



Woodlake Crossing Physical Pond Survey and Bathymetry

September, 2009

Introduction

Woodlake Crossing is located in York County, Virginia. The Development surrounds a 10.5 Acre lake which acts as a storm water retention basin for the subdivision. The purpose of this survey is to determine the physical makeup and health of the pond through bathymetric mapping, sediment analysis and visual inspection of the site.

Storm Water Management Structures

In Addition to direct surface runoff and groundwater infiltration, the pond is fed by several inflow structures. After a visual inspection, the structure and integrity of the inflows appear to be in good condition. However the amount of sediment and vegetation deposited at the outfall of these inflow structures could restrict their function. Any accumulations of sediment at the outfall of these inflow structures should be removed on a routine basis. There is one outflow structure in this lake and it is in average condition. It appears to have some structural compromising of the wooden retaining wall and underlying concrete that should be inspected further by a qualified storm water engineer to insure there is no hidden issues that could warrant structural repairs. As with the inflow structures the accumulation of debris should be removed to allow the pond to drain properly. During rain events proper flow may be restricted which could cause flooding. Once the sediment and debris have been removed, to maintain the function of the storm water management structures they should be inspected on a regular basis to ensure proper flow by keeping vegetation and other debris away from these areas. Throughout the neighborhood, concrete ditches run along roadsides and behind homes. These ditches collect and channel water to the pond and any debris accumulating in these ditches should be removed on a regular basis to prevent any accumulation in the pond.

Algae and Aquatic Weeds

Increased nutrient levels in your ponds can cause algae blooms and excessive aquatic plant growth. The amount of nutrients, such as nitrates and phosphates, can often indicate whether algae will be a problem in your ponds. The proper use of fertilizers and keeping grass clippings and leaf litter out of the

pond will help to reduce the amount of nutrients entering the pond. After inspecting the pond a small amount of algae and duckweed were found near a couple of the inflow structures. Algae and aquatic weeds can be difficult to control during the summer months due to the high nutrient content of this lake. Lake maintenance will help to control these problems and to help prevent any future problems. Maintaining a healthy ecosystem is much more efficient than waiting to deal with problems in the future.

Sediment Analysis

A sediment analysis was performed to determine the makeup of the bottom substrate of the pond. Around the inflow structures there is an accumulation of sediment and organic sludge topped with a layer of leaf litter. The organic sludge is a result of years of plant matter entering the pond and left to be broken down by anoxic bacteria. At this time the accumulation of organic sludge is not an urgent threat to the health of the pond but should be monitored to prevent future problems. The sediment accumulating at the outfall of the inflow structures should be cleared out to ensure proper flow during rain events.

Erosion

There seems to be very little if any erosion to the shoreline of the lake due to the amount of beneficial vegetation growing along its banks. Some areas of the shoreline have a very nice vegetated buffer while other areas are mowed down to the water's edge. Having a wide buffer with beneficial plants will prevent erosion and the inflow of excess nutrients. The slopes of the pond should be monitored on a regular basis and any future erosion should be dealt with before it becomes a significant problem.

Bathymetric Analysis

By integrating GPS and depth sounding equipment a bathymetric profile has been created for this pond. The pond measures an area of 10.5 Acres, has a max depth of 17.8 ft. and a mean depth of 5.4 ft which yields a volume of 59 acre feet or 19,250,000 gallons. Generally you would want an average depth of greater than 4 ft to maintain the healthy status of your pond. This pond is currently above the 4 ft average threshold. This pond has likely filled in some since it was originally constructed but without knowledge of the initial depth it is difficult to make a comparison with the current depths as determined by this bathymetric evaluation. With the information on initial conditions it would then be possible to compute a rate of sedimentation and be able to calculate how long you have before dredging is necessary.

Aeration

There are no aerating features in this lake. Aeration can be very beneficial in maintaining the health of a lake. The addition of a floating fountain/aerator or a submersed/diffused aeration system would serve to help cycle nutrients out of the water column and sequester them from availability to feed algae blooms and aquatic weeds. Water circulation is important for a lake or pond. A floating or submersed aerator would help significantly in circulating the water which has many benefits in mosquito control, fertilization mitigation, and inhibiting stagnation. These measures contribute to the ease of management of any body of water.

