IMPACT EVALUATION OF A PROPOSED WATER SUPPLY RESERVOIR

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ABSTRACT

Glades Reservoir was proposed to provide long-term water supply for Hall County, Georgia. Because the proposed project is located upstream of a federally operated regional reservoir (Lake Lanier) in a river basin where water allocation has been litigated since 1990 between the states of Georgia, Alabama and Florida, an Environmental Impact Statement (EIS) was required by the regulatory agency as part of the permit application to construct the proposed reservoir. The flows in the basin are regulated to support a variety of uses by states downriver, including preservation of marine life under the Endangered Species Act, and support for major seafood industries.

We were engaged to prepare an EIS to determine the hydrologic, biological, and social-economic impacts of the proposed reservoir. As part of the independent evaluation for the EIS, AECOM prepared population and water demand projections, and conducted extensive alternatives analyses. AECOM worked closely with government agencies and stakeholders to define the modeling objectives and evaluations necessary for the EIS alternatives analysis.

This presentation will outline the EIS process, and describe how a HEC-ResSim model was used for the hydrological effects analysis and simulation of water levels during critical drought periods, releases below dams, and impacts on hydropower production.

1. INTRODUCTION

Glades Reservoir was proposed to provide long-term water supply for Hall County, Georgia. Because the proposed project is located upstream of a federally operated regional reservoir (Lake Lanier) in a river basin where water allocation has been litigated since 1990 between the states of Georgia, Alabama and Florida, an Environmental Impact Statement (EIS) was required by the regulatory agency- the United States Army Corps of Engineers (the Corps), Savannah District, as part of the permit application to construct the proposed reservoir. The flows in the basin are regulated to support a variety of uses by states downriver, including preservation of marine life under the Endangered Species Act, and support for major seafood industries.

We were engaged to prepare an EIS to determine the hydrologic, biological, and social-economic impacts of the proposed reservoir. As part of the independent evaluation for the EIS, AECOM prepared population and water demand projections, and conducted extensive alternatives analyses. AECOM worked closely with government agencies and stakeholders such as the U.S. Environmental Protection Agency (EPA), the Georgia Environmental Protection Division (EPD), and the U.S. Fish and Wildlife Service (USFWS), to define the modeling objectives and evaluations necessary for the EIS alternatives analysis.

The development of the EIS proceeded generally in order of the following steps (Figure 1); each of which is presented in following sections:

1. Purpose and Need
2. Alternatives Analysis
3. Affected Environment and Environmental Consequences
4. Cumulative Effects Assessment

Figure 1 : EIS Preparation Process

2. PROJECT BACKGROUND

The Hall County Board of Commissioners, Hall County, Georgia (the Applicant) submitted a permit application for this proposed water supply reservoir to the Corps pursuant to Section 404 of the Clean Water Act (CWA). Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States.

Hall County is located 35 miles northeast of Atlanta, Georgia. The City of Gainesville (Gainesville) serves as the county seat and is the largest city in Hall County. In addition to Gainesville, there are several incorporated cities and towns located either partially or entirely within Hall County's borders. Hall County has intergovernmental coordination agreements with these cities to provide various services, including regional coordination.

Because of its proximity to Atlanta and Lake Lanier, Hall County has experienced growth during the last two decades. Gainesville-Hall County became a **Metropolitan Statistical Area** (MSA) in 2004, and the area was among the top 50 fastest growing metropolitan areas in the U.S. during the period of 1990 to 2010 (U.S. Census). The county population nearly doubled from 95,428 in 1990 to 179,684 in 2010, because of expansion of the metropolitan Atlanta area and the growth of local industries.

The Applicant's preferred alternative (Proposed Project) has evolved over time from a smaller project serving only northern and eastern Hall County (Hall County's service area pre-2006) to a larger project serving all of Hall County. The development of the project has been complicated by Georgia's long-term conflict over water rights in Lake Sidney Lanier (Lake Lanier) with the states of Alabama and Florida. Project elements of Hall County's updated Proposed Project, including locations of the proposed reservoir, pump station, pipeline, and potential intakes are shown in Figure 2. The Applicant's Proposed Project does not directly provide raw water to a treatment plant.

