HOA board members mentioned that their lake had been last dredged in 2001 with mechanical equipment. After the lake was drained, heavy equipment was used to remove the sediment. Although the lake reportedly filled again within a few months after the dredging project, community residents were unhappy with the mechanical process for several reasons, including the temporary loss of their lake, the loss of aquatic life, a strong odor for weeks, the mess on community streets and damage to the existing landscape.

Knowing their previous dredging experience in 2001 was unpopular with community residents, the HOA board was looking for a cleaner method for removing and dewatering the sediment that would leave a lighter footprint. It was recommended by their lake management professional, Dave Hickman, with Professional Fisheries Services, that they consider hydraulic dredging and geotextile dewatering. This process uses specialized, portable equipment with a high volume suction pump to "vacuum" the sediments from the waterway. The sediments are then pumped into geotextile tubes strategically placed onsite up to 1,000 feet away for dewatering. After the sediment is fully dewatered, it can then be hauled away or spread onsite as fertile, organic topsoil.

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The benefits of hydraulic dredging and geotextile dewatering considered by the HOA Board included:

- No draining of the lake
- No damage to the landscape due to heavy equipment
- Unobtrusive; minimal disruption to the daily routine of the community
- No strong odors
- No harm to aquatic life or need for relocation of aquatic life
- No hauling wet material on community streets

Onsite Inspection

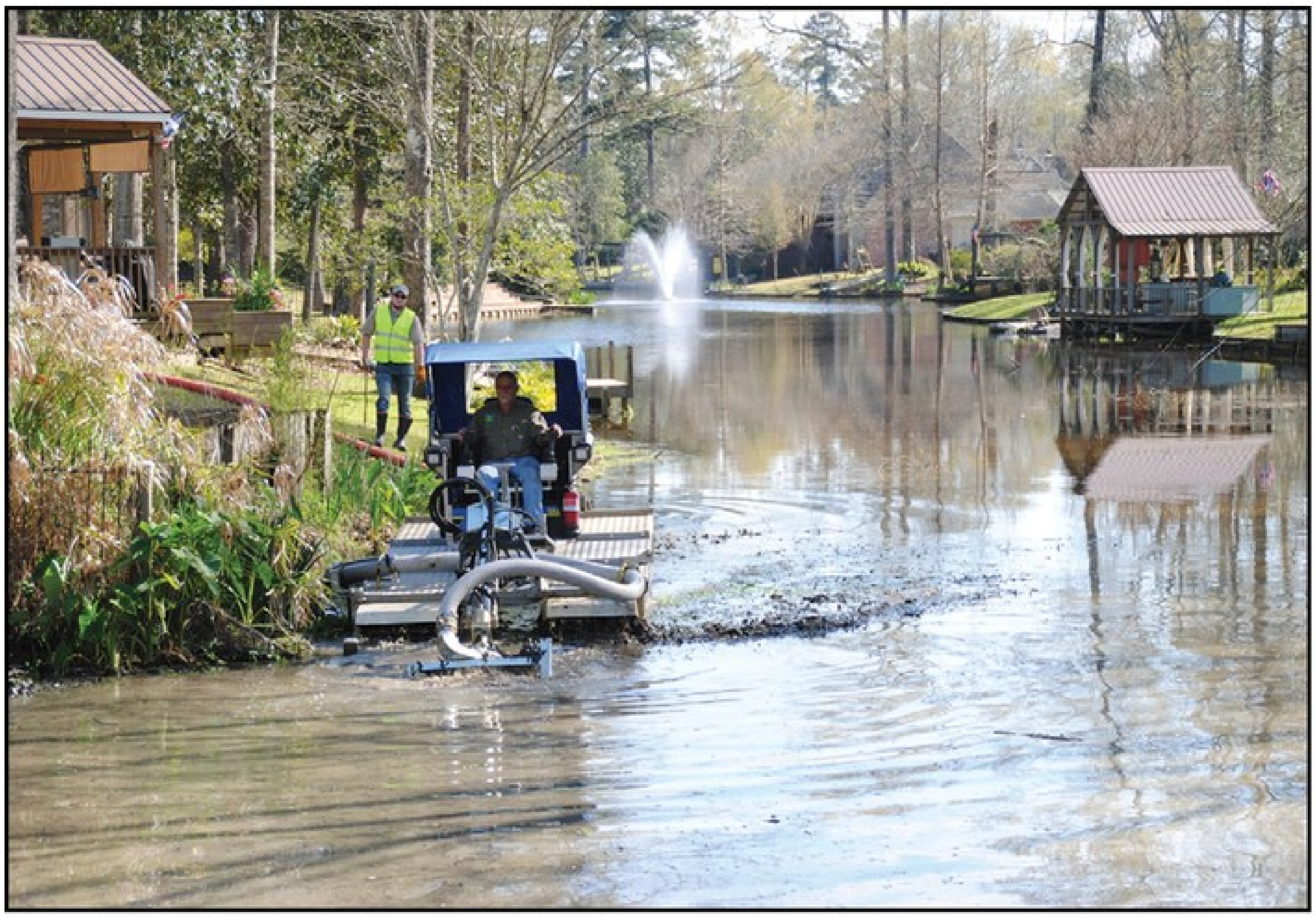
During the onsite inspection, the lake water depth was measured and the sediment depth was probed and measured in cross sections along the entire length of the lake from a small boat. It was discovered there were between 2-3 foot of silt, compared to a six-foot maximum lake depth, sediment and decomposing tree leaves located in an approximate 40,000 square foot area near the inlet of the lake. There are two main stormwater drainages flowing into the lake at the inlet from city streets and neighboring community stormwater systems. The sediment and leaf accumulation was visible from the water surface at the inlet area of the lake. Community residents had begun to complain about the smell and the aesthetics in that vicinity of the lake. Some residents complained that they were no longer able to access that area of the lake with small boats, while others expressed concern over property values possibly being adversely affected.