Nuisance Geese

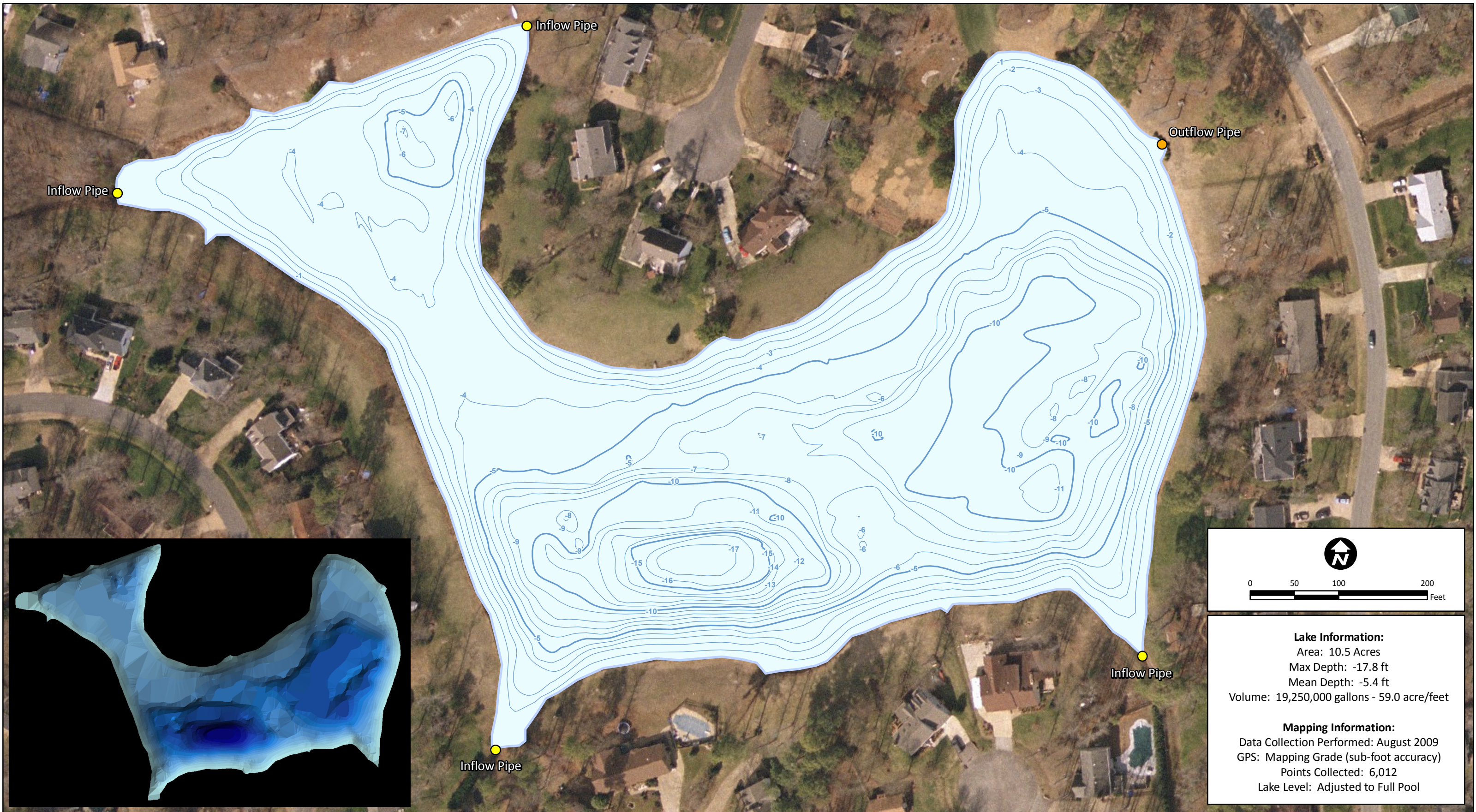
It has been brought to our attention that during some periods of the year there are nuisance geese populations inhabiting the lake. During our three site visits there was very little evidence of a nuisance geese population on this lake. If a goose presence becomes a problem in the common areas or in the backyards of homeowners adjacent to the lake, monofilament fencing such as Goose-D-Fence or the application of Flight Control in the grassy areas surrounding the lakes would be an ideal solution. It would also be beneficial to allow a vegetated buffer to grow the entire shoreline of the lake.

Nuisance Critters (Muskrats, Nutria, etc)

At this time there are no signs of Nuisance critters around this body of water.

