United States
Department of
Agriculture

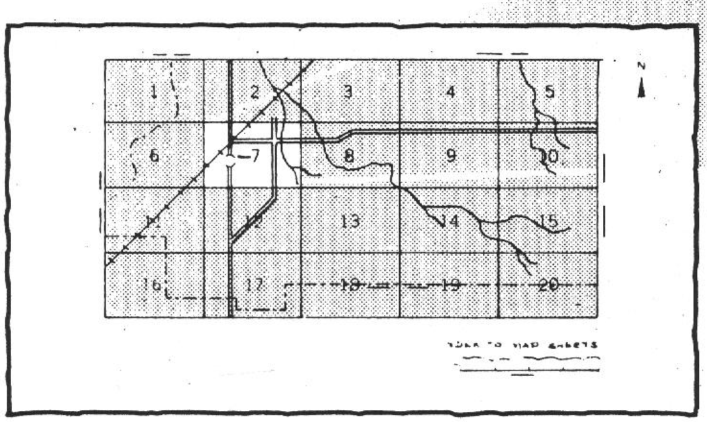
Soil
Conservation
Service

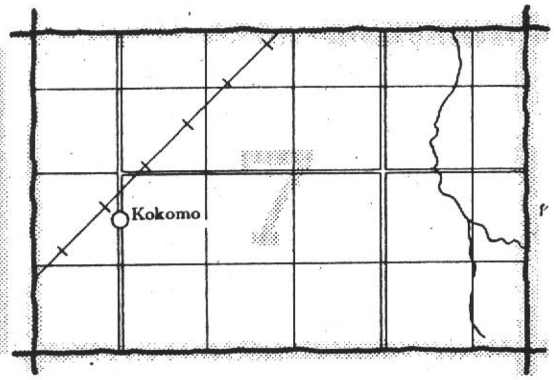
In cooperation with
Louisiana Agricultural
Experiment Station

Soil Survey of St. Charles Parish, Louisiana

HOW TO USE

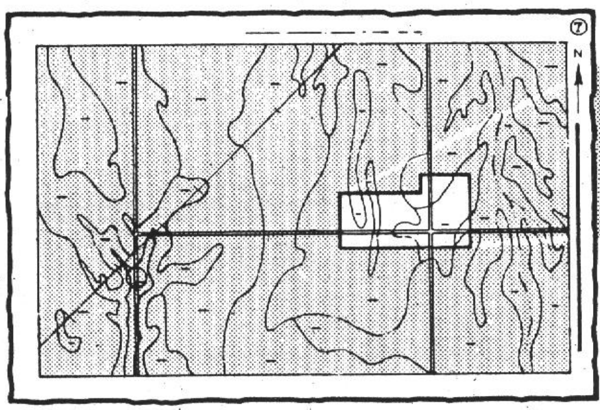
1. Locate your area of interest on the "Index to Map Sheets"

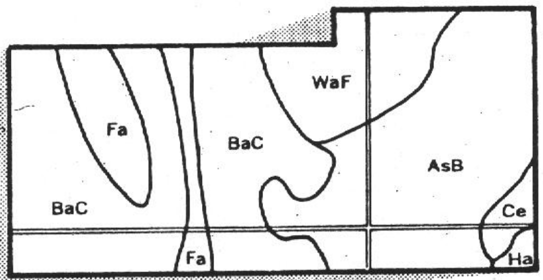




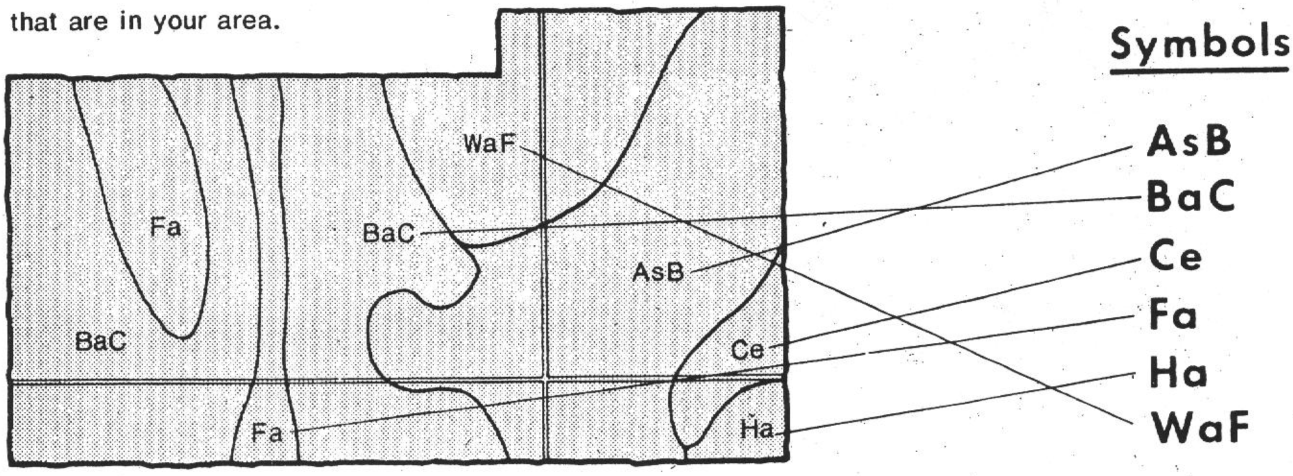
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



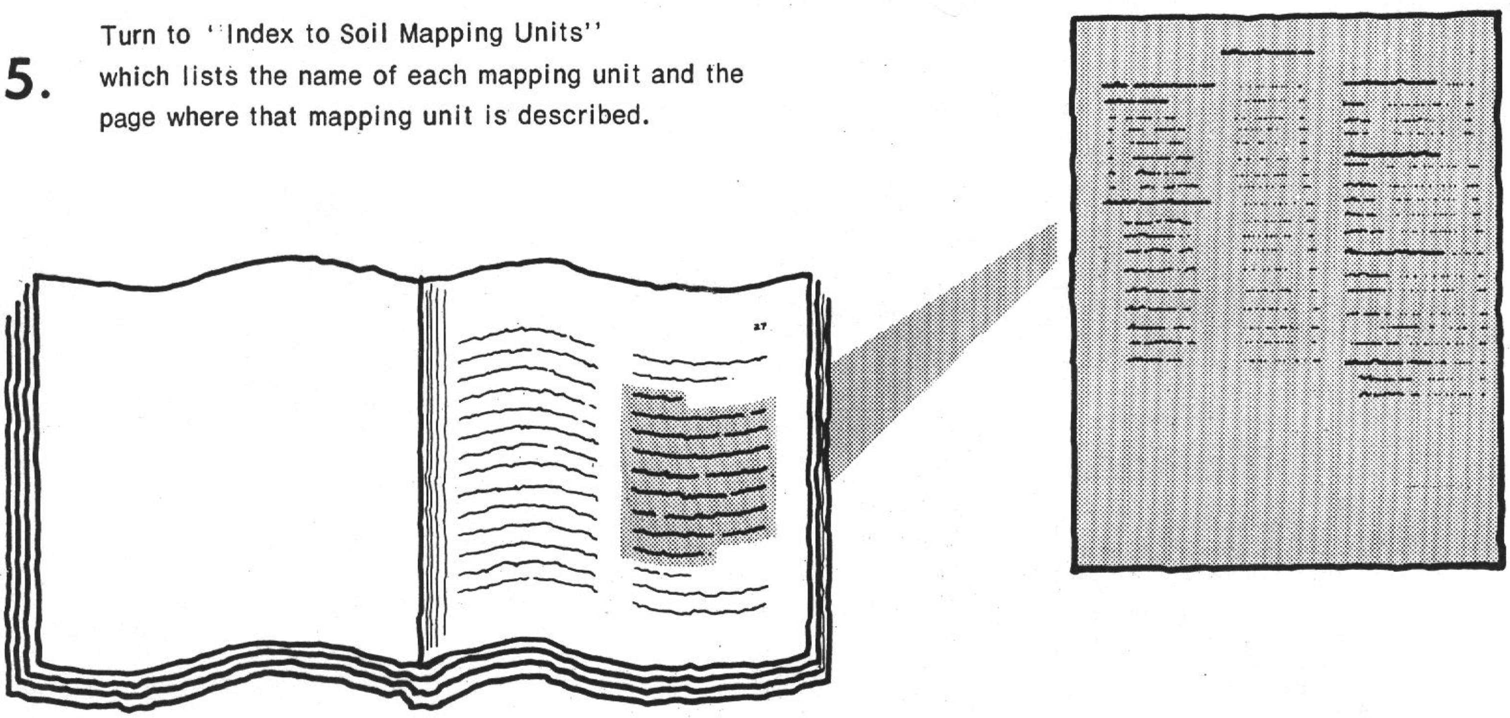


4. List the map unit symbols that are in your area.

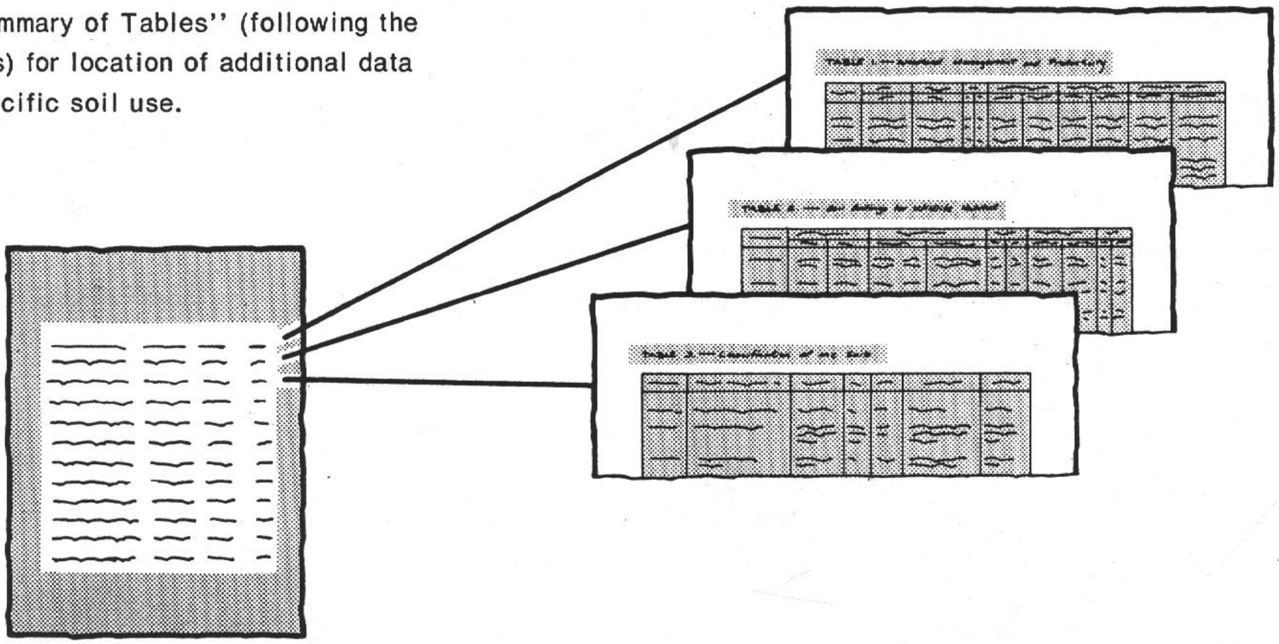


THIS SOIL SURVEY

5. Turn to "Index to Soil Mapping Units" which lists the name of each mapping unit and the page where that mapping unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in January 1984. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This soil survey was made cooperatively by the Soil Conservation Service and the Agronomy Department, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center. It is part of the technical assistance furnished to the Crescent Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: An industrial complex near Norco is an example of the urban and industrial expansion taking place along the Mississippi River in St. Charles Parish.

Contents

Soil Series

Issued January 1987

Index to Map Units

Summary of Tables

Foreword

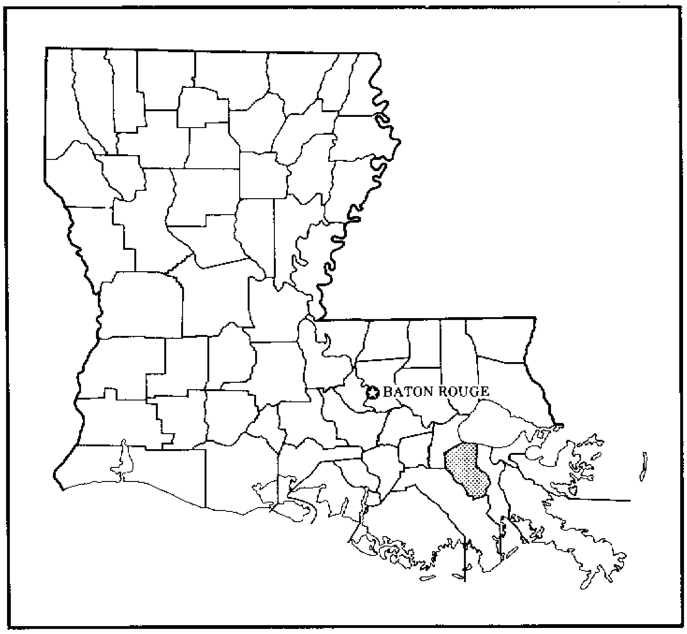
This soil survey contains information that can be used in land-planning programs in St. Charles Parish. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Horace J. Austin
State Conservationist
Soil Conservation Service



Location of St. Charles Parish in Louisiana.

Soil Survey of St. Charles Parish, Louisiana

By Donald McDaniel, Soil Conservation Service

Fieldwork by Dennis Daugereaux, Wilton Stephens, Betty Fleming, and Donald McDaniel, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with the Louisiana Agricultural Experiment Station

ST. CHARLES PARISH is in southeastern Louisiana. It has a total area of 286,691 acres. Of this total, 193,302 acres is land and 93,389 acres is large water areas in the form of streams and lakes. This parish is bordered by Lake Pontchartrain on the north, Lafourche Parish on the south, Jefferson Parish on the east, and St. John the Baptist Parish on the west.

In 1980 the population of the parish was 37,430. Most of this population is centered in several municipalities adjacent to the Mississippi River and along U.S. Highway 90. This parish is chiefly rural and is in the broad, coastal marshes of the Gulf of Mexico. Presently, the trend indicates that urban development is expanding rapidly and areas of marshes and swamps are decreasing.

This parish is entirely within the Mississippi River Delta. The natural levees of the Mississippi River and its distributaries are dominated by firm, loamy and clayey soils. These soils make up about 20 percent of the total land area of the parish and are developed mainly for urban and industrial use and for agricultural and woodland use. An extensive system of manmade levees protects these soils from flooding.

The remaining 80 percent of the land area of the parish consists mainly of ponded and frequently flooded, mucky and clayey soils in marshes and swamps. They are used mainly as habitat for wetland wildlife and for recreation. A small acreage of former swamps have been drained and developed for urban use. Elevation ranges from about 15 feet above sea level on the natural levees along the Mississippi River to about 5 feet below sea level in the former marshes and swamps that have been drained. However, most of the undrained marshes and swamps range in elevation from sea level to about 1 foot above sea level.

St. Charles Parish was once agriculturally important and had large farms and plantations that produced citrus, sugarcane, cotton, rice, and soybeans (fig. 1). In the past 25 years a large acreage of farmland has been taken over for industrial, business, and residential uses.

The natural levees are in bands about 1 to 3 miles wide on both sides of the Mississippi River and much narrower along the river's distributaries. The soils on the natural levees are high in natural fertility and are well suited to adapted crops. The extent of the cleared areas closely approximates the limits of the natural levees.

The swamps that are slightly above sea level are in broad depressions or basins distant from the natural levees of the Mississippi River and its distributaries. Mineral and organic soils are in this frequently flooded area. The water table is at or above the surface most of the year. The native vegetation is hardwood forest, dominantly of the Cypress-Tupelo type. Flooding, poor trafficability of the soils, and subsidence are major concerns for development of these areas.

The marshes that are at or slightly above sea level are adjacent to Lake Pontchartrain, Lake Des Allemands, and Lake Salvador. These marshes consist of organic soils that have a water table at or above the surface most of the time. The native vegetation is water-tolerant grasses, sedges, and forbs. The flood hazard and subsidence of the organic soils in drained areas are major concerns where the soils are developed for urban use.

Figure 1.—Sugarcane is harvested in an area of Commerce silt loam.

Excess surface water is a limitation for land use throughout the survey area. Drainage and flood control are major concerns.

General Nature of the Parish

This section gives general information about the parish. Climate, transportation, water resources, history, flood control, and industry are briefly discussed.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

In St. Charles Parish the long summers are hot and humid. Winters are warm and only occasionally interrupted by incursions of cool air from the north. Rains occur throughout the year, and precipitation is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Reserve, Louisiana, in the period 1951 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 53 degrees F, and the average daily minimum temperature is 42 degrees. The lowest temperature on record, which occurred at Reserve on January 12, 1962, is 13 degrees. In summer the average temperature is 82 degrees, and the average daily maximum temperature is 91 degrees. The highest recorded temperature, which occurred at Reserve on August 14, 1951, is 102 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 64 inches. Of this, 32 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 25 inches. The heaviest 1-day rainfall during the period of record was 8.20 inches at Reserve on April 25, 1953. Thunderstorms occur on about 70 days each year, and most occur in summer.

Snowfall is rare. In 95 percent of the winters, there is no measurable snowfall. In 5 percent, the snowfall, usually of short duration, is more than 2 inches. The heaviest 1-day snowfall on record was less than 1 inch.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the southeast. Average windspeed is highest, 10 miles per hour, in spring.

Severe local storms, including tornadoes, strike occasionally in or near the area. They are of short duration and cause variable and spotty damage. Every few years in summer or autumn, a tropical depression or remnant of a hurricane that has moved inland causes extremely heavy rains for 1 to 3 days.

Transportation

St. Charles Parish is served by three major trunkline railroads that connect to every major railroad system in the United States. The Illinois Central Gulf and the Louisiana and Arkansas Railroads provide freight service on the East Bank, and the Texas and Pacific Railroad on the West Bank. Two U.S. highways, one interstate highway, and numerous paved state highways and parish roads are in the parish. The Luling-Destrehan Bridge connects the East and West Banks of the parish.

The Mississippi River passes through St. Charles Parish. The river is part of a 19,000 mile water transportation system that serves much of the central part of the United States and Gulf Coastal area (fig. 2). Steamship service is available to all parts of the world from ports within and adjacent to St. Charles Parish.

Water Resources

Surface water—The principal source of surface water in St. Charles Parish is the Mississippi River. Two large public water suppliers in the parish pump about 2,900,000 gallons per day from this river *(19)*.

Ground water—Four major freshwater-bearing aquifer systems are in the Norco area *(8)*. These are, in descending order, the shallow aquifers that include the point bars, the Gramercy aquifer, the Norco aquifer, and the Gonzales-New Orleans aquifer.

Shallow aquifers of limited and irregular extent are in the parish generally at a depth of less than 150 feet. Sands extensive enough to produce substantial amounts of water occur as abandoned channel deposits of the

Figure 2.—The Mississippi River is used to transport goods and as a source of water supply.

Mississippi River and its distributaries and as point-bar deposits of the Mississippi River. The restricted occurrence of these aquifers limits their availability to local areas.

Water from these shallow aquifers is characteristically very hard and high in iron content. The chloride content is low, but may be high locally where a shallow aquifer is hydraulically connected to a saltwater-bearing aquifer. Because of the poor quality of water, the shallow aquifers are mainly used as a source of supply for small livestock wells.

The Gramercy aquifer, the "200-foot" sand, is the least continuous of the major aquifers in the Norco area. This aquifer is important in that it acts as a hydraulic link between the overlying and underlying aquifers.

The quality of water is and may continue to be a limiting factor in development of the aquifer. The chloride level continues to decrease in many of the areas now containing salty water. However, the displacing water, although low in chloride, is extremely hard.

The Norco aquifer, the "400-foot" sand, is the most important aquifer in the parish. The aquifer ranges in thickness from extremes of 25 to 300 feet but averages from 100 to 150 feet. The regional dip of the aquifer is to the south at about 10 feet per mile. In the vicinity of Norco, this aquifer is about 300 feet deep, and it is more than 400 feet deep in the southern part of the parish. A layer of clay, 200 to 300 feet thick, separates the Norco aquifer from the underlying Gonzales-New Orleans aquifer.

The Norco aquifer has great potential for development. Areas lying between Norco and Laplace have the best development potential for large supplies of freshwater. In this area, water in the aquifer is fresh throughout.

The Gonzales-New Orleans aquifer, the "700-foot" sand, underlies the entire parish and is the thickest of the three aquifers. It has a regional dip of 25 to 50 feet per mile to the south and an average thickness of about 200 to 250 feet. Depth to the top of the aquifer ranges from 450 feet in the vicinity of Lake Pontchartrain to about 800 feet near Lake Cataouatche.

Water quality is the most restrictive factor governing development of the Gonzales-New Orleans aquifer. Water levels are still high, and the aquifer is capable of yielding large quantities of water. However, any pumping from parts of the aquifer above or near the surface will be accompanied by increased salinity of the pumped water.

History

Edward A. Dufrene, Jr., clerk of court, St. Charles Parish, helped prepare this section.

St. Charles Parish, one of the original civil parishes of the Territory of Orleans, was created in 1807 from the County of the German Coast. It is one of the smaller parishes of the state and covers an area of about 295 square miles. The parish seat has always been at the present location, originally known as the St. Charles Parish Courthouse. In 1872, the village surrounding the courthouse was named Hahnville. The population of Hahnville is about 335.

Many early explorers passed through the area that is now St. Charles Parish during their travels up the Mississippi River. In 1699, Pierre and Jean Baptiste LeMoyno, known as Iberville and Bienville, explored the Mississippi from its mouth to as far north as the mouth of the Red River. Bienville returned through the Mississippi River to Ship Island. Iberville entered Bayou Manchac and, in a canoe, explored the route through that bayou and Lakes Maurepas and Pontchartrain to Ship Island. Thus, the southwestern shores of Lake Pontchartrain, which are in the present parish of St. Charles, were known to the French at this early date.

Although no permanent settlements are known to have been established within the boundaries of the present parish during the next twenty years, numerous explorers and traders passed through the area. Actual settlement of the "German Coast" came as the result of publicity sponsored by John Law's Western Company. The first settlers arrived about 1719, or at least before 1721. A 1724 census mentions two German villages about 30 miles above New Orleans on the right bank of the river. The location of these villages is not definitely known, except that 'le premier ancien village allemando' was 1 1/2 miles from the river, and the second village was about three-quarters of a mile inland. The date of the founding of the second village is given as 1721. This would place the founding of the first village at some previous date. It was probably founded by the 21 German families that arrived in 1719 on the ship Les Deux Froros. In September of 1721 or 1722, a hurricane forced the abandonment of the two old villages and the establishment of new settlements on the higher land of the river front. When a group of German settlers under the leadership of Karl Freiderick D'Arensbourg arrived in New Orleans, they were met by the Germans from the settlements on the Arkansas River. With the aid of Bienville, these settlers were persuaded to join the new colonists, and the combined group founded a new settlement midway between the older villages. They named this village Karistein.

Because that part of St. Charles Parish east and north of the Mississippi River was included in the Isle of Orleans, all of St. Charles Parish was placed under the rule of Spain in 1762. Three years later many of the Acadians exiled from Nova Scotia received aid from the inhabitants of the German Coast, and some settled among the Germans. The spark setting off the revolution of 1768 against Spanish control of the colony seems to have been generated on the German Coast and to have received the support of the new settlers on the Acadia Coast. The German and Acadia Coasts passed into French hands again in 1800 and were transferred to the

United States by the Louisiana Purchase in 1803. The two ecclesiastical parishes, St. Charles and St. John the Baptist, were made the County of the German Coast in 1805, and in 1807 a legislative act created the present boundaries of the parish.

The best agricultural land in the parish is in a band that averages about three miles in width along each bank of the Mississippi River. This natural levee is very fertile. Because of its accessibility, this area was settled early and has remained the most important part of the parish. This land was surveyed in French arpents, and is still held in arpents, rather than acres.

Flood Control

St. Charles Parish is commonly referred to as a "river parish" by local residents. The Mississippi River, which meanders through the north part of the parish in a general east-west direction, has greatly influenced the history and development of the parish.

Bonnet Carre Spillway, the major flood control structure for the lower Mississippi River, is located in St. Charles Parish. Built by the U.S. Army Corps of Engineers in 1932, this structure is located on the East Bank of the Mississippi River between Norco and Montz. The massive structure contains 350 gates or bays that are designed to divert 1.9 million gallons of water per second from the river at flood stage. The diverted flow enters Lake Pontchartrain and greatly reduces the possibility of levee failure along the river in the New Orleans metropolitan area.

The topography of the parish is typical of the lower Mississippi River region. The land slopes away from the river towards the lower swamps and marshes. The river divides the parish into two large drainage areas that are further divided by natural ridges and flood prevention levee systems.

East Bank Area. Historically, drainage on the East Bank has been provided by a gravity drainage system of open ditches and canals. The general flow of storm water runoff is northerly through the drainage system into the swamps and marshes bordering Lake Pontchartrain. The principal outlets include Bayou Trepagnier, Bayou La Branche, Bayou Traverse, Bayou Piquant, Walker Canal, and Duncan Canal.

The main line levees along the Mississippi River on the East Bank are maintained by the Pontchartrain Levee District. Smaller drainage districts have developed to provide improved drainage and flood protection for increased urban and industrial growth. Several pump stations have been installed along with protection levees to allow for urban expansion.

West Bank Area—The higher lands near the river are drained by gravity through open ditches and manmade canals on the West Bank. The Eighty-Arpent Canal that runs from the western most part of the parish to Boutte provides the major outlet for the storm water runoff in the area. This canal flows into Lake Des Allemands through Bayou Fortier and Providence Canal and into Bayou Des Allemands through the Paradis Canal.

Strong southerly winds and intense rainfall reduce the effectiveness of gravity drainage in low areas. This results in frequent backwater flooding in some locations. Flood protection levees and drainage pumps have been installed by drainage districts for urban and agricultural land protection in several areas on the West Bank. The largest of these areas, the Sunset Drainage District, encompasses about 10,000 acres south of U.S. Highway 90 from Des Allemands to Paradis.

The main line levees along the river are maintained by the Lafourche Basin Levee District. Further development of residential areas on the West Bank will require the installation of additional flood protection and drainage structures.

The U.S. Army Corps of Engineers is currently studying plans for the installation of hurricane protection levees on the East and West Banks of St. Charles Parish.

This survey can be used to locate the areas that are subject to flooding. The frequency and season of flooding are given in the section "Detailed Soil Map Units." Soils that generally flood more often than 2 years out of 5 are described as frequently flooded. None of the soils in the survey area are described as occasionally flooded. Soils that flood less often than 1 year out of 10 during the cropping season are described as rarely flooded.

These definitions differ from the National SCS definition of flooding in that the frequency of flooding for each of the phases is slightly different.

This survey does not replace onsite investigations. The actual flooding frequencies and height of floodwaters are best determined by onsite engineering surveys and flood stage records.

Industry

St. Charles Parish is in a major industrial region. Industry in St. Charles Parish is prosperous and rapidly expanding, largely because of its location on the Mississippi River.

At present, about 4,100 acres is occupied by industrial sites, which include chemical plants, refineries, and grain elevators. Development of another 15,000 acres for industrial sites is predicted.

The petroleum and chemical manufacturing industries are the major employers. Other employment sectors include construction, transportation, and wholesale and retail trades and services.

Louisiana's first nuclear plant is located at Waterford in St. Charles Parish.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; and the kinds of crops and native plants growing on the soils. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses. Soil scientists interpreted the data from these analyses as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils in the survey area vary widely in their potential for major land uses. Table 4 shows the extent of the map units shown on the general soil map. It lists the suitability of each, in relation to that of the other map units, for major land uses and shows soil properties that limit use. Soil suitability ratings are based on the practices commonly used in the survey area to overcome soil limitations. These ratings reflect the ease of overcoming the limitations. They also reflect the problems that will persist even if such practices are used.

Each map unit is rated for *cultivated crops, pastureland, woodland, urban uses,* and *intensive recreation areas*. Cultivated crops are those grown extensively in the survey area. Pastureland is land planted to improved pasture plants for grazing. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments. Intensive recreation areas are campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic.

Soils of the Natural Levees That are Protected From Flooding

This group consists mainly of level, somewhat poorly drained and poorly drained, loamy and clayey soils that are on natural levees of the Mississippi River and its distributaries. Large earthen levees protect these soils from flooding by the Mississippi River.

This map unit makes up about 15 percent of the land area of the parish. Most areas of these soils are in cropland or urban use. Wetness is the main limitation for crops. Wetness and the shrinking and swelling of the subsoil are the main limitations for urban use.

1. Commerce-Sharkey

Level, somewhat poorly drained and poorly drained soils that are loamy throughout or have a loamy or clayey surface layer and a clayey subsoil

The soils in this map unit are on natural levees of the Mississippi River and its distributaries. Elevation ranges from about 2.5 feet to 15.0 feet above sea level. Slopes are long and smooth and less than 1 percent.

This map unit makes up about 15 percent of the land area of the parish. It is about 54 percent Commerce soils, 31 percent Sharkey soils, and 15 percent soils of minor extent.

The somewhat poorly drained Commerce soils are in intermediate and high positions on natural levees. These soils have a surface layer of dark grayish brown silt loam or silty clay loam. The subsoil and underlying material are grayish brown or dark grayish brown, mottled silt loam.

The poorly drained Sharkey soils are in intermediate and low positions on natural levees. These soils have a surface layer of dark grayish brown or very dark grayish brown silty clay loam or clay. The subsoil and underlying material are gray, mottled clay.

Of minor extent are the somewhat poorly drained Convent and Commerce soils in areas between the Mississippi River and its protection levees. These soils are subject to frequent flooding.

Most areas of the soils in this map unit are in cropland or urban use. A small acreage is used for pasture or as woodland.

The soils in this map unit are moderately well suited to building site development and intensively used recreation areas. The soils are poorly suited to sanitary facilities. Wetness, moderately slow and very slow permeability, and the shrinking and swelling of the subsoil are the main limitations. Sharkey soils are also subject to rare flooding after unusually severe storms.

The soils in this map unit are well suited to pasture, cropland, and woodland. A good drainage system and fertilizer are needed for optimum crop and forage production. The soils are well suited to the production of hardwood trees, although wetness can limit the use of equipment.

Soils of the Natural Levees and Deltaic Fans and in the Bonnet Carre Spillway That are Frequently Flooded

The two map units in this group consist mainly of level to gently undulating, somewhat poorly drained and poorly drained, loamy and clayey soils that are frequently flooded. Flooding occurs when the Mississippi River overflows or when floodgates of the Bonnet Carre Spillway are opened.

This map unit makes up about 11 percent of the land area of the parish. Most of these soils are used as woodland. A small acreage is used for pasture or for a source of loamy fill material. Wetness and the hazard of flooding are the main limitations for most uses.

2. Convent-Commerce

Level to gently undulating, somewhat poorly drained soils that are loamy throughout

The soils in this map unit are in narrow areas between the Mississippi River and its protection levees and in a broad area within the Bonnet Carre Spillway. Elevation ranges from about 1 foot to 15 feet above sea level. The soils are subject to scouring and deposition by fast flowing floodwaters. Slopes range from 0 to 3 percent.

This map unit makes up about 5 percent of the land area of the parish. It is about 49 percent Convent soils, 36 percent Commerce soils, and 15 percent soils of minor extent.

The somewhat poorly drained Convent soils are on low ridges. These soils have a brown silt loam, fine sandy loam, or very fine sandy loam surface layer. The underlying material is gray and grayish brown, mottled silt loam.

The somewhat poorly drained Commerce soils are in swales between ridges. These soils have a dark brown silt loam or very fine sandy loam surface layer. The subsoil and underlying material are dark grayish brown or grayish brown, mottled silt loam.

Of minor extent are the somewhat poorly drained Vacherie soils. These soils have a loamy surface layer and subsoil and clayey underlying material.