3. PURPOSE AND NEED

In the permit application and other supporting documents, the Applicant stated that the project purpose is, "to provide a reliable source of public water supply capable of satisfying the projected unmet water demand in the Service Area of Hall County during drought conditions for the projected population growth through the year 2060." The Applicant defined the project service area as all of Hall County, including jurisdictions and areas currently served by other municipal or private entities.

The Applicant has identified the following three aspects of need for the Proposed Project:

1. Fifty-year planning horizon. To ensure its citizens (residents and businesses in all of Hall County) continue to have a reliable source of water supply, the Applicant concluded that it has an obligation to use a 50-year planning horizon. The Applicant stated that this obligation is consistent with state law authorizing counties to provide municipal water supplies, and the 50-year planning horizon is in accordance with Georgia Comprehensive State-wide Water Management Plan 2008 (Section 10 Water Supply Management Practices).
2. Reliability of future water supplies. Hall County indicates a need for a water supply source that will be reliable during times of drought and that a reservoir is a necessary component of water supply sources.
3. Need to secure adequate water supply now. Hall County specifies that it must move forward now to secure an adequate water supply using the best available information; its water supply planning cannot be delayed until Lake Lanier water allocation and contracting issues are resolved.

Based on these aspects, the Applicant projected their water need to be 77.3 million gallons per day (mgd) based on a projected 2060 population.

Figure 2 : Applicant's Proposed Project

4. ALTERNATIVES ANALYSIS

A wide range of water supply sources and infrastructure components were identified and screened through a two-phase process using appropriate environmental factors and criteria. The Corps conducted the identification, verification, evaluation, and screening of water supply infrastructure components and the formulation of alternatives using screened components, with review and input from the cooperating agencies. In Phase 1, 56 water supply sources and infrastructure components were identified and screened, resulting in 15 components that were carried forward to formulate alternatives. In Phase 2, twenty-two water supply alternatives were formulated and screened, resulting in 13 alternatives that were carried forward for detailed evaluation of environmental consequences. The 13 alternatives include the Proposed Project, 11 action alternatives, and a No Action Alternative. In this EIS "no action" means "no proposed Glades Reservoir project," or no permit action from the Corps for the Proposed Project.

The Applicant's Proposed Project includes construction of the 11.7 BG Glades Reservoir along Flat Creek, which would provide a safe yield of 50 mgd on an annual average daily basis. The proposed reservoir would have a usable storage of 9.4 BG and a water surface area of approximately 866 acres at its proposed normal pool elevation of 1180 feet above mean sea level. The proposed dam would have a height of 140 feet. The reservoir would be operated as a pumped-storage reservoir. Water from the Chattahoochee River would be pumped from a 37-mgd water intake and pump station via a 21,500-feet water main to the proposed Glades Reservoir. Water would only be pumped from the river when there is a need to fill or refill the reservoir, and when the instream flow protection thresholds (IFPTs) could be maintained in the river below the pump station. Water would be released from the reservoir into Flat Creek and would flow into the headwaters of Lake Lanier. The same quantity of water released from the reservoir would be withdrawn from Lake Lanier via the raw water intake at the existing Lakeside water treatment plant (WTP), which is operated by Gainesville (Figure 3).

