

## CHAPTER 2

# ENVIRONMENTAL SETTING

### *Regional Geomorphology*

The study area is set in the floodplain of the Mississippi River, just south of Plaquemine, Louisiana. The river has occupied its current position (Meander Belt Stage 2) within the area since roughly 4000 B.P. (Britsch 1998; Frazier 1967; Tornqvist et al. 1996). According to Heinrich (1994:7-13) and Britsch (1998), the earliest distributary complex within the immediate area originated with Bayou Plaquemine, formed from a crevasse originating within the present-day town of Plaquemine at around 2500 to 2000 B.P. This led to the formation of a series of culturally important distributary channels, forming higher levee soils within the resource-rich backswamp areas. Alluviation has been effectively stopped in modern times with the erection of modern flood levees, leading to subsidence in coastal and deltaic regions of Louisiana.

The immediate landscape within the study area is dominated by three landforms. The Mississippi natural levee itself is composed of recent alluvial deposits, which tend to become finer with distance from the channel itself. The tops of the levees are dominated by Commerce silt and silty clay loams, which tend to give way to finer Sharkey silty clay loams and clays in the backswamps to the south and east. Crevasse breaks in the main natural levee that result in temporary channels with their own levee systems, are common in this landscape, and the study area is partly composed of the natural levee of one of these features. Crevasse soils are largely the same as the soils on the higher portions of the Mississippi levees, and are dominated in the project area by Commerce loams. Also present in the project area are several ridges and swales. Formed during the eastward meandering of the Mississippi River at Point Pleasant, the ridges and swales are most notable in the area of 16IV109.

The study area is largely composed of Commerce silt loams and silty clay loams. These are somewhat poorly drained, slightly acid, loamy soils which tend to

occur on the high to intermediate parts of the Mississippi River levee and associated distributaries at an elevation of 15 ft above sea level and higher. Slopes tend to be less than one percent. Sharkey silty clay loam soils are found in the lower elevations of the study area and are associated with the nearby Bayou Butte channel. Sharkey silty clay loams are poorly drained, neutral soils found on the low to intermediate portions of the Mississippi levee. These tend to be found in slopes that range from zero to three percent, and occur from 5 to 20 ft above sea level. Sharkey clays may be found in the lowest portions of the project area, most notably between the aforementioned Sharkey silty clay loams and Bayou Butte. Areas of Sharkey clays typically have a slope of less than one percent. Pockets of Sharkey clay may also be found nearer the river. Those soils mark the location of the ridges and swales noted above (Spicer et al. 1977:9-10, 13-15).

### *Geology of Point Pleasant*

Sites 16IV94 and 16IV109 are located on the west bank of the Mississippi River approximately 3.7 mi (6 km) south of the town of Plaquemine, on Point Pleasant. Point Pleasant constitutes the inside of an active Mississippi River meander located about five miles south of Baton Rouge on the western edge of the Atchafalaya Basin between latitudes  $\sim 30.279^\circ$  North and  $\sim 30.225^\circ$  North (Figure 2-1). Elevations throughout the point are highest along the artificial levee system at approximately 25 feet above mean sea level (amsl).

Two local topographic depressions occur on the point (blue colors in Figure 2-1 LiDAR imagery). One lowland area, at less than approximately 20 feet amsl, lies within the younger ridge and swale topography present on the eastern portion of the point. The other lowland area, at less than approximately 15 feet amsl, occurs in the central western portion of the point, within older Atchafalaya River backswamp and flood basin deposits.



Figure 2-1. Overlay of LiDAR (www.atlas.lsu) and four United States Geological Survey Quadrangle sheets (USGS 1992a-d).

### ***Ages of Holocene Deposits of Point Pleasant***

Prior work by Saucier (Saucier 1994b:Plate 11) indicates that Point Pleasant meander deposits associated with the current Mississippi River are late Holocene in age (Hpm 1), i.e., probably about 3000 years old or younger. These meander deposits consist of crevasse splay deposits and ridge and swale topographic units in the eastern portion of Point Pleasant (Figure 2-2). Older deposits of the Atchafalaya flood basin (Hb) lie in the western half of Point Pleasant and also underlie more modern sediments in the vicinity of archaeological site 16IV109.

