Infiltration and Runoff Coefficients. Since insufficient streamflow data are available on the tributary streams, runoff coefficients were estimated based on previous urban studies within the Vicksburg District. These coefficients were increased slightly to account for the level of urbanization. Runoff coefficients are presented in Table 4-11-3.

Seepage. Seepage under the levees during high river stages was considered to contribute to the inflow to the interior ponding areas. Seepage inflow versus differential head relationships were used to determine the seepage inflow at each ponding area. This relationship is shown on Plate 4-11-27.

River Stage Relations. Pearl River stages at each major drainage structure were related to stages on the Pearl River at the Jackson gage at U.S. Highway 80. This stage transfer relationship was based on HEC-RAS computed water surface profiles for existing and post-project conditions, observed high water marks, and limited low water data.

Minor Gravity Structures. Minor gravity structures are provided as needed to eliminate local ponding inside the levee areas. These structures are located at smaller ditches or low swags along the levee and are classified as being 48-inch diameter or less. Minor structures were designed to pass the peak flow, and in some cases, routed flows from a 25-year frequency storm.

Interior Frequency Analysis. Stage-frequency curves for each interior ponding area were developed using annual maximum interior stages generated by the routing model. A Log Pearson Type III distribution and the median plotting position methods were used in the development of these curves. Existing river conditions stage frequency curves at each ponding area were developed from the frequency water surface profiles. Interior frequency curves are shown on Plates 4-11-28 to 4-11-41.

4.2 Tributary Impacts

Several major tributaries exist within the evaluation area between RM 280 and RM 298 of the Pearl River. Some of these tributaries may be directly affected by the channel improvement concept. The following is a list of major tributaries that convey flood water from urbanized areas within the Jackson Metro area.

Tributary Name	Approx. River Mile
• Richland Creek	RM 282.5
• Lynch Creek	RM 286.3
• Town Creek	RM 287.3
• Eubanks Creek	RM 290.8
• Prairie Branch	RM 291.9

- Hog Creek RM 294.5
- Hanging Moss Creek RM 295.5
- Purple Creek RM 296.0

The tributaries near the upstream side of the proposed weir location were reviewed to determine the preliminary backwater impacts, if any, based on a normal pool elevation of 258.0-ft. An additional detailed analysis of all tributaries will be performed during the continued feasibility study.

An effective HEC-2 model was obtained for Town Creek. Although an effective model was not available for Lynch Creek at the time of this evaluation, an existing HEC-RAS model was developed for Lynch Creek, using aerial photographs, existing LiDAR contours, as-built roadway and bridge construction plans, FEMA FIS and some field measurements. These models were used to evaluate the effects of additional tailwater at the confluence with the Pearl River. Tributaries farther upstream of the proposed weir were not evaluated at this time. It is not anticipated that the backwater elevation of 258.0-ft would have any significant impacts on the water surface profiles of upstream tributaries. It is assumed that, for the purposes of this evaluation, both Town Creek and Lynch Creek provide reasonable indications of the additional backwater for all affected tributaries.

4.2.1.1 Town Creek

The effective HEC-2 data file for Town Creek was imported into HEC-RAS as an existing condition model. The water surface profiles computed in the existing model matched the flood profiles contained in the effective FIS; therefore no significant calibration was required. The calibrated model was used to evaluate various weir and pool elevations as the downstream starting water elevation. The 10%, 2%, and 1% annual chance exceedance flood events for Town Creek were reviewed to determine the limits of the additional backwater caused by the proposed project. The additional tailwater, generated by the channel improvement pool, increases the flood profile for a short reach length upstream during the lower flood events. The increased tailwater ranges from 2.5-ft for the 10% annual chance exceedance event to 0.85-ft for the 2% annual chance exceedance event at the downstream most cross section. The increased flood profile elevations do not exceed the existing channel top banks and other modifications could be made to address the minor increases. The flood profiles for Town Creek for existing conditions and post-project conditions based on a weir elevation of 258.0-ft are shown in Figure 4-1.

