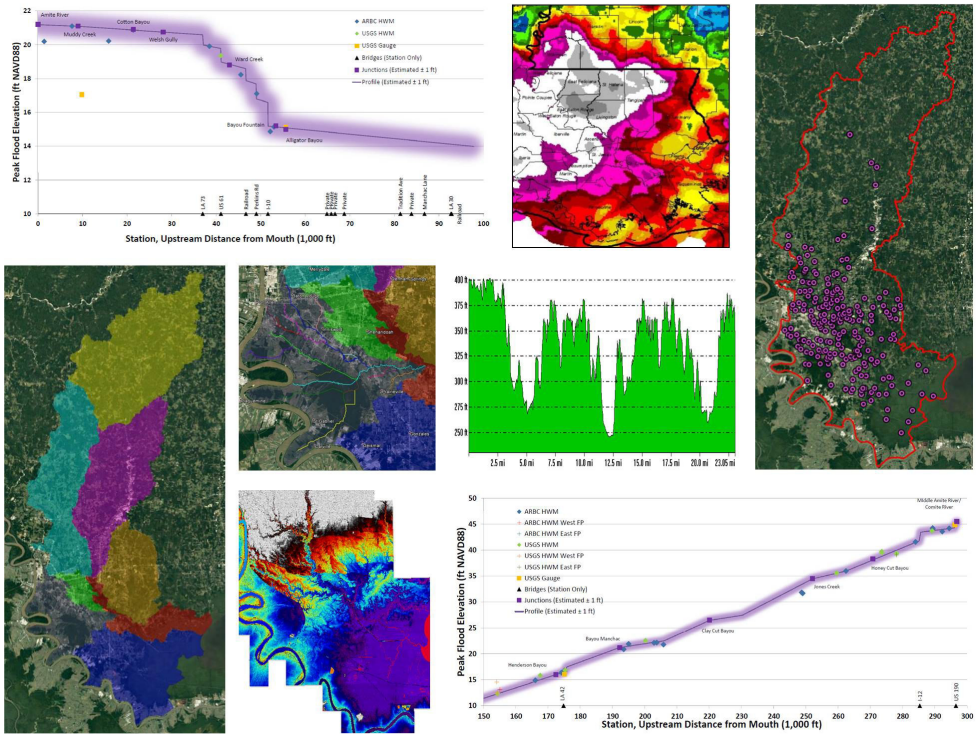
August 2016 Flood Preliminary Report
Amite River Basin



Prepared for

Amite River Basin
Drainage and Water Conservation District

AMITE RIVER BASIN
DRAINAGE AND WATER CONSERVATION DISTRICT

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Executive Summary

Objectives of This Report

The Amite River Basin Drainage and Water Conservation District (ARBD) has overseen regional flood risk management for the Amite River Basin (ARB) since its inception in 1981, and for more than 35 years has been deeply committed to advancing scientific knowledge on ARB flood hazard and risk. The ARBD tasked Bob Jacobsen PE, LLC to prepare an *August 2016 Flood Preliminary Report*:

- Describing the ARBD sponsored post-flood High Water Mark (HWM) program;
- Evaluating the ARBD HWM data quality;
- Defining and analyzing peak flood profiles for major streams in the ARB using the ARBD and US Geological Survey (USGS) peak flood data; and
- Providing conclusions and recommendations for finalizing August 2016 Flood inundation maps, including a high quality, *State-of-the-Practice* model of the flood.

The peak flood profiles and analysis presented in this Report are *preliminary* and should not be used for flood related planning or engineering purposes until an analysis of the August 2016 Flood is finalized with the aid of a high quality "hindcast model" (computer simulation of the flood).

In addition to presenting the above data and preliminary analysis for the August 2016 Flood, this Report includes two pertinent background parts. *Part I, Background—The Amite River Basin* reviews the ARB sub-basins and major streams, regional terrain and river morphology, and types of flooding. These three sections provide a crucial basic understanding of the ARB flood setting.

Part II, Background—Flood Hazard and Risk in the Amite River Basin includes sections on *Full Spectrum* flood hazard, *Real Flood Risk*, the history of ARB flooding, and the history of ARB flood risk management. These sections are meant to give readers interested in flood risk management some important context for this Report and its recommendations. Information in these sections (e.g., the review of Annual Exceedance Probability) is useful for the first two sections in *Part III—The August 2016 Flood:* the first on the August 2016 rain event and second which addresses the USGS analysis of the flood data. The additional background information provides the basis for the further objectives and key recommendations discussed in *Part IV—Conclusions and Recommendations*.

Those readers familiar with the background material and only interested in the ARBD data, profiles, and associated findings and conclusions can easily limit their attention to the sections directly addressing these topics.