Dewatering Area

While evaluating potential sediment dewatering areas during the onsite inspection, one obstacle of immediate concern was the limited common area space available for staging of the geotextile dewatering tube. The only available common area was located at the north end of the lake, but was on the opposite side of a community street accessing many of the homes in the subdivision. Not only was this common area on the opposite side of a well-traveled community street; but it was only 50' wide x 70' long which would limit the size of geotextile tube that could be used. The area would also need to be leveled as geotextile dewatering tubes must sit a level surface to prevent the tubes from rolling during the fill process. The city-parish had also previously stipulated that no "silt-laden water" be introduced "into the city street or any storm drain inlet" during the dredging process.

Proposal

After the onsite inspection was performed, a detailed proposal with costs was presented to the HOA board. It was recommended that the project be completed in three phases due to the limited space available for dewatering. A temporary containment pool to capture the water as it is filtered from the geotextile tube would be constructed and the filtered water would be pumped back across the street to the lake. Each phase would fill one 60'X50' geotextile tube, and once that sediment was dewatered and removed from the site; the next tube would be installed, and the next phase would begin. Phase I of the project would begin at the storm water inlet on the north shore and work southward until the tube was filled. Phase II would begin where Phase I left off.



Amphibious dredge running on top of accumulated sediment.

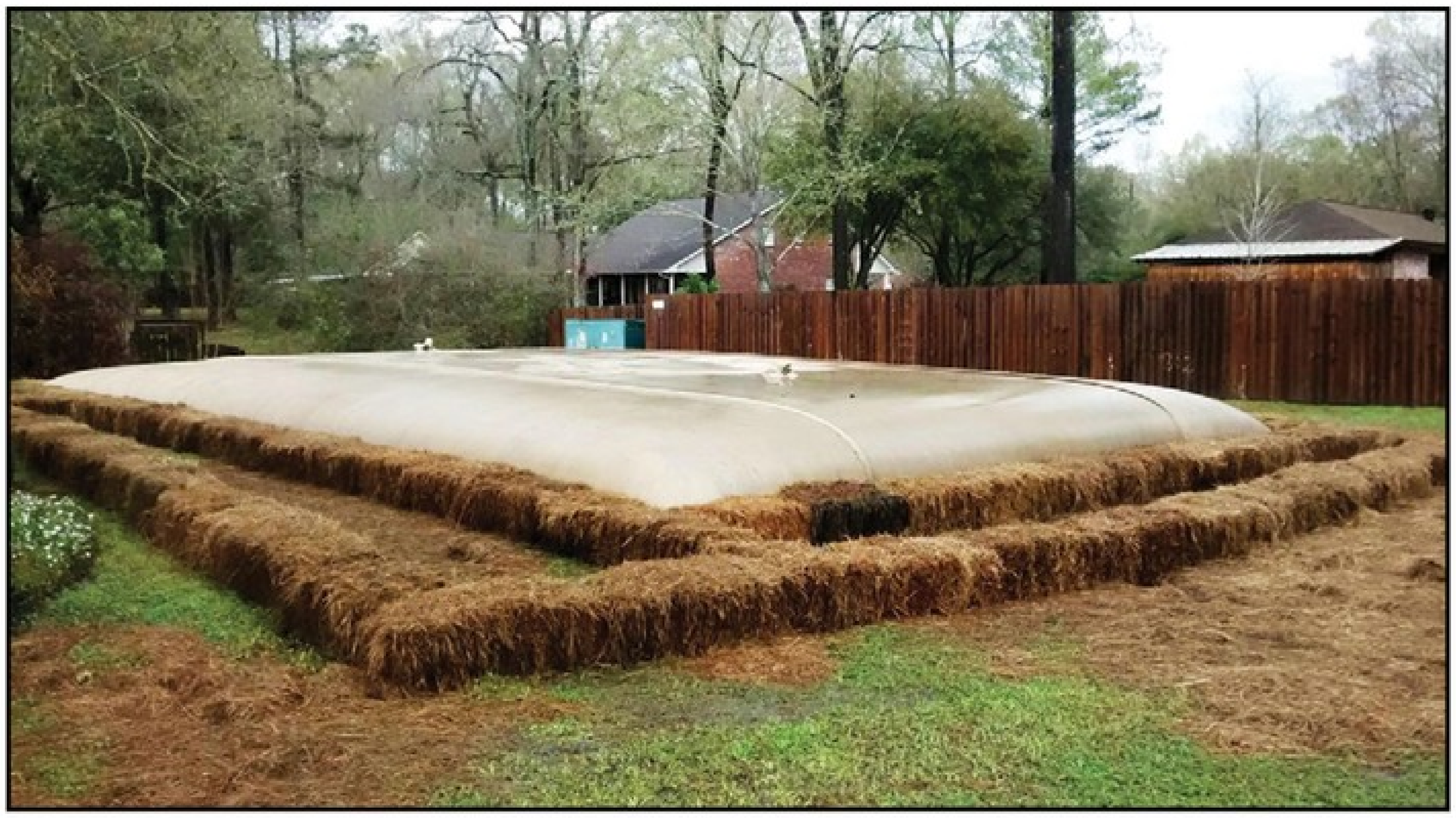
Method

There were several hydraulic dredge configurations considered when choosing the equipment most suitable for this project. The dredge would need to be able to access very small coves with the ability to launch from the lake shoreline with minimal ground disturbance. The flow rate of the dredge pump was also considered when looking for a pump that would produce higher percent solids with a lower GPM due to the limited size of the dewatering area. A cutter head, cable driven dredge with a 6" submersible pump was considered, but it would have to be launched with a crane. In addition, the 6" pump operating around 1,000 - 1,200 GPM would produce more water than could effectively be handled within the temporary containment pool.