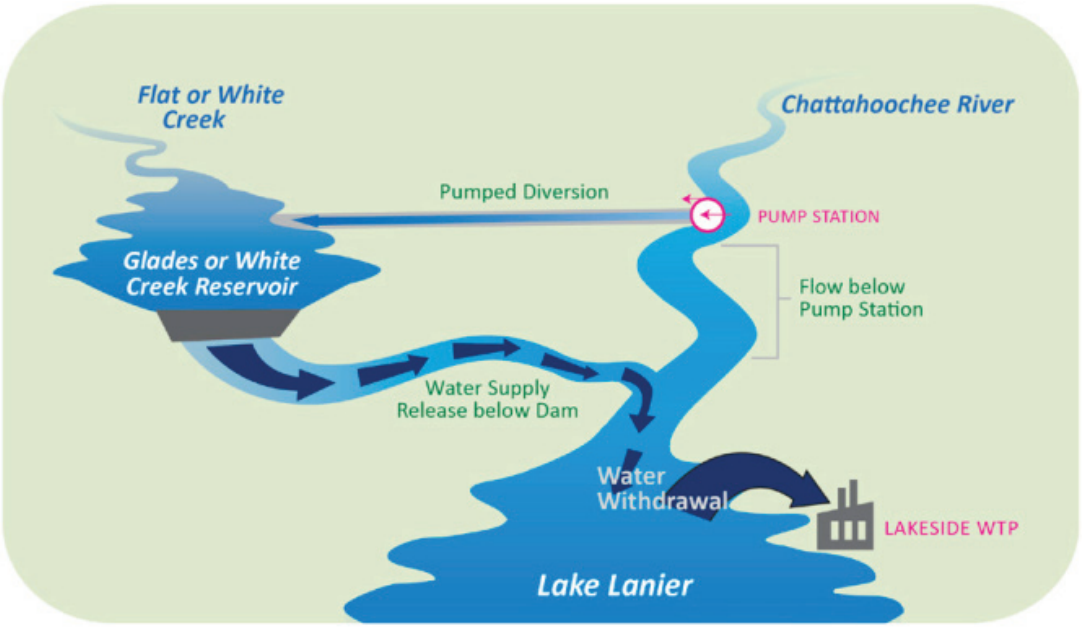

Figure 3 : Proposed Project with Water Supply Passing through Lake Lanier

5. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Potential effects of the Proposed Project, each action alternative, and the No Action Alternative were evaluated for the following resource areas identified during the scoping process: Surface Water, Water Quality, Soils and Geology, Land Use, Climate Change and Greenhouse Gases, Biological Resources, Socioeconomic Conditions, Recreation, Visual and Aesthetic Resources, Noise, Hazardous Materials, and Cultural Resources.

An impact analysis was conducted for each resource area and comparisons were made between the Baseline Conditions (Baseline), Hall County's (Applicant's) Proposed Project, action alternatives, and the No Action Alternative. The level of impact is determined based on regulatory standards, criteria and ordinances, available studies and scientific documentation, and professional judgment of the EIS team. Based on the impact analyses, additional mitigation measures to minimize potential adverse impacts were identified. The potential mitigation measures may or may not be included as conditions of a Section 404 permit or other state or local permits.

The following summarizes the definitions of various types of impact:

- Direct Impact: Impacts associated with the Proposed Project or action alternatives that would result from construction of facilities (e.g., dams, pipelines, pump stations, plants, and inundation by reservoirs).
- Indirect Impact: Secondary or subsequent impacts of the Proposed Project that occur later in time or at a distance from the action. The primary indirect impacts would result from project-induced flow and quality changes to the streams and rivers in the affected area.
- Short-term impacts: Impacts that generally occur during construction activities and are considered temporary. Short-term disturbances that can be restored (e.g., pipelines) or would cease upon completion of construction activities (e.g., construction noise).
- Long-term impacts: Impacts created by construction or operational changes that are considered long-term or permanent, sometimes remaining for the life of the project (e.g., dams), or that might occur intermittently over the life of the project (e.g., reservoir inundation).

Surface water hydrology in the ACF River Basin was presented through examination of flow rates, flow durations, reservoir water levels, and withdrawals. Factors affecting these conditions include climate conditions, municipal and industrial consumption, agricultural use for irrigation, withdrawals for cooling water use at thermoelectric power plants, reservoir operations for hydropower generation, and flood risk management.

Desk-top analysis and hydrological modeling were performed to evaluate the pumped-storage operations and the potential downstream impacts. To evaluate the hydrologic effects, we modified the Corps' Hydrologic Engineering Center's Reservoir System Simulation (HEC-ResSim) model of the Apalachicola-Chattahoochee-Flint (ACF) River Basin (**Figure 4**) to include the Applicant's preferred alternative, Glades Reservoir. The modeling time period for this analysis is from January 1, 1939 through December 31, 2008.