Conclusion

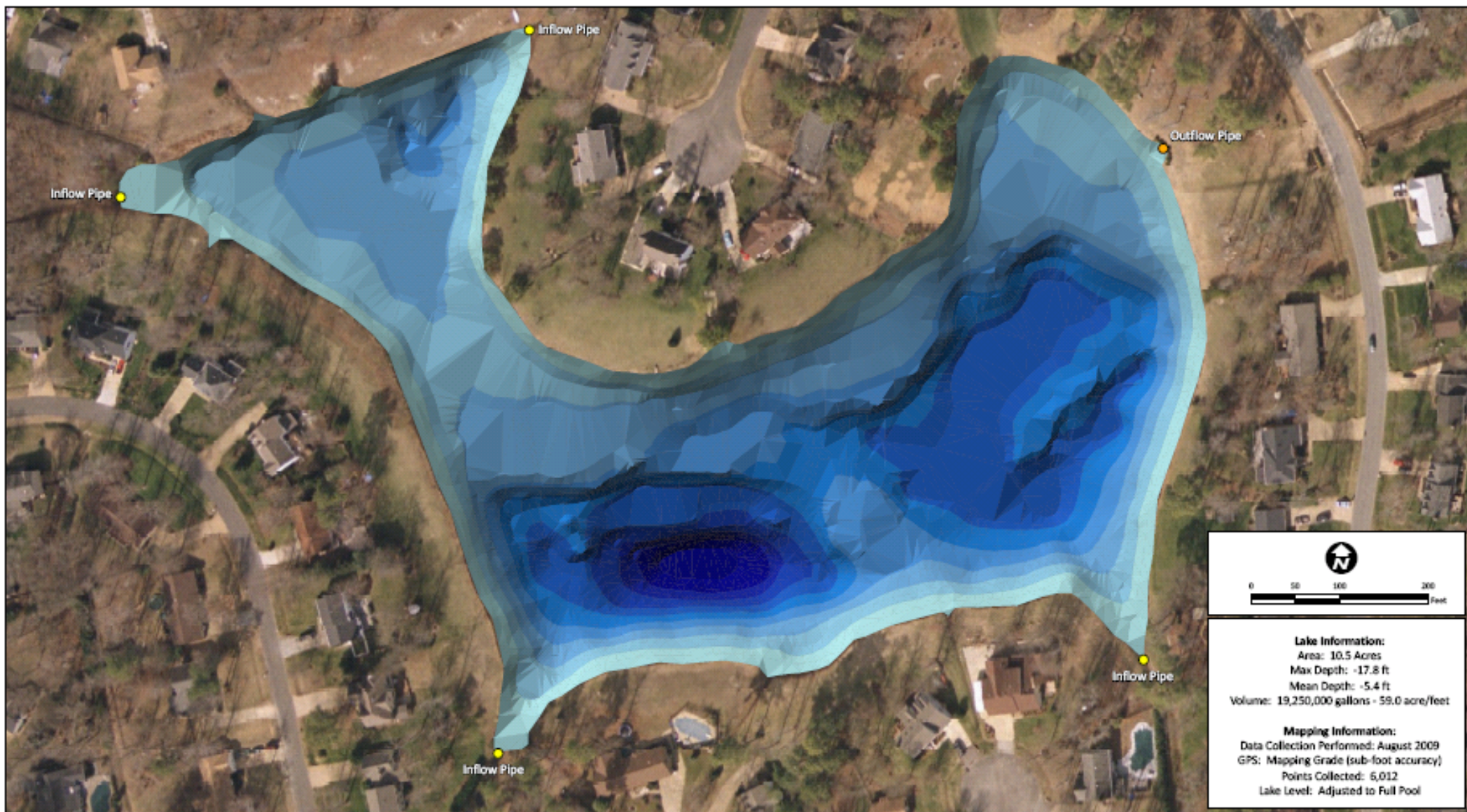
The lake seems to be in relatively good condition. The amount of organic sludge on the bottom of the lake may indicate elevated nutrient levels. There is definitely an excessive accumulation of sediment at some of the inflow points on the lake. These areas should be considered for some limited excavation if the residents deem this issue to be a priority. In order to maintain the healthy state of the lakes monthly maintenance should be started to prevent the growth of algae and unwanted aquatic vegetation. At a minimum 18 inches of beneficial shoreline vegetation should be allowed to grow on the shoreline areas that are currently being mowed to the edge of the lake. The installation of an aeration system or floating fountains will also help to prolong the good health of the lake while adding an aesthetic quality. The key here is to implement good lake management techniques now before any future problems have a chance to occur.