Ultimately, an amphibious dredge manufactured in Sweden with a 4" submersible pump mounted to a 3 foot auger head was selected for this project. The dredge pump operates around 500 GPM producing approximately 30% solids with a maximum dredging depth of eight feet (which is perfect for this shallow lake), and can operate in as little as six inches of water (another advantage considering the depth of sediment accumulation). Not only was the pump size a good choice for the project, but the amphibious machine was driven off of the trailer onto the street, then driven down the shoreline directly into the water with no disturbance to the asphalt or the grass along the shoreline slope. The amphibious design of this machine was great for accessing the lake, and with a zero-radius turn capability, for getting the dredge pump into hard to reach places.

To begin Phase I of the project, the first step was to build the containment pool that would capture the filtered water from the geotextile tube so that it could be returned to the lake. To level the dewatering area, wood chips were imported to the jobsite and used to create a grade that was slightly elevated towards the street so the filtered water would pool and could be easily pumped back across the street to the lake.

Once the dewatering area was leveled, a three foot high temporary containment pool was constructed using straw bales and poly sheeting to contain the filtered water from the geotextile tube. A 60' circumference x 50' long geotextile tube was then placed inside the containment pool, leaving approximately five foot of available space on each side for water containment. A dual hose bridge was then constructed across the community street to allow vehicles to travel safely across the dredge discharge hose and return water hose. A 3" gas powered water pump was setup to pump the filtered water



Geotextile bag contains the sediment as it is removed from the lake.

from back across the street to the lake.

The amphibious dredge was then launched and immediately began delivering the sediment slurry to the geotextile tube. As the water filtered from the geotextile tube, it was immediately returned to the lake, while the sediments were removed and provided to a private landowner for topsoil. During Phase I of the project, an assortment of trash and debris items was encountered that had washed into the lake through the stormwater drains causing the dredge pump to clog. Unclogging the open impellor system of the submersible pump took just a few minutes.

Results

A 60' circumference geotextile tube has an approximate volume capacity of 5.5 cubic yards per linear foot based on sand giving a total volume capacity of 275 cubic yards with the 50' tube length. There is, of course, no reduction in sand volume during the dewatering process (1:1) as opposed to the approximate 50% shrink rate estimated for the fine silts, organic sediments and "lake muck" removed during this project. The 60'x50' geotextile tube was filled to maximum capacity in approximately 4 days (approximately 24 pumping hours). The high percent solids and low GPM obtained with the 4 inch submersible dredge pump greatly assisted in the efficient sediment dewatering of the geotextile tube. A higher volume pump with lower percent solids would have slowed down the process while waiting for the tube to dewater before pumping more material. During this project, there was virtually no wait time for the geotextile tube dewatering process and return water pumping to catch up with the production of the dredge pump.

As the project progressed, community residents stopped by to observe the process and watch the amphibious dredge at work. They were pleased with the immediate and visible improvement of their community lake and that the lake had not been drained or aquatic habitat disturbed. During the project blue heron, waterfowl and numerous fish were observed, observing the sediment removal process as well!

Just as required maintenance on your vehicle ensures that it will continue to operate at peak performance, regular inspection and maintenance of stormwater systems provides the same assurance that they will operate efficiently for the purpose they were intended.

Summary

Most manmade ponds and lakes are originally designed to hold a certain volume of water. As these bodies of water accumulate silt, sediment, "muck" and other decomposing organic material from stormwater runoff systems, construction projects, landscape maintainence and eutrophication, their watering-holding capacity is reduced. This is especially important if the pond or lake serves in a stormwater retention system, as the reduced water holding capacity can have a direct impact on downstream rivers and lakes. Just as required maintenance on your vehicle ensures that it will continue to operate at peak performance, regular inspection and maintenance of stormwater systems provides the same assurance that they will operate efficiently for the purpose they were intended. Not only will regular maintenance allow the stormwater system to operate efficiently, but it can increase the life cycle of the pond or lake while improving the astetics of the community and preserving property values. Regular inspections should not only include the inlets, outlets, overflow structures, invasive vegetation and erosion but should also look for excessive sediment accumulation. Sediment accumulation should be monitored annually for planning and budgeting of future dredging projects. A regular inspection should also leave you with an inspection report to document your compliance with BMPs. **L&W**

by Steve Perry

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