### ***Interpreted Landforms Present at Point Pleasant***

The physiography of Point Pleasant can be divided into three zones (see Figure 2-2). The first zone consists of the artificial elevated levees that bound the point on the north, east and south and protect it from flooding. Inboard of the levee protection system, the western and eastern halves of the point show distinctly different topography. In the eastern half three ridge and swale landform groups are defined (see Figure 2-2). These groups of landforms presumably become progressively younger as they approach the present-day Mississippi River to the east (i.e., Group 1 is the oldest and Group 3 the youngest). Along most of Point Pleasant, immediately to the west of the ridges and swales, the land becomes flat, and there is no surficial evidence of former meander deposits. The division between the ridges and swales and the flatter land to the west runs in an approximately NNW-SSE direction and passes through site 16IV109 (see thick dashed black line in Figure 2-1). This same boundary probably corresponds to Saucier's dividing line between his Hb and Hpm 1 units (see dashed white line in Figure 2-2).

At least three groups of intersecting ridges and swales dominate the eastern half of the point and are separated along a NNW-to-SSE boundary from flatter topography to the west (see Figure 2-2). It is suggested that the boundary between the older floodplain deposits (Hb) and the newer meander deposits (Hpm 1) should be adjusted to reflect this change in the dominant types of landforms present on Point Pleasant (see Figure 2-2).

Both archaeological sites in the study area (16IV94 and 16IV109) lie on a relatively elevated ridge. This ridge appears to be a crevasse splay deposit that meanders and narrows slightly in a north to south direction from the edge of the river.

### ***Modern Soils Present at Point Pleasant***

Spicer et al (1977:index sheets 30 and 31) define two soil associations on Point Pleasant that are dependent upon their degree of drainage (see two regions defined by faint white lines in Figure 2-2). There is a direct correlation between drainage conditions and average elevation on the point. Commerce Association Soils are located at higher elevations than the more poorly drained Sharkey Association Soils (see Figure 2-2). Both archaeological sites are located within a defined region of Commerce Association Soils. The saturated water table occurs at roughly four feet below the subplowzone surface at both 16IV94 and 16IV109.

### ***Summary Interpretation of Sites 16IV94 and 16IV109***

Both archaeological sites appear to coincide with a younger, remnant, north-south crevasse-splay elevated ridge, most probably associated spatially and sourced from the Mississippi River.

16IV109 lies at the boundary between old Atchafalaya backswamp and flood basin deposits (interpreted Hb) to the west and more recent Mississippi Meander deposits (Hpm 1) to the east (see Figures 2-2 and 2-3). The contact between the mottled reddish brown and gray clay unit (interpreted Hb) and overlapping dark gray clay unit (Hpm 1) was encountered at roughly one meter below the plowzone at this site. The archaeological deposits at 16IV109 occur in the overlapping Hpm 1 sediments.

The deeper unit (interpreted Hb) shows features associated with hydric soils (USDA and NRCS 2003) that experience periods of oxidation when they are not saturated. This relict soil consists of diffuse masses of mixed reddish oxidized zones and gray reduced zones, reduced (gray) areas along root zones, as well as occasional Fe (iron) and Mn (manganese) concentrations (see inset in Figure 2-3).

The excavations at 16IV94 were located at the elbow of a six-to-eight-m-wide ribbon of very dark gray clay filling an interpreted shallow channel. West of the archaeological site, the channel runs east-west and east of this site the channel turns to run north-south. Due to the apparent absence of even fine sands within the channel and the channel's orientation, it appears that this original channel was cut prior to the formation of the current crevasse splay ridge upon which 16IV94 sits. However, infill and vegetative occupation of the channel fill could certainly postdate the initiation of the channel (Figure 2-4). Indeed, the archaeological