Most areas of the soils in this map unit are in woodland. A small acreage is used as pasture and for a source of loamy fill material.

The soils in this map unit are moderately well suited to the production of hardwood trees. Seedling mortality and equipment use limitations caused by wetness and the frequent flooding are concerns in management.

The soils in this map unit are not suited to cropland, urban uses, or intensively used recreation areas. It is poorly suited to pasture. The hazard of frequent flooding and scouring are the main limitations.

3. Sharkey-Commerce

Level, poorly drained and somewhat poorly drained soils that are clayey or loamy throughout

The soils in this map unit are in low positions on natural levees and deltaic fans of the Mississippi River and its distributaries. Slopes are long and smooth and less than 1 percent. The soils are subject to flooding for brief to very long periods.

This map unit makes up about 6 percent of the land area of the parish. It is about 51 percent Sharkey soils, 42 percent Commerce soils, and 7 percent soils of minor extent.

The poorly drained Sharkey soils are in low positions on natural levees. These soils have a surface layer of dark grayish brown clay. The subsoil and the underlying material are dark grayish brown, dark gray, and gray, mottled clay.

The somewhat poorly drained Commerce soils are in low positions on deltaic fans. These soils have a surface layer of dark grayish brown silty clay loam and a subsoil of grayish brown and gray, mottled silty clay loam. The underlying material is dark grayish brown, mottled silty clay loam.

Of minor extent are the very poorly drained Fausse soils in depressions and abandoned stream channels. These soils are clayey throughout.

Most areas of the soils in this map unit are in woodland. A small acreage is used as pasture.

These soils are not suited to building site development. They are poorly suited to intensively used recreation areas and to sanitary facilities. Wetness, the hazard of flooding, moderately slow and very slow permeability, and the shrinking and swelling of the subsoil are the main limitations.

These soils are poorly suited to use as woodland, pasture, or cropland. Wetness and the hazard of flooding are the main limitations.

Soils of the Marshes and Swamps That are Frequently Flooded and Ponded

The four map units in this group consist mainly of level, very poorly drained, clayey and mucky soils in marshes and swamps. These soils are flooded or ponded most of the time.

These map units make up about 68 percent of the land area of the parish. Most of the area is in native vegetation and is used for recreation and as habitat for wetland wildlife.

4. Barbary-Fausse

Level, very poorly drained soils that have a mucky or clayey surface layer and clayey underlying material; in swamps

The soils in this map unit are in swamps that are flooded or ponded most of the time. Elevation ranges from 1 foot to about 2 1/2 feet above sea level. Slope is less than 1 percent.

This map unit makes up about 20 percent of the land area of the parish. It is about 76 percent Barbary soils, 16 percent Fausse soils, and 8 percent soils of minor extent.

The Barbary soils are in low positions and have a surface layer of dark brown muck and gray clay. The underlying material is gray and greenish gray, very fluid clay.

The Fausse soils are in slightly higher positions than the Barbary soils. They have a surface layer of dark gray clay. The subsoil and underlying material are gray and greenish gray clay.

Of minor extent are the somewhat poorly drained Commerce soils, very poorly drained Maurepas soils, and poorly drained Sharkey soils. The Commerce and Sharkey soils are in higher positions on natural levees and deltaic fans, and they are firm, mineral soils. Maurepas soils are in positions similar to those of the Barbary soils, and they are mucky in the upper part of the profile.

Most of the acreage is in native trees and aquatic vegetation. It is used for recreation and as a habitat for wetland wildlife. A small acreage is used for oil and gas wells.

These soils are well suited to recreation uses and as habitat for wetland wildlife. They provide habitat for waterfowl, furbearers, alligators, swamp rabbits, and nongame birds. This map unit is part of an estuary that contributes to the support of many species of marine fishes and crustaceans. Hunting and other outdoor activities are popular in areas of this map unit.

These soils are not suited to crops, pasture, woodland, urban uses, or intensively used recreation areas. Flooding, wetness, and low strength are too severe for these uses.

5. Kenner-Allemands

Level, very poorly drained soils that have a mucky surface layer and mucky and clayey underlying material; in freshwater marshes

The soils in this map unit are in freshwater marshes that are flooded or ponded most of the time. Elevation ranges from sea level to about 1 foot above sea level. Slope is less than 1 percent.

This map unit makes up about 42 percent of the land area of the parish. It is about 92 percent Kenner soils, 5 percent Allemands soils, and 3 percent soils of minor extent.

The Kenner soils are stratified, very fluid muck and very fluid clay throughout.

The Allemands soils have a moderately thick surface layer of very fluid muck and an underlying material of very fluid clay.

Of minor extent are the very poorly drained Larose soils on the landward side of the Allemands soils. Many small ponds and perennial streams are throughout the map unit.

Most of the soils in this map unit are in native vegetation and used for recreation and as habitat for wetland wildlife. A small acreage has oil and gas wells.

These soils are well suited to use for recreation and as a habitat for wetland wildlife. They provide habitat for many species of wetland wildlife. Hunting, fishing, and other outdoor activities are popular in areas of this map unit.

These soils are not suited to crops, pasture, woodland, urban uses, or intensively used recreation areas. Flooding, subsidence, wetness, and low strength are too severe for these uses.

6. Lafitte

Level, very poorly drained soils that are mucky throughout; in brackish marshes

The soils in this map unit are in brackish marshes that are flooded or ponded most of the time. Elevation ranges from sea level to about 1 foot above sea level. Slope is less than 1 percent.

This map unit makes up about 4 percent of the land area of the parish. It is about 95 percent Lafitte soils and 5 percent soils of minor extent.

The Lafitte soils are in broad basins in the marshes. They are very fluid, saline muck throughout.

Of minor extent are the very poorly drained Allemands, Kenner, and Larose soils in freshwater marshes adjacent to Lafitte soils. Many small ponds and perennial streams are throughout the map unit.

Most areas of the soils in this map unit are in native vegetation and are used for recreation and as habitat for wetland wildlife. A small acreage has oil and gas wells.

These soils are well suited to use for recreation and as habitat for wetland wildlife. They provide suitable habitat for many species of wetland wildlife. Hunting, fishing, and other outdoor activities are popular in areas of this map unit. This map unit is part of the estuary that contributes to the support of marine life in the Gulf of Mexico.

These soils are not suited to crops, pasture, woodland, or urban uses. Flooding, subsidence, wetness, salinity, and low strength are too severe for these uses.

7. Maurepas

Level, very poorly drained soils that have a mucky surface layer and mucky and clayey underlying material; in swamps

The soils in this map unit are in swamps that are flooded or ponded most of the time. Slope is less than 1 percent.

This map unit makes up about 2 percent of the land area of the parish. It is about 98 percent Maurepas soils and 2 percent soils of minor extent.

The Maurepas soils have a very dark gray, very fluid muck surface layer and gray, very fluid muck and clay underlying material.

Of minor extent are the very poorly drained Allemands, Barbary, and Kenner soils. The Allemands and Kenner soils are in freshwater marshes. The Barbary soils are in positions similar to those of the Maurepas soils, and they are dominantly very fluid clay throughout.

Most of the acreage is in native trees and aquatic vegetation. It is used for recreation and as habitat for wetland wildlife.

The soils in this map unit are well suited to recreation uses and as habitat for wetland wildlife. They provide habitat for waterfowl, furbearers, alligators, swamp rabbits, and nongame birds. This map unit is part of an estuary that contributes to the support of marine fishes and crustaceans. Hunting and other outdoor activities are popular in areas of this map unit.

These soils are not suited to crops, pasture, woodland, urban uses, or intensively used recreation areas. Flooding, wetness, subsidence, and low strength are too severe for these uses.

Soils of the Former Swamps and Marshes That are Drained and Protected From Flooding

The three map units in this group consist mainly of level, somewhat poorly drained and poorly drained, loamy, clayey, and mucky soils in former swamps and marshes that are protected from most floods by levees and drained by pumps. Flooding is rare, but it can occur during storms or when protection levees fail.

These map units make up about 6 percent of the land area of the parish. Most of the area is in pasture. A small acreage is developed for urban uses. The hazard of flooding, wetness, and low strength are the main limitations if these soils are used for pasture. Subsidence and shrinking and swelling of the underlying material are additional limitations if the soils are used for urban development.

8. Allemands-Maurepas, Drained

Level, poorly drained soils that have a clayey or mucky surface layer and clayey and mucky underlying material; in former freshwater marshes and swamps

The soils in this map unit are in former marshes and swamps that are drained by pumps and protected from most floods by levees. Flooding is rare, but it can occur during storms or when levees fail. Elevation ranges from sea level to about 5 feet below sea level. Slope is less than 1 percent.

This map unit makes up about 1 percent of the land area of the parish. It is about 74 percent Allemands soils, drained; 15 percent Maurepas soils, drained; and 11 percent soils of minor extent.

The Allemands soils are in former freshwater marshes. They have a surface layer of clay and an underlying material of very fluid muck and clay.

The Maurepas soils are in former freshwater swamps. They have a surface layer of muck and an underlying material of very fluid muck and clay.

Of minor extent, in former freshwater marshes, are soils that are similar to the Allemands soils except that they are mucky throughout.

Most of the soils in this map unit are used as pasture. A small acreage is developed for crawfish ponds.

The soils in this map unit are moderately well suited to pasture and poorly suited to cropland and woodland. Wetness and poor tilth are the main limitations. Adequate water control is difficult. Subsidence exposes buried stumps and logs in places.

These soils are poorly suited to most urban uses and intensively used recreation areas. Wetness, low strength, subsidence, the hazard of flooding, and buried stumps and logs are the main limitations for these uses. Adequately controlling the water table and the rate of subsidence is difficult. Foundations for buildings need to be specially designed and placed on pilings.

9. Commerce-Harahan-Allemands, Drained

Level, somewhat poorly drained and poorly drained soils that are loamy throughout or have a clayey or mucky surface layer and clayey or clayey and mucky subsoil or underlying material; in former swamps and freshwater marshes

The soils of this map unit are in former swamps and freshwater marshes that are protected from most floods by levees and drained by pumps. Flooding is rare, but it occurs during storms or when levees or pumps fail. Elevations range from 1 foot above sea level to about 5 feet below sea level. Slope is less than 1 percent.

This map unit makes up about 1 percent of the land area of the parish. It is about 45 percent Commerce soils; 25 percent Harahan soils; 20 percent Allemands soils, drained; and 10 percent soils of minor extent.

The somewhat poorly drained Commerce soils are on low ridges. They have a black silty clay loam surface layer and grayish brown, mottled silty clay loam subsoil. The underlying material is gray, mottled, fluid silty clay loam.

The poorly drained Harahan soils are in slightly lower positions in former swamps. They have a black clay and muck surface layer and a dark gray, firm clay subsoil. The underlying material is dark gray, fluid clay.

The Allemands soils are in low positions in former marshes. They have a surface layer of black muck and underlying material of very dark gray muck and gray fluid clay.

Of minor extent are soils similar to the Allemands soils except they have organic layers more than 51 inches thick over the underlying clay.

The soils in this map unit are mainly used as pasture. A small acreage is in crawfish ponds.

The soils in this map unit are moderately well suited to pasture and poorly suited to cultivated crops. The main limitations are wetness, poor trafficability, and poor tilth. Wetness limits the choice of plants and the period of grazing. The use of equipment is limited by wetness and poor trafficability. Soil subsidence exposes buried stumps and logs.

The soils in this map unit are poorly suited to most urban uses and intensively used recreation areas. The main limitations are subsidence, buried stumps and logs, low strength, the hazard of flooding, wetness, very high shrink-swell potential, and excess humus. Adequately controlling the water table and protecting the soils from flooding are difficult. Foundations for buildings need to be specially designed and set upon pilings.

The soils in this map unit are poorly suited to the production of bottom land hardwoods. The main limitations are wetness, poor trafficability, and low production potentials.

10. Harahan

Level, poorly drained soils that have a clayey and mucky surface layer and a clayey subsoil; in former swamps

The soils in this map unit are in former swamps that are protected from most floods by levees and drained by pumps. Flooding is rare, but it can occur during hurricanes or when levees or pumps fail. Elevation ranges from about 3 feet above sea level to about 5 feet below sea level. Slope is less than 1 percent.

This map unit makes up about 4 percent of the land area of the parish. It is about 98 percent Harahan soils and 2 percent soils of minor extent.

The Harahan soils have a very dark gray and black clay and muck surface layer. The subsoil is grayish brown, firm clay. The underlying material is grayish brown and greenish gray, very fluid clay.

Of minor extent are the very poorly drained Barbary soils in depressional areas, and the somewhat poorly drained Commerce and Sharkey soils in slightly higher positions.

The soils in this map unit are mainly used as pasture. A small acreage is in urban uses.

The soils in this map unit are poorly suited to cropland, woodland, and pasture. The main limitations are wetness and poor tilth. Wetness limits the choice of plants and the period of grazing. The use of equipment is limited by wetness and poor trafficability. When the soil subsides, buried stumps and logs are exposed.

The soils in this map unit are poorly suited to most urban uses and intensively used recreation areas. Wetness, low strength, subsidence, buried stumps and logs, very slow permeability, the hazard of flooding, and the shrinking and swelling of the subsoil are the main limitations. Adequately controlling the water table is difficult. Foundations for buildings need to be specially designed and set upon pilings.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, salinity, wetness, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Commerce silt loam is one of several phases in the Commerce series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Commerce-Harahan-Allemands Complex, drained, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Allemands-Larose association is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Convent and Commerce soils, frequently flooded, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps.

Table 5 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The soil potential for dwellings without basements is given in table 10. The Glossary defines many of the terms used in describing the soils.

AE—Allemands muck. This level, very poorly drained soil is in freshwater marshes. It is ponded and flooded most of the time. Because of poor accessibility, fewer observations were made in these areas than in others. The detail in mapping, however, is adequate for the expected use of the soil. The mapped areas range from 200 acres to several thousand acres. Slope is less than 1 percent.

Typically, the surface layer is very dark grayish brown, slightly acid muck about 24 inches thick. The underlying material to a depth of 84 inches is dark gray, moderately alkaline, very fluid clay in the upper part and gray, moderately alkaline, fluid clay in the lower part.

Included with this soil in mapping are a few large areas of Larose and Kenner soils. Larose soils are in areas on the landward side of the Allemands soil and are fluid, mineral soils. Kenner soils have an organic layer more than 51 inches thick. They are in positions similar to those of the Allemands soil. Also included in most areas are many small ponds and perennial streams. The included soils make up about 15 percent of the map unit.

This Allemands soil is flooded with several inches of fresh water most of the time. During storms, flood waters are as deep as 2 feet. The high water table commonly is at or above the surface, but during periods of sustained north winds and low gulf tides, it is as much as 6 inches below the surface. This soil has low capacity to support loads. Permeability is rapid in the organic surface layer and very slow in the clayey underlying material. Surface runoff is very slow to ponded. The total subsidence potential is high. The shrink-swell potential is low in the organic layer and very high in the clayey underlying material.

The natural vegetation consists mainly of bulltongue, maidencane, alligatorweed, cattail, common rush, pickerelweed, swamp smartweed, and swamp knotweed.

Most of the acreage in this map unit is used as habitat for wetland wildlife and for extensive forms of recreation, such as hunting and fishing. However, small areas are in oil and gas wells.

This Allemands soil is well suited to use as habitat for wetland wildlife. It provides roosting and feeding areas for large numbers of ducks and many other waterfowl. This soil also produces habitat for large numbers of crawfish, swamp rabbits, white-tailed deer, American alligators, and furbearers, such as mink, nutria, otters, and raccoons. The small ponds and perennial streams in this map unit have significant numbers of freshwater fish. Water control structures, designed for the management of habitat, are difficult to construct and maintain because of the instability of the organic material.

Unless drained and protected from flooding, this soil is not suited to cropland, pasture, or woodland. Wetness and flooding are too severe for these uses. This soil is generally too soft and boggy for livestock grazing. Drainage and protection from flooding are possible, but extensive water control structures, such as levees and water pumps, are required. Extreme acidity, subsidence, and low strength are continuing limitations after drainage.

This soil is not suited to urban development. Wetness, the hazard of flooding, and low strength are too severe for this use. Drainage is feasible, but only with an extensive system of levees and water pumps. Subsidence is a continuing limitation after drainage. This soil is poorly suited to the construction of levees. It shrinks and cracks as it dries, and the levees fail unless continually maintained.

This soil is in capability subclass VIIw. It is not assigned a woodland suitability group.

Am—Allemands clay, drained. This nearly level, poorly drained soil is in drained freshwater marshes. Ditches and water pumps provide improved drainage. Elevation is about sea level to 5 feet below sea level. The soil is subject to rare flooding. The mapped areas are rectangular and are within the boundaries of a protection levee system. They range from 200 to 7,000 acres. Slope is less than 1 percent.

Typically, the surface layer is very dark grayish brown, very strongly acid clay about 8 inches thick. The next layer, to a depth of about 42 inches, is black muck. It is very strongly acid in the upper part and neutral in the lower part. The underlying material to a depth of about 84 inches is very fluid clay. It is gray and very strongly acid in the upper part and greenish gray and neutral in the lower part.

Included with this soil in mapping are many small areas of soils that are similar to Allemands soil except that the organic layers are more than 51 inches thick. The included soils make up about 15 percent of the map unit.

Permeability of the Allemands soil is very slow in the clay layers and rapid in the organic layers. The seasonal high water table ranges from about 1/2 foot to 4 feet below the surface. Water runs off the surface very slowly. This soil is subject to rare flooding during the cropping season. It may flood more frequently on a yearly basis. The shrink-swell potential is low in the organic layers and very high in the clay layers. This soil is high in fertility. The surface layer of this soil is very sticky when wet and dries slowly. This soil has high subsidence potential.

This Allemands soil is mostly used as pasture. A few small areas are in crawfish ponds.

This soil is moderately well suited to pasture. Wetness limits the choice of plants and the period of grazing. The use of equipment is limited by wetness and poor trafficability. The main suitable pasture plants are native species, such as maidencane, rushes, and sedges, and domestic species, such as dallisgrass and bermudagrass. Fertility generally is sufficient for sustained production of high quality nonirrigated pasture.

This soil is poorly suited to cultivated crops. If this soil is used for adapted crops, the main limitations are wetness, poor tilth, and poor trafficability. Where good water control is maintained through a system of dikes, ditches, and water pumps, crops such as sugarcane and soybeans can be grown. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment.

This soil is poorly suited to the production of bottom land hardwoods. The main limitations are wetness and poor trafficability.

The soil produces habitat for alligators, crawfish, ducks, rabbits, deer, and numerous small furbearers. Habitat for wildlife can be improved by planting appropriate vegetation, maintaining the existing vegetation, or propagating the natural growth of desirable plants.

This soil is poorly suited to urban uses and intensive forms of recreation. Flooding, wetness, subsidence, low strength, and the very high shrink-swell potential are the main limitations. If the water table is lowered, the organic matter oxidizes and slowly subsides. In places, buried logs and stumps cause uneven subsidence. If dry, the organic matter is subject to burning.

If this soil is used for dwellings, pilings and specially constructed foundations are needed. Removing the organic material and replacing it with suitable mineral material or covering the surface with mineral material can reduce subsidence where buildings, local roads and streets, and playgrounds are to be constructed. Adequate water control is needed to reduce wetness and to control subsidence. Septic tank absorption fields do not function properly in this soil; therefore, community sewage systems are needed to prevent contamination of water sources by effluent seepage. Drainage ditches and levees are difficult to construct and maintain because of the fluid nature of the underlying mineral material and the subsidence of the organic material.

This soil is in capability subclass IVw. It is not assigned a woodland suitability group.

AR—Allemands-Larose association. These level, very poorly drained, very fluid organic and mineral soils are in freshwater marshes. They are flooded or ponded most of the time. Allemands soil borders the deeper organic soils, and Larose soil is in slightly higher positions bordering back-swamp areas. The mapped areas consist of about 45 percent Allemands soil and 40 percent Larose soil. Because of poor accessibility, fewer observations were made in mapping these areas than in others. The detail in mapping, however, is adequate for the expected use of the soils. The mapped areas range from about 20 to 1,000 acres. Slope is less than 1 percent.

Typically, Allemands soil is black, mildly alkaline muck about 18 inches thick. The underlying material to a depth of 84 inches is gray and very dark gray, moderately alkaline, very fluid clay.

Typically, Larose soil is black, neutral muck about 3 inches thick. Below that, to a depth of about 10 inches, it is black, mildly alkaline, very fluid clay. The underlying material to a depth of about 84 inches is gray, mildly alkaline, very fluid clay.

Allemands and Larose soils are almost continuously flooded by 6 to 12 inches of fresh water. During storms, floodwaters are as deep as 2 feet. Hurricanes and other severe storms strike areas of this association occasionally. The high water table in these soils commonly is at or above the surface, but during periods of sustained north wind and low gulf tides, it is as much as 6 inches below the soil surface. These soils are soft and boggy and have low strength. Permeability is rapid in the organic material and very slow in the underlying clayey material. Allemands soil has high total subsidence potential, and Larose soil has medium total subsidence potential. Shrink-swell potential is low in the organic material and very high in the underlying clayey material.

Included with these soils in mapping are a few small areas of Barbary soils and a few large areas of Kenner soils. Barbary soils are in wooded swamps and are very fluid, clayey soils. Kenner soils are in positions similar to those of the Allemands soil and have organic layers more than 51 inches thick. Also included are many small ponds and perennial streams. The included soils make up about 15 percent of the map unit.

The natural vegetation consists mainly of bulltongue, maidencane, alligatorweed, cattail, common rush, pickerelweed, and swamp knotweed.

Most of the acreage in this map unit is used as habitat for wetland wildlife and for extensive forms of recreation, such as hunting and fishing. A small acreage is used for oil and gas wells.

Allemands and Larose soils are well suited to use as habitat for wetland wildlife. Roosting and feeding areas are available for large numbers of ducks and many other waterfowl. These soils also produce habitat for large numbers of crawfish, swamp rabbits, white-tailed deer, American alligators, and furbearers, such as mink, nutria, otters, and raccoons. The small ponds and perennial streams included in this map unit provide habitat for significant numbers of freshwater fish. Trapping of American alligators, crawfish, and furbearers and commercial fishing are important in areas of this map unit. Water-control structures, designed for the management of the habitat, are difficult to construct and maintain because of the instability of the organic material.

These soils are not suited to crops, woodland, pasture, or urban uses. Flooding and wetness are too severe for these uses. The soils are too soft and boggy to support livestock grazing. If these soils have been drained and are protected from flooding, they shrink, crack, and subside. These soils are poorly suited to use as construction material because of the high content of organic matter and the fluid nature of the soil.

The Allemands and Larose soils are in capability subclass VIIw. This map unit is not assigned a woodland suitability group.

BB—Barbary muck. This level, very poorly drained, very fluid, mineral soil is in swamps. It is ponded and flooded most of the time. Because of poor accessibility, fewer observations were made in mapping these areas than in others. The detail in mapping, however, is adequate for the expected use of the soil. The mapped areas range from about 200 to several thousand acres. Slope is dominantly less than 1 percent.

Typically, the surface layer is about 15 inches thick. It is dark brown, mildly alkaline, muck in the upper part and gray, mildly alkaline, very fluid clay in the lower part. The underlying material to a depth of 84 inches is gray and greenish gray, moderately alkaline, very fluid clay. Logs, stumps, and wood fragments are common throughout the profile.

Included with this soil in mapping are a few large areas of Commerce, Fausse, Sharkey, and Vacherie soils. These soils are firm, mineral soils. The somewhat poorly drained Commerce and Vacherie soils and the poorly drained Sharkey soils are in higher positions than Barbary soils. The very poorly drained Fausse soils are in slightly higher positions. The included soils make up about 15 percent of the map unit.

Barbary soil is frequently flooded by freshwater for very long periods. Floodwaters range in depth from 1 to 3 feet. During nonflood periods, the high water table fluctuates between a depth of 1/2 foot below the surface to 1 foot above the surface. This soil has low strength and very high shrink-swell potential. Permeability is very slow. The total subsidence potential is medium. Surface runoff is very slow to ponded.

Most areas are in woodland and are used as habitat for wetland wildlife and for extensive forms of recreation, such as hunting. Some areas are used for oil and gas wells.

The natural vegetation consists of water tolerant trees and aquatic understory plants. The main trees are baldcypress, water tupelo, and black willow. Understory and aquatic vegetation consists mainly of alligatorweed, buttonbush, duckweed, pickerelweed, and water hyacinth. This soil is poorly suited to the production of bottom land hardwoods. Few areas are managed for timber production because trees grow slowly and special equipment is needed to harvest timber. This soil cannot support the load of most types of harvesting equipment.

This soil is well suited to use as habitat for wetland wildlife. It produces habitat for large numbers of crawfish, ducks, squirrels, alligators, wading birds, and furbearers, such as raccoons, mink, and otters. White-tailed deer, swamp rabbits, and turkey utilize areas of this soil if the soil is dry or not flooded too deeply. Trapping of alligators, crawfish, and furbearers is important in most areas of this map unit. Timber management that encourages oak and other mast-producing trees improves the habitat for wood ducks, squirrels, deer, and nongame birds. Constructing shallow ponds and artificially flooding this soil can improve the habitat for waterfowl.

Unless drained and protected from flooding, this soil is not suited to pasture or cropland. Wetness and flooding are too severe for these uses. This soil generally is too soft and boggy for grazing by livestock.

This soil is not suited to urban uses. Wetness, flooding, low strength, and very high shrink-swell potential are too severe for these uses. Drainage and protection from flooding are possible only by constructing large water control structures. Drainage ditches are difficult to construct because stumps and logs are buried in the soil. In addition, subsidence is a problem if this soil is drained.

This Barbary soil is in capability subclass VIIw and in woodland group 5W.

Cc—Commerce silt loam. This level, somewhat poorly drained soil is in high and intermediate positions on the natural levee of the Mississippi River and its distributaries. It is protected from flooding by levees. The mapped areas range from about 10 to several thousand acres. Slope is 0 to 1 percent.

Typically, the surface layer is dark grayish brown, moderately acid silt loam about 11 inches thick. The subsoil is dark grayish brown, mottled, neutral silt loam in the upper part and grayish brown, mottled, mildly alkaline silt loam in the lower part. The underlying material to a depth of about 60 inches is grayish brown, mottled, mildly alkaline silt loam.

Included with this soil in mapping are a few small areas of Convent, Sharkey, and Vacherie soils. The somewhat poorly drained Convent and Vacherie soils are in positions similar to Commerce soil. Convent soils have less clay in the subsoil. Vacherie soils have a clayey underlying material. The poorly drained Sharkey soils are in lower positions and are clayey throughout. Also included are small areas of Commerce and Sharkey soils that have a silty clay loam surface layer. The included soils make up about 10 percent of the map unit.

This Commerce soil is high in fertility. Water and air move through this soil moderately slowly. Water runs off the surface slowly. A seasonal high water table fluctuates between a depth of about 1 1/2 feet and 4 feet during December through April. Adequate water is available to plants in most years. This soil has moderate shrink-swell potential.

Most areas of this soil are used as cropland, pasture, or urban and industrial areas. A few areas are used for recreational development and as woodland.

This soil is well suited to cultivated crops. Sugarcane and soybeans are the main crops. Citrus is grown in some areas (fig. 3). Wetness is the main limitation. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume

Figure 3.—Citrus is a common crop in some areas of Commerce silt loam.

mixtures help to maintain fertility and tilth. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Natural fertility is high. The content of phosphorus and potassium is high, and nitrogen content is low.

This soil is well suited to pasture. The main limitation is wetness. The main suitable pasture plants are improved bermudagrass, common bermudagrass, Pensacola bahiagrass, ryegrass, winter pea, fescue, and white clover. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. Grasses respond well to nitrogen fertilizer.

This soil is moderately well suited to urban development. It is firm, consists of mineral material throughout, and can support the foundations of most low structures without the use of pilings. The main limitations are wetness, moderate shrink-swell potential, moderately slow permeability, and low strength for roads. Excess water can be removed by shallow ditches and by providing the proper grade. Buildings and roads can be designed to offset the effects of shrinking and swelling. Roads need to be designed to offset the limited ability of the soil to support a load. Moderately slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. If housing density is medium to high, a community sewage system is needed to prevent contamination of ground water sources. Plans for homesite development need to provide for the preservation of as many trees as possible.

This soil is moderately well suited to intensive recreation uses. It is limited mainly by wetness and moderately slow permeability. Good drainage is needed for most recreational uses. Cuts and fills need to be seeded or mulched. Plant cover can be maintained by controlling traffic.

This soil is well suited to the production of eastern cottonwood and American sycamore. Equipment limitations are a concern unless drainage is provided. Reforestation must be carefully managed to reduce competition from undesirable understory plants.

This soil produces habitat for deer, squirrels, rabbits, quail, doves, ducks, and numerous small furbearing animals. Habitat for wildlife can be improved by planting appropriate vegetation, maintaining the existing plant cover, or propagating the natural growth of desirable plants.

This Commerce soil is in capability subclass IIw and in woodland group 4W.

Cm—Commerce silty clay loam. This level, somewhat poorly drained soil is mainly in intermediate positions on natural levees of the Mississippi River and its distributaries. A few areas of this soil are in a former swamp that has been drained. This soil is protected from flooding in most places by levees. The mapped areas range from about 10 to 2,000 acres. Slope is less than 1 percent.

Typically, the surface layer is dark grayish brown, moderately alkaline silty clay loam about 10 inches thick. The subsoil is dark grayish brown, mottled, moderately alkaline silty clay loam to a depth of about 30 inches. The underlying material to a depth of about 60 inches is gray, mottled moderately alkaline silty clay loam.

Included with this soil in mapping are a few small areas of Sharkey soils. The poorly drained Sharkey soils are in lower positions than Commerce soil and are clayey throughout. Also included are a few small areas of Commerce soils that have a very fine sandy loam or silt loam surface layer and Commerce soils that have a subsoil that is clayey below a depth of about 36 inches. A few small areas of Commerce soils that are subject to rare flooding are also included. The included soils make up about 10 percent of the map unit.

This Commerce soil has high fertility. Water and air move through this soil moderately slowly. Water runs off the surface slowly. A seasonal high water table fluctuates between a depth of about 1 1/2 feet and 4 feet during December through April. Adequate water is available to plants in most years. This soil has moderate shrink-swell potential. The Commerce soil in the drained swamp is subject to flooding about 1 to 10 times during each 100 years.

Most areas of this soil are used as cropland, pasture, or for urban and industrial uses. A few areas are used for recreational uses and as woodland.

This soil is well suited to cultivated crops. It is limited mainly by wetness and poor tilth. Sugarcane and soybeans are the main crops (fig. 4). This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing remove excess water. Returning crop residue to the soil and a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Natural fertility is high. The content of phosphorus and potassium is high, and nitrogen is low.

This soil is well suited to pasture. The main limitation is wetness. The main suitable pasture plants are improved bermudagrass, common bermudagrass,

Figure 4.—Soybeans is one of the main crops grown on Commerce silty clay loam.

Pensacola bahiagrass, ryegrass, winter peas, tall fescue, and white clover. Proper stocking, pasture rotation, and restricted grazing duirng wet periods help keep the pasture and soil in good condition. Natural fertility is high. The content of phosphorus and potassium is high, and nitrogen is low.

This soil is moderately well suited to urban development. It is firm, consists of mineral materials throughout, and can support the foundations of most low structures without the use of pilings. The main limitations are wetness, moderate shrink-swell potential, moderately slow permeability, and low strength for roads. Flooding is a hazard in the areas that were formerly swamps. Excess water can be removed by shallow ditches and by providing the proper grade. The effects of shrinking and swelling can be minimized by proper engineering designs and by backfilling with material that has low shrink-swell potential. Roads need to be designed to offset the limited ability of the soil to support a load. Moderately slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. Plans for homesite development need to provide for the preservation of as many trees as possible.

