

Appendix 4

St. Charles Basin

The St. Charles hurricane protection system (HPS), shown in Figure 1, was designed as part of the Lake Pontchartrain, LA, and Vicinity Hurricane Protection Project. The St. Charles HPS protects 17.2 square miles of urban, industrial, commercial, and ecological lands that is essentially a low density residential community with a small business district along U.S. Highway 61. The St. Charles Basin is generally bounded on the north by the St. Charles HPS, on the south by the Mississippi River Levee (MRL) and on the west by the Bonnet Carre guide levee. As designed, the HPS levees were generally constructed with a 10-foot crown width with side slopes of 1V on 3H for both the flood side and protected side. Topography is flat with ground elevations ranging from +12 feet NGVD on the alluvial ridges along the Mississippi River to -2 feet NGVD near the locally maintained levee south of Lake Pontchartrain. Approximately 25 percent of the developed area is below sea level. The design elevation of the HPS levees varies from 13 feet on the west to 12 feet on the east. There are also floodwall segments along the line of protection that consists of sheet-pile walls or concrete capped sheetpile walls constructed on the top of the levee. The line of protection was designed to provide protection from the Standard Project Hurricane. As designed, there is a total of approximately 9.5 miles of earthen levees, 1 mile of floodwall, one pump station, and five drainage structures, three swing gate closures for road and rail crossings, and one open gap for a rail crossing. The MRL is generally designed to elevation 26 feet with a 10 foot crown and a 1 V on 3 H slope on the land side and a 1 V on 4 H on the flood side. Similarly, the Bonnet Carre guide levee is generally designed to elevation 20.3 feet with a 10 foot crown and a 1 V on 3 H slope on the land side and a 1 V on 4 H on the flood side.

The basin is a mix of industrial and residential areas. The area between the HPS and Lake Pontchartrain is essentially a wetlands area. There are two sub-basins in the basin as shown in Figure 1.