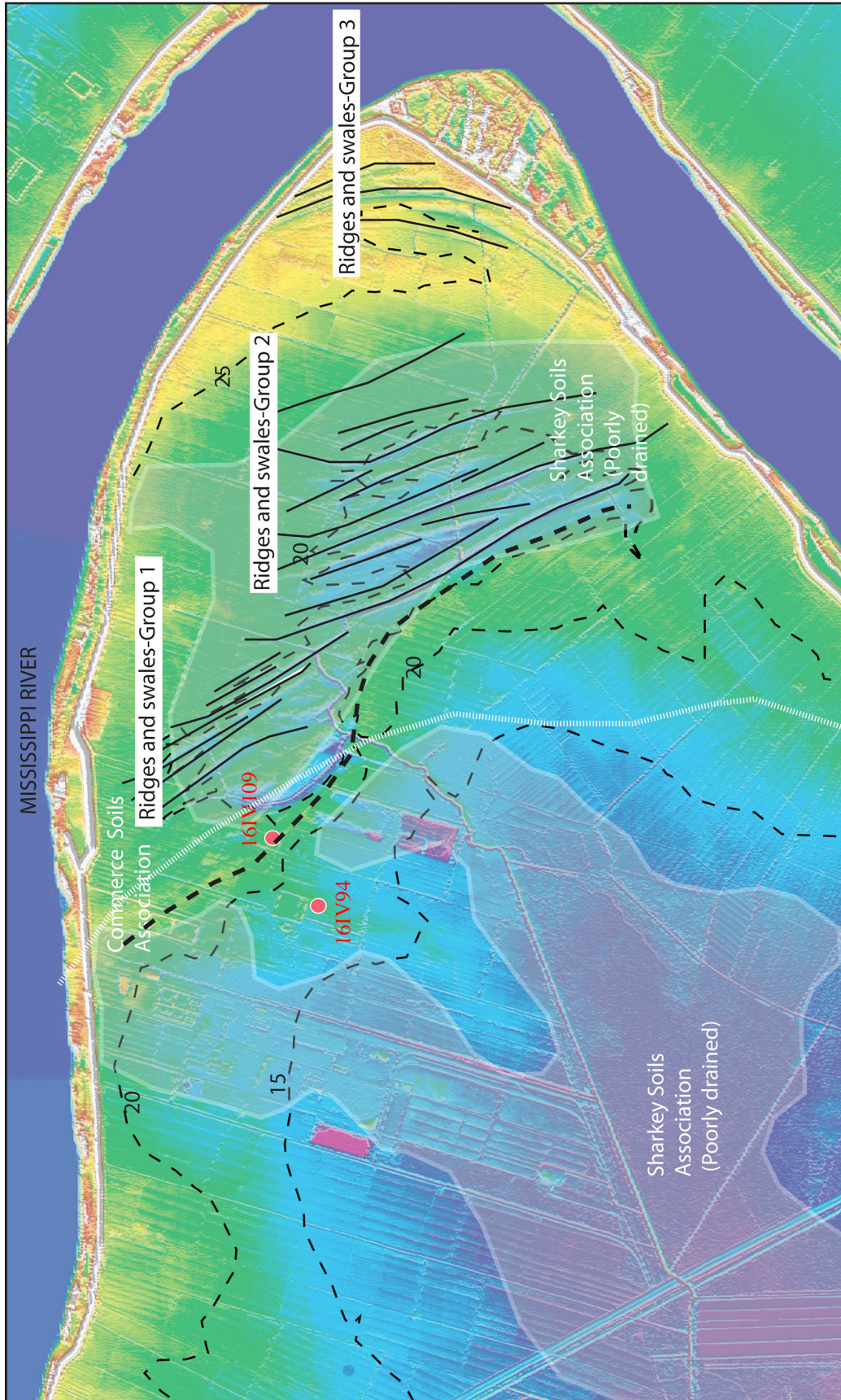


Figure 2-2. Overlay of soil and landform interpretations of Point Pleasant.