This soil is moderately well suited to recreational development. It is limited mainly by wetness and moderately slow permeability. Flooding is a hazard in areas within drained swamps. Good drainage is needed for most recreational uses. Cuts and fills need to be seeded or mulched. Plant cover can be maintained by controlling traffic.

This soil is well suited to the production of eastern cottonwood, American sycamore, green ash, water oak, and sweetgum trees. Equipment use limitations are a concern unless drainage is provided. Reforestation needs to be carefully managed to reduce competition from undesirable understory plants.

This soil produces habitat for deer, squirrels, rabbits, quail, doves, ducks, and numerous small furbearers. Habitat for wildlife can be improved by planting appropriate vegetation, maintaining the existing plant cover, or propagating the natural growth of desirable plants.

This Commerce soil is in capability subclass IIw and in woodland group 4W.

Cn—Commerce silty clay loam, frequently flooded. This level, somewhat poorly drained soil is on the lower reaches of the deltaic fans of distributaries of the Mississippi River. Flooding occurs more often than twice each 5 years during the cropping season and on a yearly basis. The mapped areas range from about 10 to 1,000 acres. Slope is less than 1 percent.

Typically, the surface layer is dark grayish brown, mildly alkaline silty clay loam about 8 inches thick. The subsoil, to a depth of about 44 inches, is mottled, moderately alkaline silty clay loam. It is grayish brown in the upper part and gray in the lower part. The underlying material to a depth of about 60 inches is dark grayish brown, mottled, moderately alkaline silty clay loam.

Included with this soil in mapping are a few small areas of Barbary, Fausse, and Sharkey soils. Barbary soils are in low back swamps and are very fluid clay throughout. Fausse and Sharkey soils are in lower positions than Commerce soil and are firm and clayey throughout. Also included are a few small areas of Commerce soils that have a silt loam surface layer. The included soils make up about 10 percent of the map unit.

This Commerce soil is high in fertility. Water and air move through this soil moderately slowly. Adequate water is available to plants in most years. Water runs off the surface slowly. A seasonal high water table fluctuates between a depth of about 1 1/2 to 4 feet during December through April. This soil is subject to brief to long periods of flooding. Flooding is frequent and occurs mainly in winter and spring. However, flooding can occur during any season. The surface layer of this soil remains wet for long periods after heavy rains. This soil has moderate shrink-swell potential.

Most areas of this soil are in bottom land hardwoods and are used as habitat for wildlife and for timber production.

This soil is moderately well suited to the production of eastern cottonwood, American sycamore, Nuttall oak, and water hickory. The main concerns in producing and harvesting timber are equipment use limitations and seeding mortality caused by wetness and the flooding hazard. Reforestation needs to be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Trees need to be water tolerant, and they should be planted or harvested during dry periods. Conventional methods of harvesting timber generally can be used, but their use can be limited during rainy periods, generally from November to April.

This soil is poorly suited to pasture. The main limitations are wetness and the hazard of flooding. Wetness limits the choice of plants and the period of grazing. Grazing when the soil is wet results in puddling of the soil's surface layer. Excessive water on the surface can be removed by levees, ditches, pumps, and vegetated outlets. The main suitable pasture plants are common bermudagrass and ryegrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. Fertilizer is needed for optimum growth of grasses and legumes. During flood periods, cattle need to be moved to protected areas or to pastures at higher elevations.

This soil is poorly suited to cultivated crops. It is limited mainly by wetness and frequent flooding. If good water control is maintained through a system of dikes, ditches, and water pumps; however, this soil is suited to most climatically adapted crops. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Returning crop residue to the soil and a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This soil produces habitat for deer, squirrels, rabbits, quail, doves, ducks, and numerous small furbearers. Habitat for wildlife can be improved by planting appropriate vegetation, maintaining the existing plant cover, or propagating the natural growth of desirable plants.

This soil is poorly suited to recreational development. It is limited mainly by wetness, moderately slow permeability, and the flooding hazard. Good drainage is needed for most intensively used areas. Plant cover can be maintained by controlling traffic. Protection from flooding is needed.

This soil is not suited to urban development. The main limitations are wetness, moderately slow permeability, moderate shrink-swell potential, the hazard of frequent flooding, and low strength for roads. Drainage is needed if roads and building foundations are constructed. Major flood control structures and extensive local drainage systems are needed to protect this soil from flooding. If this soil is developed for commercial uses, sufficient fill material is needed to raise the surface elevation above normal flood levels. Roads need to be designed to offset the limited ability of the soil to support a load. Moderately slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. Buildings and roads can be designed to offset the effects of shrinking and swelling.

This Commerce soil in capability subclass Vw and in woodland group 8W.

Co—Commerce-Harahan-Allemands complex, drained. These level, somewhat poorly drained and poorly drained soils are in former freshwater swamps and marshes that are drained and protected from most flooding. The mapped areas are rectangular and enclosed by a levee system. Commerce soil is on low ridges within areas of former marshes. Harahan soil is in low positions in former swamps. Allemands soil is in low positions in former marshes. This map unit is about 45 percent Commerce soil, about 25 percent Harahan soil, and about 20 percent Allemands soil. The soils in this complex were so intermingled that mapping them separately was not practical at the scale selected. The soils in this map unit are subject to rare flooding during the cropping season. Typically, flooding occurs less often than once in 10 years during the cropping season. The soils can flood more frequently on a yearly basis. Slope is less than 1 percent.

Commerce soil is somewhat poorly drained and has a black, mildly alkaline silty clay loam surface layer about 8 inches thick. The subsoil, to a depth of about 37 inches, is grayish brown, mottled, mildly alkaline silty clay loam. The underlying material to a depth of about 60 inches is gray and grayish brown, mottled, mildly alkaline, fluid silty clay loam. In some places, the surface layer is clay or muck. In other places, the underlying material is silty clay.

Commerce soil is high in natural fertility. Water and air move through this soil moderately slowly. A seasonal high water table fluctuates between a depth of 1 1/2 feet and 4 feet below the surface during December through April. Adequate water is available to plants in most years. Effective rooting depth is about 1 1/2 to 4 feet. This soil has moderate shrink-swell potential.

Typically, Harahan soil is poorly drained and has a surface layer of black, mildly alkaline clay about 3 inches thick. Below that, to a depth of about 9 inches, is a buried surface layer of black, mildly alkaline muck. The subsoil, to a depth of about 27 inches, is dark gray, mildly alkaline, firm clay. The underlying material to a depth of about 60 inches is dark gray, mildly alkaline, fluid clay. In some places, the surface layer is muck. In other places, stumps and logs are in the underlying material.

Harahan soil has a high water table 1 foot to 3 feet below the surface throughout the year. After heavy rains the water table is near the surface for short periods. Permeability is very slow, and water runs off the surface slowly. This soil has high fertility. It has very high shrink-swell potential and medium total subsidence potential.

Typically, the poorly drained Allemands soil has a black, slightly acid muck surface layer about 4 inches thick. The next layer, to a depth of about 42 inches, is very dark gray, neutral muck. Below that to a depth of 84 inches is gray, fluid, mildly alkaline clay. In some places, the surface layer is clay. In other places, stumps and logs are in the underlying material.

Allemands soils are very slowly permeable in the clay layers and rapidly permeable in the organic layers. A high water table is 1/2 foot to 4 feet below the surface throughout the year. After heavy rainstorms, it is near the surface for short periods. Water runs off the surface very slowly. The shrink-swell potential is low in the organic layer and very high in the clayey layers. Fertility is high. This soil has high subsidence potential.

Included with these soils in mapping are a few small areas of soils that are similar to the Allemands soil except that they have organic layers more than 51 inches thick. Also included in places are soils that are similar to the Harahan soil except that they are underlain by a thick layer of organic material. The included soils make up 10 percent of the map unit.

This complex is used mainly as pastureland. One large area is used as a crawfish pond.

This soil is moderately well suited to pasture. The main limitation is wetness. Flooding is a hazard in some years. Wetness and flooding limit the choice of plants and the period of grazing. The use of equipment is limited by wetness in all of the soils and by the clayey surface layer in the Harahan soil. The main suitable pasture plants are dallisgrass, common bermudagrass, and white clover. Native vegetation, such as maidencane, rushes, and sedges are also suitable. Fertility generally is sufficient for sustained production of high quality, nonirrigated pasture.

This soil is poorly suited to cultivated crops. The main limitations are poor tilth, poor trafficability, and wetness. If good water control is maintained through a system of dikes, ditches, and water pumps, this soil is suited to sugarcane and soybeans. However, adequate water control is difficult. As the high water table is lowered, the soil subsides; and in places, buried stumps and logs are exposed.

The soils in this map unit are poorly suited to the production of bottom land hardwoods. The main concerns are severe equipment use limitations and moderate seedling mortality caused by wetness. Commerce soil has the potential to produce commercial stands of eastern cottonwood and American sycamore trees. Allemands and Harahan soils are generally not suited to the commercial production of timber.

These soils are poorly suited to recreational development. The main limitations are wetness, the hazard of flooding, and excess humus. Good drainage and protection from flooding are needed.

These soils are poorly suited to urban development. The main limitations are subsidence, excess humus, the hazard of flooding, wetness, moderate and very high shrink-swell potential, and low strength for roads. Additional drainage and water control are needed to overcome wetness and flooding. Adding loamy fill and leveling can improve these soils for most urban uses. Roads need to be designed to offset the limited ability of these soils to support loads. In places, buried logs and stumps are limitations for shallow excavations. Constructing buildings on piers above ground can help to prevent structural damage caused by subsidence. Moderately slow and very slow permeability and the high water table increase the possibility of failure of septic tank absorption fields.

These soils produce habitat for alligators, deer, doves, ducks, rabbit, quail, and numerous small furbearers. Habitat for wildlife can be improved by planting appropriate vegetation, maintaining the existing plant cover, or propagating the natural growth of desirable plants.

This complex is in capability subclass IVw. Commerce soil is in woodland suitability group 4W, and Harahan and Allemands soils are not assigned a woodland suitability group.

CR—Convent and Commerce soils, frequently flooded. These level to gently undulating, somewhat poorly drained soils are in a narrow band between the Mississippi river and its protection levee and within the Bonnet Carre Spillway. These soils are subject to deep, frequent flooding as the river seasonally rises and falls and when flood control gates are opened during high water stages in the Mississippi River. Flooding occurs more often than twice each 5 years during the cropping season and on a yearly basis. The soil pattern is irregular; some areas are all Convent soil, some areas are all Commerce soil, and other areas have both soils. The texture of the surface layer changes as flood waters rework the deposits. In areas that contain both soils, the Commerce soil is in lower positions than the Convent soil that is on slightly higher, convex ridges. The mapped areas range from about 100 to 7,000 acres. The Convent soil makes up about 55 percent of the map unit, and the Commerce soil makes up about 35 percent. Slope ranges from 0 to 3 percent.

Typically, Convent soil has a brown, mildly alkaline fine sandy loam, very fine sandy loam, or silt loam surface layer about 6 inches thick. The underlying material to a depth of about 60 inches is grayish brown and gray, mottled, moderately alkaline silt loam.

Convent soil has high fertility. Water and air move through this soil moderately slowly. Water runs off the surface slowly. A seasonal high water table fluctuates between a depth of about 1 1/2 and 4 feet during December through April. This soil has low shrink-swell potential.

Typically, Commerce soil has a dark brown, moderately alkaline, silt loam or very fine sandy loam surface layer about 4 inches thick. The subsoil, to a depth of about 32 inches, is grayish brown, mottled, moderately alkaline silt loam. The underlying material to a depth of 60 inches is grayish brown, mottled, moderately alkaline silt loam.

Commerce soil has high fertility. Water and air move through this soil moderately slowly. Water runs off the surface slowly. A seasonal high water table fluctuates between a depth of about 1 1/2 feet and 4 feet during December through April. This soil has moderate shrink-swell potential.

Included with these soils in mapping are a few small areas of Vacherie soils. Vacherie soils are in positions similar to those of the Commerce soil. They are loamy in the upper part of the profile and clayey in the lower part. Also included are soils that are similar to the Convent soil except that they are more sandy throughout. The included soils make up about 10 percent of the map unit.

Most areas of the Convent and Commerce soils are in woodland and are used as habitat for wildlife and extensive forms of recreation. Some areas are used as a source of loamy fill material.

The soils in this map unit are moderately well suited to the production of American sycamore, eastern cottonwood, Nuttall oak, and water hickory. Because of the flooding hazard, the main concerns in producing and harvesting timber are moderate seedling mortality and equipment use limitations. Reforestation must be carefully managed to reduce competition from undesirable understory plants. Trees should be water tolerant, and they need to be planted or harvested during dry periods. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to April.

Because of deep, frequent flooding, the soils in this map unit are generally not suited to cultivated crops and are poorly suited to pasture. Scouring and sedimentation are problems.

The soils in this map unit produce habitat for ducks, rabbits, quails, deer, squirrels, doves, and numerous small furbearers. Habitat for wildlife can be improved by planting appropriate vegetation, maintaining the existing plant cover, or propagating the natural growth of desirable plants.

Because of flooding and wetness, the soils in this map unit are generally not suited to urban uses or intensive forms of recreation. If the soils are developed for commercial uses, sufficient fill material is needed to raise the surface elevation above normal flood levels.

This map unit is in capability subclass Vw and in woodland group 8W.

FA—Fausse clay. This very poorly drained, firm, mineral soil is in frequently flooded backswamp areas. It is ponded and flooded most of the time. Fewer observations were made in these mapped areas than in others because of poor accessibility. The detail in mapping, however, is adequate for the expected use of these soils. The mapped areas range from 200 to 2,000 acres. Slope is dominantly less than 1 percent.

Typically, Fausse soil has a dark gray, medium acid clay surface layer about 4 inches thick. The subsoil, to a depth of about 50 inches, is gray, slightly acid clay in the upper part and greenish gray, mildly alkaline clay in the lower part. The underlying material to a depth of about 75 inches is greenish gray, moderately alkaline clay.

Included with this soil in mapping are a few large areas of Barbary and Sharkey soils. The very poorly drained Barbary soils are in lower positions than Fausse soil and are dominantly very fluid clay throughout. The poorly drained Sharkey soils are in slightly higher positions than Fausse soil. They dry enough in most years to crack to a depth of 20 inches or more. The included soils make up about 10 percent of the map unit.

This Fausse soil is flooded for very long periods in most years from January to December. Depth of floodwaters range from 1 foot to 3 feet. During nonflood periods, the water table fluctuates between a depth of 1 1/2 feet below the surface and 1 foot above the surface. This soil is seldom dry enough to crack. It has very high shrink-swell potential. Permeability is very slow. This soil is high in natural fertility.

Most of the acreage of this soil is in woodland. It is used as habitat for wetland and woodland wildlife and for extensive forms of recreation, such as hunting.

This soil is poorly suited to the production of bottom land hardwoods. Timber can be harvested only with special equipment. Wetness and the hazard of flooding are the main limitations. Unless this soil is drained and protected from flooding, equipment use limitations and seedling mortality are severe. The natural vegetation consists mainly of baldcypress, black willow, water tupelo, water hickory, overcup oak, and red maple. The main understory and aquatic vegetation consists of buttonbush, palmetto, maidencane, lizard tail, duckweed, and swamp-privet.

This soil is well suited to use as habitat for wetland and woodland wildlife. When flooded, this soil provides feeding and roosting areas for ducks and other waterfowl. It also provides habitat for deer, squirrels, alligators, mink, muskrats, and raccoons, and it is the main habitat for deepwater crawfish. Wetland habitat can be improved by installing structures for controlling water levels. Timber management that propagates oaks and other mast-producing trees improves habitat for wood ducks, squirrels, deer, and nongame birds.

This soil is generally not suited to urban uses and intensive forms of recreation. Wetness, the hazard of flooding, very slow permeability, low strength for roads, and very high shrink-swell potential are the main limitations. If this soil is drained and protected from flooding, it can be used for local roads and streets and for dwellings without basements. However, roads and foundations need to be specially designed to overcome the limitations of very high shrink-swell potential and low strength.

Unless drained and protected from flooding, this soil is generally not suited to cropland or pasture.

This Fausse soil is in capability subclass VIIw and in woodland group 6W.

Ha—Harahan clay. This level, poorly drained, mineral soil is in former swamps. It is protected from most flooding by levees and drained by water pumps. The mapped areas range from 50 to several thousand acres. Slope is less than 1 percent.

In undisturbed areas, this soil typically has a very dark gray, strongly acid clay surface layer about 12 inches thick. Below that is a buried surface layer about 4 inches thick of black, mildly alkaline muck. The subsoil, to a depth of about 30 inches, is grayish brown, neutral, firm clay. The underlying material to a depth of about 84 inches is grayish brown and greenish gray, mildly alkaline and neutral, very fluid clay. In some places, logs and stumps are in the underlying material. In places, the soil is developed for urban uses, and it is covered with sandy or loamy fill material about 1 foot to 3 feet thick.

Included with this soil in mapping are a few small areas of Barbary, Commerce, and Sharkey soils. The very poorly drained Barbary soils are in depressional areas and channel scars, and they are continuously ponded and very fluid throughout. The somewhat poorly drained Commerce soils and the poorly drained Sharkey soils are in slightly higher positions than Harahan soil. Commerce soils are firm and loamy, and Sharkey soils are firm and clayey throughout.

This Harahan soil has been drained by pumps and is protected from flooding by levees. Under normal conditions, the high water table is maintained at a depth of about 1 foot to 3 feet below the surface. After heavy rains, it is near the surface for short periods. Flooding is rare during the cropping season and on a yearly basis. It can occur during winter storms, hurricanes, or when water pumps or protection levees fail. Permeability is very slow. Water runs off the surface slowly. This soil has high fertility. It has very high shrink-swell potential and medium total subsidence potential.

Most areas of this soil are used as pasture. A few areas are used for urban development.

This soil is moderately well suited to pasture and poorly suited to cropland. Suitable pasture plants are common bermudagrass, improved bermudagrass, dallisgrass, tall fescue, and white clover. Fertility generally is sufficient for high quality, nonirrigated pasture. Water control is a major concern for crops and pasture. As the high water table is lowered, the soil subsides; and in places, buried stumps and logs are exposed. Maintaining crop residue on or near the surface helps to maintain soil tilth and organic matter content.

This soil is poorly suited to bottom land hardwoods. The main concerns in management are equipment use limitations and seedling mortality caused by wetness and the clayey surface layer.

This soil is poorly suited to urban uses and intensive forms of recreation. Wetness, very slow permeability, subsidence, low strength for roads, the hazard of flooding, and very high shrink-swell potential are the main limitations. If buildings are constructed, pilings and specially constructed foundations are needed. Additional support and stability for buildings and roads can be provided by adding sandy or loamy fill material to the soil surface. Adequate water control is needed to reduce wetness and to control the rate of subsidence. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with mineral material that has a low shrink-swell potential. Shallow excavations are difficult to construct because of the buried stumps and logs in the soil and the very fluid nature of the underlying material. Septic tank absorption fields do not function properly because of wetness and the very slow permeability. If housing density is moderate to high, a community sewage system is needed.

This Harahan soil is in capability subclass IIIw. It is not assigned a woodland suitability group.

KE—Kenner muck. This level, very poorly drained, organic soil is in freshwater marshes. It is ponded and flooded most of the time. Fewer observations were made in these mapped areas than in others because of poor accessibility. The detail in mapping, however, is adequate for the expected use of the soil. The mapped areas range from 200 to several thousand acres. Slope is less than 1 percent.

Typically, the surface layer is very dark gray, slightly acid, fluid muck about 21 inches thick. The next layer is gray, very fluid clay about 2 inches thick. The underlying material, to a depth of 78 inches, is black, mildly alkaline, very fluid muck. To a depth of 84 inches, it is very dark gray, mildly alkaline, very fluid clay. In places, buried stumps and logs are in the underlying material.

Included with this soil in mapping are a few large areas of Allemands, Barbary, and Larose soils. Also included are many small open water areas. The very poorly drained Allemands soils are on submerged natural levees along distributary channels and have organic layers 16 to 51 inches thick. The very poorly drained Barbary and Larose soils are fluid, mineral soils. The included soils make up about 15 percent of the map unit.

This Kenner soil is almost continuously flooded with several inches of fresh water. During storms, floodwaters are as deep as 2 feet. During nonflood periods, the seasonal high water table ranges from 1 foot above the surface to 1/2 foot below the surface. This soil has low strength and poor trafficability. Permeability is rapid in the organic layers and very slow in the clayey layers. The total subsidence potential is very high. If drained, the organic material on drying initially shrinks to about half the original thickness and then subsides further as a result of compaction and oxidation.

Most of the acreage of this soil is used as habitat for wetland wildlife and for extensive forms of recreation. A small acreage is in oil and gas fields.

Natural vegetation consists mainly of maidencane, cattail, alligatorweed, bulltongue, pickerelweed, swamp knotweed, and common rush (fig. 5). Other less common plants are marshfern, common buttonbush, elephant ears, and water hyacinth.

This soil is well suited to use as habitat for wetland wildlife and for extensive forms of recreation. It provides food and roosting areas for ducks, geese, and other waterfowl. This soil also provides habitat for the American alligator and furbearers, such as mink, otters, raccoons, and nutria. Fishing, hunting, and trapping are popular in areas of this soil. The many waterways that have been constructed during gas and oil exploration activities provide access for hunters, fishermen, and trappers. Many species of freshwater fish are in the small open water areas included in this map unit. Intrusion of saltwater is a problem in managing the vegetation for wetland wildlife habitat. Water control structures designed to improve the habitat for wildlife are difficult to construct and maintain because of the instability of the organic material.

This soil is not suited to cropland, woodland, or pasture. Wetness and flooding are too severe for these

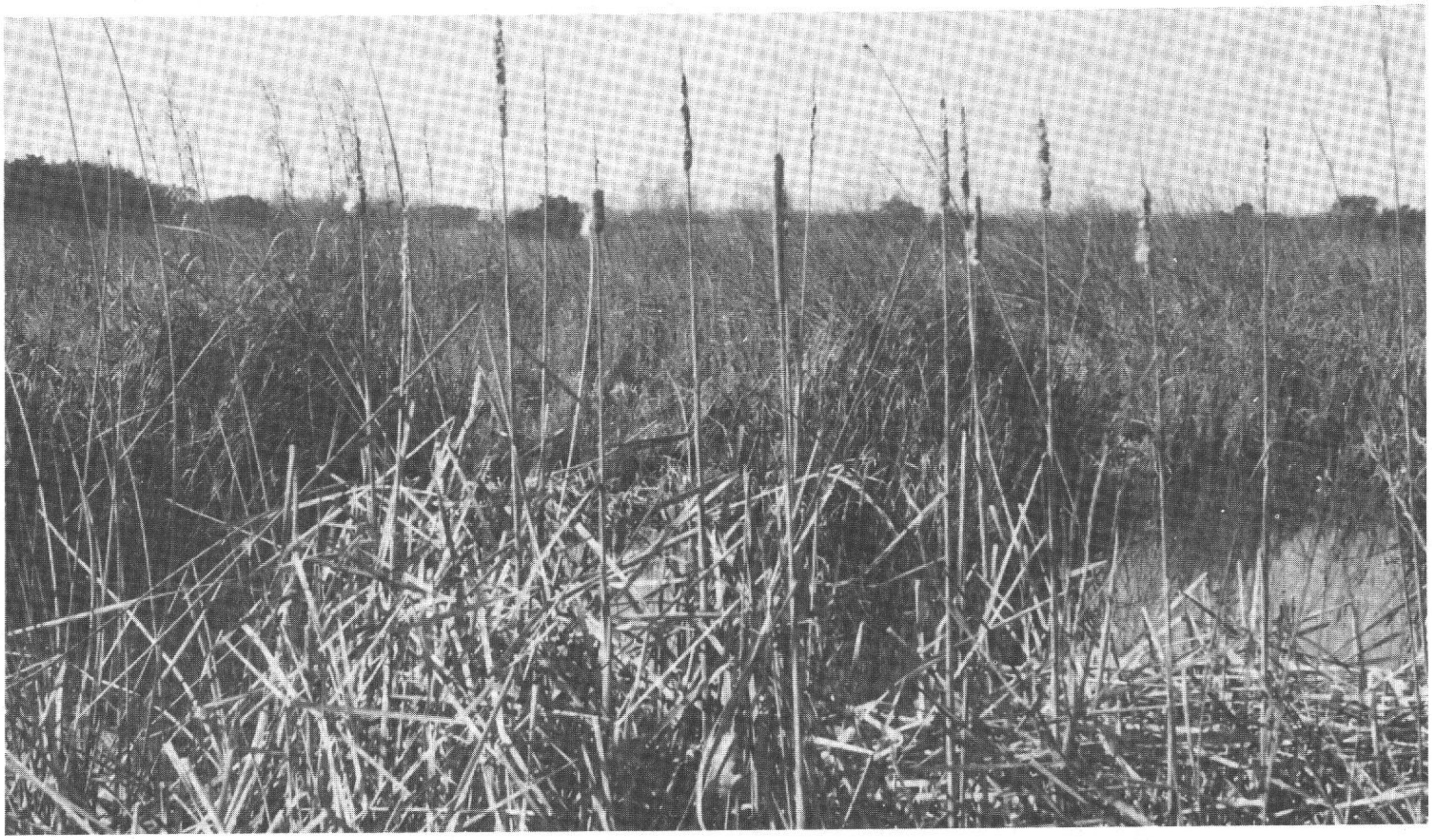


Figure 5.—Cattail is the main vegetation in this area of Kenner muck in freshwater marshes.

uses. This soil is too soft and boggy to support the weight of grazing livestock.

This soil is not suited to urban and intensive recreational uses. Flooding, wetness, low strength for roads, and subsidence potential are too severe for these uses. If this soil is drained and protected from flooding, it will subside several feet below sea level. The underlying clay has very high shrink-swell potential.

This Kenner soil is in capability subclass VIIIw. It is not assigned a woodland suitability group.

LF—Lafitte muck. This level, very poorly drained, organic soil is in brackish marshes. It is flooded or ponded most of the time. Fewer observations were made in these mapped areas than in others because of poor accessibility. The detail in mapping, however, is adequate for the expected use of the soil. The mapped areas range from about 200 acres to several hundred acres. Slope is less than 1 percent.

Typically, the surface layer is very dark grayish brown, moderately alkaline muck about 10 inches thick. The next layer, to a depth of about 48 inches is black, moderately alkaline muck. Below that to a depth of about 84 inches is very dark brown, moderately alkaline muck.

Included with this soil in mapping are a few small areas of Allemands, Barbary, Larose, and Kenner soils. None of the included soils are as saline as the Lafitte soil. Barbary soils are in swamps and are fluid, mineral soils. Allemands, Kenner, and Larose soils are in adjacent freshwater marshes. The included soils make up about 15 percent of the map unit.

This Lafitte soil is flooded with several inches of brackish water most of the time. During storms, it is covered by as much as 2 feet of water. The high water table commonly is at or above the surface, but during periods of sustained northwinds and low gulf tides, it is as much as 6 inches below the soil surface. This soil has low capacity to support loads. Permeability is moderately rapid. Surface runoff is very slow to ponded. The total subsidence is very high. The shrink-swell potential is low.

The natural vegetation consists mainly of marshhay cordgrass, needlegrass rush, and sumpweed.

Most of the acreage of this soil is used as habitat for wetland wildlife and for extensive forms of recreation, such as hunting and fishing.

This Lafitte soil is well suited to use as habitat for wetland wildlife. It provides habitat for large numbers of ducks and furbearers, such as mink, muskrat, otters, and raccoon. Intensive management for wildlife generally is not practical. Water control structures are difficult to construct and maintain because of the instability of the organic material. Saltwater intrusion is a problem in the management of the vegetation for wildlife habitat. The small open water areas in this map unit are used for sport and commercial fishing.

This soil is not suited to crops, pasture, or woodland because of wetness, flooding, salinity, and poor trafficability. It is generally too soft and boggy to support livestock.

This soil is not suited to urban or intensive recreational uses. Wetness, the hazard of flooding, low strength for roads, and subsidence are the main limitations.

This Lafitte soil is in capability subclass VIIIw. It is not assigned a woodland suitability group.

MA—Maurepas muck. This level, very poorly drained, organic soil is in swamps. It is ponded and flooded most of the time. Fewer observations were made in these mapped areas than in others because of poor accessibility. The detail in mapping, however, is adequate for the expected use of the soil. The mapped areas range from about 50 to 800 acres. Slope is dominantly less than 1 percent.

Typically the surface layer is very dark gray, moderately alkaline muck about 10 inches thick. Below that, to a depth of about 70 inches, is dark reddish brown, moderately alkaline muck. The underlying material to a depth of about 84 inches is gray, moderately alkaline, very fluid clay. Stumps and logs are typically buried throughout the organic material.

Included with this soil in mapping are a few large areas of Allemands, Barbary, and Kenner soils. Allemands soils are in freshwater coastal marshes and have organic layers less than 51 inches thick. Barbary soils are in positions similar to those of the Maurepas soil, but they are dominantly clayey throughout. Kenner soils are in freshwater coastal marshes and have organic layers thicker than 51 inches. The included soils make up about 15 percent of the map unit.

Maurepas soil is frequently flooded by fresh water for very long periods. Depth of floodwaters ranges from 1 foot to 3 feet. During nonflood periods, the high water table fluctuates between a depth of 1/2 foot below the soil surface to 1 foot above the surface. This soil has low strength, and the total subsidence potential is very high. Permeability is rapid in the organic material and very slow in the underlying clay. Surface runoff is very slow to ponded.

Most of the acreage of this soil is in woodland. It is used as habitat for wetland wildlife and for extensive forms of recreation, such as hunting.

Natural vegetation consists of water-tolerant trees and aquatic understory plants. The main trees are baldcypress, water tupelo, and black willow. Understory and aquatic vegetation consists mainly of alligatorweed, buttonbush, bulltongue, duckweed, pickerelweed, and water hyacinth. This soil is poorly suited to the production of bottom land hardwoods. Wetness, the hazard of flooding, and poor trafficability are the main limitations. Few areas are managed for timber production because natural regeneration is slow and special equipment is needed for harvesting. This soil cannot support the load of most types of harvesting equipment.

This soil is well suited to use as habitat for wetland and woodland wildlife. It provides habitat for large numbers of crawfish, ducks, squirrels, alligators, and wading birds. Many furbearers, such as raccoons, mink, and otters, utilize these areas. Other animals, such as white-tailed deer and swamp rabbits, also utilize areas of this soil that are dry or not flooded too deeply. Trapping of alligators and furbearers is an important enterprise. Timber management that propagates oak and other mast-producing trees improves habitat for wood ducks, squirrels, deer, and nongame birds. Constructing shallow ponds and artifically flooding this soil can improve the habitat for waterfowl by providing open water areas.

This soil is not suited to pasture or cropland. Wetness and flooding are too severe for these uses. Generally, this soil is too soft and boggy for livestock grazing.

This map unit is not suited to urban and intensive recreational uses. Wetness, the hazard of flooding, and low strength for roads are too severe for these uses. Buried stumps and logs make shallow excavations very difficult. Drainage and protection from flooding are possible, but only by constructing levees and using water pumps to remove excess water. Subsidence and low strength are continuing limitations after drainage. This soil is poorly suited to the construction of levees. It shrinks and cracks as it dries and causes levees to fail unless they are continually maintained.

This Maurepas soil is in capability subclass VIIIw. It is not assigned a woodland suitability group.

Mp—Maurepas muck, drained. This level, poorly drained, organic soil is in swamps that have been drained. It is protected from most flooding but is still subject to rare flooding. The mapped areas range from 100 to several hundred acres. Slope is less than 1 percent.

Typically the surface layer is dark reddish brown, very strongly acid, very fluid muck about 12 inches thick. The next layer is black, medium acid, very fluid muck to a depth of about 55 inches. The underlying material to a depth of about 84 inches is gray, neutral, very fluid clay. Buried stumps and logs are typically throughout the organic material. In places, the surface layer is underlain by a layer of neutral, gray clay 4 to 8 inches thick.