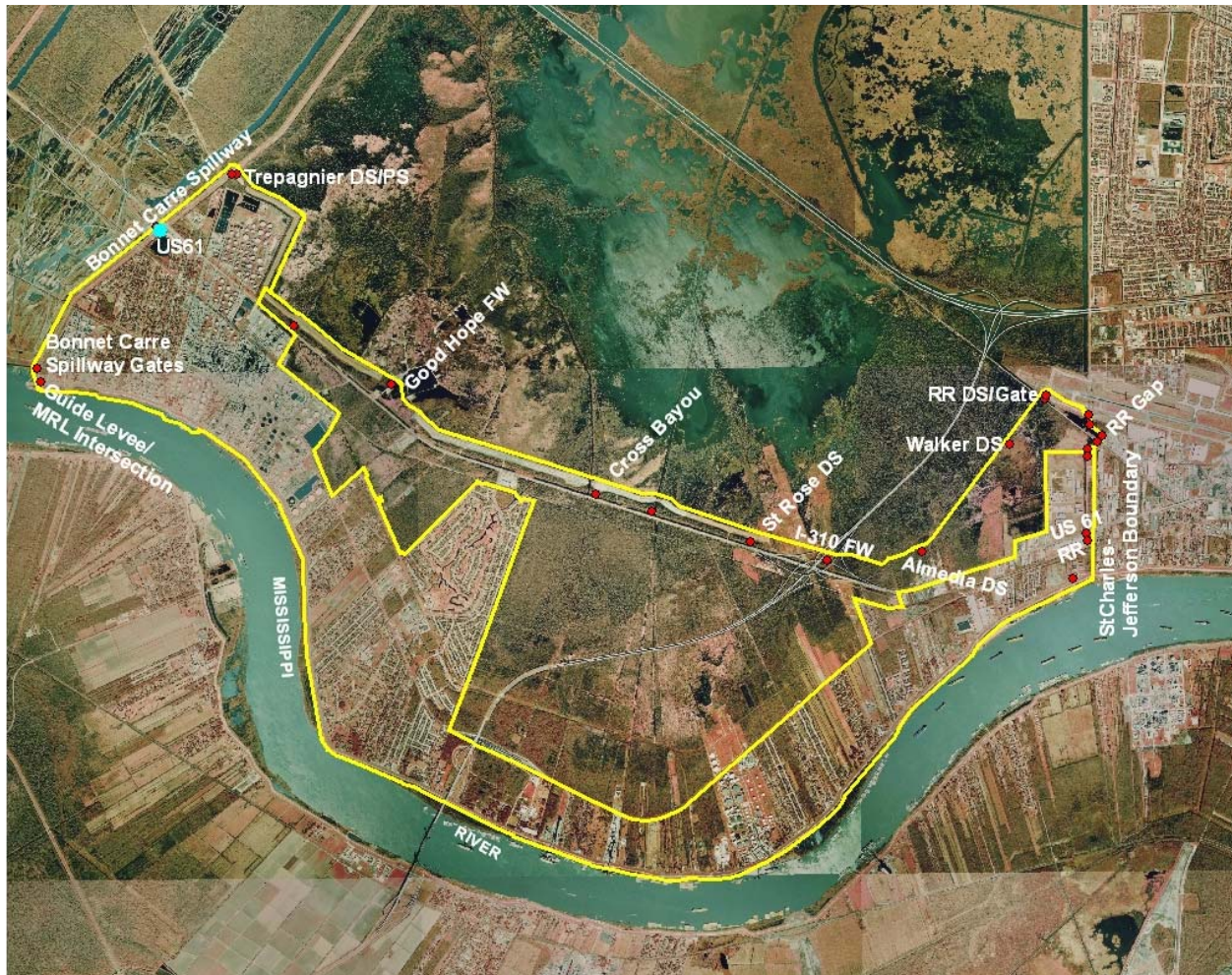