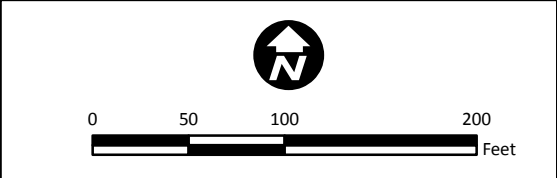
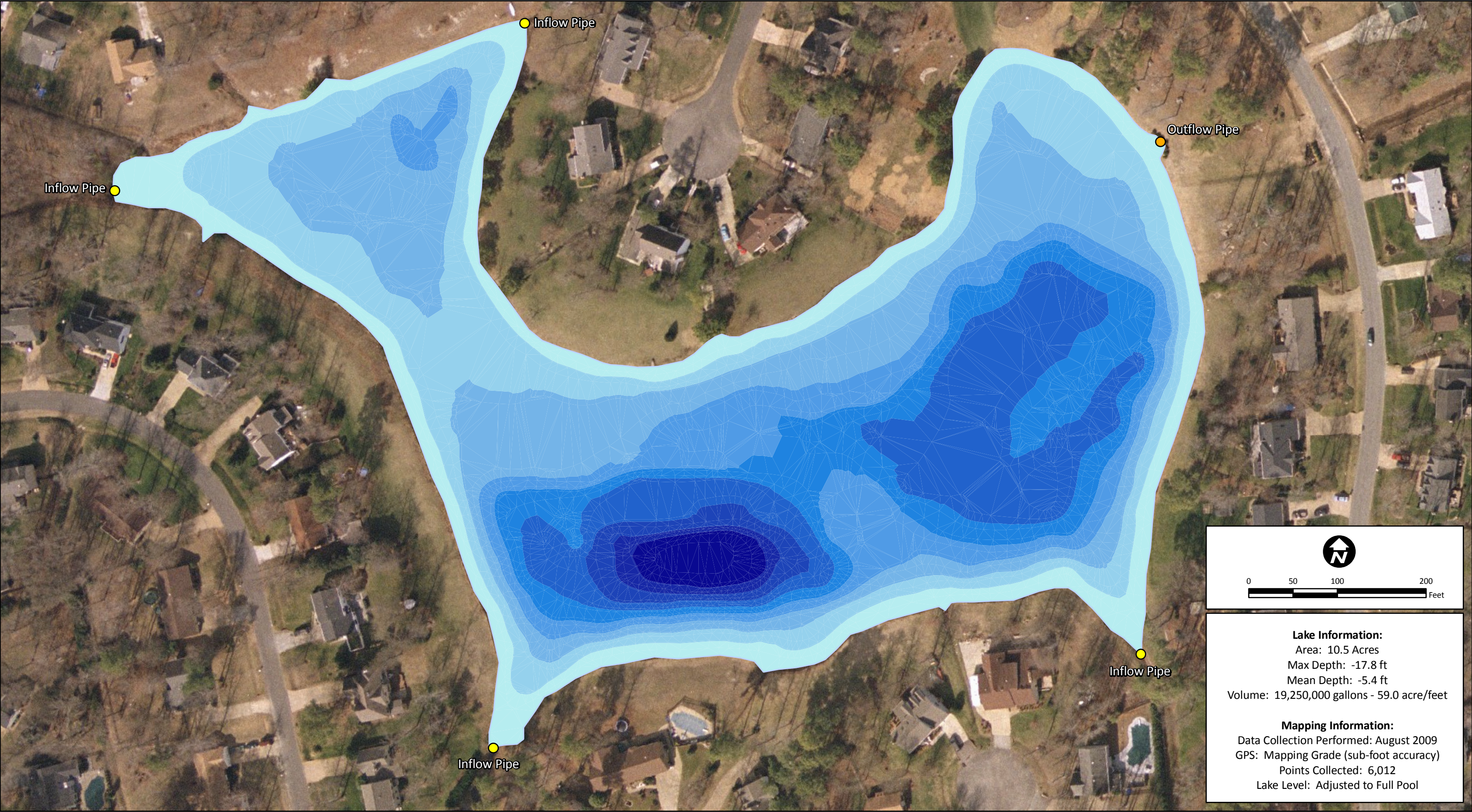