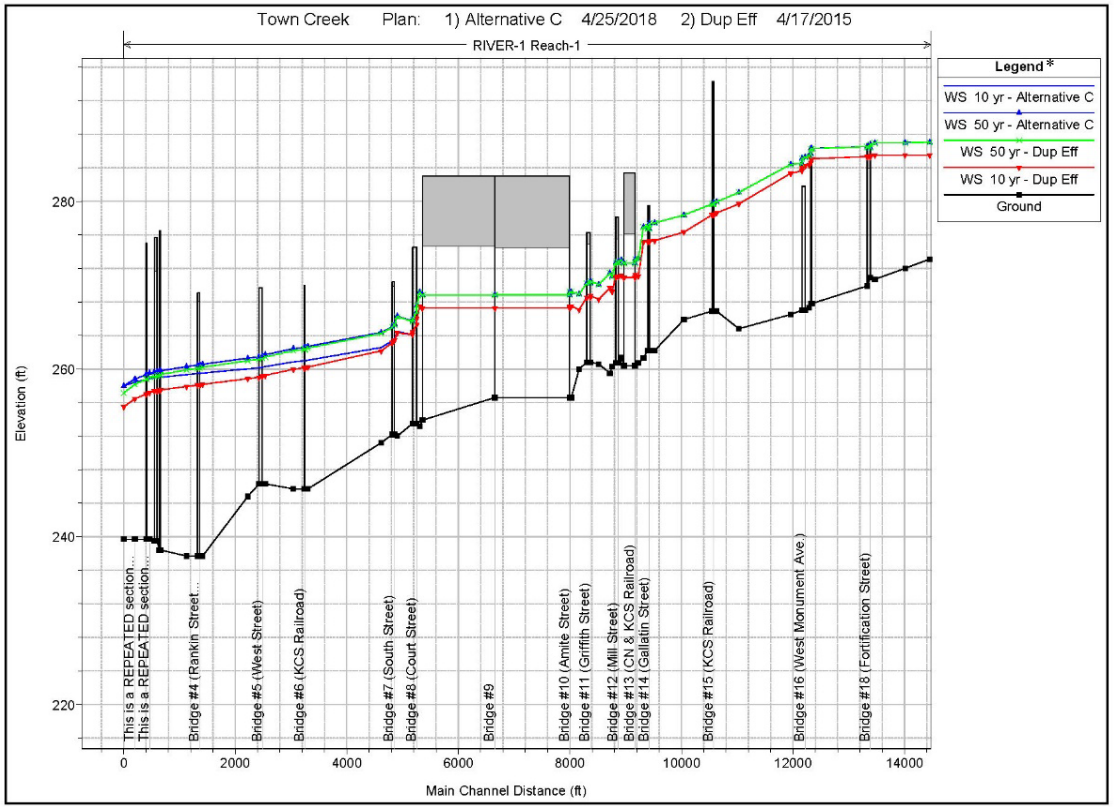

Figure 4-1: Town Creek Flood Profiles

*WS 10 YR = Annual 10% Chance Exceedance Flood Event Dup Eff = Duplicative Effective Model (Existing Conditions)
WS 50 YR = Annual 2% Chance Exceedance Flood Event

Figure 4-1 illustrates that increased tailwater on Town Creek does not appear to affect the flood profile beyond Court Street during headwater flood conditions. Based upon this preliminary evaluation it does not appear that a pump station would be required for the tributary; however, some other improvements may be required to mitigate standing backwater for maintenance purposes at the affected structures.

To further evaluate the impacts of the increased tailwater on the tributary, existing gage data was observed. Records from the USGS Gage Station No. 02485950 on Town Creek, located at North Gallatin Street, approximately 1.9 miles upstream of the confluence with the Pearl River, were reviewed for the September 2011 flood event. The stage hydrograph was compared to the stage hydrograph for the Pearl River at Highway 80. The time to peak for the maximum stage on Town Creek for this event occurred 86 hours or approximately 3.5 days prior to the time to peak stage of the Pearl River. The event occurred during low tailwater conditions. Figure 4-2 presents the stage hydrographs of both the Pearl River and Town Creek.