Included with this soil in mapping are a few small areas of Allemands clay, drained. These Allemands soils are in former freshwater marshes and have organic layers less than 51 inches thick that are underlain by clay. The included soils make up about 5 percent of the map unit.

This Maurepas soil is drained by water pumps and protected from flooding by levees. Under normal conditions, the high water table is at a depth of about 1 foot to 3 feet below the surface throughout the year. After heavy rains, it may be near the surface for short periods. Flooding occurs less often than once each 10 years during the cropping season. It can occur more frequently on a yearly basis. Flooding occurs when water pumps or protection levees fail or during storms and hurricanes. Permeability is rapid in the organic material and very slow in the mineral material. The shrink-swell potential is low in the organic material and very high in the mineral material. The total subsidence potential is very high.

Most of the acreage of this soil is in woodland. It is used as habitat for wetland and woodland wildlife and for extensive forms of recreation, such as hunting. A small acreage is cleared and used as pasture.

This soil is poorly suited to the production of bottom land hardwoods. Wetness and poor trafficability are the main limitations. Few areas are managed for timber production because trees grow slowly and special equipment is needed for harvesting. This soil cannot support the load of most types of harvesting equipment.

Natural vegetation on the Maurepas soil consists of water-tolerant trees. The main trees growing are baldcypress, water tupelo, and black willow.

This soil is well suited to use as habitat for wetland and woodland wildlife. It provides habitat for large numbers of turkey, white-tailed deer, rabbits, crawfish, squirrels, and furbearers, such as raccoons, mink and otters. Timber management that propagates oak and other mast-producing trees improves habitat for wood ducks, squirrels, deer, and nongame birds. Constructing shallow ponds and artifically flooding this soil can improve the habitat for waterfowl by providing open water areas.

This soil is poorly suited to crops and pasture. Wetness and poor trafficability are the main limitations. Adequate water control is difficult. If the water table is lowered, the soil subsides and tree stumps and buried logs are exposed. Suitable pasture plants are common bermudagrass and native grasses, such as maidencane and rushes.

This soil is poorly suited to urban uses and intensive forms of recreation. The main limitations are wetness, the hazard of flooding, low strength for roads, and subsidence. Buried stumps and logs make shallow excavations very difficult. When the high water table is lowered, the organic matter oxidizes and slowly subsides. If this soil is used for buildings, pilings and specially constructed foundations are needed. Adequate water control is needed to reduce wetness and to control the rate of subsidence. Septic tank absorption fields do not function properly in this soil because of wetness. Soil acidity limits the choice of ornamental trees and other plants used in landscaping.

This Maurepas soil is in capability subclass IVw. It is not assigned a woodland suitability group.

Sa—Sharkey silty clay loam. This level, poorly drained soil is in intermediate positions on natural levees of the Mississippi River and its distributaries. It is subject to rare flooding. The mapped areas range from about 10 to 2,000 acres. Slope is less than 1 percent.

Typically, the surface layer is dark grayish brown, mildly alkaline silty clay loam about 5 inches thick. The subsoil, to a depth of about 43 inches, is mottled, moderately alkaline clay. It is dark gray in the upper part and gray in the lower part. The underlying material to a depth of about 60 inches is olive gray, mottled, moderately alkaline clay. In places, the underlying material is silty clay loam or silty clay between a depth of 40 and 60 inches.

Included with this soil in mapping are a few small areas of Commerce soils. The somewhat poorly drained Commerce soils are in higher positions than Sharkey soil and are loamy throughout. Also included are a few small areas of Commerce soils that have a silty clay loam surface layer and Sharkey soils that have a clay surface layer. The included soils make up about 10 percent of the map unit.

This Sharkey soil is high in fertility. Water and air move through this soil very slowly. Water runs off the surface very slowly and stands in low places for short periods after heavy rains. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April. Flooding occurs less often than once in 10 years during the cropping season. It can occur more frequently on a yearly basis. Adequate water is available to plants in most years. The surface layer of this soil is sticky when wet and hard when dry. The shrink-swell potential is very high. During dry periods, this soil shrinks and cracks to a depth of 20 inches or more.

Most areas of this soil are used as cropland, pasture, or for urban and industrial uses. A few areas are used as woodland or for intensive forms of recreation.

This Sharkey soil is moderately well suited to cultivated crops. Sugarcane and soybeans are the main crops. It is limited mainly by wetness and poor tilth. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Returning crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Most crops and pasture plants respond well to fertilizer.

This soil is well suited to pasture. The main limitation is wetness. The main suitable pasture plants are common bermudagrass, improved bermudagrass, dallisgrass, tall fescue, white clover, and ryegrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition.

This soil is poorly suited to urban development. However, it is firm, has mineral material throughout, and can support the foundations of most low structures without the use of piling. The main limitations are wetness, very slow permeability, very high shrink-swell potential, the hazard of flooding, and low strength for roads. Excess water can be removed by shallow ditches and by providing the proper grade. Roads need to be designed to offset the limited ability of the soil to support a load. Very slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. If housing density is moderate to high, a community sewage system is needed. The effects of shrinking and swelling can be minimized by proper engineering designs and by backfilling with material that has low shrink-swell potential.

This Sharkey soil is well suited to the production of sweetgum, eastern cottonwood, American sycamore, sugarberry, and water oak. The main concerns in producing and harvesting timber are moderate seedling mortality and severe equipment use limitations caused by wetness. Reforestation must be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Trees that can tolerate seasonal wetness need to be planted. Because the silty clay loam surface layer is sticky when wet, most planting and harvesting equipment can be used only during dry periods.

This soil is poorly suited to intensive forms of recreation. It is limited mainly by wetness and very slow permeability. Providing drainage and adding sandy or loamy material to the surface improve this soil for use for playgrounds and other intensive recreational uses. Plant cover can be maintained by controlling traffic.

This soil produces habitat for deer, squirrels, rabbits, quail, doves, ducks, and numerous small furbearers. Habitat for wildlife can be improved by planting appropriate vegetation, maintaining the existing plant cover, or propagating the natural growth of desirable plants.

This Sharkey soil is in capability subclass IIIw and in woodland group 7W.

Se—Sharkey clay. This level, poorly drained soil is in intermediate and low positions on natural levees of the Mississippi River and its distributaries. It is subject to rare flooding. The mapped areas range from about 10 to several thousand acres. Slope is less than 1 percent.

Typically, the surface layer is very dark grayish brown, slightly acid clay about 4 inches thick. The subsoil, to a depth of 41 inches, is gray, mottled, medium acid clay. The underlying material to a depth of about 60 inches is gray, mottled, neutral clay. In places, the underlying material is silty clay loam or silt loam below a depth of 40 inches.

Included with this soil in mapping are a few small areas of Commerce soils. The somewhat poorly drained Commerce soils are in higher positions than Sharkey soil and are loamy throughout. Also included are a few small areas of Sharkey soils that have a silty clay loam surface layer. The included soils make up about 10 percent of the map unit.

This Sharkey soil is high in fertility. Water and air move through this soil very slowly. Water runs off the surface very slowly and stands in low places for short periods after heavy rains. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during December through April. Flooding occurs less often than once in 10 years during the cropping season. It can occur more often on a yearly basis. Adequate water is available to plants in most years. The surface layer of this soil is very sticky when wet and very hard when dry. This soil has very high shrink-swell potential.

Most areas of this soil are used as cropland, pasture, or urban and industrial areas. A few areas are used as woodland and for intensive forms of recreation.

This soil is moderately well suited to cultivated crops. Sugarcane and soybeans are the main crops. It is limited mainly by wetness and poor tilth. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when too wet or too dry. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment.

This soil is well suited to pasture. The main suitable pasture plants are common bermudagrass, improved bermudagrass, dallisgrass, tall fescue, white clover, and ryegrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer is needed for optimum growth of grasses and legumes.

This Sharkey soil is poorly suited to urban development. However, this firm, mineral soil can support the foundations of most low structures without the use of piling. Wetness, very high shrink-swell potential, very slow permeability, the hazard of flooding, and low strength for roads are the main limitations. Drainage is needed for most urban uses. The effects of shrinking and swelling can be minimized by proper engineering designs and by backfilling with material that has low shrink-swell potential. Roads need to be designed to offset the limited ability of the soil to support a load. Very slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. If housing density is moderate to high, a community sewage system is needed.

This soil is well suited to the production of eastern cottonwood, sweetgum, American sycamore, sugarberry, Nuttall oak, and water oak. The main concerns in producing and harvesting timber are moderate seedling mortality and severe equipment use limitations caused by wetness. Reforestation must be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Trees that can tolerate seasonal wetness need be planted. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods.

This soil is poorly suited to intensive forms of recreation. It is limited mainly by wetness and very slow permeability. Good drainage needs to be provided. If this soil is used for playgrounds or other intensive recreation, adding sandy or loamy material to the surface reduces wetness and stickiness of the surface layer.

This soil produces habitat for deer, squirrels, rabbits, quail, doves, ducks, and numerous small furbearers. Habitat for wildlife can be improved by planting appropriate vegetation, maintaining the existing plant cover, or propagating the natural growth of desirable plants.

This Sharkey soil is in capability subclass IIIw and in woodland group 7W.

Sh—Sharkey clay, frequently flooded. This level, poorly drained soil is in low positions on natural levees of the Mississippi River and its distributaries. The mapped areas range from about 10 to 2,000 acres. Slope is less than 1 percent.

Typically, the surface layer is dark grayish brown, moderately alkaline, clay about 8 inches thick. The subsoil, to a depth of about 50 inches, is mottled, moderately alkaline clay. It is dark grayish brown in the upper part and dark gray in the lower part. The underlying material to a depth of about 60 inches is gray, mottled, moderately alkaline clay. In places, the underlying material is silty clay loam or silty clay.

Included with this soil in mapping are a few small areas of Barbary, Commerce, Fausse, and Vacherie soils. Also included are small areas of Sharkey soils in high positions that are subject to occasional flooding. The very poorly drained Barbary and Fausse soils are in lower positions than Sharkey soil and do not dry enough to crack to a depth of 20 inches. The somewhat poorly drained Commerce and Vacherie soils are in slightly higher positions than Sharkey soil. Commerce soils are loamy throughout, and Vacherie soils are loamy in the upper part of the profile. The included soils make up about 15 percent of the map unit.

This Sharkey soil is high in fertility. Water and air move through this soil very slowly. Water runs off the surface very slowly and stands in low places for long periods after heavy rains. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface between December and April. This soil is subject to frequent and prolonged periods of flooding during any season of the year. Flooding occurs more often than twice in 5 years during the cropping season and on a yearly basis. This soil has very high shrink-swell potential. Adequate water is available to plants in most years. During dry periods, this soil shrinks and cracks to a depth of 20 inches or more.

Most areas of this soil are used as woodland and pasture. A few areas are used for intensive forms of recreation.

This soil is moderately well suited to the production of bottom land hardwoods. The main concerns in producing and harvesting timber are severe seedling mortality and equipment use limitations caused by wetness and the flooding hazard. Reforestation needs to be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Trees that can tolerate seasonal wetness, such as baldcypress, need to be planted. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods.

This soil is poorly suited to pasture. Frequent flooding precludes intensive management practices. Wetness limits the choice of plants and the period of grazing. The main suitable pasture plant is common bermudagrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. During flood periods, cattle need to be moved to protected areas or to pastures at higher elevations.

This soil is generally not suited to cultivated crops. Wetness and frequent flooding are too severe for this use. This soil can be protected from flooding only by constructing an extensive system of levees.

This soil produces habitat for deer, squirrels, rabbits, quail, doves, ducks, and numerous small furbearers. Habitat for wildlife can be improved by planting appropriate vegetation, maintaining the existing plant cover, or propagating the natural growth of desirable plants.

This Sharkey soil is not suited to urban uses, and it is poorly suited to intensive forms of recreation. Wetness and flooding are generally too severe for these uses. Other limitations are very high shrink-swell potential, low strength for roads, and very slow permeability. This soil needs to be protected from flooding by levees and drained with water pumps before urban development is considered. Major flood control structures and extensive local drainage systems are needed. Roads need to be designed to offset the limited ability of the soil to support a load. Roads, buildings, and streets need to be designed to withstand very high shrink-swell potentials. Septic tank absorption fields do not function properly because of wetness and very slow permeability.

This Sharkey soil is in capability subclass Vw and in woodland group 7W.

Ud—Udorthents. This map unit consists of sanitary landfills into which solid refuse is deposited. The landfills are mostly within areas of swamps and marshes that range from 5 to 200 acres.

Typically, these soils consist of alternating layers of compacted refuse and thin soil layers. The combined thickness of these layers can range from 5 feet to more than 30 feet. The landfill is covered with a thick layer of soil when it is completed.

Included with these areas in mapping are a few small areas of Kenner, Barbary, and Fausse soils that are not yet covered with refuse.

This map unit is used chiefly for the disposal of solid waste. Udorthents are generally not suited to agricultural, forest, or urban uses. If areas of this map unit are drained, the underlying refuse can decay. The surface may then cave in and subside unevenly.

This map unit is not assigned to a capability subclass or woodland suitability group.

UR—Urban land. This map unit consists of areas where more than 85 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces. Examples are business centers, parking lots, industrial sites, grain elevators, and nuclear power plants along the Mississippi River industrial corridor. The mapped areas range from 100 to 500 acres.

Included with this Urban land in mapping are areas of lawns that are mostly covered with miscellaneous, artifical fill. In some areas, several feet of this fill has been placed over the original soil surface. The included areas make up about 15 percent of the map unit.

Examination and identification of soils or soil material in this map unit are impractical. Careful onsite investigation is needed to determine the potential and limitations for any proposed use.

Urban land is not assigned to a capability subclass or woodland group.

Vc—Vacherie silt loam, frequently flooded. This gently undulating, somewhat poorly drained soil is in intermediate positions on natural levees of the Mississippi River. The landscape consists of parallel ridges and swales. The ridges are 1 to 3 feet high and 10 to 50 feet wide. The swales are about 10 to 50 feet wide. The mapped areas range from about 200 to 2,000 acres. Slopes are short and choppy and range from 0 to 3 percent.

Typically, the Vacherie soil has a dark grayish brown, mildly alkaline silt loam surface layer about 4 inches thick. The subsoil is grayish brown, mottled, neutral silt loam. Below that is a buried surface layer of dark gray, neutral clay. The next layer to a depth of about 60 inches is a buried subsoil of dark gray, mottled, neutral clay. In places the surface layer is very fine sandy loam.

Included with this soil in mapping are a few small areas of Barbary and Sharkey soils. The very poorly drained Barbary soils are in low, ponded, backswamps and are very fluid and clayey throughout. The poorly drained Sharkey soils are in lower positions than Vacherie soil and are clayey throughout. The included soils make up about 15 percent of the map unit.

Vacherie soil has high fertility. Permeability is moderate in the upper part of the soil and very slow in the lower part. Adequate water is available to plants in most years. Water runs off the surface very slowly and stands in low places for long periods after heavy rains. Flooding occurs more often than twice in 5 years during the cropping season and on a yearly basis. A seasonal high water table fluctuates between a depth of about 1 foot and 3 feet during December through April. This soil has very high shrink-swell potential in the underlying clay.

Most of the acreage of this soil is in bottom land hardwoods and is used as habitat for wildlife and for timber production.

This soil is moderately well suited to the production of green ash, eastern cottonwood, Nuttall oak, water hickory, and American sycamore. The main concerns in producing and harvesting timber are moderate equipment use limitations and seedling mortality because of wetness from flooding. Reforestation needs to be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Trees should be water tolerant, and they need to be planted or harvested during dry periods. Conventional methods of harvesting timber generally can be used, but their use may be limited during rainy periods, generally from December to April.

This Vacherie soil is poorly suited to pasture. The main limitations are wetness and the hazard of flooding. Wetness limits the choice of plants and the period of grazing. The main suitable pasture plants are common bermudagrass and ryegrass. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. During flood periods, cattle need to be moved to protected areas or to pastures at higher elevations.

This soil is not suited to cultivated crops. Wetness and the flooding hazard are generally too severe for this use.

If good water control is maintained through a system of dikes, ditches, and water pumps, however, this soil is suited to most climatically adapted crops.

This soil produces habitat for deer, squirrels, ducks, doves, quail, rabbits, and numerous small furbearers. Habitat for wildlife can be improved by planting appropriate vegetation, maintaining existing plant cover, or propagating the natural growth of desirable plants.

This soil is poorly suited to recreational development. It is limited mainly by the flooding hazard, wetness, and very slow permeability. Drainage and protection from flooding are needed.

This soil is not suited to urban uses. The hazard of flooding is generally too severe for these uses. Other limitations are wetness, very high shrink-swell potential, and low strength for roads. Major flood control structures and extensive local drainage systems are needed. Roads need to be designed to offset the limited ability of the soil to support a load. Buildings and roads can be designed to offset the effects of shrinking and swelling. Very slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. Drainage is needed for best results with most lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens.

This Vacherie soil is in capability subclass Vw and in woodland group 8W.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in St. Charles Parish are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 3 percent.

The following map units, or soils, make up prime farmland in St. Charles Parish. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 5. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Soils that have limitations, such as a high water table or flooding, may qualify as prime farmland if these limitations are overcome by such measures as drainage or flood control. Onsite evaluation is necessary to determine if the limitations have been overcome by the corrective measures.

Cc Commerce silt loam
Cm Commerce silty clay loam
Ha Harahan clay
Sa Sharkey silty clay loam
Se Sharkey clay

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of roadfill and topsoil. They can use it to identify areas where wetness or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Stanley D. Matthews, conservation agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 49,143 acres in St. Charles Parish was used for crops and pasture in 1984, according to an estimate by local agricultural agencies. About 4,143 acres was used for crops, mainly soybeans and sugarcane, and more than 45,000 acres was used as pasture. The acreage in crops and pasture has remained nearly constant. Small acreages of cropland and pasture have been converted to industrial use.

Differences in crop suitability and management needs are the result of differences in soil characteristics, such as fertility levels, erodibility, organic matter content, availability of water for plant growth, drainage, and the hazard of flooding. Cropping systems and soil tillage are also important parts of management. Because the soil pattern of a farm is unique, each farm has unique management problems. Some principles of farm management, however, apply to specific soils and certain crops. This section gives the general principles of management that can be applied widely to the soils of St. Charles Parish.

Perennial grasses or legumes or mixtures of grasses and legumes are grown for pasture and hay. These mixtures generally consist of either a summer or a winter perennial grass and a suitable legume. In addition, many farmers seed small grains or ryegrass in the fall for winter and spring forage. Excess grass in summer is harvested as hay.

Common and improved bermudagrass and Pensacola bahiagrass are the main summer perennials. These grasses produce good quality forage. Tall fescue, the main winter perennial grass, grows well on these soils. All of these grasses respond well to fertilizer, particularly nitrogen. White clover, crimson clover, vetch, and wild winter peas are the most common legumes.

Proper grazing is essential for high quality forage, stand survival, and erosion control. A system of rotation grazing improves forage production and quality. Brush and weed control, applications of fertilizer, and renovation of the pasture are also important.

Fertilization and liming. The amount of fertilizer needed depends upon the crop to be grown, past cropping history, level of yield desired, and the soil phase. Specific recommendations should be based on laboratory analysis of soil samples from each field.

A soil sample for laboratory testing should consist of a single soil phase and should represent no more than 10 acres. Agricultural agencies in the parish can supply detailed information and instruction regarding soil sampling.

The soils in St. Charles Parish generally range from medium acid to moderately alkaline in the upper 20 inches. They generally do not require lime. However, the drained marshes and swamps have a highly oxidized organic or clayey layer at the surface that ranges to extremely acid. Liming of these soils may not be economically practical because of the large lime requirement. Most of the large pump-off areas were used for row crops, mostly sugarcane, but are now used for pasture or wildlife.

Organic matter content. Organic matter is important as a source of nitrogen for crop growth. It also increases the water intake rate, reduces surface crusting and soil loss by erosion, and promotes good physical condition of the surface soil.

Most of the cultivated soils in St. Charles Parish are low to moderate in organic matter content. To a limited extent, organic matter can be built up and maintained by leaving plant residue on the soil, promoting more plant growth and using plants that have extensive root systems, adding barnyard manure, and growing perennial grasses and legumes in rotation with other crops.

Soil tillage. Soil tillage prepares the seedbed and controls weeds. Seedbed preparation and cultivating and harvesting tend to damage the soil structure. Crusting of the surface and compaction of the soil can be reduced by returning the crop residue to the soil and by using conservation tillage. Excessive cultivation of soils should be avoided. Some of the clayey soils in the parish become cloddy if they are plowed.

A compacted layer develops in loamy soils that are plowed to the same depth for long periods or are plowed when wet. The compacted layer is generally known as a traffic pan or plowpan, and it develops just below the plow layer. The development of this compacted layer can be avoided by not plowing when the soil is wet, by varying the depth of plowing, or by subsoiling or chiseling.

Some tillage implements stir the surface and leave crop residue as protection from beating rains. The use of such implements helps to control erosion, reduce runoff, and increase infiltration.

Drainage. The soils in the parish need surface drainage. Early drainage methods involve a complex pattern of main ditches, laterals, and field drains. A more recent approach combines land leveling and grading with minimum use of open ditches. This approach creates larger and more uniformly shaped fields that are more suited to the use of modern, multirow farm machinery.

The Mississippi River guide levee system protects most cropland and pastureland from flooding. Nevertheless, some of the soils at lower elevations are subject to flooding by runoff from higher areas. Flooding in many of these areas is controlled by constructing a ring levee system and removing excess water by pumps.

Water for plant growth. In St. Charles Parish, water is commonly available for optimum plant growth without irrigation. Large amounts of rainfall occur in summer, and the distribution pattern favors the growth of sugarcane. The rainfall pattern precludes economical growth of certain crops. Cotton, for example, is better suited to a drier climate. Soybeans are grown, but this climate is near the maximum wetness range. The available water capacity of soils in the parish is high or very high.

Cropping system. A good cropping system includes a legume for nitrogen, a cultivated crop to aid in weed control, a deep-rooted crop to utilize fertility and maintain permeability in the subsoil, and a close-growing crop to help maintain the content of organic matter. The sequence of crops should keep the soil covered as much of the year as possible.

A suitable cropping system varies according to the needs of the farmer and the characteristics of the soil. Producers of livestock, for example, generally use a cropping system that has a higher percentage of pasture than the cropping system used on cash-crop farms. Grass or legume cover crops are commonly grown during the fall and winter. Additional information on cropping systems can be obtained from the Soil Conservation Service, the Cooperative Extension Service, or the Louisiana Agricultural Experiment Station.

Control of erosion. Soil erosion is not a serious problem in St. Charles Parish mainly because the topography is level or nearly level. Sheet erosion is moderate in all fallow-plowed fields and in newly constructed drainage ditches. Some gully erosion occurs where side water enters the drainage ditches unless water control structures are installed. Sheet and gully erosion can be reduced by maintaining a cover of vegetation or plant residue, by conservation tillage, and by controlling weeds by methods other than fallow plowing. New drainage ditches need to be seeded immediately after construction. Water control structures placed in areas where water flows into drainage ditches help control gully erosion.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter to the class numeral, for example, IIw. The letter *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage).

The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation. In St. Charles Parish, class V contains only the subclasses indicated by *w*.

Woodland Management and Productivity

Carl V. Thompson Jr., state staff forester, Soil Conservation Service, helped prepare this section.

This section contains information on the relation between trees and their environment, particularly trees and the soils on which they grow. It also includes information on the kind, amount, and condition of woodland resources in St. Charles Parish. Interpretations of the soils that can be used by woodland owners, foresters, forest managers, and agricultural workers in planning the use of soils for wood crops are also included.

Soils directly influence the growth, management, harvesting, and multiple uses of forests. They anchor the tree and provide its nutrients and moisture. Soil characteristics, such as chemical composition, texture, structure, depth, and slope affect tree growth, seedling survival, species adaptability, and equipment limitations.

The ability of a soil to supply moisture and nutrients to trees is strongly related to the texture, structure, and depth. Generally, sandy soils are less fertile and lower in water holding capacity than clayey soils. However, aeration is often impeded in clayey soils, particularly under wet conditions.

Texture, structure, and depth of soils largely determine the forest stand composition and influence management and utilization decisions. Sweetgum, for example, is tolerant of many soils and sites, but grows best on the rich, moist, alluvial loamy soils on bottom lands. Use of heavy logging and site preparation equipment is more restricted on clayey soils than on better drained sandy or loamy soils.

Woodland Resources

St. Charles Parish contains about 70,600 acres of commercial forest land. Commercial forest land is producing or capable of producing crops of industrial wood and is not withdrawn from timber use. About 4.9 percent of this acreage is publicly owned, 6.3 percent is privately owned, and 88.8 percent is under miscellaneous private ownership *(17)*. The Salvadore Wildlife Management Area, primarily a freshwater marsh tract, is located in the southeast part of the parish. It covers about 27,500 acres. Along the northern extremity of this wildlife management area are several large stands of cypress timber. The Bonnet Carre Wildlife Management Area is located on the U.S. Army Corps of Engineers' Bonnet Carre Floodway on the northwest side of St. Charles Parish between the towns of Norco and LaPlace. The east and west sides of the floodway, about 4,300 acres, are covered with hardwood trees, mainly oak, baldcypress, sugarberry, water tupelo, and willow. The center of this area, about 3,300 acres, abounds in grasses, shrubs, and aquatic and semi-aquatic plants.

The commercial forests in St. Charles Parish are in two major forest types. These forest types are named for the trees that predominate.

The oak-gum-cypress forest type covers 88 percent of the forest land area in St. Charles Parish. This type is composed of bottom land forests of water tupelo, blackgum, sweetgum, oak, and baldcypress, singularly or in combination. Associated trees include eastern cottonwood, black willow, ash, sugarberry, maple, and elm.

The elm-ash-cottonwood forest type covers 12 percent of the forest land area in the parish. The most common trees are American elm, green ash, and eastern cottonwood. Major associates include water hickory, Nuttall oak, willow oak, water oak, overcup oak, sweetgum, boxelder, and black and sandbar willows.

The marketable timber volume is composed of about 40 percent baldcypress and 60 percent hardwood. About 75 percent of the commercial forest acreage is in sawtimber, about 19 percent is poletimber, and 6 percent is saplings and seedlings. Most of the more productive sites are in pasture or cropland. Consequently, only 6 percent of the forest land produces more than from 120 to 165 cubic feet of wood per acre, while 19 percent produces 85 to 120 cubic feet per acre, and 75 percent produces less than 85 cubic feet per acre *(17)*.

Since 1974, about 6,200 acres of forest, all bottom land hardwood, have been cleared in St. Charles Parish. Most of the cleared acreage was planted to row crops or developed for residential sites and transmission and transportation corridors. This trend is expected to decline in the future as the acres of woodland suitable for these uses decreases.

The importance of timber production to the economy of the parish has decreased significantly in recent years. One reason is the depletion of supply. As timber was harvested, the land was not reforested. The potential value of wood products in St. Charles Parish is still substantial; however, under present management, much of the existing woodland is producing far below its potential. Most of the commercial woodland would benefit if stands were improved by thinning out mature trees and undesirable species. Tree planting, control of insects and disease, and protection from grazing and fire are also needed to improve stands.

The Soil Conservation Service, Louisiana Office of Forestry, or the Louisiana Cooperative Extension Service can help determine specific woodland management needs.

Environmental Impact

The commercial forest land of St. Charles Parish provides food and shelter for wildlife and offers opportunity for sport and recreation to many users. Hunting and fishing clubs in the parish either lease or otherwise use the forest land. The forest land provides watershed protection, helps to control soil erosion and reduce sedimentation, and enhances the quality and value of water resources.

Trees can be planted to screen distracting views of dumps and other unsightly areas, muffle the sound of traffic, reduce the velocity of winds, and lend beauty to the landscape. They produce fruits and nuts for use by people as well as wildlife. Trees and forests help filter out airborne dust and other impurities, convert carbon dioxide into life-giving oxygen, and provide shade from the sun's hot rays.

Soils vary in their ability to produce trees. Depth, fertility, texture, and the available water capacity influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Available water capacity and depth of the root zone are major influences of tree growth. Elevation and aspect are of particular importance in mountainous areas.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to fertilization than others, some are more susceptible to landslides and erosion after building roads and harvesting timber, and some require special efforts to reforest. In the section "Detailed soil map units," each map unit in the survey area suitable for producing timber presents information about productivity, limitations for harvesting timber, and management concerns for producing timber. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 7 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as wetness. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if soil wetness restricts equipment use from 2 to 6 months per year. The rating is *severe* if soil wetness restricts equipment use for more than 6 months per year. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

Ratings of *seedling mortality* refer to the probability of death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall as influenced by kinds of soil or topographic features. *Seedling mortality* is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and the aspect of the slope. Mortality generally is greatest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to use containerized planting stock or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing surface drainage, or providing artificial shade for seedings. Reinforcement planting is often needed if the risk is *moderate* or *severe*.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. *Plant competion* becomes more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants reduces adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants reduces natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A *moderate* or *severe* rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers must plan site preparation measures to ensure reforestation without delays.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species are dominant on a soil.

The soils that are commonly used to produce timber have the yield predicted in cubic feet. The yield is predicted at the point where mean annual increment culminates. The productivity of the soils in this survey is usually based on 30 years for eastern cottonwood, 35 years for American sycamore, and 50 years for all other species *(3, 4, 5, 6)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic meters per hectare per year. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. It can be converted to board feet by multiplying by a factor of about 71. For example, a productivity class of 8, means the soil can be expected to produce 114 cubic feet per acre per year at the point where mean annual increment culminates, or about 568 board feet per acre per year.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. Desired product, topographic position (such as a low, wet area), and personal preference are three factors of many that can influence the choice of trees to use for reforestation.

Recreation

In table 8, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils that are subject to flooding are limited for recreational use by the duration and the intensity of flooding and by the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm, and is not dusty when dry.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface of the soils is firm after rains and is not dusty when dry.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic (fig. 6). Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Billy R. Craft, state staff biologist, Soil Conservation Service, helped prepare this section.

The large acreages of marshes, swamps, bayous, rivers, lakes, and ponds in the parish provide habitat for fish and wetland wildlife. The bottom land hardwoods provide habitat for many species of woodland wildlife. Pasture and cropland provide some limited habitat for openland wildlife.

Marshland in St. Charles Parish is about 89,000 acres, or about 31 percent of the total area in the parish. Freshwater and brackish marsh types are in the parish.

Many species of waterfowl that utilize the Mississippi flyway winter in the marshes of St. Charles and surrounding parishes. The mottled duck is a permanent resident. Common furbearers in the marshes are nutria, muskrat, raccoon, mink, and otter. The American alligator is also present. The marshes also are a part of the coastal estaurine complex that makes a significant contribution to the support of the marine life from the Gulf of Mexico. Many of the fish and crustaceans use the marshes as nursery areas for larval and juvenile forms. Normal plant decomposition (detritus) occurring in these marshes forms the base of the food chain for fisheries.

Freshwater marshes, totaling 81,000 acres, are the dominant marsh type in the parish. They contain the highest plant diversity compared to the other marsh types and are highly productive for waterfowl, nutria, alligators, and many other wildlife species (fig. 7). Some of the common plants in the fresh marshes are maidencane, alligatorweed, elephantears, rattlebox, water hyacinth, pennywort, common rush, waterlily, pickerelweed, American cupscale, bulltongue, softstem bulrush, giant cutgrass, and cattail.

The brackish marsh area is small. It comprises only 7,900 acres near the southwestern corner of Lake Pontchartrain. Brackish marsh provides excellent habitat for muskrat. Some of the typical plants in the brackish marsh are marshhay cordgrass, olney bulrush, coastal waterhyssop, dwarf spikesedge, marsh morningglory, saltmarsh bulrush, hairypod cowpea, big cordgrass, and widgeongrass.