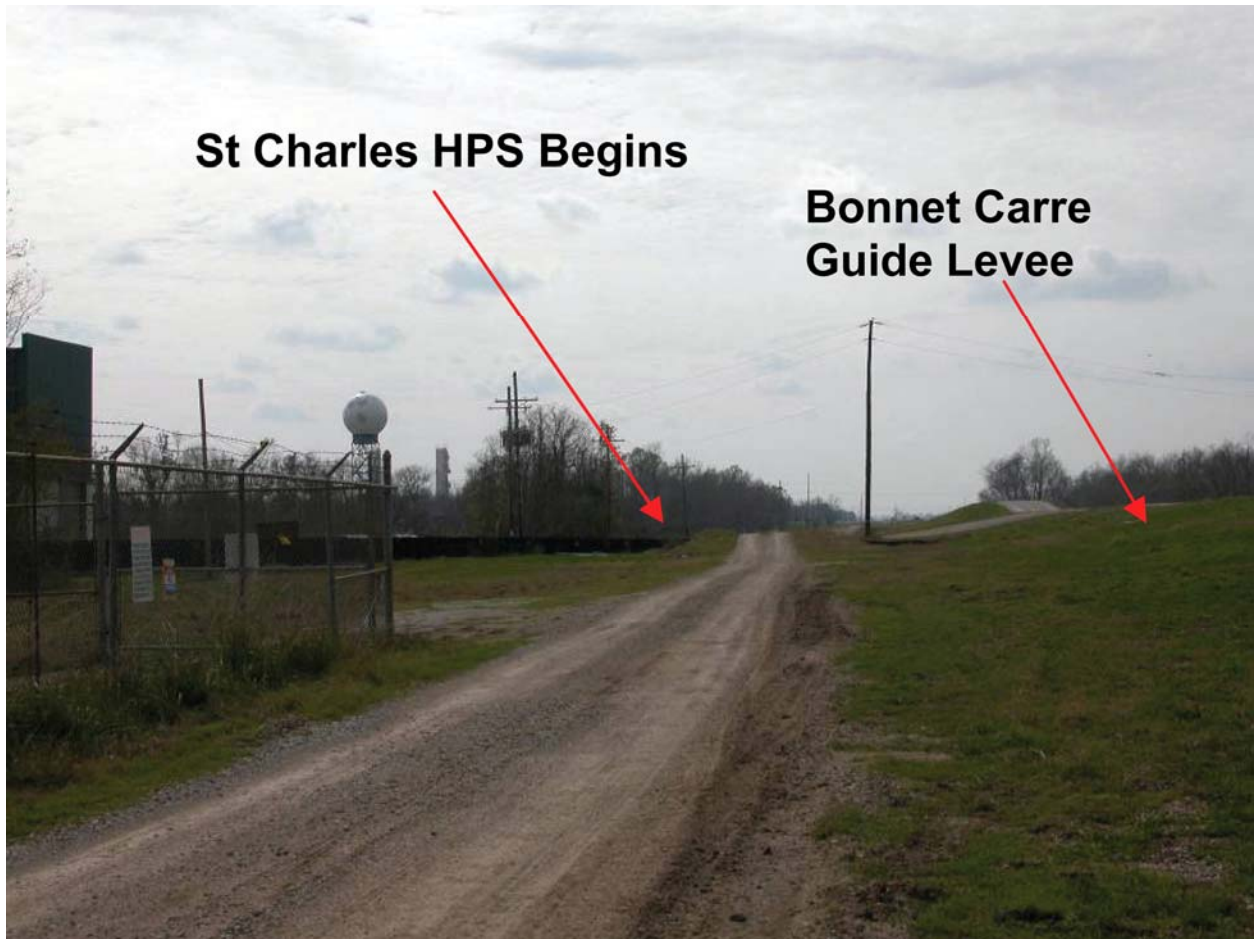