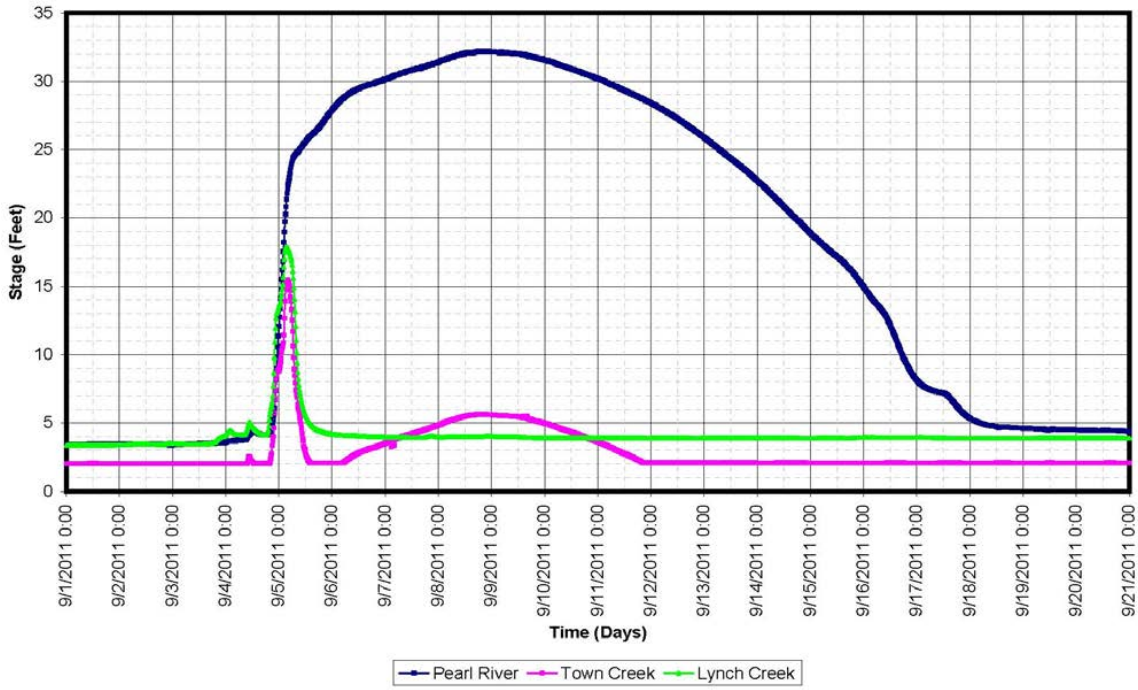

Figure 4-2: Stage Hydrographs of Pearl River, Town Creek, and Lynch Creek

4.2.1.2 Lynch Creek

A HEC-RAS model was developed for Lynch Creek using the best available data at the time of this evaluation, as described above. The model was calibrated to the flood profiles contained in the effective FEMA FIS for Hinds County. Similar to Town Creek, various weir and pool elevations were evaluated to determine the effects of increased tailwater at the confluence with the Pearl River. The 10%, 2%, and 1% annual chance exceedance flood events for Lynch Creek were reviewed to determine the limits of the additional backwater generated by the proposed channel improvement concept. The additional backwater, generated by the pool, increases the flood profile for a short reach length upstream during the lower flood events. The increased flood profile elevations do not appear to exceed the existing channel top banks. The flood profiles for Lynch Creek for existing conditions and post-project conditions based on a weir elevation of 258.0-ft are shown in Figure 4-3.

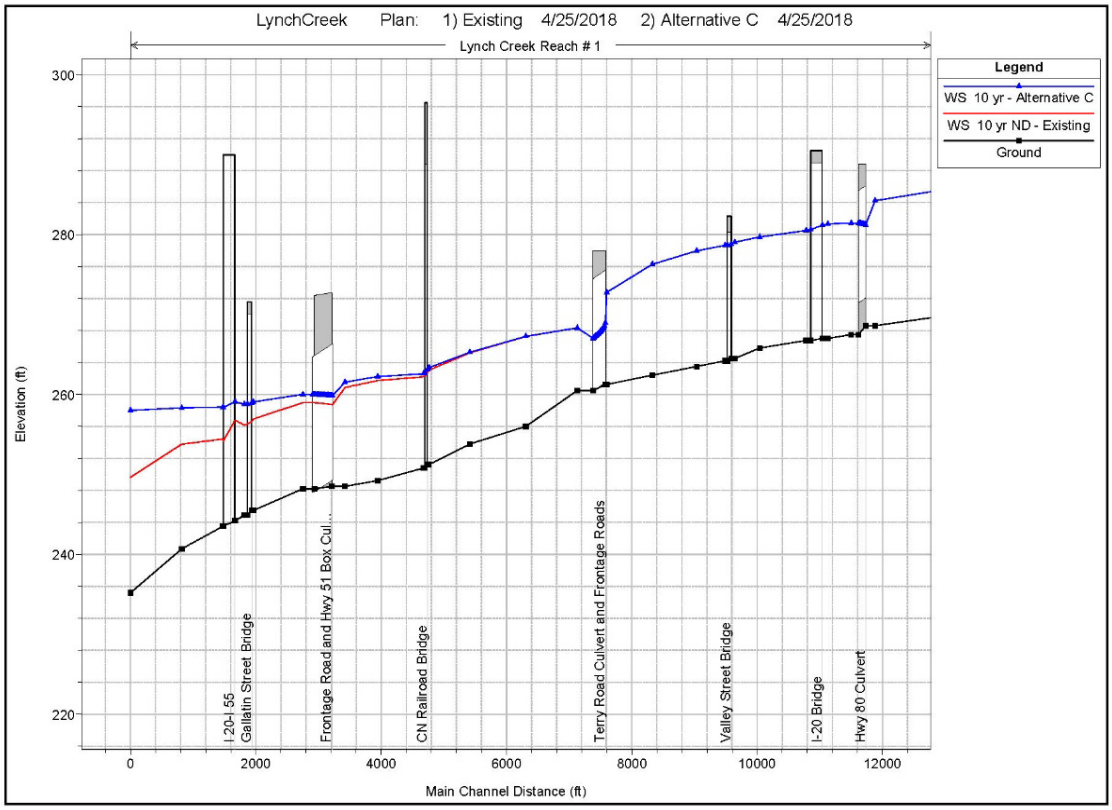

Figure 4-3: Lynch Creek Flood Profiles

Figure 4-3 illustrates that increased tailwater on Lynch Creek does not appear to affect the flood profile beyond the Canadian National Railroad during headwater flood conditions. Based upon this preliminary evaluation it does not appear that a pump station would be required at this location; however, some other improvements may be required to mitigate standing backwater for maintenance purposes at the affected structures.

Data from USGS Gage Station No. 02486100 on Lynch Creek at Valley Street was also reviewed for the September 2011 flood event. The data indicates similar results as those discussed in Section 4.2.1.1 for Town Creek. Figure 4-2 above presents the hydrograph for Lynch Creek as a comparison to the Pearl River.