The swamps of St. Charles Parish make up about 41,000 acres, or 14 percent of the total area of the parish. Most of the swampland in the parish is dominated by hydrophytic vegetation, such as baldcypress, water tupelo, red maple, green ash, and buttonbush. The flooding regime is permanently or semi-permanently flooded. The swamps provide excellent wood duck habitat in the form of nesting, brood cover, and roosting. Amphibians, reptiles, and many other aquatic and semi-aquatic organisms utilize this area.

The bottom land hardwoods in St. Charles Parish cover about 22,000 acres, or about 8 percent of the total area in the parish. They are mostly in frequently flooded

Figure 6.—This golf course is in an area of Harahan clay.

areas. Nuttall oak, overcup oak, water oak, water hickory, green ash, baldcypress, red maple, possumhaw, and common persimmon are the dominant trees.

The openland areas in the parish consist of about 29,000 acres of pastureland and cropland. The areas provide some limited habitat for small game. Bobwhite quail, rabbit, and mourning dove utilize these areas. Lack of quality cover, urbanization, and ownership patterns are the limiting factors for small game populations. A small acreage of the openland is allowed to be fallow on a periodic basis. The fallow fields, if not grazed, provide good small game habitat. Nongame birds are common, and during migration seasons the area provides excellent opportunities for bird watching.

Pond crawfish culture exists on a limited scale. According to a 1980 survey by the U.S. Department of Agriculture, there were 365 acres in crawfish pond production. Interest in crawfish culture is expanding, and acreages in ponds are increasing.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be

Figure 7.—These small areas of open water make the freshwater marsh ideal habitat for waterfowl. The cattail is growing on Allemands muck.

expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, and grain sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, common bermudagrass, vetch, and clover.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, panicum, and fescue.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, sweetgum, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are hawthorn, persimmon, and sumac.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are American beautyberry, American elder, and deciduous holly.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and swamp rabbits.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, otter, alligator, and nutria.

Marshland Management

Billy R. Craft, state staff biologist, Soil Conservation Service, helped prepare this section.

General management needed to control the losses of marshlands and to improve these marshlands for use as habitat for wetland wildlife are discussed in this section.

Planners of management systems for individual areas should consider the detailed information given in the description of each soil in the section "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service, the Cooperative Extension Service, or the Louisiana Agricultural Experiment Station.

Marshland loss. The loss of Louisiana's coastal marshlands has reached a crisis level. St. Charles Parish is in an area that is experiencing the highest rates of marshland losses in Louisiana. Both natural and manmade events are responsible for these losses.

Geologic subsidence of the Gulf Coastal marshes is the main natural cause. As the Continental Shelf and adjoining marshlands slowly subside, some of the marshlands at the lowest elevations become submerged below sea level. Little can be done about the losses caused by these natural events. However, the deterioration of the marshlands caused by activities of man can be controlled with better management. Drainage and the construction of channels for navigation accelerate the rates of erosion, subsidence, and salt water intrusion. Coastal marsh erosion changes areas of marshland to open water areas. In most cases, this is a permanent land loss because the open water areas are too deep to revegetate.

The production of fish and wildlife resources in the marshes of the parish is directly related to the marsh plant community. The need for maintaining the marshland resource base is very important ecologically and economically. If plants are killed by increases in salinity or for other reasons, the other dependent resources experience degradation. Each plant species and community requires a definite range of salinity and water levels for growth. The marsh plants are the basic source of energy for dependent animal populations, such as muskrat, and conditions enhancing plant growth also serve to benefit the fish and wildlife resources.

The organic soils of the marshland are very sensitive to increases in salinity. Salt water intrusions into brackish and freshwater marshes have increased in recent years. The increased salinity causes the loss of surface vegetation. As the plants die, they start decomposing and eventually are carried out of the marshes by tidal action. In a very short time, the surface soil is lost and the areas revert to open water.

Management. Many opportunities exist for improving the marshes of St. Charles Parish for fish, wildlife, and other resources *(16)*. The marshland is a delicately balanced ecosystem that requires an interdisciplinary approach to planning management practices. Some management practices that can improve habitat for waterfowl, furbearers, and fisheries are weirs, prescribed burning, leveed impoundment, and shoreline erosion control.

Weirs are low level dams placed in marsh watercourses to provide better water management capability. Fixed crest weirs are normally placed so the weir crest is about 6 inches below average marsh level. These water control structures:

- Stabilize water levels in the marsh
- Reduce the turbidity levels of the water
- Improve plant community condition
- Improve trapper and hunter access during the winter months by holding water in the bayous and canals

Weirs that have fixed crests are most useful in brackish marshes. Other types of water control structures are needed for freshwater marshes.

Prescribed or controlled burning is a very useful and economical technique to improve marsh vegetative conditions (fig. 8). Periodic controlled burning helps maintain a good variety of marsh plants. This has a positive impact on furbearers, such as muskrat, and other wildlife species.

Prescribed burning results are best in brackish marshes, but freshwater marshes also benefit. Control burning in the fall is the best for wildlife. However, some positive results can be obtained by winter burning.

Figure 8.—An area of Lafitte muck that has been burned. Prescribed burning can improve the vegetative conditions in a marsh for use as habitat for wetland wildlife.

Leveed impoundments can be installed if suitable soils are available for construction. Almost every form of marsh wildlife utilizes the impoundments for feeding, roosting, or cover areas. Landowner objectives, marsh type, and other factors determine the management techniques to use on an impoundment.

Shoreline erosion control. Erosion is one of the primary concerns for the parish and the entire coastal area. Numerous studies and field trials have been conducted to determine suitable techniques to help control shoreline erosion. Structural and vegetative approaches or a combination of both are currently being used. One of the most promising plants used in the tidal zone of saline and brackish areas is smooth cordgrass. This cordgrass is generally locally available. It is easily established in the tidal zone where a large portion of the erosion is occurring. Smooth cordgrass also withstands a wide salinity range, expands rapidly in the tidal zone, normally provides shoreline protection in one growing season, and forms dense stands that dissipate wave energy.

Many other plants are available to alleviate shoreline erosion. Specific site information is needed to plan the proper combination of structural and vegetative measures.

Soil Potentials for Selected Uses

Soil potential ratings indicate the relative potential of a soil for a particular use compared with other soils in an area. The potential is based on performance level, the relative cost to minimize the soil limitations, and the adverse effects of continuing limitations, if any, on social, economic, or environmental values.

The rating classes are defined in terms of the performance expected of a soil if suitable measures are taken to overcome its limitations, the cost of such measures, and the limitations that remain after measures have been applied. The following class terms and definitions are used in this soil survey.

High potential. Performance is at or above the level of local standards. Soil conditions are exceptionally favorable or costs of measures for overcoming soil limitations are favorable in relation to the expected performance. There are no soil limitations, or the continuing limitations after corrective measures are installed do not detract from environmental quality or reduce economic returns.

Medium potential. Performance is somewhat below local standards. The costs of measures for overcoming soil limitations are high, or continuing limitations after corrective measures are installed detract from environmental quality.

Low potential. Performance is significantly below local standards. The measures required to overcome severe soil limitations are too costly to be practical, or continuing limitations after corrective measures are installed detract from environmental quality.

Soil potential ratings help decision makers determine the relative suitability of soils for a given use. They are used with other resource information as a guide to planning land use. Soil potential ratings are not intended as recommendations for soil use. Corrective measures listed are general guides for planning and are not to be applied at a specific location without onsite investigations for design and installation.

Soil potential ratings are made by using a systematic procedure. A standard is established locally for each soil use. It defines the site condition, kind and method of construction, and the expected performance of a soil with a potential of 100. The standard has a fixed installation cost.

The performance of each map unit is compared to the standard. The means of overcoming the soil limitations are determined and the cost of the corrective measures are estimated. Also included are any continuing limitations.

Soil potential ratings are given for each soil map unit regardless of map scale or composition of a unit. Components of multitaxa map units can be evaluated separately if needed to supplement the overall evaluation of a map unit. The soil uses for which soil potential ratings are prepared are consistent with the detail of mapping.

In St. Charles Parish, soil potential ratings are prepared for dwellings without basements. Soil potential ratings of this use can be of value to planners, community officials, engineers, developers, builders, and home buyers.

Table 10 gives the ratings of the potential of the soils for use as dwellings without basements. It also gives index values and corrective measures. The table lists the limitations to use of the soils for dwellings without basements, and it gives the continuing limitations or concerns. The soil potential ratings and the index values indicate the relative quality or performance of each map unit as compared to local standards.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of earthfill and topsoil; plan drainage systems, irrigation systems, ponds, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the presence of buried logs and stumps, a very firm dense layer, and soil texture. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, and flooding affect absorption of the effluent.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, and surfacing of effluent can affect public health. Ground water can be polluted if highly permeable sand is less than 4 feet below the base of the absorption field or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, flooding, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, and flooding affect both types of landfill. Texture, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, and buried logs and stumps affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by a high water table. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* have at least 5 feet of suitable material and low shrink-swell potential. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10 or a high shrink-swell potential. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, or soils that have an appreciable amount of soluble salts. The soils are not so wet that excavation is difficult.

Soils rated *poor* are clayey, have less than 20 inches of suitable material, have soluble salts, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant-available nutrients as it decomposes.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage and irrigation.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of organic matter or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and the salinity of the soil.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; susceptibility to flooding; and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, and permeability. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They influence the soil's adsorption of cations, moisture retention, shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of

K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable period of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions and occurs less often than once in 10 years. *Occasional* means that flooding occurs infrequently under normal weather conditions, no more than twice in 5 years. *Frequent* means that flooding occurs often under normal weather conditions, more than twice in 5 years. Frequency is expressed as *common* when classification as occasional or frequent does not affect soil interpretations. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. January-December, for example, means that flooding can occur during the period January through December. About two-thirds to three-fourths of all flooding occurs during the stated period.

The definitions of the frequency of flooding differ slightly from the National Soil Conservation Service definition. In addition, the period of flooding for the map units shown as rarely flooded in table 17 is based on the frequency of flooding during the cropping season. The cropping season in this survey area is considered to be the period from June 1 to November 30. See the map unit descriptions to determine whether these soils are flooded more frequently at other times during the year. Except for the capability subclasses shown in table 6, the interpretations in other tables in this survey are based on the frequency of flooding on a yearly basis.

The information on flooding is based on evidence in the soil profile: thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that are characteristic of soils not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, such as grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, *perched* or *apparent*; and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 17 shows the expected initial subsidence, which usually is a result of drainage, and annual subsidence, which usually is a result of oxidation.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Urban Development Features

Expansion of the New Orleans metropolitan area into St. Charles Parish has resulted in the development of parts of the nearby marshes and swamps for urban use. The organic soils and fluid mineral soils in these marshes and swamps are severely limited for most urban uses because of flooding, wetness, and the low to high subsidence potential. Although wetness and flooding are common problems on many of the soils in the parish, subsidence is a problem unique to the organic soils and the fluid mineral soils in the marshes and swamps.

Subsidence is the loss of surface elevation after an organic soil or a fluid mineral soil is artifically drained. Subsidence on organic soils after drainage is attributed mainly to four factors: shrinkage caused by desiccation; consolidation from loss of the buoyant force of ground water or from loading, or both; compaction; and biochemical oxidation.

The problems associated with subsidence in the survey area are mainly in the Allemands clay, drained; Commerce-Harahan-Allemands complex, drained; Harahan clay; and Maurepas muck, drained, map units.

Elevation loss caused by shrinkage by desiccation and by consolidation from loss of the buoyant force of ground water or from loading, or both, is termed initial subsidence. It is normally completed about 3 years after the water table is lowered. Initial subsidence of organic soils results in about a 50 percent reduction of thickness of the organic material above the water table. It is accompanied by permanent open cracks that do not close if the soil is wetted.

After initial subsidence, shrinkage continues at a uniform rate because of the biochemical oxidation and subsequent disintegration of the organic material. This is continued subsidence, and it progresses until the mineral material or the permanent water table is reached. The rate of continued subsidence depends upon temperature (amount of time per year above 41 degrees fahrenheit, 5 degrees centigrade), the mineral content, and thickness of the organic layers above the water table. The average rate of continued subsidence in the survey area is about 1/2 inch to 2 inches per year. The total subsidence potential is as much as 144 inches on some soils.

An important feature of organic soils is low bulk density (weight per unit volume). The bulk density, in grams per cubic centimeter, for selected material is water, 1.0 G/cc; mineral soil, 1.2 to 1.7 G/cc; and organic soil, 0.15 to 0.5 G/cc.

The low bulk density reflects the small volume of mineral matter in organic soil material. The mineral content of organic soil material is about 6 percent compared to about 40 percent for mineral soil. The rest of the volume is organic matter and pore space filled with air and water. This accounts for compressibility under load, volume change upon drying, and general instability if used as foundation material.

Fluid, mineral soil layers have a potential for initial subsidence caused by loss of water and consolidation after drainage. Each time the water table is lowered and the fluid soil material is drained, a new increment of initial subsidence takes place. Continued subsidence after drainage on soils that have fluid mineral layers is minor.

Additional urbanization on organic soils and fluid mineral soils can lead to increased subsidence if the water table is lowered. Because of the hard surface cover by the addition of streets, parking lots, buildings, and other structures, the absorptive capacity of the soil is decreased. This increases runoff; consequently, drainage canal size and pumping capacity are generally increased to accommodate the additional runoff. As a result of the more intensive drainage, the water table is lowered. This is accompanied by a new increment of initial subsidence. With this new depth of drainage ditches, pumping capacity must again be increased to prevent flooding. This cycle will continue until all of the organic material has been oxidized and the mineral layers dewatered; however, this seemingly endless cycle can be interrupted.

Subsidence of organic soils can be effectively controlled by maintaining the water table at the surface. It can be reduced to some degree by covering the surface with mineral soil material to slow oxidation. Raising the water table as high as possible to reduce the thickness of organic material between the mineral soil fill material and the water table will also reduce subsidence. In land use decisions, a choice must be made in controlling the water table—to use the land without drainage to control subsidence; to use the land with some drainage, but to tolerate wet conditions and minimum subsidence; or to provide better drainage and tolerate subsidence at a greater rate.

Subsidence is a very severe limitation for most urban uses in St. Charles Parish. Unless piling is used, buildings tilt and foundations crack. Organic soils around structures built on piling subside, and periodic filling is needed to maintain a desirable surface elevation. When organic soils subside, foundations are exposed, and unsupported driveways, patios, air conditioner slabs, and sidewalks crack and warp and gradually drop below original levels. Underground utility lines can be damaged.

A concern of homeowners and communities is finding ways to resolve the problems caused by subsidence. The following are some of the things that can be done to minimize or counteract these problems.

Selection of building site. Avoid sites that have organic or fluid mineral soil layers. Table 17 gives the initial and total subsidence of each soil. The final selection should be based on onsite examination of the soil.

Structure design and minerals. The recommendations of qualified professionals, such as structural engineers, soil engineers, and architects, should be followed. New or innovative construction techniques and materials can minimize some problems. For example, constructing buildings on piers above ground instead of on concrete slabs on the ground can help overcome some problems of subsidence (fig. 9). The possibility of gas accumulating under the slabs and the need for fill material to cover exposed slabs would be eliminated. Small sections of easily moved, unjoined fabricated material or concrete used in the construction of sidewalks, driveways, and patios would eliminate cracking and possibly make releveling after subsidence easier. Other construction material, such as brick, shale,

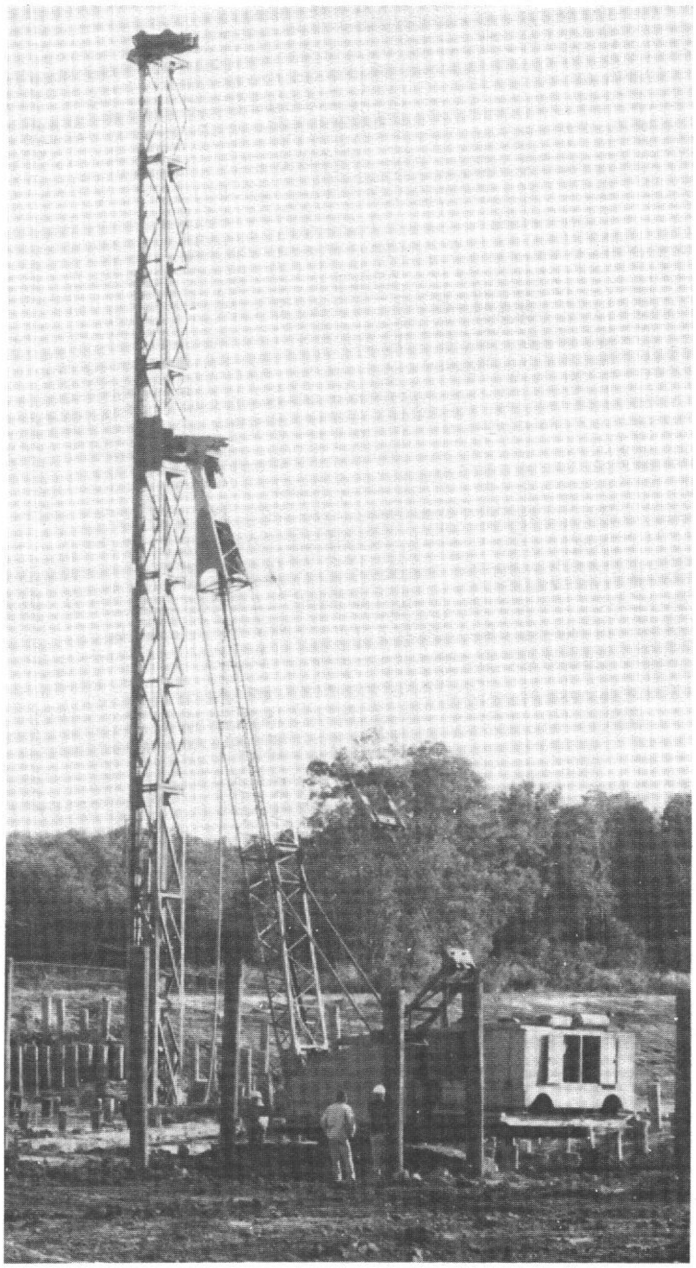


Figure 9.—Wooden pilings driven deep into the soil provide support for the foundations of houses without basements on Harahan clay.

gravel, or lightweight aggregate, could be considered for these uses.

Initial site fill practices. Subsidence can be reduced by the addition of mineral fill material to the organic soil surface. Thin blankets of fill material that do not reach the permanent water table can reduce the rate of subsidence. The amount of reduction is related to the amount of oxygen that is excluded from organic layers and the thickness of organic layers above the water table. If the base of the mineral fill material is within the permanent water table, subsidence caused by oxidation of organic material will be eliminated. Future subsidence, unless the water table is lowered, will be limited to compaction or displacement. Loamy mineral soils are generally considered the most desirable fill material. Fill material high in organic content should be avoided.

Maintenance or continual filling practices. To maintain the esthetic value of homesites, filling is necessary on organic soils. This helps avoid sunken lawns and exposed foundation footings that result from subsidence. If several inches or more of subsidence occurs, additions of small amounts or thin layers of fill is generally preferable over adding thick layers. Regular addition of 1 or 2 inches of fill material as needed generally will not permanently harm most lawn grasses and landscaping plants. If filling is postponed until several inches to a foot or more of fill is required, the thick layers of fill material can permanently damage lawn grasses and landscape plants.

Underground utilities. Engineering innovations that allow movement of utility lines with changes in soil surface elevations should reduce the number of failures of underground utilities. For example, flexible pipes at joints where pipes are connected to stationary structures could be used rather than rigid pipes.

Water level control. Water level or depth to the continuous water table affects the rate of subsidence. Generally, the nearer to the surface that the water table is maintained, the slower the rate of subsidence. Microdifferences in surface elevation that occur in most urban developed areas contribute to uneven water table depths and to differences in rates of subsidence. Precision leveling would help eliminate the differences in water table depth. Also, a carefully designed and constructed drainage system would help to maintain a desirable, uniform water table throughout the level area. In developed, unleveled areas, a system to monitor the level of the water table would provide information needed to determine optimum water table levels.

Site development on organic soils. Generally, site development on organic soils involves first building a levee and a pumping system to lower the water table below the organic layers. Sufficient time (1 to 3 years) is necessary for initial subsidence. The area then could be backfilled, hydrologically or by other methods, with mineral fill material to a desired level to help reduce possible flooding. The mineral fill material would load and compact the organic layers. Then the water table could be raised to a level where the organic layers would be permanently inundated. By keeping the water table above the organic layers, oxygen would be excluded. Under this condition, the organic material would be preserved; therefore, subsidence would be at a minimum, and the soils of the area would be stable for urban use. A few feet of proper mineral fill material would also provide a good environment for utility lines.

Chemical Analyses of Selected Soils

The results of chemical analysis of several typical pedons in the survey area are given in table 18. The data are for soils sampled at carefully selected sites. Most of the pedons are typical of the series and are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the Soil Fertility Laboratory of Louisiana State University.

The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods *(18)*.

Organic carbon—dichromate, ferric sulfate titration (6A1a).

Exchangeable cations—ammonium acetate pH 7.0, uncorrected; calcium (6N2e), magnesium (602d), sodium (6P2b), potassium (6Q2b).

Total acidity—barium chloride-triethanolamine I (6H1a).

Cation-exchange capacity—sum of cations (5A3a).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Reaction (pH)—1:1 water dilution (8C1a).

Aluminum—potassium chloride extraction (6G).

Available phosphorus—Bray 2 extractant (0.03 M NH4F-0.1 M HC1).

Effective cation-exchange capacity—sum of bases plus exchangeable aluminum and hydrogen (5A3b).

Exchangeable sodium percentage—exchangeable sodium divided by the sum casion-exchange capacity.

Aluminum saturation—exchangeable aluminum divided by the effective cation exchange capacity.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(15)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning river, plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is very-fine, montmorillonitic, nonacid, thermic Typic Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (14)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (15)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Allemands Series

The Allemands series consists of level, poorly drained and very poorly drained, organic soils. These soils formed in moderately thick accumulations of decomposed herbaceous material overlying clayey alluvium. They are in freshwater coastal marshes. Unless drained, these soils are ponded and flooded most of the time. Elevations range from about 1 foot above sea level to 5 feet below sea level. Slope is less than 1 percent.

Soils of the Allemands series are clayey, montmorillonitic, euic, thermic Terric Medisaprists.

Allemands soils commonly are near Barbary, Commerce, Harahan, Kenner, Larose, and Sharkey soils. Barbary soils are in swamps and are very fluid, mineral soils. Commerce soils are in former marshes and swamps that are drained. They are firm, mineral soils. Harahan soils are in former swamps and are firm and clayey in the upper part of the subsoil. Kenner and Larose soils are in positions similar to those of Allemands soils. Kenner soils have thin layers of mineral material within the organic material, and Larose soils are very fluid, mineral soils. Sharkey soils are in higher positions than Allemands soils and are firm and clayey throughout.

Typical pedon of Allemands muck; 1.25 miles southeast of Burchell Canal, 300 feet north of Bayou de Sauce, Spanish Land Grant 13, T. 15 S., R. 21 E.

Oa—0 to 24 inches; very dark grayish brown (10YR 3/2) muck; about 50 percent fiber, about 10 percent rubbed; about 50 percent mineral matter; massive; flows easily between fingers when squeezed leaving small residue in hand; common fine roots; slightly acid; clear smooth boundary.

Cg1—24 to 60 inches; dark gray (5Y 4/1) clay; massive; flows easily between fingers when squeezed leaving hand empty; moderately alkaline; clear wavy boundary.

Cg2—60 to 72 inches; gray (5Y 5/1) clay; massive; flows easily between fingers when squeezed leaving hand empty; moderately alkaline; clear wavy boundary.

Cg3—72 to 84 inches; gray (5Y 5/1) clay; massive; flows with difficulty between fingers leaving large residue in hand; moderately alkaline.

Thickness of the organic material ranges from 16 to 51 inches. The mineral underlying material is dominantly clay, but thin strata of loamy material are in some pedons.

The surface tier, 0 to 12 inches, has hue of 10YR or 7.5YR, value of 2 to 4, and chroma of 1 to 3. The content of rubbed fiber ranges from 5 to 30 percent. Reaction ranges from strongly acid to mildly alkaline in undrained pedons and from extremely acid to slightly acid in pedons that have been drained. Some pedons have a thin overwash of clay.

The organic material in the subsurface tier, 12 to 36 inches, and bottom tier, 36 to 51 inches, has hue of 10YR or 7.5YR, value of 2 to 4, and chroma of 1 to 3. The content of rubbed fiber ranges from 1 to 10 percent. Reaction ranges from slightly acid to moderately alkaline in undrained pedons. In drained pedons, it ranges from very strongly acid to neutral.

The Cg horizon has hue of 10YR, 5Y, 5G, or 5GY, value of 4 or 5, and chroma of 1 or 2. It is clay, mucky clay, silty clay, or silty clay loam. Reaction ranges from slightly acid to moderately alkaline in undrained pedons. In drained pedons, it ranges from very strongly acid to slightly acid in that part of the Cg horizon above a depth of 40 inches and from slightly acid to moderately alkaline below a depth of 40 inches.

Barbary Series

The Barbary series consists of level, very poorly drained, very fluid, mineral soils that are very slowly permeable. These soils formed in clayey alluvium. They are in swamps that are ponded and flooded most of the time. Elevations range from sea level to about 2 feet above sea level. Slope is less than 1 percent.

Soils of the Barbary series are very-fine, montmorillonitic, nonacid, thermic Typic Hydraquents.

Barbary soils are similar to Larose soils and commonly are near Allemands, Commerce, Fausse, Kenner, and Sharkey soils. Allemands, Larose, and Kenner soils are in freshwater marshes. Allemands and Kenner soils are organic soils. Larose soils do not have logs or woody fragments in their profile. Commerce soils are in higher positions than Barbary soils and are fine-silty. Fausse and Sharkey soils are in higher positions than Barbary soils and are firm, mineral soils.

Typical pedon of Barbary muck; 2,000 feet south of Highway 18, 1,000 feet west of the St. Charles Canal, 3,000 feet north of Louisiana Highway 90, Spanish Land Grant 68, T.13 S., R. 8 E.

Oa—0 to 5 inches; dark brown (7.5YR 3/2) muck; massive; about 60 percent organic matter; mildly alkaline; clear smooth boundary.

A—5 to 15 inches; gray (5Y 5/1) clay; common medium distinct brown (7.5YR 4/4) mottles; massive; very fluid, flows easily through fingers when squeezed leaving small residue in hand; about 20 percent organic matter; mildly alkaline; clear smooth boundary.

Cg1—15 to 50 inches; greenish gray (5BG 5/1) clay; common medium distinct reddish brown (5YR 4/4) mottles; massive; very fluid, flows easily through fingers when squeezed leaving small residue in hand; about 5 percent organic matter; moderately alkaline; clear smooth boundary.

Cg2—50 to 62 inches; gray (5Y 5/1) clay; massive; very fluid, flows easily through fingers when squeezed leaving hand empty; about 5 percent organic matter; few small to large fragments of wood; moderately alkaline; clear smooth boundary.

Cg3—62 to 70 inches; gray (5Y 5/1) clay; common medium faint olive gray (5Y 5/2) mottles and common medium distinct reddish yellow (5YR 6/6) mottles; massive; very fluid, flows easily through fingers when squeezed leaving small residue in hand; about 5 percent organic matter; few small to large fragments of wood; moderately alkaline; clear smooth boundary.

Cg4—70 to 84 inches; greenish gray (5BG 5/1) clay; common medium faint olive gray (5Y 5/2) mottles and common medium distinct reddish yellow (5YR 6/6) mottles; massive; very fluid, flows easily through fingers when squeezed leaving small residue in hand; about 5 percent organic matter; few small to large fragments of wood; moderately alkaline.

The *n* values are greater than 0.7 in all horizons to a depth of 40 inches or more. Though not diagnostic, organic horizons containing logs, stumps, and wood fragments are common below a depth of 50 inches.

The 0a horizon has hue of 10YR, 7.5YR, or 5YR, value of 2 or 3, and chroma of 1 or 2. It is 2 to 8 inches thick and ranges from slightly acid to mildly alkaline.

The A horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 to 5, and chroma of 1 or 2. It is 2 to 10 inches thick and ranges from neutral to mildly alkaline. Typically the A horizon is very fluid clay or mucky clay.

The Cg horizon has hue of 10YR, 2.5Y, 5BG, or 5Y, value of 4 or 5, and chroma of 1, or it is neutral and has value of 4 or 5. It is very fluid clay or mucky clay and ranges from neutral to moderately alkaline.

Commerce Series

The Commerce series consists of level and gently undulating, somewhat poorly drained mineral soils that are moderately slowly permeable and firm. These soils formed in loamy alluvium. They are in high and intermediate positions on natural levees and deltaic fans of the Mississippi River and its distributaries. Slope ranges from 0 to 3 percent.

Soils of the Commerce series are fine-silty, mixed, nonacid, thermic Aeric Fluvaquents.

Commerce soils commonly are near Allemands, Convent, Fausse, Harahan, Sharkey, and Vacherie soils. Allemands, Fausse, Harahan, and Sharkey soils are in lower positions than Commerce soils. Allemands soils are organic soils, and Fausse, Harahan, and Sharkey soils are clayey throughout. Convent and Vacherie soils are in positions similar to those of Commerce soils. Convent soils are coarse-silty, and Vacherie soils have a loamy surface layer and subsoil and clayey underlying material.

Typical pedon of Commerce silt loam; 1.5 miles west of Luling, 550 feet south of Louisiana Highway 18, Spanish Land Grant 1, T. 13 S., R. 20 E.

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint brown mottles; weak medium subangular blocky structure; friable; many fine roots; many fine random discontinuous tubular pores; medium acid; clear smooth boundary.

Bw—11 to 17 inches; dark grayish brown (10YR 4/2) silt loam; common medium faint brown (10YR 4/3) mottles; moderate medium subangular blocky structure; friable; many fine roots; many fine random discontinuous tubular pores; neutral; clear smooth boundary.

BC—17 to 24 inches; grayish brown (10YR 5/2) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine random discontinous tubular pores; mildly alkaline; clear smooth boundary.

C1—24 to 32 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark yellowish brown (10YR 4/6) mottles and common fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; few fine random discontinuous tubular pores; mildly alkaline; clear smooth boundary.

C2—32 to 60 inches; grayish brown (10YR 5/2) silt loam; few medium distinct dark yellowish brown (10YR 4/6) mottles; massive; friable; mildly alkaline.

Thickness of the solum ranges from 20 to 45 inches.

The A or Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 3. It is silt loam, very fine sandy loam, or silty clay loam. The thickness ranges from 4 to 12 inches. Reaction ranges from medium acid to moderately alkaline.

The B and BC horizons have hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. Texture is silt loam, loam, or silty clay loam. Reaction ranges from slightly acid to moderately alkaline.

Some pedons have a buried A horizon. This horizon has colors and textures similar to the A or Ap horizon and ranges in reaction from neutral to moderately alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is silt loam, silty clay loam, loam, or very fine sandy loam and commonly is stratified. In some pedons, thin layers of silty clay are in this horizon. Reaction ranges from neutral to moderately alkaline.

The Commerce soils in Commerce-Harahan-Allemands complex, drained, are taxadjuncts to Commerce soils because the surface layer is black and contains more organic matter than is typical for the series.

Convent Series

The Convent series consists of level and gently undulating, somewhat poorly drained mineral soils that are moderately permeable and firm. These soils formed in loamy alluvium. They are on the highest parts of natural levees along the Mississippi River and its distributaries. Slopes range from 0 to 3 percent.

Soils of the Convent series are coarse-silty, mixed, nonacid, thermic Aeric Fluvaquents.

Convent soils commonly are near Commerce, Sharkey, and Vacherie soils. Commerce and Vacherie soils are in positions similar to those of the Convent soils, and Sharkey soils are in lower positions.

Commerce soils are fine-silty, and Sharkey soils are clayey throughout. Vacherie soils have a loamy surface layer and subsoil and a clayey underlying material.

Typical pedon of Convent silt loam, in an area of Convent and Commerce soils, frequently flooded; 2,000 feet north of Highway 61, 2,500 feet west of Lower Guide Levee for Bonnet Carre Floodway, Spanish Land Grant 21, T. 12 S., R. 8 E.