Figure 1. St. Charles Basin with sub-basins and annotations for significant features

The St. Charles HPS is made up of Reach SC1 – SC4 which begins at the Bonnet Carre Guide levee and extends eastward to the St. Charles – Jefferson Parrish border.

Reach SC1 is approximately 17,000-ft-long earthen levee (with a geotextile blanket) and contains (1) the Bayou Trepagnier Pump Station and Drainage Structure with a transition sheetpile wall, (2) a pipeline crossing and (3) the Good Hope floodwall. It was designed to a net grade of 13 ft MSL.



Intersection of St. Charles HPS and the Bonnet Carre Guide Levee



Trepagnier Drainage Structure



Trepagnier Pump Station

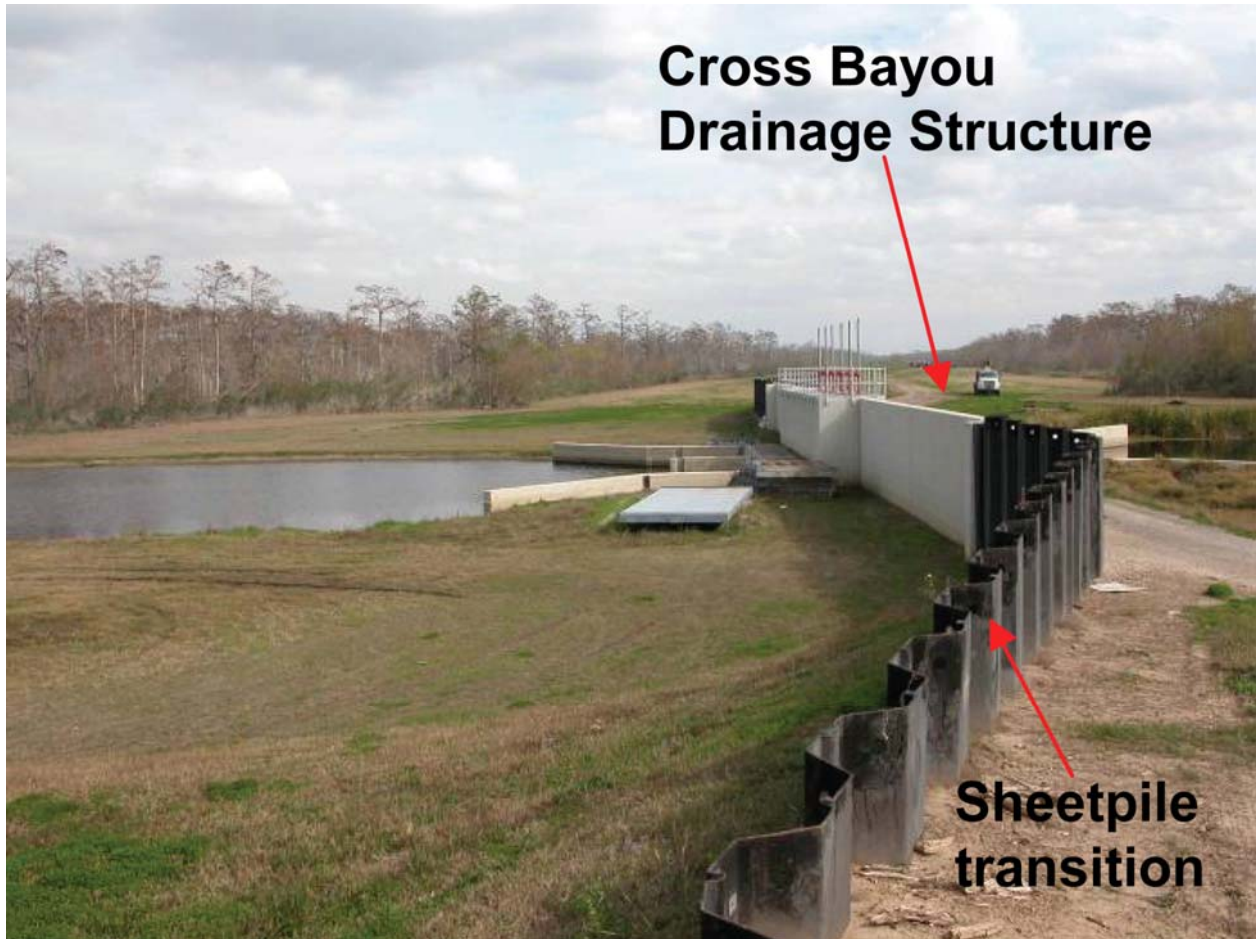


Pipeline Crossing with sheetpile transition to levee



Industrial access road closure gate

Reach SC2 is approximately 12,000-ft-long earthen levee (with a geotextile blanket) and contains (1) the Cross Bayou Drainage structure and the Gulf South Pipeline crossing. It is designed to an elevation of 12.5 ft. There is a 500-ft transition from 12.5 to 12 ft where SC3 begins.



Cross Bayou Drainage Structure



Gulf South Pipeline Crossing

Reach SC3 is approximately 24,000-ft-long earthen levee (with a geotextile blanket) and contains (1) The St.Rose, Almedia, and Walker Drainage structures, (2) the I310 Floodwall with one access gate, and (3) the railroad crossing near the airport runway extension. The RR crossing closure gate was not in place during Hurricane Katrina, but has since been completed. It was closed by sandbags for Katrina.



St. Rose Drainage Structure



I-310 Floodwall



I-310 Floodwall access closure gate (normally closed) with 24-ft closure gate



Alemedia Drainage Structure



Walker Drainage Structure with sheetpile transition



Railway Gated Crossing at Airport Levee (not constructed during Katrina)



Railway Gated Crossing at Airport Levee (not constructed during Katrina). HPS joins Airport Levee just north of the Railway Gated Crossing

Reach SC4 is approximately 8,048-ft-long earthen levee with most of it having an embedded sheetpile wall in its crown. It is designed to an elevation of 27.9 ft. It extends from where the HPS intersects the airport runway extension levee to the St. Charles – Jefferson Parish boundary, then proceeds southward to US 61, and on to the railroad crossing. Significant features are (1) an abrupt 3-ft drop in elevation at one 90 deg turn in the wall, (2) the 24-ft gap at the railroad crossing, (3) the US 61 crossing has no closure gate, and (4) the HPS ends at the railroad crossing, with the remainder of the Parrish boundary line at the same elevation as the RR until it intersects the MRL. The RR crossing gap was sandbagged during Katrina.



