

Section 22 - Econlockhatchee River Phase III

AUTHORITY

The following report was undertaken in accordance with the provisions of Section 22, Public Law 93-251. This public law authorizes the Chief of Engineers to cooperate with the States in preparation of plans for development, utilization, and conservation of water and related land resources of drainage basins located within the boundaries of the State.

INTRODUCTION

The Econlockhatchee River Basin encompasses about 275 square miles and is located to the east of Orlando in central Florida. The river flows through Seminole and Orange Counties. The basin is shown in Figure 1. The river follows a northerly water course parallel to the St Johns River until it turns east and conflues with the St. Johns River downstream of the Puzzle Lake area.

Seminole County is one of Florida's smaller counties based on its 1990 population of over 287,000. Seminole County is under development pressures which are changing the area from an agricultural region to small urban towns and residential areas. Close proximity to Orange County with Disney World and other major attractions are responsible for much of the changes. The June-October rainy season produces an average annual rainfall in Seminole County of about 50.51 inches. Average temperatures for January and August are 61.6 and 82 degrees, respectively.

Once almost entirely a citrus farming area, Orange County has been transformed in the past two decades into a highly urbanized area. The conversion of lands has been accelerated by construction of large tourist attractions such as Walt Disney World. Average annual rainfall for Orange County is 52.35 inches. Average temperatures for January and August is 60.7 and 82 degrees, respectively.

The study area has experienced rapid and continuous growth. Population projections indicate that the Orlando area is one of the fastest growing areas in Florida. As the population increases, there is a greater demand for residential and industrial sites. Development has increased population growth to over 30% in the nearby cities of Orlando and Sanford. If new development in the flood plain is not restricted the flow of water could increase flood heights and damages upstream.

PREVIOUS REPORTS

Analyses of the existing conditions of the river were performed by the U.S. Army Corps of Engineers, Savannah District in 1990. Updated survey data was obtained in November 1994 in order to check the results of that study. The U.S. Army Corps of Engineers, Jacksonville District reevaluated previously compiled HEC-1 and HEC-2 models that were produced for the existing conditions flood stages of the 10-, 25-, 50-, and 100-year storm events.

FINDINGS

Existing Conditions. The existing conditions analyses was performed in 1990 and was based on 1985 surveys provided by the St. Johns River Water Management District (SJRWMD). Since 1985, the Lockwood Rd. Bridge on the Little Econlockhatchee River, a main tributary into the Econlockhatchee River, has been replaced along with the CR 419 Bridge on the Econlockhatchee River. Furthermore, the Snow Hill Rd. Bridge is scheduled to be replaced in 1995, according to the Seminole County, Engineering Division. Surveys were received by the Jacksonville District showing the updated bridge deck and low chord elevations, however, the bridge pier information was omitted. In order to obtain the missing data, surveys were furnished by the SJRWMD and the Seminole County, Engineering Division.

HYDROLOGIC MODELING

Analyses. The hydrologic re-analyses performed for the existing conditions were based on the HEC-1 models and maps furnished by the SJRWMD and Savannah District. A review was made of the monthly rainfall at the Orlando rain gage from 1900 to 1987. This data was processed in a manner that would provide an index of monthly groundwater levels. An analysis revealed that in that vicinity the 1960 groundwater was at a 50 year high in contrast to the 1979 period where the groundwater was the lowest in the 87 year range. That yielded a large difference in runoff when using the same rainfall amount. The original HEC-1 models were calibrated to the 1960 event except for the portion from the confluence of Turkey Creek and the Econlockhatchee River to the upstream sub-basins, which were calibrated to the 1979 event at the gage at Magnolia Ranch. The hydrology from the confluence of Turkey Creek and the Econlockhatchee River and upstream was recomputed and remodelled.

The hydrologic model was recalibrated for the upstream portion of the original HEC-2 model, which was based on the hydrologic model calibration used by Savannah District. The Jacksonville District recalibrated the hydrology model to reflect the antecedent ground water levels in 1960 and 1979. The hydraulic HEC-2 model of

the 1990 study was expanded to include current bridge data. The revised model incorporated all of the updates along with amended data from the revised HEC-1 analyses.

Channel Roughness. The channel roughness values of 0.048 in the channel and 0.165 on the overbanks were used to reflect roughness values for the channel cross sections downstream of the Snow Hill Rd. Bridge to the St. Johns River. After a site visit to the area, the channel overbank roughness values for the channel upstream of Snow Hill road were increased to 0.21 and within the channel the roughness varied from 0.09 to 0.27 depending on the vegetation density and channel width. These channel roughness values were calibrated from field surveys, which yielded a flow reading of 2,630 cfs at USGS Chuluota gage and a water surface elevation of 53.55 feet at S.R. 528 on July 27, 1995.

RESULTS

The results of the existing conditions HEC-2 model are shown in Table I and reveal that the Jacksonville District's model was mostly consistent with the FEMA water surface elevations, as compared to Savannah District's flood stages for the 100 year event. There was a 3 to 4 foot difference in the water surface elevations at S.R. 50. According to Jacksonville Districts Flood Control Section this discrepancy may be attributed to the building of a new bridge at S.R. 50, which may have proceeded the May 29, 1973 Survey Report of the Central and Southern Florida Project on the Econlockhatchee River, from which the FEMA flood stages were based on.

The flood stages produced by the 1995 HEC-2 model are shown in Table II, which cites the water surface elevations for the different storm frequencies along the Econlockhatchee River and the Little Econlockhatchee River. A plot of the cross section locations are displayed in Figure 2. Plates 1 and 2 show water surface profiles of various storm flows on the Econlockhatchee and Little Econlockhatchee Rivers, respectively.