A1—0 to 6 inches; brown (10YR 5/3) silt loam; weak thin platy structure; friable; many fine roots, many fine random discontinuous tubular pores; mildly alkaline; clear smooth boundary.

A2—6 to 13 inches; brown (10YR 5/3) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak thin platy structure; friable; many fine roots; many fine random discontinuous tubular pores; mildly alkaline; clear smooth boundary.

C1—13 to 19 inches; grayish brown (10YR 5/2) silt loam; few fine faint brown mottles and few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; many fine roots; few fine pores; mildly alkaline; clear smooth boundary.

C2—19 to 30 inches; grayish brown (10YR 5/2) silt loam; few fine distinct yellowish brown (10YR 5/6) and very pale brown (10YR 7/3) mottles, common medium distinct strong brown (7.5YR 5/6) mottles, and common medium prominent yellowish red (5YR 4/6) mottles; massive; friable; few fine roots; few fine pores; moderately alkaline; clear smooth boundary.

C3—30 to 42 inches; grayish brown (10YR 5/2) silt loam; common medium distinct strong brown (7.5YR 5/8) mottles and common medium prominent yellowish red (5YR 4/6) mottles; massive; friable; moderately alkaline; clear smooth boundary.

C4—42 to 48 inches; grayish brown (10YR 5/2) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; moderately alkaline; clear smooth boundary.

C5—48 to 52 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark brown (7.5YR 4/4) mottles; massive; friable; moderately alkaline, clear smooth boundary.

C6—52 to 60 inches; grayish brown (10YR 5/2) silt loam, common medium distinct strong brown (7.5YR 5/6) mottles and common medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; moderately alkaline.

The A horizon has hue of 10YR, value of 4 or 5, and a chroma of 2 or 3. It is silt loam, very fine sandy loam, or fine sandy loam and ranges in thickness from 4 to 18 inches. Reaction ranges from medium acid to moderately alkaline.

The C horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2. It is silt loam or very fine sandy loam. Some pedons have hue of 10YR, value of 3, 4, or 6, and chroma of 3; hue of 7.5YR, value of 4, and chroma of 2 or 4; or hue of 5YR, value of 4, and chroma of 2. Thin layers of finer or coarser material are in some pedons, and some pedons have carbonates in some horizons below a depth of 20 inches. Reaction ranges from slightly acid to moderately alkaline.

Fausse Series

The Fausse series consists of very poorly drained, very slowly permeable soils that formed in clayey alluvium. These soils are in low, ponded backswamp areas. Slope is less than 1 percent.

Soils of the Fausse series are very-fine, montmorillonitic, nonacid, thermic Typic Fluvaquents.

Fausse soils commonly are near Barbary, Commerce, and Sharkey soils. The very poorly drained Barbary soils are in swamps at lower elevations than Fausse soils and are dominantly very fluid clay throughout. The somewhat poorly drained Commerce soils and the poorly drained Sharkey soils are in higher positions than Fausse soils. Commerce soils are fine-silty. Sharkey soils are clayey and crack to a depth of 20 inches during dry periods in most years.

Typical pedon of Fausse clay; 1 mile southwest at Kilona, 0.4 mile south of Highway 90, 150 feet east of Mary's Canal, Spanish Land Grant 77, T. 12 S., R. 19 E.

A—0 to 4 inches; dark gray (10YR 4/1) clay; weak coarse subangular blocky structure; firm, very sticky; common roots; medium acid; clear wavy boundary.

Bg1—4 to 19 inches; gray (10YR 5/1) clay; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm, very sticky; common fine to coarse roots; slightly acid; clear wavy boundary.

Bg2—19 to 50 inches; greenish gray (5GY 5/1) clay; common medium prominent dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky structure; firm, very sticky; mildly alkaline; clear wavy boundary.

Cg—50 to 75 inches; greenish gray (5BG 5/1) clay; massive; firm, very sticky; moderately alkaline.

Thickness of the solum ranges from 20 to 50 inches. The soil is saturated or above field capacity continuously in all layers below a depth of 24 inches in most years. COLE values range from 0.09 to 0.18 in all mineral layers. The *n* values are typically 0.7 or less throughout, but thin layers that have *n* values of more than 0.7 are in some pedons. Cracks do not form to a depth of 20 inches below the soil surface in most years.

Some pedons have an O horizon of muck on the surface. The O horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2, or hue of 10YR, value of 4 and chroma of 1. Reaction ranges from medium acid to neutral.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2; hue of 5Y, value of 4, and chroma of 1; or it is neutral and has value of 4. Thickness of the A horizon is less than 10 inches where the color is very dark gray or very dark grayish brown. Reaction ranges from medium acid to neutral.

The Bg horizon has hue of 10YR, 5Y, or 5GY, value of 4 or 5, and chroma of 1; or it is neutral and has value of 4 or 5. Reaction ranges from slightly acid to moderately alkaline.

The Cg horizon has hue of 5Y, 5GY, or 5BG, value of 4 or 5, and chroma of 1, or it is neutral and has value of 5. Reaction ranges from neutral to moderately alkaline. Texture is clay or silty clay.

Harahan Series

The Harahan series consists of level, poorly drained, very slowly permeable soils. These soils formed in clayey alluvium. They are firm in the upper part and very fluid in the lower part. Harahan soils are in former swamps that are drained and protected from most flooding. Elevation ranges from about 1 foot above sea level to about 2 feet below sea level. Slope is less than 1 percent.

Soils of the Harahan series are very-fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts.

Harahan soils commonly are near Allemands, Barbary, Commerce, and Sharkey soils. Allemands soils are in slightly lower positions than Harahan soils in former marshes and are organic soils. Barbary soils are in undrained swamps and have an *n* value that is more than than 0.7 between a depth of 8 and 20 inches. Commerce and Sharkey soils are in higher positions than the Harahan soils. Commerce soils are fine-silty, and Sharkey soils have an *n* value that is less than 0.7 throughout.

Typical pedon of Harahan clay; 1.25 miles east southeast of Antioch Church in Des Allemands, 500 feet south of Canal No. 18, Spanish Land Grant 38, T. 14 S., R. 20 E.

Ap—0 to 12 inches; very dark gray (10YR 3/1) clay; common fine distinct yellowish brown (10YR 5/8) mottles; thin strata of gray (10YR 5/1) clay at a depth of 11 inches; massive; firm; strongly acid; clear wavy boundary.

Oab—12 to 16 inches; black (10YR 2/1) muck, same color pressed and rubbed; about 20 percent fiber, less than 10 percent rubbed; massive; very friable; 60 percent mineral; mildly alkaline; abrupt smooth boundary.

Bg—16 to 30 inches; grayish brown (2.5Y 5/2) clay; fine medium distinct olive (5Y 5/6) mottles; weak medium subangular blocky structure; firm; neutral; clear smooth boundary.

Cg1—30 to 65 inches; grayish brown (2.5Y 5/2) clay; few medium distinct olive (5Y 5/6) mottles; massive; flows easily between fingers when squeezed leaving hand empty; common medium prominent dark brown (7.5YR 4/4) wood fragments in lower part; mildly alkaline; clear smooth boundary.

Cg2—65 to 84 inches; greenish gray (5BG 5/1) clay; few medium prominent dark brown (7.5YR 4/4) mottles; massive; flows easily between fingers when squeezed leaving hand empty; neutral.

Thickness of the solum ranges from 20 to 40 inches. Depth to layers that have *n* values of more than 0.7 ranges from 20 to 40 inches.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2, or it is neutral and has value of 2 to 4. It is 3 to 12 inches thick, and reaction ranges from strongly acid to mildly alkaline.

The Oab horizon, if present, has the same range in colors and reaction as the A horizon. It ranges in thickness from 2 to 7 inches.

The Bg horizon has hue of 10YR, 2.5Y, 5Y, 5GY, or 5BG, value of 3 to 5, chroma of 1 or 2, or it is neutral and has value of 3 to 5. It is clay or silty clay. Reaction ranges from strongly acid to mildly alkaline.

The Cg horizon has hue of 10YR, 2.5Y, 5Y, 5BG, or 5G, value of 2 to 5, chroma of 1 or 2, or it is neutral and has value of 2 to 5. It is very fluid or fluid clay, silty clay, or mucky clay. Reaction ranges from neutral to moderately alkaline. In some pedons, the Cg horizon is silty clay loam below a depth of 40 inches.

Kenner Series

The Kenner series consists of level, very poorly drained organic soils. These soils are very slowly permeable in the mineral layers and rapidly permeable in the organic layers. They formed in herbaceous plant materials stratified with clayey alluvium. These soils are in freshwater marshes and are ponded and flooded most of the time. Elevations range from about sea level to 1 foot above sea level. Slope is less than 1 percent.

Soils of the Kenner series are euic, thermic Fluvaquentic Medisaprists.

Kenner soils commonly are near Allemands, Barbary, and Larose soils. The very poorly drained Allemands and Larose soils are in positions similar to the Kenner soils. Allemands soils do not have thin mineral layers in the upper part of the profile. Larose soils are very fluid and mineral throughout. The very poorly drained Barbary soils are in nearby swamps and are very fluid, mineral soils.

Typical pedon of Kenner muck; 1,000 feet west of a drill hole on Couba Island, 2,000 feet north of Lake Salvador, Spanish Land Grant 6, T. 15 S., R. 23 E.

Oa1—0 to 10 inches; very dark gray (10YR 3/1) muck; about 30 percent fiber unrubbed, about 5 percent fiber rubbed; about 60 percent mineral; massive; flows easily between fingers when squeezed leaving small residue in hand; common fine roots; slightly acid; clear smooth boundary.

Oa2—10 to 21 inches; black (10YR 2/1) muck; about 12 percent fiber unrubbed, about 2 percent fiber rubbed; about 60 percent mineral; massive; flows easily between fingers when squeezed leaving hand empty; common fine roots; midlly alkaline; clear smooth boundary.

Cg—21 to 23 inches; gray (5Y 5/1) clay; massive; flows easily between fingers when squeezed leaving hand empty; mildly alkaline; abrupt smooth boundary.

O'a—23 to 78 inches; black (10YR 2/1) muck; about 12 percent fiber unrubbed, about 2 percent fiber rubbed; about 60 percent mineral; massive; flows easily between fingers when squeezed leaving hand empty; mildly alkaline; abrupt smooth boundary.

C'g—78 to 84 inches; very dark gray (10YR 3/1) clay; massive; flows easily between fingers when squeezed leaving hand empty; mildly alkaline.

Thickness of the organic material that has thin mineral layers ranges from 51 to over 100 inches. Soil reaction ranges from medium acid to mildly alkaline throughout.

The organic material in the surface tier, 0 to 12 inches, has hue of 10YR, value of 2 or 3, and chroma of 1; hue of 10YR, value of 4, and chroma of 3; or hue of 10YR or 7.5YR, value of 3, and chroma of 2. The content of rubbed fiber ranges from 5 to 60 percent.

The organic material in the subsurface tier, 12 to 36 inches, has hue of 10YR, value of 2, and chroma of 1 or 2; hue of 10YR, value of 3, and chroma of 1 to 3; or hue of 7.5YR, value of 3, and chroma of 2. The content of rubbed fiber ranges from 1 to 8 percent.

The organic materiai in the bottom tier, 36 to 51 inches, has the same range in colors as the subsurface tier, or it has hue of 5YR. The percent fiber after rubbing has the same range as the subsurface tier.

The Cg horizon has hue of 5Y, 5GY, 5BG, 2.5Y, or 10YR, value of 4 or 5, and chroma of 1, or it is neutral and has value of 4 or 5. In some pedons, the Cg horizon has hue of 5Y, value 5 or 6, and chroma of 2. Texture is clay, silty clay, or mucky clay.

Lafitte Series

The Lafitte series consists of very poorly drained, moderately rapidly permeable, saline organic soils. These soils formed in decomposed herbaceous plant material. They are in brackish marshes. These soils are ponded or almost continuously flooded. Elevation ranges from sea level to about 1 foot above sea level. Slope is less than 1 percent.

Soils of the Lafitte series are euic, thermic Typic Medisaprists.

Lafitte soils commonly are near Allemands, Barbary, Kenner, and Larose soils. Allemands, Kenner, and Larose soils are in freshwater marshes and are not as saline as Lafitte soils. Barbary soils are in swamps and are very fluid, mineral soils.

Typical pedon of Lafitte muck; 500 feet south of Lake Pontchartrain, 1.8 miles east of Bayou Piquant, 1,000 feet west of Duncan Canal, Spanish Land Grant 40, T. 11 S., R. 9 E.

Oa1—0 to 10 inches; very dark grayish brown (10YR 3/2) muck; about 20 percent fiber, 5 percent rubbed; massive; flows easily between fingers when squeezed leaving hand empty; about 60 percent mineral; moderately alkaline; gradual smooth boundary.

Oa2—10 to 48 inches; black (10YR 2/1) muck; about 20 percent fiber, 1 percent rubbed; massive; flows easily between fingers when squeezed leaving hand empty; about 40 percent mineral; moderately alkaline; gradual smooth boundary.

Oa3—48 to 84 inches; very dark brown (10YR 2/2) muck; about 20 percent fiber, 1 percent rubbed; massive; flows easily between fingers when squeezed leaving hand empty; about 40 percent mineral; moderately alkaline.

Depth to mineral layers ranges from 51 inches to over 100 inches. The soil is mildly alkaline or moderately alkaline throughout. Salinity is moderate or high in some or all layers of the subsurface and bottom tiers.

The surface tier, 0 to 12 inches, has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; hue of 7.5YR, value of 3, and chroma of 2; or hue of 10YR, value of 4, and chroma of 1 or 3. The content of rubbed fiber ranges from 1 to 35 percent.

The subsurface tier, 12 to 36 inches, and bottom tier, 36 to 51 inches, and all layers between a depth of 51 and 84 inches have hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or they have hue of 7.5YR, value of 3, and chroma of 2. The content of rubbed fiber ranges from 1 to 10 percent.

Larose Series

The Larose series consists of level, very poorly drained, mineral soils that are very slowly permeable and very fluid. They formed in thin deposits of decomposed herbaceous material over clayey alluvium. These soils are in freshwater marshes and are ponded and flooded most of the time. Slopes are less than 1 percent.

Soils of the Larose series are very-fine, montmorillonitic, nonacid, thermic Typic Hydraquents.

Larose soils commonly are near Allemands, Barbary, Fausse, and Kenner soils. Allemands and Kenner soils are in positions similar to those of the Larose soils and have an organic surface layer that is more than 16 inches thick. Barbary soils are in swamps and have stumps and logs in their profile. Fausse soils are in slightly higher positions than Larose soils and have a B horizon that has an *n* value of less than 0.7.

Typical pedon of Larose muck in an area of Allemands-Larose association; 350 feet east of Paradis Canal, 5,400 feet north of the intersection of Highway 90 and Paradis Canal, Spanish Land Grant 117, T. 13 S., R. 20 E.

Oa—0 to 3 inches; black (10YR 2/1) muck; massive; flows easily between fingers when squeezed leaving only roots and fiber in hand; about 65 percent mineral; about 15 percent fiber, less than 1 percent rubbed; many fine roots; neutral; clear smooth boundary.

Ag—3 to 10 inches; black (N 2/0) clay; massive; flows easily between fingers when squeezed leaving hand empty; many fine roots; mildly alkaline; clear smooth boundary.

Cg1—10 to 30 inches; gray (N 5/0) clay; massive, flows easily between fingers when squeezed leaving hand empty; many fine roots; mildly alkaline; clear smooth boundary.

Cg2—30 to 49 inches; gray (N 5/0) clay; common fine distinct yellowish brown (10YR 5/6) mottles; massive, flows easily between fingers when squeezed leaving hand empty; few fine roots; mildly alkaline; clear smooth boundary.

Cg3—49 to 65 inches; gray (N 6/0) clay; massive; flows easily between fingers when squeezed leaving hand empty; few fine roots, mildly alkaline; clear smooth boundary.

Cg4—65 to 84 inches; gray (5Y 5/1) clay; massive; flows easily between fingers when squeezed leaving hand empty; mildly alkaline.

The soils are continuously saturated with fresh water. The mineral horizons above a depth of 60 inches have an *n* value of 1 or more. The soils range from medium acid to mildly alkaline in the Oa horizon and from slightly acid to moderately alkaline in the Cg horizon.

The Oa horizon has a hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is 2 to 15 inches thick.

The Ag horizon has hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 or 2; or it is neutral and has value of 2 to 4. It is 4 to 12 inches thick. Texture is clay, silty clay, or mucky clay.

The Cg horizon has hue of 10YR to 5BG, value of 3 to 5, and chroma of 1 or 2; or it is neutral and has value of 3 to 5. Texture is clay, silty clay, or mucky clay.

Maurepas Series

The Maurepas series consists of very poorly drained and poorly drained soils that have formed in decomposed organic material consisting mainly of woody fibers that are underlain by clayey alluvium. These soils are in low, broad, ponded backwater swamps. Slope is less than 1 percent.

Soils of the Maurepas series are euic, thermic Typic Medisaprists.

Maurepas soils commonly are near Allemands, Barbary, and Kenner soils. Allemands and Kenner soils are in freshwater marshes. Allemands soils have an organic surface layer less than 51 inches thick. Kenner soils have organic layers more than 51 inches thick, and they do not contain wood fragments. Barbary soils are in backwater swamps and are clayey, very fluid, mineral soils.

Typical pedon of Maurepas muck; 1 mile north of Baie Des Deux Chenes, 1 mile west of Lac Des Allemands, and 100 feet east of the Providence Canal, sec. 34, T. 14 S., R. 19 E.

Oa1—0 to 10 inches; very dark gray (10YR 3/1) muck, same color pressed or rubbed; massive; about 10 percent fiber, 2 percent rubbed; about 40 percent herbaceous fiber, the remainder woody; 40 percent mineral matter; common wood fragments; moderately alkaline; clear smooth boundary.

Oa2—10 to 70 inches; dark reddish brown (5YR 3/2) muck, same color pressed or rubbed; massive; about 15 percent fiber, 0 percent rubbed; about 60 percent herbaceous fiber, the remainder woody; 40 percent mineral matter; common wood fragments and logs; moderately alkaline; clear smooth boundary.

2Cg—70 to 84 inches; gray (N 5/0) clay; few fine faint gray mottles; massive, flows easily between fingers when squeezed leaving hand empty; moderately alkaline.

Thickness of the organic material ranges from 51 to 90 inches or more. Soil reaction ranges from medium acid to moderately alkaline throughout. Drained and protected pedons range from extremely acid to strongly acid in the surface tier. Salinity is none or slight in more than half of the subsurface and bottom tiers.

The surface tier, 0 to 12 inches, has hue of 5YR, 7.5YR, or 10YR, value of 1 to 3, and chroma of 2; or it is neutral and has value of 1 to 3. The content of rubbed fiber ranges from 2 to 40 percent.

The subsurface tier, 12 to 36 inches, and bottom tier, 36 to 51 inches, have hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, and chroma of 1 to 4; or they are neutral and have value of 2 or 3. The subsurface tier contains as much as 60 percent fiber undisturbed, but less than 10 percent after rubbing. The bottom tier typically has less than 10 percent fiber after rubbing.

Fibers are dominantly woody, but some pedons have as much as 45 percent herbaceous fiber in the 0- to 51-inch control section. The organic layers contain 15 to 45 percent mineral matter. Logs, dominantly cypress, and wood fragments are common throughout the organic material. The organic layers are typically underlain by very fluid gray clay or mucky clay at a depth of from 51 to 90 inches.

Sharkey Series

The Sharkey series consists of level, poorly drained, mineral soils that are very slowly permeable and firm. These soils formed in clayey alluvium. They are in intermediate and low positions on natural levees of the Mississippi River and its distributaries. Slope is less than 1 percent.

Soils of the Sharkey series are very-fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts.

Sharkey soils are near Barbary, Commerce, Fausse, and Vacherie soils. The very poorly drained Barbary soils are in ponded backswamps and have an *n* value of more than 0.7. The somewhat poorly drained Commerce soils are in slightly higher positions than Sharkey soils and are fine-silty. The very poorly drained Fausse soils are in lower positions than Sharkey soils. They remain wet throughout the year and do not crack to a depth of 20 inches. The somewhat poorly drained Vacherie soils are in positions similar to those of the Sharkey soils and are coarse-silty over clayey.

Typical pedon of Sharkey clay; 0.25 miles south of Illinois Central Gulf railroad, 2,000 feet north of Highway 48, 150 feet east of a road, Spanish Land Grant 41, T. 13 S., R. 9 E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) clay; common medium faint dark brown (10YR 4/3) mottles; moderate medium subangular blocky structure; very firm; many fine roots; slightly acid; clear smooth boundary.

Bg1—4 to 12 inches; gray (10YR 5/1) clay; common medium faint dark brown (10YR 4/3) mottles; moderate medium subangular blocky structure; very firm; many fine roots; few fine random discontinuous tubular pores; medium acid; clear smooth boundary.

Bg2—12 to 22 inches; gray (10YR 5/1) clay; common medium distinct dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; very firm; many fine roots; few fine random discontinuous tubular pores; medium acid; gradual smooth boundary.

BCg—22 to 41 inches; gray (10YR 5/1) clay; common medium distinct dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; very firm; many fine roots; few fine random discontinuous tubular pores; medium acid; clear smooth boundary.

Cg—41 to 60 inches; gray (5Y 5/1) clay; common coarse distinct dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; very firm; many fine roots; few fine random discontinuous tubular pores; neutral.

Thickness of the solum ranges from 36 to 60 inches. Cracks, 1/2 inch to 2 inches wide, develop to a depth of 20 inches or more during dry periods of most years.

The A or Ap horizon has hue of 10YR, value of 2, and chroma of 1, or hue of 10YR, value of 3 or 4, and chroma of 1 or 2. It is clay or silty clay loam and ranges in thickness from 4 to 15 inches. Reaction ranges from strongly acid to moderately alkaline.

The Bg and BCg horizons have hue of 10YR, value of 4, 5, or 6, and chroma of 1; hue of 5Y, value of 4 or 5, and chroma of 1 or 2; or they are neutral and have value of 4 or 5. Reaction ranges from medium acid to moderately alkaline. Some pedons have thin silty clay loam or silt loam B subhorizons. Other pedons have a clayey, buried A horizon below a depth of 20 inches.

The Cg horizon has the same range in colors as the Bg horizon. It is clay or silty clay. Reaction ranges from neutral to moderately alkaline.

Vacherie Series

The Vacherie series consists of gently undulating, somewhat poorly drained, very slowly permeable soils. These soils formed in loamy alluvium over clayey alluvium. They are in intermediate positions on the natural levees of the Mississippi River and its distributaries. These soils are subject to frequent flooding. Elevations range from 1 foot to 8 feet above sea level. Slope ranges from 0 to 3 percent.

Soils of the Vacherie series are coarse-silty over clayey, mixed, nonacid, thermic Aeric Fluvaquents.

Vacherie soils are similar to Convent soils and commonly are near Commerce, Fausse, and Sharkey soils. Commerce and Convent soils are in positions similar to those of Vacherie soils, but they are loamy throughout. Fausse and Sharkey soils are in lower positions than Vacherie soils and are clayey throughout.

Typical pedon of Vacherie silt loam, frequently flooded; 1.9 miles southeast of Luling, 240 feet south of Willow Ridge Estate Road, 740 feet east of Highway 90, Spanish Land Grant 27, T. 13 S., R. 21 E.

A—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint brown mottles; weak fine platy structure; few fine roots; mildly alkaline; clear smooth boundary.

B—4 to 26 inches; grayish brown (10YR 5/2) silt loam; common fine faint dark gray and yellowish brown mottles; weak medium subangular blocky structure; fine roots; neutral; clear smooth boundary.

2Agb—26 to 32 inches; dark gray (N 4/0) clay; moderate medium subangular blocky structure; firm and very sticky; few fine random discontinuous tubular pores; neutral; gradual smooth boundary.

2Bgb1—32 to 38 inches; dark gray (10YR 4/1) clay; moderate medium subangular blocky structure; very sticky; few fine random discontinuous tubular pores; neutral; gradual smooth boundary.

2Bgb2—38 to 48 inches; dark gray (10YR 4/1) clay; common coarse faint gray (5Y 5/1) mottles; moderate medium subangular blocky structure; very sticky; neutral; gradual smooth boundary.

2Bgb3—48 to 60 inches; dark gray (N 4/0) clay; common coarse faint gray (5Y 5/1) mottles; common coarse distinct brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; very sticky; moderately alkaline.

Thickness of the silty upper part of the solum ranges from 15 to 36 inches. This silty material is underlain by clay material.

The A horizon has hue of 10YR, value of 4, and chroma of 1 to 3, or hue of 10YR, value of 5, and chroma of 2. It is 4 to 10 inches thick. Reaction ranges from medium acid to moderately alkaline.

The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2. It is silt loam or very fine sandy loam. Reaction ranges from slightly acid to moderately alkaline.

The 2Agb and 2Bgb horizons have hue of 10YR, value of 4 or 5, and chroma of 1, or they are neutral and have value of 4, or they have hue of 5Y, value of 5, and chroma of 1. These horizons are clay or silty clay. Reaction ranges from neutral to moderately alkaline.

Formation of the Soils

Bobby J. Miller, Department of Agronomy, Agricultural Experiment Station, Louisiana State University, prepared this section.

This section explains the processes and factors of soil formation and relates them to the soils in the survey area.

Factors of Soil Formation

Soils are natural, three-dimensional bodies that formed on the earth's surface. They have properties resulting from the integrated effect of climate and living matter acting on parent material as conditioned by relief over periods of time.

The interaction of five main factors influences the processes of soil formation and results in differences among the soils. These factors are the climate under which the soil material has accumulated, the physical and chemical composition of the parent material, the kind of plants and other organisms living in and on the soil, the relief of the land and its effect on runoff and soil temperature and moisture conditions, and the length of time it took the soil to form.

The effect of any one factor can differ from place to place, but the interaction of all the factors determines the kind of soil that forms. Many of the differences in soils cannot be attributed to differences in the effects of only one factor. For example, the organic matter content in the soils of St. Charles Parish is influenced by several factors including relief, parent material, and living organisms. The following paragraphs describe the factors of soil formation as they relate to soils in the survey area.

Climate

St. Charles Parish has the subtropical, humid climate that is characteristic of areas near the Gulf of Mexico. The warm, moist climate has promoted rapid soil formation. Climate is uniform throughout the parish, although its effect is modified locally by relief. The minor climate differences within the parish are not considered significant enough to create soil differences. Detailed information about climate is given in the section "General nature of the parish."

Living Organisms

Living organisms, including plants, bacteria, fungi, and animals, are important in the formation of soils. Among the chemical and physical changes they cause are gains in content of plant nutrients and changes in structure and porosity. Plant roots force openings into the soil and modify porosity. As they grow, they break up and rearrange the soil particles. Plants transfer nutrients from the subsoil to the surface layer, and when they die, plant tissue supplies organic matter to the soil. Bacteria and other micro-organisms decompose organic matter and help improve the physical condition of the soil. Animals, such as crawfish and earthworms, also influence soil formation by mixing the soil. When animals die, they too decompose and enrich the soil with organic matter and nutrients.

Man's activities, such as cultivating, fertilizing, channel constructing, harvesting, burning, draining, diking, flooding, and land smoothing, affect the soil. Some soils of St. Charles Parish have been changed significantly by man's activities. Examples include the drained areas of the Allemands and Maurepas soils. The native vegetation and the associated complex communities of bacteria and fungi generally have had a greater influence on soil formation in this parish than other living organisms.

The soils of the natural levees along streams formed under bottom land hardwood forest vegetation.

The soils of the marsh formed under grass and sedge vegetation *(10)*. The thick layers of organic material of Kenner soils accumulated in fresh water. As the land surface subsided, the area was flooded with fresh water from rains and runoff. Maidencane, alligatorweed, bulltongue, cattail, and southern wildrice were some of the freshwater marsh plants that formed the organic material. The buildup of organic material kept pace with subsidence. However, further land subsidence and sea level rise introduced seawater over the area *(9)*. With the change in salinity, brackish marsh vegetation was established, namely, marshhay cordgrass, coastal waterhyssop, dwarf spikerush, and Olney bulrush. The Lafitte soils formed in the organic material accumulated in areas that are now brackish.

Parent Material

Parent material is the initial material from which soil forms. It determines the chemical and mineralogical composition of the soils. It also influences the degree of leaching, the kind and color of the surface and subsoil layers, and the reaction, texture, permeability, and drainage. Textural differences in parent material are accompanied by differences in chemical and mineral composition. In general, soils that form in loamy and sandy parent material have a lower capacity to hold nutrients than those that form in clay.

Soils in St. Charles Parish formed in alluvial and marine sediment and accumulations of organic material.

The alluvium is from distributary streams of present and former deltas of the Mississippi River *(12)*. Bordering the stream channels are low ridges called natural levees. These levees are highest next to the channels and slope gradually away from them. The levees are shaped by waters that overspread the streambanks *(11)*. When the water slows, it first drops sand, then silt, and finally clay particles. Thus, the soils on the higher parts of natural levees formed in loamy material that has a moderate sand content. These soils are generally lighter colored, more permeable, and better drained than the soils on the lower part and beyond the natural levees. An example is the Commerce soils. On the lower part of the natural levees and beyond the natural levees in the backswamps is the clayey sediment dropped from slowly moving water. Fausse and Sharkey soils formed in this type of material. Larose soils also formed in clayey alluvium, but they contain some marine sediment.

Organic material accumulates in areas that are saturated or flooded with water. Water prevents the complete oxidation and decomposition of the plant residue. Water, vegetation, and time coupled with a rise in sea level and land subsidence created the conditions from which thick layers of organic material accumulated in the marshes of St. Charles Parish. The buildup of organic material kept pace with land subsidence and sea level rise. Kenner and Lafitte soils formed in thick accumulations of herbaceous organic material. Allemands soils formed in moderately thick accumulations of herbaceous organic material over clayey alluvium.

Relief

Relief and other physiographic features influence soil formation processes mainly by affecting internal soil drainage, runoff, erosion and deposition, salinity levels, and exposure to the sun and wind. In St. Charles Parish, sediment has accumulated at a much faster rate than it has eroded away. The accumulation of sediment has been faster than the rate of many of the processes of soil formation. This is shown in the distinct stratification in lower horizons of some soils. Levee construction and other water control measures may have reversed this trend for soils such as the Commerce soils. Soil slope and rate of runoff, however, are low enough to prevent erosion from being a major problem in the parish.

The land surface of the parish is level or nearly level. The slope is less than 1 percent except on some ridges where it is as much as 3 percent. Relief and the landscape position have had an important influence on formation of the different soils. Characteristically, the slopes are long and extend from the highest elevation on natural levees along the Mississippi River and bayous or distributary channels to an elevation that is several feet lower in the swamps and marshes.

Differences in the Commerce, Sharkey, and Allemends soils illustrate the influence of relief on the soils in the parish. Commerce soils are on the highest elevation, contain the least amount of clay, and have the best natural drainage. Sharkey soils are on the lower parts of the natural levees, have a high content of clay, and are poorly drained. Allemands soils are in lower positions than Commerce and Sharkey soils and are very poorly drained and ponded most of the time unless they are artificially drained. These soils have a thick organic surface layer, the result of accumulations of decaying vegetation, and clayey underlying material. If the Allemands soils are drained, they are as low as 5 feet below sea level because of subsidence.

The dominant soils are the Commerce and Sharkey soils at the highest elevations and Barbary, Allemands, and Kenner soils in swamps and marshes at the lowest elevations. Soils at the lower elevations receive runoff from those at the higher elevations, and the water table is nearer the surface for longer periods in the soils at lower elevations. Differences in the organic matter content of the soils are related to the internal drainage of the soils, which is related to relief. The content of organic matter generally increases as internal soil drainage becomes more restricted. Such soils as the Commerce soils, in the higher and better drained positions, have an environment in which more extensive oxidation of organic matter takes place. The very poorly drained Allemands and Kenner soils are ponded for extended periods, which results in a more limited environment and in a greater accumulation of organic matter.