Floodwall as it turns east by the Airport runway extension



Corner of sheetpile floodwall as it turns south by the Airport runway extension (3 ft drop in elevation)



Floodwall as it turns south just north of the railroad crossing



Railroad crossing has no closure gate. During Katrina it was sandbagged.



St. Charles – Jefferson Parish Boundary Levee ends North of US 61 Highway – gap at this crossing



St. Charles – Jefferson Parish Boundary Levee South of US 61 Highway – no closure at this crossing



Short Transition Section of HPS from South of US 61 toward railroad



St. Charles –Jefferson Levee at South side of US 61



The basin protection then continues westward as the MRL at a design elevation of 26 ft. The MRL is an earthen levee with a 10-ft crown. No major structure or pipeline passes through the MRL.



Mississippi River Levee at the St. Charles-Jefferson boundary at Hwy 48



Top of Mississippi River Levee at the St. Charles-Jefferson boundary



I-310 passing over the Mississippi River Levee

At the east extend of the basin, the MRL intersects the Bonnet Carre guide levee, which continues the protection northward on the west side of the basin until it reached the HPS. This stretch contains the intersection with the spillway and US 61.



Mississippi River Levee intersection with Bonnet Carre Guide Levee



Bonnet Carre Spillway intersection with guide levee



Bonnet Carre Guide Levee Looking North from the Spillway gates

Risk Model Idealization

The St. Charles Basin was discretized into two sub-basins (SC 1 and SC 2) as shown in Figure 1. The sub-basins were defined to correspond to the known interior drainage areas. This reach idealization follows from the basin description information presented above which was collected from project documents and field inspections. Figure 2 shows the elevations for the St. Charles HPS: **PreKatrina**- at the time of Katrina and **Current**-as of 1 June 2007.