Woodlake Crossing - Contour

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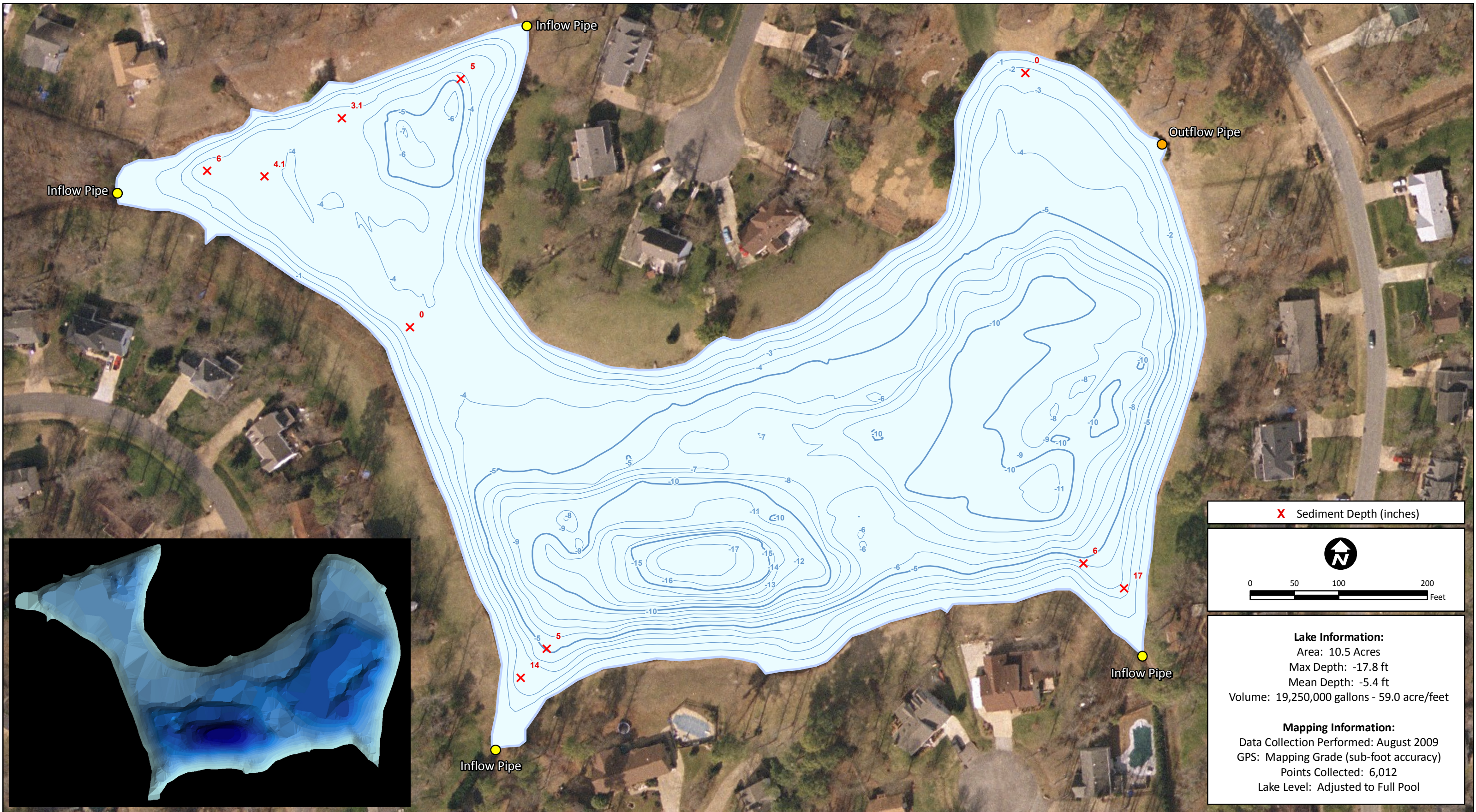






Lake Information:
Area: 10.5 Acres
Max Depth: -17.8 ft
Mean Depth: -5.4 ft
Volume: 19,250,000 gallons - 59.0 acre/feet
Mapping Information:
Data Collection Performed: August 2009
GPS: Mapping Grade (sub-foot accuracy)
Points Collected: 6,012
Lake Level: Adjusted to Full Pool

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Woodlake Crossing - Sediment

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