The relief factor in the parish is somewhat unique because the soils are on a low, slowly subsiding landmass. Geologic investigations indicate that the overall area is very slowly decreasing in elevation *(7)*. Present elevation of undrained soils ranges from sea level to a maximum of about 15 feet above sea level. The subsidence can be attributed partly to the continued accumulation in the Gulf of Mexico of sediment from the Mississippi River and lesser sources. The added weight of this sediment results in a continuous downwarping of the adjoining landmass. This process causes a general lowering of the landmass and an increase in the regional gulfward slope. In addition, post-depositional sediment compaction can result in some subsidence, and local deposition of sediment can contribute to similar but more localized changes.

Some possible effects of this natural geologic subsidence are apparent. For example, some soils that were subject only to intermittent flooding are now flooded more frequently and are covered with deeper water for longer periods. Some of the soils on natural levees along distributary channels have subsided to an elevation below sea level and are now covered with water most of the time. As the soils subside, seawater moves landward with each increment of subsidence. Consequently, some soils that were formerly in freshwater marshes are now in brackish marshes.

Subsidence and the resulting intrusions of saltwater are accelerated by some of man's activities. Artificial drainage can cause organic soils to subside several feet in a short time. In addition, ditches and channels dug for drainage or navigation purposes create courses for seawater to intrude inland for great distances.

The resulting increase in soil and water salinity has a marked effect on marsh and swamp vegetation. The less salt-tolerant vegetation is quickly replaced by more salt-tolerant vegetation. In addition, numbers and species of fish and crustaceans in any given area change dramatically as salinity of the soil and water increases.

In many areas, natural and accelerated subsidence have lowered the elevation to such an extent that only lakes and ponds exist where land once was visible.

Time

The kinds of horizons and their degree of development within a soil are influenced by the length of time of soil formation. Long periods are generally required for soils to form prominent horizons.

In general, the soils of St. Charles Parish are young. Time has been too short for distinct horizons to develop. However, such soils as Commerce and Sharkey soils on the natural levees of streams have been influenced by soil forming processes long enough to develop faintly differentiated horizons. Evidence of development is darkening of the A horizon by organic matter and a weakly developed B horizon. These soils developed in alluvium thought to be about 2,000 years old *(12)*.

The youngest soils in the parish have little, if any, profile development. For example, Convent soils have developed a darkened A horizon but have not developed a B horizon. The Allemands and Kenner soils are also young and show little evidence of profile development. The soils in the marshes are forming in recent accumulations of herbaceous organic material and alluvium.

Processes of Soil Formation

The processes of soil formation influence the kind and degree of development of soil horizons. The factors of soil formation include climate, living organisms, relief, parent material, and time. These factors determine the rate and relative effectiveness of the different processes.

Important soil forming processes are those that result in additions of organic, mineral, and gaseous materials to the soil; losses of these same materials from the soil; translocation of material from one point to another within the soil; and physical and chemical transformation of mineral and organic material within the soil *(13)*.

Many processes occur simultaneously, for example, the accumulation of organic matter, the development of soil structure, and the leaching of bases from some soil horizons. The contribution of a particular process may change over a period of time. The installation of drainage and water control systems, for example, can change the length of time soils are flooded or saturated with water. Some important processes that have contributed to the formation of soils in St. Charles Parish are discussed in the following paragraphs.

Organic matter has accumulated and has been partly decomposed and incorporated in all the soils. The organic accumulations range from the humus in mineral horizons of the Commerce and Sharkey soils to the organic horizons, muck, of the Allemands and Barbary soils in the marshes and swamps. Because most organic matter is produced in and above the surface layer, the surface layer is higher in organic matter content than the deeper horizons. Living organisms decompose, incorporate, and mix organic residue into the soil. Some of the more stable products contribute to darker colors, increased water-holding and cation-exchange capacities, and granulation of the soil.

Processes resulting in development of soil structure have occurred in most of the mineral soils. Plant roots and other organisms contribute to the rearrangement of soil material into secondary aggregates. The decomposition products of organic residue and the secretions of organisms serve as cementing agents that help stabilize these structural aggregates. Alternate wetting and drying as well as shrinking and swelling contribute to the development of structural aggregates and particularly affect soils that have appreciable amounts of clay. Consequently, soil structure is typically most pronounced in the surface horizon, which contains the most organic matter, and in clayey horizons that alternately undergo wetting and drying.

Most of the soils mapped in the parish have horizons in which reduction of iron and manganese compounds is an important process. Reducing conditions prevail for long periods in poorly aerated horizons. Consequently, the relatively soluble reduced forms of iron and manganese predominate over the less soluble oxidized forms. The reduced compounds of these elements produce the gray colors in the Bg and Cg horizons that are characteristic of many of the soils. In the more soluble reduced form, appreciable amounts of iron and manganese can be removed from the soils or translocated from one position to another within the soil by water. Reduced forms of iron and manganese not removed can be reoxidized upon development of oxidizing conditions in the soil. The presence of gray and yellowish or reddish mottles indicates alternating oxidizing and reducing conditions in many of the soils.

Water moving through the soil has leached many soluble components, including any free carbonates that may have been present initially, from the upper horizon of some of the mineral soils in the parish. The carbonates and other more readily soluble salts have been mostly leached from the soil or moved to lower horizons in the better drained, loamy soils, such as Commerce soils. In general, the permanently wet soils of the marshes and swamps have rarely been leached. However, areas of organic soils are readily leached during unusual and extended dry periods or when these soils are artificially drained.

References

(1) American Association of State Highway and Transportation Officials. 1982. Standard specifications for highway materials and methods of sampling and testing. Ed. 13, 2 vol., illus.

(2) American Society for Testing and Materials. 1985. Standard test method for classification of soils for engineering purposes. ASTM Stand. D 2487.

(3) Applequist, M.B. 1959. Soil-site studies of southern hardwoods. Duke Univ., Sch. Forest., Doct. forest. thesis.

(4) Broadfoot, W.M. and R.M. Krinard, 1959. Guide for evaluating sweetgum sites. U.S. Dep. Agr., Forest Serv., South. Forest Exp. Stn. Occas. Pap. 176, 8 pp., illus.

(5) Broadfoot, W.M. 1960. Field guide for evaluating cottonwood sites. U.S. Dep. Agric., Forest Serv., South. Forest Exp. Stn. Occas. Pap. 178, 6 pp., illus.

(6) Broadfoot, W.M. 1963. Guide for evaluating water oak sites. U.S. Dep. Agric., Forest Serv., South. Forest Exp. Stn. Res. Pap. SO-1, 8 pp., illus.

(7) Charbreck, Robert H. 1972. Vegetation, water, and soil characteristics of Louisiana. La. Agric. Exp. Stn. Bull. 664, 72 pp., illus.

(8) Hosman, R.L. 1972. Ground-water resources of the Norco area, Louisiana. La. Dep. Conserv. and La. Dep. Public Works, Water Resour. Bull. 18, 61 pp.

(9) Morgan, James P. 1972. Impact of subsidence and erosion on Louisiana coastal marshes and estuaries. La. State Univ., Dep. Geol., 17 pp., illus.

(10) Palmisano, A.W. and Robert H. Charbreck. 1972. The relationship of plant communities and soils of the Louisiana coastal marshes. 13th annu. meet., La. Assoc. Agron., 42 pp.

(11) Russell, Richard Joel. 1939. Louisiana stream patterns. Am. Assoc. Pet. Geol. Bull., vol. 23 (8), pp. 1199-1227, illus.

(12) Saucier, Roger T. 1974. Quarternary geology of the Lower Mississippi Valley. Ark. Arch. Surv. Res. Ser. no. 6., 26 pp.

(13) Simonson, R.W. 1959. Outline of a generalized theory of soil genesis. Soil Sci. Soc. Am. Proc. 23:152-156.

(14) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. (Supplements replacing pp. 173-188 issued May 1962.)

(15) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

(16) United States Department of Agriculture. 1976. Gulf coast wetlands handbook. Soil Conserv. Serv., La., 50 pp., illus.

(17) United States Department of Agriculture. 1980. Louisiana mid-cycle survey shows change in forest resource trends. C.E. Thomas and C.V. Bylin, Forest Serv., South. Forest Exp. Stn.

(18) United States Department of Agriculture. 1984. Procedures for collecting soil samples and methods of analysis for soil survey. Soil Surv. Invest. Rep. 1, 68 pp., illus.

(19) United States Department of Interior. 1970. Public water supplies in Louisiana. Don C. Dial, Geol. Surv., La. Dep. Public Works, Baton Rouge, La., Basic Rec. Rep. no. 3.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). The volume of soft soil decreases excessively under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.
Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a

catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil restrict the growth of most plants.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forb. Any herbaceous plant that is not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Green-manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor outlets (in tables). In these areas, surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs the growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). An otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). An excessive amount of toxic substances in the soil, such as sodium or sulfur, severely hinders the establishment of vegetation or severely restricts plant growth.

Unstable fill (in tables). There is a risk of caving or sloughing on banks of fill material.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data were recorded in the period 1951-79 at Reserve, Louisiana]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	61.2	40.7	51.0	90	21	179	4.96	2.22	7.30	7	.0
February---	64.4	43.1	53.8	82	24	192	5.82	2.69	8.51	7	.2
March------	70.7	49.9	60.3	85	31	332	4.91	2.04	7.34	6	.0
April------	78.6	58.1	68.4	89	41	552	4.21	1.46	6.48	5	.0
May--------	84.4	65.0	74.7	93	50	766	5.12	2.12	7.66	6	.0
June-------	89.8	70.9	80.4	97	60	912	4.24	1.67	6.39	7	.0
July-------	91.2	73.1	82.2	98	67	998	6.55	4.21	8.67	11	.0
August-----	90.8	72.7	81.8	97	64	986	5.86	2.97	8.38	10	.0
September--	87.2	69.4	78.3	96	56	849	5.98	2.60	8.86	7	.0
October----	80.1	58.1	69.1	93	39	592	2.98	.83	4.74	4	.0
November---	70.2	48.9	59.6	85	30	300	4.08	1.44	6.27	5	.0
December---	64.1	43.0	53.6	81	24	175	5.74	3.38	7.84	7	.0
Yearly:											
Average--	77.7	57.7	67.8	---	---	---	---	---	---	---	---
Extreme--	---	---	---	99	21	---	---	---	---	---	---
Total----	---	---	---	---	---	6,833	60.45	50.67	70.49	82	.2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 °F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1951-79 at Reserve, Louisiana]

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	February 3	March 6	March 19
2 years in 10 later than--	January 27	February 23	March 9
5 years in 10 later than--	January 5	February 2	February 17
First freezing temperature in fall:			
1 year in 10 earlier than--	December 22	November 16	November 8
2 years in 10 earlier than--	December 30	November 28	November 16
5 years in 10 earlier than--	January 24	December 22	November 29

TABLE 3.--GROWING SEASON

[Data was recorded in the period 1951-79 at Reserve, Louisiana]

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	341	283	252
8 years in 10	356	295	262
5 years in 10	365	317	282
2 years in 10	365	343	304
1 year in 10	365	362	317

TABLE 4.--SUITABILITY AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR MAJOR LAND USES

Map unit	Extent of area (pct)	Cultivated crops	Pastureland	Woodland	Urban uses	Intensive recreation areas
Commerce-Sharkey	15	Well suited	Well suited	Well suited	Moderately well suited: wetness, moderately slow and very slow permeability, shrink-swell, low strength.	Moderately well suited: wetness, moderately slow and very slow permeability, clayey surface layer.
Convent-Commerce	5	Not suited: flooding, wetness, scouring and deposition.	Poorly suited: flooding, wetness, scouring and deposition.	Moderately well suited: flooding, wetness, moderate seedling mortality and equipment use limitations.	Not suited: flooding, wetness, low strength for roads.	Not suited: flooding, wetness.
Sharkey-Commerce	6	Poorly suited: flooding, wetness, poor tilth.	Poorly suited: flooding, wetness.	Poorly suited: flooding, wetness, severe and moderate seedling mortality and equipment use limitations.	Not suited: flooding, wetness, low strength for roads.	Poorly suited: flooding, wetness, clayey surface layer.
Barbary-Fausse	20	Not suited: flooding, wetness, ponding.	Not suited: flooding, wetness, ponding.	Not suited: flooding, wetness, ponding, severe equipment use limitations.	Not suited: flooding, wetness, ponding, low strength for roads, shrink-swell, very slow permeability.	Not suited: flooding, wetness, ponding.
Kenner-Allemands	42	Not suited: flooding, wetness, ponding.	Not suited: flooding, wetness, ponding.	Not suited: flooding, wetness, ponding, severe equipment use limitations.	Not suited: flooding, wetness, ponding, subsidence low strength.	Not suited: flooding, wetness, ponding, subsidence.
Lafitte	4	Not suited: flooding, wetness, ponding, salinity.	Not suited: flooding, wetness, ponding, salinity.	Not suited: flooding, wetness, ponding, severe equipment use limitations.	Not suited: flooding, wetness, ponding, low strength, subsidence.	Not suited: flooding, wetness, ponding, subsidence.

TABLE 4.--SUITABILITY AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR MAJOR LAND USES--Continued

Map unit	Extent of area (pct)	Cultivated crops	Pastureland	Woodland	Urban uses	Intensive recreation areas
Maurepas	2	Not suited: flooding, wetness, ponding.	Not suited: flooding, wetness, ponding.	Not suited: flooding, wetness, ponding, severe equipment use limitations.	Not suited: flooding, wetness, ponding, low strength, subsidence.	Not suited: flooding, wetness, ponding, subsidence.
Allemands-Maurepas, drained	1	Poorly suited: flooding, wetness, poor tilth, subsidence, buried stumps and logs.	Moderately well suited: wetness, subsidence, exposes buried stumps and logs.	Poorly suited: wetness, severe equipment use limitations and seedling mortality.	Poorly suited: flooding, wetness, low strength, subsidence, buried stumps and logs.	Poorly suited: flooding, wetness, subsidence, buried stumps and logs.
Commerce-Harahan-Allemands, drained	1	Poorly suited: wetness, poor tilth, subsidence, buried stumps and logs.	Moderately well suited: wetness, subsidence, exposes buried stumps and logs.	Poorly suited: wetness, severe equipment use limitations.	Poorly suited: flooding, wetness, very slow permeability, shrink-swell, low strength, subsidence, buried stumps and logs.	Poorly suited: flooding, wetness, moderately slow and very slow permeability, subsidence, buried stumps and logs.
Harahan	4	Poorly suited: wetness, poor tilth, subsidence, buried stumps and logs.	Moderately well suited: wetness, subsidence, exposes buried stumps and logs.	Poorly suited: wetness, severe equipment use limitations.	Poorly suited: flooding, wetness, subsidence, very slow permeability, low strength for roads, shrink-swell, buried stumps and logs.	Poorly suited: flooding, wetness, subsidence, buried stumps and logs, very slow permeability.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AE	Allemands muck	2,250	0.8
Am	Allemands clay, drained	2,130	0.7
AR	Allemands-Larose association	3,891	1.4
BB	Barbary muck	30,630	10.7
Cc	Commerce silt loam	7,984	2.8
Cm	Commerce silty clay loam	8,340	2.9
Cn	Commerce silty clay loam, frequently flooded	5,046	1.8
Co	Commerce-Harahan-Allemands complex, drained	1,652	0.6
CR	Convent and Commerce soils, frequently flooded	8,703	3.0
FA	Fausse clay	6,423	2.2
Ha	Harahan clay	8,139	2.8
KE	Kenner muck	74,718	26.1
LF	Lafitte muck	7,936	2.8
MA	Maurepas muck	4,369	1.5
Mp	Maurepas muck, drained	570	0.2
Sa	Sharkey silty clay loam	3,240	1.1
Se	Sharkey clay	4,836	1.7
Sh	Sharkey clay, frequently flooded	6,983	2.4
Ud	Udorthents	430	0.1
UR	Urban land	4,129	1.4
Vc	Vacherie silt loam, frequently flooded	903	0.3
	Water	93,389	32.7
	Total	286,691	100.0

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Sugarcane	Soybeans	Common bermudagrass	Improved bermudagrass
		Tons	Bu	AUM*	AUM*
AE------------------------ Allemands	VIIw	---	---	---	---
Am------------------------ Allemands	IVw	---	---	9	---
AR**:					
Allemands----------------	VIIw	---	---	---	---
Larose-------------------	VIIw	---	---	---	---
BB------------------------ Barbary	VIIw	---	---	---	---
Cc------------------------ Commerce	IIw	35	40	9.0	15.5
Cm------------------------ Commerce	IIw	35	40	7.5	12.5
Cn------------------------ Commerce	Vw	---	---	6.0	---
Co------------------------ Commerce-Harahan-Allemands	IVw	---	---	8	---
CR------------------------ Convent and Commerce	Vw	---	---	---	---
FA------------------------ Fausse	VIIw	---	---	---	---
Ha------------------------ Harahan	IIIw	---	---	7.0	9.5
KE------------------------ Kenner	VIIIw	---	---	---	---
LF------------------------ Lafitte	VIIIw	---	---	---	---
MA------------------------ Maurepas	VIIIw	---	---	---	---
Mp------------------------ Maurepas	IVw	---	---	9.0	---
Sa, Se-------------------- Sharkey	IIIw	30	40	6.5	10.0
Sh------------------------ Sharkey	Vw	---	---	4.2	---
Ud. Udorthents					

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Sugarcane	Soybeans	Common bermudagrass	Improved bermudagrass
		Tons	Bu	AUM*	AUM*
UR**. Urban land					
Vc: Vacherie	Vw	---	---	5.0	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordi- nation symbol	Management concerns			Potential productivity			Trees to plant
		Equip- ment limita- tion	Seedling mortal- ity	Plant competi- tion	Common trees	Site index	Produc- tivity class*	
BB: Barbary	5W	Severe	Severe	Severe	Baldcypress	80	5	Baldcypress.
					Water tupelo	60	6	
					Black willow	---	--	
Cc: Commerce	4W	Moderate	Slight	Moderate	Green ash	80	4	Eastern cottonwood, American sycamore.
					Eastern cottonwood	120	13	
					Nuttall oak	90	--	
					Water oak	110	8	
					Pecan	---	--	
					American sycamore	---	--	
					Willow oak	---	--	
Cm: Commerce	4W	Moderate	Slight	Moderate	Green ash	80	4	Eastern cottonwood, American sycamore.
					Eastern cottonwood	120	13	
					Nuttall oak	90	--	
					Water oak	110	8	
					Pecan	---	--	
					American sycamore	---	--	
					Willow oak	---	--	
Cn: Commerce	8W	Moderate	Moderate	Moderate	Eastern cottonwood	95	8	Eastern cottonwood, American sycamore.
					Nuttall oak	---	--	
					Overcup oak	---	--	
					Water hickory	---	--	
					Sugarberry	---	--	
Co**:								
Commerce	4W	Moderate	Slight	Moderate	Green ash	80	4	Eastern cottonwood, American sycamore.
					Eastern cottonwood	120	13	
					Nuttall oak	90	--	
					Water oak	110	8	
					Pecan	---	--	
					American sycamore	---	--	
					Willow oak	---	--	
Harahan.								
Allemands.								
CR**:								
Convent	8W	Moderate	Moderate	Moderate	Eastern cottonwood	95	8	Eastern cottonwood, American sycamore.
					Nuttall oak	---	--	
					Overcup oak	---	--	
					Water hickory	---	--	
					Sugarberry	---	--	
Commerce	8W	Moderate	Moderate	Moderate	Eastern cottonwood	95	8	Eastern cottonwood, American sycamore.
					Nuttall oak	---	--	
					Overcup oak	---	--	
					Water hickory	---	--	
					Sugarberry	---	--	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
FA----------------- Fausse	6W	Severe	Severe	Severe	Baldcypress---------	96	6	Baldcypress.
					Water hickory-------	---	--	
					Water tupelo--------	---	--	
					Overcup oak---------	---	--	
					Black willow--------	---	--	
					Red maple-----------	---	--	
Sa, Se------------- Sharkey	7W	Severe	Moderate	Severe	Sweetgum------------	90	7	Eastern cottonwood, American sycamore, sweetgum.
					Willow oak----------	100	7	
					Water oak-----------	90	6	
					Nuttall oak---------	90	--	
					Sugarberry----------	---	--	
Sh----------------- Sharkey	7W	Severe	Severe	Severe	Baldcypress---------	105	7	Baldcypress.
					Water hickory-------	---	--	
					Overcup oak---------	---	--	
					Black willow--------	---	--	
Vc----------------- Vacherie	8W	Moderate	Moderate	Severe	Eastern cottonwood--	95	8	Eastern cottonwood, American sycamore.
					Nuttall oak---------	---	--	
					Overcup oak---------	---	--	
					Water hickory-------	---	--	
					Sugarberry----------	---	--	
					Green ash-----------	---	--	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The flooding limitation in this table is based on the frequency of flooding on a yearly basis]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AE------------------ Allemands	Severe: flooding, ponding, percs slowly.	Severe: ponding, excess humus, percs slowly.	Severe: flooding, excess humus, ponding.	Severe: ponding, excess humus.	Severe: flooding, ponding, excess humus.
Am------------------ Allemands	Severe: flooding, wetness, percs slowly.	Severe: too clayey, wetness, excess humus.	Severe: too clayey, wetness, excess humus.	Severe: too clayey, wetness, excess humus.	Severe: too clayey, wetness.
AR*:					
Allemands-----------	Severe: flooding, ponding, percs slowly.	Severe: ponding, excess humus, percs slowly.	Severe: flooding, excess humus, ponding.	Severe: ponding, excess humus.	Severe: flooding, ponding, excess humus.
Larose---------------	Severe: flooding, ponding, percs slowly.	Severe: ponding, excess humus, percs slowly.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: flooding, ponding, excess humus.
BB------------------ Barbary	Severe: flooding, ponding, percs slowly.	Severe: ponding, excess humus, percs slowly.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
Cc------------------ Commerce	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Cm------------------ Commerce	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Cn------------------ Commerce	Severe: flooding.	Moderate: flooding, wetness, percs slowly.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
Co*:					
Commerce------------	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Harahan-------------	Severe: flooding, wetness, percs slowly.	Severe: too clayey, excess humus, percs slowly.	Severe: too clayey, excess humus, wetness.	Severe: too clayey, excess humus, erodes easily.	Severe: too clayey.
Allemands-----------	Severe: flooding, wetness, percs slowly.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CR*:					
Convent	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
Commerce	Severe: flooding.	Moderate: flooding, wetness, percs slowly.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
FA Fausse	Severe: flooding, ponding, percs slowly.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding, flooding.	Severe: ponding, too clayey.	Severe: ponding, flooding, too clayey.
Ha Harahan	Severe: flooding, wetness, percs slowly.	Severe: too clayey, excess humus, percs slowly.	Severe: too clayey, excess humus, wetness.	Severe: too clayey, excess humus.	Severe: too clayey.
KE Kenner	Severe: flooding, ponding, percs slowly.	Severe: ponding, excess humus, percs slowly.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: flooding, ponding, excess humus.
LF Lafitte	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.
MA Maurepas	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
Mp Maurepas	Severe: flooding, excess humus, wetness.	Severe: excess humus.	Severe: excess humus, wetness.	Severe: excess humus.	Severe: excess humus.
Sa Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Se Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Sh Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, flooding, too clayey.
Ud. Udorthents					
UR*. Urban land					

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Vc-------------------- Vacherie	Severe: flooding, wetness, percs slowly.	Severe: percs slowly.	Severe: flooding, wetness, percs slowly.	Moderate: flooding.	Severe: flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AE: Allemands	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Very poor.	Very poor.	Very poor.	Good.
Am: Allemands	Poor	Fair	Fair	Fair	Fair	Good	Very poor.	Fair	Fair	Good.
AR*:										
Allemands	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Very poor.	Very poor.	Very poor.	Good.
Larose	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
BB: Barbary	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Poor	Very poor.	Very poor.	Fair.
Cc: Commerce	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Cm: Commerce	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Cn: Commerce	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Co*:										
Commerce	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Harahan	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Allemands	Poor	Fair	Fair	Fair	Fair	Good	Very poor.	Fair	Fair	Good.
CR*:										
Convent	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Commerce	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
FA: Fausse	Very poor.	Very poor.	Very poor.	Poor	Poor	Good	Good	Very poor.	Poor	Good.
Ha: Harahan	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
KE: Kenner	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Very poor.	Very poor.	Very poor.	Good.
LF: Lafitte	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Very poor.	Very poor.	Very poor.	Good.
MA: Maurepas	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Fair.
Mp: Maurepas	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Sa, Se------------- Sharkey	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Sh----------------- Sharkey	Poor	Poor	Fair	Good	Poor	Fair	Fair	Poor	Fair	Fair.
Ud. Udorthents										
UR*. Urban land										
Vc----------------- Vacherie	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SOIL POTENTIAL FOR DWELLINGS WITHOUT BASEMENTS

Map symbol and soil name	Potential, index and corrective treatment	Limitations	Continuing limitations
AE------------------- Allemands	Low: 41 Pile support, add fill, construct levees and use water pumps.	Flooding, rapid subsidence, low strength.	Maintain flood protection and drainage pumps, purchase flood insurance.
Am------------------- Allemands, drained	Low: 44 Pile support, add fill, improve levees and pumping capacity.	Flooding, rapid and uneven subsidence, low strength.	Maintain improved flood protection and drainage pumps, purchase flood insurance.
AR*:			
Allemands------------	Low: 41 Pile support, add fill, construct levees and use water pumps.	Flooding, rapid subsidence, low strength.	Maintain flood protection and drainage pumps, purchase flood insurance.
Larose---------------	Medium: 69 Pile support, add fill, construct levees and use water pumps.	Flooding, uneven subsidence.	Maintain flood protection and drainage pumps, purchase flood insurance.
BB------------------- Barbary	Medium: 69 Pile support, add fill, construct levees and use water pumps.	Flooding, uneven subsidence.	Maintain flood protection and drainage pumps, purchase flood insurance.
Cc, Cm--------------- Commerce	High: 99 Add reinforcing bars.	Shrink-swell.	None.
Cn------------------- Commerce	Medium: 78 Construct levees and use water pumps, add reinforcing bars.	Flooding, shrink-swell.	Maintain flood protection and drainage pumps, purchase flood insurance.
Co*:			
Commerce-------------	Medium: 74 Pile support, improve levees and pumping capacity, add reinforcing bars.	Flooding, shrink-swell, soft underlying material.	Maintain flood protection and drainage pumps, purchase flood insurance.
Harahan--------------	Medium: 71 Pile support, improve levees and pumping capacity.	Flooding, shrink-swell, uneven subsidence.	Maintain flood protection and drainage pumps, purchase flood insurance.
Allemands, drained---	Low: 44 Pile support, add fill, improve levees and pumping capacity.	Flooding, rapid and uneven subsidence, low strength.	Maintain improved flood protection and drainage pumps, purchase flood insurance.
CR*:			
Convent--------------	No potential.	---	---
Commerce-------------	No potential.	---	---
FA------------------- Fausse	Medium: 69 Pile support, add fill, construct levees and use water pumps.	Flooding, uneven subsidence, shrink-swell.	Maintain flood protection and drainage pumps, purchase flood insurance.

See footnote at end of table.