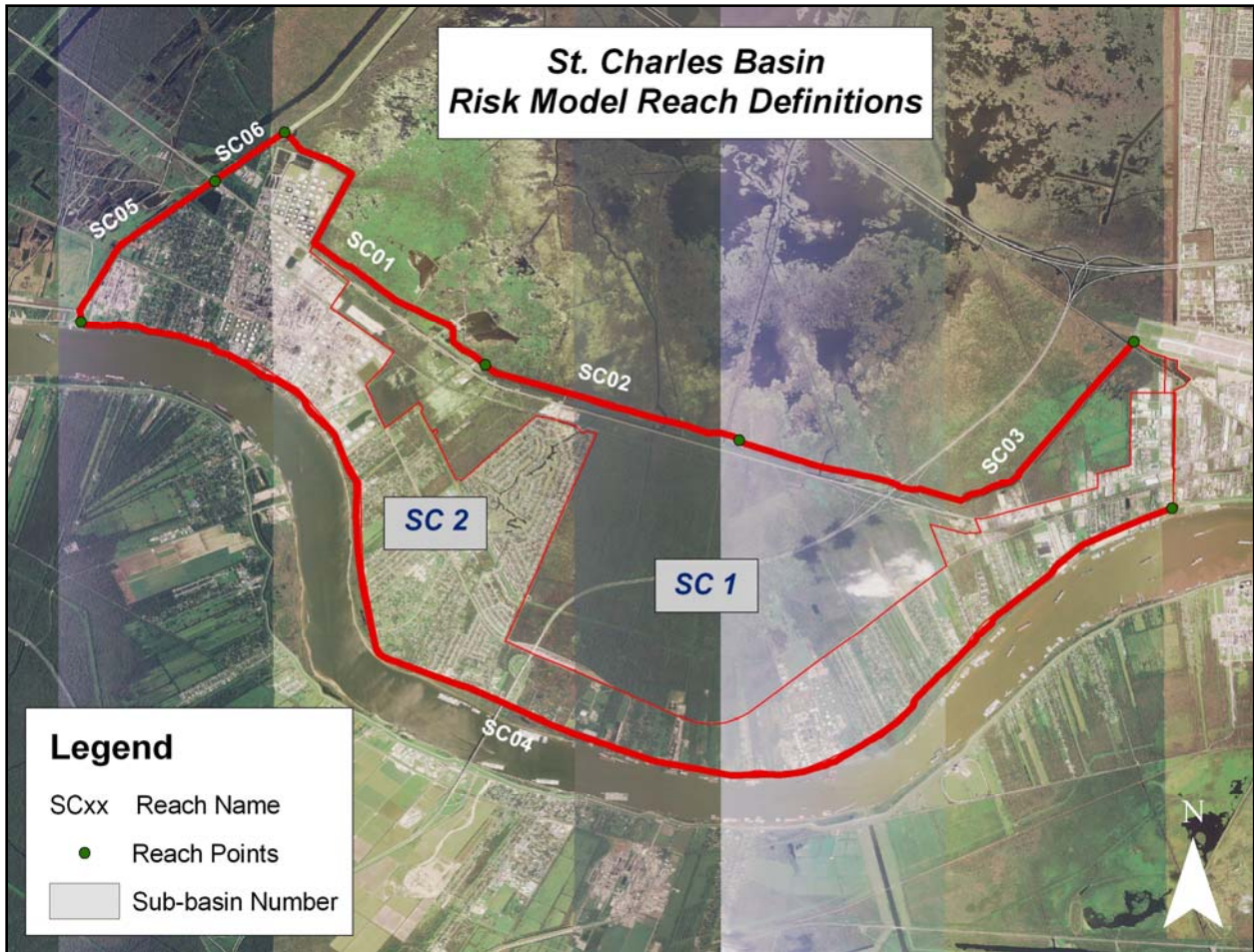


Figure 1. St. Charles Basin reach (SC01 – SC06) and sub-basin (SC 2 and SC 2) definition for use in the risk model.

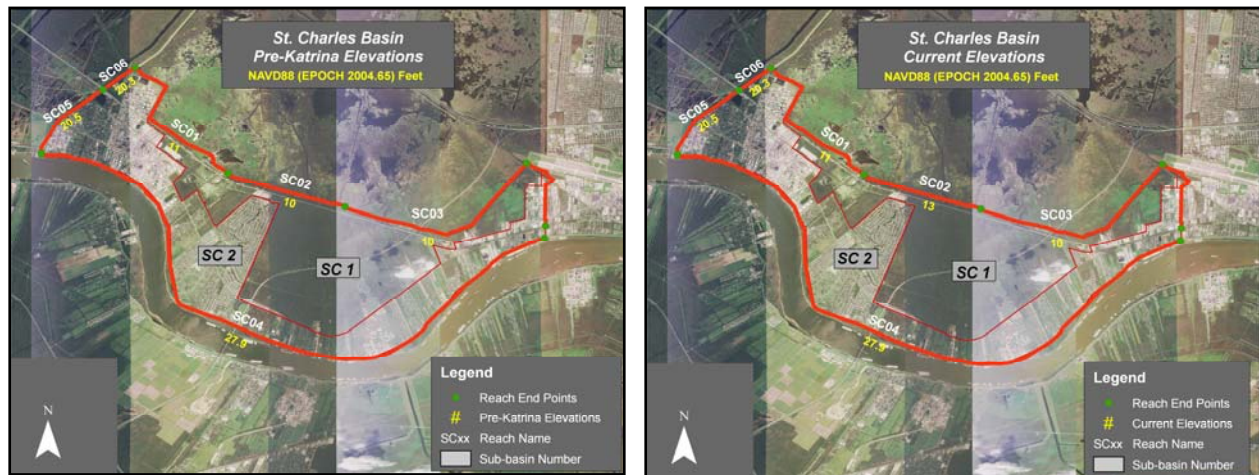


Figure 2. Elevations for the St. Charles Basin for the Pre-Katrina HPS (in place when Katrina occurred) and the Current HPS (on 1 June 2007).