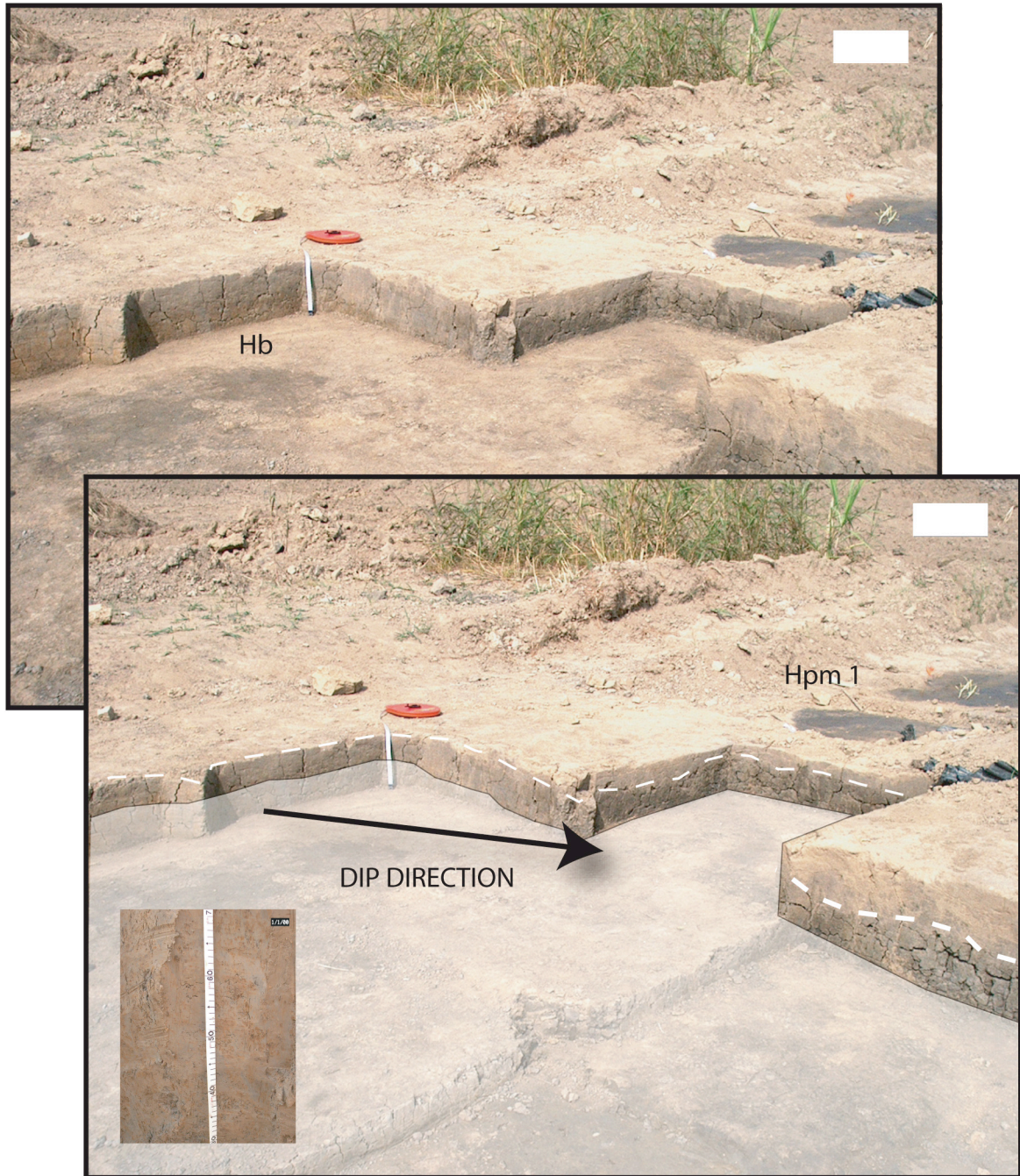


Figure 2-3. View of 16IV109 after archaeological excavations and prior to geologic trenching. Interpreted white surface separates darker meander deposits (Hpm 1, Saucier 1994b: Plate 11) from older Atchafalaya backswamp, flood basin deposits (Hb, Saucier 1994b: Plate 11). Arrow marks direction of dip on this interpreted contact surface. Dashed white lines separates plough-zone soils (above) from undisturbed units below. Older, deeper meander deposits bear a reddish-gray overall color (small inset). In contrast, younger, meander deposits are a darker gray, which is more apparent when the sediments are still moist as can be observed within some small, circular, surficial depressions.



**Figure 2-4. Western wall of trench cut across the block excavations at 16IV94. The Hb unit (Saucier 1994b:Plate 11) is represented. The dashed white line divides the overlying gray, interpreted stream infill from the underlying interpreted brown-gray relict, backswamp soil. Note the shape of the former roots that cross into the lower unit. Root-like features are often associated with darker sediment, probably representing zones containing reduced iron compounds.**

deposits at this site occur within the channel fill. The mottled reddish brown and gray clay unit below the interpreted channel fill is similar in appearance to the interpreted redoximorphic features of the flood basin backswamp deposits (Hb) noted at 16IV109.

#### ***Biological Environment***

The natural levee of the Mississippi River and its associated crevasses were once covered by water-tolerant hardwood forests, primarily oaks, hickories, and gums. Understories were dominated by palmetto, river cane, and green haw. These supported a wide

variety of fauna, including important prey species such as deer, raccoon, opossum and cottontail rabbit. Swampier areas, as well as the margins of the bayous, were populated by hydrophilic plant species such as cypress, tupelo, willow and button bush. These were very productive areas in terms of aquatic fauna, such as fish, turtles, crayfish, alligator, snakes, amphibians, and wading birds. The modern study area is largely given over to agricultural lands, primarily for the production of sugar cane. To this end, much of the landscape has been altered by the construction of artificial drainage features (e.g., ditches and canals).