Preliminary Conclusions

The peak flood data and analysis of profiles yielded eight major preliminary conclusions regarding the August 2016 Flood:

1. Peak flood data for the August 2016 Flood exhibit good coverage, particularly of flooded areas. Due to limitations of survey time/funds and available/accessible evidence, the USGS and ARBD could not obtain HWMs for some major stream reaches (especially in the Hilly Uplands portion of the ARB). A total of 482 measurements (34 USGS gauges; 198 USGS HWMs; and 250 ARBD HWMs) were used to generate 1,060 miles of preliminary peak flood profiles for 70 major streams—on average 7 points per stream or one every half mile.

2. In terms of HWM repeatability (precision), the peak flood data are of very reasonable quality for use in flood analysis. A conservative estimate of uncertainty with respect to repeatability in the combined set of USGS/ARBD HWMs is ± 1.0 ft.
3. More than half the data were provided by the ARBD HWMs. In addition, the ARBD HWMs showed better repeatability than USGS HWMs. The ARBD HWMs will be a crucial resource for studying the August 2016 Flood and analyzing ARB flood hazards for decades to come.
4. Reasonable preliminary profiles were defined using engineering judgment for most reaches along the 70 selected major streams, manually fitting profiles to the peak flood data. Preliminary profiles were estimated using the regional terrain in reaches that lacked HWMs.
5. Many reach profiles in the ARB were influenced by backwater flooding. Those strongly affected by backwater flooding included Hurricane Creek; Robert Canal; lower portions of Honey Cut Bayou, Jones Creek; Grays Creek, and Colyell Creek; most of Clay Cut Bayou; Bayou Manchac and most of its tributaries; and the remaining lower Amite and Blind Rivers and their tributaries.
6. Bridges had a widespread impact on peak flood levels throughout the ARB—preliminary profiles indicate more than 80 bridges. Bridge impacts exceeded 1 foot at many locations. The most significant impact was the I-12 bridge/barrier at Grays Creek—about 4 ft. Bridge impacts were negligible in areas with more sluggish backwater flow. The widespread bridge impacts indicated by the August 2016 Flood preliminary profiles are consistent with the general limitation of bridges with respect to very extreme floods.
7. Two other structures markedly influenced the peak flood: Bayou Manchac Road (which restricted flow into Spanish Lake/Bluff Swamp) and the gate at the Marvin Braud Pump Station on New River (which restricted flow to the Petite Amite River).
8. Additional HWMs for many reaches would likely improve the quality of a hindcast model of the August 2016 Flood and finalizing stream peak flood profiles and basin-wide inundation maps.

<u>Further Objectives</u>

ARB leaders, planning officials, and the public need the results of a finalized analysis of the August 2016 Flood available online and accurate down to the parcel level, *as soon as possible*, in order to develop and implement a ***holistic strategy*** for ARB flood risk management. Such a strategy must seek to economically manage *Real Flood Risk* with minimal adverse impact, and must receive solid, basin-wide public support.

Finalizing the post-flood analysis includes:

1. Preparing high quality ARB-wide inundation maps for the August 2016 Flood (online, showing both peak flood elevation ft NAVD88 and depth above ground) and finishing a detailed study of flood characteristics and the impacts of terrain and man-made features (e.g., bridges).
2. Determining the *Full Spectrum* flood hazard and *Real Flood Risk* for current conditions throughout the ARB.
3. Evaluating changes to the *Full Spectrum* flood hazard and *Real Flood Risk* for “what if” scenarios.

Five Recommendations to Finalize Analysis

FIRST: Formalize coordination of the diverse technical programs and activities among the numerous entities with roles in ARB flood risk management.

SECOND: Develop and maintain an online ARB Geographic Information System (GIS) portal—to provide users and the public easy access to important reliable data and analysis.

THIRD: Develop a *State-of-the-Practice* hindcast model of the August 2016 Flood. Such a hindcast should incorporate the most modern approaches, including development of two interim models to assist in development.

FOURTH: Obtain additional HWMs where feasible to support final hindcast model development.

FIFTH: Develop additional tools to complete *Full Spectrum* flood hazard and *Real Flood Risk* analyses and scenario assessments, including: synthetic rainfall/coastal-wind events, risk assessment software, and "what if" inputs/conditions for climate change, sea level rise, river morphodynamics, land-use modifications, flood risk reduction projects and programs, and future development and infrastructure.

Acknowledgements

The ARBD Executive Director Dietmar Rietschier has been a leading advocate in the State of Louisiana for sound, science-based regional flood risk management for more than two decades. The ARBD high water mark survey and preliminary analysis for the August 2016 Flood were only able to be undertaken due to his understanding of the criticality of this work. He and the ARB Commission are to be greatly credited with diligently supporting many basin-wide flood risk management initiatives in the face of numerous obstacles.

Clint Willson, Ph.., P.E. graciously agreed to review this Report and his suggestions improved it immensely.

The author gladly shares any and all appreciation for this Report with them, and assumes sole responsibility for any and all flaws.