TABLE 10.--SOIL POTENTIAL FOR DWELLINGS WITHOUT BASEMENTS--Continued

Map symbol and soil name	Potential, index and corrective treatment	Limitations	Continuing limitations
Ha------------------- Harahan	Medium: 71 Pile support, improve levees and pumping capacity.	Flooding, shrink-swell, uneven subsidence.	Maintain flood protection and drainage pumps, purchase flood insurance.
KE------------------- Kenner	Low: 19 Pile support, add fill, construct levees and use water pumps.	Flooding, rapid subsidence, low strength.	Maintain flood protection and drainage pumps, purchase flood insurance.
LF------------------- Lafitte	Low: 19 Pile support, add fill, construct levees and use water pumps.	Flooding, rapid subsidence, low strength.	Maintain flood protection and drainage pumps, purchase flood insurance.
MA------------------- Maurepas	Low: 19 Pile support, add fill, construct levees and use water pumps.	Flooding, rapid and uneven subsidence, low strength.	Maintain flood protection and drainage pumps, purchase flood insurance.
Mp------------------- Maurepas, drained	Low: 22 Pile support, add fill, improve levees and pumping capacity.	Flooding, rapid and uneven subsidence, low strength.	Maintain flood protection and drainage pumps, purchase flood insurance.
Sa, Se--------------- Sharkey	High: 87 Gravity drainage, add fill and reinforcing bars.	Flooding, shrink-swell.	Purchase flood insurance.
Sh------------------- Sharkey	Medium: 78 Construct levees and use water pumps, add fill and reinforcing bars.	Flooding, shrink-swell.	Maintain flood protection and drainage pumps, purchase flood insurance.
Ud------------------- Udorthents	Not rated.	---	---
UR------------------- Urban land	Not rated.	---	---
Vc------------------- Vacherie	Medium: 78 Construct levees and use water pumps, add fill and reinforcing bars.	Flooding, shrink-swell.	Maintain flood protection and drainage pumps, purchase flood insurance.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The flooding limitation in this table is based on the frequency of flooding on a yearly basis]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AE---------------- Allemands	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, excess humus.
Am---------------- Allemands	Severe: excess humus, wetness.	Severe: flooding, low strength, wetness.	Severe: flooding, low strength, wetness.	Severe: wetness, flooding.	Severe: too clayey, wetness.
AR*:					
Allemands---------	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, excess humus.
Larose-----------	Severe: excess humus, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: flooding, ponding, excess humus.
BB---------------- Barbary	Severe: excess humus, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding, excess humus.
Cc---------------- Commerce	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: wetness, flooding.
Cm---------------- Commerce	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: wetness, flooding.
Cn---------------- Commerce	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
Co*:					
Commerce---------	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: wetness, flooding.
Harahan----------	Severe: excess humus, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, shrink-swell, flooding.	Severe: too clayey.
Allemands--------	Severe: excess humus, wetness.	Severe: flooding, low strength, wetness.	Severe: flooding, low strength, wetness.	Severe: wetness, flooding.	Severe: wetness.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CR*:					
Convent	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Commerce	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
FA Fausse	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding, too clayey.
Ha Harahan	Severe: excess humus, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
KE Kenner	Severe: excess humus, ponding.	Severe: flooding, low strength, ponding.	Severe: flooding, low strength, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding, excess humus.
LF Lafitte	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: low strength, ponding, flooding.	Severe: excess humus, ponding, flooding.
MA Maurepas	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: ponding, flooding, excess humus.
Mp Maurepas	Severe: excess humus, wetness.	Severe: flooding, low strength, subsides.	Severe: flooding, low strength, subsides.	Severe: subsides, flooding.	Severe: excess humus.
Sa Sharkey	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
Se Sharkey	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness, too clayey.
Sh Sharkey	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, too clayey.
Ud. Udorthents					
UR*. Urban land					

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Vc---------------- Vacherie	Severe: wetness.	Severe: wetness, flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, low strength, shrink-swell.	Severe: flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The flooding limitation in this table is based on the frequency of flooding on a yearly basis]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AE------------------ Allemands	Severe: flooding, ponding, percs slowly.	Severe: flooding, seepage, excess humus.	Severe: flooding, ponding, excess humus.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus.
Am------------------ Allemands	Severe: percs slowly, wetness, flooding.	Severe: seepage, excess humus, flooding.	Severe: excess humus, wetness, flooding.	Severe: seepage, wetness, flooding.	Poor: excess humus, wetness.
AR*:					
Allemands----------	Severe: flooding, ponding, percs slowly.	Severe: flooding, seepage, excess humus.	Severe: flooding, ponding, excess humus.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus.
Larose-------------	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding, excess humus.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, ponding, hard to pack.
BB------------------ Barbary	Severe: flooding, ponding, percs slowly.	Severe: flooding, excess humus, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
Cc------------------ Commerce	Severe: wetness, flooding, percs slowly.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Fair: wetness.
Cm------------------ Commerce	Severe: wetness, flooding, percs slowly.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Fair: wetness.
Cn------------------ Commerce	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
Co*:					
Commerce-----------	Severe: wetness, percs slowly, flooding.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Fair: wetness.
Harahan------------	Severe: wetness, percs slowly, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding, too clayey, excess humus.	Severe: wetness, flooding.	Poor: too clayey, hard to pack, wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Co*:					
Allemands	Severe: percs slowly, wetness, flooding.	Severe: seepage, excess humus, flooding.	Severe: excess humus, wetness, flooding.	Severe: seepage, wetness, flooding.	Poor: excess humus, wetness.
CR*:					
Convent	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
Commerce	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
FA Fausse	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
Ha Harahan	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey, excess humus.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
KE Kenner	Severe: flooding, percs slowly.	Severe: flooding, seepage, excess humus.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus.
LF Lafitte	Severe: flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding, seepage.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus.
MA Maurepas	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: excess humus, ponding.
Mp Maurepas	Severe: poor filter, subsides, wetness, flooding.	Severe: seepage, excess humus, wetness, flooding.	Severe: seepage, wetness, flooding, excess humus.	Severe: seepage, flooding, wetness.	Poor: excess humus, wetness.
Sa, Se Sharkey	Severe: wetness, percs slowly, flooding.	Severe: flooding, wetness.	Severe: wetness, flooding, too clayey.	Severe: wetness, flooding.	Poor: too clayey, hard to pack, wetness.
Sh Sharkey	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Ud. Udorthents					
UR*. Urban land					

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Vc------------------ Vacherie	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Topsoil
AE----------------- Allemands	Poor: wetness.	Poor: excess humus, wetness.
Am----------------- Allemands	Poor: thin layer, wetness.	Poor: too clayey, wetness.
AR*:		
Allemands--------	Poor: wetness.	Poor: excess humus, wetness.
Larose----------	Poor: low strength, wetness, shrink-swell.	Poor: excess humus, wetness.
BB----------------- Barbary	Poor: low strength, wetness, shrink-swell.	Poor: wetness.
Cc----------------- Commerce	Poor: low strength.	Fair: thin layer.
Cm, Cn------------ Commerce	Poor: low strength.	Fair: too clayey, thin layer.
Co*:		
Commerce--------	Poor: low strength.	Fair: too clayey, thin layer.
Harahan---------	Poor: low strength, shrink-swell.	Poor: too clayey.
Allemands--------	Poor: thin layer, wetness.	Poor: wetness.
CR*:		
Convent---------	Fair: wetness.	Good.
Commerce--------	Poor: low strength.	Fair: thin layer.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Topsoil
FA: Fausse	Poor: low strength, wetness, shrink-swell.	Poor: too clayey, wetness.
Ha: Harahan	Poor: low strength, shrink-swell.	Poor: too clayey.
KE: Kenner	Poor: wetness.	Poor: excess humus, wetness.
LF: Lafitte	Poor: low strength, wetness.	Poor: excess humus, wetness.
MA: Maurepas	Poor: wetness.	Poor: excess humus, wetness.
Mp: Maurepas	Poor: low strength.	Poor: excess humus.
Sa: Sharkey	Poor: low strength, wetness, shrink-swell.	Poor: wetness.
Se, Sh: Sharkey	Poor: low strength, wetness, shrink-swell.	Poor: too clayey, wetness.
Ud. Udorthents		
UR*. Urban land		
Vc: Vacherie	Poor: low strength, shrink-swell.	Fair: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The flooding limitation in this table is based on the frequency of flooding on a yearly basis]

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation
AE: Allemands	Severe: seepage.	Severe: slow refill.	Slight	Flooding, percs slowly, ponding.	Flooding, ponding, percs slowly.
Am: Allemands	Severe: seepage.	Severe: excess humus, wetness.	Severe: slow refill.	Percs slowly, subsides, flooding.	Slow intake, wetness, percs slowly, flooding.
AR*:					
Allemands	Severe: seepage.	Severe: slow refill.	Slight	Flooding, percs slowly, ponding.	Flooding, ponding, percs slowly.
Larose	Slight	Severe: excess humus, hard to pack, ponding.	Severe: slow refill.	Ponding, percs slowly, flooding.	Ponding, percs slowly, flooding.
BB: Barbary	Slight	Severe: excess humus, hard to pack, ponding.	Severe: slow refill.	Ponding, percs slowly, flooding.	Ponding, percs slowly, flooding.
Cc: Commerce	Moderate: seepage.	Severe: thin layer, wetness.	Severe: slow refill.	Flooding	Wetness, flooding, erodes easily.
Cm: Commerce	Moderate: seepage.	Severe: thin layer, wetness.	Severe: slow refill.	Flooding	Wetness, flooding, erodes easily.
Cn: Commerce	Moderate: seepage.	Severe: thin layer, wetness.	Severe: slow refill.	Flooding	Wetness, erodes easily, flooding.
Co*:					
Commerce	Moderate: seepage.	Severe: thin layer, wetness.	Severe: slow refill.	Flooding	Wetness, erodes easily, flooding.
Harahan	Slight	Severe: excess humus, hard to pack, wetness.	Severe: slow refill.	Percs slowly, subsides, flooding.	Wetness, slow intake, percs slowly, flooding.
Allemands	Severe: seepage.	Severe: excess humus, wetness.	Severe: slow refill.	Percs slowly, subsides, flooding.	Percs slowly, wetness, flooding.
CR*:					
Convent	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding	Wetness, erodes easily, flooding.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation
CR*:					
Commerce	Moderate: seepage.	Severe: thin layer, wetness.	Severe: slow refill.	Flooding	Wetness, erodes easily, flooding.
FA Fausse	Slight	Severe: hard to pack, ponding.	Severe: slow refill.	Ponding, percs slowly, flooding.	Ponding, flooding, slow intake, percs slowly.
Ha Harahan	Slight	Severe: excess humus, hard to pack, wetness.	Severe: slow refill.	Percs slowly, subsides.	Wetness, slow intake, percs slowly.
KE Kenner	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, percs slowly, flooding.	Flooding, ponding, percs slowly.
LF Lafitte	Severe: seepage.	Severe: excess humus, ponding.	Slight	Ponding, flooding, subsides.	Ponding, flooding, excess salt.
MA Maurepas	Severe: seepage.	Severe: excess humus, ponding.	Slight	Ponding, flooding, subsides.	Ponding, flooding.
Mp Maurepas	Severe: seepage.	Severe: excess humus, wetness.	Slight	Subsides, flooding.	Wetness, flooding.
Sa Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly flooding.	Wetness, percs slowly, flooding.
Se Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, flooding, slow intake, percs slowly.
Sh Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, flooding, slow intake, percs slowly.
Ud. Udorthents					
UR*. Urban land					
Vc Vacherie	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Flooding, percs slowly.	Flooding, percs slowly, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
AE: Allemands	0-24	Muck	PT	A-8	---	---	---	---	---	---
	24-84	Clay, mucky clay	MH, OH	A-7-5	100	100	95-100	80-100	65-90	30-50
Am: Allemands	0-8	Clay	MH, OH	A-7-5	100	100	95-100	80-100	65-90	30-50
	8-42	Muck	PT	A-8	---	---	---	---	---	---
	42-84	Clay, mucky clay	MH, OH	A-7-5	100	100	95-100	80-100	65-90	30-50
AR*:										
Allemands	0-18	Muck	PT	A-8	---	---	---	---	---	---
	18-84	Clay, mucky clay	MH, OH	A-7-5	100	100	95-100	80-100	65-90	30-50
Larose	0-3	Muck	PT	A-8	---	---	---	---	---	---
	3-84	Clay, silty clay, mucky clay.	CH	A-7-5	100	100	100	90-100	60-87	30-52
BB: Barbary	0-5	Muck	PT	A-8	---	---	---	---	---	---
	5-84	Mucky clay, clay	OH, MH	A-7-5, A-8	100	100	100	95-100	70-90	35-45
Cc: Commerce	0-11	Silt loam	CL-ML, CL, ML	A-4	100	100	100	75-100	<30	NP-10
	11-24	Silty clay loam, silt loam, loam.	CL	A-6, A-7-6	100	100	100	85-100	32-45	11-23
	24-60	Stratified very fine sandy loam to silty clay.	CL-ML, CL, ML	A-4, A-6, A-7-6	100	100	100	75-100	23-45	3-23
Cm: Commerce	0-10	Silty clay loam	CL	A-6, A-7-6	100	100	100	90-100	32-50	11-25
	10-30	Silty clay loam, silt loam, loam.	CL	A-6, A-7-6	100	100	100	85-100	32-45	11-23
	30-60	Stratified very fine sandy loam to silty clay.	CL-ML, CL, ML	A-4, A-6, A-7-6	100	100	100	75-100	23-45	3-23
Cn: Commerce	0-8	Silty clay loam	CL	A-6, A-7-6	100	100	100	90-100	32-50	11-25
	8-44	Silty clay loam, silt loam, loam.	CL	A-6, A-7-6	100	100	100	85-100	32-45	11-23
	44-60	Stratified very fine sandy loam to silty clay.	CL-ML, CL, ML	A-4, A-6, A-7-6	100	100	100	75-100	23-45	3-23
Co*:										
Commerce	0-8	Silty clay loam	CL	A-6, A-7-6	100	100	100	90-100	32-50	11-25
	8-37	Silty clay loam, silt loam, loam.	CL	A-6, A-7-6	100	100	100	85-100	32-45	11-23
	37-60	Stratified very fine sandy loam to silty clay.	CL-ML, CL, ML	A-4, A-6, A-7-6	100	100	100	75-100	23-45	3-23

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In								Pct	
Co*:										
Harahan---------	0-3	Clay-------------	MH, CH	A-7-5, A-7-6	100	100	100	95-100	60-90	35-50
	3-9	Muck-------------	PT	A-8	---	---	---	---	---	---
	9-27	Clay, silty clay	MH, CH	A-7-5,	100	100	100	95-100	60-90	35-50
	27-60	Clay, silty clay, mucky clay.	OH, MH, CH	A-7-6, A-8, A-7-5	100	100	100	95-100	60-90	35-50
Allemands--------	0-4	Muck-------------	PT	A-8	---	---	---	---	---	---
	4-42	Muck-------------	PT	A-8	---	---	---	---	---	---
	42-84	Clay, mucky clay	MH, OH	A-7-5	100	100	95-100	80-100	65-90	30-50
CR*:										
Convent---------	0-6	Silt loam---------	ML, CL-ML	A-4	100	100	95-100	85-100	<27	NP-7
	6-60	Silt loam, very fine sandy loam, loam.	ML, CL-ML	A-4	100	100	95-100	75-100	<27	NP-7
Commerce---------	0-4	Silt loam---------	CL-ML, CL, ML	A-4	100	100	100	75-100	<30	NP-10
	4-32	Silty clay loam, silt loam, loam.	CL	A-6, A-7-6	100	100	100	85-100	32-45	11-23
	32-60	Stratified very fine sandy loam to silty clay.	CL-ML, CL, ML	A-4, A-6, A-7-6	100	100	100	75-100	23-45	3-23
FA--------------- Fausse	0-4	Clay-------------	CH, MH	A-7-6	100	100	100	95-100	50-100	21-71
	4-75	Clay-------------	CH	A-7-6	100	100	100	95-100	60-100	31-71
Ha--------------- Harahan	0-12	Clay-------------	MH, CH	A-7-5, A-7-6	100	100	100	95-100	60-90	35-50
	12-16	Muck-------------	PT	A-8	---	---	---	---	---	---
	16-30	Clay, silty clay, mucky clay.	OH, MH, CH	A-7-5, A-8, A-7-6	100	100	100	95-100	60-90	35-50
	30-84	Clay, silty clay, mucky clay.	OH, MH, CH	A-7-5, A-8, A-7-6	100	100	100	95-100	60-90	35-50
KE--------------- Kenner	0-21	Muck-------------	PT	A-8	---	---	---	---	---	---
	21-23	Clay, silty clay, mucky clay.	MH, OH	A-7-5	100	100	100	95-100	70-100	30-55
	23-78	Muck-------------	PT	A-8	---	---	---	---	---	---
	78-84	Clay, silty clay, mucky clay.	MH, OH	A-7-5	100	100	100	95-100	70-100	30-55
LF--------------- Lafitte	0-84	Muck-------------	PT	A-8	---	---	---	---	---	---
MA--------------- Maurepas	0-70	Muck-------------	PT	A-8	---	---	---	---	---	---
	70-84	Clay, mucky clay	MH, OH	A-7-5, A-8	100	100	100	95-100	70-100	35-55
Mp--------------- Maurepas	0-12	Muck-------------	PT	A-8	---	---	---	---	---	---
	12-55	Muck-------------	PT	A-8	---	---	---	---	---	---
	55-84	Clay, mucky clay	OH, MH	A-8, A-7-5	100	100	100	95-100	70-100	30-55

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Sa--------------- Sharkey	0-5	Silty clay loam	CL	A-6, A-7-6	100	100	100	95-100	32-50	11-25
	5-43	Clay-------------	CH	A-7-6, A-7-5	100	100	100	95-100	56-85	30-50
	43-60	Clay, silty clay, silt loam.	CL, CH	A-6, A-7-6, A-7-5	100	100	100	95-100	32-85	11-50
Se--------------- Sharkey	0-4	Clay-------------	CH, CL	A-7-6, A-7-5	100	100	100	95-100	46-85	22-50
	4-41	Clay-------------	CH	A-7-6, A-7-5	100	100	100	95-100	56-85	30-50
	41-60	Clay, silty clay, silt loam.	CL, CH	A-6, A-7-6, A-7-5	100	100	100	95-100	32-85	11-50
Sh--------------- Sharkey	0-8	Clay-------------	CH, CL	A-7-6, A-7-5	100	100	100	95-100	46-85	22-50
	8-50	Clay-------------	CH	A-7-6, A-7-5	100	100	100	95-100	56-85	30-50
	50-60	Clay, silty clay, silty clay loam.	CL, CH	A-7-6, A-6, A-7-5	100	100	100	95-100	32-85	11-50
Ud. Udorthents										
UR*. Urban land										
Vc--------------- Vacherie	0-26	Silt loam--------	ML, CL-ML	A-4	100	100	95-100	65-90	<27	NP-7
	26-60	Clay, silty clay	CH	A-7-6	100	100	100	95-100	51-75	26-45

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
AE---------------	0-24	---	0.05-0.25	>2.0	0.20-0.50	5.1-7.8	<4	Low----------	----	---	---
Allemands	24-84	60-95	0.15-1.00	<0.06	0.14-0.18	6.1-8.4	<4	Very high	0.32		
Am---------------	0-8	50-95	1.20-1.50	<0.06	0.12-0.20	3.6-6.5	<4	Very high	0.32	5	2-15
Allemands	8-42	---	0.05-0.25	>2.0	0.20-0.50	4.5-7.3	<4	Low----------	----		
	42-84	60-95	0.15-1.00	<0.06	0.14-0.18	6.1-8.4	<4	Very high	0.32		
AR*:											
Allemands--------	0-18	---	0.05-0.25	>2.0	0.20-0.50	5.1-7.8	<4	Low----------	----	---	---
	18-84	60-95	0.15-1.00	<0.06	0.14-0.18	6.1-8.4	<4	Very high	0.32		
Larose-----------	0-3	---	0.05-0.25	>2.0	0.20-0.50	5.6-7.8	<4	Low----------	----	---	---
	3-84	50-80	0.15-1.00	<0.06	0.14-0.18	6.1-8.4	<4	Very high	0.28		
BB---------------	0-5	45-90	0.15-0.50	2.0-6.0	0.20-0.50	5.6-7.8	<2	Low----------	----	---	---
Barbary	5-84	60-95	0.60-1.50	<0.06	0.18-0.20	6.6-8.4	<2	Very high	0.32		
Cc---------------	0-11	14-27	1.35-1.65	0.6-2.0	0.21-0.23	5.6-8.4	<2	Low----------	0.43	5	.5-4
Commerce	11-24	14-39	1.35-1.65	0.2-0.6	0.20-0.22	6.1-8.4	<2	Moderate-----	0.32		
	24-60	14-39	1.35-1.65	0.2-2.0	0.20-0.23	6.6-8.4	<2	Low----------	0.37		
Cm---------------	0-10	27-39	1.35-1.65	0.2-0.6	0.20-0.22	5.6-8.4	<2	Moderate-----	0.37	5	.5-4
Commerce	10-30	14-39	1.35-1.65	0.2-0.6	0.20-0.22	6.1-8.4	<2	Moderate-----	0.32		
	30-60	14-39	1.35-1.65	0.2-2.0	0.20-0.23	6.6-8.4	<2	Low----------	0.37		
Cn---------------	0-8	27-39	1.35-1.65	0.2-0.6	0.20-0.22	5.6-8.4	<2	Moderate-----	0.37	5	.5-4
Commerce	8-44	14-39	1.35-1.65	0.2-0.6	0.20-0.22	6.1-8.4	<2	Moderate-----	0.32		
	44-60	14-39	1.35-1.65	0.2-2.0	0.20-0.23	6.6-8.4	<2	Low----------	0.37		
Co*:											
Commerce---------	0-8	27-39	1.35-1.65	0.2-0.6	0.20-0.22	5.6-8.4	<2	Moderate-----	0.37	5	.5-4
	8-37	14-39	1.35-1.65	0.2-0.6	0.20-0.22	6.1-8.4	<2	Moderate-----	0.32		
	37-60	14-39	1.35-1.65	0.2-2.0	0.20-0.23	6.6-8.4	<2	Low----------	0.37		
Harahan----------	0-3	50-95	1.20-1.50	<0.06	0.11-0.30	5.1-7.8	<2	Very high	0.32	5	2-25
	3-9	---	0.25-1.00	>2.0	0.20-0.50	5.1-7.8	<2	Low----------	----		
	9-27	60-95	1.20-1.50	<0.06	0.11-0.30	5.1-7.8	<2	Very high	0.37		
	27-60	50-95	0.50-1.00	<0.06	0.11-0.30	6.6-8.4	<2	Very high	0.37		
Allemands--------	0-4	---	0.05-0.25	>2.0	0.20-0.50	3.6-6.5	<4	Low----------	----	---	---
	4-42	---	0.05-0.25	>2.0	0.20-0.50	4.5-7.3	<4	Low----------	----		
	42-84	60-95	0.15-1.00	<0.06	0.14-0.18	6.1-8.4	<4	Very high	0.32		
CR*:											
Convent----------	0-6	0-18	1.30-1.65	0.6-2.0	0.18-0.23	5.6-8.4	<2	Low----------	0.43	5	.5-2
	6-60	0-18	1.30-1.65	0.6-2.0	0.20-0.23	6.1-8.4	<2	Low----------	0.37		
Commerce---------	0-4	14-27	1.35-1.65	0.6-2.0	0.21-0.23	5.6-7.8	<2	Low----------	0.43	5	.5-4
	4-32	14-39	1.35-1.65	0.2-0.6	0.20-0.22	6.1-8.4	<2	Moderate-----	0.32		
	32-60	14-39	1.35-1.65	0.2-2.0	0.20-0.23	6.6-8.4	<2	Low----------	0.37		
FA---------------	0-4	40-95	0.80-1.45	<0.06	0.18-0.20	5.6-7.3	<2	Very high	0.20	5	2-25
Fausse	4-75	60-95	1.10-1.45	<0.06	0.18-0.20	6.1-8.4	<2	Very high	0.24		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
Ha: Harahan	0-12	50-95	1.20-1.50	<0.06	0.11-0.30	5.1-7.8	<2	Very high	0.37	5	2-25
	12-16	---	0.25-1.00	>2.0	0.20-0.50	5.1-7.8	<2	Low	----		
	16-30	60-95	1.20-1.50	<0.06	0.11-0.30	5.1-7.8	<2	Very high	0.37		
	30-84	60-95	0.25-1.00	<0.06	0.11-0.30	6.6-8.4	<2	Very high	0.37		
KE: Kenner	0-21	---	0.05-0.25	>2.0	0.20-0.50	5.6-7.8	<4	Low	----	---	---
	21-23	45-85	0.15-1.00	<0.06	0.12-0.18	5.6-7.8	<4	High	0.32		
	23-78	---	0.05-0.50	>6.0	0.20-0.50	5.6-7.8	<4	Low	----		
	78-84	45-85	0.15-1.00	<0.06	0.12-0.18	5.6-7.8	<4	High	0.32		
LF: Lafitte	0-84	---	0.05-0.25	2.0-6.0	0.18-0.45	7.4-8.4	4-8	Low	----	---	---
MA: Maurepas	0-70	---	0.05-0.25	>2.0	0.20-0.50	5.6-8.4	<4	Low	----	---	---
	70-84	45-85	0.15-1.00	<0.06	0.12-0.18	5.6-8.4	<4	Very high	0.32		
Mp: Maurepas	0-12	---	0.05-0.25	>2.0	0.20-0.50	3.6-5.5	<4	Low	----	---	30-60
	12-55	---	0.05-0.25	>2.0	0.20-0.50	5.6-8.4	<4	Low	----		
	55-84	45-85	0.15-1.00	<0.06	0.12-0.18	5.6-8.4	<4	Very high	0.32		
Sa: Sharkey	0-5	27-35	1.30-1.65	0.2-0.6	0.20-0.22	5.1-8.4	<2	Moderate	0.37	5	.5-4
	5-43	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	<2	Very high	0.28		
	43-60	45-90	1.20-1.60	0.06-0.2	0.12-0.22	6.6-8.4	<2	High	0.28		
Se: Sharkey	0-4	40-60	1.20-1.50	<0.06	0.12-0.18	5.1-8.4	<2	Very high	0.32	5	.5-4
	4-41	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	<2	Very high	0.28		
	41-60	45-90	1.20-1.60	0.06-0.2	0.12-0.22	6.6-8.4	<2	High	0.28		
Sh: Sharkey	0-8	40-60	1.20-1.50	<0.06	0.12-0.18	5.1-8.4	<2	Very high	0.32	5	.5-4
	8-50	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	<2	Very high	0.28		
	50-60	45-90	1.20-1.60	0.06-0.2	0.12-0.22	6.6-8.4	<2	High	0.28		
Ud. Udorthents											
UR*. Urban land											
Vc: Vacherie	0-26	10-18	1.35-1.65	0.6-2.0	0.11-0.24	5.6-8.4	<2	Low	0.43	5	.5-2
	26-60	40-60	1.20-1.35	<0.06	0.12-0.18	6.6-8.4	<2	Very high	0.32		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated. The period of flooding for the map units shown as having rare flooding is based on the period of June through November; these map units may flood more often during other times of the year. See the map unit for a description of flooding]

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
AE*: Allemands	D	Frequent	Very long.	Jan-Dec	+1-0.5	Apparent	Jan-Dec	8-25	16-51	High	Moderate.
Am: Allemands	D	Rare	---	---	0.5-4.0	Apparent	Jan-Dec	8-25	16-51	High	High.
AR*:											
Allemands	D	Frequent	Very long.	Jan-Dec	+1-0.5	Apparent	Jan-Dec	8-25	16-51	High	Moderate.
Larose	D	Frequent	Very long.	Jan-Dec	+2-0.5	Apparent	Jan-Dec	2-8	5-15	High	Moderate.
BB*: Barbary	D	Frequent	Very long.	Jan-Dec	+1-0.5	Apparent	Jan-Dec	3-12	6-15	High	Moderate.
Cc: Commerce	C	None	---	---	1.5-4.0	Apparent	Dec-Apr	---	---	High	Low.
Cm: Commerce	C	None	---	---	1.5-4.0	Apparent	Dec-Apr	---	---	High	Low.
Cn: Commerce	C	Frequent	Brief to long.	Jan-Dec	1.5-4.0	Apparent	Dec-Apr	---	---	High	Low.
Co:											
Commerce	C	Rare	---	---	1.5-4.0	Apparent	Dec-Apr	---	---	High	Low.
Harahan	D	Rare	---	---	1.0-3.0	Apparent	Jan-Dec	2-5	4-10	High	Moderate.
Allemands	D	Rare	---	---	0.5-4.0	Apparent	Jan-Dec	8-25	16-51	High	High.
CR:											
Convent	C	Frequent	Brief to long.	Jan-Dec	1.5-4.0	Apparent	Dec-Apr	---	---	High	Low.
Commerce	C	Frequent	Brief to long.	Jan-Dec	1.5-4.0	Apparent	Dec-Apr	---	---	High	Low.
FA*: Fausse	D	Frequent	Very long.	Jan-Dec	+1.-1.5	Apparent	Jan-Dec	---	---	High	Low.
Ha: Harahan	D	Rare	---	---	1.0-3.0	Apparent	Jan-Dec	2-5	4-10	High	Moderate.
KE*: Kenner	D	Frequent	Very long.	Jan-Dec	+1-0.5	Apparent	Jan-Dec	15-30	>51	High	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
LF*: Lafitte	D	Frequent	Very long.	Jan-Dec	+1-0.5	Apparent	Jan-Dec	15-30	>51	High	High.
MA*: Maurepas	D	Frequent	Very long.	Jan-Dec	+1-0.5	Apparent	Jan-Dec	15-30	>51	High	Moderate.
Mp: Maurepas	D	Rare	---	---	1.0-3.0	Apparent	Jan-Dec	15-30	>51	High	Moderate.
Sa, Se: Sharkey	D	Rare	---	---	0-2.0	Apparent	Dec-Apr	---	---	High	Low.
Sh: Sharkey	D	Frequent	Brief to very long.	Jan-Dec	0-2.0	Apparent	Dec-Apr	---	---	High	Low.
Ud. Udorthents											
UR*. Urban land											
Vc: Vacherie	C	Frequent	Brief to very long.	Jan-Dec	1.0-3.0	Apparent	Dec-Apr	---	---	High	Low.

* In the "High water table-depth" column, a plus sign preceding the range in depth indicates that the water rises above the surface of the soil. The first numeral indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

TABLE 18.--CHEMICAL TEST DATA ON SELECTED SOILS

[Analyses by the Soil Fertility Laboratory, Louisiana Agricultural Experiment Station]

Soil name and sample number	Depth	Horizon	pH 1:1 H_2O	Organic matter	Extractable P	Exchangeable cations Ca	Mg	K	Na	Al	H	Total acidity	Effective cation exchange capacity	Cation exchange capacity (sum)	Base saturation	Saturation: Sum of cation exchange capacity Al	Saturation: Effective cation exchange capacity Na
	In			Pct	ppm	Meq/100g									Pct	Pct	Pct
Commerce silt loam: 1/ (S83LA-89-1)	0-11	Ap	5.8	1.30	126	10.1	1.6	0.1	0.1	0.0	0.2	2.2	12.1	14.1	84.8	0.0	0.7
	11-17	Bw	7.3	0.28	204	11.9	3.2	0.2	0.2	0.0	0.0	1.1	15.5	16.8	93.4	0.0	1.2
	17-24	BC	7.6	0.32	226	13.7	4.2	0.2	0.2	0.0	0.0	0.7	14.1	19.0	96.3	0.0	1.1
	24-32	C1	7.6	0.19	204	13.9	3.8	0.3	0.2	0.0	0.0	2.8	18.2	21.0	86.7	0.0	1.0
	32-60	C2	7.8	0.15	217	12.6	3.4	0.2	0.2	0.0	0.0	2.9	16.4	19.3	85.0	0.0	1.0
Fausse clay: 1/ (S83LA-89-4)	0- 4	A	5.8	4.43	193	50.1	13.0	0.9	1.8	0.0	0.0	23.9	65.8	89.7	73.4	0.0	2.0
	4-19	Bg1	6.5	3.24	244	47.4	13.2	0.8	2.1	0.0	0.0	16.7	63.5	80.2	79.2	0.0	2.6
	19-50	Bg2	7.5	1.47	311	46.7	8.8	0.7	2.8	0.0	0.0	9.9	59.0	68.9	85.6	0.0	4.1
	50-75	Cg	7.9	0.99	233	59.2	14.9	1.1	3.5	0.0	0.0	10.1	78.7	88.8	88.6	0.0	3.9
Maurepas muck drained: 2/ (S84LA-89-1)	0-12	Oa1	---	47.58	010	18.7	6.4	0.5	0.8	0.8	0.6	19.6	27.8	46.0	57.4	2.9	1.7
	12-55	Oa2	---	67.08	005	21.0	8.0	0.2	3.0	0.6	0.7	55.9	33.5	88.1	36.5	1.8	3.4
	55-84	2Cg	7.0	2.84	222	20.7	7.4	0.6	2.5	0.0	0.0	10.4	31.2	41.6	75.0	0.0	6.0
Sharkey clay: 1/ (S83LA-89-2)	0- 4	A	6.4	3.99	066	38.3	6.9	0.8	0.2	0.0	0.2	12.5	46.4	58.7	78.7	0.0	0.3
	4-12	Bg1	5.6	1.03	026	34.2	11.0	0.8	0.3	0.0	0.0	12.4	46.3	58.7	78.9	0.0	0.5
	12-22	Bg2	5.6	0.54	038	33.5	12.0	0.8	0.4	0.0	0.0	12.4	46.7	59.1	79.0	0.0	0.7
	22-41	BCg	5.8	0.41	062	35.5	12.7	0.8	0.5	0.0	0.2	12.8	49.5	62.3	79.5	0.0	0.8
	41-60	Cg	6.8	0.19	208	19.1	7.4	0.5	0.4	0.0	0.2	7.7	27.4	35.1	78.1	0.0	1.1
Vacherie silt loam: 3/ (S83LA-89-3)	0- 5	Ap1	7.4	1.83	143	13.5	3.8	0.2	0.2	0.0	0.0	3.6	17.7	21.3	83.1	0.0	0.9
	5-10	Ap2	6.4	2.09	101	11.7	3.5	0.2	0.1	0.0	0.0	4.7	15.5	20.2	76.7	0.0	0.5
	10-31	B	7.7	0.37	164	10.1	3.0	0.2	0.3	0.0	0.0	3.6	13.6	17.2	79.1	0.0	1.7
	31-38	2Agb	7.3	1.87	078	53.2	11.0	0.9	1.6	0.0	0.0	13.5	66.7	80.2	83.2	0.0	2.0
	38-60	2Bgb	7.3	1.43	041	56.6	11.8	1.0	1.7	0.0	0.0	13.7	71.1	84.8	83.8	0.0	2.0

1/ For the location of the sample site, see the typical pedon in the section "Soil Series and Their Morphology."

2/ Sample site is on Martins Island, 5,000 feet west of Victors Canal, 4,000 feet northeast of Baie des deux chens, 200 feet west of a field canal, sec. 37, T. 14 S., R. 19 E.

3/ Sample site is 1.9 miles southeast of Luling, Louisiana, 248 feet south of Willow Ridge Estate Road, 750 feet east of U.S. Highway 90, Spanish Land Grant 27, T. 13 S., R. 9 E.

TABLE 19.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Allemands	Clayey, montmorillonitic, euic, thermic Terric Medisaprists
Barbary	Very-fine, montmorillonitic, nonacid, thermic Typic Hydraquents
* Commerce	Fine-silty, mixed, nonacid, thermic Aeric Fluvaquents
Convent	Coarse-silty, mixed, nonacid, thermic Aeric Fluvaquents
Fausse	Very-fine, montmorillonitic, nonacid, thermic Typic Fluvaquents
Harahan	Very-fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Kenner	Euic, thermic Fluvaquentic Medisaprists
Lafitte	Euic, thermic Typic Medisaprists
Larose	Very-fine, montmorillonitic, nonacid, thermic Typic Hydraquents
Maurepas	Euic, thermic Typic Medisaprists
Sharkey	Very-fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Vacherie	Coarse-silty over clayey, mixed, nonacid, thermic Aeric Fluvaquents

* The soil is a taxadjunct to the series. See text for description of those characteristics of the soil that are outside of the range of the series.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1986 O - 493-512 : QL 3

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.