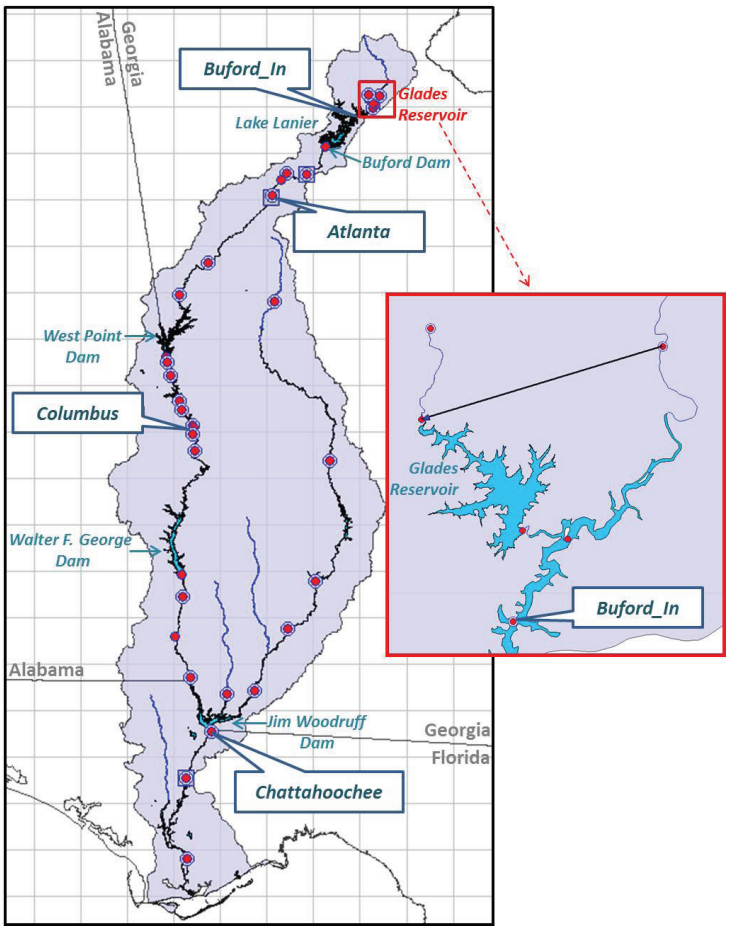

Figure 4 : Corps' HEC-ResSim model of the Apalachicola-Chattahoochee-Flint (ACF) River Basin, Including the Applicant's Preferred Alternative

6. CUMULATIVE EFFECTS

This DEIS evaluated the aggregate impacts of past, present, and reasonably foreseeable water-based or land-based actions that, when combined with one of the action alternatives, may affect the environment cumulatively. Cumulative effects analyses were conducted for all resources. However, a focus of the analysis, based on ongoing ACF Basin water management controversy and public scoping comments, was on surface water hydrology and management.

7. CONCLUSIONS

Modeling of the operations of the Corps' ACF reservoir operations indicates that the addition of water supply storage within the Proposed Project and the action alternatives does not adversely affect the Corps' operation of the ACF system under the rules defined in the existing water control manual. The analyses show that shifting a portion of Hall County's demand from Lake Lanier to the proposed Glades Reservoir would not significantly impact lake levels, downstream flows, drought operation, recreation, or hydropower production (as compared to the No Action Alternative that meets identical demands without an additional reservoir). Adding storage is slightly beneficial to the system operation under these assumptions because it increases the Lake Lanier water level and does not affect operation downstream of Buford Dam. The slightly higher average daily lake levels at Lake Lanier reduces the time the lake is below the its designated recreation impact levels (comparing action alternatives to the No Action Alternative). However, Lake Lanier would see an average of one-foot pool level decrease when the overall system demand increases from Baseline to 2060 conditions.

The modeling results indicated that the direct, indirect, and cumulative impacts of the Proposed Project or action alternatives on the Corps reservoirs and downstream flows in the ACF Basin would occur mostly above Buford Dam. The majority of impacts would occur below proposed intake locations in the Chattahoochee River above Lake Lanier and in Lake Lanier (above Buford Dam).

Overall, the water management modeling indicates that the increase in projected system-wide demand from 2011 to 2060 would result in some adverse impacts and most of the adverse impacts would be felt in the upper Chattahoochee Basin above Buford Dam (upper Chattahoochee River and Lake Lanier). This is due to (1) the increase in net consumptive use in the Metro Atlanta area, and (2) because the existing rules operate the Corps' ACF basin reservoirs to maintain certain flows downstream of Buford Dam.

Potential cumulative effects from present and future foreseeable actions could range from short-term effects during construction of infrastructure to long-term effects associated with increased water consumption and changes in water management including changed streamflows and reservoir levels, and long-term operation and management of the new water supply infrastructure once constructed.