

YSI Optical Technology Used to Protect Lake Oconee, Georgia Water Quality



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YSI Continuous Turbidity Monitoring
Application Note A502-02

Northern Georgia is experiencing unprecedented development; consequently, water quality in many of its watersheds is in jeopardy of severe degradation. The State of Georgia, Environmental Protection Division (EPD) has implemented an National Pollutant Discharge Elimination System (NPDES) monitoring and enforcement program designed to prevent construction activities from impacting water quality. The program has proven challenging to all involved; but is designed to not only protect water quality, but also protect those abiding by program requirements, such as erosion prevention and water quality monitoring in nearby waters. Through compliance, construction companies not only protect water quality, but their reputation as well. Nowhere in Georgia is there a better example of this mutual benefit than at Reynolds Plantation on Lake Oconee.

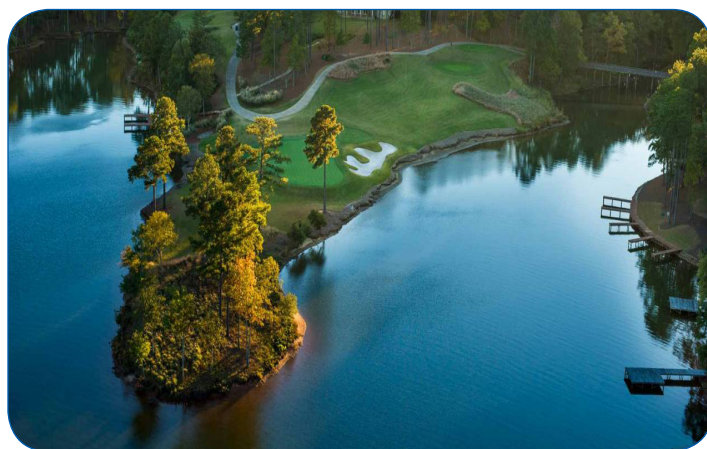
Reynolds Plantation is a 7,000-acre golf resort development situated between the Oconee River and Richland Creek branches of Lake Oconee, a deep-storage hydroelectric reservoir in North Central Georgia.

The responsibility to monitor the turbidity of Lake Oconee in the vicinity of Reynolds Plantation fell to two people – Jeni Key, landscape architect, and her supervisor Craig Johnson. Key and Johnson are experts in their fields of landscape architecture, site planning and erosion control, but not in the design, implementation and maintenance of water quality monitoring programs. With help from consultants Carter and Sloope Consulting Engineers, Inc., Key and Johnson set about the task of developing their monitoring program in accordance with EPD guidelines.

In the past, NPDES turbidity monitoring was typically performed manually, and in some cases with automated water samplers. In either case, physical samples were taken from predetermined locations before, during and after (within 24 hours) what was hoped to be a qualifying storm event, and then delivered soon thereafter to a laboratory for analysis.

The implementation and maintenance of a monitoring

program in this conventional manner seemed to Key and Johnson to be prohibitive considering personnel resources, expense and potential dangers to those responsible for collecting samples. In addition, manual storm event sampling requires that decisions be made well in advance of the storm entering the monitoring area. This presents significant resource management issues since storm events, much less those that qualify as sampling events, are often unpredictable. The unpredictability of a qualifying storm event makes the potential for the unnecessary deployment of staff or for missing a qualifying event quite high. With these concerns in mind, Key and Johnson began searching for alternative methods for the continuous acquisition of accurate turbidity data. Their search led them to YSI's representative in Georgia.



YSI OMS sonde monitoring turbidity data helps keep Lake Oconee clean. Image credit: visitlakeoconee.com.

After observing the demonstration of the YSI Optical Monitoring System (OMS) sonde technology, and carefully considering their options, Key and Johnson felt that the OMS was the means by which they could get accurate, round-the-clock turbidity data from Lake Oconee. In addition, with the OMS they could also afford to establish the number of site locations and sample-timeliness necessary to meet EPD's requirements, as well as to protect the reputation of Reynolds Plantation.

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The YSI OMS sonde is a 1.6-inch diameter sonde that can measure turbidity, chlorophyll or rhodamine in combination with temperature, conductivity, and depth or level. The OMS utilizes field-proven optical sensors and incorporates innovations in sensor configuration such as a temperature and conductivity module that is part of the main sonde body. It is designed for surface and vertical profile measurements, as well as for unattended monitoring of these parameters utilizing internal memory and power.

Reynolds Plantation's monitoring sites were selected using known down-reservoir flow patterns and by performing bathymetric studies to locate the thalweg (inundated river channel) over which the each OMS would be suspended, at an exact depth, by a buoy. Once site locations were selected, their GPS coordinates were recorded for future reference. The monitoring program was designed to accurately depict turbidity levels up-reservoir and down-reservoir of Reynolds Plantation and to document the effects, if any, of construction activities on the water quality (turbidity) of Lake Oconee.

During the early stages of the program, Key also collected grab samples and performed vertical profile measurements of turbidity in cross-section at each monitoring site using a YSI OMS and a YSI handheld display-logger. The purpose of these extra efforts is two-fold:

1. To verify the accuracy of their OMS turbidity data
2. To insure that they have positioned their monitoring stations such that the data from them accurately represents conditions before, during and after a qualifying event.

Grab samples are analyzed by a HACH 2100 AN at Key's office. Key reports, "Our YSI OMS data is always in excellent agreement with data from the 2100."

Key and Johnson now maintain five continuous monitoring sites on Lake Oconee. Every two weeks to once each month, Key and company retrieve the deployed OMS sondes and replace them with serviced and calibrated OMS sondes. By doing this, they can insure that maintained, recently calibrated sondes are deployed at each station 24 hours a

day, seven days a week. Data from each sonde is downloaded to a PC, analyzed and placed in report format. For much of this post deployment work, Key uses YSI's desktop software. "We download our data and use some of the software features to check our data. We then transfer our data to Excel® for developing our reports." A report is prepared and submitted each month for EPD.

This monitoring program has allowed Reynolds Plantation to document the success of their efforts to prevent turbid runoff from leaving construction sites and entering Lake Oconee. In addition, Reynolds Plantation's OMS sondes have allowed Key and company to document "textbook" examples of down-reservoir turbidity plume passage, as well as to record substantial turbidity events during storm events exceeding 7.5-10 inches in just a few hours.

With their monitoring program well underway and providing high quality data to EPD, Key was asked to what she attributes the success of their program, and if she has any advice for those new to the field of water quality monitoring. "With the growing responsibility for protecting water quality, there will be an increasing number of people who are not water quality professionals, working with water quality monitoring programs... ease of use and good training are essential," reported Key. "The [YSI] equipment is reliable, accurate and easy to use, and the on-site application training and technical support provided by YSI has been essential to our success." Regarding advice, Key recommended, "...contact YSI for equipment, as well as application assistance and make certain that your data is accurate, and that it is presented clearly and concisely."

The YSI sondes offer an excellent solution for long-term monitoring of turbidity, with exceptional accuracy, reliability and cost effectiveness.